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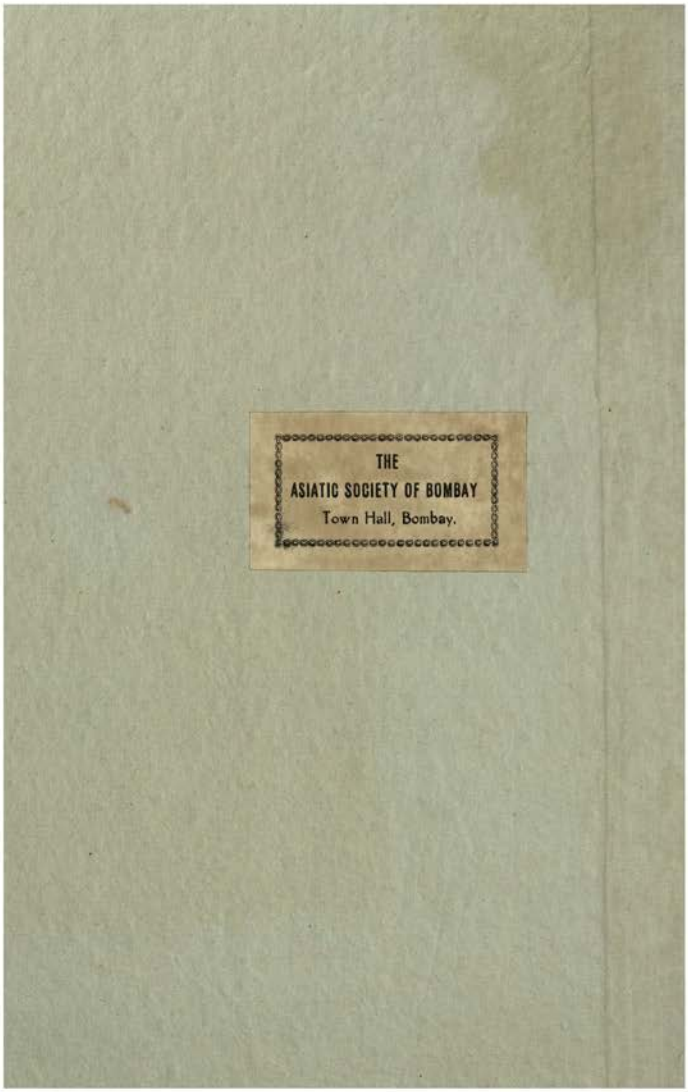
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CYCLOPÆDIA:

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OF

ARTS AND SCIENCES.

CONTAINING

An EXPLANATION of the TERMS, and an ACCOUNT OF THE SEVERAL SUBJECTS,

IN THE

LIBERAL AND MECHANICAL ARTS,

AND THE

SCIENCES, HUMAN and DIVINE.

Intended as a COURSE of ANCIENT and MODERN LEARNING.

By E. CHAMBERS, F.R.S.

Floriferis ut apes in saltibus omnia libant,
Omnia nos— LUCRET.

WITH THE

SUPPLEMENT

AND

MODERN IMPROVEMENTS,

Incorporated in one ALPHABET.

By ABRAHAM REES, D.D. F.R.S.

IN FOUR VOLUMES.

VOLUME THE THIRD.

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K.

K, A double conſonant, and the tenth letter of the alphabet.

This conſonant has the ſound of hard *c*, and is uſed before *e* and *i*, where, according to the Engliſh analogy, *c* would be ſoft; as in the words *kept*, *KING*; at the end of words it is not much uſed, except after *c*, and chiefly in monoſyllables, as *clock*, *back*, &c. It is now properly omitted in many other words, as *muſic*, *public*, &c. It is alſo uſed between a vowel and the ſilent *e* final, as *close*, *broke*, &c. It likewiſe ends a word after a diphthong, as *look*, *brook*, &c. In the preſent pronunciation, *k* is ſilent before *n*.

K is borrowed from the Greek *koppa*; and was but little uſed among the Latins: Priſcian looked on it as a ſuperfluous letter, and ſays, it was never to be uſed except in words borrowed from the Greek. Dauſquius, after Salluſt, obſerves, that it was unknown to the ancient Romans.—Indeed we ſeldom find it in any Latin authors, excepting in the word *kalendæ*, where it ſometimes ſtands in lieu of a *c*.—Carthage, however, is frequently ſpelt on medals with a *K*: SALVS AVG. ET CAES. FEL. KART. and ſometimes the letter *K* alone ſtood for *Carthage*.—M. Berger has obſerved, that a capital *K*, on the reverſe of the medals of the emperors of Conſtantinople, ſignified KONSTANTINUS; and on the Greek medals he will have it to ſignify KOIAH ΣΤΡΙΑ, Cœleſyria.

Quintilian tells us, that in his time ſome people had a miſtaken notion, that wherever the letter *c* and *a* occurred at the beginning of a word, *k* ought to be uſed inſtead of the *c*. See C.

Lipſius obſerves, that *K* was a ſtigma, anciently marked on the foreheads of criminals with a red-hot iron.

The letter *K* has various ſignifications in old charters and diplomas; for inſtance, KR. ſtood for *chorus*, K.R.C for *cara civitas*, KRM. for *carmen*, KR. AM. N. *carus amicus noſter*, KS. *cuos*, KT. *capite tonſus*, &c.

The French never uſe the letter *k*, excepting in a few terms of art, and proper names borrowed from other countries. Abbancourt, in his dialogue of the letters, brings in *k* complaining, that he has been often in a fair way to be baniſhed out of the French alphabet, and confined to the countries of the North.

K is alſo a numeral letter, ſignifying 250, according to the verſe;

K *quoque ducentos & quinquaginta tenebit.*

When it had a ſtroke at top, K, it ſtood for 250000.

K on the French coinage denotes money coined at Bourdeaux.

KAABA. See CAABA.

KAALING, in *Natural Hiſtory*, the name of a ſpecies of ſtarling, common in China, and not unfrequent in the Philippine iſlands. It is black, but its eyes, legs, and beak are yellow. It is eaſily kept tame, and may be taught both to ſing and talk. It eats rice and inſects in its wild ſtate; but when kept in a cage will feed very heartily on bread, and all kinds of fruit.

KAB, in *Jewiſh Antiquity*. See CAB.

KABANI, in the *oriental offices*, a perſon who ſupplies the place of what we call the notary public. All obligations that are valid are drawn by him; and he is likewiſe the public weigh-maſter, and every thing of conſequence ought to be weighed before him.

KABBADE or CABADE, the name of a military habit of the modern Greeks, which they wear under another garment.

KABBALA. See CABBALA.

KABIN, KHABIN, KEBIN, or KUBIN, a temporary kind of marriage, in uſe among the Mahometans.

The *kabin* is contracted before the cadi, in whoſe preſence the man eſpouſes the woman for a certain time, upon condition that if he quits her at the end of that term, ſhe ſhall be allowed a certain ſum of money.

Some authors ſay, that the *kabin* is only permitted among the Perſians, and in the ſect of Ali; but others maintain, that it is practiſed among the Turks.

KABBOS, in *Ichthyology*, the name of an Eaſt Indian fiſh of the muſtela kind. It grows to about two feet long, has no ſcales, but feels ſmooth and ſoft like the eel, and is of a brown colour; the noſe or ſnout much paler than the reſt, and ſpotted with black. The head is obtuſe, and the eyes placed very near the extremity of it.

KABESQUI or CABESQUI, is the name of a piece of money, equal in value to five deniers and a *maille* of French, coined and current only in Perſia. See *Perſian* COINS.

KADARI, or KADARITES. See CADARI.

KÆADAS, καιάδας, among the Lacedæmonians, a dungeon for throwing their criminals into. It was of the ſame nature with the Athenian barathron, or orygma.

KÆRURIAGHAKA, in *Botany*, a name uſed by ſome authors for the tree which affords the gum elemi of the ſhops.

KÆMPFERIA, in *Botany*. See GALANGAL.

KAFER *alibeuk*, in the *Materia Medica*, the name given by Avicenna to the drug we call *bitumen Judaicum*, or Jews pitch.

KAGHU, in *Botany*, a name by which ſome authors have called the cajou, or caſhew-tree, the fruit of which affords us the caſhew-nuts. See ACAJOU and ANACARDIUM.

KAHIASSCE, in the Turkiſh court; an officer of ſtate, anſwering to our maſter of the ceremonies.

KAIEBACA *debari*, in *Botany*, the name uſed by ſome authors for the ARNOTTO or ROCOU, called orleana or orellana by other authors.

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KAIMACHAN, among the Turks. See CAIMACAN.

KAKILE, a ſpecies of Eruca. See ROCKET.

The original ſenſe of this word was not the plant now named by it, but the *ſoldanella* or ſea bindweed. This was one of the plants uſed in the making the pot-aſhes, or alkali ſalt for glaſs and ſoap-making, when thoſe manufactures were firſt brought into uſe; and it had both the names from that ſalt. The *kakile* from *kali*, and the *ſoldanella* from *ſoder* or *ſolda*, another name of that ſalt. Dioſcorides calls this *crambe thalaſſia*, and we find the ſame name turned into Latin and ſtill preſerved, and the plant called *braſſica maritima*, and in Engliſh the ſea-cabbage.

KAKOUSA, in *Botany*, a name by which ſome authors have called the tree which affords the gum elemi uſed in medicine.

KALD, a word uſed by Rulandus to expreſs vinegar.

KALE, in *Botany*. See CALE.

KALE. *Sea*. See CRAMBE.

KALED, a word uſed by ſome of the chemical writers to expreſs volatile.

KALENDAR. See CALENDAR.

KALENDS. See CALENDS.

KALI, or GLASS-WORT, *ſolſola*, in *Botany*, a genus of the *pentandria digynia* claſs. Its characters are theſe: the empalement of the flower is permanent, compoſed of five oval obtuſe leaves; the flower has no petals, but has five ſhort ſtamina, which are inſerted in the diviſions of the empalement; it has a globular germen, with a ſhort two-pointed ſtyle, crowned by recurved ſtigmas; the germen becomes a globular capſule, with one cell wrapped up in the empalement, including one large ſeed. There are ſeveral ſpecies.

The name *kali*, or *alkali*, was given it by the Arabians: among naturaliſts it has been alſo called *ſalicornia*, *ſoda*, &c. and in Engliſh, *glaſs wort*, and *ſalt-wort*: though the *ſalicornia* or SALT-*wort* is now made a diſtinct genus.

Kali grows in great abundance in Egypt and Syria; as alſo in Languedoc and Provence, where it is cultivated by the farmers, who ſow whole fields of it to good effect, and in many other places.

Being burnt, its aſhes made into a ley, and boiled with oil, make the beſt ſoap.

Out of the ſame aſhes, called alſo *pulverine*, is extracted a ſalt, called *alkali ſalt*; which mixed with a fine ſort of ſand, makes the fine glaſs called *cryſtal*.

All the ſorts of glaſs wort are ſometimes promiſcuouſly uſed for the making *ſal alkali*; but the greater glaſs-wort with a cochleated ſeed is moſt eſteemed for this purpoſe.

The manner of making it is as follows: having dug a trench near the ſea, they lay laths acroſs it, on which they lay the herbs in heaps; and having made a fire below, the liquor which runs out of the herbs drops to the bottom, and at length thickening becomes *ſal alkali*; which is partly of a black, and partly of an aſh colour, very ſharp and corroſive, and of a ſaltiſh taſte; this when thoroughly hardened, becomes like a ſtone, and is then called ſoude or ſoda. Miller.

An impure ſoda is prepared from it at Montpelier, where the plant is ſaid to be cultivated for this uſe in the ſalt-marſhes; and a purer kind at Alicant in Spain, from a ſomewhat different ſpecies of *kali*. See KELP.

They make ſuch quantities of it in Languedoc, that they export it into ſeveral other countries, but principally into Italy, where the Venetians manufacture it into thoſe beautiful glaſſes which they afterwards return into moſt countries in Europe. However, the ſoda made here is inferior to that brought from Alicant; the beſt is in little dry ſonorous lumps, of a bluiſh grey colour, and full of little eyes, or holes.

The juice of this plant is cathartic and diuretic, accounted good to purge phlegmatic watery humours; and ſerviceable againſt the dropſy, jaundice, and obſtructions of the liver and ſpleen; half a dram of the juice is reckoned a ſufficient doſe; but it is ſeldom or never uſed in England.

This plant abounds greatly with ſea-ſalt, its juices being properly a ſaline, not an inſipid aqueous fluid; but the difference between the produce of this plant when green and when dry, is wonderful in chemical experiments. If diſtilled while freſh and green, it yields an inſipid water; if a pound of it be gathered freſh and hung up to dry, it will yield only three ounces of the dried plant; this being burnt, is more difficult than any other ſubſtance of a ſeeming like texture to be reduced to aſhes; and the aſhes finally produced from this quantity burnt in a potter's kiln, will yield only a dram and a half of a whitiſh ſalt, and this will but ſlightly ferment with aqua fortis. Four ounces of the freſh herb being boiled in water, and that water carefully evaporated, there will be formed near three quarters of an ounce of pure ſea-ſalt, in its own natural cubic form, faſtened to the bottom and ſides of the veſſel; and when no more ſalt will ſhoot, the remaining liquor being carefully diſtilled, increaſing the fire to a proper degree, the water will firſt paſs over, and then a dry volatile ſalt will be raiſed and ſtick to the top and ſides of the veſſel. The ſalts being purified, there will be found, as the reſult of the experiment, that this herb, while growing, contains about one fifth part of its weight of common ſalt. The herb which had been thus boiled being dried, and afterwards again boiled in four or five pints of water, and that decoction evaporated to half the quantity, the liquor will yield ſeveral different ſmells, as that of a honey comb, that of cabbage, and other pot herbs. And after all this, the boiled herb being left to putrefy, yields the ſmell of animal excrements, and in the ſame manner becomes the reſort of flies, and yields a proper place of habitation, and food for numbers of worms hatched out of the eggs of thoſe winged inſects. Henkel, de Affinit. Veget. et Miner.

All the experiments that can be made with the cubic cryſtals of ſalt, formed in the evaporited decoction of this herb, prove them to be common ſalt; and the volatile ſalt raiſed afterwards by fire from that liquor, in which no more of this cubic ſalt would cryſtallize, is found to be high alkali by its fermenting with the acid ſpirits. The juice of this plant, when it has been fit by, in order to ſhoot, and all its ſea-ſalt has been ſeparated from it by that means, being dried away by evaporation, and the remainder calcined; there is found a ſalt and earthy ſubſtance, which has ſomewhat of a lixivial taſte, but does not run to a liquor by being expoſed to the air. This calcined ſubſtance, being mixed with any of the acid ſpirit, but particularly with that of the vitriol, becomes of a beautiful blue colour, not inferior to the fineſt ultramarine.

If the recent herb *kali* be fit to ferment with common water, it yields, in the different ſtages of fermentation, ſeveral very different ſmells; firſt that of pickled cabbage, afterwards that of earth-worms killed in ſpirit of wine, and afterwards that of fiſh and dried herrings. If this matter be after all this diſtilled, it yields a ſpirit very much reſembling the fineſt ſpirit of tartar, and afterwards an empyreumatic oil, exactly reſembling thoſe of animal ſubſtances; but what is remarkable of, that there can be no volatile ſalt extracted from this putrefied maſs by any art. The reſiduum yields a pot-aſh, which effervesces violently with acids, and with the vitriolic acid becomes a ſal enixum; with aqua fortis a maker nitre; with ſpirit of ſalt, it affords common ſalt, ſuch as that ſpirit was diſtilled from: and with all the acids of whatever kind under proper management, it yields the blue colour before mentioned, approaching more or leſs to the fine colour of the ultramarine, according to the nature of the acid and the proceſs. The ſalt extracted from purified pot-aſh, made in this manner, is of a greeniſh caſt like native borax, and the remainder, after the extracting of this ſalt, on mixing and digeſting with aqua fortis, will become a ſoft gelatinous matter of a truly metallic taſte. The *kali* promiſes to be an uſeful article of the materia medica, and has for ſome time paſt been adopted into practice in this country, as it has long been among the French, both by itſelf and combined with tartar into the neutral ſalt called *ſal* RUPELLINE.

KALI, *ſal*. See SALT-WORT.

KALIPH. See CALIPH.

KALMIA, in *Botany*, a genus of the *decandria monogynia* claſs. Its characters are theſe: the flower has a ſmall permanent empalement, and one petal cut into five ſegments, which ſpreadopen; it has ten ſtamina, which are the length of the petal, and decline in the middle; in the centre is ſituated a roundiſh germen, which becomes an oval or globular capſule with five cells, filled with very ſmall ſeeds. There are two ſpecies.

KALKABRE, a name given by ſome of the barbarous writers to *gagates*, or *jet*.

KAMAN, in *Natural Hiſtory*, a name given by many authors to a ſtone found about the burning mountains, and at ſome times uſed to engrave ſeals on. It is deſcribed as a white ſtone, variegated with ſeveral colours.

KAMAR, a word uſed by ſome writers in chemiſtry, to expreſs ſilver.

KAMINE, a name given by ſome to the BUTTER-*ſtone*.

KAN, or KHAN, the name of an officer in Perſia, anſwering to that of *governor* in Europe.

There are *kans* of provinces, countries, and cities, who have different additions to diſtinguiſh them.

KANASTER, is a name given in America to baſkets of ruſhes or cane, in which they put the tobacco which they ſend into Europe: hence ariſes the name of *kanaſter* tobacco, the beſt of which comes from Makaribou.

KANTREFF, or KANTREV. See CANTRED.

KANG, or *Chineſe ſtove*, is a kind of ſtove that is heated by means of a furnace, which calls all its heat into it. The furnace is adapted to the fire of the ſtove which it is intended

may be placed either in a room, ... or on the outside of ... furnace, impelled by the ... into a tube or con... into another pipe or ... being under the middle of ... through the stove by vent... communicated to the bricks ... the stove, and from them ... further is carried off by ... See a drawing and ... in Phil. Transf. vol. lxi.

... the levelling furnaces, but ... is observed, that in order ... remains of the ai, constantly ... the Chinese always keep bowls ... and occasionally renew them: ... apartments in the palace are deco... and little grotesque trees, &c. which, ... is the best way of ... the fiery particles dis... that this practice ... lately advanced by ... Phlogisticated.

... on the coast of New ... is as big as a sheep, ... The head, neck, ... very small in proportion to the other ... as long as the body, ... towards the end: the ... only eight inches; ... the progress is by ... a great length, in an erect ... close to the breast, ... kept close to the ... for digging: the skin is ... short fur, of a dark mouse or grey co... which bear a light ... like those of a hare. See *Tab.* III. *Quadru...* N° 6. Blue-kettoush's Voyages, &c. vol. iii. p.

KAMAHAHA, in *Botany*. See RHIZOPHORA.

KAOLIN, the name of one of the two substances which are the ingredients of China-ware. The other, which is called PETUNTSE, is easily vitrifiable, and this *kaolin* is scarce at all so: whence the fire composes from a mixture of them both a semivitrification, which is China-ware. See PORCELAIN.

Mr. Reaumur had an opportunity of examining this substance, not in its native state, but only in form of small bricks, made out of the paste of the powder of the native *kaolin* and water. He found it of a white colour, and sprinkled all over with fine glittering particles; but these he did not judge to be fragments of a different substance mixt among the mass, as are the small flakes of talc in our clays and sands; but that the whole mass was composed of some stone reduced to powder and made into a paste with water, and that these larger spangles were only coarser particles of the powder; the examination of which he promised himself would discover what the stone was of which they were formed. And this was the most worthy a diligent enquiry, since the *petuntse* might easily be supplied by many of our own earths and sands; nothing being required of that but a substance easily turning into a white glass. But the difficulty of vitrifying this other ingredient, renders it a thing much more difficult to be supplied by one of the same nature among ourselves. The comparison of these, with other mineral substances, soon proved that they were of the nature of talc; or, in other words, that *kaolin* was talc powdered, and made up into a paste with water. And to be assured whether the whole mass was talc powdered, or any thing else with a mixture of talc, he separated the particles of the *kaolin* by water, and found the small ones wholly the same with the larger; and that the larger, when reduced to powder alone, made with water a paste wholly the same with the *kaolin*. It is well known, that the fragments of talc have a great resemblance to the pearly part of some shell fishes; and hence unquestionably has arisen the opinion of porcelain being made of sea shells: ignorant persons having seen the talc of *kaolin*, and taken it for a shelly matter. Talc has not yet been successfully used in any of our European manufactures of porcelain; but it is easy to see, from many unanswerable reasons, that since China porcelain is made of a mixture of vitrifiable and unvitrifiable matter, nothing is so likely to succeed with us in the place of the last of these as talc.

1. We know no substance in the fossile world so difficult to reduce to glass as talc, which if put into the strongest of ourfires, in a crucible, is not to be vitrified, nor even calcined. 2. We know no substance which keeps so much brightness after having passed the fire as talc, or that is of so pure a white; whence we may also learn that it is not to the *petuntse* alone, that the China-ware owes its whiteness, but that the *kaolin* is instrumental to the giving it that colour. 3. Talc is transparent, nay, and in some degree keeps its transparence after the action of the most violent fire. If we are to make porcelain of a vitrifiable, and an unvitrifiable matter mixed together, yet it is necessary that the unvitrifiable one should retain its transparence, otherwise it would obscure the mass; and talc is therefore the only known substance qualified for this purpose. Persons who have been at the China works, say, that the porcelain is made of equal quantities of *petuntse* and *kaolin*, and it is therefore a just and exact semivitrification. 4. Talc is well known to have a great flexibility or toughness, and as it is found to preserve this even after it has passed the fire; it is very probable, that it is owing to this property of the *kaolin*, that the China-ware is so much less brittle than glass. Mem. Acad. Par. 1727.

It has been before observed, that we may easily in Europe be provided with different substances, which will, in our porcelain manufactures, supply the place of the *petuntse* of China, and talc appears equally qualified to serve instead of the *kaolin*. For this purpose we may use the common Muscovy talc, or isinglass, used by our miniature painters, to cover their pictures instead of glass, and, by the curious, to preserve objects for the microscope; or perhaps the Venetian talc of the druggists, would succeed even better; at least the process is so rational, as to be extremely well worth trying.

But this *kaolin* is more probably an argillaceous earth, from its forming with water a mass tenacious enough to be made into the loaves into which it is brought over. M. Bomare says, that by analysing some Chinese *kaolin*, he found it was a compound earth consisting of clay, to which it owed its tenacity; of calcareous earth, which gave it a mealy appearance; of sparkling particles of mica, and of small gravel or particles of quartz crystals. He says, that he has found a similar earth upon a stratum of granite, and conjectured that it may be decomposed granite. This conjecture is the more probable, as *kaolins* are frequently found in the neighbourhood of granites.

KAPI, a term in the eastern countires for *gate*.

Thus the chief gate of the palace of the emperor of Persia is called *alla kapi*, the Gate of God. Hence also, the officer who has the command of the grand seignor's palace-gates, is called *topighi bachi*.

KARABE. See CARABE.

KARADRE, a name given by the writers of the middle ages to a stone, of which they record many imaginary virtues, such as the rendering people amiable, sprightly, and the like. They describe it to have resembled crystal, but with a mixture of a dusky white. It seems to have been a foul kind of pebble crystal.

KARAITES. See CARAITES.

KARAT. See CARAT.

KARATA, by some called *ceraguata maca*, a kind of aloe growing in America; whose leaves, when boiled, are made into a thread, of good use for making cloth, fishing nets, &c. Its roots or leaves thrown into the water, stupefy the fishes to that degree, that they are easily taken with the hand: its stalk, when dried and burnt, serves for tinder; and when briskly rubbed on a harder wood, it takes fire, and consumes itself.

KARATAS, in *Botany*. See PINE APPLE.

KARFE, a kind of CINNAMON.

KARKRONY, a building where the royal manufactures of Persia are carried on.

Here are made their tapestries, cloth of gold, silk, wool, and brocades, velvets, taffeties, coats of mail, fabres, bows, arrows, and other arms. There are also in it painters in miniature, goldsmiths, lapidaries, &c.

KARLE, a Saxon word, used in our laws, sometimes simply for a *man*, and sometimes for a *servant*, or *clown*.

Hence the Saxons call a seaman a *buscarle*, and a domestic servant a *huscarle*.

KARLE *Hemp*, a term used by our country people for the latter green HEMP.

KASI, a term in the East, applied to the fourth pontiff of Persia, who is also the second lieutenant civil, and judges of temporal as well as spiritual affairs.

He has two deputies, who determine matters of less consequence; particularly quarrels arising in coffee-houses, which make a great part of their business.

KASTRIL, in *Zoology*. See KESTRIL.

KATKIN. See CATKIN.

KATOU-*cerva*, in *Botany*, a name by which some authors have called the tree, whose leaves are the TAMALAPATRA, or Indian leaf of the shops. See MALABATHRUM.

KATOVINDEL, in *Botany*, the name given by the authors of the Hortus Malabaricus, to a genus of plants, called by some *elate*, and by Linnæus phœnix.

KAURYSAOUL, a body of soldiers who form the laſt of the five corps of the King of Perſia's guards.

They are in number two thouſand, and are all horſe, commanded by the conſtable, and in his abſence by the captain of the watch. They keep watch in the night around the palace, ſerve to keep off the croud when the ſophi goes on horſeback, keep ſilence at the audience of ambaſſadors, ſeize the khans and other officers when diſgraced, and cut off their heads when the ſophi commands it.

KAY, KEY, or QUAY, a wharf or place by the water ſide, in a ſea-port, for the loading and unloading of merchandize.

The verb *cajare*, in old writers, according to Scaliger, ſignifies *to keep in* or *reſtrain*; and hence came our term *key*; the ground where keys are made being bound in with planks and poſts.

The lawful *keys* and wharfs for the lading or landing of goods, belonging to the port of London are the following: viz. Cheſter's *Key*, Brewer's *Key*, Galley *Key*, Wool Dock, Cuſtom-houſe *Key*. Bear *Key*, Porter's *Key*, Sab's *Key*, Wiggan's *Key*, Young's *Key*, Ralph's *Key*, Dice *Key*, Smart's *Key*, Somer's *Key*, Hammond's *Key*, Lyon's *Key*, Botolph Wharf, Grannt's *Key*, Cock's *Key*, and Freſh Wharf; beſide Billingſgate, for landing fiſh and fruit; and Bridgehouſe in Southwark, for corn and other proviſions; but for no other goods or merchandiſe. Deal-boards, maſts, and timber, may be landed at any place between Limehouſe and Weſtminſter; the owner firſt paying or compounding for the cuſtoms, and declaring at what place he will land them.

KAYAGE, the money, or toll, paid for loading or unloading wares at kays.

KEAJA, or KIAHIA, is the name of the lieutenant of the chief officers of the Porte, or the ſuperintendant of their particular court.

KEALE, ſmall fragments reſembling chips or broken pieces of ſtone of various kinds; ſome of lime-ſtone, others of free-ſtone, and others of rag-ſtone, found mixed among the earth, of the upper ſtratum in many parts of this kingdom, and giving that ſoil the name of *kealy*; hence, ſome of theſe pieces of *keale* are thin and flat like bits of ſlate.

KEALY *ſoil*, in *Agriculture*, is uſed by the huſbandmen for a ſort of land, plentifully ſtrewed with *keale* or *kale*.

KEBER, the name of a ſect among the Perſians, who, in general, are rich merchants. See GABRES.

KEBLA, or KEBLAH, called alſo KEBLEH, KIBLEH, and ALKEBLA, among the MUSSULMEN, denotes that point, or quarter, to which they turn themſelves when they ſay their prayers.

Mahomet, at firſt, durſt not propoſe any other *kebla* to his followers but the temple of Jeruſalem, which was the *kebla* of the Jews and Chriſtians. In the courſe of time, however, being willing to bring them off from any communication in matters of religion, with the Jews and Chriſtians, he appointed them, in the Koran, to turn themſelves, at prayer, towards the temple of Mecca: from which time they called thoſe two temples the *keblatan*, or two *keblas*.

Ricaut adds, that it is not the temple of Mecca, properly ſpeaking, that the Turks call *kebla*, but rather the large ſquare tower in the middle of the amphitheatre of that temple.

The *kebla* of the Jews was the temple at Jeruſalem; that of the Sabians, the meridian; and that of the Magians, the riſing ſun. To this the prophet Ezekiel refers chap. viii. 16.

KEBLA is alſo uſed for an altar; or rather a *niche*, as Ricaut calls it, which the Mahometans have in all their moſques, and which is placed very exactly on that ſide towards the temple of Mecca.

Hence alſo *kebla* comes to be uſed, metaphorically, for the object, or end propoſed, in doing any thing.

Thus, the *kebla* of kings, is their crown and authority; that of men of buſineſs, is money; that of gluttons, good chear, &c.

KEBLA-NOMA, or KEBLEH-NOMA, a name which the Turks and Perſians give to a little pocket-compaſs, which they always carry with them, in order to place themſelves the more exactly when they go to prayers.

KECKLE, on *board a ſhip*. When the cables gall in the hawſe, or the bolt-ropes do ſo againſt the ſhip's quarter, the ſeamen wind ſome ſmall ropes about them; and this is called *keckling*.

KEDGER, or KEDGE-*anchor*, in a ſhip. See ANCHOR.

KEDGING, a ſea-term uſed when a veſſel is brought up or down a narrow river by the wind, though the tide be contrary to it.

To do this, the ſeamen [illegible] and mizen-ſails, and let [illegible] they may ſail [illegible] ſhore, they have a [illegible] or *kedging-anchor*, [illegible] ſhip; and this they [illegible] which means they [illegible] take up the anchor again.

KEDRELÆON, [illegible] *Apocynum*, an [illegible] cedar-tree.

KEEL, the loweſt piece of [illegible] bottom of her hull, [illegible] ſtern-poſt, and the [illegible] If we compare the [illegible] human body, the *keel* [illegible] and the timbers [illegible] unites the whole [illegible] are elevated [illegible] tion of the *keel* [illegible] nuities of the ſides [illegible] unites the bottom [illegible] compoſed of ſeveral [illegible] which, after being [illegible] ed upon the upper [illegible] procured long [illegible] *keel*, there is a ſtrong [illegible] bottom thereof, called [illegible] When a ſhip [illegible] *keel*; and this [illegible] *Ship*, fig. [illegible]

KEEL is alſo a name [illegible] uſed in the river [illegible] Newcaſtle, and [illegible] colliers for tranſporting [illegible]

KEEL, *upon an even*, in *Sea Language*, [illegible] of a ſhip when [illegible] parallel [illegible] zon, ſo that the [illegible]

KEEL-*hauling*, or [illegible] puniſhment inflicted [illegible] great offenders, [illegible] of the ſhip. See DRAWING.

KEEL-*rope*, a hawſe-[illegible] the *bed* of a ſhip, [illegible] chocked up with billets, &c.

KEELAGE, *Hithernage*, [illegible] the bottom of ſhips [illegible]

KEELERS, in the *Sea Language*, ſmall tubs to hold ſtuff to grave a ſhip's bottom.

KEELING, a name uſed in ſome Engliſh writers for the common COD-FISH. See ASELLUS.

KEELSON, in a *ſhip*, the next piece of timber to the *keel*, lying right over it next above the floor-timber.

KEEP, *to*, in *Sea Language*, is a term uſed on various occaſions: as

To KEEP *the land aboard*, is, to *keep* within ſight of land as much as poſſible. See HOLD.

To KEEP *the luff*, is to continue cloſe to the wind, or to ſail with a courſe inclined to the direction of the wind as much as poſſible, without deviating to leeward. This is alſo called *keeping the wind*. See CLOSE-*hauled* and LOOF.

To KEEP *off*, is to ſail off, or *keep* at a diſtance from the ſhore. See OFFING.

KEEPER *of the foreſt*, otherwiſe called *chief warden of the foreſt*, is an officer who has the principal government of all things belonging to a royal foreſt, and the chief of all the other officers.

The lord chief juſtice in eyre of the foreſt, when he thinks fit to hold his juſtice ſeat, ſends out his general ſummons to the *keeper* forty days before, to warn all under-officers to appear before him, at a day alligned in the ſummons. See JUSTICE *of the foreſt*.

KEEPER *of the great-ſeal*, is a lord by his office, and is ſtyled *lord keeper of the great-ſeal*. He is one of the king's privy-council, through whoſe hands paſs all charters, commiſſions, and grants of the king under the great ſeal; without which ſeal, all ſuch inſtruments, by law, are of no force: for the king is, in the interpretation of the law, a corporation, and paſſes nothing firmly but under the ſaid ſeal; which is, as the public faith of the kingdom, in the higheſt eſteem and reputation.

The lord *keeper* has the ſame place, authority, pre-eminence, juriſdiction, execution of laws, and all other cuſtoms, commodities, and advantages, as the lord chancellor of England has for the time being. Both theſe officers cannot properly ſubſiſt at the ſame time, ſince the ſtatute of 5 ELIZ. The lord CHANCELLOR, or lord *keeper*, is ſuperior in point of precedency to every temporal lord.

KEEPER *of the privy ſeal*, is a lord by his office; through whoſe hands paſs all charters ſigned by the king, before they

they come to the great-seal, and some things which do not pass the great-seal at all. He is of the king's privy-council, and was anciently called *clerk of the privy-seal*: Yet reckoned in the number of the great officers of the realm. 12 Ric. II. c. 11. 27 Hen. VIII. c. 11.

KEEPER, *boat*, in *Sea Language*, one of the rowers, who remains as a centinel in his turn, to take care of any boat and her contents, either when she lies by the shore, or along-side of the ship; or when she is towed a-stern of her.

KEEPING, in *Painting*, denotes the representation of objects in the same manner that they appear to the eye, at different distances from it, for which the painter should have recourse to the rules of perspective. There are two instances in which the famous Raphael Urbin has transgressed these rules: in one of his cartons, representing the miraculous draught of fishes, the men in each of the two boats appear of full size, the features of their faces being strongly marked; and the boats are represented so small, and the men so big, that any one of them appear sufficient to sink either of the boats by his own bare weight: and the fowls on the shore are also drawn so big, as to seem very near the eye of the observer; who could not possibly, in that case, distinguish the features of the men in the distant boats. Or, supposing the observer to be in either of the boats, he could not see the eyes or beaks of the fowls on the shore. The other instance occurs, in his historical picture of our Saviour's transfiguration on the Mount; where he is represented with those who were then with him, almost as large as the rest of his disciples at the foot of the Mount, with the father and mother of the boy whom they brought to be cured; and the mother, though on her knees, is more than half as tall as the mount is high. So that the mount appears only the size of a little hay-rick, with a few people on its top, and a greater number at its bottom on the ground; in which case, a spectator at a little distance, could as well distinguish the features of those at the top as of those on the ground. But upon any large eminence, deserving the name of a mount, that would be quite impossible.

KEEPITHEJA, in *Botany*, the name by which some authors call the tree, on the branches of which the gum lacca of the shops is usually found.

KEEVE, or KEEVEL, a large tub, or brewing vessel, in which ale or beer ferments, before it is tunned.

KEIKEM, in the *Materia Medica*, a name given by the Arabian writers, to a gum used in their time for making of varnish.

Gum lacca is generally said to be the substance meant by it, but Avicenna seems to express by it every thing that was used as varnish. Thus he sometimes means by it the gum sandarach, and sometimes amber. The *gum-cancamum* of the Greeks is also certainly often meant by it; but this is scarce to be mentioned as an explication of the word, it being almost as general a term as itself, and standing with many of the old authors for sandarach, gum lac, and amber, as well as for the gum properly expressed by it. In short, all the gums used in making varnish, are in general called by the names of any one of them, and thus vernix, sandarach, cascamum, and lacca, are made synonymous words, and either stands for each of the things signified by all the words.

KEIRAN, in the *Oriental Learning*, the Persian and Arabic name for the planet Saturn, according to Salmasius. See CHIUN.

KEKIO. See PERN-*oil*.

KELMEJAN, in *Botany*, a name given by some authors to the acacalis, or wild carob-tree.

KELP, in the *Glass-Trade*, a term used for a sort of pot-ashes used in many of their works, particularly for the crystalline metal. It is the calcined ashes of a plant, called by the same name, and in some places sea-thongs, or laces, a sort of thick-leaved fucus or sea-wrack: the *alga angustifolia vitriariorum* of John Bauhine. This plant, if kept moist a little after gathering, will shew afterwards, though long kept, its white salt upon the surface of its leaves. This plant is thrown on the rocks and shores in great abundance, and in the summer months is raked together, and dried as hay in the sun and wind, and afterwards burnt to the ashes called *kelp*, which are used not only in the glass, but in the alum works. This contains an alkali of the same kind with the plant KALI, but more impure.

KEMA, in *Natural History*, a name given by Leo Africanus, and other writers of the African history, to a sort of subterranean production of the vegetable kind, greatly esteemed as a delicious food. The Arabian writers on medicine have often mentioned it, and that under names sufficiently resembling the modern African appellation, such as *cumbe*, *cumah*, *kemah*, and *camba*. They are not the roots of any plant, but a fine kind of subterraneous mushroom, or truffle, white on the outside, and which is generally pretty deep in the earth.

KENKS, in the *Sea-Phrase*, are doublings in a cable of rope, when it is handed in or out, so that it does not run smooth, or when any rope makes turns, and does not run smooth and clever in the block, they say it makes *kenks*.

KENNEL, a term used indifferently for a puddle, a watercourse in the streets, a house for a pack of hounds, and the pack or cry of hounds themselves.

Among sportsmen, a fox is said to *kennel*, when he lies close in his hole.

KENNETS, in our *Old Writers*, a sort of coarse Welsh cloth, mentioned in the stat. 33 Hen. VIII. c. 3.

KENNETS, in a *Ship*, are small pieces of timber, nailed to the inside of the ship, unto which the tacks and sheets are belayed (as they call it) i. e. fastened.

KEPLER'S *Laws*, is that law of the planetary motions, discovered by Kepler: in reality, Kepler discovered two of the fundamental laws of the mundane system, viz. 1. That the planets describe about the sun are as proportional of the times; and 2. That the squares of the times of revolution are as the cubes of the mean distances of the planets from the sun. Sir I. Newton has shewn, that the first of these laws results from a centripetal force which urges the planets towards the sun, and the second, from the centripetal force being in an inverse ratio of the square of the distance.

KEPLER'S *Problem*. See PROBLEM.

KERAMIANS, a sect, among the Mussulmen, so called from Mohammed Ben Keram, its author.

The *Keramians* maintain, that whatever the Alcoran says of the arms, eyes, and ears of God, is to be understood literally: so that they admit the tagisdum, that is, a kind of corporeity in God; which, however, they explain very variously.

KERANA, a long sort of trumpet; somewhat in form of a speaking-trumpet, used by the Persians.

To the sound of this, they add a confused noise of hautboys, timbrels, drums, and other instruments, every evening at sun-set, and two hours after midnight.

KERATOPHYTUM, a name by which Boerhaave expresses the black coral, called also ANTIPATHES, *lithophyton*, and *pseudocorallium*.

The *keratophyta*, in the Linnæan system, are a species of the GORGONIA: they are called the *frutices coralloides*, or sea-shrubs, and generally known among naturalists, by the different appellations of *lithophyta*, *lithoxyla*, and *keratophyta*; epithets intended to convey an idea of their composition, which, at first view, seems to consist partly of a woody or horny, partly of a stony or calcareous substance, variously disposed with respect to each other. Their general form approaches to that of shrubs, having a root-like base, by which they adhere to some solid support in the ocean; and a stem, or trunk, and branches differently disposed; some rising up in one or more different twigs, subdivided into smaller and separate ramifications; while others have their smaller branches connected in such a manner, as to form a curious net-like structure: from this diversity of figure, they borrow the names of sea-fans, sea-feathers, &c. The seeming fibres of the base are, in reality, small tubes, of which the whole shrub consists: these tubes run up longitudinally into the trunk, and are also circularly disposed about the centre of the trunk; the woody part, as naturalists have called it, thus formed, affords, when burnt, a strong smell like burning horn; whence some have called it the horny part. Upon this part is superinduced, a kind of stony or calcareous coat, which covers both trunk and branches to their extremities. In this coat may be discovered, regular orders or pores of cells; and viewed by the microscope, it always appears to be an organical body, consisting of a regular congeries, like the cells in which animals have been formed or existed. Some of this kind of bodies have lost their calcareous covering by the violence of the waves, and other accidents. In some specimens of an advanced growth, the calcareous tubes, just mentioned, find out little cells of animals of the polype kind, with proper openings to them all: these cells are diffused along the branches in some regular order, much in the same manner as they are in the corallines. From the cells, the animals have been discovered extending themselves as well to procure food as materials for the increase of this surprising structure: and, therefore, there is no reason to doubt, that they are animal productions: a small sprig of the *keratophyton flabelliforme, cortice verrucoso obductum*, or warted sea fan, is represented in *fig.* 7. *Tab.* II. *Corallines*. The outside is covered with a crust, full of little lumps like warts; which, when dissolved in vinegar, discover the contracted bodies of polypes, like claws. C and C 1 are two views of one of the warts magnified: C 2. is the appearance of the polype, when the cretaceous matter was dissolved: C 3. represents the particles that compose the incrustation magnified. D, fig. 8. represents a sea-willow,

willow, or *keratophyton dichotomum, caule & ramulis leviter compressis*. On both edges of the flat branches, are regular rows of little rising cells in the calcareous part, with small holes for an entrance to each. Ellis's Hist. of Corallines, chap. 5. See CORALLINES.

KERF is the notch or slit that is made by the saw between two pieces of wood, when they are sawing asunder.

KERFE-KARUMFEL, in the *Materia Medica*, a name given by Avicenna, and others, to the wood of the clove-tree, as the wood of the cinnamon-tree was called *berse darsini*; and many others in the same manner.

KERI *Cetib*, are various readings in the Hebrew Bible: *keri*, signifies that which is read; and *cetib*, that which is written. For where any such various readings occur, the wrong reading is written in the text, and that is called the *cetib*; and the true reading is written in the margin, with ק under it, and called the *keri*. It is generally said by the Jewish writers, that these corrections were introduced by Ezra; but it is most probable that they had their original from the mistakes of the transcribers after the time of Ezra, and the observations and corrections of the Masorites. Those *Keri-chetibs*, which are in the sacred books written by Ezra himself, or which were taken into the canon after his time, could not have been noticed by Ezra himself; and this affords a presumption, that the others are of late date. These words amount to about a thousand; and Dr. Kennicott, in his Dissertatio Generalis, remarks, that all of them, excepting fourteen, have been found in the text of manuscripts.

KERMES, a kind of little animal, found in great plenty on an evergreen of the oak kind, and forming excrescences or *nidules*, of considerable use, both in physic and dying. See COCCUS.

The *kermes*, called also *scarlet grain*, and by the Greeks *coccus baphica*, by the Latins *vermiculus*, by the French sometimes *vermillon*, or *grain de gale*, or *vermeil*, is about the size of a juniper-berry, round, smooth, and glossy; of a beautiful red colour, and full of a mucilaginous juice, of the same dye; it is found adhering to the bark on the stem and branches of a peculiar sort of scarlet oak.

The *kermes* is the most famous, and most valuable creature of its kind, and is properly an insect of the gall-insect class, and of that genus whose figure resembles a sphere, from which a small part had been cut off. This species is found on a particular kind of the ilex, known by the name of the *ilex aculeata coccigiandifera*. This never arises beyond the height of a small shrub, and is very plentiful in the uncultivated parts of Provence and Languedoc, and in some other places; as in Spain, in the islands of the Archipelago, and particularly in Crete. The peasants make their harvest of these animals, from off these shrubs, at the proper season; and though the history of this drug is a subject well worthy the attention of every naturalist, yet it is but of very late years that it has been enquired into with any degree of accuracy. Messrs. de la Hire and Sedileau opened a way to the knowledge of it, by their history of the gall-insect of the orange-tree; but all the advantages that might have been expected thence, were not soon obtained, nor was the resemblance and strict analogy between the flat and spherical gall-insects so soon observed, as might have been expected.

The *kermes*, when at his full growth, appears a small shell fixed to the branches of this shrub, or seems a purse or bag, the covering of which is sufficiently strong, bright, and shining, and of the colour of a ripe plum, and covered with the same sort of whitish powder, as that fruit is when ripe. This powder, the people of the place call the flower of the *kermes*. Those who have never seen *kermes* otherwise than in the shops of the druggists, may naturally think it of a reddish brown; but this is not its natural colour, but it is the effect of the vinegar they use for its preservation; that remaining on the branches, and which has not been affected by vinegar, having nothing of this colour, but exactly that of ripe sloes in the hedges.

There are two kinds of *kermes*; the one, that which has been already described, which is of the colour of a plum, and which lays red eggs. The other is whitish, or somewhat reddish, and is covered in the same manner as the other, with a white powder, and lays its eggs in the same manner. Its growth is the same with the other, and at the same seasons, and its eggs are white.

The young insects produced from both these species, are very like, and have a considerable resemblance to woodlice, or millepedes, as indeed have the young of all the gall-insect class. They differ however in colour: those which are produced from the red eggs, are themselves red; they are flat in shape, and somewhat more pointed behind than at the head; their back is convex, with a round arched prominence. This kind has several shining gold-coloured spangles, and is traited on the back, and has several transverse lines across the belly. It has six legs, and two horns nearly as long as his body, and a tail split into two, or forked, the divided parts being nearly as long as his horns, and its eyes are black and shining.

The young ones produced from the white eggs, are of a dirty white; their back is somewhat flatter than that of the others, and the spangles on them, viewed by the microscope, appear of a silver colour, not of a gold. There are a much smaller number of these white than of the red *kermes*, and the people of the country call them the mother of the *kermes*. There are also among the *kermes*, several found, containing, instead of these eggs, the nymphs of two kinds of small flies, which regularly are produced from them, and have both a power of hopping or jumping. The one species of fly is of a fine jet black, and the other is of a dirty white. One of these is a white-winged fly, alike, in all respects, to the gall-insect fly, and is, without all doubt, the male *kermes*; though this very observation of a fly being produced from some of the *kermes*, has been one great occasion of believing the *kermes* to be a true gall.

According as the winter has been more or less mild, the harvest of *kermes* is the more or less plentiful; and the people always presage themselves a fine season, when the spring has been free from frosts and fogs. It is observed, that the lowest and oldest shrubs, are always the fullest of this insect; and the *kermes* produced on those trees, which are in the neighbourhood of the sea, is always larger and finer than from the inland places.

It is no uncommon thing to have two harvests of *kermes* in a year. Those of the latter season are smaller and less valuable than those of the first, and are found not on the branches, but on the leaves of the shrub; which is just analogous to the custom of the gall-insects of all other kinds; all which, about this age, leave the branches to feed on the leaves, where their yet tender trunks can find an easier entrance. See *Tab. of Insects*, N° 36.

From this analogy between the *kermes*, and other insects of the same class, it should seem worth while to try, whether some of those may not possess the same virtues in medicine, at least, if not in the arts. It is certain that the common oak produces a red gall-insect of the very shape of the *kermes*, and of the colour of the paler ones. Reaumur, Hist. Insect. p. 45.

The *kermes* is of a vinous smell, a bitter, rough, agreeable taste; and its pulp, or juice, is pregnant with numerous minute ova.

The animal retains these ova under her belly, till they hatch into a very numerous offspring.

Hence, when the *kermes* is dried, there comes out of it an infinite number of little insects, and flies, so small, that they are scarce visible; insomuch, that the whole inward substance seems converted into them. To prevent this inconvenience, they usually steep the *kermes* in vinegar before it be dry; and thus prevent the exclusion of the ova, and kill such animals as are already hatched. They draw the juice, or pulp, from the *kermes*, by pounding it in a mortar, and then straining it through a sieve: of this they make a syrop, by adding a sufficient quantity of sugar. Sometimes they dry the pulp separate from the husk; which pulp, thus dried, they call *paste of kermes*.

The *kermes* again is of great use in physic: it is cardiac, deficcative, and astringent; it fortifies the stomach, and prevents abortion. Of this is made that celebrated confection called ALKERMES.

The restringent and corroborant confection sold in the shops, is prepared by dissolving, in the heat of a water-bath, six ounces of fine sugar, in six ounces, by measure, of damask rose-water; then adding three ounces of the juice of *kermes*, warmed and strained; and after the whole has grown cold, mixing half a scruple of oil of cinnamon. This confection is taken, from a scruple to a dram, or more, either by itself, or in juleps, with which it mingles uniformly, without injuring their transparency.

The dried grains of *kermes*, if they have not been too long kept, give out, both to water and to rectified spirit, the same deep red colour, and nearly the same kind of smell and taste with those of the expressed juice. The inspissated extracts are considerably bitter, astringent, and of a kind of mild balsamic pungency.

It is, however, of greater use in dying scarlet; for which use the manner of preparing it is as follows: the *kermes* being taken when ripe, they spread it on linen, and at first, while it abounds most in moisture, turn it twice or thrice a day, to prevent its heating, till such time as there appears a red powder among it: this they separate, by passing it through a sieve, and then again spread abroad the grain on the linen, till they perceive the same redness of powder, when they repeat the sifting: thus they

they proceed, while they diſcover any red powder on the ſurface of the grain, which is ſtill paſſing through the ſearce, till it yield no more.

In the beginning, when the ſmall red grains are found to move, as they will always do, they are ſprinkled over with ſtrong vinegar, and rubbed between the hands.—Were not this precaution taken, out of every grain would be formed little inſects, which would be of no uſe in dying.

The grain being quite emptied of its pulp, or red powder, by the proceſs above mentioned, is waſhed in wine, and then expoſed to the ſun; after this, it is put up into the huſks, formed into balls, and along with it the proportion of red duſt that it had afforded.

According to M. Marſigli's experiments, made at Montpellier, the *kermes* has the effect of galls; when mixed with vitriol; and makes a good ink: mixed with oil of tartar, or lime-water, its colour turns from a vermilion to a crimſon colour. In a decoction of turnſol flowers, it retains its proper colour. They have not been able to get any fixed eſſential ſalt from it; but a volatile ſalt it yields in abundance; which, in M. Marſigli's opinion, would have a better effect in medicine, if taken in a liquid, than when enclosed in conferves and confections, which hinder its action.

Woollen cloth, prepared with alum and tartar, acquires, on being boiled with dry *kermes* berries, a durable deep red colour, called *ſcarlet in grain*, from the *kermes* having been formerly ſuppoſed to be the grain or ſeed of the tree; and *Venice ſcarlet*, from the greateſt quantities having been dyed there. This colour wants the luſtre and fire of the cochineal ſcarlet now in vogue, but in return is far more permanent, nor ſubject to be ſtained by dirt, or acrid liquors; and when ſpotted with greaſe, may be cleaned again without injury to the colour.

Mr. Hellot obſerves, that the figured cloths to be ſeen in the old tapeſtries of Bruſſels, and the other manufactures of Flanders, which have ſcarcely loſt any thing of their liveline ſs in ſtanding for two hundred years, were all dyed with this ingredient: that nevertheleſs *kermes* is at preſent entirely in diſuſe among the European dyers, though ſaid to be commonly employed in the Levant, and exported thither from Marſeilles in conſiderable quantities: that when the *kermes* ſcarlet (now called an ox-blood colour) is wanted for tapeſtries, &c. our dyers endeavour to imitate it with cochineal; that as the colour is difficultly hit with cochineal alone, they generally add a portion of Brazil wood; and that the dyes thus produced, though at firſt more vivid than they ought to be, often loſe their luſtre before a year is at an end, and turn white and grey in an extraordinary manner: that *kermes* might again be introduced to very good advantage, as its colour is of the moſt durable kind, and as ſundry ſhades are obtainable from it with leſs trouble and expence than from other drugs.

The ſame author has given a great number of experiments upon *kermes*, with different ſalts and metallic ſolutions. The principal of theſe are as follow:

On adding to the decoction of *kermes*, a ſmall quantity of ſolution of tin, the dark colour of the liquor is immediately brightened, and prepared woollen dyed therein, inclines more to the orange than with the *kermes* alone. With this improvement of the colour, it receives the imperfections, though not all the beauty of the cochineal ſcarlet; all alcaleſcent ſubſtances ſtaining the cloth, that is, deſtroying the effect of the acid ſolution.

Kermes, with cream of tartar, and as much of the ſolution of tin as is employed for the cochineal ſcarlet (without any alum) dyed unprepared cloth of an extremely vivid cinnamon colour. On dipping the cloth in a ſolution of alum, a part of the red re-appeared, but was not beautiful.

With cream of tartar, ſolution of tin, and alum in larger quantity than the tartar, this drug gives purpliſh colours, which vary according to the proportions of the ingredients.

If vitriolated tartar be ſubſtituted to the alum and tartar; and if after the *kermes* has been boiled in a ſolution of a ſmall quantity of this ſalt, the ſtuff be boiled in this mixture for about an hour, the dye proves a beautiful kind of grey, in which the red is little perceived.

Glauber's ſalt, employed along with *kermes*, entirely deſtroys its redneſs, and gives an earthy grey colour. This dye is very periſhable, on account of the particular nature of the ſaline ſubſtance, by means of which the tinging particles are applied; for Glauber's ſalt diſſolves eaſily in cold water, and falls into a powder in the ſun's heat. This obtains equally in all dyes; thoſe drugs which afford moſt durable colours with tartar and vitriolated tartar, give very periſhable ones with the more diſſoluble and calcinable ſalts.

Green and blue vitriol, ſubſtituted ſeparately to alum, but taken in conjunction with cream of tartar, deſtroy likewiſe, or conceal the red colour of *kermes*, which in theſe two experiments has the ſame effect with galls, for it precipitates the iron of the green vitriol which tinges the cloth of a bright grey, and the copper of the blue, which gives a kind of olive dye. It likewiſe gave an olive dye with ſolution of copper made in aqua fortis; a certain mark, that it poſſeſſes, like galls, an aſtringent precipitating quality. It is probably the aſtringency of *kermes*, that renders its dye ſo durable; for all the barks, woods, roots, and other ſubſtances that are aſtringent, yield permanent colours.

White vitriol, employed with cryſtals of tartar, changes the red colour of *kermes* into a violet. A tincture of biſmuth ore, in ſpirit of nitre, and a ſolution of biſmuth itſelf made leiſurely in four times its weight of ſpirit of nitre, diluted with an equal quantity of water, gave alſo a violet dye upon white cloth. See Neumann's Chemiſtry, by Lewis, p. 508, &c.

KERMES *mineral*. The *kermes mineral* was a preparation of Glauber, which the king of France bought of M. de la Ligerie, and made public in 1720. That receipt was in the following form: take a pound of Hungarian antimony, broken into thin pieces, according to the direction of its ſpicula; four ounces of nitre, fixed by chaucoal; and a pint of rain water: boil them two hours; then ſiltre the warm liquor, and when it cools, the *kermes* precipitates. The ſame antimony undergoes the ſame operations with the remaining liquor, to which three ounces of fixed nitre, and a pint of water is added. In a third boiling, two ounces of nitre, and a pint of water are to be added to the former lixivium. The *kermes* thus obtained is about a dram, and is well edulcorated by waſhing it with water, and burning ſpirit of wine on it; then it is dried for uſe.

Mr. Geoffroy ſhews, by many experiments, that the *kermes* is the reguline part of the antimony, joined to a ſort of *hepar ſulphuris*. He teaches us a much eaſier way of preparing this medicine, thus: mix intimately the fine powder of two parts of antimony, and one of any fixed alkaline ſalt, melt thoſe metals in a crucible; then having powdered them while hot, boil them two hours in a large quantity of water; after this, paſs the hot liquor through paper, receiving it into a veſſel, in which there is hot water, the *kermes* ſeparates when it cools. The groſſer parts, which do not paſs through the paper, are to be boiled again, and filtrated as before; and the operation is to be repeated a third time, by which ſix or ſeven drams of *kermes* may be got out of every ounce of antimony. He ſays, he has ſeen effects like to thoſe of mild *kermes* from antimony, reduced to ſuch a fine powder, that none of the ſhining ſpicula are to be ſeen; and that the magiſtery of antimony, made by pouring ſpirit of nitre, or aqua regia, on the powder of antimony, and then edulcorating the maſs with water, has the ſame effects as *kermes*. Mem. de l'Acad. des Sciences, 1734, 1735.

Half a grain, or a grain of this powder, given every three or four hours, produces no violent effects; but by increaſing the doſe, it may be made to vomit, purge and ſweat.

When ſeven or eight grains are taken at once, it chiefly acts upon the primæ viæ, generally as an emetic and purgative. A doſe of three or four grains is ſeldom emetic, and more frequently purgative. When taken in theſe quantities as an evacuant, a little of it paſſes alſo into the viæ ſecundæ & tertiæ. When it is adminiſtered in ſmaller doſes, it paſſes almoſt entirely into the lacteal, blood and lymphatic veſſels. In theſe it occaſions ſuch ſpaſms and oſcillations as it does in the primæ viæ; ſo that it increaſes all ſecretions and excretions, but particularly thoſe of urine, ſweat, and expectoration; according to the doſe, the nature of the diſeaſe, and the diſpoſition of the patient. It produces ſingularly good effects in thoſe diſeaſes of the breaſt which proceed from fulneſs and obſtruction. It may be adminiſtered in any vehicle, or incorporated in a bolus, with other ſuitable remedies. But it ſhould never be joined with acids, when it is deſigned to act as *kermes*.

Some commend this medicine as the moſt univerſal reſolvent, and deobſtruent; aſſuring us, that it almoſt infallibly cures pleuriſies, peripneumonies, aſthmas, catarrhs, anginæ, ſmall-pox, and many other diſeaſes. Others are as poſitive, that it heats and thickens the blood, thereby increaſing obſtructions, and is particularly hurtful in all inflammatory diſeaſes.

This preparation was famous in France, and known by the name of *poudre des Chartreux*, becauſe a Carthuſian monk, who got it from Mr. de la Ligerie, firſt brought it into vogue. See Hiſt. de l'Acad. des Sciences 1720, and the Memoirs for the ſame year, where it is ſaid that Glauber was looked upon as the firſt inventor of this remedy.

Its effects, like that of many other antimonial preparations, are very various, which is frequently owing, as Mr. Geoffroy obſerves, to the different manner and care in making it. He adds, that the more the *kermes* contains of a regulus eaſily revivified, the more it proves emetic. He alſo ſhews how to make a cinnabar with the *kermes* and mercury, and to diſengage the vitriolic acid from the *kermes*. See Mem. de l'Acad. des Sciences, 1734.

KERN, or KERNE, a term in the ancient Iriſh militia, ſignifying a *foot-ſoldier*.

Camden tells us, the armies of Ireland conſiſted of cavalry, called *gall glaſſes*; and infantry, lightly armed, called *kerne*. The *kerne* bore ſwords, and darts; to the laſt were fitted cords, by which they could recover them after they had been launched out.

KERN, in the *Engliſh ſalt-works*, a word uſed to ſignify the cryſtallizing, or ſhooting of ſalt in the brine, when ſufficiently evaporated in the boiling pan.

This word is alſo uſed by the ſeamen for the firſt forming of the bay-ſalt, made by the ſun's heat in the iſles of May, &c. See SALT.

KERN-*ſtone*, in *Natural Hiſtory*, a name given by the common people of many parts of England, to a peculiar ſort of ſtone, which is found on the ſides of hills in ſandy countries, where the hills are rocky. Pyran ſands afford a great many ſtones of this kind; and the manner of their formation is thus: the rocks in the ſides of the hills are continually covered over with the looſe ſand, which the winds toſs up, and the ſparry matter continually oozing out of the pores of theſe ſtones, with the wet, cements the grains of ſand together. When one cruſt is thus formed, another is ſoon added, and ſo on, till the whole maſs is of a conſiderable thickneſs; and the ſpar ſtill ſerving as a general cement, the whole is held together, though but in a looſe way, yet ſo as to reſemble a ſort of ſtone. The little grains of ſand are ſtill viſible in all parts of this ſtone, and are what induced the people to call it *kern-ſtone*, as they call theſe *kerns*, or *kernels*. This account of the origin of the ſtone is eaſily proved, by putting a ſmall piece of it into aqua fortis, for this diſſolves the ſpar, or cement, and the ſand is left looſe.

KERNES, in our *Laws*, ſignify idle perſons, or VAGABONDS.

KERNING, in *Letter-Founding*. See *Letter* FOUNDERY.

KERSEY, a kind of coarſe woollen cloth, made chiefly in Kent and Devonſhire.

KESITAH. This word is to be met with in Geneſis, and in Job; and is tranſlated in the Septuagint and Vulgate ſheep or lambs. But the Rabbins and modern interpreters are generally of opinion, that *Keſitah* ſignifies rather a piece of money. Bochart and Eugubinus are of opinion the Septuagint meant *minæ*, and not *lambs*; in Greek *hecatommion*, ἑκατομμοιον, inſtead of ἑκατον αρνων. Now a mina was worth ſixty Hebrew ſhekels, and conſequently ſix pounds ſixteen ſhillings and ten pence half-penny ſterling. M. de Pelletier of Rouen, is of opinion, that *Keſitah* was a Perſian coin, ſtamped on one ſide with an archer (*Keſitah* or *Keſeth*, in Hebrew, ſignifying a *bow*) and on the other with a lamb; that this was a gold coin known in the Eaſt by the name of a Darie, and was in value about twelve livres and ten pence French money. Several learned men, without mentioning the value of the *Keſitah*, ſay it was a ſilver coin, the impreſſion whereof was a ſheep; for which reaſon the Septuagint and Vulgate tranſlate it by this name. Calmet is of opinion, that *Keſitah* was a purſe of gold or ſilver. In the Eaſt they reckon at preſent by purſes. The word *Kiſta* in Chaldee ſignifies a meaſure, or veſſel. And *Euſtathius* ſays, that *Kiſta* is a Perſian meaſure. Jonathan and the Targum of Jeruſalem tranſlate *Keſitah* a Pearl. Gen. xxxiii. 19. Job xlii. 11. Or nine pounds Engliſh, ſuppoſing, as Dr. Prideaux does, that a ſhekel is worth three ſhillings. A Darie is a piece of gold, worth, as Dr. Prideaux ſays, five and twenty ſhillings Engliſh. See his Connect. P. I. p. 101. See Calmet Comment. upon Gen. xxxiii. 19. Gen. xxv. 12. Job xlii. 2. &c. and Dict. Bibl.

KESTREL, the Engliſh name of a hawk, called alſo the *ſtannel* and the *windhover*, and by authors the tinnunculus and *cenchris*. It builds with us in hollow oaks, and feeds on partridges and other birds.

KETCH, a kind of veſſel, equipped with two maſts, viz. the main-maſt, and mizen-maſt, and uſually from one hundred to two hundred and fifty tons burthen: they are uſed either as yachts, for conveying princes of the blood, ambaſſadors, or other great perſonages, from one place to another, or as BOMB-*veſſels*: theſe are built remarkably ſtrong, and fitted with a greater number of RIDERS than any other veſſels.

KETMIA, in *Botany*, ſee *Syrian* MALLOW.

KETRAN, KITRAN, or ALKETRAN, a name given by ſome of the Arabian authors to the oil of cedar, called by the Greeks CEDRIA. We have of later times formed the word *cedrenum* upon this, and it has ſince been applied to the zopiſſa of the ancients, a compoſition made of pitch and wax melted together, and uſed for covering the bottoms of ſhips.

KETTLE, in the *Art of War*, a term the Dutch give to a battery of mortars, becauſe it is ſunk under ground.

KETTLE-*drums* are formed of two large baſons of copper or braſs, rounded at the bottom, and covered over with vellum or goat-ſkin, which is kept faſt by a circle of iron, and ſeveral holes faſtened to the body of the drum, and a like number of ſcrews to ſcrew up and down, with a key for the purpoſe. The two *drums* are kept faſt together by two ſtraps of leather, which go through two rings, and are faſtened, the one before and the other behind the pommel of the *kettle*-drummer's ſaddle. They have each a banner of ſilk or damaſk, richly embroidered with the ſovereign's arms, or of the colonel, and are fringed with ſilver or gold; and to preſerve them in bad weather, they have each a cover of leather. The drum-ſticks are of crab-tree, or other hard wood, eight or nine inches long, with two knobs on the ends, which beat the drum head, and cauſe the ſound. The *kettle-drum*, with trumpets, is the moſt martial ſound of any; each regiment of horſe has a pair.

The *kettle*-drummer rides always at the head of the ſquadrons, and his poſt is on the right when the ſquadron is drawn up.

The *kettle*-drum belonging to the royal regiment of artillery, is mounted on a ſuperb waggon, richly gilt and ornamented, and drawn by four white horſes, elegantly capariſoned, with a ſeat for the drum-major general.

KEVELS, or CHEVILS, *in a Ship*, are two pieces of timber ruiſed to the inſide of a ſhip, from whence the upper ends branch outward into arms or horns, ſerving to belay the great ropes, by which the bottoms of the main-ſail and fore-ſail are extended.

KEY, a little iron inſtrument, for the opening of locks.

L. Molinus has a treatiſe of *keys*, De Clavibus Veterum, printed at Upſal. He derives the Latin name *clavis* from the Greek κλειω, *claudo*, *I ſhut*; or from the adverb *clam*, *privately*; and adds, that the uſe of *keys* is yet unknown in ſome parts of Sweden.

The invention of *keys* is owing to one Theodore of Samos, according to Pliny, and Polydore Virgil; but this muſt be a miſtake, the uſe of *keys* having been known before the ſiege of Troy: mention even ſeems to be made of them in the nineteenth chapter of Geneſis.

Molinus is of opinion, that *keys*, at firſt, only ſerved for the untying certain knots, wherewith they anciently ſecured their doors: but the Laconic *keys*, he maintains, were ſcarly akin in uſe to our own: they conſiſted of three ſingle teeth, and made the figure of an E; of which form there are ſtill ſome to be ſeen in the cabinets of the curious.

There was alſo another *key*, called βαλαναγρα, made in the manner of a male ſcrew, which had its correſponding female in a bolt affixed to the door.

KEY is, hence, become a general name for ſeveral things ſerving to ſhut up or cloſe others.

KEY, or KEY-STONE, *of an arch, or vault*, is the laſt ſtone placed atop thereof; which, being wider and fuller at the top than bottom, wedges as it were, and binds in, all the reſt.

The *key* is different in the different orders; in the Tuſcan and Doric, it is a plain ſtone, only projecting; in the Ionic, it is cut, and waved ſomewhat after the manner of conſoles; in the Corinthian and Compoſite, it is a conſole enriched with ſculpture, foliages, &c. See *Tab. Archit. fig. 3. lit. c. fig. 50. lit. f.*

M. Belidor makes the thickneſs of the *arch-ſtones* of a bridge, one twenty-fourth part of the width of the arch; but M. Gautier, another experienced engineer, makes their length, in an arch twenty-four feet wide, two feet; in arches, forty-five, ſixty, ſeventy-five, ninety wide, three, four, five, ſix feet, reſpectively: and it is obſerved by Mr. Muller, that the thickneſs allowed by Belidor is not ſufficient to prevent the weight of the arches from cruſhing the *key-ſtones* to pieces by their preſſure againſt one another. Muller's Pract. Fortif. p. 253

The name KEY-*ſtones*, or *arch-ſtones*, is ſometimes alſo given to all the ſtones which form the ſweep of an arch, or vault—anſwering to what the French more diſtinctly call *vouſſoirs*.

KEY is alſo uſed for the eccleſiaſtical juriſdiction; particularly for the power of excommunicating, and abſolving. The Romaniſts ſay, the pope has the power of the *keys*, and can open and ſhut paradiſe as he pleaſes; grounding their opinion on that expreſſion of Jeſus Chriſt, *I will give thee the keys of the kingdom of heaven.*

In St. Gregory we read, that it was the cuſtom heretofore, for the popes to ſend a golden *key* to princes, wherein they always incloſed a little of the filings of St. Peter's chains,

chains, kept with great devotion at Rome; and that these *keys* were worn in the bosom, as being supposed to contain some wonderful virtues.

KEY, in *Poiography*, and *Steganography*, denotes the alphabet of a CIPHER; which is a secret known only to the person who writes the letter, and him who deciphers it. See ALPHABET.

Some ciphers have a single *key*, where the same characters are used throughout; in other ciphers, the characters are varied, and the *key* is double.

KEY, in *Musick*, is a certain fundamental note, or tone, to which the whole piece, be it concerto, sonata, cantata, &c. is accommodated; and with which it usually begins, but always ends.

To get an idea of the use of the *key*, it may be observed, that as in an oration there is a subject, *viz.* some principal person or thing to which the discourse is referred, and which is always to be kept in view, that nothing unnatural, and foreign to the subject may be brought in; so in every regular piece of music, there is one note, viz. the *key*, which regulates all the rest. The piece begins and ends in this; and this is, as it were, the musical subject, to which a regard must be had in all the other notes of the piece. Again, as in an oration there are several distinct articles, which refer to different subjects, yet so as they have all a visible connection with the principal subject, which regulates and influences the whole; so in music there may be various subaltern subjects, that is, various *keys*, to which the different parts of the piece may belong: but then they must be all under the influence of the first and principal *key*, and have a sensible connection with it.

To give a more distinct notion of the *key*, we must observe, that the octave contains in it the whole principles of music, both with respect to consonance or harmony, and succession or melody; and as either scale be continued to a double octave, there will, in that case, be seven different orders of the degrees of an octave, proceeding from the seven different letters, with which the terms of the scale are marked. Any given sound, therefore, i. e. a sound of any determinate pitch or tune, may be made the *key* of the piece, by applying it to the seven natural notes arising from the division of an octave, and repeating the octave above or below, at pleasure. The given note is applied as the principal note or *key* of the piece, by making frequent closes, or cadences upon it; and, in the progress of the melody, no other but those seven natural notes can be admitted, while the piece continues in that *key*, every other note being foreign to the fundamental, or *key*.

For instance, suppose a song begun in any note, and carried on upwards, or downwards, by degrees, and harmonical distances, so as never to touch any notes, but what are referable to that first note as a fundamental, i. e. are the true notes of the natural scale proceeding from the fundamental; and let the melody be so conducted through those natural notes, as to close and terminate in the fundamental, or any of its octaves above or below; that note is called the *key* of the melody, because it governs all the rest, limiting them so far, as that they must be to it, in the relation to the seven essential notes of an octave; and when any other note is brought in, it is called *going out of the key*.

From which way of speaking, viz. a song's continuing in, or going out of the *key*, it may be observed, that the whole octave, with its natural notes, come under the idea of a *key*; though the fundamental or principal note is, in a peculiar sense, called the *key*.

In which last sense of the word *key* (viz. where it is applied to one fundamental note), another note is said to be out of the *key*, when it has not the relation to that fundamental of any of the natural notes belonging to the conciunous division of the octave.

Here too it must be added, with respect to the two different divisions of the octave, that a note may belong to the same *key*, i. e. it may have a just musical relation to the same fundamental in one kind of division; and be out of the *key*, with respect to another.

Now a piece of music may be carried through several *keys*; i. e. it may be given in one *key*, and be led out of that into another, by introducing some note foreign to the first, and so on to another: but a regular piece must not only return to the first *key*, but those other *keys*, too, must have a particular connexion with the first. It may be added, that those other *keys* must be some of the natural notes of the principal *key*, though not any of them at pleasure.

As to the distinctions of *keys*, we have already observed, that to constitute any given note or sound, a *key*, or fundamental note, it must have the seven essential or natural notes added to it; out of which, or their octaves, all the notes of the piece must be taken, while it keeps within the *key*, i. e. within the government of that fundamental. It is evident, therefore, there are but two different species of *keys*, which arise according as we join the greater or less third, these being always accompanied with the sixth or seventh of the same species, the third *g*, for instance, with the sixth and seventh *g*; and the third *b* with the sixth and seventh *b*.

This distinction is expressed under the names of *sharp key*, which is that with the third *g*, &c. and the *flat key*, which is that with the third *b*, &c. whence it is plain, that how many different closes soever there be in a piece, there can be but two *keys*, if we consider the essential difference of *keys*; every *key* being either flat or sharp, and every sharp *key* being the same, as to melody, as well as every flat one.

It must be observed, however, that in common practice the *keys* are said to be different, when nothing is considered but the different tune, or pitch of the note, in which the different closes are made. In this sense, the same piece is said to be in different *keys*, according as it is begun in different notes, or degrees of tune.

To prevent any confusion which might arise, from using the same word in different senses, Mr. Malcolm proposes the word *mode* to be substituted instead of the word *key*. In the former sense; that is, where it expresses the melodious constitution of the octave, as it consists of seven essential or natural notes, besides the fundamental; and in regard there are two species of it, he proposes, that that with a third *g* be called the *greater mode*; and that with a third *b*, the *lesser mode*; appropriating the word *key* to those notes of the piece in which the cadence is made; all of which may be called *different keys*, in respect of their different degrees of tune.

To distinguish then accurately between a *mode* and a *key*, he gives us this definition; viz. an octave, with all its natural and essential degrees, is a *mode*, with respect to the constitution, or manner of dividing it; but with respect to its place in the scale of music, i. e. the degree or pitch of tune, it is a *key*; though that name is peculiarly applied to the fundamental.

Whence it follows, that the same mode may be with different *keys*; i. e. an octave of sounds may be raised in the same order, and kind of degrees, which makes the same mode, and yet be begun higher or lower; i. e. be taken at different degrees of tune, with respect to the whole, which makes different *keys*; and, *vice versâ*, that the same *key* may be with different modes. i. e. the extremes of two octaves may be in the same degree of tune, yet the division of them be different.

KEYS also denote those little pieces in the fore-part of an organ, spinett, or harpsichord; by means whereof the jacks are played, so as to strike the strings of the instrument; and wind is given to the pipes, by raising and sinking the sucker of the sound-board.

In large organs there are several sets of these *keys*; some to play the small second organ, some for the main organ, some for the trumpet, and some for the echoing trumpet. In some these are but a part that play, the rest being for ornament. There are twenty slits in large *keys*, which make the half notes.

M. Bulioutki, of Douliez, pretends to have invented a new kind of *keys*, much preferable to the common ones. With these, he says, he can express sounds, which follow each other in a continual geometrical proportion; and so can furnish all the sounds in music, and by consequence all the imaginary intervals and concords; whereas the common *keys* do but yield some of them.

KEY, in a *Naval Sense*. See KAY.

KEYS, in *Sea Language*, a name given to certain rocks lying near the surface of the water, particularly in the West *Indies*.

KEYS, a denomination given to the seeds of the ash.

KHAZINE, the grand seignior's treasury. See TREASURY, and EXCHEQUER.

Here are kept registers of receipts, accounts of provinces, in drawers, marked with the years, and the places names: here is also kept part of the emperor's wardrobe.

Every day of the divan this treasury is opened, either to take out, or put something in; and the principal officers, who have the charge of it, are all to assist at this opening. The tchaouch-bachi, in their presence, first breaks the wax wherewith the key-hole had been sealed up, and, carrying it to the grand vizir, that minister first kisses it, and then draws out of his bosom the grand seignior's gold seal. In the mean time he looks narrowly after the officer, who when he has done his business in the treasury, locks and seals up the place, and returns the seal to the vizir with the same ceremony as before.

Besides this, there are other apartments for the money, where the officers are never allowed to enter with any cloaths that have pockets in them.

KIBES. See CHILBLAIN.

KICKER *against the spurs*, in the *Manage*, See RAMINGUE.

KID, in *Zoology*, the name by which young goats are called. *See* GOAT.

KIDDERS, those that badge, or carry corn, dead victuals, or other merchandiſe, up and down to ſell: every perſon being a common badger, *kidder*, lader, or carrier, &c. ſays the ſtat. 5 Eliz. cap. 12. And they are called *kidders*, 13 Eliz. cap. 25.

KIDDLE, or KIDEL, *Kidellus*, a dam or wear in a river, with a narrow cut in it, for the laying of pots, or other engines to catch fiſh.

The word is ancient; for in Magna Charta, cap. 24. we read, *omnes kidelli deponantur per Thamefiam & Medowayam & per totam Angliam, niſi per coſteram maris.* And by king John's charter, power was granted to the city of London, *de kidellis amovendis per Thamefiam & Medowayam.* A ſurvey was ordered to be made of the weirs, mills, ſtanks, and *kidells*, in the great rivers of England, 1 Hen. IV. Fiſhermen of late corruptly call theſe dams *kettles*; and they are much uſed in Wales, and on the ſea-coaſts of Kent.

KIDDOW, in *Ornithology*, the moſt common Engliſh name of the LOMWIA, a web-footed bird, common on our ſhores, and called in different places the guillemot or guillem, and the ſea-hen, and ſkout.

KIDNAPPING, in *Law*, is the offence of ſtealing and conveying away a man, woman, or child, and at common law is puniſhable by fine, pillory, &c. Alſo if a maſter of a ſhip ſhall, during his being abroad, force any man aſhore, and wilfully leave him behind, he ſhall ſuffer three months impriſonment. 11 & 12 W. III. c. 7.

KIDNEY, *ren*, in *Anatomy*, a part of an animal, whoſe uſe is to ſeparate the urine.

The *kidneys* are two, ſituate one on each ſide; one between the liver and muſculus lumbaris, on the right ſide; the other between the ſpleen and the ſame muſcle, on the left ſide. In man, the right is lower than the left; but in quadrupeds it is uſually the contrary; they are faſtened to the loins and the diaphragm, by their exterior membrane, and to the bladder by the ureters; the right is alſo faſtened to the inteſtinum cœcum, and the left to the colon; their figure reſembles a bean, or rather a creſcent, being curve on the ſide of the vena cava, and on the outſide gibbous.

There are ordinarily but two *kidneys*, though ſometimes three have been found, and ſometimes four, and ſometimes on the other hand only one. In men they are commonly about five inches long, and three broad, and one and a half thick; their ſubſtance is compoſed of glands, and very ſmall urinary pipes, or canals; the glands form the circumference, and ſerve to ſeparate the urine; the papillæ, or urinary tubes, form the inner part; they come out of the glands, and carry the urine into a cavity in the concave part of the *kidney*, called the PELVIS; whence it paſſes through the ureters into the bladder.

The *kidneys* are covered with two membranes; they have each of them arteries and veins; the arteries come from the aorta, and the veins terminate in the cava; theſe are all called *emulgents*. They have nerves alſo, which take their origin from the plexus renalis, formed by the ramifications of the intercoſtal nerve, and the nerves of the loins.

The lymphatic veſſels of the *kidneys* appear upon blowing by the ureter into the pelvis of the *kidney*.

The *kidneys* ſecrete the urine from the blood, which, by the motion of the heart, is driven through the arteries into the emulgent arteries, and theſe carry it into the little glands; where its ſeroſity being ſeparated, it is received in at the orifices of the urinary pipes, which go from the glands to the pelvis, and thence runs by the ureters into the bladder; the blood, which could not enter the glands, is brought back by the emulgent veins. See *Tab. Anat. (Splanch.) fig. 1. litt. II. fig. 4. litt. b b, c c.*

KIDNEYS, *inflammation of the*. See NEPHRITIS.

KIDNEYS *of fiſh*. Fiſh of all kinds have *kidneys*, but they differ extremely in the ſeveral genera. All the cetaceous fiſhes, and many of the cartilaginous kinds, have two *kidneys*, as quadrupeds have. In moſt of the ſpinoſe kinds, they are found concreted into one. In the ſpinoſe fiſhes they are oblong, and extended throughout the whole length of the abdomen. In the cetaceous fiſhes they are of a roundiſh oblong figure, as in quadrupeds; and as to their ſituation, the ſpinoſe fiſh in general have them extended all along the back-bone, and the cetaceous kinds are on the contrary in the lower part of the belly; they are very long and large in the ſpinoſe kinds, and very ſmall and ſhort in the cetaceous. The urinary bladder is generally ſituated in the lower part of the abdomen in theſe creatures, and often lies upon the rectum. There are generally two ureters, by which the urine is ſecreted from the *kidneys* into it; but the urethra, through which the urine is to be diſcharged from the bladder, is leſs obvious in the ſpinoſe fiſhes. In the cetaceous kinds, it is plainly to be followed either into the vulva, or *foramen ſeminis*.

KIDNEY *beans*, in *Botany*. See *Kidney* BEANS.

KIDNEY *bean tree*. See *Liquorice* VETCH.

KIDNEY *wort*. See HERB *bennet*, and NAVEL *wort*.

KIGGELARIA, in *Botany*, a genus of the *dioecia decandria* claſs. Its characters are theſe: the male and female flowers are ſituated on different trees; the male flowers have an epalement of one leaf, cut into five concave ſegments, and five concave petals, which are ſhaped like a pitcher, each having a honey gland faſtened to the baſe, with three obtuſe coloured lobes; and have ten ſmall ſtamina; the female flowers have petals like the male, but no ſtamina; in the centre is ſituated a roundiſh germen, which becomes a rough globular fruit, with a thick cover, having one cell, filled with angular ſeeds. We have but one ſpecies of this genus, which grows naturally at the Cape of Good Hope. Miller.

KILCH, in *Ichthyology*, a name uſed by ſome for a ſpecies of fiſh of the albula kind, caught in the lakes of Germany, of a fine firm fleſh and delicate flavour, and ſeems very little, if at all, different from the FERRA.

KILDERKIN, a kind of liquid meaſure, which contains two firkins, or eighteen gallons, beer-meaſure, and ſixteen ale-meaſure.

Two *kilderkins* make a barrel, and four an hogſhead.

KILLAS, in *Natural Hiſtory*, a name given by the people who dig in the mines of Cornwall, to a kind of greyiſh white earth, which is of great hardneſs, and ſeems to approach very much to the nature of the *lapis Helmontii* of ſome kinds, only that it is ſomewhat leſs hard than that, and has nothing of the ſepta or partitions that make the character of that foſſil. This earth contains ſo great a quantity of ſpar, that it ferments with acids very ſtrongly, though that ſpar being once diſſolved, and the earthy part of the ſubſtance only left, it will no longer ferment with theſe menſtruums; whence it is evident, that its terreſtrial matter is not alkaline, though the ſpar it contains is ſo.

This is the certain character of what is called *killas* in many parts of Cornwall, where it lies in ſtrata of two, three, or more feet thick, and often beſide this is laid on each ſide of the vein of tin or other ore. But in ſome other parts of England, the miners uſe the ſame word to expreſs a kind of white, brittle, and ſhattery ſtone, ſomewhat like the flag-ſtone with which they cover houſes in Northamptonſhire, and many other counties.

KILLAS is alſo uſed as the name of a flaky ſtone of various colours, ſpangled all over with talc in ſmall flakes in the place where they uſe it. In this ſenſe they generally expreſs themſelves, when talking of the earth deſcribed above, by the phraſe *white killas*. They alſo ſometimes call this flaky ſtone by the name DELVIN.

KILLKENNY-*marble*, a fine black marble full of ſhells, and coralloide bodies, and much uſed in chimney-pieces, &c. See *Coralloide* MARBLE.

KILLOS, a name given by the miners of Cornwall to a ſtone of the ſlate kind, found in the mines there. See GROWAN.

KILLOW, or CULLOW, an Engliſh name for a black earth of a very remarkable ſtructure, ſeeming of a mixed nature between the marbles, ochres, and clay; and uſually containing a large quantity of the matter of the common vitriolic pyrites or ink-ſtone, which gives it a very ſharp unpleaſant taſte, and makes it, when thrown on the fire, emit a ſlight blue-flame of a ſulphureous ſmell, and calcine to a deep red. It is common in many parts of England, Wales, and Ireland. It is lighter than any of the other clays, though that is the genus to which it moſt properly belongs; and it is of an uneven ſurface, and ſhattery ſtructure.

KILLYTH-STALLION, in our *Old Writers*, is where lords of manors were bound by cuſtom to provide a ſtallion for the uſe of their tenants mares.

KILN, a ſtove uſed in the manufacture of various articles. A fabric formed for admitting heat, in order to dry or burn materials placed in it to undergo ſuch operations.

KILN, *brick*. See BRICK.

KILN *for drying hops*. See HOPS and OAST.

KILN, *lime*. The *kilns* uſed for chalk or ſtone, they commonly make in a large pit, which is dug either round or ſquare, according as they have convenience; and is of ſuch a ſize as will be proper for the quantities they intend to burn. They are wideſt at the top, and narrower, by degrees, as they come nearer the bottom. The inſide of this pit is lined with a wall built of lime-ſtones at the outſide, near the bottom, they have a hole, or door, by which they take out the aſhes, and above that ſome have an iron grate, which comes cloſe to the wall all about it; but others arch it over with ſtone, or large

pieces

piece of chalk; and upon this they lay a layer of ſtone, or of whatever elſe they burn in the pit; upon this they place a layer of wood, or coals, and ſo on, layer over layer, to the top of the pit; only they obſerve, that the outermoſt layer be always of the fuel, not of the ſtone. When the *kiln* is thus filled, they give fire at the hole underneath, and the lime is finiſhed in a different time, according to the nature of the ſubſtance. That made of chalk is commonly burnt into lime in twenty-four hours; but lime-ſtone generally takes ſixty hours in burning. Ten buſhels of ſea-coal, or one hundred of faggots, three feet long, will burn forty buſhels of chalk, and this will yield thirty buſhels of unſlaked lime. Where chalk is ſcarce, they work up the chalk rubbiſh into a ſort of ſtiff paſte with water, and make it into a ſort of bricks, which they dry in the air, and then burn them into lime in the common way; but this is not quite ſo good as the other. But lime taken out of the *kiln*, and mixed into a very ſoft paſte with water, and then mixed with ſand, makes a kind of mortar, very much ſuperior to the common ſort. See LIME.

KILN, *malt*. See MALT.

KILNS *for drying maddor, ſaffron*, &c. ſee the reſpective articles.

KILN *for tin-ore*. The place where the tin-ore is roaſted in order to burn away the mundic, and other ſulphureous matters that are mixed with it, is called the *tin-kiln*. This is of a very plain ſtructure; its hearth or floor is made of one large ſtone, and this is covered with another, ſupported at ſix inches height above it. The uppermoſt has a hole in the middle, through which the ore is pounced on the under one; and when it is diſtributed over it in a bed of three or four inches thick, it is burnt by means of a fire of furze-buſhes kept underneath, and communicating with the ſpace between the two ſtones by an aperture behind; the lower ſtone not reaching the wall by ſix inches.

When the ſulphur is all burnt away by the fire, and the flame is no longer blue, the whole bed of roaſted ore is thruſt off the ſtone by the rake into the aperture behind, through which it falls into the open fire. The fire is kept up with new buſhes, and there is a new bed of ore thrown in at the hole above. Thus the fire is kept up day and night, and ſupplies of freſh ore made through the hole by the black tin brought from the buddles of waſhing troughs. When the lower part of the furnace is filled up with the ore thrown into it, there is a hole behind the *kiln*, through which this ore, and the coals and aſhes, are all raked out together, and left in the open air to cool; and the whole maſs thus raked out, with ſometimes be ſeveral days in cooling, the mixture of coals among it keeping it red-hot for a conſiderable time. When it is taken away from behind the furnace, it is waſhed again before it is put into the melting furnace. It is obſerved, that the different ores require for this laſt operation a different proportion, and different ſort of fuel. The moor-tin, that is, ſuch ore as is dug up in the moory countries, melts beſt with moor-coal charred; but that dug on the hills is found to run beſt with a mixture of charcoal and peat in equal quantities. The ſtones uſed for the *kilns* are always moor-ſtone. Phil. Tranſ. N° 69.

KIMBULA, in *Zoology*, the name of a ſpecies of crocodile found in the iſland of Ceylon, and of a very beautiful variegation of colours, being mottled all over with extremely elegant black ſpots ſhining with the gloſs of black velvet.

KIN-*bote*, compenſation for the ſlaughter of a kinſman. See BOTE.

KINAKINA *aromatica*, in the *Materia Medica*, a name by which ſome authors have called the *cortex winteranus*.

KINDRED, in *Law*, are a certain body of perſons of kin, or related to each other. See ADMINISTRATION, AGNATI, COGNATI, CONSANGUINITY, and DEGREES.

KINE, in *Zoology*. See BULL and COW.

KING, a monarch, or potentate, who rules ſingly and ſovereignly over a people.

Camden derives the word from the Saxon *cyning*, which ſignifies the ſame; and that from *can, power*, or *ken, knowledge*, wherewith every monarch is ſuppoſed to be inveſted. The Latin *rex*, the Scythian *reix*, the Punic *reſch*, the Spaniſh *rey*, the French *roy*, come all, according to Poſtel, from the Hebrew ראש, *reſch, chief, head*. *Kings*, both among the ancient Greeks and Romans, were prieſts as well as princes. Virgil, ſpeaking of Anius, king of Delos, ſays,

Rex Anius, rex idem hominum, Phœbique ſacerdos.

As to the Romans, Livy and Dionyſius are expreſs; they ſay, that though Numa inſtituted a great number of orders of prieſthood, yet ſome he diſcharged himſelf, and in perſon. After the expulſion of the *kings*, they were obliged to create a *rex ſacrorum*, a *king* of the ſacrifices, for the adminiſtration of the prieſtly part of the royalty.

Lawyers ſay, the *king* of England is a mixed perſon, a prieſt as well as a prince: at his coronation he is anointed with oil, as the prieſts and *kings* of Iſrael were, to intimate, that his perſon is ſacred.

Among the Greeks, the *king* of Perſia had anciently the appellation of the *great king*; the *king* of France now has that of the *moſt Chriſtian king*, and the king of Spain has that of *catholic king*. See CATHOLIC.

The *king* of the Romans is a prince choſen by the emperor, as a coadjutor in the government of the empire.

The *kings* of England, by the Lateran council, under pope Julius II. had the title of *Chriſt anoiſſimus* conferred on them; and that of *DEFENDER of the faith* was added by pope Leo X. though it had been uſed by them ſome time before.

The title of *grace* was firſt given to our *kings* about the time of Henry IV. and that of *moſtly* firſt to Henry VIII. before which time our *kings* were called grace, highneſs, &c.

In all public inſtruments and letters, the *king* ſtyles himſelf *we*, us; though till the time of *king* John, he ſpoke in the ſingular number.

The Hungarians formerly gave the name *king* to their queen Mary, to avoid the infamy which the laws of that country caſt upon thoſe who are governed by women: accordingly, the bore the title of *king* Mary, till her marriage with Sigiſmund, at which time ſhe took the title of queen.

The laws make it *high* TREASON barely to imagine or intend the death of the *king*; and, becauſe the deſtruction of the *king* may riſque that of his great counſellors or officers, it is felony in any of the *king*'s ſervants to conſpire even that; though in other capital caſes, it is a rule, that *voluntas non reputabitur pro facto*; and an Engliſhman ſhall not, in any other caſe, be put to death, unleſs the deed follow the intent. The *king*'s office (as he promiſes at his coronation) is to preſerve the rights and privileges of the church, the prerogative of the crown, the laws and cuſtoms of the realm, &c. or, as Forteſcue has it, he is *pugnare bella populi ſui, & eos rectiſſime judicare*. See *Coronation* OATH. He acknowledges no precedence in any other prince but the emperor.

The *king* is conſidered by the laws of England as the head and ſupreme governor of the national church. 26 Hen. VIII. cap 1. 1 Eliz. cap. 1. In virtue of this authority, he convenes, prorogues, reſtrains, regulates, and diſſolves, all eccleſiaſtical ſynods or convocations.

He has the ſupreme right of patronage, called *patronage paramount*, over all the eccleſiaſtical benefices in England. He has power, by his prerogative, without any act of parliament, to make war or peace, conclude leagues and treaties, grant ſafe-conducts, give commiſſions for raiſing and regulating fleets and armies, as well as for erecting, manning, and governing forts, and other places of ſtrength, to appoint ports and havens, to erect beacons, light-houſes, and ſea-marks, to prohibit the exportation of arms or ammunition out of the kingdom, diſpoſe of magazines, caſtles, ſhips, public moneys, &c. He has the ſole power of ſending ambaſſadors to foreign ſtates, and of receiving ambaſſadors at home. He convokes, adjourns, prorogues, and diſſolves parliaments; and may refuſe his aſſent to any bill paſſed by both houſes, without giving his reaſons for it. See DOCTRINE.

He may increaſe the number of members of either houſe at pleaſure, by creating new peers, and beſtowing privileges on other towns for ſending burgeſſes to parliament. But this part of the prerogative of increaſing the number of parliament-men, in the lower houſe, ſeems to be given up by the late *kings*. The *king* is entruſted with the ſole power of conferring dignities and honours, ſo that all degrees of nobility, knighthood, and other titles, are received by immediate grant from the crown; either expreſſed in writing, by writs or letters patent, as in the creation of peers and baronets; or by corporal inveſtiture, as in the creation of a ſimple knight. And as the *king* may create new titles, ſo he may create new offices, but with this reſtriction, that he cannot create new offices with new fees annexed to them, nor annex new fees to old offices: for this would be a tax upon the ſubject, which cannot be impoſed but by act of parliament. The *king* has alſo the prerogative of conferring privileges upon private perſons; ſuch as granting place or precedence to any of his ſubjects; ſuch is alſo the power to enfranchiſe an alien, and make him a denizen. Such is likewiſe the prerogative of erecting CORPORATIONS.

The *king* is alſo the arbiter of commerce. Under this branch of the prerogative he has power to eſtabliſh public marts, or places of buying and ſelling; ſuch as markets and fairs, with the tolls belonging to them; and likewiſe to regulate weights and meaſures; to give money, which is the medium of commerce, authority, or to make it current; and the coining of money is the act

of the sovereign power, and the settling of the denomination or value for which the coin is to pass current. The *king* may also at any time decry or cry down any coin of the kingdom, and make it no longer current.

Debts due to him are always to be satisfied in the first place, in case of executorship, &c. and till his debt is discharged, he may protect the creditor from the arrests of others. He may distrain for the whole debt on a tenant that holds but part of the land; is not obliged to demand his rent as others are; may sue in what court he pleases, and distrain where he sues. In all doubtful cases, *semper præsumitur pro rege*: no statute restrains him, unless he be particularly named. In all cases where the *king* is plaintiff, his officers may enter with an arrest; and, if entrance be denied, break open a house, and seize the party; though in other cases a man's house is his castle, and has a privilege to protect him against all arrests.

He has custody of the persons and estates of idiots and lunatics; he is *ultimus hæres regni*, and to him revert all estates, when no heir appears. All treasure-trove (i. e. money, plate, or bullion, found, and the owners not known) belongs to him; so all waifs, estrays, wrecks, lands recovered from the sea, gold and silver mines, royal fishes, &c. belong to him. See REVENUE. He can unite, separate, enlarge, or contract, the limits of bishopricks, or ecclesiastical benefices, and by his letters erect new bishopricks, colleges, &c. See REGALIA.

He can dispense with the rigour of the ecclesiastical laws, except those which have been confirmed by act of parliament, or declared by the bill of rights; as, for a bastard to be a priest, for a bishop to hold a benefice in commendam, &c. He has also power to dispense with several acts of parliament, and penal statutes, by a non-obstante, where himself is alone concerned; to moderate the rigour of the law, according to equity; to pardon a man condemned by law, except in appeals of murder, and in case of impeachments by the house of commons; and to interpret by his judges, in statutes and cases not defined by law.

But though he be intrusted with the whole executive power of the law, yet he cannot sit in judgment in any court; for justice must be administered according to the powers committed and distributed to the several courts.

The law esteems him God's vicegerent on earth, and ascribes various perfections to him, not belonging to any other man. *Rex est vicarius*, says Bracton, *et minister Dei in terra. Omnis quidem sub eo est, et ipse sub nullo nisi tantum sub Deo.* He is said to have imperial dignity; and in charters before the Conquest is frequently stiled *basileus* and *imperator*, the titles respectively assumed by the emperors of the East and West. His realm is declared to be an empire, and his crown imperial, by many acts of parliaments, particularly the statutes 24 Hen. VIII. cap. 12. and 25 Hen. VIII. cap. 28. which at the same time declare the *king* to be the supreme head of the realm in matters both civil and ecclesiastical, and consequently inferior to no man upon earth, dependent on no man, and accountable to no man. See also 24 Geo. II. cap. 24. 5 Geo. III. cap. 27. Hence it is that no suit or action can be brought against the *king*, even in civil matters; because no court can have jurisdiction over him. The law also ascribes to the *king*, in his political capacity, absolute perfection. The *king* can do no wrong; by which ancient and fundamental maxim we are not to understand, that every transaction of government is of course just and lawful, but that whatever is exceptionable in the conduct of public affairs is not to be imputed to the *king*, nor is he answerable for it personally to his people; and farther, that the prerogative of the crown extends not to do any injury: it is created for the benefit of the people, and, therefore, cannot be exerted to their prejudice. In the *king* there is no folly or weakness; no injustice or error; and, therefore, if the crown should be induced to make an improper grant of any franchise or privilege, the law declares that the *king* was deceived in his grant, and thereupon such grant is rendered void, merely upon the foundation of fraud and deception, either by or upon those agents whom the crown had employed. Yet, notwithstanding this personal perfection which the law ascribes to the sovereign, the constitution has allowed a latitude of supposing the contrary, in respect of both houses of parliament; each of which, in its turn, hath exerted the right of remonstrating and complaining to the *king* even of those acts of royalty, which are most properly his own; such as messages signed by himself, and speeches delivered from the throne; nevertheless, for the sake of freedom of debate, these acts of state are usually supposed to proceed from the advice of the administration. In the *king* likewise there can be no negligence or *laches*, and, therefore, no delay will bar his right: *nullum tempus occurrit regi*. In the *king* also there can be no infancy, stain, or corruption of blood. By his crown he is, *ipso facto*, cleared of all attainder; no non-age or minority are allowed to him; and his very grants of lands, though held in his natural capacity, cannot be avoided by non-age. Nay more, the law ascribes a kind of perpetuity, or immortality to him: *rex Angliæ non moritur*. His death is termed his *demise*, because the crown is thereby demised to his heir.

He is said not to be liable to death, as being a corporation of himself, that lives for ever. There is no interregnum, but the moment one *king* dies, his heir is *king*, fully and absolutely, without any coronation, ceremony, &c. To these, it may be added, that the law attributes a kind of ubiquity to the *king*; he is in a manner every where, in all courts of judicature, which he alone has the right of erecting, and therefore cannot be nonsuited. The power of issuing proclamations is vested in the *king* alone, considered as the fountain of justice.

Some things, however, there are which the *king* cannot do; viz. he cannot divest himself, or successors, of any part of his regal PREROGATIVE, authority, &c. There are several things also which he cannot do *salvo jure, salvo juramento, & salva conscientia sua*: in particular, there are two things which he cannot do without the consent of parliament; viz. make new laws, or raise new taxes.

KING, *champion of the.* See CHAMPION.

KING, *charters of the.* See CHARTER.

KING, *committee of the.* See COMMITTEE.

KING, *peace of the.* See PEACE.

KING, *quarantain of the.* See QUARANTAIN.

KING, *revenue of the.* See REVENUE.

KING, *succession of the.* See CROWN, *right of.*

KING, *tenant of the.* See TENANT.

KING, *widow of the.* See WIDOW.

KING *of the Romans.* See ROMANS.

KING, among *Hebrew Grammarians*, is an appellation given to a species of accents answering to our colon. See ACCENT.

KING *of the mullets.* See MULLUS *imberbis*.

KING *of the quails.* See DAKER *hen*.

KING *of the sacrifices, rex sacrificulus*, or *sacrorum*, was a title of an ancient priest, or minister of religion, at Rome; who was superior to the flamen dialis, but inferior to the pontifex maximus.

He was created at the comitia centuriata, or assembly of the centuries, and was at first chosen out of the number of the patricians. He could not, during his office, hold any magistracy, nor harangue the people. He presided at all the sacrifices, proclaimed the feasts, &c.

His wife bore the title of *queen of the sacrifices, regina sacrorum*; and had herself a part in the sacred ceremonies.

KING *at arms, or of arms*, is an officer of great antiquity, and anciently he was of great authority; his business is to direct the heralds, preside at their chapters, and have the jurisdiction of armory.

The origin of this title is doubtful. Some of the French writers imagine, that it was given to heralds, because they attended upon and regulated military ceremonies. Others attribute to them the style of *kings*, because they governed and presided in ceremonies of tournaments, in like manner as the master of the ceremonies at Athens was styled *βασιλευς*. Others again ascribe the title to them, because in alliguing arms, as expressions of honour to any person, they resembled the kingly prerogative. But this supposes that the custom of granting arms by the *kings* of heralds is as ancient as their titles; whereas Mr. Edmondson observes, in his Complete Body of Heraldry, that it doth not any where appear that these *kings* had anciently the addition *armorum* given to them, they being then called, as they truly were, *reges heraldorum*; which for the most part continued till about the reign of Henry IV. when they began to be entitled *reges armorum*, although their primitive appellation was also used for some ages. The latter title of *reges armorum* was attributed to them before such time as those officers made any grant of arms.

In England we have three *kings* of arms, viz. Garter, Clarencieux, and Norroy.

Garter, principal KING *at arms.* See GARTER.

The two last are also called *provincial heralds*, because they divide the kingdom between them into two provinces.

These, by charter, have power to visit noblemen's families, to set down their pedigrees, distinguish their arms, appoint persons their arms, and, with *Garter*, to direct the other heralds.

Anciently the *kings at arms* were created, and solemnly crowned, by the *kings* of England themselves; but of later days the earl marshal has a special commission, at every creation, to personate the *king*.

To these may be added, *Lyon* KING *at arms*, for Scotland, who is the second *king at arms* for Great Britain; the

he is invested and crowned with great solemnity. To him belong the publishing the *king's* proclamations, marshalling funerals, reversing arms, &c. And also Ulster *king of arms* in Ireland. See COLLEGE *of Heralds.*

KING's *bench.* See COURT *of king's bench.*

KING's *evil.* See EVIL.

KING's *exchange.* See EXCHANGE.

KING's *houshold.* See HOUSHOLD, GREENCLOTH, COFFERER, and REVENUE.

KING's *library.* See LIBRARY.

KING's *palace.* The limits of the *king's* palace at Westminster extend from Charing-cross to Westminster-hall, and shall have such privileges as the ancient palaces. 28 Hen. VIII. If any person shall strike another in the *king's* palace, he shall have his right-hand cut off, be imprisoned during life, and also be fined. 32 Hen. VIII. cap. 12.

KING's *prerogative.* See PREROGATIVE, and KING.

KING's *privy council.* See PRIVY-*council.*

KING's *silver*, the money due to the king in the court of common pleas, *pro licentia concordandi*, in respect of a licence there granted to any man for levying a fine of lands, or tenements, to another person. See CLERK.

KING's *spear*, *asphodelus*, in *Botany*, a genus of the *hexandria monogynia* class. Its characters are these: the flower has no empalement; it is of one leaf, cut into six parts, which spread open; at the bottom is inserted a globular nectarium, having six valves, and it has six stamina, which are inserted in the valves of the nectarium; between the nectarium is placed a globular germen, which becomes a fleshy seed-vessel, having three cells filled with triangular seeds. There are six species.

Linnæus mentions only three species.

The several sorts of this plant all flourish very well in any soil that is not too wet, which is subject to rot the roots in winter; and the way to increase them, is by parting their roots in August, before they shoot up their fresh green leaves. They may also be raised from seeds sown in August, and the August following the plants produced from these may be transplanted into beds, and will produce flowers the second year. They must not be planted in small borders, among tender flowers, for they will draw away all the nourishment, and starve every thing else. Miller.

The roots of asphodel are of an acrimonious taste, and heating quality; being drank, they promote urine, and the menses; and the weight of a dram taken in wine, is used with success in pains in the side, coughs, convulsions, and ruptures. They are good against bites of serpents, and make a good cataplasm for foul spreading ulcers, inflammations, &c. The ashes of the burnt root, rubbed on an alopecia, cause new hair to spring.

KING's *thanes.* See THANES.

KING's *war.* See WAR.

KING's *wardrobe.* See WARDROBE.

KING-*fish.* See OPAH.

KING-*fisher*, *ispida*, the *alcedo ispida* of Linnæus, in *Ornithology*, a very beautiful bird frequenting waters, and feeding on fish; it builds in deep holes in the banks of rivers, and lays five, or according to some, nine eggs; it much approaches to the picus or wood-pecker, in many things, but wants its great character, which is the having two toes behind; the legs of this bird are very short, and are black before, and red behind; its colours, particularly its green and blue, which are its general ones, are extremely bright and beautiful; it takes its prey after the manner of the osprey, balancing itself at a certain distance over the water for a considerable space, then darting below the surface, brings up the prey in its feet. While it remains suspended in the air, in a bright day, the plumage exhibits a most beautiful variety of very dazzling and brilliant colours. This bird was called *halcyon* by the ancients. Aristotle has described the bird and its nest, which, according to him, resembled those concretions that are formed by the sea-water, and fashioned in the shape of a long necked gourd, hollow within, but so narrow at the entrance, that if it overset, the water could not enter. This nest was called *halcyonium*, and had medical virtues ascribed to it. This nest was a floating one, and therefore it was necessary for the poets who have described it to place it in a tranquil sea, and to supply the bird with charms to allay the fury of a turbulent element during its incubation; for it had, at that season, power over the seas and winds. During the days of this bird's incubation, in the depth of winter, the mariner might sail in full security; and, therefore, they were called HALCYON *days.* See *Tab.* III. *of Birds*, N° 27.

KING-*piece*, in any buildings, is a piece of timber standing upright in the middle, between two principal rafters, and having struts or braces going from it to the middle of each rafter.

KINGDOM, among *Chemists*, is a term which they apply to each of the three orders or classes of natural bodies; *animal*, *vegetable*, and *mineral.*

KINGS, *books of*, two canonical books of the Old Testament, so called, because they contain the history of the *kings* of Israel and Judah, from the beginning of the reign of Solomon, down to the Babylonish captivity, for the space of near six hundred years. The first book of *Kings* contains the latter part of the life of David, and his death; the flourishing state of the Israelites under Solomon, his building and dedicating the temple of Jerusalem, his shameful defection from the true religion, and the sudden decay of the Jewish nation after his death, when it was divided into two kingdoms; the rest of the book is taken up in relating the acts of four *kings* of Judah, and eight of Israel. The second book, which is a continuation of the same history, is a relation of the memorable acts of sixteen *kings* of Judah, and twelve of Israel, and the end of both kingdoms, by the carrying off the ten tribes captive into Assyria by Salmanassar, and the other two into Babylon by Nebuchadnezzar.

It is probable that these books were composed by EZRA, who extracted them out of the public records, which were kept of what passed in that nation.

KINK-*cough.* See CHIN-*cough.*

KINKS, in the *Sea Language.* When ropes are new, or too hard laid, they are apt in foldings to make turns, which are called *kinks.*

KINNOR, in the *Jewish Antiquities.* See CINYRA, and CHINNOR.

KINTAL, or QUINTAL, a weight of one hundred pounds, more or less, according to the different usage of divers nations.

The *kintal* of Smyrna is 123 pounds 3 ounces 9 drachms, or 120 pounds 7 ounces 12 drachms; but that of Aleppo is 465 pounds 11 ounces 15 drachms.

KIPE, a kind of osier basket, wide in the middle, and narrow at both ends; used for taking fish.

KIPE is also a game, which consists in throwing something into a hole, called the *kipe*-hole.

KIPPER. See *Salmon* FISHERY.

KIPPER-TIME, a space of time between the festival of the finding of the Holy Cross, May the *third*, and Twelfth-day, during which, salmon-fishing in the river Thames, from Gravesend to Henley, is forbidden by Rot. Parl. 50 Edw. III.

KIRK-MOTE, a synod. See SYNOD.

Sometimes the word is also taken for a meeting in the church, or vestry. See MOTE.

KIRK-SESSIONS, the name of a petty ecclesiastical judicatory in Scotland. Each parish, according to its extent, is divided into several particular districts, every one of which has its own elder and deacon to oversee it. A consistory of the ministers, elders, and deacons of a parish, form a *kirk-session.*

These meet once a week, the minister being their moderator, but without a negative voice. It regulates matters relating to public worship, elections, catechizing, visitations, &c. It judges in matters of less scandal; but greater, as adultery, are left to the presbytery; and in all cases an appeal lies from it to the presbytery.

KIRTLE, a term used for a short jacket; also for a quantity of flax about a hundred weight.

KIS, in *Natural History*, a name given by some people to the common pyrites; and by others to a peculiar kind of it, containing copper, and a small quantity of silver.

KISSINA, in *Botany*, a name by which some authors have called the tree, whose wood is the *agallochum*, or lignum-aloes of the shops.

KIST, a word used by Paracelsus as the name of a weight, equal to fourteen grains.

KIT, in *Music*, the name of a small violin of such form and dimension as to be capable of being carried in a case or sheath in the pocket. Its length, measuring from the extremities, is about sixteen inches, and that of the bow about seventeen. Small as this instrument is, its powers are coextensive with those of the violin.

KITCHEN, a room appropriated to the dressing of meat, and furnished with suitable accommodations and utensils for that purpose. See BUILDING.

The *kitchen* in the king's household is under the direction and management of a clerk-comptroller, who has a salary of 500 l. a year, subordinate clerk at 250 l. a year, first clerk at 150 l. a year, junior clerks, two master-cooks, the salary of the first being 237 l. 10 s. a year, and of the second 217 l. 10 s. a year, yeomen, grooms, &c.

KITCHEN-*Garden.* See GARDEN.

KITE, *falco milvus* of Linnæus, in *Ornithology*, the English name of a bird of the hawk-kind, with a brown body, and a white head, sometimes marked with oblong streaks of black; its tail is forked, and of a tawny red, and the wings are immoderately

immoderately long and large, measuring near three times the length of the body; the coverts of the wings are varied with tawny black and white; the thighs are covered with very long feathers; and the legs are yellow and strong. The *kite* generally breeds in large forests, or woody mountainous countries: it lays two or at most three eggs. Its motion in the air distinguishes it from all other birds; being so smooth and even as to be scarce perceptible: Sometimes it will remain quite motionless for a long while: at other times, glide through the sky, without the least apparent action of its wings, from whence it derived the old name *glead*, of the Saxon *Glida*. Lord Bacon observes, that when *kites* fly high, it portends fair and dry weather. Pliny thinks that the invention of the rudder arose from the observation made of the various motions of the tail, when the *kite* was steering through the air. Lib. x. c. 10.

It remains with us the whole year; but in many other countries is a bird of passage.

The whole bird is of use in medicine. The ashes of the bird burnt, are said to be effectual in the gout and epilepsy, being taken inwardly: the same is said of the head and liver when burnt; and the latter also is an ingredient in ophthalmic medicines: the blood mixed with nettles and applied, is said to give relief under the gout: the gall enters the composition of collyria for the eyes; and the fat is used to anoint parts pained with the gout.

KITE, in *Falconry*. See CONDUCTOR.

KITTIWAKE, in *Ornithology*, a species of the GULL kind, being the *larus rissa* of Linnæus: the head, neck, belly and tail are of a snowy whiteness; behind each ear is sometimes a dusky spot; the back and wings are grey; the bill is yellow, tinged with green; the legs are dusky, and have a small knob instead of the back toe. This bird inhabits the romantic cliffs of Flamborough-head, the Bass-isle, the rocks near the castle of Slains in the county of Aberdeen, and Pittenhorn-isle. The young of these birds are a favourite dish before dinner, for whetting the appetite, in North Britain, but they have a rank taste and smell. Pennant.

KIZILBASCH, or KAZELBASCH, a Turkish term signifying *red-head*: applied by way of obloquy to the Persians, ever since Ishmael Sophi, founder of the family last reigning in Persia, who ordered his soldiers to wear a red cap, round which is a scarf or turban with a dozen plaits in it, in memory of the twelve imams, successors of Ali, from whom he pretended to descend.

Vigenere writes the word *kezelbash*, and adds, that, according to the vulgar interpretation among the Persians, the twelve plaits signify the twelve sacraments of their law. But not contented with this, he looks out for another original, and tells us there is a mystery in it, derived from the ancient paganism, when the Persians adored fire, whose heat is denoted by the red colour, which in some measure symbolizes with the sun, held by them in the highest veneration. He adds, that the twelve plaits shew the twelve months of the year, and the twelve signs in which that luminary performs his course.

KLEINIA, in *Botany*. See *Foreign* COLTSFOOT.

KLEINHOVIA, in *Botany*, a genus of the *gynandria decandria* class: the characters of which are, that it is monogynous; the calyx is five-leaved; the petals are five; the nectarium is campanulated, pedunculated and staminiferous; the fruit is an inflated capsule, containing five grains. There is only one species.

KLIMIA, or CLIMIA, in the *Materia Medica*, the name given by the Arabian writers to the *lapis calaminaris*. Avicenna and Serapio never call it by any other name. Some pronounce the word *calimia*. Hence the modern Greeks have formed their *calimia*, which is the name of the same substance; and our *calaminaris* is evidently deduced from the same original.

KLINKERS, in *Fortification*, a sort of small gates made through palisadoes, for sallies.

KLIP-*fish*, in *Ichthyology*, a name by some authors supposed to mean the *lupus piscis*, or wolf-fish; and by others, the common cod fish.

Of the former opinion is Fabricius, who supposes the lupus so called, because it is able to climb up rocks, or generally lies hid among rocks; the word *klip*, in the German signifying a *rock*. Of the other is Schonefeldt, who supposes the cod has its name of *klip-fish*, or rock-fish, from its being usually dried upon the rocks.

KLIP-*fish*, is also a name by which the Dutch in the East-Indies call a flat fish, caught frequently on those shores, and sometimes called also *soldatus piscis*, or the soldier's fish. It somewhat resembles the bream in shape. Its general size is about six or seven inches in length, and it is of a very white and silvery hue. It differs very greatly, however, from the bream in many particulars. The nerves of its back-fin are prickly as in the pearch; its tail is pointed, not forked; and the irises of its eyes are yellow. It is one of the finest fish of the East-Indies. Its flesh is very firm, and falls into large pieces, when dressed, like that of the cod, and is very well tasted.

KNAG, a term used by country people for a knot in wood; also for the branches which grow out in the hart's horn, near the forehead.

KNAPSACK, in *Military Language*, is a rough leather bag, which a soldier carries on his back, containing all his necessaries. Square *knapsacks* are most convenient, and should be made with a division to hold the shoe-blacking-balls, and brushes, separate from the linen. White goat skins are the best.

KNAPWEED, *jacea*, in *Botany*, see CENTAURY.

KNAVE, an old appellation for a man-servant, and so used in 14 E. III. stat. 1. cap. 3.

The word is formed from the Saxon *cnapa*, or Flemish *knape*, which signify the same.

KNAVE also signifies a male-child or boy: in which sense *knave-child* has been frequently used, in contradistinction to a *girl*; and in this sense Wickliff uses the word in his translation of Exod. ii. 6. and other places of the Bible. In the old Saxon translation of Mat. xviii. 6. *Pær wære gaet in cone gardstenn*, was turned *Myn knapa*.

KNAVE has sometimes also been used as an addition; as William Cowper de Denbigh, *knave*, &c. It is a common opinion, that Rom. i. 1. was translated, *Paul a knave of Jesus Christ*. This mistake was occasioned by a Bible in the duke of Lauderdale's library, where the word *knave* is inserted in less characters than the others, and a nature might easily be discerned.

KNAVE-*line*, in a *Ship*, a rope fastened to the cross-trees, under the main or fore-top, whence it comes down by the ties to the yard-head, and there it is reeved through a piece of wood of about two feet long, and so is brought to the ship's side, and there haled up taught to the rails.

KNAUTIA, in *Botany*, a genus of the *tetrandria monogynia* class. Its characters are these: it has several flosculæ flowers, included in one common cylindrical empalement, which have their petals ranged so as to appear like a regular flower, but each separate flosculæ is irregular; in the bottom of each flower is situated the germen, attended by four stamina; which germen changes to a single, oblong, naked, seed. Miller mentions one species, which is nearly of a kin to the scabious; but Linnæus two.

KNAWEL, in *Botany*. See SELERANTHUS.

KNECK, in the *Sea Language*, the twisting of a rope or cable, as it is veering out.

KNEE, *genu*, in *Anatomy*, the articulation of the thigh and leg-bones. See FEMUR and TIBIA.

The mucilaginous glands of the *knee*, which lie near the edges of the patella, are very remarkable; they are disposed in fringes, and supported by a great quantity of fatty matter, which in some measure makes one mass with them. This common mass is contained within the capsular ligament, and on the side of the joint is covered by a very fine membrane, which likewise lines the inner surface of the ligament. The glandulous substance is easily distinguished from the fat by the reddish colour of the capillary vessels, which surround the glands. The superior portion of this mass is, as it were, supported by a small ligament, fixed in the anterior part of the great common notch of the condyles of the os femoris, and which from thence runs to the upper part of the patella. There are also other mucilaginous glands, both above and below the edges of the semilunar cartilages, and likewise in the *knee*: some of these serve for the joint, and the others for the crucial ligaments. These last lie in folds formed by the internal membrane of the capsular ligament, which give particular coverings to the crucial ligaments, and to the other bundles of ligamentary fibres near them. Winslow.

KNEE, *Mumps of the*. See DROPSY.

KNEE, *luxated*. A luxation of the *knee* is a receding of the tibia from under the femur. The leg is sometimes thus luxated from the back of the thigh-bone on the outside, sometimes on the inside, and sometimes backward, but very rarely or never forward; unless it be forcibly driven with great violence that way; for the patella is bound against the articulation forwards, by the strong tensions of the muscles which extend the leg; nor is it indeed easy for the bones of the leg to be wholly displaced from that of the thigh, so as to make a perfect luxation of the *knee*, by reason of the great strength of the ligaments, and the two deep sinuses, which receive the head of the thigh bone, unless those strong ligaments should happen to be broken asunder at the same time. This is the reason also why people, who suffer a perfect luxation of the *knee*, are generally tortured with the most violent and excruciating pains, and convulsions; and if they escape the mischiefs usually attending such symptoms, they are generally troubled afterward with a lameness and

ſtiffneſs of the joint; but ſlight or imperfect luxations of this joint are uſually very ſpeedily and eaſily cured. The patient in this caſe is to be ſeated on a bed, bench, or table, and one aſſiſtant is to hold the thigh firmly above the knee, and another ſtrongly to extend the leg, while the ſurgeon replaces the bones by his hands and *knee*, in their natural ſituation. If the hands and ſlings are not ſufficient, in this caſe, to make a proper extenſion, recourſe muſt be had to the pulſies, generally uſed on ſuch occaſions: but in children and young perſons, great care muſt be taken not to make the extenſion to violent, as to ſeparate the epiphyſes from the bones, to which they are, in ſuch ſubjects, not yet firmly united. After the luxation is properly reduced, the *knee* is to be bound up with a proper bandage, and placed in a frame or caſe, ſo as to be kept at reſt for a proper time. Heiſter, p. 172.

KNEE-*Pan*. See PATELLA.

KNEE, in the *Manage*, is the joint of the fore quarters, that joins the fore thigh to the ſhank.

KNEES, in a *Ship*, thoſe crooked pieces of timber, bowed like a *knee*, that bind the beams and ſtuttocks together, being bolted faſt into them both. Some of theſe ſtand right up and down, ſome along-ſhip. They are uſed about all the decks; ſome hewed to that form, and others naturally ſo, which are certainly the beſt for ſervice. See CARLINE.

KNEE *of the head*, in a *Ship*, a large flat piece of timber, fixed edgeways upon the fore-part of a ſhip's ſtem, and ſupporting the ornamental-figure or image, placed under the bowſprit; it is the ſame with the *cut-water*.

KNEE-*timber*, in a *Ship*, the ſame with the *cut-water*, which is called the *knee of the head*.

KNEE *holm*, or KNEE *holly*. See BUTCHER'S *Broom*.

KNEELING. See GENUFLEXION.

KNEVELS, in a *Ship*. See KEVELS.

KNIFE is a well known inſtrument made for cutting, and adapted in form to the uſes for which it is deſigned.

Knives are ſaid to have been firſt made in England in 1563, by one Matthews, on Fleet bridge, London. Anderſ. Hiſt. Com. vol. ii. p. 402.

Surgeons have various ſorts of *knives*. See BISTOURY and *Tab. Surgery*, *Fig.* 4.—8.

KNIGHT, *Eques*, among the *Romans*, was the ſecond degree of the nobility, following immediately that of the ſenators.

At the time of building the city of Rome, the whole army of Romulus conſiſted of three thouſand foot, and three hundred horſe, which three hundred horſe were the original of the Roman *equites*, or *knights*. Theſe made the ſecond order that had places in the ſenate.

Manutius and Sigonius are of opinion, that beſide the equeſtrian order, and thoſe *knights* immediately below the ſenators, Romulus inſtituted a military order, whereof the Roman cavalry was compoſed. But no ancient author takes notice of any order of knighthood inſtituted on purpoſe for the war, nor any other *knights* but thoſe three hundred, which, as we have obſerved, were the firſt foundation of the equeſtrian order.

The *knights* had horſes kept for them at the public charge; but when they were admitted among the ſenators, they reſigned that privilege: to be a *knight*, it was neceſſary they ſhould have a certain revenue, that their poverty might not diſgrace the order; and when they failed of the preſcribed revenue, they were expunged out of the liſt of *knights*, and thruſt down among the plebeians. Ten thouſand crowns are computed to have been the revenue required.

The *knights* grew ſo very powerful, that they became a balance between the power of the ſenate and the people. They neglected the exerciſes of war, and betook themſelves principally to civil employments in Rome; inſomuch that Pliny obſerves, in his time, they had no longer a horſe kept at the public expence.

Some ſay, that the order of *knights*, as diſtinct from the people, did not begin before the time of the Gracchi; others ſay the privilege was then firſt granted them, that no judge ſhould be choſen, but out of their order: ſome time after which they admitted them into the ſenate. This, however, is certain, it was only from that time that a certain revenue was neceſſary, and that this intitled them to the knighthood, without being deſcended from ancient *knights*.

KNIGHT, in a more modern ſenſe, properly ſignifies a perſon, who, for his virtue and martial proweſs, is, by the king, raiſed above the rank of gentlemen, into a higher claſs of dignity and honour.

The word *knight*, in its original German, *knecht*, ſignifies a *ſervant*; and has ſince been uſed for a ſoldier, or man of war. We have but one inſtance among us where *knight* is uſed in the firſt ſenſe, and that is in *knight of the ſhire*, who properly *ſerves* in parliament for ſuch a county. In the Latin, French, Spaniſh, Italian, and Dutch languages, *knight* is expreſſed by a word which properly ſignifies a *horſeman*, as being uſually employed on horſeback. Indeed our common law calls them *milites*, *ſoldiers*, becauſe they uſually held lands in *knight* ſervice; to ſerve the king as ſoldiers in his wars; in which ſenſe the word *miles* was uſed *pro vaſſallo*.

Knighthood was the firſt degree of honour in the ancient armies, and was uſually conferred with a great deal of ceremony on thoſe who had diſtinguiſhed themſelves by ſome notable exploit in arms. They were originally ſaid to be adopted, *adoptabantur in militiam*, which we now call *dubbed*; as being ſuppoſed, in ſome meaſure, the ſons of him who knighted them.

The ceremonies at the creation of a *knight* have been various. The principal were a box on the ear, and a ſtroke with a ſword on the ſhoulder. Then they put on him a ſhoulder-belt, gilt ſword, ſpurs, and the other military accoutrements; after which, being armed as a *knight*, he was led in great pomp to the church.

The manner of making a *knight* with us, is deſcribed by Camden in a few words: *Qui equeſtrem dignitatem ſuſcipit, flexis genibus leviter in humero percutitur: principis his verbis Gallice effatur*: Sus vel ſois chevalier au nom de Dieu, *ſurge tu es eques in nomine Dei*. This is meant of *knights-bachelors*, which are the loweſt, though the moſt ancient order of knighthood among us; for we have an inſtance of king Alfred's conferring this order on his ſon Athelſtan. Will. Malmſb. lib. ii.

Knights grew ſo very numerous, that the dignity became of much leſs repute. Charles V. is ſaid to have made five hundred in a ſingle day: on which account, therefore, new orders of knighthood were inſtituted, in order to diſtinguiſh the more deſerving from the croud. For the ſeveral kinds of *knights* among us, ſee BACHELOR, BANNERET, BARONET, BATH, GARTER, &c.

KNIGHT is alſo underſtood of a perſon admitted into any order, either purely military, or military and religious, inſtituted by ſome king or prince, with certain marks and tokens of honour and diſtinction.

Such are the *knights of the Garter*, *of the Elephant*, *of the Holy Ghoſt*, *of Malta*, &c. All which ſee under GARTER, ELEPHANT, &c.

KNIGHTHOOD, a military order, or honour; or a mark or degree of ancient nobility, or reward of perſonal virtue and merit.

There are four kinds of *knighthood*; *military*, *regular*, *honorary*, and *ſocial*.

KNIGHTHOOD, *Military*, is that of the ancient knights, who acquired it by high feats of arms.

Theſe are called *milites*, in ancient charters and titles, by which they were diſtinguiſhed from mere *bachelors*, &c. Theſe knights were gilt with a ſword, and a pair of gilt ſpurs; whence they were called *equites aurati*.

Knighthood is not hereditary, but acquired. It does not come into the world with a man like nobility; nor can it be revoked. The ſons of kings, and kings themſelves, with all other ſovereigns, heretofore had *knighthood* conferred on them as a mark of honour. They were uſually knighted at their baptiſm or marriage, at their coronation, before or after a battle, &c.

KNIGHTHOOD, *Regular*, is applied to all military orders, which profeſs to wear ſome particular habit, to bear arms againſt the infidels, to ſuccour and aſſiſt pilgrims in their paſſage to the Holy Land, and to ſerve in hoſpitals where they ſhould be received; ſuch were the knights Templars, and ſuch ſtill are the knights of Malta, &c.

KNIGHTHOOD, *Honorary*, is that which princes confer on other princes, and even on their own great miniſters and favourites; ſuch are knights of the Garter, St. Michael, &c.

KNIGHTHOOD, *Social*, is that which is not fixed, nor confirmed by any formal inſtitution, nor regulated by any laſting ſtatutes; of which kind there have many orders been erected on occaſion of factions, of tilts and tournaments, maſquerades, and the like.

The abbot Bernardo Juſtiniani, at the beginning of his hiſtory of *knighthood*, gives us a complete catalogue of the ſeveral orders: according to this computation, they are in number ninety-two. Favin has given us two volumes of them under the title of Theatre d'Honneur & de Chevalerie. Menenius has publiſhed Deſiciæ Equeſtrium Ordinum, and Andr. Mendo has written de Ordinibus Militaribus. Beloi has traced the original, and Gelot, in his Armorial Index, has given us their inſtitutions.

To theſe may be added, Father Meneſtrier de la Chevaleric Ancienne & Moderne, Michiell's Teſoro Militale, Caramuel's Theologia Regolare, Miræus's Origines Equeſtrium ſive Militarium Ordinum: but above all, Juſtiniani's Hiſtorie Chronologiche dell' Origine de gl' Ordine Militari, e di tutte le Religione Cavalereſche: the

edition which is fuller, is that of Venice in 1692, in two vols. fol.

KNIGHT *Marſhall*. See MARSHALL.

KNIGHTS *of St. Ampulla*. See AMPULLA.

KNIGHTS *of Annunciata*. See ANNUNCIATA.

KNIGHTS *of St. Anthony*. See ANTHONY.

KNIGHTS *of St. Bridget*. See BRIGIANI.

KNIGHTS *of St. Catharine of Mount Sinai*. See CATHARINE.

KNIGHTS *of the Chapel*. See CHAPEL.

KNIGHTS *of Chriſt*. See CHRIST.

KNIGHTS *of the Collar*. See COLLAR.

KNIGHTS *of the Dragon*. See DRAGON.

KNIGHTS *of the Ermine*. See ERMINE.

KNIGHTS-*Errant*, a pretended order of chivalry, whereof ample mention is made in the old romances.

They were a kind of heroes, who travelled the world in ſearch of adventures, redreſſing wrongs, reſcuing damſels, and taking all occaſions of ſignalizing their proweſs. This romantic bravery of the old *knights* was heretofore the chimera of the Spaniards; among whom there was no cavalier but had his miſtreſs, whoſe eſteem he was to gain by ſome heroic action. The duke of Alva, notwithſtanding his age and gravity, is ſaid to have vowed the conqueſt of Portugal to a young lady.

KNIGHTS *of St. George*. See GEORGE.

KNIGHTS *Hoſpitalers*. See HOSPITALERS and MALTA.

KNIGHTS *of St. Louis*. See LOUIS.

KNIGHTS *of Malta*. See MALTA.

KNIGHTS *of St. Mark*. See St. MARK.

KNIGHTS *of Mary*. See MARY.

KNIGHTS *of the Mine*. See MINE.

KNIGHTS *of Mount Carmel*. See CARMEL.

KNIGHTS *Rad*. See RAD.

KNIGHTS *of the Round Table*. See TABLE.

KNIGHTS *of the Temple*. See TEMPLARS.

KNIGHTS *Teutonic*. See TEUTONIC.

KNIGHTS *of the Thiſtle*. See THISTLE.

KNIGHTS *of the Shire*, or KNIGHTS *of Parliament*, are two gentlemen of worth, choſen on the king's writ in pleno comitatu, by ſuch of the freeholders of every county as have the value of 40s. per ann. within the county, clear of all taxes and deductions except parliamentary and parochial taxes, to repreſent ſuch county in parliament.

This qualification of electors for *knights* of the ſhire or county members, is ſettled by ſtat. 8 Hen. VI. c. 7. and 10 Hen. VI. c. 2. According to the eſtimate of biſhop Fleetwood in his Chronicon Preciouſum, 40s. in the reign of Henry VI. was equal to 12*l. per annum* in the reign of Queen Anne; and as the value of money has been lowered ſince, Judge Blackſtone concludes that 12*l.* in the biſhop's days muſt have been equivalent to 20*l.* at preſent. The other qualifications of the electors for counties in England and Wales, collected from ſtatutes are; that no perſon under twenty-one years of age ſhall be capable of voting; nor any perſon convicted of perjury or ſubornation of perjury; that no perſon ſhall vote in right of any freehold granted to him fraudulently to qualify him to vote: that every voter ſhall have been in the actual poſſeſſion or receipt of the profits of his freehold to his own uſe for twelve calendar months before, except it came to him by deſcent, marriage, marriage ſettlement, will, or promotion to a benefice or office: that no perſon ſhall vote in reſpect of an annuity or rent-charge, unleſs regiſtered with the clerk of the peace twelve calendar months before: that in mortgaged or truſt eſtates, the perſon in poſſeſſion ſhall have the vote: that only one perſon ſhall be admitted to vote for any one houſe or tenement, to prevent the ſplitting of freeholds: that no eſtate ſhall qualify a voter, unleſs the eſtate has been aſſeſſed to ſome land-tax aid, at leaſt twelve months before the election: and that no tenant by copy of court-roll ſhall be permitted to vote as freeholder. 7 and 8 W. III. c. 25. 10 Ann. c. 23. 2 Geo. II. c. 21. 10 Geo. II. c. 18. 31 Geo. II. c. 14. 3 Geo. III. c. 24.

Theſe *knights*, when every man who had a knight's-fee was cuſtomarily conſtrained to be a *knight*, were of neceſſity to be *milites gladio cincti*, for ſo the writ runs to this day; but now cuſtom admits eſquires to be choſen to this office.

It is required by 23 Hen. VI. c. 15. that all *knights* of the ſhire ſhall be actual *knights*, or ſuch notable eſquires and gentlemen as have eſtates ſufficient to be *knights*; and by no means of the degree of yeomen: and more preciſely by 9 Ann. c. 5. that every *knight* of the ſhire ſhall have a clear eſtate of freehold or copyhold to the value of 600*l. per annum*, except the eldeſt ſons of peers and of perſons qualified to be *knights* of ſhires. For other qualifications, ſee PARLIAMENT.

The expences of *knights* of the ſhire, are to be defrayed by the county, during their ſitting in parliament, at the rate of four ſhillings a day. This rate of wages was eſtabliſhed in the reign of Edw. III. See alſo 35 Hen. VIII. c. 11. It is hardly neceſſary to add, that theſe are never now required.

KNIGHTS *Croſs*, in *Botany*. See CAMPION.

KNIGHTS, in a *Ship*, two thick, ſhort pieces of timber, uſually carved in the figure of ſome head, having in each four ſhivers, three for the halliards, and one for the top-ropes to run in. One of them ſtands abaft the main-maſt, and for that reaſon is called the *main-knight*. The other ſtands abaft the fore-maſt, on the ſecond deck, and is called the *fore-knight*.

KNIGHTS *fee*, an ancient law-term, ſignifying ſo much land of inheritance as was eſteemed ſufficient to maintain a knight with ſuitable retinue; which, in Henry the Third's days, was reckoned at 15*l. per ann.* And by a ſtat. 1 Edw. II. ſuch as had 20*l. per ann.* in fee, or for life, might be compelled to be knights. But this ſtatute is repealed 17 Car. I. Sir T. Smith rates a *knight's fee* at 40*l.* yearly. According to Coke, a *knight's fee* contained twelve carucates, or plough-lands. Stow ſays, that there were found in England, at the time of the Conqueror, 60,215 *knight's fees*; according to others there were 60,215; whereof the religious houſes, before their ſuppreſſion, were poſſeſſed of 28,015. See FEE.

KNIGHTS *ſervice, ſo whom militare*, a tenure whereby ſeveral lands in this nation were anciently held of the king; which drew after it homage, ſervice in war, eſcuage, wardſhip, marriage, &c. but taken away by the ſtatute 12 Car. II. c. 24.

KNIGHTEN-*gild*, in our *Old Writers*, a *gild* or company in London, conſiſting of nineteen knights, which king Edgar founded, giving them a portion of void ground lying within the walls of the city, now called Portſoken-ward.

KNITTLE, in *Sea-Language*, a ſmall line, which is either plaited or twiſted, and uſed for various purpoſes at ſea; as to faſten the ſervice in the cable, to reef the ſails by the bottom, and to hang the hammocs between decks, &c.

KNOCKING *Mills*. See STAMPING.

KNOLL, a term uſed in many parts of the kingdom, for the top of a ſmall hill, or for the hill itſelf.

KNOTS, in *Gardening*, a term uſed to expreſs the rudiments of the firſt branches of plants, as they grow up from the ſeed. Thus in the melon, the two firſt leaves or ſeed-leaves, are called the ears, and the branches that grow from them are called according to the order of their growth, the firſt, ſecond and third *knots*. Mr. Quintiny's famous method of raiſing the beſt melons, depended principally on the cutting off every third *knot* of the plant as they grew up. Philoſ. Tranſ. N° 45.

In trees, the *knot* denotes that part from whence it ſhoots out branches, roots, or even fruit.

The wood is harder and cloſer in the *knots* than in any other part, but it is alſo more ſubject to ſplit there.

The uſe of the *knots* of plants is to ſtrengthen the ſtem: they ſerve alſo as ſtrainers to filtrate, purify, and refine, the juice raiſed up for the nouriſhment of the plant.

KNOT, on *board a Ship*, is a large knob formed on the extremity of a rope by untwiſting the ends thereof and interweaving them regularly amongſt each other. Of this there are ſeveral ſorts; the chief of which are, the *ſnake-knot*, which is ſo made with the lays of a rope, that it cannot ſlip, and ſerves for ſheats, tacks, and ſloppers. The *bow-line-knot* is ſo firmly made, and faſtened to the crengles of ſails, that they muſt break, or the ſails ſplit, before it will ſlip; the *ſtop-ſhank-knot*, which ſerves to ſhorten a rope without cutting it, which may be preſently looſened; the diamond *knot*, the roſe *knot*, &c. The *knots* are generally uſed to faſten one rope to another, by means of a ſmall cord attached to the neck of the *knot*, called the lanyard, which is firmly tied about both ropes. They are alſo deſigned to prevent the end of a rope from ſliding through an eye, which the *knot* is intended to confine in a particular ſituation.

KNOT-*berries*. See RASPBERRIES.

KNOT-*graſs*, *polygonum*, in *Botany*, the name of a genus of plants, of the *octandria trigynia* claſs, the characters of which are theſe: the flower is of the aperalous kind, being compoſed only of a number of ſtamina ariſing from a tunnel-ſhaped cup, divided into many ſegments at the edge. The piſtil finally becomes an angular ſeed, which is covered by a capſule that was originally the cup of the flower; to this it may be added, that the flowers grow in the axe of the leaves, and that the roots are fibrous.

The ſpecies of *knot-graſs* enumerated by Linnæus, are twenty-ſeven.

The ancients as well as moderns have deſcribed the common kinds of *knot-graſs* under the name of *polygonum*; but as they have alſo given the ſame appellation to another plant, much error has ariſen by miſtaking theſe ſynonyms;

Pliny began the miſtake, and others have ſince in great numbers fallen into it, thinking Pliny's example to be a ſufficient excuſe.

The common great *knot-graſs* is eſteemed a very powerful aſtringent. It is generally uſed in infuſion, and is ſaid to have great virtue in ſtopping hæmorrhages of all kinds.

KNOT-GRASS, *mountain*. See WHITLOW-*Graſs*.

KNOT's of the log-line, at ſea, are the diviſions of it. See LOG.

KNOT, in *Medicine*, a protuberance in the joints of old gouty people: conſiſting of a thick, viſcous, crude, indigeſted pituita, accompanied with a bilious humour, hot and acrimonious; the groſſeſt and moſt terreſtrial part whereof clogs and is converted into a ſtony ſubſtance like chalk. *Knots* appear to be generated like ſtones in the bladder.

Phyſicians ſometimes alſo call them nodes and tophi. See TOPHUS and NODE.

KNOT is alſo uſed for the intrigue of a romance, or dramatic piece; being that part where the perſons are the moſt embarraſſed, by a conjuncture of affairs, whoſe end it is not eaſy to foreſee.

Ariſtotle, under this term, includes all the inciſents of a tragedy, from its beginning to the place where it begins to unravel. The *knot* holds as long as the mind is kept ſuſpended about the event. The *knot* ought always to laſt to the middle of the fifth act, otherwiſe the reſt of the piece languiſhes.

KNOT, *Order of the*, was the name of a military order in the kingdom of Naples, inſtituted in 1352, by queen Jane I. on occaſion of the peace eſtabliſhed between her and the king of Hungary, by means of her marriage with Louis prince of Tarentum.

The order conſiſted of ſixty knights: Clement VI. approved this order, and gave it the rule of St. Baſil: it choſe St. Nicholas for its protector; but it dwindled away after the death of its founderſs.

KNOT, in *Ornithology*, the name of an Engliſh bird of the ſnipe-kind, not known among authors by any particular Latin name, unleſs it be the *calidrys nigra*, or black calidrys of Bellonius, which is doubtful from his deſcription; and ſaid to have obtained its Engliſh name from Canute, one of the Daniſh kings of this iſland, who was particularly fond of it; it is the *tringa Canutus* of Linnæus. It is ſeldom of more than two ounces and a half in weight; its head and back are of a greyiſh brown; its rump is variegated with black and grey; its breaſt and belly are white, and its ſides brownith; in ſome, but not in all the birds of this ſpecies, there is on each ſide of the head a white ſtreak, running from the angles of the beak to the eyes; the long feathers of the wings are black and white; and the tail, which is two fingers breadth and a half in length, has its feathers tipped with white at the ends; its beak is a finger's breadth and a half long, and is black, but it is ſtrouger than any other of the ſnipe kind; its eyes are large, and its legs are green. They appear in Lincolnſhire and Yorkſhireiu the beginning of winter, always keeping about the ſea-ſhores. Their ſeaſon is from the beginning of Auguſt to that of November; and they diſappear with the firſt froſts.

KNOUT is the name of a puniſhment inflicted in Ruſſia, with a kind of whip called *knout*, and made of a long ſtrap of leather prepared for this purpoſe. With this whip the executioners dexterouſly carry off a ſlip of ſkin from the neck to the bottom of the back laid bare to the waiſt, and repeating their blows, in a little while rend away all the ſkin off the back in parallel ſtrips. In the common *knout*, the criminal receives the laſhes ſuſpended on the back of one of the executioners: but in the great *knout*, which is generally uſed on the ſame occaſions as racking on the wheel in France, the criminal is raiſed into the air by means of a pully fixed to the gallows, and a cord faſtened to the two wriſts tied together; a piece of wood is placed between his two legs alſo tied together; and another of a crucial form under his breaſt. Sometimes his hands are tied behind over his back, and when he is pulled up in this poſition, his ſhoulders are diſlocated. The executioners can make this puniſhment more or leſs cruel; and, it is ſaid, are ſo dextrous, that when a criminal is condemned to die, they can make him expire at pleaſure, either by one or ſeveral laſhes.

KNOWING, *principles and rules of*. See PRINCIPLE, and RULE.

KNOWLEDGE, according to Mr. Locke, conſiſts in the perception of the connexion and agreement, or diſagreement and repugnancy, of our ideas. See IDEA.

In which ſenſe, *knowledge* ſtands oppoſed to ignorance.

To *know that white is not black*, is only to perceive that theſe two ideas do not agree. So, in *knowing* that the three angles of a triangle are equal to two right ones; what do we more than perceive, that equality to two right ones neceſſarily agrees to, and is inſeparable from, the three angles of a triangle?

KNOWLEDGE, *kinds of*. For what relates to the agreement or diſagreement of ideas, we may reduce the whole doctrine, and conſequently the whole ſtock of our *knowledge*, to four heads, viz. *identity* or *diverſity*, *relation*, *co-exiſtence*, and *real exiſtence*.

As to the identity or diverſity of our ideas, we may obſerve, that it is the firſt act of the mind to perceive its own ideas; and, ſo far as it perceives them, to *know* what each is, and thereby to perceive their difference; that is, the one not to be the other: by this the mind clearly perceives each idea to agree with itſelf, and to be what it is: and all diſtinct ideas to diſagree. This it does without any pains, or deduction, by its natural power of perception, and diſtinction: and, for doing this, men of art have eſtabliſhed certain general rules or principles; as that, what is, is: and that it is impoſſible for the ſame thing to be, and not to be. But no maxim can make a *man know* clearer, that round is not ſquare, than the bare perception of the two ideas, which the mind, at firſt ſight, perceives to diſagree.

The next kind of agreement, or diſagreement, the mind perceives, in any of its ideas, may be called *relative*, and is nothing but the perception of the relation between any two ideas, of what kind ſoever; that is, their agreement or diſagreement, one with another, in the ſeveral ways, or reſpects, the mind takes of comparing them.

The third ſort of agreement, or diſagreement, to be found in our ideas, is co-exiſtence, or non-co-exiſtence, in the ſame ſubject; and this belongs particularly to ſubſtances. Thus when we pronounce concerning gold, that it is fixed, it amounts to no more but this, that fixedneſs, or a power to remain in the fire unconſumed, is an idea which always accompanies that particular ſort of yellowneſs, weight, fuſibility, &c. which make our complex idea ſignified by the word *gold*.

The fourth ſort is that of actual and real exiſtence, agreeing to any idea.

Within theſe four ſorts of agreement, or diſagreement, ſeems contained all the *knowledge* we have, indeed all we are capable of; for all that we *know*, or can aſſirm, concerning any idea, is, that it is, or is not, the ſame with ſome other; as, that blue is not yellow: that it does, or does not, coexiſt with another in the ſame ſubject; as, that iron is ſuſceptible of magnetical impreſſions: that it hath that or this relation to ſome other idea; as, that two triangles upon equal baſes, between the ſame parallels, are equal: or, that it has a real exiſtence without the mind; as, that God is.

The mind becomes poſſeſſed of truth in ſeveral manners, which conſtitute ſo many different ſpecies of *knowledge*. Thus, when the mind has a perfect view of the agreement or diſagreement of any of its ideas, or of the relation they have one with another, it is called *actual knowledge*.

Secondly, a man is ſaid to *know* any propoſition, when, having once evidently perceived the agreement or diſagreement of the ideas wherein it conſiſts, and ſo lodged it in his memory, that whenever it comes to be reflected on again, the mind aſſents to it without doubt or heſitation, and is certain of the truth of it: this may be called *habitual knowledge*. And thus a man may be ſaid to *know* all thoſe truths which are lodged in his memory, by a foregoing, clear, and full perception.

Of habitual *knowledge*, there are two ſorts: the one conſiſts of ſuch truths, laid up in the memory, as, whenever they occur to the mind, it actually perceives the relation that is between their ideas; and this is in all thoſe truths where the ideas themſelves, by an immediate view, diſcover their agreement or diſagreement one with another. The other is of ſuch truths, whereof the mind having been convinced, it remins the memory of the conviction, without the proofs. Thus a man that remembers certainly, that he once perceived the demonſtration, that the three angles of a triangle are equal to two right ones, *knows* it to be true, when that demonſtration is gone out of his mind, and cannot poſſibly be recollected: but he *knows* it in a different way from what he did before; namely, not by the intervention of thoſe intermediate ideas; whereby the agreement, or diſagreement, of thoſe in the propoſition was at firſt perceived; but by remembering, that is, *knowing*, that he was once certain of the truth of this propoſition, that the three angles of a triangle are equal to two right ones,—the immutability of the ſame relation between the ſame immutable things, is now the idea that ſhews him, that if the three angles of a triangle were once equal to two right ones, they will always be ſo. And hence he comes to be certain, that what was once true, is always true; what ideas once agreed, will always agree; and conſequently, what he once *knew* to be true, he will always *know* to be true, as long as he can remember that he once knew it.

KNOWLEDGE alſo may be uſefully diſtinguiſhed into three kinds; hiſtorical, philoſophical, and mathematical.

KNOWLEDGE, *hiſtorical*, is merely the knowledge of facts, or of what is or happens in the material world, or within our own minds. Thus, that the ſun riſes and ſets, that trees bud in the ſpring, that we remember, will, &c. are inſtances of *hiſtorical knowledge*.

KNOWLEDGE, *philoſophical*, is the *knowledge* of the reaſons of things, or of what is or happens. Thus he has a *philoſophical knowledge* of the motion of rivers, who can explain how it ariſes from the declivity of the bottom, and from the preſſure which the lower part of the water ſuſtains from the upper. So likewiſe the ſhewing how, and by what reaſon, deſire or appetite ariſes from the perception or imagination of its object, would be *philoſophical knowledge*.

KNOWLEDGE, *mathematical*, is the *knowledge* of the quantity of things, that is, of their proportions or ratios to ſome given meaſure. Thus he who knows the proportion of the meridian heat of the ſun at the ſummer ſolſtice to its meridian heat at the winter ſolſtice, might ſo far be ſaid to have a *mathematical knowledge* of the ſun's heat. So likewiſe he has a *mathematical knowledge* of the motion of a planet in its orbit, who can diſtinctly ſhew how, from the quantity of the impreſſed and centripetal force, the velocity of the planet is produced; and how, from the action of this double force, the elliptical figure of the orbit ariſes.

Theſe three kinds of *knowledge*, differ evidently, it being one thing to know that a thing is; another, the reaſon why it is; and a third, to know, its quantity or meaſure.

It is alſo evident, that hiſtorical *knowledge*, though extenſively uſeful, and the foundation of the reſt, is the loweſt degree of human *knowledge*. Thoſe who aim at the greateſt certainty ought to join *mathematical* with *philoſophical knowledge*. Nothing can more evidently ſhew that an effect ariſes from a certain cauſe, than the *knowledge* that the quantity of the effect is proportional to the force of the cauſe. Beſides, there are many things in nature, the reaſons of which depending on certain figures or quantities, are not aſſignable but from mathematical principles.

KNOWLEDGE, *degrees of*. As to the different degrees, or clearneſs of our *knowledge*, it ſeems to lie in the different way which the mind has of perceiving the agreement or diſagreement of any of its ideas. When the mind perceives this agreement or diſagreement of two ideas immediately by themſelves, without the intervention of any other, we may call it *intuitive knowledge*; in which caſe the mind perceives the truth, as the eye doth light, only by being directed towards it. Thus the mind perceives that white is not black; that three are more than two, and equal to one and two. This part of *knowledge* is irreſiſtible; and, like the bright ſun-ſhine, forces itſelf immediately to be perceived, as ſoon as ever the mind turns its view that way. It is on this intuition that all the certainty and evidence of our other *knowledge* depends; which certainly every one finds to be ſo great, that he cannot imagine, and therefore cannot require a greater.

The next degree of *knowledge* is, where the mind perceives not this agreement, or diſagreement, immediately, or by the juxtapoſition, as it were, of the ideas; becauſe thoſe ideas, concerning whoſe agreement, or diſagreement, the inquiry is made, cannot, by the mind, be ſo put together, as to ſhew it. In this caſe, the mind is obliged to diſcover the agreement, or diſagreement, which it ſearches for, by the intervention of other ideas: and this is that which we call *reaſoning*.

Thus, if we would *know* the agreement, or diſagreement, in bigneſs, between the three angles of a triangle and two right angles, we cannot do it by an immediate view and compariſon of them, becauſe the three angles of a triangle cannot be brought together at once, and compared with any other one or two angles; and ſo of this the mind has no immediate or intuitive *knowledge*. But we muſt find out ſome other angles, to which the three angles of a triangle have equality; and, finding thoſe equal to two right ones, we come to *know* the equality of theſe three angles to two right ones.

Thoſe intervening ideas, which ſerve to ſhew the agreement of any two others, are called *proofs*; and where the agreement, or diſagreement, is by this means plainly and clearly perceived, it is called *demonſtration*: and a quickneſs in the mind to find thoſe proofs, and to apply them right, is that which is called *ſagacity*.

This *knowledge*, though it be certain, is not ſo clear and evident as intuitive *knowledge*; it requires pains and attention, and ſteady application of mind, to diſcover the agreement, or diſagreement, of the ideas it conſiders; and there muſt be a progreſſion by ſteps and degrees, before the mind can, in this way, arrive at any certainty.

Before demonſtration, there was a doubt, which, in intuitive *knowledge*, cannot happen to the mind, that has its faculty of perception left in a degree capable of diſtinct ideas, no more than it can be a doubt to the eye (that can diſtinctly ſee white and black), whether this ink and paper be all of a colour. Now, in every ſtep that reaſon makes in demonſtrative *knowledge*, there is an intuitive *knowledge* of that agreement, or diſagreement, it ſeeks with the next intermediate idea, which it uſes as a proof: for, if it were not ſo, that yet would need a proof, ſince, without the perception of ſuch agreement, or diſagreement, there is no *knowledge* produced.

By which it is evident, that every ſtep in reaſoning, that produces *knowledge*, has intuitive certainty; which, when the mind perceives, there is no more required, but to remember it, to make the agreement, or diſagreement, of the ideas, concerning which we inquire, viſible and certain. This intuitive perception of the agreement, or diſagreement, of the intermediate ideas in each ſtep and progreſſion of the demonſtration, muſt alſo be exactly carried in the mind; and a man muſt be ſure, that no part is left out, which, becauſe in long deductions the memory cannot eaſily retain, this *knowledge* becomes more imperfect than intuitive, and men often embrace falſhoods for demonſtrations.

It has been generally taken for granted, that mathematics alone are capable of demonſtrative certainty: but to have ſuch an agreement, or diſagreement, as may be intuitively perceived, being, as we imagine, not the privilege of the ideas of number, extenſion, and figure alone, it may, poſſibly, be the want of due method and application in us, and not of ſufficient evidence in things, that demonſtration has been thought to have ſo little to do in other parts of *knowledge*. For, in whatever ideas the mind can perceive the agreement, or diſagreement, immediately, there it is capable of intuitive *knowledge*; and, where it can perceive the agreement, or diſagreement, of any two ideas, by the intuitive perception of the agreement, or diſagreement, they have with any intermediate ideas, there the mind is capable of demonſtration, which is not limited to the ideas of figure, number, extenſion, or their modes.

The reaſon why it has been generally ſuppoſed to belong to theſe only, is, becauſe, in comparing their equality or excels, the modes of numbers have every the leaſt difference very clear and perceivable: and, in extenſion, though every the leaſt excels is not ſo perceptible, yet the mind has found out ways to diſcover the juſt equality of two angles, extenſions, or figures; and both numbers and figures can be ſet down by viſible and laſting marks. But, in other ſimple ideas, whoſe modes and differences are made and counted by degrees, and not quantity, we have not ſo nice and accurate a diſtinction of their differences, as to perceive or find ways to meaſure their juſt equality, or their leaſt differences. For, theſe other ſimple ideas being appearances, or ſenſations produced in us, by the ſize, figure, motion, &c. of minute corpuſcles, finely inſenſible, their different degrees alſo depend on the variation of ſome or all of thoſe cauſes; which, ſince it cannot be obſerved by us in particles of matter, whereof each is too ſubtile to be perceived, it is impoſſible for us to have any exact meaſures of the different degrees of theſe ſimple ideas.

Thus, not knowing what number of particles, nor what motion of them, is fit to produce any preciſe degree of whiteneſs, becauſe we have no certain ſtandard to meaſure them by, nor means to diſtinguiſh every the leaſt difference; the only help we have, is from our ſenſes, which, in this point, fail us. But where the difference is ſo great as to produce in the mind ideas clearly diſtinct, theſe ideas, as we ſee in colours of different kinds, blue and red for inſtance, are as capable of demonſtration, as ideas of number and extenſion. And what is here ſaid of colours, holds true in all ſecondary qualities.

Theſe two then, *intuition* and *demonſtration*, are the degrees of our *knowledge*; and whatever comes ſhort of one of theſe, is only *faith*, or *opinion*, but not *knowledge*, as leaſt, in all general truths.

There is, indeed, another perception of the mind, employed about the particular exiſtence of finite beings without us, which going beyond probability, but not reaching to either of the foregoing degrees of certainty, paſſes under the name of *knowledge*.

Nothing can be more certain, than that the idea we receive from an external object is in our minds: this is intuitive *knowledge*; but whether we can thence certainly infer the exiſtence of any thing without us, correſponding to that idea, is that, whereof ſome men think there may be a queſtion made; becauſe men may have ſuch an idea in their minds, when no ſuch thing exiſts, nor any ſuch object affects their ſenſes.

But it is evident, that we are invincibly conſcious to ourſelves

ſelves of a different perception, when we look on the ſun in the day, and when we think on it by night; when we actually taſte wormwood, or ſmell a roſe, or only think on that ſavour or odour; ſo that we may add, to the two former ſorts of *knowledge*, this alſo of the exiſtence of particular external objects, by that perception and conſciouſneſs we have of the actual entrance of ideas from them; and allow theſe three degrees of *knowledge*, viz. *intuitive*, *demonſtrative*, and *ſenſitive*.

But, ſince our *knowledge* is founded on, and employed about, our ideas only, will it follow thence, that it muſt be conformable to our ideas, and that where our ideas are clear and diſtinct, obſcure and confuſed, there our *knowledge* will be ſo too? We anſwer, No; for our *knowledge* conſiſting in the perception of the agreement, or diſagreement, of any two ideas; its clearneſs or obſcurity conſiſts in the clearneſs and obſcurity of that perception, and not in the clearneſs or obſcurity of the ideas themſelves. A man (for inſtance), who has a clear idea of the angles of a triangle, and of equality to two right ones, may yet have but an obſcure perception of their agreement, and ſo have but a very obſcure *knowledge* of it: but obſcure and confuſed ideas can never produce any clear or diſtinct *knowledge*; becauſe, as far as any ideas are obſcure or confuſed, ſo far the mind can never perceive clearly, whether they agree or diſagree; or, to expreſs the ſame thing in other words, he that has not determined ideas to the words he uſes, cannot make propoſitions of them, of whoſe truth he can be certain.

From all this it follows; 1. That we can have no *knowledge* farther than we have ideas.

2. That we have no *knowledge* farther than we can have perception of the agreement, or diſagreement, of our ideas, either by intuition, demonſtration, or ſenſation.

3. We cannot have an intuitive *knowledge*, that ſhall extend itſelf to all our ideas, and all that we would *know* about them; becauſe we cannot examine and perceive all the relation they have one to another by juxtapoſition, or in immediate compariſon one with another. Thus, we cannot intuitively perceive the equality of two extenſions, the difference of whoſe figures makes their parts incapable of an exact immediate application.

4. Our rational *knowledge* cannot reach to the whole extent of our ideas; becauſe, between two different ideas which we would examine, we cannot always find ſuch proofs, whereby we can connect one to another with an intuitive *knowledge* in all the parts of the deduction.

5. Senſitive *knowledge*, reaching no farther than the exiſtence of things actually preſent to our ſenſes, is yet much narrower than either of the former.

6. From all which it is evident, that the extent of our *knowledge* comes not only ſhort of the reality of things, but even of the extent of our own ideas. We have the idea of a ſquare, a circle, and equality; and yet perhaps, ſhall never be able to find a circle equal to a ſquare. See CIRCLE.

KNOWLEDGE, *extent and limits of*. The affirmations or negations we make concerning the ideas we have, being reduced to the four ſorts above mentioned, viz. identity, coexiſtence, relation, and real exiſtence, let us inquire how far our *knowledge* extends in each of theſe. 1. As to identity and diverſity, our intuitive *knowledge* is as far extended, as our ideas themſelves; and there can be no idea in the mind, which it does not preſently, by an intuitive *knowledge*, perceive to be what it is, and to be different from any other.

2. As to the agreement, or diſagreement, of our ideas of co-exiſtence, our *knowledge* herein is very defective, though it is in this that the greateſt and moſt material part of our *knowledge*, concerning ſubſtances, conſiſts: for our ideas of ſubſtances being nothing but certain collections of ſimple ideas co-exiſting in one ſubject (our idea of flame, for inſtance, is a body hot, luminous, and moving upwards); when we would know any thing farther, concerning this, or any other ſort of ſubſtance, what do we but enquire what other qualities, or powers, theſe ſubſtances have, or have not? which is nothing elſe but to *know* what other ſimple ideas do, or do not exiſt with thoſe which make up ſuch complex ideas. The reaſon of this is, that the ſimple ideas, which make up our complex ideas of ſubſtances, have no viſible neceſſary connection, or inconſiſtence, with other ſimple ideas, whoſe co-exiſtence with them we would inform ourſelves about. Theſe ideas being likewiſe, for the moſt part, ſecondary qualities, which depend upon the primary qualities of their minute or inſenſible parts, or on ſomething yet more remote than theſe from our comprehenſion, it is impoſſible we ſhould *know* which have a neceſſary union, or inconſiſtence, one with another; ſince we *know* not the root from whence they ſpring, or the ſize, figure, and texture of parts on which they depend, and from which they reſult. Beſides this there is no diſcoverable connection between any ſecondary quality, and thoſe primary qualities that it depends on. We are ſo far from *knowing* what figure, ſize, or motion, produces (for inſtance) a yellow colour, or ſweet taſte, or ſharp ſound, that we can by no means conceive how any ſize, figure, or motion, can poſſibly produce in us the idea of any colour, taſte, or ſound, whatſoever; there being no conceivable connection between the one and the other.

Our *knowledge*, therefore, of co-exiſtence reaches little farther than experience. Some few, indeed, of the primary qualities have a neceſſary dependence, and viſible connection, one with another: as figure neceſſarily ſuppoſes extenſion; receiving or communicating motion by impulſe ſuppoſes ſolidity; but qualities co-exiſtent in any ſubject, without this dependence and connection, cannot certainly be *known* to co-exiſt, any farther than experience, by our ſenſes, informs us. Thus, though, upon trial, we find gold yellow, weighty, malleable, fuſible, and fixed; yet, becauſe none of theſe have any evident dependence, or neceſſary connection, with the other, we cannot certainly *know*, that, where any four of theſe are, the fifth will be there alſo, how highly probable ſoever it may be. But the higheſt degree of probability amounts not to certainty, without which there can be no true *knowledge*; for this co-exiſtence can be no farther *known* than it is perceived; and it cannot be perceived, but either, in particular ſubjects, by the obſervation of our ſenſes, or, in general, by the neceſſary connection of the ideas themſelves.

As to incompatibility, or repugnancy to co-exiſtence, we *know*, that no ſubject can have of each ſort of primary qualities, more than one particular at once, as one extenſion, or one figure; and ſo of ſenſible ideas peculiar to each ſenſe: for whatever, of each kind, is preſent in any ſubject, excludes all other of that ſort: for inſtance, one ſubject cannot have two ſmells, or two colours, at the ſame time.

As to powers of ſubſtances, which make a great part of our inquiries about them, our *knowledge* reaches little farther than experience; becauſe they conſiſt in a texture and motion of parts, which we cannot by any means come to diſcover; and I doubt, whether, with thoſe faculties we have, we ſhall ever be able to carry our general *knowledge* much farther in this part. Experience is that, which, in this part, we muſt depend on: and it were to be wiſhed, that it were more improved. We find the advantages ſome men's generous pains have this way brought to the ſtock of natural *knowledge*; and if others, eſpecially the philoſophers by fire, had been ſo wary in their obſervations, and ſincere in their reports, as thoſe who call themſelves *philoſophers* ought to have been, our acquaintance with the bodies here about us, and our inſight into their powers and operations, might have been yet much greater.

As to the third ſort, the agreement, or diſagreement, of our ideas in any other relation; this is the largeſt field of *knowledge*, and it is hard to determine how far it may extend; this part depending on our ſagacity in finding intermediate ideas, that may ſhew the habitudes and relations of ideas, it is a hard matter to tell when we are at an end of ſuch diſcoveries. They, who are ignorant of algebra, cannot imagine the wonders of this kind that are to be done by it: and what farther improvements and helps, advantageous to other parts of *knowledge*, the ſagacious mind of man may yet find out, it is not eaſy to determine.

Thus, at leaſt, we may believe, that the ideas of quantity are not the only ones capable of demonſtration and *knowledge*; and that other, and, perhaps, more uſeful parts of contemplation, would afford us certainty, if vices, paſſions, and domineering intereſt, did not oppoſe or menace endeavours of this kind.

As to the fourth ſort of *knowledge*, viz. *of the real, actual exiſtence of things*, we have an intuitive *knowledge* of our own exiſtence, a demonſtrative *knowledge* of the exiſtence of God, and a ſenſitive *knowledge* of the objects that preſent themſelves to our ſenſes.

Hitherto we have examined the extent of our *knowledge*, in reſpect of the ſeveral ſorts of beings that are: there is another extent of it, in reſpect of univerſality, which will alſo deſerve to be conſidered; and this in regard our *knowledge* follows the nature of our ideas. If the ideas, whoſe agreement, or diſagreement, we perceive, are abſtract, our *knowledge* is univerſal; for what is *known* of ſuch general ideas, will be true of every particular thing, in which that eſſence, that is, that abſtract idea, is found: and what is once *known* of ſuch ideas, will be perpetually and for ever true; ſo that, as to all general *knowledge*, we muſt ſearch and find it only in our own minds; and it is only the examining our own ideas that furniſhes us with it. Truth belonging to eſſences of things (that is, to abſtract ideas) are eternal, and are to be found out by the contemplation only of theſe eſſences; as the exiſtence of things is to be known only from experience.

KNOWLEDGE, *reality of.* It is evident, that the mind *knows* not things immediately, but by the intervention of the ideas it has of them. Our *knowledge*, therefore, is real only so far as there is a conformity between our ideas, and the reality of things. But how shall we *know* when our ideas agree with things themselves? It is answered, There are two sorts of ideas, that we may be assured agree with things: these are,

1. *Simple ideas*, which, since the mind can by no means make to itself, must be the effect of things operating upon the mind in a natural way, and producing therein those perceptions, which, by the will of our Maker, they are ordained and adapted to. Hence it follows, that simple ideas are not fictions of our fancies, but the natural and regular production of things without us, really operating upon us, which carry with them all the conformity our state requires, which is to represent things under those appearances they are fitted to produce in us. Thus the idea of whiteness, as it is in the mind, exactly answers that power which is in any body to produce it there; and this conformity between our simple ideas, and the existence of things, is sufficient for real *knowledge*.

2. All our *complex ideas*, except only those of substances, being archetypes of the mind's own making, and not referred to the existence of things, as to their originals, cannot want any conformity necessary to real *knowledge*; for that which is not designed to represent any thing but itself, can never be capable of a wrong representation. Here the ideas themselves are considered as archetypes, and things are no otherwise regarded than as conformable to them. Thus the mathematician considers the truth and properties belonging to a rectangle, or circle, only as they are ideas in his own mind, which possibly he never found existing mathematically, that is, precisely, true; yet his *knowledge* is not only certain, but real, because real things are no farther concerned, nor intended to be meant by any such propositions, than as things really agree to those archetypes in the mind.

3. But the *complex ideas*, which we refer to archetypes without us, may differ from them; and so our *knowledge* about them may come short of being real: and such are our ideas of substances. These must be taken from something, that does or has existed, and not be made up of ideas arbitrarily put together, without any real pattern. Herein, therefore, is founded the reality of our *knowledge* concerning substances, that all our complex ideas of them must be such, and such only as are made up of such simple ones as have been discovered to co-exist in nature: and our ideas, being thus true, though not, perhaps, very exact copies, are the subject of real *knowledge* of them. Whatever ideas we have, the agreement we find they have with others will be *knowledge*. If those ideas be abstract, it will be general *knowledge*; but, to make it real concerning substances, the ideas must be taken from the real existence of things. Wherever, therefore, we perceive the agreement, or disagreement, of our ideas, there is certain *knowledge*; and wherever we are sure those ideas agree with the reality of things, there is certain, real *knowledge*.

KNOWLEDGE, *method of improving or enlarging.* It being the received opinion amongst men of letters, that maxims are the foundation of all *knowledge*, and that sciences are each of them built upon certain præcognita, from whence the understanding is to take its rise, and by which it is to conduct itself in its enquiries in the matters belonging to that science; the beaten road of the schools has been to lay down, in the beginning, one or more general propositions, called *principles*, as foundations whereon to build the *knowledge* that was to be had of that subject.

That which gave occasion to this way of proceeding was, the good success it seemed to have in mathematics, which of all the sciences, have the greatest certainty, clearness, and evidence in them. But, if we consider it, we shall find, that the great advancement and certainty of real *knowledge* men arrive to in these sciences, was not owing to the influence of those principles, but to the clear, distinct and complete ideas, their thoughts were employed about, and to the relation of equality and excess, so clear between some of them, that they had an intuitive *knowledge*, and by that a way to discover it in others, and this is without the help of those maxims. For is it not possible for a lad to *know*, that his whole body is bigger than his little finger, but by virtue of this axiom, the whole is bigger than a part; nor be assured of it till he has learned that maxim? Let any one consider which is *known* first and clearest by most people, the particular instance, or the general rule: and which it is that gives life and birth to the other: these general rules are but the comparing our more general and abstract ideas, which ideas are made by the mind, and have names given them, for the easier dispatch in its reasonings: but *knowledge* began in the mind, and was founded on particulars, though afterwards, perhaps, no notice be taken thereof, it being natural for the mind to lay up those general notions, and make the proper use of them, which is to disburden the memory of the cumbersome load of particulars. The way to improve in *knowledge* is, not to swallow principles with an implicit faith, and without examination, which would be apt to mislead men, instead of guiding them into truth; but to get and fix in our minds clear and complete ideas, as far as they are to be had, and to annex to them proper and constant names: and thus, barely by considering our ideas, and comparing them together, observing their agreement or disagreement, their habitudes and relations, we shall get more true and clear *knowledge* by the conduct of this one rule, than by taking up principles, and thereby putting our minds into the disposal of others.

We must therefore, if we will proceed as reason advises us, adapt our methods of inquiry to the nature of the ideas we examine, and the truth we search after. General and certain truths are only founded on the habitudes and relations of abstract ideas; therefore a sagacious, methodical application of our thoughts for the finding out these relations, is the only way to discover all, that can with truth and certainty be put into general propositions. By what steps we are to proceed in these, is to be learned in the schools of the mathematicians, who, from very plain and easy beginnings, by gentle degrees, and a continued chain of reasonings, proceed to the discovery and demonstration of truths, that, at first sight, appeared beyond human capacity. This may reasonably be said, that, if other ideas that are real, as well as nominal essences of their species, were pursued in the way familiar to mathematicians, they would carry our thoughts farther, and with greater evidence and clearness, than possibly we are apt to imagine. This is reason sufficient to advance that conjecture above mentioned; viz. "That "morality is capable of demonstration, as well as mathe-"matics;" for moral ideas being real essences, which have a discoverable connection and agreement one with another, so far as we can find their habitudes and relations, so far we shall be possessed of real and general truths.

In our *knowledge* of substances, we are to proceed after a quite different method; the bare contemplation of their abstract ideas (which are but nominal essences) will carry us but a very little way in the search of truth and certainty. Here experience must teach us what reason cannot; and it is by trying alone, that we can certainly *know* what qualities co-exist with those of our complex idea; for instance, whether that yellow, heavy, fusible body, I call *gold*, be malleable, or no; which experience (however it prove in that particular body we examine) makes us not certain that it is so in all, or any other yellow, heavy, fusible bodies, but that which we have tried; because it is no consequence, one way or other, from our complex idea. The necessity or inconsistence of malleability has no visible connection with the combination of that colour, weight, and fusibility, in any body. What is here said of the nominal essence of gold, supposed to consist of a body of such a determinate colour, weight, and fusibility, will hold true if other qualities be added to it. Our reasonings from those ideas will carry us but a little way in the certain discovery of the other properties in those masses of matter wherein all those are to be found. As far as our experience reaches, we may have certain *knowledge*, and no farther. It is not denied, but that a man, accustomed to rational and regular experiments, shall be able to see farther into the nature of bodies, and their unknown properties, than one that is a stranger to them: but this is but judgment and opinion, not *knowledge* and certainty.

This would make it suspected, that natural philosophy is not capable of being made a science. From experiments, and historical observations, we may draw advantages of ease and health, and thereby increase our stock of conveniences for this life; but, beyond this, it is to be feared, our talents reach not, nor are our faculties able to advance farther. See PHYSICS.

The ways to enlarge our *knowledge*, as far as we are capable, seem to be these two: the first is, to get and settle in our minds, as far as we can, clear, distinct, and constant ideas of those things we would consider and *know*; for it being evident that our *knowledge* cannot exceed our ideas, where they are either imperfect, confused, or obscure, we cannot expect to have certain, perfect, or clear *knowledge*. The other art is, of finding out the intermediate ideas, which may shew us the agreement or repugnancy of other ideas, which cannot be immediately compared.

That these two (and not relying on maxims, and drawing consequences from some general propositions) are the right method of improving our *knowledge* in the ideas

of

of other modes, beſides thoſe of quantity, the conſideration of mathematical *knowledge* will eaſily inform us; where, firſt, we ſhall find, that he, who has not clear and perfect ideas of thoſe angles or figures, of which he deſires to *know* any thing, is utterly thereby incapable of any *knowledge* about them. Suppoſe a man not to have an exact idea of a right angle, ſcalenum, or trapezium, and it is clear, that he will in vain ſeek any demonſtration about them.

And farther, it is evident, that it was not the influence of maxims or principles that led the maſters of this ſcience into thoſe wonderful diſcoveries they have made: let a man of good parts *know* all the maxims of mathematics ever ſo well, and contemplate their extent and conſequences as much as he pleaſes, he will, by their aſſiſtance, ſcarce ever come to *know*, that the ſquare of the hypothenuſe in a right-angled *triangle*, is equal to the ſquares of the two other ſides. This, and other mathematical truths, have been diſcovered by the thoughts otherwiſe applied. The mind had other objects, other views before it, far different from thoſe maxims, which men, well enough acquainted with thoſe received axioms, but ignorant of their method who firſt made thoſe demonſtrations, can never ſufficiently admire.

Our *knowledge*, as in other things, ſo in this alſo, has ſo great a conformity with our ſight, that it is neither wholly neceſſary, nor wholly voluntary. Men, who have ſenſes, cannot chooſe but receive ſome ideas by them; and, if they have memory, they cannot but retain ſome of them; and if they have any diſtinguiſhing faculty, cannot but perceive the agreement or diſagreement of ſome of them one with another. As he that has eyes, if he will open them by day, cannot but ſee ſome objects, and perceive a difference in them; yet he may chooſe whether he will turn his eyes towards an object, cuſtomarily ſurvey it, and obſerve accurately all that is viſible in it. But what he doth ſee he cannot ſee otherwiſe than he doth; it depends not on his will to ſee that black, which appears yellow. Juſt thus it is with our underſtanding: all that is voluntary in our *knowledge*, is the employing or with-holding any of our faculties from this or that ſort of objects, and a more or leſs accurate ſurvey of them; but, they being employed, our will hath no power to determine the *knowledge* of the mind one way or another; that is done only by the objects themſelves, as far as they are clearly diſcovered. Thus, he that has got the ideas of numbers, and has taken the pains to compare one, two, or three, to ſix, cannot chooſe but *know* they are equal. He alſo, that hath the idea of an intelligent, but weak and frail being, made by, and depending on, another, who is eternal, omnipotent, and perfectly wiſe and good, will as certainly know, that man is to honour, fear, and obey God, as that the ſun ſhines when he ſees it. But yet, he thoſe truths ever ſo certain, ever ſo clear, he may be ignorant of either or both of them, who will not take the pains to employ his faculties as he ſhould, to inform himſelf about them.

KNOXIA, in *Botany*, a genus of the *tetrandria monogynia* claſs; the characters of which are, that the flower conſiſts of a ſingle petal, and is funnel-ſhaped; and its ſeeds are two, and ſulcated.

KODDA-*pail*, in *Botany*, a name given by Plumier, and in the Hortus Malabaricus, to a genus of plants, called by Linnæus PISTIA.

KOEMPFERIA, in *Botany*. *See* GALANGAL.

KOENIGIA, in *Botany*, a genus of the *triandria trigynia* claſs; the characters of which are, that the calyx is formed of three leaves; that it has no corolla; and the ſeed is ſingle, ovated, and naked.

KOHLMULEN, in *Ichthyography*, a name given by ſome to the *oſſilus flaveſcens*, or yellow cod, called by others *blank* and *gelbe*.

KOKOB, in *Zoology*, the name of a ſpecies of ſerpent, found in the Weſt Indies, and very fatal by its bite. It is ſmaller than our viper, and of a brown colour, variegated with green and red ſpots.

KOLERUS, a name given by Paracelſus to an old dry ulcer.

KOLLOW. *See* KILLOW.

KOLTO, a name given by ſome writers to the PLICA *Polonica*.

KOMMANICK, in *Ornithology*, the German name for the large-creſted lark, common in many parts of Germany, but not known in England. It is larger than our common lark, and has a much larger and longer beak; its back is of a greyer colour, and leſs ſpotted than in the common lark; and its rump is ſcarce ſpotted at all; its creſt is very beautiful, and is compoſed of eight, ten, or twelve, feathers, much darker coloured than the reſt, and the bird can not only raiſe and depreſs, but can ſpread and contract them at pleaſure; it very ſeldom is ſeen high in the air, and never makes any long ſtay there, but is moſt frequently ſeen about the banks of rivers.

KONNARUS, a name given by Agathocles in Athenæus to a plant of Arabia, which the deſcription ſhews to be the ſame with the *ſadus* of the later Arabians, the fruit of which is called *nabac* or *nabech*.

This tree is the *lotus* of Dioſcorides, and the *acanthus* of Virgil, whoſe berries he mentions. The fruit of this tree is like a cherry, but ſmaller, and is ground to powder by the Africans when dried. It is very well known to all who are acquainted with the writings of the old phyſicians, that the berries of the *lotus* or *nabac* were ground down, by the Egyptians and other nations where they grew, to a fine powder for medicinal uſes. They were aſtringents, and uſed both externally in poultices and fomentations, and internally in decoctions and other forms where aſtringents were required.

KORACHORYNCHUS *Indicus*, in *Ichthyology*, the name of a ſea-fiſh of the Eaſt Indies, called by the Dutch the *roevenbeck*. It has its name from its noſe reſembling the beak of a raven or crow, and is about ſeven inches long; its back and tail are red, and its belly yellow; it has alſo on each ſide two pale yellow longitudinal lines, running from the gills to the tail. It is a wholeſome and well-taſted fiſh. Ray.

KORAN. *See* ALCORAN.

KOS, in the *Jewiſh Antiquities*, a meaſure which held the quantity of four cubic inches, and ſomething over. This was the cup of bleſſing, out of which they drank when they gave thanks after ſolemn meals, as on the day of the paſſover.

KOUANIN, in the *Chineſe Language*, the name of a tutelary deity of women. The Chineſe make great numbers of the figures of this deity in white porcelain, and ſend them to all parts of the world, as well as keep them in their own houſes. The figure repreſents a woman with a child in her arms. The women, who have no children, pay a ſort of adoration to theſe images, and ſuppoſe the deity they repreſent to be of power to make them fruitful. It has been ſuppoſed, by many Europeans, that theſe images were meant to repreſent the Virgin Mary, with our Saviour in her arms; but this is an idle opinion; the Chineſe have been fond of this figure in all times that we have an account of. The ſtatue always repreſents an handſome woman, very modeſtly attired.

KRAKEN, in *Zoology*, a moſt amazing large ſea animal, ſeemingly of a crab-like form; the credit of whoſe exiſtence reſts upon the evidence produced by biſhop Pontoppidon, in his Natural Hiſtory of Norway, publiſhed ſome few years ſince; and though the reality of it cannot be denied, the relation will be thought to require good authentication.

As a full grown *kraken* has never been ſeen in all its parts and dimenſions, an accurate ſurvey of which muſt employ ſome time, and not a little motion; it is impoſſible to give a complete deſcription of one. Nevertheleſs, we ſhall ſubmit the probability of its exiſtence on the beſt information our author could collect, which ſeems to have fixed his own belief of it; though, at the ſame time, he acknowledges the account is very defective, and ſuppoſes a farther information concerning the creature may be reſerved for poſterity.

Our fiſhermen, ſays the author, unanimouſly and invariably affirm, that when they are ſeveral miles from the land, particularly in the hot ſummer days, and by their diſtance, and the bearings of ſome points of land, expect from eighty to a hundred fathoms depth, and do not find but from twenty to thirty; and more eſpecially if they find a more than uſual plenty of cod and ling, they judge that the *kraken* is at the bottom; but if they find by their lines, that the water in the ſame place ſtill ſhallows on them, they know he is riſing to the ſurface, and row off with the greateſt expedition, till they come into the uſual ſoundings of the place; when, lying on their oars, in a few minutes the monſter emerges, and ſhews himſelf ſufficiently, though his whole body does not appear. Its back, or upper part, which ſeems an Engliſh mile and a half in circumference (ſome have affirmed more), looks at firſt like a number of ſmall iſlands, ſurrounded with ſomething that floats like ſea-weeds; at laſt, ſeveral bright points or horns appear, which grow thicker the higher they emerge, and ſometimes ſtand up as high and large as the maſts of middle ſized veſſels. In a ſhort time it ſlowly ſinks, which is thought as dangerous as its riſing; as it cauſes ſuch a ſwell and whirlpool, as draws every thing down with it, like that of Maleſtrom. The biſhop juſtly regrets the omiſſion of, probably, the only opportunity that ever has, or may be preſented, of ſurveying it alive, or ſeeing it entire when dead. This, he informs us, once did occur, on the credit of the reverend Mr. Frois, miniſter at Nordland, and vicar of the college for promoting Chriſtian knowledge; who informed him, that in 1680, a *kraken* (perhaps a young and careleſs one, as they generally keep ſeveral leagues from land) came into the

the waters that run between the rocks and cliffs near Alftahoug; where, in turning about, some of its long horns caught hold of some adjoining trees, which it might eaſily have torn up, but that it was alſo entangled in ſome cliffs of the rock, whence it could not extricate itſelf, but putrefied on the ſpot. Our author has heard of no perſon deſtroyed by this monſter, but relates a report of the danger of two fiſhermen, who came upon a part of the water full of the creature's thick ſlimy excrements (which he voids for ſome months, as he feeds for ſome other); they immediately ſtrove to row off, but were not quick enough in turning to ſave the boat from one of the *kraken's* horns, which ſo cruſhed the head of it, that it was with difficulty they ſaved their lives on the wreck, though the weather was perfectly calm; the monſter never appearing at other times. His excrement is ſaid to be attractive of other fiſh, on which he feeds; which expedient was probably neceſſary, on account of his ſlow unwieldy motion, to his ſubſiſtence; as this ſlow motion again may be neceſſary to the ſecurity of ſhips of the greateſt force and burthen, who muſt be overwhelmed on encountering ſuch an immenſe animal, if his velocity was equal to his weight: the Norwegians ſuppoſing, that if his arms on which he moves, and with which he takes his food, were to lay hold of the largeſt man of war, they would pull it down to the bottom.

In confirmation of the reality of this animal, our learned author cites Debes's deſcription of Faroe, for the exiſtence of certain iſlands, which ſuddenly appear, and as ſuddenly vaniſh. Many ſeafaring people, he adds, give accounts of ſuch, particularly in the North ſea; which their ſuperſtition has either attributed to the deluſion of the devil, or conſidered as inhabited by evil ſpirits. But our honeſt hiſtorian, who is not for wronging the devil himſelf, ſuppoſes ſuch miſtaken iſlands to be nothing but the *kraken*, called by ſome the *ſea trolden*, or *ſea moſchieſ*; in which opinion he was greatly confirmed by the following quotation of Dr. Hierne, a learned Swede, from baron Grippenhielm; and which is certainly a very remarkable paſſage, viz. "Among the rocks "about Stockholm, there is ſometimes ſeen a tract of "land, which at other times diſappears, and is ſeen "again in another place. Buræus has placed it as an "iſland in his map. The peaſants, who call it *gummars "ore*, ſay, that it is not always ſeen, and that it lies out "in the open ſea, but I could never find it. One Sun"day, when I was out amongſt the rocks, ſounding the "coaſts, it happened that, in one place, I ſaw ſome"thing like three points of land in the ſea, which ſur"priſed me a little, and I thought I had inadvertently "paſſed them over before. Upon this I called to a pea"ſant, to enquire for *gummars ore*; but when he came "we could ſee nothing of it: upon which the peaſant "ſaid, all was well, and that this prognoſticated a ſtorm, "or a great quantity of fiſh." To which our author ſubjoins, "who cannot diſcover that this *gummars ore* "with its points, and prognoſtications of fiſh, was the "*kraken*, miſtaken by Buræus for an iſland, who may "keep himſelf about that ſpot where he *riſes*." He takes the *kraken*, doubtleſs, from his numerous *teſtaculi*, which ſerve him as feet, to be of the polype kind; and the contemplation of its enormous bulk led him to adapt a paſſage from Eccleſ. xliii. 31, 32, to it. Whether by it may be intended the dragon that is in the ſea, mentioned Iſaiah xxvii. 1. we refer to the conjecture of the reader. After paying but a juſt reſpect to the moral character, the reverend function, and diligent inveſtigations of our author, we muſt admit the poſſibility of its exiſtence, as it implies no contradiction; though it ſeems to encounter a general prepoſſeſſion of the whale's being the largeſt animal on, or in, our globe; and the eradication of any long prepoſſeſſion is attended with ſomething irkſome to us. But were we to ſuppoſe a ſalmon or a ſturgeon, the largeſt fiſh any number of perſons had ſeen or heard of, and the whale had diſcovered himſelf as ſeldom, and but in part, as the *kraken*, it is eaſy to conceive, that the exiſtence of the whale had been as indigeſtible to ſuch perſons then, as that of the *kraken* may be to others now. Some may incline to think, ſuch an extenſive monſter would encroach on the ſymmetry of nature, and be over proportionate to the ſize of the globe itſelf: as a little retroſpection will inform us, that the breadth of what is ſeen of him, ſuppoſing him nearly round, muſt be full two thouſand ſix hundred feet (if more oval, or crab-like, full two thouſand) and his thickneſs, which may rather be called altitude, at leaſt three hundred; our author declaring, he has choſen the leaſt circumference mentioned of this animal, for the greater certainty. Theſe immenſe dimenſions, nevertheleſs, we apprehend will not argue concluſively againſt the exiſtence of the animal, though conſiderably againſt a numerous increaſe or propagation of it. In fact, the great ſcarcity of the *kraken*, his confinement to the North ſea, and perhaps to equal latitudes in the ſouth; the ſmall number propagated by the whale, who is viviparous; and by the largeſt land animals, of whom the elephant is ſaid to go near two years with young; all induce us to conclude, from analogy, that this creature is not numerous; which coincides with a paſſage in a manuſcript aſcribed to Sverre king of Norway, as it is cited by Ol. Wormius, in his Muſeum, p 280. in Latin, which we ſhall exactly tranſlate. "There remains one kind, which they call "hafgufe, whoſe magnitude is unknown, as it is ſeldom "ſeen. Thoſe who affirm they have ſeen its body, de"clare, it is more like an iſland than a beaſt, and that "its carcaſe was never found; whence ſome imagine, "there are but two of the kind in nature." Whether the vaniſhing iſland, Lemair, of which captain Rodney went in ſearch, was a *kraken*, we ſubmit to the fancy of our readers. In fine, if the exiſtence of the creature is admitted, it will ſeem a fair inference, that he is the ſmalleſt as well as largeſt in our world; and that if there are larger in the univerſe, they probably inhabit ſome ſphere or planet more extended than our own. Such we have no pretence to limit; and that fiction can deviſe a much greater than this, is evident, from the cock of Mahomet, and the whale in the Bava Bathra of the Talmud, which were intended to be credited; and to either of which our *kraken* is a very ſhrimp in dimenſions.

KRAMERIA, in *Botany*, a genus of the *tetrandria monogynia* claſs; the characters of which are, that it has no calyx; the corolla has four petals; the upper nectarium is divided into three ſegments, and the lower conſiſts of two leaves; the fruit is a dry, echinated, ſingle-ſeeded berry.

KUL, or KOOL, a Turkiſh term, properly ſignifying a *ſlave* or *ſervant*.

Meninſky tells us, the name is given to all the ſoldiers in the Ottoman empire, particularly to thoſe of the grand ſeignior's guard, and the infantry. The captains of the infantry, and thoſe who command the guards are called *kûl kahyaſi*, and the ſoldiers of the grand ſeignior *kapu kûlleri*, i. e. *ſlaves of the court*. Others inform us, that all who hold any places depending on the crown, or receive wages from it, in a word, all who are, in any meaſure, the grand ſeignior's ſervants, take the title of *kûl* or *kool*, i. e. *ſlave*, as more creditable than that of ſubject; even the grand vizir and the baſhaws value themſelves upon it. A *kûl* or ſlave, of the grand ſeignior, has authority to abuſe any who are only his ſervants; but a ſubject, who ſhould affront a *kûl*, or ſlave, would be ſeverely puniſhed. The *kûls* are entirely devoted to the will of the grand ſeignior, and look on it as a kind of martyrdom, that merits heaven, when they die either by his order, or in the execution of his commands.

KUPPER-*Nickel*, in *Natural Hiſtory*, is a reddiſh yellow mineral, containing the ſemi-metal called NICKEL together with iron and cobalt, mineraliſed by arſenic and ſulphur. It is ſometimes of a vitreous texture, ſometimes fine-grained, and ſometimes conſiſting of ſcaly particles.

KURTCHI, an order of ſoldiery among the Perſians.

The word, in its original, ſignifies *army*; and is applied to a body of cavalry, conſiſting of the nobility of the kingdom of Perſia, and the poſterity of thoſe conquerors, who placed Iſmael Sophi on the throne. They are in number about eighteen thouſand men.

Their commander is called *kurtchi baſchi*, which was formerly the firſt poſt in the kingdom; equivalent to a conſtable of France.

KYPHONISM, KYPHONISMUS, or CYPHONISMUS, an ancient puniſhment, which was frequently undergone by the martyrs in the primitive times; wherein the body of the perſon to ſuffer was anointed with honey, and ſo expoſed to the ſun, that the flies and waſps might be tempted to torment him. This was performed in three manners; ſometimes they only tied the patient to a ſtake; ſometimes they hoiſted him up into the air, and ſuſpended him in a baſket; and ſometimes they ſtretched him out on the ground, with his hands bound behind him. The word is originally Greek, and [illegible] κύφων, which ſignifies either the *ſtake* to which the criminal was tied, the *collar* fitted to his neck, or the [illegible] wherewith they tormented him; the Scholiaſt on Ariſtophanes ſays, it was a wooden lock, or [illegible] and that it was called ſo from κύπτω, *to ſtoop* or *bend*, becauſe it kept the tortured in a crooked, bowing poſture. Others take the κύφων for a log of wood laid over the criminal's head, to prevent his ſtanding upright: Heſychius deſcribes the κύφων as a piece of wood, whereon criminals were ſtretched and tormented. In effect, it is probable the word might ſignify all theſe ſeveral things. It was a generical name, whereof theſe were the ſpecies.

Suidas gives us the fragment of an old law, which puniſhed thoſe who treated the laws with contempt, with *kyphoniſm* for the ſpace of twenty days; after which they were to be precipitated from a rock, dreſſed in women's habit.

KYSTIS, Κύστις, in *Anatomy*. See CYSTIS.

L.

L, *EL*, a semi-vowel, or liquid conſonant, making the eleventh letter of the Engliſh alphabet, and always preſerving the ſame ſound.

The *l* is pronounced by applying the tongue to the palate.

Feſtus obſerves, that *l* was frequently uſed among the ancients for *b*, as in *ollibæ* for *olibæ*; for *d*, as *alipe* for *adipe*; for *i*, as *mutila* for *mutica*; for *n*, as *arvilla* for *arvina*, *bello* for *bene*, *colligo* for *conligo*; for *r*, as *fratelles* of *frater*, *balatrones* for *baratrones*; for *ſ*, as *ancille* of *am* and *caſum*, *equiles* for *equiſes*; for *t*, as *equiſelis*, for *equiſetis*, *Thelis* for *Thetis*. See B, T, &c.

The *ll* is a modern contrivance, and was never uſed among ancient Roman authors: they wrote *alum*, not *allium*; *macellum*, not *macellum*; *pulcer*, not *pulcherr*.

The *ll* of the Greeks was ſometimes changed by the Romans into *l*, as in ἀλλομαι, *ſalio*; ἀλλος, *alius*; φολλον, *folium*: *r* has alſo been turned into *ll*; as *hira*, *illa*; *farare*, *fatullare*, &c. and *l* into *n* or *mill*; as *alo*, *anilla*; *malo*, *maxilla*; *velum*, *vexillum*; *d* was alſo uſed for *l*, *n* for *ll*, and *r* for *l*. See R, &c.

L is alſo frequently uſed inſtead of *d*, as in *Ulyſſes*, from the Greek Ὀδυσσεύς, in the Æolic dialect Ὀδυσσεύς. Thus alſo for *dautia*, we ſay *lautia*; for *dacrumæ*, *lacrymæ*, &c. See D.

There are ſeveral people, for inſtance the Chineſe in Aſia, the Illinois in America, &c. who cannot pronounce the *r*, but always change it into *l*. Thus, when any of them have been baptized by the name of *Petrus*, *Franciſcus*, &c. they always pronounce it *Pethus*, *Flanciſcus*, &c. See R.

Among the Saxons the *l* was aſpirated, and the Spaniards and Welſh uſually double it at the beginning of a word, which ſounds nearly the ſame with our *hl* or *ſl*. At the end of a monoſyllable it is always doubled, except after a diphthong. In a word of more ſyllables it is written ſingle. It is ſometimes inſerted before *s*, and founded feebly after it.

The figure of our *L* we borrowed from the Latins, they from the Greeks, and they again from the Hebrews, whoſe *lamed* is much like our *L*, excepting that the angle is ſomewhat more acute.

L, was alſo a numeral letter among the ancients, and is ſtill ſo in the Roman cypherings, ſignifying *fifty*; according to the verſe,

Quinquies L *denos numero deſignat habendos.*

When a daſh was added at the top, thus, $\overline{L}$, it ſtood for *fifty thouſand*.

L was uſed for fifty, being half a C, which ſignified a hundred, and was formerly written thus L, which, according to Paſquier, makes two L.L. the one upright, the other inverted.

The French Louis *d'ors* have a croſs on them, conſiſting of eight *L*'s interwoven, and diſpoſed in form of a croſs.

The letter *L* is marked on the money coined at Bayonne.

The epochas on Greek medals are uſually written with the ancient *lambda*, *L*; which, according to the tradition of the antiquaries, ſtands for Λευκόθεα, a poetical word, unknown in common ſpeech, ſignifying *aurea*, and which it is probable was more uſed in Egypt than Greece.

L as an abbreviature ſtands for Lucius; and *LLS.* for a BEFERCE. In Engliſh, it denotes a pound ſterling.

LA, in the *Italian Muſic*, a ſyllable by which Guido denominated the laſt ſound in each hexachord; if it begins in C it anſwers to our A, if in G to E, if in F to D.

LABADISTS, or LABBADISTS, in *Eccleſiaſtical Hiſtory*, a ſect of religioniſts, followers of the opinion of Jean de Labbadie, who lived in the laſt century, and was contemporary with mademoiſelle Bourignon.

Labbadie was a native of France, who, after having been honourably diſmiſſed, in 1630, from the order of the Jeſuits, to which he belonged, became a member and miniſter of the reformed church, and erected a new community, which, after his death, in 1674, ſettled at Wievert, in North Holland; where it ſoon ſunk into oblivion.

Some of his tenets were, that 1. God could and did deceive men. 2. That in reading the Scriptures greater attention ſhould be given to the internal inſpiration of the Holy Spirit than to the words of the text; that the Scripture was not ſufficient to lead men to ſalvation, without certain illuminations and revelations from the Holy Ghoſt; and that the efficacy of the word depended upon him that preached it. 3. That baptiſm ought to be deferred till mature age. 4. That the good and the wicked entered equally into the old alliance, providing they deſcended from Abraham, but that the new admitted only ſpiritual men. 5. That the obſervation of Sunday was a matter of indifference. 6. That Chriſt would come and reign a thouſand years on earth. 7. That the euchariſt was only a commemoration of the death of Chriſt; and that though the ſymbols were nothing in themſelves, yet that Chriſt was ſpiritually received by thoſe who partook of them in a due manner. 8. That a contemplative life was a ſtate of grace, and of divine union during this life, the ſummit of perfection, &c. 9. That the man whoſe heart was perfectly content and calm, half enjoys God, has familiar entertainments with him, and ſees all things in him. 10. That this ſtate was to be come at by an entire ſelf-abnegation, by the mortification of the ſenſes and their objects, and by the exerciſe of mental prayer. He alſo maintained, that the faithful ought to have all things in common, and that there is no ſubordination or diſtinction of rank in the church of Chriſt. It is ſaid that the Browniſts, and afterwards the Quakers, offered to connect themſelves with this ſect, but were rejected. See Journ. des Sçavans for October, 1727, where we have ſome account of Labadie and his followers, which were moſtly women; and with ſome of whom, it has been ſaid, he took criminal liberties.

LABARIFERI, among the *Romans*, ſtandard bearers, who carried the LABARUM.

LABARUM, in *Antiquity*, the banner or ſtandard borne before the Roman emperors in the wars.

The *labarum* conſiſted of a long lance, with a ſtaff at the top, croſſing it at right angles; from which hung a rich ſtreamer, of a purple colour, adorned with precious ſtones.

Till the time of Conſtantine it had an eagle painted on it; but that emperor, in lieu thereof, added a croſs, with a cypher expreſſing the name of Jeſus, and thoſe fifty of the braveſt men in his guards to bear it on their ſhoulders, each in his turn.

This ſtandard the Romans took from the Germans, Dacæ, Sarmatæ, Pannonians, &c. whom they had overcome.

The name *labarum* was not known before the time of Conſtantine; but the ſtandard itſelf, in the form we have deſcribed it, abating the ſymbols of Chriſtianity, was uſed by all the preceding emperors.

Some derive the word from *labor*, as if this finiſhed their labours; ſome from λαβαειν, *recurvum*, *picty*; others from λαβαρος, *celer*; and others from λαμπρα, *ſplis*.

The *labarum* has afforded very ample matter for criticiſm, and has been diſcourſed of by Voſſius, Alciatus, Cujas, Gyraldus, Lipſius, Meurſius, Voſſius, Hoffman, Valois, Du-Cange, &c.

LABDACISM, Λαβδακισμος, in *Rhetoric*, the too frequent repetition of the letter L, as *ſol et luna lucc lucebunt*, and *alba levi lallea*.

LABDANUM, in the *Materia Medica*. See LADANUM.

LABEL, a long thin brass ruler, with a small tight at one end, and a center-hole at the other; commonly used with a tangent line on the edge of a circumferentor, to take altitudes, &c.

LABEL, in *Law*, is a narrow slip of paper, or parchment, affixed to a deed or writing, in order to hold the appending seal. Any paper annexed by way of addition, or explication, to any will or testament, is also called a *label*, or CODICIL.

Among apothecaries likewise, the slip of paper round their phials, containing directions how to use the medicine, is called a *label*.

LABEL, in *Heraldry*, a kind of addition to the arms of the heir or first son, to distinguish him from the others. See FILE, and *Tab. Heraldry, fig.* 23.

The *label* is esteemed the most honourable of all differences; and is formed by a fillet usually placed in the middle, and along the chief of the coat, without touching its extremities. Its breadth ought to be a ninth part of the chief.

It is adorned with pendants somewhat like the drops under the triglyphs in the Doric frieze. When there are above three pendants, the number must be specified in blazoning. There are sometimes six.

The *label* is the only difference allowed on the coats of arms belonging to any of the royal family.

LABELLED-*line*, in *Heraldry*, a term used by some to express the line in certain coat arms, called more usually *indented* or *champaigne*. Others apply the same word to express the paire or dove-tail line, called also the *enclaveline* by Morgan. It somewhat resembles the joint called a *dovetail* by our joiners, and its points, as they proceed from the ordinary, whether chief or fess, resemble the ends of *labels*. See URDEE and PATEE.

LABEO, in *Ichthyology*, a name given by the old Latin writers to the fish usually called *cheilon* and CHELON.

LABER, a word found in Serapion, and used there as the name of an aromatic drug. The commentators have been much perplexed to find the reason or etymology of the word, as it appears no where else in the writings of the ancients. It seems to be no other than a wrong spelling of the word *saber* or *sabar*, sometimes also written by the Arabians *ceber*, which is a name of the lignum aloes.

LABIA, in *Anatomy*. See LIPS.

Depressor LABIORUM. See DEPRESSOR.

Elevator LABIORUM. See ELEVATOR.

LABIAL, a term in the French law, used in the same sense with ORAL.

LABIAL *letters*, among *Grammarians*, are those whose pronunciation is chiefly effected by the motion of the lips. By which they stand contradistinguished from PALATAL, DENTAL, GUTTURAL, &c. letters.

LABIAL *offerings* are such as are only made by word of mouth, or even by writing, where there is no valuable consideration. In courts of equity these are not regarded.

LABIATE *flowers*, from the word *labium*, a *lip*, is a term used for a very large series of flowers; the distinctions of which are, that they are monopetalous, and are in their lower part formed into a pipe or narrow tube, and in their upper become widened into one or two lips. The cup of these flowers consists of one leaf, and is usually tubular, and resembles a paper cone; and their pistil is surrounded with four embryos, which ripen into a fruit, composed of four seeds, and kept inclosed in the cup. By this they are distinguished from the perfonated flowers, whose fruit is an oblong capsule; and they differ from the rotated flowers of borrage, and the like, in that they have some sort of resemblance to the opening of the mouth of some animals. See *Tab.* VIII. *of Botany, Class* 4. See FLOWER.

LABIATED *leaf*. See LEAF.

LABINÆ, in *Natural History*, a term used by the authors who have written of Switzerland, and other mountainous countries, to express those vast masses of snow, which sometimes fall from the hills and bury houses, or even whole towns; and when hardened by the frosts, as is often the case, into solid substances, they overthrow woods, villages, and whatever stands in the way of their course, as they roll down the steep sides of the precipices in their way. Some authors have also extended the word to a larger sense, and made it express the falling of vast rocks, or parts of mountains, and their rolling down in the same manner into the flat country: this is a mischief very frequent in the same places, after frosts, and often very fatal.

LABIUM *superius attollens*, in *Anatomy*, a name given by Spigelius to the muscle, called by Albinus, Winslow, and others, *zygomaticus major*.

LABORANT, in *Chemistry*, the person that attends on, and works under a chemist, while he is about any process or experiment.

LABORATORY, or ELABORATORY, the chemists workhouse, or the place where they perform their operations; where their furnaces are built, their vessels kept, &c.

In general, the term *laboratory* is applied to any place where physical experiments, and operations in pharmacy, chemistry, pyrotechnia, &c. are performed.

Dr. Shaw, who has taken great pains to bring the study of chemistry more into use in England than it has hitherto been, has explained the easiest of its operation in general, and attempted a means of making its practice less expensive, by introducing in the place of that vast number of furnaces, and other contrivances, figured and described by the generality of writers on the subject, a *portable laboratory*, by means of which alone all the chemical operations may be commodiously performed. This *laboratory*, fitted for its several purposes, is figured in the plate of chemical furnaces and vessels, to which we refer the reader. See *Tab.* IV. *of Chemist.* N° 82—88. seq. Its contrivance is such, that not only complete courses of chemical experiments and operations may be commodiously performed by its means, but all the medicines may be prepared in such quantities, as to supply not only the demands of a family, but of an apothecary's shop, in moderate business. The first person who planned out this sort of furnace was Beecher; and the scheme executed by Dr. Shaw is an improvement on that attempt. This *laboratory* consists of two parts beside the furnace; these are the apparatus and the materia medica. The apparatus may be divided into the remote and immediate, or, in other words, such as are preparatory to the operations, and such as are actually employed in them. The remote apparatus consists of scales, weights, and measures; also mortars, sieves, rasps, files, hammers, sheers, and forceps. Next to these are the instruments used in the management of the fire, as shovels, hooks, tongs, and blow-pipes; likewise for charging the vessels with the subject matters of the operations, as shells, horns, tin-plates, brushes, hares feet, spoons, and spatulas; also rounds for setting glasses upon, and for emptying their contents, &c. hooked tongs, cones, ingots, basons, funnels, and Bore-glasses, furnished, according to the nature of the things to be kept in them, with common cocks, wax Stoppels, and glass stoppels; and for tying down of these, bladders, leathers, and the like. In the last place come the instruments for making certain utensils, as moulds for muffles, tests, crucibles, and melting-pots, and iron rings for cutting glasses, and the necks of retorts. The more immediate apparatus, or that employed in the operations themselves, consists of vessels containing the subjects to be wrought upon, particularly glass eggs, and bodies for digestion; retorts and receivers for distillation, blind heads for bodies in sublimation; stone-pans and cut-glasses for evaporation; peculiar stout receivers and glasses for separation; strainers for percolation; paper for filtration; muffles and tests for cupellation; crucibles for melting; pots for cementing; and lutings to close the junctures of the vessels, whenever necessary. For the materia chemica, see MATERIA *chemica*.

The furnace has four principal parts: 1. The cover. 2. The ring. 3. The body. And, 4. The foot. The general office and use of the cover is to check, suppress, and throw back the heat and flame, that the fuel may not waste itself too fast, as it otherwise would do to very little purpose in many of the operations; for the action of the fire being not momentary but successive, the more it is kept in, and directed upon the subject, the more it is able to perform its effect, and that with the less expence or destruction of it. In order to increase the draught to the fire, and urge the air more forcibly through the body of the fuel, there is a moveable funnel or chimney, which may occasionally be fixed to the orifice, in the top of the cover left for that and many other uses. See the figure, ubi supra. The ring is the place or seat of many operations. The body to be worked upon by the fire is frequently lodged in it; and in other cases, it helps to enlarge the furnace, and receive the couple of operations it could not otherwise perform. The body of the furnace serves to contain the fuel, and is the common seat of the operations by the fire, in the running metals from their ores; and in these, and many other like cases, it performs the office of a crucible as well as fire-place, and contains the subject mixed along with the fuel, as supra cited at the smelting-house. To this body there belong three several grates, which may be placed at different heights therein, according to the nature of the operation, and the distance required between the subject and the fire. Lastly, the foot is of two kinds, and is not only of use in supporting the rest of the parts, but it receives the ashes of the fuel, and the melted matter that may, in any of the operations, run down from the ores of metals; or, on other the like occasions,

occasions, when the fire liquidates any thing above. The more immediate appurtenances of this furnace are fuel and bellows. The general fuel is to be charcoal; or, as there is a contrivance for a vent or flue in the body of the furnace, common sea-coal may be employed, and the smoak directed up the chimney of the room, in which the furnace is to ſtand. The ſtructure of this furnace is alſo very well fitted for a lump, which is a ſort of heat, highly convenient for ſome curious digeſtions and calcinations; and by this means thoſe operations, which would otherwiſe require an athanor, may be conveniently performed, and that in the moſt accurate manner.

The number of chemical proceſſes that may be performed by this furnace is not eaſily reckoned up; but it may not be improper to add an account of the ſeveral ſtates into which it is to be put for the performing them.

The moſt ſimple ſtate of the furnace is a combination of its two lower parts, the body and the foot. When theſe are put together, it is fit for fuſion by the naked fire, where the matter to be melted is to be mixed among the fuel; as for inſtance, in the running of the ores of lead, tin, or iron, which may thus, in the quantity of many pounds at a time, be ſeparated from their droſs, and purged for uſe, as exactly as at the mine-works, or ſmelting-houſes, either with the aſſiſtance of the bellows, or without, as the nature of the ore requires. By barely placing a grate in the middle of the body, the inſtrument becomes a melting-furnace for a crucible, wherein all the operations that require a fire of fuſion, animated either by the air, or bellows, are performable with ſuch advantages, as cannot be had in the common wind or blaſt-furnaces made for this purpoſe. When only the body of the furnace with its middle grate is ſet upon the foot, it anſwers all the purpoſes of a ſhop-furnace, uſed by the apothecaries for decoction, inſpiſſation, extraction, and the like purpoſes, where a naked fire only is required; and certain diſtillations and ſublimations may alſo be performed conveniently by it.

It may in this ſtate alſo be conveniently made to ſerve the purpoſes of a *balneum Mariæ*, an aſh-heat, a ſand-heat, or a ſtill ſtronger one for digeſtion and ſublimation, by only ſetting on it in this ſtate a veſſel of water, or one filled with aſhes, ſand, or iron filings; and thus ſeveral operations, requiring the ſame kind of heat, may be carried on at the ſame time. If inſtead of a common pan or veſſel to hold water, ſand, &c. the ring, or third part of the furnace, be ſet on, furniſhed with its ſet of pots, the whole is then a furnace fitted for that ſort of diſtillation called *diſtillation in capella vacua*, where the retorts are contained in the cavity of the pots, and locked down therein without any viſible meſſium between. By this means many operations may be performed in the diſtillation and ſeparation of bodies, that could not be worked upon to ſo much advantage by any other method; particularly, the rectification of the ſtrongeſt acid ſpirits is very eaſily and conveniently performed this way at very little expence.

If an iron pan be placed in the room of the ring juſt mentioned, the inſtrument is then a calcining furnace, where ores of metals may be roaſted; and lead, antimony, and the like bodies, may be conveniently reduced to aſhes.

If the loweſt grate be uſed inſtead of the middle one, then either a cold ſtill, or, as it is generally called, a hot one, may be put into the body, and worked in the common manner with its head and refrigeratory. Thus all the cordial waters may be made, ſpirits may be rectified, and the eſſential oils diſtilled by the ſame means, as well as by the common fixed ſtills.

The laſt part, or cover of the furnace, may ſometimes be applied to the ring, ſometimes only to the body of the furnace without the ring. The inſtrument in this caſe becomes a proper reverberatory furnace, and is uſeful for cementation, cupellation, and the aſſaying of ores; and for diſtilling with a fire of ſuppreſſion, that is, where the fire is placed above as well as below the ſubject, and the veſſel that contains it.

A furnace of this nature has numerous advantages, not only over all the chemical furnaces in common uſe, but even over thoſe of the moſt celebrated ſtructure and contrivance, deſcribed by authors on particular occaſions, not excepting thoſe of Glauber and Vigani. Thoſe nicely contrived furnaces are generally adapted to ſome few particular purpoſes, and yet this eaſy kind anſwers in experiment thoſe very purpoſes better; and at the ſame time is of general uſe on all the other occaſions of chemiſtry. Experience has ſhewn, that it is better for the various uſes of Glauber's philoſophical furnaces, than thoſe very furnaces themſelves, though made for theſe very purpoſes; and for the higher operations, as they are called, of metallurgical chemiſtry. For example, to obtain a pure ſpirit of ſalt in plenty, Glauber orders the ſalt to be thrown upon the fire, and has contrivances to catch the riſing vapour; but this is a tedious way, and turns to very little account in practice, nor is the matter much improved by quenching the coals in a brine of ſea-ſalt, and afterwards burning them for their fume. But all that can be expected from theſe aukward contrivances, may be had commodiouſly from the furnace here deſcribed, where the fire being animated by bellows, cauſes the fire to burn more free, and the fuel to yield the ſpirit it was impregnated with much more quickly and eaſily, than in the furnace contrived by that author for the purpoſe, while the fuel is ſupplied by the door, without any diſturbance to the operation. Shaw's Eſſay on a Portable *Laboratory*.

There are many other curious philoſophical experiments, which can be no way ſo well done as with this kind of furnace, and many ſcarce at all without it. It is excellently fitted alſo for enamelling, making of paſtes, ſtaining of glaſs, and making the artificial gems; and beſide theſe, and a number of other curious uſes, it is extremely well fitted for all the common purpoſes of fires. Any artizan who requires fire, in whatever manner, in his buſineſs, may contrive to apply it in this manner as he will. The offices of a common ſtove in a kitchen may alſo be very well ſupplied by it, and the warming a room or vault is as well done by it, as by any of the common contrivances of ſtoves, ovens, and other things, made purpoſely for that uſe.

The outer caſe of the furnace is to be made of good plate-iron of a conſiderable thickneſs, formed in ſeparate pieces of the figures expreſſed in the plate, and its ſize may be ſuch as the operator chooſes; obſerving only a due proportion in its ſeveral parts. The inner ſides of all the parts muſt be lined, at leaſt an inch thick, with a proper LUTE, which muſt be carefully laid on, and gently dried, the cracks which happen in the drying being filled up with more of the ſame luting. See *Portable* FURNACES.

LABORATORY *of an hoſpital*, is a tent where the fire-workers and bombardeers prepare their works, drive their fuſees, fix their ſhells and carcaſes, make quick-match, &c.

LABOUR, in a general ſenſe, imports the exertion of human ſtrength in the performance of any kind of work. See LAND.

Labourers conſpiring together, concerning their work or wages, ſhall forfeit 10*l*. for the firſt offence, 20*l*. for the ſecond, &c. and if not paid, to be ſet on the pillory. Stat. 2 & 3 Edw. VI. cap. 15. Juſtices of peace, and ſtewards of leets, &c. have power to hear and determine complaints relating to non-payment of labourers wages. 4 Edw. IV. cap. 1. And labourers taking work by the great, and leaving the ſame unfiniſhed, unleſs for non-payment of wages, or when they are employed in the king's ſervice, &c. are to ſuffer one month's impriſonment, and forfeit 5*l*. The wages of labourers are to be yearly aſſeſſed for every county, by the ſheriff and juſtices of peace, in the Eaſter ſeſſions; and in corporations by the head officers, under penalties. 5 Eliz. cap. 4. And the ſheriff is to cauſe the ſaid rates and aſſeſſments of wages to be proclaimed. 1 Jac. I. cap. 6. All perſons fit for *labour* ſhall be compelled to ſerve by the day, in the time of hay or corn harveſt; and labourers in harveſt time may go to other counties, having teſtimonials. From the middle of March to the middle of September, labourers are to work from five o'clock in the morning till ſeven or eight at night, being allowed two hours for breakfaſt and dinner, and half an hour for ſleeping in the three hot months; and all the reſt of the year from twilight to twilight, excepting an hour and a half for breakfaſt and dinner, on pain of forfeiting one penny for every hour's abſence. 4 Eliz. If any labourer ſhall make an aſſault upon his maſter, he ſhall ſuffer as a ſervant making ſuch aſſault.

LABOUR, likewiſe, is uſed to denote the pain which women endure in giving birth to their offspring; and is uſually divided into natural, difficult, and preternatural. For the progreſs of a natural *labour*, ſee DELIVERY.

A labour is ſaid to be difficult, when the infant is not brought into the world in the uſual time, that is, in an hour or two; but for certain cauſes is retained longer than ordinary, and cannot be brought away without difficulty, and the greateſt care and diligence. The moſt direct and immediate cauſes of accidents of this kind are, firſt, a bad conformation of the body, as in deformed women; and eſpecially when the bones of the pelvis, the os coccygis, and the os ſacrum, in particular, are preternaturally formed, by which means the pelvis is frequently rendered ſo narrow as not to admit the hands. Secondly, the age of the patient; when, for inſtance, women are either too young and tender, or too old, eſpecially

cially in their firſt labour. Thirdly, when they are too timorous, delicate, or abound too much in blood. Fourthly, when their labour is too much haſtened, before nature concurs, and offers her aſſiſtance; or when the waters are either too ſoon diſcharged, or too long retained. Fifthly, when the patients, not before accuſtomed to ſuch circumſtances, refuſe to aſſiſt their genuine and legitimate pains by their own efforts. The more of theſe, or ſuch cauſes concur, ſo much the more difficult is the *labour*, and the danger is alſo proportionable. When the head of the child is long confined in the pelvis, it is equally dangerous to the mother and the child; for by its preſſure againſt the ſoft parts, it may ſtop the circulation, and bring on inflammation and gangrene, which would prove certain death to the mother, and likewiſe to the child, by its affecting the brain. When this kind of danger is apprehended, the forceps muſt be uſed.

Preternatural *labour* is that in which the legs or breech are delivered firſt, and the body and head laſt. *Labours* of this kind are more or leſs difficult, according to the poſition of the child, and the contraction of the uterus. They are uſually divided into three claſſes: 1. When the lower parts of the child, as the feet, knees, or breech, preſent. 2. When it is known that the preſentation is wrong, and the midwife has the advantage of turning the child immediately, on breaking the membranes, by means of the waters. 3. When the child preſents wrong, and the uterus is cloſely contracted, the advantage of the water being loſt. When it is known that the breaſt, belly, ſhoulders, or any part but the head, feet, knees, or buttocks, preſent, and the membranes have ſomewhat protruded, let them be broke; and by immediately introducing the hand, let the feet be brought into the paſſage, and thus let the child be delivered, as when the feet preſent. In other caſes of preternatural *labour*, the method of delivery depends upon the part of the child which firſt preſents itſelf.

LABOUR, in *Sea-Language*, is uſed when a ſhip rolls or toſſes much in a turbulent ſea.

LABRISULCIUM, in the *Art of Healing*, is a chap in the lip, or the ſame with CHEILOCACE; and is a ſcrophulous ſymptom.

The chaps upper lip, as it is an attendant on the ſtrumæ, is beſt cured by the ſame internal remedies uſually preſcribed to alter and rectify this particular dyſcraſy of the blood, and its ſecreted juices; which, together with mercurial purgation, oftentimes takes down the ſwelling, at leaſt for a time; till by getting a freſh cold, or ſome other treſpaſs in the non-naturals, a new fluxion ariſes, and the part ſwells up again.

The chap, or cleft, may be anointed with oil of almonds, ſpermaceti, ointment of tutty, or Turner's cerate of lapis calaminaris.

LABRUS, in *Ichthyology*, the name of a genus of fiſh, the characters of which are theſe; they are of the acanthopterygious tribe; the branchioſtege membrane on each ſide contains ſix ſlender and flat bones, when the fiſh is full grown; but in the young ones, five only can be counted; the teeth are large, and are placed in the jaws, and on three bones in the fauces; the upper ones hard, and two in number, the lower one ſingle; the palate and tongue are ſmooth; there are thick and fleſhy lips covering the teeth; the membrane of the back-fin contains in its fore-part double rays, ariſing from each baſe of theſe two; the one is prickly, the other ſoft and inoffenſive; the colour is generally beautiful, and in moſt of the ſpecies elegantly variegated; the tail is generally undivided; the ſcales are large, ſoft, and ſmooth; and there are no appendices to the pylorus. The ſpecies of this genus, enumerated by Artedi, are ten.

In the Linnæan ſyſtem this is a genus of the thoracic order, comprehending forty-one ſpecies.

The word *labrus* is truly Roman, and is uſed in the ſame ſenſe by Ovid and others, being probably derived from the word *labra*, *lips*; this fiſh having remarkably thick and prominent lips.

LABRUSCA, in *Botany*, a name uſed by the old authors for black bryony.

LABURNUM, in *Botany*. See *Baſe-tree* TREFOIL.

LABUYO, in *Natural Hiſtory*, a name given by the inhabitants of the Philippine iſlands to a bird very common among them, and called by us the UROGALLUS.

LABYRINTH, Λαβύρινθος, among the *Ancients*, was a large and intricate edifice cut out into various iſles and meanders, running into each other, ſo as to render it difficult to get out of it.

There is mention made of four celebrated *labyrinths* among the ancients, ranked by Pliny in the number of the wonders of the world; viz. the Cretan, Egyptian, Lemnian, and Italian.

That of Crete is the moſt famed; it was built by Dædalus, for king Minos, on the model o that of Egypt; and it was hence that Theſeus made his eſcape by means of Ariadne's clue.

That of Egypt, according to Pliny, was the oldeſt of all; and was finiſhing in his time, after having ſtood 3600 years. He ſays it was built by king Peteſuchus, or Tithoes; but Herodotus makes it the work of ſeveral kings: it ſtood on the banks of the lake Mœris, and conſiſted of twelve palaces, in which the twelve kings of Egypt aſſembled to tranſact affairs of ſtate and religion, containing three thouſand apartments. See a plan and deſcription of this *labyrinth*, in the preſent ſtate of it, in Pococke's Hiſt. of the Eaſt, vol. i. p. 61, &c. See alſo Perry's View of the Levant, p. 381, &c.

That of Lemnos was ſupported by columns of wonderful beauty; there were ſome remains of it at the time when Pliny wrote. That of Italy was built by Porſenna, king of Hetruria, for his tomb.

LABYRINTH, in *Anatomy*, denotes the ſecond cavity of the internal EAR, which is formed or excavated out of the os petroſum; and is thus called, as having ſeveral windings in it.

Dr. Vieuſſens obſerves, that the bone, out of which the *labyrinth* is dug, is white, hard, and very compact; that the ethereal matter of ſounds laden with impreſſions ſtriking againſt its ſide, may loſe little or nothing of its motion, but communicate it entire to the nerves of the ear. See HEARING, SOUND, &c.

LABYRINTH, in *Gardening*, is a part of the ground ſo planted and diſpoſed, as to render it difficult, when any one is in it, to find the way out; and in the attempting to get out, there are to be as many ſtops and diſappointments laid in the way as poſſible: the center alſo is to be made difficult to be found. There are two general ways of making them; the firſt is with ſingle hedges, and this is what has been moſt practiſed in England; and this may be beſt where there is but a ſmall ſpot of ground allowed for the making them; but where there is room enough, the double hedges are much the moſt eligible; and theſe are beſt of all, when there is a wood-work between them. The walks in *labyrinths* ſhould be gravelled, and ſhould by no means be made too narrow. Theſe are to be ſet with iron bars, and the paliſades ought to be ten, twelve, or fourteen feet high. *Labyrinths* are only proper for large gardens; and the moſt in the world is ſaid to be that of Verſailles. That at Hampton-court is well known.

LAC, *milk*. See MILK.

LAC *ammoniaci* is formed by triturating gum ammoniac in ſimple penny-royal water, in ſuch proportion that four ſpoonfuls, or two ounces, of the emulſion, contain thirty grains of the AMMONIAC. Some have diſſolved it in vinegar of ſquills.

LAC *lunæ*. Dr. Plott gives this foſſil as a mark of good lime-ſtone; but it has been obſerved, that two quarries in Ireland, where *lac lunæ* was found, were of building ſtone, but would not burn into lime. Phil. Tranſ. N° 477. § 9.

There are many varieties of this mineral, differing in their texture and colour. It is found in many parts of Europe, and alſo in Aſia and America. Many of the Engliſh quarries in Oxfordſhire, Glouceſterſhire, Northamptonſhire, and Derbyſhire, afford conſiderable quantities of it. It adheres to the roofs and walls of grottoes and caverns, and is lodged in the fiſſures of ſtrata of ſtone, ſometimes in form of a farinaceous powder, and ſometimes concreted into maſſes. Its ſurface is rough and duſky; it colours the hands, adheres to the tongue, melts readily in the mouth, without grittineſs, yields an inſipid taſte, and raiſes an ebullition in water, which ſoon diſſolves it into a fine white powder. See AGARIC.

LAC *ſulphuris*. See SULPHUR.

LAC *virginale*. See *Virgin's* MILK.

LAC *virginis*. See VIRGIN's *milk*, and BALAUSTIN.

LACCA, *ſtick-lac*, improperly called [illegible] is a ſort of hard, red, brittle, clear, and [illegible] ſubſtance, brought from Malabar, Bengal, and [illegible] uſed in dyeing ſcarlet, and in painting, making [illegible] ſpirit varniſhes, &c.

Authors differ as to the production of this [illegible] F. Tachard, who was on the ſpot, tells us, [illegible] of little ants, fixing themſelves on the branches [illegible] ſeveral trees, leave behind them a reddiſh moiſture, which, lying expoſed to the air and ſun, hardens in five or ſix days time, and becomes *lacca*. Some imagine that it is not the production of the ants, but a juice which they draw out of the trees, by making little inciſions in it; and others ſay, that the trees where the *lacca* is found do yield a gum; but that it is of a very different nature from the *lacca*.

The ants, they tell us, act here in quality of bees, and the *lacca* is their wax. They work it in eight months

in the year, and the reſt of the time lie by, becauſe of the rains.

Lemery, having examined the gum *lacca* chemically, judges it to be a mean mixture between a gum and a reſin, and more abundant in ſalt than oil.

Mr. Geoffroy, examining the gum *lacca*, found it to be a kind of comb, ſuch as the bees, and ſome other inſects, are accuſtomed to make. Upon breaking it into pieces, it appeared divided into a great number of alveoli, or little cells, of an uniform figure, and which he thinks plainly ſhew that it never oozed from trees. Theſe cells are not mere excrements, as ſome imagine; but are intended for ſomething to be depoſited in them, and accordingly are found to contain little bodies, which the firſt obſervers took for the wings, or other parts of the inſects that produced the *lacca*. Theſe little bodies are of a beautiful red colour; and, when broken, make a powder as fine as cochineal. It is moſt probable theſe cells are deſtined to lodge the young brood, as thoſe of the bees; and that theſe little carcaſes are the embryos of inſects, or perhaps their ſkins.

There are ſeveral ſorts of *lacca*; that mentioned in the laſt paragraph is the natural, being a kind of wax depoſited either on the branches of the trees, or on ſticks faſtened in the earth for that purpoſe, and thence called *ſtick-lac*. When it is prepared, thoſe kinds of dry cells are not ſeen. If the *lac* be ſeparated from the ſticks to which it adheres, groſly powdered, and deprived of its colour by digeſtion with menſtruums, it is called *lac lac*; and when the *ſtick-lac* is freed from its impurities, by melting it over a gentle fire, and formed into cakes, it is called *ſhell-lac*. The grains, or plates, thus formed by liquefaction, and robbed of great part of the animal tincture, ſeem to be of an intermediate nature between that of wax and reſins, or to partake of the nature of both; they crumble on chewing, and do not ſoften or ſtick together again; laid on a red-hot iron, they inſtantly catch fire, and quickly burn off, with a ſtrong and not diſagreeable ſmell; diſtilled, they yield, like wax, an acid ſpirit, and a butyraceous oil; alkaline lixivia, and volatile alkaline ſpirits, diſſolve them into a purpliſh liquor; they diſſolve alſo, by the aſſiſtance of heat, in rectified ſpirit of wine, communicate to it a yelloviſh or browniſh red colour, an agreeable ſmell, and a bitteriſh, ſubaſtringent, not unpleaſant, taſte. The *lac* in ſubſtance, whether entire, or freed from ſo much of its colouring matter as boiling water is capable of extracting, has no manifeſt taſte or ſmell. M. Geoffroy reckons ſix or ſeven different kinds; beſides which, there are ſeveral paſtes uſed by the painters, that go by this name, or by that of *laque*. This gum boiled in water with acids makes a beautiful red dye.

To prepare the *lacca* for uſe in dyeing, they firſt ſeparate it from the branches to which it adheres, pound it in a mortar, and throw it into boiling water; and when the water is well dyed, they pour on freſh, till ſuch time as it will tinge no more. Part of the water thus tinged is evaporated in the ſun; after which the thickened tincture is ſtrained through a linen cloth.

The colour given by *lac* is leſs beautiful, but more durable, than that given by cochineal. To render the colouring matter of the *lac* diffuſible in water, ſo as to be applied to the ſtuffs to be dyed, Mr. Hellot directs the following procedure. Let ſome powdered *gum-lac* be digeſted for two hours in a decoction of ſoot-free-ſtone, by which a fine crimſon colour is given to the water, and the gum is rendered pale or throw-coloured. To this tincture, poured off clear, let a ſolution of alum be added; and when the colouring matter has ſubſided, let it be ſeparated from the clear liquor, and dried. It will weigh about one-fifth of the quantity of *lac* employed. This dried feculæ is to be diſſolved or diffuſed in warm water, and ſome ſolution of tin is to be added to it, by which it acquires a vivid ſcarlet colour. This liquor is to be added to a ſolution of tartar in boiling water; and thus the dye is prepared.

The method of obtaining the fine red *lac* uſed by painters from this ſubſtance, is by the following ſimple proceſs. Boil the *ſtick-lac* in water, filtre the decoction, and evaporate the clear liquor to a conſiſtence over a gentle fire. The occaſion of this eaſy ſeparation is, that the beautiful red colour, here ſeparated, adheres only ſlightly to the outſides of the ſticks, broke off the trees along with the *gum-lac*, and readily communicates itſelf to boiling water. Some of this ſticking matter alſo adhering to the gum itſelf, it is proper to boil the whole together; for the gum does not at all prejudice the colour, nor diſſolve in boiling water: ſo that after this operation the *gum* is as fit for making ſealing-wax as before, and for all other uſes which do not require its colour.

A tincture of *gum-lac* may be thus prepared. Take two ounces of *gum-lac*, reduce it to a fine powder, and make it into a ſtiff paſte with oil of tartar *per deliquium*; ſet this in an open glaſs to dry by a gentle heat, then remove it to the open air, that it may relent and grow ſoft, then dry it again, and repeat this two or three times, at the end of which the hard body of this reſin will be found reſolved into a purple liquor. This may yet again be dried, and when dried muſt be reduced to powder, which powder will afford a fine ſtrong tincture to ſpirit of wine, being boiled in it in a tall glaſs in a ſand-heat for two or three hours. And by this proceſs ſtrong tinctures may be made from myrrh, amber, gum, juniper, &c. which will yield no tincture of ſtrength to ſpirit of wine alone, if treated in the uſual way.

A ſpirituous tincture of *ſtick-lac* has been ſometimes given as a mild reſtringent and corroborant in female weakneſſes, and in rheumatic and ſcorbutic diſorders. But the principal medicinal uſe of this concrete is as a topical corroborant and antiſeptic, in laxities and ſcorbutic bleedings, and exulcerations of the gums. Some employ for this purpoſe a tincture of the *lac* in alum water; others, a tincture made in vinous ſpirits, impregnated with the pungent antiſcorbutics. The college of Edinburgh directs an ounce of the powdered *lac*, with half an ounce of powdered myrrh, to be digeſted in a ſand-heat, for ſix days, in a pint and a half of ſcurvy graſs.

The *gum-lac* has been lately uſed as an electric, inſtead of glaſs, for ELECTRICAL *machines*. See LACHRIE, LAKE, and VERNISH.

LACCA, *artificial*, or LAQUE, is alſo a name given to a coloured ſubſtance, drawn from ſeveral flowers; as the yellow from the flowers of the juniper, the red from the poppy, and the blue from the iris or violet.

The tinctures of theſe flowers are extracted by digeſting them ſeveral times in aqua vitæ, or by boiling them over a ſlove fire in a lixivium of pot-aſhes and alum.

An *artificial lacca* is alſo made of Brazil wood, boiled in a lixivium of the branches of the vine, adding a little cochineal, turmeric, calcined alum, and arſenic, incorporated with the bones of the cuttle-fiſh pulverized, and made up into little cakes, and dried.

If it be to be very red, they add the juice of lemon to it; to make it brown, they add oil of tartar.

Dove-coloured, or columbine *lacca*, is made with Brazil of Fernambuc, ſteeped in diſtilled vinegar for the ſpace of a month, and mixed with alum incorporated in cuttle-fiſh bone. For other proceſſes, ſee LAKE and MADDER.

LACCIA, in *Ichthyology*, a name given by Paulus Jovius to the SHAD, or, as we ſometimes call it, the mother of the pilchards.

LACCOPEDON, a word uſed by the old medical writers to expreſs the lax part of the ſcrotum.

LACCUS, Λάκκος, among the Greeks, a ditch or trench uſed inſtead of an ALTAR, when ſacrifices were to be offered to the ſubterranean or infernal gods.

LACE, in *Commerce*, a work compoſed of many threads of gold, ſilver, ſilk, or linen, interwoven the one with the other, and worked upon a pillow with ſpindles, according to the pattern deſigned; the open work being formed with pins, which are placed and diſplaced as the ſpindles are moved. See GOLD *thread*.

The importation of gold and ſilver *lace* is prohibited.

LACE, *bone*, a *lace* made of fine linen thread or ſilk, much in the ſame manner as that of gold and ſilver. The pattern of the *lace* is fixed upon a large round pillow, and pins being ſtuck into the holes or opening in the pattern, the threads are interwoven by means of a number of bobbins made of bone or ivory, each of which contains a ſmall quantity of fine thread, in ſuch a manner as to make the *lace* exactly reſemble the pattern. There are ſeveral towns in England, and particularly in Buckinghamſhire, that carry on this manufacture; but vaſt quantities of the fineſt *laces* have been imported from Flanders.

The duties on foreign *bone lace* are as follow. *Bone lace* of thread, the dozen yards, pays on importation 15*s.* 4¼*d.* and drawn back on exportation 13*s.* 6*d.* Plain, or antler *lace* of thread, the groſs, pays 3*s.* 10·½*d.* Silk *bone-lace* the pound, containing ſixteen ounces, pays 11*l.* 10*s.* 10¾*d.*

LACE is alſo uſed for a kind of chord made of ſilk or cotton, chiefly uſed in lacing women's ſtays.

LACEDÆMONIUM *marmor*, in the *Natural Hiſtory of the Ancients*, the name of a ſpecies of marble very hard, and of a beautiful green colour; it is a very cloſe, even, and compact marble; of a fine ſtrong and bright green, and when poliſhed, is the brighteſt of all the green marbles, and is remarkable for this, that the colour is not regularly and equally diffuſed through the whole maſs, but leaves in it many ſpots and lines very bright and pale, and ſome much deeper than the general colour, though

 there

there is no colour but green in the whole, only in different shades and degrees, some parts approaching to black, and others to whiteneſs.

It was originally found only in Egypt, and there not in entire ſtrata, but in large pieces waſhed off from the ſtrata, and ſometimes left on the ſurface, ſometimes buried in the earth, and was greatly valued. It has been ſince found in Italy and Germany, and in England. About five miles from the Hot-Wells at Briſtol there is a ſtratum of it, whence it might be had in conſiderable quantities. Its beauty would ſoon recommend it, if it were once known; and though hard to cut, it would make amends for that by the high poliſh it would take.

LACERNA, a thick coarſe ſort of military garment worn by the ancients.

The *lacerna* was a kind of cloke of woollen, only uſed by the men; who wore it over the toga, and, when that was not on, over the tunica. It was at firſt very ſhort, but growing popular in the Roman army, it was ſoon lengthened.

The *lacerna* was ſcarce known in Rome till the time of the civil wars, and the triumvirate; then indeed it came into faſhion; for the ſoldiers being then frequently in the city, or at the city gates, the ſight became familiar to the citizens, and they fell into the uſe of it; inſomuch that it became the common dreſs of the knights and ſenators, till the time of Valentinian and Theodoſius, when the ſenators were prohibited the wearing of it in the city.

The *lacerna* appears to have been much the ſame with the *chlamys* and *birrus*.

Martial mentions *lacernæ* often ten thouſand ſeſterces price.

LACERTA, *Lizard*, in *Aſtronomy*, a conſtellation of the northern hemiſphere, including, according to Hevelius, ten ſtars, and in the Britiſh Catalogue ſixteen, which are as follow:

Names and ſituations of the ſtars.	Signs.	Longit.		Latitude N.		Magnitudes.
		°	′	°	′	
In the extremity of the tail	♐	19	42	74	24	30	5
In the right foot		27	58	36	61	18	22	5
	♑	4	23	56	55	34	10	4·5
In the head		1	57	33	55	19	9	5
		0	57	54	51	24	22	4·5
5.								
In the belly	♐	27	8	24	47	32	44	5
	♑	3	52	12	53	47	26	4
Firſt in the root of the tail	♐	25	43	28	44	2	31	6
	♑	6	27	28	53	41	44	6
3d in the root of tail	♐	26	4	36	45	12	34	6
10.								
In the back	♑	0	19	52	47	30	5	5
2d in root of the tail	♐	27	25	27	43	59	35	6
		29	11	36	35	5	6	6
	♑	0	41	54	44	34	3	6
		2	5	9	45	33	38	5
15.								
		1	45	28	43	41	10	6

LACERTA, the *lizard* or *eft*, in *Zoology*, the name of a large genus of animals, comprehending all thoſe quadrupeds which are oviparous, and have long tails continued from their bodies. The *lizard*, or *lacerta*, in the Linnæan ſyſtem, is a genus of reptiles in the claſs of *amphibia*, diſtinguiſhed by a four-footed naked body, with a tail, comprehending forty-eight ſpecies. The term oviparous is to be underſtood however in a larger ſenſe, expreſſing ſome among theſe, which, though they have true and proper eggs within them, yet never depoſit them as ſuch, but keep them in their bodies till they are hatched, and bring forth living young ones. Some of the ſerpents, as well as ſome of the *lizards*, are of this kind, and the obſervation is as old as Ariſtotle, who calls the creatures, whoſe generation is of this kind, *internally oviparous*, *externally viviparous*. See *Tab. of Serpents*, N° 30, ſeq.

The *lizard* claſs is very numerous; and the ſeveral ſpecies are diſtinguiſhed chiefly by the number of their toes, and the form and length of their tail.

The *lizard* lives in caverns, ruins, and deſolate places. The large green *lizard* is eſteemed above the reſt for medicinal purpoſes; but this being rarely to be found in theſe countries, what we ſay is to be underſtood of the common *lizard*.

Being cut in pieces, or bruiſed, eſpecially the head, and applied with ſalt, it extracts ſplinters, pieces of glaſs, or the like, out of the body. The fleſh, or the aſhes of it, burnt, made into a liniment, with fat, cures an alopecia. It is alſo good againſt the ſting of a ſcorpion, and the bites of other venomous creatures.

LACERTA *anguina*, or *orbicularis*. See EFT.

This ſpecies is found, in the ſpring and ſummer, in moſt ditches and ſhallow ſtanding waters throughout England, but are ſeldom or ever ſeen in winter. Theſe ſmall *lizards* ſhed their ſkins every two or three weeks, and theſe changes may be obſerved by keeping them in a jar of water. The animal begins this work of putting off the old ſkin, by ſoftening it with its fore-feet about the jaws; it then puſhes it backward gently and gradually both above and below the head, till it is able to ſlip out firſt one leg, and then the other; which being done, it proceeds to thruſt the ſkin backwards as far as theſe legs can reach; it is then obliged to rub its body againſt pebbles, gravel, &c. till more than half its body is freed from the ſkin, which appears doubled back, and covering the hinder part of the body and tail. The animal afterwards turning its head round to meet its tail, takes hold of the ſkin with its mouth, and ſetting its feet upon it, by degrees pulls it quite off. The ſkin will be found with its inſide outwards, but not having the leaſt hole or breach. The animal will ſwallow the ſkin whole, as it does its other food, unleſs it be ſpeedily removed. Phil. Tranſ. vol. xliv. p. 532, &c.

LACERTA *chalcidica*, in *Zoology*, the name of a ſpecies of *lizard*, more uſually known by the name SEPS.

LACERTA *orbicularis*, in *Zoology*, the name of a very ſingular ſpecies of *lizard*, which is not long and ſlender like the reſt, but broad and rounded. It is an inhabitant of Mexico.

LACERTA *ſquamoſa*, in *Zoology*, a name given by authors to a ſpecies of *lizard*, more eminently ſcaly than any other kind. The general length of this creature is about a yard and half; his head from the noſe end to the fore-feet, is not above three inches; he has no neck; his trunk from the fore-legs to the hinder, is not above ten inches and a half, but his tail is exceeding long, not meaſuring leſs than a yard and a half quarter; the back part of his head is near two inches over; his noſe about an inch, his body nearly four inches, and his tail very taper; he is all over, except his throat and belly, and the lower part of his fore-legs, and the inward part of the hinder ones, covered with ſcales very thick, and in ſolidity equal to the hardeſt bone; the baſes of the ſcales are of a blackiſh yellow, the reſt of a pale yellow, like that of old ivory; they are ſtriated from the baſe to the cone, and are diſpoſed alternately in the manner of the ſcales of fiſh. It is ſaid to be a very tame and inoffenſive animal.

The throat and belly of this animal are beſet with hairs, and Mr. Ray ſuppoſes it from that, to belong to the viviparous quadrupeds, notwithſtanding that its ſhape has always made it be ranked among the *lizard* kind. It is preſerved in the muſeums of the curious, but we are not acquainted with the part of the world it lives in. Ray's Syn. Quad. p. 275.

LACERTA *ſubterranea*, the *under-ground lizard*, a very diſagreeable and dangerous ſpecies of *lizard*, found in the Antilles-iſlands, and ſome other places. They are often met with by the people who dig in marſhy places, and are of a very formidable aſpect; they are about ſeven inches long. Their back is covered with black gloſſy ſcales, with a few grey ones, mixed here and there among them, and they look ſleek and gloſſy as if rubbed over with oil; the belly is no leſs ſcaly than the back, and their ſkin is of a yellowiſh colour. The head is ſmall and ſharp, and the mouth opens very wide, and is armed with very numerous and ſharp teeth; their eyes are very ſmall. As ſoon as they are dug up, and thrown on the ground, they immediately dig their way in again with their feet, which are prepared for that purpoſe, and armed with ſharp claws; and when they are once in, they burrow their way like moles wherever they pleaſe. They do great miſchiefs to the inhabitants in their gardens and plantation, burrowing horizontally at ſmall depths, and deſtroying the roots of every thing they meet with. Their bite is eſteemed as dangerous as that of the moſt poiſonous ſerpent.

LACERTA *viridis*, the *green-lizard*, a very beautiful creature, which is common in many parts of Italy, and is ſometimes found in Ireland. It is conſiderably larger than our land-eft, and of a very beautiful green. See *Tab. of Serpents*, N° 31.

LACERTA *volans*, is a ſpecies of *lizard*, according to ſome writers, but Linnæus has referred this and another ſpecies to a diſtinct genus, under the name of *draco*; it lives on trees, feeding on ants, flies, and other inſects, and doing no injury to man or any other large animal. It has membranes on its ſides, which ſerve the office of wings, in carrying it from one tree to another, and has been called by Geſner the *dragon* or *winged-ſerpent*.

LACERTUS, in *Ichthyography*, the *lizard-fiſh*, a name given by ſome writers to a fiſh of the cucullus-kind, much reſembling the common mackrel in ſhape and in taſte, and more uſually called trachurus.

LACERTUS is alſo uſed for a fiſh of the garfiſh-kind, or acus *Oppiani*,

Oppiani, but larger than the common species, and called by the Italian fishermen *aguglia imperiale*, or the imperial garfish, and by the fishermen of England, particularly in Cornwall, the *girrock*, in distinction from the common kind which they call *sipper*. It is thicker in proportion to its length than the common garfish, and has a shorter and sharper snout, and instead of teeth, has only its jaws serrated like a file. It is a scarce fish, but is more firm in its flesh than the common garfish.

LACERTUS *alter sphincteris*, in *Anatomy*, a name given by Santorini, and some others, to one of the muscles of the anus, now generally known by the name of the *levator ani*: the *musculus sedem attollens* of Vesalius, and *latus* of others. The thin termination of this muscle, not the whole, is understood by this name.

LACERUM *felinum*, among *Botanists*. See LEAF.

LACHES, (from the French *lascher*, i. e. *laxare*, or *laschè*, *ignavus*) in our law, signifies slackness or negligence; as it appears in Littleton, where *laches* of entry is a neglect in the heir to enter, and probably it may be an old English word; for when we say there is *laches* of entry, it is the same as if it were said, there is lack of entry; and in this signification it is used. Litt. 136. No *laches* shall be adjudged in the heir within the age; and regularly *laches* shall not bar either infants or femes covert for not entry or claim to avoid descents: but *laches* shall be accounted in them, for non-performance of a condition annexed to the state of the land. Co. Litt. 146.

LACHNÆA, in *Botany*, a genus of the *octandria monogynia* class: it has no calyx; the corolla is divided into four segments, with an uneven margin; the seed is single and obliquely acute.

LACHNIS, in *Natural History*, the name of a genus of fossils, of the class of the *fibraria*; the characters of which are, that they are fibrose bodies, not elastic, and composed of short and abrupt fibres, or filaments.

The word is derived from the Greek λαχνος, a hair or short capillament or fibre. See *Tab. of Fossils, Class* 1.

The bodies of this genus are divided into those which are composed of larger and broader, and those which are composed of smaller and narrower filaments. Of the first of these, there are six species known among us; and of the other four.

It is very certain, that most of the rest, from the quantities they are found in, might be made a very profitable thing to the owners of the pits where they lie, though they are in most places neglected.

LACHRYMA *Jobi*, in *Botany*. See JOB's *tears*.

LACHRYMÆ *Batavicæ*. See RUPERT's *drops*.

LACHRYMAL, or LACHRYMAL *gland*, in *Anatomy*, a small oblong gland, situate above the eye, near the little canthus, whence proceed two or three small ducts, which, opening on the inward surface of the eye-lid, filtrate a serosity serving to moisten the ball of the eye, and facilitate its motion.

Near the larger angle is also a little eminence, in form of a caruncle, which some have taken for another *glandula lachrymalis*, but by mistake; this being no more than the duplicature of the inner membrane of the eye-lids. See CARUNCULA *Lachrymalis*.

On the same side near the lesser angle, are two little perforations, called *puncta lacrymalia*.

On the same side is also a small bone, one of those of the upper jaw, sometimes called *os lachrymale*, but more usually *os unguis*.

LACHRYMALIS, *fistula*, is a fistula in the larger angle of the eye.

It usually happens after an abscess formed in the sacculus lachrymalis, by means of the serosity lodged there; which, being retained too long, becomes acrimonious, and occasions an ulcer, which frequently degenerates into a fistula. See FISTULA *Lachrymalis*.

LACHRYMALIS, *saccus*. See SACCULUS and LACHRYMALIA.

LACHRYMALIS, or LACHRYMALIA *puncta*, in *Anatomy*, two little apertures in the great angle of each eye, into which an muco-saline pellucid humour, secreted from the blood by the glandula lachrymalis, is conveyed, and thence carried off by the lachrymal canals, termed *carunculæ*, into a little sac called *saculus lacrymalis*, in the canal of the nose; whence, by a pipe always open, it is carried into the cavity of the nose; immediately under the lower os spongiosum.

Hence appears the reason why people, in crying, run at the nose.

This humour, separated by the glandula lachrymalis, serves to moisten and lubricate the ball of the eye, and prevent any hurtful attrition; when it is secreted in any great quantity, so as to overflow the eye-lids, it is called tears.

LACHRYMATORIES, or LACHRYMATORIES, in *Antiquity*, were small glass or earthen vessels, wherein the tears of the weeping friends that survived were reposited, and buried with the ashes and urns of the dead.

Some of these are still seen in the cabinets of the curious.

LACINIATED *leaf*, in *Botany*. See LEAF.

LACK of *Rupert*. See RUPERT.

LACKER. See LACQUER.

LACMUS. See LITMUS.

LACONIC *style*. See STYLE.

LACONICA *scytala*. See SCYTALA.

LACONISM, *Λακωνισμος*, a short, pithy, sententious speech, in the manner of the Lacedæmonians, who were remarkable for the closeness and conciseness of their way of delivering themselves.

LACQUER or LACKER, is a varnish applied upon tin, brass, and other metals, to preserve them from tarnishing, and to improve their colour. The basis of *lacquers* is a solution of the resinous substance, called seed-lac, in spirit of wine. The spirit ought to be very much dephlegmated in order to dissolve much of the lac. For this purpose, some authors direct dry pot-ash to be thrown into the spirit. This alkali attracts the water, with which it forms a liquid that subsides distinctly from the spirit, at the bottom of the vessel. From this liquid the spirit may be separated by decantation. By this method the spirit is much dephlegmated: but at the same time it becomes impregnated with part of the alkali, which depraves its colour, and communicates a property to the *lacquer* of imbibing moisture from the air. These inconveniences may be prevented by distilling the spirit; or, if the artist has not an opportunity of performing that process, he may cleanse the spirit in a great measure from the alkali, by adding to it some calcined alum, the acid of which uniting with the alkali remaining in the spirit, forms with it a vitriolated tartar, which, not being soluble in spirit of wine, falls to the bottom together with the earth of the decomposed alum. To a pint of the dephlegmated and purified spirit about three ounces of powdered shell-lac are to be added; and the mixture to be digested during some days with a moderate heat. The liquor ought then to be poured off, strained, and cleared by settling. This clear liquor is now fit to receive the required colour, from certain resinous colouring substances, the principal of which are gamboge, and anotto, the former of which gives a yellow, and the latter an orange colour. In order to give a golden colour, two parts of gamboge are added to one of anotto; but these colouring substances may be separately dissolved in the tincture of lac, and the colour required may be adjusted by mixing the two solutions in different proportions.

When silver-leaf, or tin, are to be lacquered, a larger quantity of the colouring materials is requisite than when the *lacquer* is intended to be laid on brass.

There are sundry other materials, from a due mixture of which a like colour may be produced, as turmeric, saffron, dragon's blood, &c. See *Gold Coloured* VARNISH and *Japanner's* GILDING.

Instead of seed-lac, used in the composition of varnishes for *lacquering*, resin or turpentine is substituted for the coarser uses; the following composition for brass-work, designed to resemble gilding, has been much recommended: take of turmeric ground, as it may be had at the dry-salters, one ounce, and of saffron and Spanish anotto each two drams: put them into a bottle with a pint of highly rectified spirit of wine, and place the bottle in a moderate heat, occasionally shaking it, for several days; then strain off the yellow tincture thus obtained, through a coarse linen cloth, and putting it back into the bottle, add three ounces of good seed-lac grossly powdered; place the bottle again in a moderate heat and shake it, till the seed-lac be dissolved. The *lacquer* strained as before will be fit for use and must be kept in a bottle carefully stopped. By increasing or diminishing the proportion of anotto, the *lacquer* will be rendered warmer and redder, or cooler and nearer a true yellow. A cheaper composition, little inferior to the former, may be formed of one ounce of turmeric root ground, half a dram of the best dragon's blood, and a pint of spirit of wine, managed as the former. The varnish for tin may be made of one ounce of turmeric root, two drams of dragon's blood, and one pint of spirit of wine; prepared in the same manner with the other. The dragon's blood may be increased or diminished, as the red or yellow is to be the most prevalent; and for a coarser *lacquer* the quantity of seed-lac may be lessened, and the deficiency supplied by the same proportion of resin. The *lacquer* for locks, nails, &c. where little or no colour is desired, may be either seed-lac varnish alone, or with a little dragon's blood; or a compound varnish of equal parts of seed-lac and resin, with or without the dragon's blood. The manner of laying on the *lacquer* is as follows: the pieces to be Lacquered must first be made thoroughly clean; and if they be new founded, aqua fortis must be used for this purpose. When they are afterwards heated by a small charcoal fire, the *lacquer* is laid on with a proper brush,

like other varnishes, and the pieces restored to the heat. After the *lacquer* is thoroughly dry and firm, the same operation must be renewed four or five times, or till the work appears of the required colour and brightness.

The *lacquering* of leather, improperly called gilding, is performed by means of leaf-silver, coloured by a yellow varnish. See *Japanner's* GILDING. For this purpose calf or goat skins are procured in a dry state, after the common dressing and tanning. They are softened by being immersed and stirred about for some hours in a tub of water; and afterwards beaten against a flat stone and smoothed, by spreading them on the stone and rubbing them over with an iron instrument: the skins, thus prepared, are joined together in pieces of the dimensions required; and then sized on the grain of the leather with a kind of soft glue, or stiff size, that answers to the *gold-size* used in other kinds of GILDING or SILVERING, prepared from parchment or glover's cuttings. The workman next proceeds to cover the whole surface of the sized skin, before it be quite dry, with leaf silver, and with a fox's tail, made into the form of a ball at the end, settles the leaves, by pressing and striking them; and closes this operation with gently rubbing the whole surface with the tail. When the skins are silvered, they are hung to dry first on cords, and the drying is completed by putting them over a board joined together, with the silvered side next the boards, where they must be kept stretched out by means of some nails. They are then burnished with a flint burnisher, which operation is performed by spreading the skin even on a smooth stone and sliding the burnisher backwards and forwards over every part of the skin, with a considerable degree of pressure. In some manufactures the burnishing is performed, by passing the silvered skins betwixt two cylindrical rollers of steel, with polished faces. The skins are now prepared for receiving the yellow *lacquer* or varnish, which gives the appearance of gilding. Different artists have different recipes for compounding this *lacquer*. The following is said to be equal to any hitherto used: take of fine white resin, 4½ pounds; the same quantity of common resin; of gum sandarac, 2½ pounds; and of aloes, two pounds: bruise and mix them; and put them into an earthen pot over a good fire of charcoal, or over any other fire which has no flame: when all the ingredients are perfectly melted and mixed, add gradually to them seven pints of linseed oil, and stir the whole well together with a spatula: let the whole boil, stirring all the time, to prevent a kind of sediment, that will form, from sticking to the bottom of the vessel. When the varnish is almost sufficiently boiled, which will generally require seven or eight hours, add gradually half an ounce of litharge, or half an ounce of red lead; and when this is dissolved, pass the varnish through a linen cloth, or flannel bag. A pint of oil, and a corresponding proportion of fine resin and aloes have produced a very good varnish in an hour and a half. This *lacquer* or varnish is laid on the silvered leather in the open air; and is best done in summer, when it is hot and dry. For this purpose, the skins are stretched and fastened with nails to the boards, on which the drying was finished, with the silvered side outwards. And when these boards are properly disposed on trestels, the workman generally spreads some white of eggs over each skin; and when this is dry, the varnish, which is nearly of the consistence of a thick syrup, is repeatedly spread with the four fingers of one hand, moved to that each finger paints a kind of S with the varnish, from one end of the skin to the other; and it is then diffused evenly over every part with the flat of the hand: after this, it is to be immediately beaten by strokes of the palms of the hands, and principally where the varnish is observed to lie thickest. When this coat of varnish is sufficiently dry, which may be known by the finger's making no impression upon it, another coat is laid on in the same manner. When this coat is dry, the varnishing for producing the appearance of gilding is completed; and if it has been well performed, the leather will have a very fine gold colour, with a considerable degree of polish or brightness. When there is an intention to have one part of the leather silver, and the other gold, a pattern is formed on the surface, by printing, calking or stamping a design on the surface after the silvering. The skin is then to be varnished, as if the whole were intended to be gold; but after the last coat, instead of drying the varnish, it is to be immediately taken off that part, which is intended to be silver, according to the design printed or calked upon it, by a knife; with which the workman scrapes off all that he can without injuring the silver, and afterwards by a linen cloth, with which all that remains is to be wiped or rubbed off. The skins, thus silvered and varnished, are made the ground of various designs for embossed work and painting. The embossed work or relief is raised by means of printing with a rolling press, such as is used for copper-plates; but the design is here to be engraved on wood. The painting may be of any kind; but oil is principally used, as being durable and more easily performed. Dossie's Handmaid to the Arts, vol. i. p. 454, &c.

LACRYMA *cervina*, in *Natural History*, a little round and hard bone, said to grow in the great corner of a stag's eye after a certain age. Some also preserve under this name a thickened excretion from the inner angle of that creature's eye, in colour and consistence resembling myrrh, or ear-wax, long hardened in the ear. This is of a strong and very disagreeable smell, like the sweat of the same animal, and is all med to be sudorific and alexipharmic.

LACRYMÆ *Christi*, the name of a sort of wine produced by grapes on the lower part of Mount Vesuvius; so called from the drops of juice oozing from the grapes, when fully ripe.

LACRYMAL. See LACHRYMAL.

LACTARIA, in *Botany*. See MILK-*wort*.

LACTARY *Column*. See COLUMN.

LACTATION, the act of giving suck.

The word is also applied to the time during which the mother doth that office to her young.

LACTEA *via*, the milky way. See GALAXY.

LACTEALS, or LACTEAL *veins*, or *vessels*, a kind of long slender tubes, for the conveyance of the chyle from the intestines to the common reservatory.

They are called veins, because their valves are disposed as those of the ordinary blood-veins, and because the fluid which they contain runs from smaller into larger tubes.

They appear to have been known to Hippocrates, Erasistratus, and Galen; but were first duly described and published by Aselius, an Italian physician, in 1627, and called *lacteals*, from the liquor they contain, which resembles milk. Vid Doug. Bibl. Anat. p. 296. ed. 1734.

Their coats are so thin as to be invisible, except when distended with chyle, or lympha. They arise from all the parts of the small guts, and as they run from the sides of the guts to the glands in the mesentery, unite, and form larger branches, called *tunæ lacteæ primi generis*. The mouths of these *lacteals*, which are open into the cavity of the guts, from whence they receive the chyle, are so small, as not to be seen by the best microscope. It was necessary they should be smaller than the finest arteries in the body, that nothing might enter to stop the circulation of the blood.

The same extremity of the *lacteals* has likewise a communication with the capillary arteries of the guts, by which they receive a lympha that dilutes, and propels the chyle forwards, and washes the *lacteals* and glands, that they might not fur, and be obstructed by the chyle's staying in them upon settling.

The other extremity of the *lacteals* discharges the chyle into the velicular cells of the glands dispersed up and down the mesentery; and from these arise other *lacteals*, of a larger size, which carry the chyle immediately into the receptaculum chyli, and these are called *lacteæ secundi generis*.

The *lacteal veins* have valves at proper distances, which hinder the chyle from returning back into the intestines. Winslow has divided the *lacteal* vessels in the human body into three clules: they derive, he says, their first origin from the tunica vellosa of the intestines, and chiefly from that of the small intestines, by a great number of small capillary roots. From these roots there arises, between the coats of the intestines, a kind of reticulum mirabile, which surrounds almost the whole circumference of the intestinal canal, between the muscular and external coat: this reticular texture of lacteal vessels keeps close to the external coat, and leaves the canal along with it, on the side of the mesentery, where it forms two planes of ramifications, plainly distinguished from each other by the cellular substance, and adhering close to the inside of the two membranes of the mesentery. In this separate state they run up the lamina of the mesentery as far as the first mesenteric glands, where [illegible] into one plane. These Winslow re[illegible] the first class of *lacteals*. The se[illegible] class includes those vessels, which, after this uni[illegible] distributed almost uniformly through the whole e[illegible] the mesentery, from its circumference to its origin or adhesion to the vertebræ of the back, between the mesenteric glands, forming frequent anastomoses or communi[illegible]. The third class includes those ramifications, which, after having passed through the mesentery, begin to unite as they approach the spina dorsi to that their number is lessened and their size increased; and having passed the last mesenteric glands, terminate about the middle of the adhesion of the mesocolon in small common trunks, which receive a great number of lymphatic vessels from the

the glandulæ lumbares, and others below these. The *lacteals* of this last class run down on the body of the inferior aorta, between the extremities of the small muscle of the diaphragm, and terminate in a kind of cistern, called RECEPTACULUM *chyli*.

It has been doubted, whether or no the intestina crassa have any *lacteals* or not. The impossibility of human dissection proper for such an enquiry, gives no room either to affirm or deny. But the contents of the thick intestines seem not likely to afford much chyle; and therefore, if there be any *lacteals*, it is probable they are very few.

However Winslow informs us, that he has exhibited several of these, very full of chyle, to the Royal Academy, in a human colon. And of these he makes a fourth class. The *lacteal* vessels, in general, may be seen in those who die a violent or sudden death, soon after a meal; and they remain visible even in the intestines, for a long time after death, when a great number of the mesenteric glands have become schirrous, especially in children. Anat. vol. ii. § 8 N° 215, &c.

In brutes, if dissected at a reasonable time after feeding, as two or three hours, the *lacteals* appear very turnid and white; and, if wounded, the chyle flows plentifully from them. But if inspected when the stomach of the animal has lain some time empty, they appear like lymphatics, visible indeed, but filled with a transparent liquor.

That the *lacteals* have a communication with the cavities of the intestines, is evidently demonstrated by their contents, the chyle; but how their pores are disposed to receive it, has not yet been discovered; nor is there any way known whereby to fill the *lacteals* from the cavities of the guts after death. It is probable then, their entrance into the gut is oblique, since neither wind nor liquors can pass from thence. As it is found these pores can only receive any thing in their living state, we may be allowed to imagine, that it is the peristaltic motion of the guts which disposes them in that state to receive the chyle. And this may be done by means of the circular and longitudinal fibres of the intestines still applying the internal coats of the guts to their contents, by which means its pores absorb the chyle from the excrementitious part.

The *lacteals* are the absorbents of the bowels, beginning in their inner surface: the same kind of vessels are called absorbents in other parts of the body, and take their rise from the surfaces of the respective parts; so that the *lacteals*, LYMPHATICS, and ABSORBENTS, are the same kind of vessels. Some anatomists have considered the *lacteals* and lymphatics as the same vessels, differing only in their situation, and both terminating in the same duct.

The ingenious Mr. Hewson discovered the lymphatic system in birds, fish, and turtle, and an account of his discovery was published in the Phil. Trans. vol. lxii. art. 34. p. 217, and vol. lix. art. 28. p. 198. and art. 29. p. 204. However, these discoveries were claimed by professor Monro in a letter read before the Royal Society in 1769, and the claim was afterwards supported in a pamphlet, called, A state of facts, &c. printed at Edinburgh in 1770. The professor alledges, that he injected the *lacteals* of a sea-tortoise or turtle with quicksilver, after injecting every artery and vein with wax, in the year 1765; and that as early as the year 1761, he had mentioned the *lacteal* vessels in fowls and fishes, though he had not injected them. Mr. Hewson replies, that the professor's not having injected the *lacteals* in fowls and fishes afforded a strong presumption that he had not discovered them; more especially as in a work printed in 1758 he had declared, that, after a considerable number of experiments, he was convinced that neither birds, fish, nor amphibious animals in general, had either *lacteals* or lymphatics: because, after having seen these vessels, he would naturally have endeavoured to inject them. He also alleges, that the professor publicly declared in his lectures since the year 1762, that he had sought for the *lacteals* in fowls and fishes in vain by a variety of experiments; and so late as the year 1767, he also declared that the lymphatic system was supposed to take place in men and viviparous animals, and, by analogy, in those kinds which Linnæus has classed among the mammalia. Adding, that he had found the *lacteals* in some amphibious animals, as the turtles. Upon the whole, the dispute between Mr. Hewson and the professor seems to be reduced to this single point, which of them first discovered the *lacteals* of birds; both agreeing that the lymphatics in their necks had been discovered by Mr. Hunter many years before: and Mr. Hewson acknowledges, that the *lacteals* of the turtle were discovered by the professor in 1765, some years before the publication of his own paper in the Philosophical Transactions; though he says, that the description of those vessels, published in that paper, was taken in 1763. It seems also to be agreed, that the professor had seen what he suspected to be *lacteals*; but Mr. Hewson insists that he had not discovered them before him. For a farther account of the state of this controversy, the reader may consult Monro's pamphlet above mentioned, and Mr. Hewson's Appendix to his Experimental Inquiry into the Properties of the Blood, &c.

LACTEAL *fevers*, a term used by *Medical Writers* to express what the women call *milk-fevers*, that is, such fevers as attend the difficult ingress of milk to the breasts of lying-in women.

LACTEUS *lapis*, in *Natural History*, a name given by some authors to the *galactites*.

LACTIFERI *tubuli*. See TUBULI.

LACTIFEROUS, an epithet applied to such plants as abound with a milk-like juice, such as the tithymal, sow-thistle, and many others.

LACTUCA, in *Botany*. See LETTUCE.

LACTUCA *marina*, *sea-lettuce*, in *Botany*, a name used by some authors for the *lichen marinus*, commonly called *sister-green*.

LACUNÆ, among *Anatomists*, certain excretory canals in the genital parts of women. See *Tab. Anat. (Splanch.) Fig.* II. *lit* II.

Between the fleshy fibres of the ureters, and the membrane of the vagina, is found a whitish glandulous body, about a finger thick, running round the neck of the bladder, having a great number of excretory ducts, which de Graef calls *lacunæ*, and which terminate in the lower part of the orifice of the womb; conveying thither a slimy matter, that mixes with the semen of the male.

LACUNAR, in *Architecture*, an arched roof, or ceiling more especially the planking or flooring over porticoes or piazzas.

LADA, in *Botany*, a name given by some authors to the plant which produces the common black pepper.

LADANUM, or LABDANUM, in *Pharmacy*, a gummous or a resinous matter, oozing out of the leaves of a shrub called *cistus ladaniferus*, which is very common in the hot countries of the Levant, and whereof there are various kinds. The shrub is also plentiful in Spain, though no *ladanum* is brought from thence.

Dioscorides says, they gather the *ladanum* by means of goats, which, brousing on the leaves of this shrub, return to the stable with their beards loaded with a fat substance, which the peasants rake off, with a kind of combs made for that purpose. This matter they thus collect into lumps, and, as it is mixed with the goats hair, and other impurities, call it *ladanum in the beard*, or *natural ladanum*. Others are said to draw cords over the leaves, and other parts of the shrub; and, scraping off what had stuck to the cords, they make up the *ladanum* into little balls.

Tournefort assures us, that the common way of gathering the *ladanum* at this time is, by brushing it off the leaves with a sort of whip, composed of many lashes, or straps: after it is scraped off the straps, they make it into cakes of different sizes.

Pietro delle Valle tells us, he was informed by the Indians, that *ladanum* is formed like dew, and falls from heaven like manna; that it is gathered on the leaves of a plant a palm and an half high; that, after gathering, they boil it, by which means it becomes soft, like wax.

Belloulus says, that this juice is collected by lightly brushing the shrub, in the summer heats, with a kind of rake, having several straps or throngs of leather fixed to it, instead of teeth; the unctuous juice adheres to the throngs, and is afterwards scraped off with knives.

There are two sorts of *ladanum* in the shops: the best, which is very rare, is in dark coloured masses, of the consistence of a soft plaster, which becomes still softer on being handled. The other is in long rolls coiled up, and much harder than the preceding and not so dark. The first has commonly a small, and the last a very large admixture of fine sand, blown upon the juice from the sandy soil where it is found.

Ladanum has been sometimes exhibited as a resinous corroborant and restringent, but it is principally employed in external applications and perfumes. The soft kind, which has an agreeable smell and a lightly pungent bitterish taste, makes an useful ingredient in the cephalic and stomachic plasters of the shops. Rectified spirit of wine dissolves nearly the whole of the pure *ladanum* into a gold-coloured liquor. Water acquires by infusion much of its smell and taste: and, by distillation in water an essential oil arises, leaving a brittle almost insipid resin and a pale-coloured liquor, which, inspissated, yields a weakly bitterish extract. Heat soon destroys the specific flavour of this juice. Lewis.

LADANUM, *Liquid* more properly called *clear*, or *purified ladanum*, is a preparation of the natural *ladanum*, by melting and purifying it from the hairs, &c.

This hardened is sometimes sold for a sort of black ambergris.

LADDER *to heaven*, in *Botany*. See LILY *of the Valley*.

LADDERS, *scaling*, in the *Military Art*, are used in ESCALADE. They are of various sorts; some are of ropes and some of wood; some are made of several joints, so as to be capable of being put together, and to form *ladders* of different length, according to the service required. There is a sort used in England, much of the same make as the common *ladders*, except that the steps turn about wooden pegs, so that the poles may be brought near each other, or to shut like a parallel ruler. These are very convenient for carriage.

LADDERS, in a *Ship*, derive their names from the several hatchways or other parts where they are situated. Besides these, there are some of a particular construction, as the accommodation-*ladder*, and the quarter-*ladder*. The *accommodation-ladder* is a sort of light stair-case, occasionally fixed on the gang-way of the admiral, or commander in chief of a fleet. It is furnished with rails and entering ropes, covered with red bays, and the lower end of it is kept at a proper distance from the ship's side by iron-bars or braces, to render the passage more convenient to those who enter or leave the ship. *Quarter-ladders*, are two ladders of rope, depending from the right and left side of the ship's stern, whereby to descend into the boats which are moored astern, in order to bring them up along-side of the ship, or to use them for any other occasion.

LADEN, in *Sea Language*, denotes the state of a ship when she is charged with a weight or quantity of any sort of merchandize or other materials, equal to her tonnage or burthen. If the cargo, with which she is *laden*, be extremely heavy, her burthen is denominated by the weight of the goods; if it be light, she carries as much as she can stow, so as to be fit for the purposes of navigation. A ton in measure is generally estimated at 2000 lb. in weight, and therefore a vessel of 200 tons ought to carry a weight of 400,000 lb. when the matter of which the cargo is composed is specifically heavier than the water in which she floats.

LADEN, in *Bulk*, denotes the state of being freighted with a cargo, which is not in casks, boxes, bales, or cases: but lies loose in the hold, being defended from the moisture or wet of the hold, by a number of mats and a quantity of dunnage. Such are usually the cargoes of corn, salt, or such materials.

LADING. See BILL *of Lading*.

LADLE *of a gun*, the instrument wherewith the powder is put into the piece.

It is made of a plate of copper bowed in form of a half-cylinder, rounded at one end, the other being fixed upon a long staff; this filled with powder, the gunner carries, with his left hand under the end of it, to keep the powder from falling out, till he enters it in the muzzle of the piece; when he has carried the powder home to the charged cylinder, he turns the *ladle*, that the powder may fall out, and withdraws it.

Ladles are fitted to the bore of each gun, and hold powder sufficient for the charge.

Small *ladles*, with short handles of wood, are also used in filling the fuzes of shells, or any other composition for filling the cases of rockets, &c.

LADLE-*boards*, those boards disposed on the circumference of the water-wheels of over-shot mills; forming hollows, or receptacles, not unlike *ladles* to receive the water that falls upon the wheel. See *Water*-WHEEL.

LADONIS, in the *Materia Medica of the Ancients*, a name given by some to the laurus or bay-tree. We find the word in a composition prescribed in Galen, from the works of some of the empirics of his time, but it never was used by the more regular authors.

LADRE, in the *Manege*, denotes *Dull*. See HORSE.

LADY's *bed-straw*, or *cheese-rennet*, *gallium*, in *Botany*, a genus of the *tetrandria monogynia* class. Its characters are these: the flower which hath an empalement, indented in four parts, has also one petal, divided into four parts, and also four awl-shaped stamina: it has a twin germen situated under the flower, which afterwards become two dry berries, joined together, each including a large kidney-shaped seed. There are several species, of which, the sort commonly used in medicine is very common in moist meadows and pasture grounds, and flowers in June and July.

This plant is drying and incrassating, good in stopping all kinds of fluxes and hæmorrhages, and for the cure of wounds: some commend a decoction of it for the gout; and a bath made of it is refreshing to wash the feet of persons tired with over walking. In the northern countries they use this herb for the making cheese, instead of rennet, whence it is called *cheese-rennet*; the flowers containing an acidity, which may be extracted by distillation. This plant is but seldom used in the shops.

LADY's *bower*, in *Botany*. See VIRGIN's *Bower*.

LADY-*bird*, in *Zoology*. See HEMISPHERIA and SCARABÆUS.

LADY's *comb*, in *Botany*. See SHEPHERD's *needle*.

LADY's *cushion*, in *Botany*. See SAXIFRAGE.

LADY-*day*, in *Law*, the twenty-fifth of March, being the ANNUNCIATION of the holy Virgin.

LADY's *finger*, *anthyllis*, in *Botany*, a genus of the *diadelphia decandria* class. Its characters are these: the flower is of the butterfly kind, having a long standard reflexed on both sides beyond the empalement; the two wings are short; the keel of the same length and compressed: in the centre is situated an oblong germen, which becomes a small roundish pod inclosed by the empalement, having one or two seeds. There are several species.

LADY's *Mantle*, *alchemilla*, in *Botany*, a genus of the *tetrandria monogynia* class. Its characters are these: the flower has a permanent empalement of one leaf, which is cut into eight segments; it has no petals, and each flower is succeeded by one seed wrapped up in the empalement. Miller reckons four, and Linnæus three species. The common sort, used in medicine, grows naturally in dry fields and meadows in several parts of England; but is not very plentiful near London; and flowers from May to August.

The leaves are used, and are esteemed to be vulnerary, drying, and binding, and of great force to stop inward bleedings.

Their styptic matter is extracted both by water and spirit: the roots are more astringent than the leaves; and the extracts made from them proportionably stronger.

LADY's *seal*, in *Botany*. See TAMUS.

LADY's *slipper*, *cypripedium*, in *Botany*, a genus of the *gynandria diandria* class. Its characters are these: it has a simple spadix; the germen sits under the flower, which is covered with a sheath; the flower has four or five narrow spear-shaped petals which expand; the nectarium which is situated between the petals, is swollen and hollow, in shape of a shoe or slipper; and it has two short stamina; below the flower is fixed a slender contorted germen; which becomes an oval blunt capsule with three corners, having three valves and one cell, filled with small seeds. There are two species.

LADY's *smock*, in *Botany*. See CARDAMINE.

LADY's *traces*, in *Botany*. See TWYBLADE.

LADY *of the Thistle*. See THISTLE.

LADY, *Presentation of our*. See PRESENTATION.

LÆNA, among the *Ancients*, a thick shaggy upper garment. See CHLÆNA.

LAERTA, in *Natural History*, a name given by authors to a species of vespa or wasp, whose sting is said to be fatal: but this is an erroneous opinion. This wasp is larger and longer bodied than the common kind, but smaller than the hornet. It seems of a very irritable disposition, attacking animals of any kind that come in its way.

LAETIA, in *Botany*, a genus of the *polyandria monogynia* class: the corolla has five petals; the calyx is composed of five leaves; the fruit is three-lobed and contains a single cell; the seeds are inclosed in a pulpy coat.

LAFORDSWICK, (Saxon, *blafred*, i. e. *dominus*, and *wic*, *præditio*, *infidelitas erga dominum*) the betraying of a lord or master. This word is found in king Canute's laws, c. 61. and in the laws of king Henry I.

LAGA, in *Antiquity*, denotes *lex* or *law*: whence are deduced *Saxon-lage*, *Danelage*, &c.

LAGAN, or LAGON, in our *ancient Sea Laws*, shipwrecked goods, left by the sea, lying on the sand, either ashore, or out at sea.

The word seems formed from the Saxon *legan*, or *lagan*, *jacere*, *to lie*. Though others deduce it from the Latin *ligare*, *to bind*; and suppose it to denote goods tied together with a buoy, or the like, to hinder their sinking to the bottom, that they may be found again.

Lagan is usually joined with jetson and flotson.

LAGANUM, in *Natural History*, the name of a genus of the *echini marini*, of the general class of the echinus. The characters of the *lagana* are, that they have their mouth in the center of the base, and their aperture for the anus in its third region; that their substance is whole, and their edges waved. Of this genus there are five known species.

LAGEMAN, *(lagamannus) homo habens legem, or legalis seu legitimus*: such as we call now good men of the jury. The word is frequently used in Domesday, and the laws of Edward the Confessor, cap. 38.

LAGEN, *lagena*, in ancient time, was a measure of wine, containing six sextarii: whence probably is derived our *flagon*. The lieutenant of the Tower has the privilege to take *unam lagenam vini ante malum & retro*, of all wine ships that come up the Thames; and sir Peter Leicester, in his Antiquities of Cheshire, interprets *lagena vini*, a bottle of wine.

LAGERSTROEMIA, in *Botany*, a genus of the *polyandria monogynia* class: the corolla is curled, and has six petals; the calyx is campanulated and divided into six segments:

the ſtamina are numerous, the outer ſix being thicker and longer than the petals.

LAGINE, in *Natural Hiſtory*, a name given by Pliny to a climbing-plant, of the nature of that from which ſcammony was obtained, but ſmaller, and thence called by ſome *ſcammonea parva*, the ſmaller ſcammony. The ancient Greeks have called this plant *ſaſine*; and it appears very probable, that the word *lagine* here mentioned by Pliny is but a corruption of that name.

LAGOCEPHALUS, in *Zoology*, the name of a ſpecies of orbis or globe-fiſh. It is about a foot long, and half a foot high.

LAGOECIA, in *Botany*. See *Baſtard* CUMIN.

LAGOPHTHALMIA, derived from λαγὼς, *hare*, and ὀφθαλμὸς, *eye*: this being the property of the eyes of hares: λαγοφθαλμία, a diſeaſe of the eye-lids, when the upper lid is ſo contracted, that the eye cannot be quite ſhut, but remains open even in the time of ſleep.

LAGOPUS, in *Ornithology*. See PTARMIGAN.

LAGOPUS is alſo the name of a ſpecies of the CANIS with a ſtrait tail thoughout of the ſame colour. It is ſometimes called the white fox, the iſatis, and the ſky-coloured fox. It is found in Lapland and Siberia.

LAGOUDI, a name given by the Indians to a tree, which produces the leſſer GALANGAL-root of the ſhops.

LAGRIMOSO, in the *Italian Muſic*, is uſed to ſignify a plaintive manner of ſinging or playing.

LAGURUS, *hare's tail graſs*, in *Botany*. See GRASS.

LAICA *vi removenda*. See VI.

LAID-*up* is applied to a ſhip, when ſhe is either moored in a harbour during the winter ſeaſon, or laid by for want of employment; or when ſhe is become incapable of farther ſervice.

LAID *under metal*. See METAL.

LAIR, or LAYER, in *Gardening*. See LAYER.

LAIR, LAYR, or LAYER, among *Sportſmen*, denotes a place where deer harbour by day.

LAIR, or LAYR *of a deer*, is the impreſſion which the beaſt has made on the graſs and ground, where he has lain down, or repoſed.

LAIR, among *Huſbandmen*, alſo denotes a place where cattle uſually reſt, under ſome ſhelter; the ground being enriched by their dung.

LAITY comprehends ſuch of the people as are not included under the denomination of CLERGY; and may be divided into three diſtinct ſtates, viz. the CIVIL, the MILITARY, and the MARITIME.

LAKE, a collection of water, incloſed in the cavity of ſome inland place, of a conſiderable extent and depth.

According to ſome authors, thoſe only are properly called *Lakes*, which receive and emit rivers.

Lakes, however, may be divided into four kinds: 1. Such as neither receive nor emit rivers. 2. Such as emit rivers, without receiving any. 3. Such as receive, without emitting any. 4. Such as both receive and emit rivers.

Of the firſt kind, ſome are perennial, others temporary: the temporary owe their origin, moſt of them, to rain, and to the cavity or depreſſion of the place where they are lodged.

In the Indies they make artificial *lakes*, of a mile or two in compaſs, which they wall about to catch the rain in wet ſeaſons, and preſerve it for their uſe in the dry ones. There are ſeveral of this kind of *lakes*, formed alſo by the inundations of the ſea and rivers, particularly the Nile and Niger; which, when they retire within their banks, leave floods of water, which the inhabitants take care to incloſe, to ſerve as a magazine for the enſuing months. There are ſeveral of theſe *lakes* alſo in Muſcovy, Finland, and Lapland, generated partly by the rain, and partly by the melting of the ice and ſnow.

The generation of perennial *lakes* may be alſo referred to rain, where the cavity is ſo deep as to receive a quantity in winter, more than the heat of the ſun will be able to exhale in ſummer; though it is probable many of theſe *lakes* have their ſprings at bottom, by which they are alſo continually ſupplied.

The only large *lake* of this ſort is the *lake* of Parime in America, lying directly under the equator, which is, in length, about three hundred and five German miles, and at the greateſt breadth about one hundred miles. To this claſs may be referred the turloughs, i. e. *terreus lacus*, or land-*lakes*, in Ireland, which are *lakes* one part of the year, and the reſt ſmooth fields: at the bottom of theſe turloughs are found holes, through which the water ſprings in winter, and ſinks towards ſummer.

The ſecond ſpecies of *lakes*, which emit, without receiving rivers, is very numerous; they owe their origin to ſprings, the cavities where the ſpring is found not being able to contain all the waters it yields. See SPRING. Of this kind is the Wolga, at the head of the river Wolga; the *lake* Odium, at the head of the Tanais; the Adac, whence flows one of the branches of the Tigris, the Ozero or White *Lake* in Muſcovy, that gives ſource to the river Shackſna; the *lake* Chaamay, to the eaſtward of the river Ganges, whence flow four very large rivers, the *lake* Nicaragua, in America; the *lakes* Frontena in Canada, out of which iſſues the river St. Lawrence, &c. The third kind, viz. thoſe which receive rivers without emitting any, apparently owe their origin to thoſe rivers, which, in their progreſs from their ſource, falling into ſome ample cavity, are collected together, and form a *lake* of ſuch dimenſions, as may loſe as much by exhalation as it continually receives from its ſprings; or to a river's flowing on a ſoft ſpongy ſoil, which imbibes the water, and tranſmits it to the neighbouring grounds. The number of theſe is but ſmall.

The *lake* Aſphaltites, called the Dead Sea, is of this kind, receiving the river Jordan, but emitting none; the *lake* of Geneva, the lake Soran in Muſcovy, &c.

Of the fourth ſpecies, which both receive and emit rivers, we reckon three kinds; as the quantity of water they emit is greater, equal, or leſs than that they receive. If the quantity they emit be greater, it is plain they muſt have a ſpring at the bottom; if leſs, there muſt be ſome ſubterraneous ducts, or canals, or elſe the earth muſt be ſpongy; if it be equal, we gather, that they have neither any hidden ſprings nor canals. Of theſe *lakes* we have a great number, and thoſe very conſiderable ones.

The generality of *lakes* conſiſt of freſh waters, as moſt of thoſe which are ſupplied either from ſome ſpring, far from the ſea, or a river, or from the rain: ſome few of ſalt water, as thoſe produced from the inundation of the ſea, or by its immiſſion through ſome duct of the earth, or that have ſalt ſprings at bottom.

Dr. Halley is of opinion, that all great perennial *lakes* are ſaline, either in a greater or leſs degree; and that this ſaltneſs increaſes with time; and on this foundation, he propoſes a method for determining the age of the world.

The large *lakes*, wherewith the northern regions abound, ſerve for very good purpoſes, inaſmuch as the warm vapours ariſing from them ſerve for a defenſative againſt the pinching cold of thoſe climates. To this it is owing, that Ireland, Scotland, &c. are leſs affected with froſts than much warmer countries.

They alſo furniſh exhalations and vapours, which diſtil on the countries bordering upon them in refreſhing ſhowers, and prevent their being barren deſerts.

The *lake* Neſs in Scotland has been commemorated by many writers, but never with any degree of judgment, till Mr. Fraſer gave a perfect account of it to our Royal Society. It never freezes though the winters be ever ſo ſevere, and is full of ſprings in almoſt every part; and its waters, in the time of the ſevereſt froſts, run fluid, and ſmoaking, for ſix miles down the river into which they are diſcharged, while every thing is frozen about them. The river runs very ſlowly notwithſtanding, and from this ſmoak of the water there is raiſed a ſort of fog which overſpreads the whole country for ſeveral miles. There is a mountain near its ſide, of two miles perpendicular height from the ſurface of the *lake*; and on the ſummit of this mountain there is another *lake*, which has no ſpring viſibly running into it, nor any outlet, and yet always keeps of the ſame degree of fulneſs, ſummer and winter. Due weſt from the river into which the lower *lake* diſcharges itſelf, there is an opening of ſea, or frith, of two miles long and ſix miles wide; the middle of this is ſometimes dry, and it is then eaſily ſeen that this was once dry land, and an inhabited country. There are found there large bodies of trees felled, and lying ſtraight along: The wood of theſe is black but it is very ſound, and there are many tumuli, or heaps of ſtones, to be ſeen under water in different parts of the frith, one of which is acceſſible at low water, and there have been found in it urns, which prove that they have been all burying-places. Phil. Tranſ. N° 253. p. 231.

As the ſea waſhes away the banks of this frith, there is found in many places a large quantity of wrought timber; beams of fourteen, or more feet long, with the marks of the axe and other inſtruments upon them; and at the depth of ſixteen feet, in the ſteep banks of the neighbouring river Beuly, there are found oak-trees and pieces of burnt timber. We find by this, that the face of the whole country hereabout is very different from what it was ſome ages ago; and there ſeems ſome reſemblance between the preſent face of things here, and that in the bogs of many parts of England. The trees found buried in theſe were felled by the conquering Romans, and perhaps theſe are of ſome ſuch origin.

We have many ſingularities offering to our view in the *lakes* of our own country; that of their freezing at peculiar ſeaſons is not one of the leaſt. Philoſophical Tranſ. N° 114.

The ſtrange effect of ſome *lakes*, on their water being diſturbed, are recorded by many writers with an air of truth; but are to be examined with great caution, before they

they are credited. Wagner, in his Hiſtory of Switzerland, quotes no leſs than thirty-five authors, who ſay, that a water there called the *Lake of Pilate*, is of this kind, and that it cauſes tempeſts, rain, thunder, *&c.* if any thing be caſt into it; but the truth is, that it is a very tame puddle, ſcarce deſerving the name of a *lake*; and it is proved, by experience, that no conſequence at all attends the throwing it into confuſion by any means whatever.

LAKES, *ſubterranean*. That there are in many places immenſe *ſubterranean lakes*, can ſcarce be doubted, becauſe we ſee them in ſome places; but their effects are often perceived where they are not ſeen, and puzzle the people who attempt to account for thoſe effects upon other principles. The famous Zirchnitzer *lake* in Carniola, which fills and empties itſelf, at times, in an impetuous manner, bringing up with its waters fiſh, and even wild fowl, communicates with another immenſe *ſubterranean lake* in the mountain Savornick; and according to its filling or emptying, the upper one is alſo filled and emptied. See DUCK.

The grotto Podſperſchio, in the ſame country, gives another inſtance of ſuch a *ſubterranean lake*. The people of the neighbouring country enter the ſide of the mountain where this *lake* is, by a ſmall opening, through which they go to a cavern of a great width and height; and at the end of this is a ſmall opening again, through which they go on to the edge of a vaſt ſubterranean piece of water. They go with torches, and find the water very clear and fine. If is ten cubits deep at the edge, and doubtleſs is much more in the middle. The water runs into this *lake* by a large channel, and runs out of it again by another, falling down a precipice into another *lake*, and that with ſuch a noiſe, that the report of a piſtol cannot be heard near it. Stones thrown in every way are heard to fall into water, and there is great reaſon to ſuppoſe the *lake* a German mile long; for at that diſtance there is another water diſcovered through ſuch another cleft of the rock, which ſtands at the ſame horizontal height as this, and is ſubject to the ſame accidents at the ſame times. This vaſt body of water ſometimes all runs off in a few minutes, and leaves the baſon dry, and after ſome weeks it fills again with a frightful noiſe. As theſe accidents always happen to both the waters above mentioned at the ſame time, they appear very plainly to be only the two ſides of the ſame *lake*. Phil. Tranſ. N° 191. We have in England many of theſe reſervoirs, the water of which is always remarkably clear and cold, and is ſo loaded with ſpar, that it generally incruſts things very quickly that are put into it; and when raiſed into vapours, as a part of it ſometimes is, by the ſubterranean heat, or carried up with other vapours, ſtops at the cieling of the vaults, and there forms ſtalactitæ, and other ſuch concretions. In many of theſe *lakes* alſo are found the round balls of ſpar, called *ſtalagmitæ*. They are compoſed of ſeveral cruſts gathering round ſome central nucleus, and often exceed the ſize of a ſchool-boy's marble. Phil. Tranſ. N° 144.

In Pen-Park hole, in Glouceſterſhire, there is a remarkable inſtance of this, that ſtrange cavern containing one of the largeſt of the *lakes* in our kingdom.

It was accidentally diſcovered by ſome miners: it is twenty-nine fathoms deep from the ſurface, being a vaſt cavern of the ſhape of a horſe-ſhoe, ſurrounded with rugged rocks and rough walls of earth, containing in the midſt of it a river or ſubterranean *lake*, twenty fathom broad and eight fathom deep, of the ſame cold and petrifying water with the other reſervoirs of this kind.

LAKE, or LAQUE, a preparation of different ſubſtances into a kind of magiſtery for the uſe of painters. One of the fineſt and firſt invented of which, was that of *gum-lacca* or *lacque*; from which all the reſt, as made by the ſame proceſs, are called by the common name *laques*. See LACCA.

The method of preparing theſe, in general, may be known by the example of that of the curcuma-root of the ſhops, called *turmeric-root*; the proceſs for the making of which is this: take a pound of turmeric-root in fine powder, three pints of water, and an ounce of ſalt of tartar; put all into a glazed earthen veſſel, and let them boil together over a clear gentle fire, till the water appears highly impregnated with the root, and will ſtain a paper to a beautiful yellow. Filtre this liquor, and gradually add to it a ſtrong ſolution of roch-alum in water, till the yellow matter is all curdled together, and precipitated; then pour the whole into a filtre of paper, and the water will run off and leave the yellow matter behind. It is to be waſhed many times with freſh water, till the water comes off inſipid, and then is obtained the beautiful yellow, called *lake of turmeric*, and uſed in painting.

In this manner may a *lake* be made of any of the tinging ſubſtances that are of a ſomewhat ſtrong texture, as madder, logwood, *&c.* but it will not ſucceed in the more tender ſpecies, as the flowers of roſes, violets, *&c.* as it deſtroys the nice arrangement of parts in thoſe ſubjects, on which the colour depends.

A yellow *lake* for painting is to be made from broom-flowers in the following manner: make a lee of pot-aſhes and lime reaſonably ſtrong; in this boil, at a gentle fire, freſh broom-flowers till they are white, the lee having extracted all their colour; then take out the flowers, and put the lee to boil in earthen veſſels over the fire; add as much alum as the liquor will diſſolve; then empty this lee into a veſſel of clean water, and it will give a yellow colour at the bottom. Let all ſettle, and decant off the clear liquor. Waſh this powder, which is found at the bottom, with more water, till all the ſalts of the lee are waſhed off; then ſeparate the yellow matter and dry it in the ſhade. It proves a very valuable yellow.

Lake is at preſent ſeldom prepared from any other ſubſtance than ſcarlet rags, cochineal and Braſil wood. The beſt of what is commonly ſold is made from the colour extracted from ſcarlet rags, and depoſited on the cuttle-bone; and this may be prepared in the following manner: diſſolve a pound of the beſt pearl-aſhes in two quarts of water, and filter the liquor through paper; add to this ſolution two more quarts of water and a pound of clean ſcarlet ſhreds, and boil them in a pewter boiler, till the ſhreds have loſt their ſcarlet colour; take out the ſhreds and preſs them, and put the coloured water yielded by them to the other: in the ſame ſolution boil another pound of the ſhreds, proceeding in the ſame manner; and likewiſe a third and fourth pound. Whilſt this is doing, diſſolve a pound and a half of cuttle-fiſh bone, in a pound of ſtrong aqua fortis, in a glaſs receiver; adding more of the bone, if it appear to produce any ebullition in the aqua fortis; and pour this ſtrained ſolution gradually into the other; but if any ebullition be occaſioned, more of the cuttle-fiſh bone muſt be diſſolved as before, and added, till no ebullition appears in the mixture. The crimſon ſediment depoſited by the liquor thus prepared is the *lake*: pour off the water; and ſtir the *lake* in two gallons of hard ſpring water, and mix the ſediment in two gallons of freſh water; let this method be repeated four or five times. If no hard water can be procured, or the *lake* appears too purple, half an ounce of alum ſhould be added to each quantity of water before it be uſed. Having thus ſufficiently freed the *lake* from the ſalts, drain off the water through a filtre, covered with a worn linen cloth. When it has been drained to a proper dryneſs, let it be dropped through a proper funnel on clean boards, and the drops will become ſmall cones or pyramids, in which form the *lake* muſt be ſuffered to dry, and the preparation is completed.

Lake may be prepared from cochineal, by gently boiling two ounces of cochineal in a quart of water; filtering the ſolution through paper, and adding two ounces of pearl-aſhes diſſolved in half a pint of warm water and filtered through paper. Make a ſolution of cuttle-bone as in the former proceſs; and to a pint of it add two ounces of alum diſſolved in half a pint of water. Put this mixture gradually to that of the cochineal and pearl-aſhes, as long as any ebullition appears to ariſe, and proceed as above. A beautiful *lake* may be prepared from Brazil wood, by boiling three pounds of it, for an hour in a ſolution of three pounds of common ſalt, in three gallons of water; and filtering the hot fluid through paper: add to this a ſolution of five pounds of alum in three gallons of water. Diſſolve three pounds of the beſt pearl-aſhes in a gallon and a half of water, and purify it by filtering; put this gradually to the other, till the whole of the colour appear to be precipitated, and the fluid be left clear and colourleſs. But if any appearance of purple be ſeen, add a freſh quantity of the ſolution of alum by degrees, till a ſcarlet hue be produced. Then purſue the directions given in the firſt proceſs with regard to the ſediment. If half a pound of ſcarlet rags be added to the ſolution of pearl-aſhes, and diſſolved before its purification by the filtre, and two pounds of the wood, and a proportional quantity of the common ſalt and water be uſed in the coloured ſolution, a *lake* will be produced that will ſtand well in oil; but it is not ſo tranſparent in oil as without the ſcarlet. *Lake* with Braſil wood may be alſo made by adding half an ounce of anotto to each pound of the wood; the anotto muſt be diſſolved in the ſolution of pearl-aſhes. There is a kind of beautiful *lake* brought from China; but as it does not mix well with either water or oil, though it diſſolves entirely in ſpirit of wine, it is not of any uſe in our kinds of painting. This has been erroneouſly called ſaflower. Handmaid to the Arts, v. 1. p. 61, *&c.*

LAKE, *Orange*, is the tinging part of anotto precipitated together with the earth of alum. This pigment which

is of a bright orange colour, and fit for varnish painting, where there is no fear of flying, and also for putting under crystal to imitate the vinegar garnet. may be prepared, by boiling four ounces of the best anotto and one pound of pearl-ashes half an hour in a gallon of water; and straining the solution through paper. Mix gradually with this a solution of a pound and a half of alum in another gallon of water; dessiling, when no ebullition attends the commixture. Treat the sediment in the manner already directed for other kinds of *lake*, and dry it in square bits or round lozenges. Handmaid to the Arts, vol. i. p. 119.

LAKE, *rose* See *Rose* PINK.

LAKE of *madder*. See MADDER.

LAKE-*weed*, in *Botany*. See ARSMART.

LAMA, or LAMAS, the title of an order of priests among the western Tartars, on the frontiers of China, who are held in great veneration.

They have a grand *lama*, who is their high-priest, and who is the second person in the kingdom, being the next in authority to the king. He receives homage, and adoration, not only from the people, but from the neighbouring kings; none of whom are ever inthroned, without sending ambassadors to him to obtain his benediction.

The more remote Tartars absolutely regard him as the deity himself. They believe him immortal and endowed with all knowledge and virtue. They come up every year from different parts to worship and make rich offerings at his shrine. The orthodox opinion is, that when the grand *lama* seems to die, either of old age or infirmity, his soul in fact only quits a crazy habitation to look for another, younger or better; and it is discovered again in the body of some child, by certain tokens known only to the *lamas* or priests, in which order he always appears.

The *lamas* are extremely superstitious, and are remarkably addicted to magic. See Phil. Trans. vol. lxvii. p. 2. art. 25.

LAMAC, a word used by some authors to express gum arabic.

LAMARE, a word used by some of the chemical writers as a name for sulphur.

LAMB, in *Zoology*, the young of the sheep kind. See SHEEP.

A male lamb of the first year is called a wedder hog, and the female, a ewe hog; the second year it is called a wedder, and the female a shearc. If a lamb be sick, mare's milk with water may be given it, and by blowing into the mouth many have been recovered after appearing dead. The best season for weaning them is when they are fifteen or eighteen weeks old; and about Michaelmas the males should be separated from the females; and such males as are not designed for rams, gelded. See PASCHAL *Lamb*.

LAMB-*earth*, in *Husbandry*, is a whitish stony loam. The name seems only a corruption of the word *loam-earth*. It is a clay, with an admixture of that sort of stony matter which usually constitutes lime-stone, of fragments of lime-stone, and of many smaller pieces of a stony matter, of a less firm concretion. These stones are all of much the same colour with the earth, and the whole easily breaks and moulders upon putting water to it. It has usually an admixture of sea-shells also in it, and, while in the stratum, is so hard, as scarce to be cut by a spade. It is in great esteem in many counties of England for making the earthen floors of barns, and other such uses.

LAMB's *lettuce*. See VALERIAN.

LAMBATIVES, or rather LAMBITIVES, a form of medicine to be licked off the end of a liquorice-stick.

Lambatives amount to the same with *linctuses*, *lohocks*, and *electuaries*.

LAMBDOIDES, Λαμβδοειδὴς, in *Anatomy*, an epithet applied to the third proper SUTURE of the cranium, in regard it resembles the form of a Greek Λ, *lambda*.

For the same reason it is sometimes called ypsiloides, as bearing some resemblance to the Greek Υ, *upsilon*.

LAMBENT *fire*. See FIRE.

LAMBERT's *blue*. See AZURE and BLUE *ultramarine*.

LAME, in the *Manege*, is used in several phrases of that art; as *lame of an ear*, called in French *boiteux de l'oreille*, is said of a horse, when he halts upon a walk or trot, and keeps time to his halting with the motions of his head; for all *lame* horses do not keep time in that manner. See HALTING.

LAME *of the bridle*, is used by way of raillery, to signify the same thing.

LAMELLÆ, derived of *lamina*, and signifying as much as *little laminæ*; little, thin plates, or laminæ, whereof the scales and shells of fishes, &c. are composed.

LAMENESS, *claudicatio*, in *Surgery*. We want a chirurgical treatise on *lameness*: no person has as yet enquired into the various causes, and the proper remedies adapted to them, in cases of *lameness*; and in some instances remedies may be efficaciously applied.

Lameness arises from a variety of causes. From native deformity, or from the thigh being put out of joint in the birth; from the bad conformation of the cotyloid cavity of the ossa innominata; from the weakness of the hips; from external accidents; and from diseases. See LUXATION.

Natural *lameness* is incurable, but the *lameness* of the mother does not generally descend to the children; nevertheless it may sometimes be communicated by causes difficult to discover. Zwinger tells us of a *lame* woman who brought three children into the world, afflicted with the same infirmity.

In all the species of accidental luxation of the thigh, as well as in fractures, the action of limping is unavoidable; and is only to be cured by a skilful reduction: sometimes a simple blow or a slight fall, will occasion a species of luxation of the thigh bone, in which an effusion of the mucilage, and a relaxation of the ligaments ensuing, the bone is driven out of its place, and occasions absolute *lameness*: and sometimes the unskilful treatment of a surgeon is the only cause.

A leg or a thigh too long or too short, occasioned by violence in bringing an infant into the world, will make it halt all the days of its life, if an attempt be not made in proper time toward a cure, by endeavouring to restore the joint to its natural socket.

The leg or thigh, when grown too short by the contraction of those parts, for want of radical moisture, in consequence of some disorder, produces an incurable *lameness*. It is the same in a relaxation of the ligaments, which is sometimes caused by a sciatic humour. If a schirrus is formed in one of the rems, the thigh of the same side will become paralytic, or incurably *lame*. Sometimes it happens without what is called a luxation, that the leg, merely by a contraction or rigidity of the muscles which serve to put it in motion, shrinks to that degree, that it cannot be moved without halting. The remedy for such a complaint, is to employ emollient fomentations, together with resolutive spirits, mollifying baths, purging with mineral waters, and to wear a shoe with a leaden sole, of a weight proportioned to the contraction of the limbs.

A weakness of the hips will occasion a *lameness* of both sides. This misfortune is frequently owing to nurses, who put children to walk without assistance, before their parts have acquired sufficient strength and firmness to sustain the weight of their body.

As soon as this weakness discovers itself, it may be corrected by having recourse to a girdle round the waist, which taking in the whole swell of the belly, is well braced at the hips; this girdle will give strength in walking, by fortifying the loins. They ought also to be bathed several times a day for some months with astringent decoctions.

LAMENTATIONS, a canonical book of the Old Testament, written by the prophet Jeremiah, according to archbishop Usher and some other learned men who follow the opinion of Josephus and St. Jerom, on occasion of Josiah's death. But this opinion does not seem to agree with the subject of the book, the lamentation composed by Jeremiah on that occasion being probably lost. The fifty-second chapter of the book of Jeremiah was probably added by Ezra, as a preface or introduction to the *Lamentations*: the two first chapters are employed in describing the calamities of the siege of Jerusalem: in the third the author deplores the persecutions he himself had suffered: the fourth treats of the desolation of the city and temple, and the misfortune of Zedekiah: the fifth chapter is a prayer for the Jews in their dispersion and captivity: and at the close of all he speaks of the cruelty of the Edomites, who had insulted Jerusalem in her misery. All the chapters of this book, except the last, are in metre, and digested in the order of the alphabet, with this difference, that in the first, second, and fourth chapters, the first letter of every verse follows the order of the alphabet; but in the third the same initial letter is continued for three verses together. This order was probably adopted, that the book might be more easily learnt and retained. The subject of this book is of the most moving kind; and the style throughout lively, pathetic, and affecting. In this kind of writing the prophet Jeremiah was a great master, according to the character which Grotius gives of him: *Mirus in affectibus concitandis*.

LAMIA. See SHARK.

LAMIÆ, *Λαμιαι*, among the *Ancients*, a kind of demons, or evil spirits, who, under the form of beautiful women, are said to have devoured children.

Horace makes mention of them in his Art of Poetry.—Some authors call them *Lamiæ*, *à lanitando*. Philostratus says, they are also called *Larvæ*, or *Lemures*, as if they were all the same. Bochart will have the word to be

be Phœnician, and derived it from לחם *to devour*; alledging, that the fable of the *Lamiæ* came from Libya.

LAMINÆ, in *Physiology*, thin plates, or tables, whereof any thing consists: particularly the human skull, which are two, the one laid over the other.

LAMIODONTES, is the name given by Dr. Hill to the GLOSSOPETRÆ.

LAMIOLA, in *Ichthyology*, a name by which some authors have called the MALTHA or forrar, a kind of shark.

LAMIOLA is also the name given by the modern Italians to a fish called in Cornwall the *tope*. It is a species of the squalus, called by the generality of authors *galeus canis*; and by Artedi the *squalus*, with the nostrils placed near the mouth, and with the small foramina near the eyes.

LAMIUM, *dead nettle*, in *Botany*. See ARCHANGEL.

LAMIUM *exoticum*, in *Botany*, a name given to a species of cassida. See SKULL-*cap*.

LAMMAS-DAY, the first of August; so called, as some will have it, because lambs then grow out of season, as being too big. Others derive it from a Saxon word, signifying *loaf-mass*, because on that day our forefathers made an offering of bread prepared with new wheat.

On this day, the tenants who formerly held lands of the cathedral church in York, were bound by their tenure to bring a lamb alive into the church at high mass.

It is celebrated by the Romish church in memory of St. Peter's imprisonment.

LAMNE, in *Ichthyology*, a name given by Appian, and some other of the old Greek authors, to the common SHARK, or, as we usually call it, the *white shark*, the *lamia* and *canes carcharias* of authors. This is properly a species of SQUALUS, and is accurately distinguished by Artedi under the name of the *squalus*, with a flat back, and with numerous teeth serrated at the edges.

LAMP, *Λαμπας*, a sort of luminary, consisting of oil disposed with a wick in a proper vessel for burning. See LENS.

The use of lighted *lamps* in churches, and places of devotion, is very ancient. In the city of Fez is a mosque, wherein are nine hundred brazen *lamps* burning every night. In Turky, all the illuminations are made only with *lamps*. Polydore Virgil ascribes the first invention of *lamps* to the Egyptians; and Herodotus describes a feast of *lamps* held annually in Egypt.

Kircher shews the manner of preparing *lamps*, which shall diffuse a light so disposed, as to make the faces of those present appear black, blue, red, or of any other colour.

There has been a great dispute among the learned about the sepulchral *lamps* of the ancients: some maintain, they had the secret of making *lamps* that were inextinguishable, alledging several that had been found burning, at the opening of tombs fifteen or sixteen hundred years old. But others treat these relations as fables; and others think, that the *lamps*, which before were extinguished, took light afresh upon the admission of fresh air.

Dr. Plott, however, is of opinion such perpetual *lamps* are things practicable, and has himself made some proposals of this kind. The linum albestinum, he thinks, may do pretty well for the wick, and that the naphta, or liquid bitumen, constantly springing into some of the coal-mines, would answer for the oil.

If the asbestos will not make a perpetual wick, he thinks there is no matter in the world that will; and argues, that the tradition of such *lamps* must be fabulous, or else that they made them without wicks.

Such a *lamp* he thinks it possible to make of the bitumen springing into the coal-mines at Pitchford, in Shropshire; which, he says, like other liquid bitumens, will burn without a wick.

Those *lamps* that kindle on the immission of fresh air, the same author thinks, might be imitated by inclosing some of the liquid phosphorus in the recipient of an air-pump; which, under those circumstances, will not shine at all; but on letting the air into the recipient, there will possibly, says he, appear as good a perpetual *lamp*, as some that have been found in the sepulchres of the ancients.

LAMP, *Gordon's*, is a contrivance of an author of that name, which furnishes itself with its own oil.

It consists of a little column of brass, tin, or the like, well closed every where, excepting a small aperture at bottom, in the middle of a little gullet or canal, where the wick is placed.

Here the oil cannot get out, but in proportion as it wastes, and so opens the passage of that little aperture.

This kind of *lamp* was much in use some years ago; but it has several inconveniences: such as that the air gets into it by flaws and gluts; and that when the air in the cavity comes to be much rarefied by heat, it drives out too much oil, so as sometimes to extinguish the *lamp*.

Dr. Hook, and Mr. Boyle, have invented other *lamps*, that have all the conveniences of Cardan's without the inconveniences.

The flame in a *lamp* never consumes the wick, till the wick be exposed to the air by the flame's falling downward; and from hence it may be inferred, that a way found out to keep the fuel, and consequently the flame, at the same height upon the wick, would make it last a long time. Many ways have been devised to arrive at this, but it seems only possible to be done, in any degree of perfection, by hydrostatics. Thus, let a *lamp* be made two or three inches deep, with a pipe coming from the bottom almost as high as the top of the vessel; let it be filled to high with water, as to cover the hole of the pipe at the bottom, to the end that the oil may not run in at the pipe, and so be lost. Then let the oil be poured in, so as to fill the vessel almost brim full, which must have a cover, pierced with as many holes as there are wicks designed. When the vessel is thus filled, and the wicks are lighted, if water falls in by drops at the pipes, it will always keep the oil at the same height, or very near; the weight of the water being to that of the oil as 28½ to 19, which in two or three inches makes no great difference. If the water runs faster than the oil wastes, it will only run over at the top of the pipe, and what does not run over will come under the oil, and keep it at the same height. Phil. Trans. N° 245. p. 388.

By 17 Geo. II. cap. 29. a convenient number of glass *lamps* shall be put in such places of the city of London, as the mayor, aldermen, and commonalty, shall think fit; to be kept lighted and burning from sun-set to sun-rising throughout the year; and rates shall be made not exceeding 6*d.* in the pound, nor above 30*s.* a year on any one person, for defraying the charges of them. Every alderman, with consent of his deputy and common council, may contract yearly for the setting up *lamps*, and their lighting, trimming, &c. and persons maliciously breaking down, or extinguishing any *lamp*, shall forfeit 40*s.* for the first offence, 50*s.* for the second, and 3*l.* for the third, leviable by justices, or to be sent to the house of correction. None but British oil is to be used for *lamps* in private houses, under penalty of 40*s.* 8 Ann. cap. 9.

LAMP, *rolling*, in *Mechanics*, is a *lamp* AB (*Tab.* IV. *Mechanics*, *fig.* 48.) that has within it the two moveable circles DE and FG, whose common center of motion is at K, where their axes of motion cross one another, in which point also is their common center of gravity. If to the inward circle you join within side the lamp KC, made pretty heavy, and moveable about its axis HI, whose center of gravity is at C, the common center of gravity of the whole machine will fall between K and C, and by reason of the pivots A, B, D, E, H, I, will be always at liberty to descend; and therefore let the whole *lamp* be rolled along the ground, or moved in any manner, the flame will always be uppermost, and the oil cannot be spilt. In this manner the compass is hung at sea; and thus should all the moon-lanthorns be made that are carried upon a pole before coaches or carriages which travel in the night. Desag. Exp. Phil. vol. I. p. 57.

LAMP *black*. See BLACK.

LAMP. *oil de*. See OIL.

LAMP, *enamelling by*. See ENAMELLING.

LAMP, *fire of a*. See FIRE.

LAMP *furnace*. See *Lamp* FURNACE.

LAMPADARY, *lampadarius*, an officer in the ancient church of Constantinople, whose business was to see the church well lighted, and to bear a taper before the emperor, the empress, and the patriarch, when they went to church or in procession.

The taper borne by the *lampadary* before the emperor was encompassed with divers circles of gold, in manner of crowns; those held before the empress and patriarch had but one. It seems they were made in those figures, and were intended to keep those great lights steady, that their light was to illumine those whose stations. There were also *lampadaries* in the emperor's palace, and others in the houses of the grandees, who had the privilege of having a *lampadary*, or torch-bearer, and only granted to the principal officers of the empire, and the chief magistrates; but afterwards the emperor followed it to other inferior officers, as questors, &c.

Together with the taper, they bore before the emperor the emperor's image, &c. And it is very probable, it was on account of this image, that they were not permitted to have a *lampadary*.

LAMPADIAS is used by some authors for a kind of blazing comet, which, as they pretend, resembles a burning *lamp*, being of several shapes; its flame or blaze tapering upward sometimes like unto a sword, and being at other times double or triple pointed.

LAM-

LAMPAS, or LAMPERS, a kind of ſwelling in the palate of a horſe; ſo called, becauſe it is cured by burning with a lamp, or a hot iron.

The *lampas* is an inflammation or tumor in the roof of a horſe's mouth, behind the nippers of the upper jaw. It ariſes from abundance of blood reſorting to the firſt furrow of the mouth, near the fore-teeth, which cauſes that furrow to ſwell as high as his gatherers; it hinders the beaſt's feeding, and makes him let his meat fall, half chewed, out of his mouth.

The *lampas* is a natural infirmity, which every horſe has firſt or laſt, and which every farrier can cure.

LAMPERN, in *Ichthyology*, a river fiſh, being the *petromyzon branchialis* of Linnæus, found in many parts of England, particularly in Oxfordſhire, and the neighbouring counties, and there called the *pride of the Iſis*. The Latin authors call it the *lampetra parva*, and *muſtela fluviatilis*. It is a ſmall fiſh, of a browniſh or bluiſh black upon the back, and a fine ſilver white on the belly, divided from the mouth to the anus with a ſtraight line; its mouth is circular or elliptic, and furniſhed with ſix or ſeven teeth, and over theſe a ſmall ſemicircular bone; in the middle of the head it has a hollow or ſmall tube, like the whale; the uſe of this is to admit the water and air, while the mouth is applied cloſe to the rocks; its gills are ſeven holes on each ſide, and it has two fins on the back.

The word *lampern* is uſed by the common people in England for one ſpecies of the *lampetra*, and is not to be confounded with the other called the *lamprey*, or the *lamprey-eel*. The near alliance in ſound between the two words *Lampern* and *lamprey*, has deceived ſeveral to ſuppoſe they meant the ſame fiſh; and even ſome authors have not diſtinguiſhed them; but the determinate ſenſe of the word is this: they are the names of two fiſh, both of the genus of the *lampetra*, according to the generality of writers, and of the *petromyzon*, according to the new ſyſtem of Artedi.

No *lamperns* are to be taken in the rivers Thames and Medway, except from Auguſt 24 to March 30. 30 Geo. II. cap. 21.

LAMPETIANS, LAMPETIANI, a ſect of ancient hereties, in the ſeventh century, who fell in with ſome of the opinions of the Arians.

Their founder, Lampetius, is ſaid to have been one of the chiefs of the Marcionites. They condemned all kind of vows, particularly that of obedience, as inconſiſtent with the liberty of the ſons of God.

LAMPETRA *Indica*, in *Ichthyology*, the name of an Eaſt Indian fiſh of the lamprey kind, caught in ſtanding waters, and called by the Dutch there *bont eel*, and *neegen oog*, or *nine eyes*.

LAMPREY, *lampetra*, a *lambendo petras*, becauſe this ſpecies is ſuppoſed to lick the rocks, in *Ichthyology*, belongs, in the Artedian and Linnæan ſyſtems, to the genus of PETROMYZON. The diſtinguiſhing characters of the common *lamprey*, or *petromyzon marinus* of Linnæus, are theſe: its back is of a blackiſh hue, with ſome angular whitiſh ſpots; the ſkin is tough, but much thinner than that of the eel; its mouth is rounded, and it lays ſo faſt hold of rocks, or wood, with this, that it ſeems to ſuck them, and ſticks ſo firmly, as not to be eaſily removed; it can, however, contract this mouth lengthwiſe, and ſhut it at pleaſure; it has a white ſpot in the middle of its forehead, between the eyes, and before that a hole, ſurrounded with a thin membrane, by which it admits the water and air, while its mouth lies cloſely on the rock; the gills are placed within ſeven round holes on each ſide, and the edge of its mouth is ſurrounded with a range of ſhort fibrillæ, which have by ſome been miſtaken for teeth; but are really of no other uſe than to affix its mouth the more firmly; its teeth are placed within its mouth, and there are twenty rows of them, the inner ones being the larger; theſe are diſpoſed in rows from the center toward the circumference, and are five, ſix, or ſeven in a row. See *Tab.* II. *Fiſh*, N° 17.

It is a fiſh that equally lives in ſalt and freſh water. In the month of March it commonly runs up into the rivers, and is then moſt valuable for the table, as being fat and full of eggs; ſo that the beſt ſeaſon for *lampreys* is in the months of March, April, and May, becauſe they are moſt firm when they firſt leave the ſalt-water, and become waſted and flabby at the approach of hot weather; they are found in ſeveral of our rivers, but the Severn is the moſt noted for them. They are taken in nets along with ſalmon and ſhad, and ſometimes in weels laid in the bottom of the river. It has been an old cuſtom for the city of Gloucester, annually, to preſent his majeſty with a *lamprey* pye, covered with a large raiſed cruſt; and as the gift is made at Chriſtmas, the corporation procure freſh *lampreys* at that time with great difficulty. They are reckoned a great delicacy, either potted or ſtewed; but are a ſurfeiting food, as one of our monarchs fatally experienced, Henry the firſt's death being occaſioned by a too full meal of this fiſh. They are ſometimes found ſo large as to weigh four or five pounds. The leſſer *lampreys*, or *petromyzon fluviatilis* of Linnæus, ſometimes grows to the length of ten inches. Its mouth is formed like that of the preceding; on the upper part is a large bifurcated tooth; on each ſide are three rows of very ſmall ones; on the lower part are ſeven teeth, the exterior of which on each ſide is the largeſt; the irides are yellow; it has the ſame orifice between the eyes with the other ſpecies; on the lower part of the back is a narrow fin, beneath which riſes another, which at the beginning is high and angular, then grows narrow, ſurrounds the tail, and ends near the anus; the colour of the back is brown or duſky, ſometimes mixed with blue; the whole underſide is ſilvery. Theſe are found in the Thames, Severn, and Dee, and are potted with the larger ſpecies, and are reckoned of a milder taſte. They are ſold to the Dutch as bait for their cod-fiſhery. Above 450,000 have been ſold in a ſeaſon at 40*s.* per thouſand. Of late, about 100,000 have been ſent to Harwich for the ſame purpoſe. It is ſaid the Dutch have the ſecret of preſerving them till the turbot fiſhery. The other ſpecies is the LAMPERN, already deſcribed.

LAMPRILLON, or LAMPREYON, a name by which ſome authors have called that particular ſpecies of *lamprey*, which we by way of diſtinction call LAMPERN.

LAMPROPHORUS, an appellation anciently given to the neophytes, during the ſeven days that ſucceeded their baptiſm.

In the ceremony of baptiſm, the new Chriſtian was clothed with a white robe, which he wore for the week following; and was thence called *lampropheros*, which ſignifies a *perſon wearing a ſhining garment*; from λαμπρος, *ſhining*, and φερω, *I bear*.

The Greeks alſo gave this name to the day of the reſurrection, becauſe their houſes were adorned and illuminated on that day with a great number of torches, as a ſymbol of the light which that myſtery diffuſed in the world.

LAMPSANA, in *Botany*. See NIPPLE-*wort*.

LAMPUGA, in *Ichthyology*, a name given by ſome authors to the fiſh more uſually known by the name of STROMATEUS.

LAMPUGO, in *Ichthyography*, a name given by many to the HIPPURUS, a ſea-fiſh, caught on the coaſt of Spain, and ſuppoſed by ſome to be the ſame with the DORADO.

LAMPYRIS, in *Natural Hiſtory*, a genus of the *coleoptera* claſs of inſects; the antennæ of which are filiform, the elytra flexile, the thorax plane and ſemiorbiculated, covering and ſurrounding the head, and the ſides of the abdomen are covered with folds of down. Linnæus enumerates eighteen ſpecies. See GLOW-*worm*.

LANÆ *petra*. See PETRA.

LANARIA, or *Herba* LANARIA, in *Botany*, a name given by the ancient Romans to a plant called *ſtruthium* by the Greeks, and uſed in the cleanſing of wool. The plant was of the thiſtle kind, and had large roots, and very prickly leaves. Some have ſuppoſed that the *chaſuſa* of the ancients was the ſame with the *lanaria herba*, or *ſtruthium*; but this appears to be a great error; for the *chaſuſa* of the Greeks is the *antirrhinum* of the Latins, which Pliny deſcribes to have leaves like flax.

LANATA, in *Botany*, a name given by Cordus, and ſome other authors, to the *aria Theophraſti*, or *white beam-tree*.

LANCARIM *ſpring*, the name of a medicated water of Glamorganſhire. It has its name from a town near which it riſes, and has been very long famous in the place for the cure of the king's evil. The body of water is about an ell broad, and runs between two hills covered with wood. About twelve yards from this ſpring the rill falls from a rock of about eight or nine feet high, with a conſiderable noiſe. The ſpring is very clear, and riſes out of a pure white marl. The cures that have been performed there are proofs of a real power in the water; but there is ſome queſtion, whether the water, or its motion and coldneſs, does the good; for the people, who come for relief, always drink of the ſpring, and bathe the part afterwards in the fall below. It is generally ſuppoſed that the lime-ſtone rocks communicate a virtue to it, by which it cures internally; but it has been often found, that the holding a limb diſordered with the evil, in the ſtrong current of a mill-tail, has cured it; and there is the ſame advantage in the fall of this water. Phil. Tranſ. N° 233. or Abr. vol. ii. p. 333.

LANCASTER, *county palatine of*. See COUNTY.

LANCASTER, *duchy court of*. See COURT.

LANCE, *Lancea*, a ſpear; an offenſive weapon, borne by the ancient cavaliers, in form of a half pike.

The *lance* conſiſted of three parts, the ſhaft, or handle, the

the wings, and the dart. Pliny attributes the invention of *lances* to the Etolians. But Varro, and Aulus Gellius, say, the word *lance* is Spanish; whence others conclude the use of this weapon was borrowed by the people of Italy from the Spaniards. Diodorus Siculus derives it from the Gaulish, and Festus from the Greek λογχη, which signifies the same.

LANCEA *Christi*, in *Botany*, a name given by some authors to the *ophioglossum*, or adder's tongue, a small herb found in moist places, with a single stem of seeds.

LANCEARII, in *Middle Age Writers*, soldiers whose chief weapon was the lance. They were in great esteem formerly.

LANCEOLA, in *Botany*, a name given by some authors to that species of plantain called *rib-wort*, or *plantago quinquenervia*, by most authors.

LANCEOLATED *leaf*, among *Botanists*. See LEAF.

LANCET, a name given by the ancient laws of England to a kind of vassals, who were obliged to work for the lord one day in a week, from Michaelmas to autumn, either with fork, spade, or flail, at the option of the lord.

LANCETTE, or LANCET, a fine, small surgeon's knife; strait-pointed, and two-edged; used in opening veins, &c. See PHLEBOTOMY.

LANCH, in *Sea Language*, a peculiar kind of *long-boat*, employed by ships in the Mediterranean sea. It is longer, lower, and more flat-bottomed than the long boat, and, though less fit for sailing, better adapted for approaching a flat shore. It is also, by its construction, fitter to under-run the cable than the long-boat, which adapts it to the harbours of the Levant sea, where the cables of different ships are fastened across each other.

LANCH *of a ship*. See LAUNCH.

LAND, in a general sense. See EARTH, SOIL, &c.

Dr. Davenant, from a scheme of Mr. King, states the quantity of *land* in England and Wales to be thirty-nine millions of acres; which, reckoning the number of inhabitants, as he does, to be 5,500,000, will at an average be 7¾ acres per head. Davenant's Works, vol. vi. p. 3. See ACRE, and EXPECTATION *of life*.

LAND, in a *Legal Sense*, includes not only the face of the earth, but every thing under or over it; so that if a man grants all his *lands*, he grants thereby all his mines of metal and other fossils, his woods, his waters, and his houses, as well as his fields and meadows.

LAND, *inclosing of*. Inclosing of *lands*, and dividing the same into several fields for pasture and tillage, is one of the principal ways of improvement; first, by ascertaining to every man his just property, and thereby preventing an infinity of trespasses and injuries that *lands* in common are subject unto, beside the disadvantage of being obliged to keep the same seasons with the other people who have *land* in the same field; so that the sowing, fallowing, and tilling the ground, must be equally performed by all the landholders; and when there happens a slothful negligent person, who has *land* intermixed with others, it is one of the greatest nuisances imaginable. Secondly, where *land* is properly inclosed, and the hedge-rows planted with timber trees, &c. it preserves the land warm, and defends and shelters it from the violent cold nipping winds, which, in severe winters, destroy much of the corn, pulse, or whatever grows on the champain grounds; and where it is laid down for pasture, it yields much more grass than the open fields, and the grass will begin to grow much sooner in the spring. The hedges and trees also afford shelter for the cattle from the cold winds in winter, and shade for them in the great heats of summer. These hedges also afford the diligent husbandman plenty of fuel, as also plough boot, cart boot, &c. And where they are carefully planted and preserved, furnish him with mast for his swine; or where the hedge-rows are planted with fruit trees, there will be a supply of fruit for cyder, perry, &c. which in most parts of England are of no small advantage to the husbandman.

By this method of inclosing, there is also much more employment for the poor, and it is therefore a good remedy against beggary; for in those open countries, where there are great downs, commons, heaths, and wastes, there is nothing but poverty and idleness to be seen amongst the generality of their inhabitants. Miller.

It must be acknowledged, that inclosures of waste *lands* and commons would be useful, if they were divided into small parcels, and given up to be occupied at moderate rents by the poor. But if besides lessening the produce of fine wool, they bear hard on the poor, by depriving them of a part of their subsistence, and only serve to increase farms already too large, which is commonly the case, the advantages attending them may not much exceed the disadvantages. With respect to inclosures of open fields and *lands*, the advocates for inclosing are ready to own, that these diminish tillage, increase the monopolies of farms, raise the prices of provisions, and produce depopulation. Such inclosures, therefore, however gainful they may be at present to a few individuals, are undoubtedly pernicious. It is a known fact, that in Northamptonshire and Leicestershire, where inclosing has greatly prevailed, most of the inclosed lordships are converted into pasturage; in consequence of which, many lordships have not now fifty acres ploughed yearly, in which fifteen hundred, or at least a thousand, were ploughed formerly; and scarce an ear of corn is to be seen in some that bore hundreds of quarters; the effect of which has been, that the price of wheat and malt is nearly doubled, and that the inhabitants in almost all the inclosed villages, where they have no considerable manufacture, are very sensibly diminished; insomuch that a hundred houses and families have in some places dwindled into eight or ten; and the landholders, in most parishes that have been inclosed only fifteen or twenty years, are very few in comparison of the numbers who occupied them in their open-field state. It is no uncommon thing to see four or five wealthy graziers engrossing a large inclosed lordship, which was before in the hands of twenty or thirty farmers, and as many smaller tenants or proprietors. All these are hereby thrown out of their livings, with their families, and many other families which were employed and supported by them. The state of Norfolk is in some respects similar to this. Inclosures, says the celebrated lord Bacon, in his History of the Reign of Henry VII. (see his Works, vol. iii. p. 431.) began in 1489 to be more frequent, whereby arable land was turned into pasture, which was easily managed by a few herdsmen. This fired a decay of people. In remedying this inconvenience, the king's wisdom and the parliament's was admirable. Inclosures they would not forbid, and tillage they would not compel; but they took a course to take away depopulating inclosures, and depopulating pasturage by consequence. The ordinance was, that all houses of husbandry, with twenty acres of ground to them, should be kept up for ever, together with a competent proportion of land to be occupied with them, and in no wise to be severed from them. By these means, the houses being kept up, did, of necessity, enforce a dweller; and the proportion of land for occupation being also kept up, did, of necessity, enforce that dweller not to be a beggar. This statute was renewed in king Henry the eighth's time; and every person who converted tillage into pasture subjected to a forfeiture of half the land, till the offence was removed. In a law of the twenty-fifth of the same reign, it is set forth, that many farms, and great plenty of cattle, particularly sheep, had been gathered into few hands, whereby the rents of lands had been increased, and tillage very much decayed; churches and towns pulled down; the price of provisions greatly enhanced, and a marvellous number of people rendered incapable of maintaining themselves and families; and, therefore, it was enacted, that no person should keep above two thousand sheep, nor hold more than two farms. In the third of Edw. VI. a bill was brought in for the benefit of the poor, for rebuilding decayed farm-houses, and maintaining tillage against too much inclosing. In the year 1638 there was a special commission from Charles I. for enforcing the statute of the 39th of Elizabeth, by which no cottage was allowed in any country place, without at least four acres of land to it, to prevent the increase of the poor, by securing to them a maintenance; nor were any inmates allowed in any cottage, to secure the full cultivation of the *land*, by diffusing the people more over it. And by an act in Cromwell's time, no new house was to be built within ten miles of London, unless there were four acres of *land* occupied by the tenant. Thus did the policy of our ancestors discourage inclosing and engrossing, upon the same general view of their depopulating tendency; and though the increase of trade and manufactures in more modern times has produced a considerable alteration in the state of our country, and may require some change in our internal policy, yet it is easy to observe, that facts justify the apprehension, that inclosing and engrossing to the degree in which they have lately prevailed will annihilate the small occupiers of land, and reduce the inhabitants of the kingdom to two classes, the gentry and beggars, or grandees and slaves.

As in former times the number of the occupiers of land was greater, and all had more opportunities of subsisting for themselves, it is reasonable to conclude, that the number of people willing to work for others must have been smaller, and the price of day-labour higher. The principal price of day-labour is at present no more than about four times, or at most five times, higher than it was in the year 1514. But the price of corn is seven times, and of flesh-meat and raiment about fifteen times higher; therefore the price of labour has been so far from advancing

vancing in proportion to the increaſe in the expences of living, that it does not appear to bear now half the proportion to theſe expences that it did formerly. See on this ſubject Price's Obſervations on Reverſionary Payments. Supplement, p. 388. &c. Appeal to the Public on the Subject of the National Debt, p. 93. &c.

In incloſing of *land*, regard ſhould be had to the nature of the ſoil, and what it is intended for; becauſe corn land ſhould not be divided into ſmall fields; for beſides the loſs of ground in hedges, &c. the corn doth ſeldom thrive ſo well in ſmall incloſures as in more open *land*, eſpecially where the trees are large in the hedge-rows. The graſs alſo in paſture is not ſo ſweet near hedges, or under the drip of trees, as in an open expoſure; ſo that where the incloſures are made too ſmall, or the land over planted with trees, the herbage will not be near ſo good, nor in ſo great plenty, as in larger fields; therefore, before a perſon begins to incloſe, he ſhould well conſider how he may do it to the greateſt advantage: as, for inſtance, it is always neceſſary to have ſome ſmaller incloſures near the habitation, for the ſhelter of cattle, and the conveniency of ſhifting them from one field to another, as the ſeaſon of the year may require; and hereby the habitation, barns, ſtables, and out-houſes, will be better defended from ſtrong winds, which often do great damage to thoſe that are expoſed to their fury. Theſe ſmall incloſures may be of ſeveral dimenſions, ſome of them three, four, ſix, or eight acres in extent; but the larger diviſions for corn ſhould not contain leſs than twenty or thirty acres, or more, according to the ſize of the farm.

The moſt common incloſure is by a ditch and bank raiſed by its ſide with quick: this takes place in almoſt any ground; but as it is expenſive, and ſtone or water are more plentiful, they are uſed in its ſtead. In marſhy lands they only cut ditches, by way of fence between ground and ground; and theſe, when wide and deep enough, are a very good fence in all places where there is water to keep them full. In Cornwall and Devonſhire, and ſome other of the weſtern counties, they uſe a ſtone fence, which is the beſt kind both for the lands and for the cattle. Flat ſtones are very plentiful in theſe counties, and may be had at a trifling expence. With theſe ſtones they build round the land that is to be incloſed two walls near one another, laying the ſtones one upon another, firſt two and two, then one, all the way up; and as they riſe, they fill up the ſpace with earth; and ſo they continue the ſtone work, filling it to what height and breadth they pleaſe, and beating the ſtones in flat to the ſides, which makes the whole firm. On the top of theſe walls they plant quick, and even timber-trees, which thrive extremely well. In the northern counties of England, and ſome others, where there is plenty of ſtone of a large and rough kind, they make their fences with the rough and unhewn ſtones, piling them up into a wall with no ſort of cement or mortar, only laying on large ones at the top in a bed of clay, which keep all the reſt together. They make theſe walls about five feet high. See EARTH-*banks*, FENCE, HEDGE, and WALL.

LAND, *draining of*. The draining of *land* is alſo another great improvement to it; for though meadows and paſtures, which are capable of being overflowed, produce a greater quantity of herbage than dry land, yet where the wet lies too long upon the ground, the graſs will be ſour and extremely coarſe; and when there is not care taken in time to drain this *land*, it will produce little graſs, and ſoon be over-run with ruſhes and flags, ſo as to be of ſmall value.

The beſt method for draining of theſe lands is, to cut ſeveral drains acroſs the land, in thoſe places where the water is ſubject to lodge; and from theſe croſs drains to make a convenient number of other drains, to carry off the water to either ponds or rivers in the lower parts of the land. Theſe drains need not be made very large, unleſs the ground be very low, and ſo ſituated as not to be near any river to which the water may be conveyed; in which caſe there ſhould be large ditches dug at proper diſtances, in the loweſt part of the ground, to contain the water; and the earth which comes out of the ditches ſhould be equally ſpread on the land, to raiſe the ſurface. But where the water can be conveniently carried off, the beſt method is to make under-ground drains at proper diſtances, which may empty themſelves into large ditches, which are deſigned to carry off the water. This ſort of drains is the moſt convenient, and as they are hid from the ſight, do not incommode the land; nor is there any ground loſt where theſe are made.

The uſual method of making theſe drains is to dig trenches, and fill the bottoms with ſtones, bricks, ruſhes, or buſhes, which are covered over with the earth which was dug out of the trenches; but this is not the beſt method, becauſe the water has not a free paſſage through theſe drains; ſo that whenever there is a flood, they are often ſtopped by the ſoil which the water frequently brings down with it. The beſt method yet found to make theſe drains is to dig trenches to a proper depth for carrying off the water, which for the principal drains ſhould be three feet wide at their top, and ſloped down for two feet in depth, where there ſhould be a ſmall bank left on each ſide, upon which the croſs ſtakes or bearers ſhould be laid, and below theſe banks there ſhould be an open drain left, at leaſt one foot deep, and nine or ten inches wide, that there may be room for the water to paſs through: the larger drains ſhould be at convenient diſtances, and ſmaller drains of about ſix or ſeven inches wide, and the hollow under the buſhes eight or nine inches deep, ſhould be cut acroſs the ground, which ſhould diſcharge the water into theſe larger drains. The number and ſituation of them muſt be in proportion to the wetneſs of the land; and the depth of earth above the buſhes muſt alſo be proportioned to the intended uſe of the *land*; for if it is arable land to be ploughed, it muſt not be ſhallower than a foot or fourteen inches, that there may be ſufficient depth for the plough, without diſturbing the buſhes, but for paſture land nine inches will be full enough; for when the buſhes lie too deep in ſtrong *land*, they will have little effect, the ground above will bind ſo hard, as to detain the wet on the ſurface. When the drains are dug, there ſhould be prepared a quantity of good bruſh wood, the larger ſticks ſhould be cut out to lengths of about ſixteen or eighteen inches, which ſhould be laid acroſs upon the two ſide-banks of the drain, at about four inches diſtance; then cover theſe ſticks with the ſmaller bruſh-wood, furz, broom, heath, or any other kind of bruſh, laying it lengthwiſe pretty cloſe; on the top of theſe may be laid ruſhes, flags, &c. and then the earth laid on to cover the whole. This ſort of drains will continue good for a great number of years, and are never liable to the inconveniences of the other; for the water will find an eaſy paſſage through them under the buſhes; and where there is plenty of bruſh-wood, they are made at an eaſy expence; but in places where wood is ſcarce, it would be chargeable to make them: however, in this caſe, it would be a great advantage to theſe *lands* to plant a ſufficient number of cuttings of willow, or the black poplar, on ſome of the moiſt places, which would furniſh bruſh-wood for theſe purpoſes in four or five years; and as the expence of planting theſe cuttings is trifling, there cannot be a greater advantage to an eſtate which wants draining, than to practiſe this method, which is in every perſon's power, ſince there is little expence attending it.

In countries where there is plenty of ſtone, that is the beſt material for making theſe under-ground drains; for when theſe are properly made, they will never want repairing.

The beſt time of the year for making theſe drains is about Michaelmas, before the heavy rains of autumn fall, becauſe at this ſeaſon the land is uſually dry, ſo that the drains may be dug to a proper depth; for when the ground is wet it will be very difficult to dig to any depth, becauſe the water will drain in, wherever there is an opening in the ground. Miller. See BOG, DRAINS, and FEN.

By 11 Geo. II. cap. 34. 14 Geo. II. cap. 24. and 21 Geo. II. cap. 18. the ſecond offence in ſetting fire to engines for draining the ſeveral fens, to which theſe acts relate, is made felony without clergy. By 22 Geo. II. cap. 11. 16. 19. 29 Geo. II. cap. 22. 30 Geo. II. cap. 32, 33. 35, 36. 31 Geo. II. cap. 18, 19. 32 Geo. II. cap. 13. 33 Geo. II. cap. 32. offenders maliciouſly ſetting fire to any of the works for draining the ſeveral fens to which theſe acts relate, may be tranſported for ſeven years.

LAND, *flooding of*. As the draining of cold wet *lands* is a great improvement to them, ſo the floating or watering of dry looſe land is not a leſs advantage to them. This may be eaſily effected where there are rivers, or reſervoirs of water, which are ſituated above the level of the ground deſigned to be floated, by under-ground drains (made after the manner of thoſe before directed for draining of *land*) through which the water may be conveyed at proper ſeaſons, and let out on the ground: in order to this, there muſt be good ſluices made at the heads of the drains, ſo that the water may never get out, but at ſuch times as is required; for if this be not taken care of, the water, inſtead of improving the land, will greatly damage it.

The time for drowning of *land* is uſually from November to the end of April; but though this is the general practice, yet Miller ſays he cannot approve of it for many reaſons. The firſt is, that by the wet lying continually on the ground in winter, the roots of the finer ſort of graſs are rotted and deſtroyed; and by letting on of the water, at

the ſeaſon when the ſeeds of docks, and other bad weeds, which commonly grow by river ſides, are falling, theſe ſeeds are carried upon the land, where they remain and grow, and fill the ground with bad weeds, which is commonly the caſe with moſt of the water meadows in England, the graſs in general being deſtroyed; ſo that ruſhes, docks, and other trumpery, make up the burden of theſe lands; but if theſe meadows were judiciouſly managed and never floated till March or April, the quantity of ſweet good graſs would be thereby greatly increaſed, and the beautiful verdure of the meadows preſerved. Miller. See OVERFLOWING.

LAND, *burning of*. Another great improvement of *land* is by burning of it, which for four, heathy, and ruſhy land, be it either hot or cold, wet or dry, is a very great improvement; ſo that ſuch *lands* will, in two or three years after burning, yield more, excluſive of the charges, than the inheritance was worth before; but this is not to be practiſed on rich fertile land; for as the fire deſtroys the acid juice, which occaſions ſterility in the poor land, ſo it will in like manner conſume the good juices of the richer land, and thereby impoveriſh it, ſo that it hath been with great reaſon diſuſed in deep rich countries.

It is alſo a very great improvement, where land is overgrown with broom, furz, &c. to ſtub them up by the roots; and when they are dry, lay them on heaps, and cover them with the parings of the earth, and burn them, and ſpread the aſhes over the ground. By this method vaſt tracts of land, which at preſent produce little or nothing to their owners, might be made good at a ſmall expence, ſo as to become good eſtates to the proprietors. Miller. See BURNING and DENSHIRING *of land*.

LAND, *arable*. See ARABLE.

LAND, *bog*. See BOG.

LAND, *burning of*. See BURNING.

LAND, *catch*. See CATCH-*land*.

LAND, *chalk*. See SOIL.

LANDS, *champion* See CHAMPION.

LAND, *charter*. See CHARTER-*land*.

LAND, *chiſely*. See CHISELY.

LAND, *clay*. See SOIL.

LANDS, *court*. See COURT-*lands*.

LANDS, *fabric*. See FABRIC-*lands*.

LAND, *fardel of*. See FARDEL.

LAND, *folk*. See FOLK-*land*.

LAND, *fore*. See FORE-*land*.

LAND, *glebe*. See GLEBE-*land*.

LAND, *gravelly*. See SOIL.

LAND, *head*. See HEAD-*land*.

LAND *in peerage, holding*. See PEERAGE.

LAND, *in*. See IN-*land*.

LAND, *inclining of*. See LAND, above.

LAND, *lay*. See LAY.

LAND, *marſh*. See MARSHY *lands*.

LAND, *meadow*. See MEADOW.

LANDS, *overflowing of*. See OVERFLOWING, and *Flooding of* LAND, above.

LAND, *oxgang of*. See OXGANG.

LAND, *plough*. See CARRUCATE.

LAND, *road*. See ROAD.

LAND, *ſandy*. See SOIL.

LAND-*teleſcope*. See TELESCOPE.

LANDS, *tenementary*. See TENEMENTARY.

LANDS, *thane*. See THANE-*lands*.

LAND, *up*. See UP-*land*.

LANDS, *wood*. See WOOD-*lands*.

LAND, *yard*. See YARD-*land*.

LAND, *yoak*. See YOAK *of land*.

LAND, *laying the*, in *Sea Language*, denotes that motion of a ſhip which increaſes its diſtance from the coaſt, ſo as to make it appear lower and ſmaller; a circumſtance ariſing from the intermediate convexity of the ſea. This is uſed in contradiſtinction to *roſhing the land*, which is produced by the oppoſite motion of approach towards it. When a ſhip is got out of ſight of *land*, they ſay the *land is laid*.

LAND, *to make the*. See MAKE.

LAND-*mark*, at *Sea*, is any mountain, rock, ſteeple, windmill, tree, or the like, near the ſea-ſide, which ſerve to direct ſhips paſſing by, how to ſteer, ſo as to avoid certain dangers, be they rocks, ſhoals, whirlpools, &c.

LAND, *ſetting the*, at *Sea*, is obſerving by the compaſs how it bears.

LAND *ſhut in*, at *Sea*. When another point of *land* hinders the ſight of that which a ſhip came from, then they ſay the *land is ſhut in*.

LAND-*to*, at *Sea*. When a ſhip lies ſo far from the ſhore, that ſhe can but juſt ken *land*, then ſhe is ſaid to lie *land-to*.

LAND-*turn*, at *Sea*, is a wind that blows from the ſhore in the night, at certain times, in moſt hot countries.

LAND, *head*, or *point of land*, in the *Sea Language*, is that which lies farther out into the ſea than the reſt. See POINT, CAPE, &c.

LAND-CHEAP, an ancient cuſtomary fine, paid either in cattle, or money, upon the alienating or ſelling of *land* in certain manors, or within the liberty of certain boroughs.

At Malden in Eſſex, a payment is ſtill made of 12*d.* in every mark of the purchaſe-money, for lands and houſes ſold in that town; which is called *land-cheap*.

LAND-FALL, is a ſea-term, ſignifying to fall in with the land, or the firſt land diſcovered after a ſea-voyage

LAND-FALL, *good*, is when a ſhip makes or ſees the land, as ſhe expected, according to her reckoning. The contrary is called a *bad land-fall*.

LAND-GABLE, an ancient term for a tax or rent, iſſuing out of a land; anſwering to what we now call *ground-rent*.

LAND-LOCKED, a ſhip is ſaid to ride *land-locked*, when ſhe is ſurrounded with land; that is, is at anchor in a place where there is no point open to the ſea, ſo that ſhe is ſafe from the violence of winds and tides.

LAND-TAX is one of the uſual annual taxes, which has ſuperſeded all the former methods of rating either property, or perſons in reſpect of their property, whether by tenths, fifteenths, ſubſidies on land, hydage or hidage, ſcutage or eſcuage, or talliage. Tenths and fifteenths were temporary aids iſſuing out of perſonal property, and granted to the king by parliament, being the real tenth or fifteenth part of all the moveables belonging to the ſubject. We meet with the payment of fifteenths as far back as the ſtatute of Magna Charta; in the concluſion of which, the parliament grants to the king, for the conceſſions made by him, a fifteenth part of all their moveable goods. This taxation was originally charged upon the ſeveral individuals, but in the 8th year of Edward III. a certain ſum was rated on every town, &c. In proceſs of time this fifteenth being inſufficient for the public exigence, the number of fifteenths was augmented to two or three fifteenths. Whenever, in later years, the commons granted the king a fifteenth, every parith in England knew their proportion of it; i. e. the ſame identical ſum that was aſſeſſed by the ſame aid in the 8th of Edward III. and then raiſed it by a rate among themſelves, and returned it into the royal exchequer. See FIFTEENTH. See alſo TENTH. The other ancient levies were in the nature of a modern *land-tax*; for we may trace the original of that charge as high as to the introduction of our military tenures; when every tenant of a knight's fee was bound, if called upon, to attend the king in his army for forty days in every year. In lieu of this perſonal attendance, a pecuniary ſatisfaction came to be levied by aſſeſſments, at ſo much for every knight's fee, under the name of ſcutages. See ESCUAGE. Of the ſame nature with theſe were the aſſeſſments of hydage or HIDAGE upon all other lands, and of TALLIAGE upon cities and boroughs. But they all gradually fell into diſuſe, upon the introduction of ſubſidies, about the time of king Richard II. and king Henry IV. See SUBSIDY. In lieu of ſubſidies, which were uſually raiſed by commiſſioners appointed by the crown, or the great officers of ſtate, the parliament, in the beginning of the civil wars, introduced the practice of laying weekly and monthly aſſeſſments of a ſpecific ſum upon the ſeveral counties of the kingdom, to be levied by a pound rate on lands and perſonal eſtates; which were occaſionally continued during the whole uſurpation, ſometimes at the rate of 120,000*l.* a month, ſometimes at inferior rates. After the Reſtoration the ancient method of granting ſubſidies, inſtead of theſe monthly aſſeſſments, was twice, and twice only renewed, viz. in 1663, when four ſubſidies were granted by the laity and four by the clergy; and in 1670, when 800,000*l.* was raiſed by way of ſubſidy, which was the laſt time of raiſing ſupplies in this manner. The monthly aſſeſſments being eſtabliſhed by cuſtom, raiſed by commiſſioners named by parliament, and producing a more certain revenue, ſubſidies were diſcontinued and occaſional aſſeſſments granted as emergencies required. Theſe periodical aſſeſſments, the ſubſidies which preceded them, and the more ancient talliage, hydage and tallinge, ſays Judge Blackſtone, were to all intents and purpoſes a *land-tax*; and the aſſeſſments were ſometimes expreſsly called ſo. However, in the year 1692 a new aſſeſſment or valuation of eſtates was made throughout the kingdom, which, though by no means a perfect one, had this effect, that a ſupply of 1*s.* in the pound was equal to 1*l.* in the pound of the value of the ſums given in. And, according to this enhanced valuation, from the year 1693 to the preſent, the *land-tax* has continued an annual charge upon the ſubject, above half the time at 4*s.* in the pound, ſometimes at 3*s.* ſometimes at 2*s.* twice, viz. in 1732 and 1733, at 1*s.* but without any total intermiſſion. The medium has been at 3*s.* in the pound, being equivalent to twenty-three ancient ſubſidies, and amounting annually to more than a million and a half of money. The method of raiſing it is by charging

charging a particular ſum upon each county, according to the valuation of 1692; and this ſum is aſſeſſed and raiſed upon the perſonal as well as the real eſtates of individuals by commiſſioners appointed in the act, being the principal landholders of the county, and their officers. The general qualification of commiſſioners in counties, with ſome few exceptions, is 100*l.* a year of landed property: theſe commiſſioners before they can act, are required to take the oaths of allegiance, ſupremacy, and abjuration. When they firſt meet they direct the return and appointment of proper aſſeſſors: at their ſecond meeting they direct them how to proceed in ſettling the ſeveral rates and charges; the aſſeſſment on perſonal eſtates ſhall be 4*s.* in the pound, according to the true yearly value of them; i. e. for every 100*l.* of ready money and debts, and for every 100*l.* worth of goods, 20*l.* excepting ſuch ſums as are owing and debts which the commiſſioner ſhall judge deſperate; and excepting ſtock upon lands and houſhold ſtuff, and debts and loans owing to his majeſty. Every perſon having a public office or employment, and their ſubſtitutes, ſhall pay 4*s.* for every 20*l.* of their ſalaries: military officers in the army or navy excepted. By 32 George II. c. 33. relating to the duty upon offices, it is provided, that in all future aſſeſſments to the *land-tax*, ſuch officers ſhall not be aſſeſſed at a higher rate to the *land-tax*, than they were in 1758. Every perſon having an annuity or penſion out of the exchequer, or out of any branch of the revenue ſhall pay 4*s.* for every 20*s.* except ſalaries charged upon lands which pay to the full, and annuities exempted by act of parliament; and except annuities paid to ſuper-annuated commiſſioners or warrant ſea-officers, or to the widows of ſea-officers ſlain in the ſervice of the crown; and except money lent to the government on the ſecurity of the act; and except turnpike tolls, and the ſalaries of turnpike officers.

Real eſtates ſhall be charged with as much equality and indifference as poſſible by a pound rate, to make up the ſeveral ſums charged by the act on each county or place. Colleges and hoſpitals are exempted, together with the buildings that are within the walls or limits of the ſame. All ſuch lands, revenues, or rents belonging to any hoſpital or alms-houſe, or ſettled to any charitable or pious uſe as were aſſeſſed in 4 W. and M. ſhall be liable: and no other lands, revenues or rents, then belonging to any hoſpital or alms-houſe, or ſettled to any charitable or pious uſe, ſhall be charged or aſſeſſed: but lands given to charities ſince the 4th W. and M. ſhall not be exempted. No poor perſon ſhall be charged, whoſe lands, &c. are not of the full yearly value of 20*s.* in the whole. The aſſeſſors themſelves are aſſeſſed by the commiſſioners. The *land-tax* ſhall be paid by the tenant, who ſhall deduct it out of his rent. Papiſts and non-jurors ſhall pay double. At the third meeting of the commiſſioners the aſſeſſors ſhall deliver duplicates of the aſſeſſment in writing, ſigned by them, to the commiſſioners, with the names of proper collectors, for whom the pariſh or place ſhall be anſwerable. One of the duplicates, ſigned by three or more commiſſioners, ſhall be delivered to the collectors, with warrant for collecting; and the time and place of appeals ſhall then be appointed. The fourth meeting is that of appeal, notice of which ſhall be given in the church; and every perſon intending to appeal ſhall give a written notice to one or more aſſeſſors, that they may attend to juſtify the aſſeſſment. The commiſſioners are empowered to give relief in caſe of over-charge, and cauſe the ſum abated to be re aſſeſſed: and when the appeal is determined, it is abſolutely final. If any perſon refuſe or neglect to pay to the collector on demand, he may levy the ſum aſſeſſed by diſtreſs and ſale of the goods of the perſon neglecting or refuſing to pay; and for want of diſtreſs, he may be committed by warrant of two commiſſioners to the common gaol, until payment of the money aſſeſſed and of the charges. The collector is required to pay the money received to the receiver-general or his deputy quarterly, on or before June 24, Sept. 29, Dec. 25, and March 25; who ſhall give a receipt gratis: the collectors are allowed 3*d.* in the pound, which they may detain out of the laſt payment; but if any collector detains the money longer than the time appointed, or pays it otherwiſe than directed, he ſhall forfeit 40*l.* and if he refuſe to pay it, two commiſſioners may impriſon him, ſeize his eſtates real and perſonal, and ſell them for payment. The receiver-general is appointed by the king, or in purſuance of his directions, and has a ſalary allowed him by the lords of the treaſury, not exceeding 2*d.* a pound; notice of his appointment is to be given to the commiſſioners, before the time of the firſt quarterly payment. The receiver, within twenty days after the receipt, ſhall pay the money into the exchequer, or forfeit 100*l.* to him who ſhall ſue. The clerks of the commiſſioners are allowed 13*d.* in the pound for writing the aſſeſſments, duplicates, &c. to be paid by the receiver-general, according to the warrant of two commiſſioners. Aſſeſſors, collectors, &c. not doing their duty may be fined by three or more commiſſioners, in any ſum not exceeding 40*l.* Blackſt. Com. vol. i. p. 308, &c. Burn's Juſtice, art. LAND-*Tax*.

LAND-WAITER, an officer of the cuſtom-houſe, whoſe duty is, upon landing any merchandize, to examine, taſte, weigh, meaſure them, &c. and to take an account thereof. In ſome ports they alſo execute the office of a coaſt waiter. They are likewiſe occaſionally ſtyled ſearchers, and are to attend and join with the patent ſearcher, in the execution of all cockets for the ſhipping of goods to be exported to foreign parts; and in cales where drawbacks on bounties are to be paid to the merchant on the exportation of any goods, they, as well as the patent ſearchers, are to certify the ſhipping thereof on the debentures.

LANDAN, in *Phyſiology*. See SARCO.

LANDED *intereſt*, a term oppoſed to moneyed intereſt, in political conſiderations; though there is a near connexion between them: for, the *landed intereſt* is affected by foreign trade.

The foreign trade of every country muſt decline, that, 1. Lays unequal taxes in general on its people. 2. That cramps its commerce, the fountain of riches, by high duties, and impolitic prohibitions. 3. That ſuffers many monopolies. 4. That oppreſſes its people by prohibiting the importation of victuals, under the pretence of raiſing the value of its lands. 5. That encourages idleneſs, by bad laws relating to its poor. 6. That tempts foreigners to carry away its coin for leſs than its intrinſic value. 7. That makes the obtaining juſtice chargeable. 8. That ſuffers a heavy national debt, contracted in time of war, to continue unpaid in time of peace.

The reaſon why the decline of foreign trade ſinks the value of land is, 1. becauſe it ſinks the markets at home. For, the produce of land being rendered exceſſively dear from the cauſes above enumerated, foreigners will not take its ſuperfluities; and labour being by the ſame cauſes rendered exceſſively dear, we cannot manufacture or improve that produce, becauſe nations which can afford cheaper ſupply the markets abroad; ſo that the produce of the lands, not being carried off as uſual, muſt become a dead ſtock on the farmer's hands, and cauſe great quantities to be crouded into markets, where, being encouragement but for few buyers, the price naturally falls; as, for inſtance, the declining demand of our woollen goods abroad falls the price of wool at home.

2. Becauſe it increaſes the number of poor, to burden the *land*.

3. Becauſe it diminiſhes the number of people: for as employment leſſens, the moſt induſtrious, rather than ſtarve here, will fly to other countries, where trade can maintain them. So the conſumption of theſe being taken away, the demand at market muſt grow leſs, and of courſe rents muſt fall, yet the farmer's charges muſt grow greater; for the fewer the hands, the higher wages are; this muſt break him in the end, and produce all the conſequences following that misfortune; beſides men who trade, bring in money; therefore the fewer they are, the leſs money will be brought; and the leſs money, the leſs rent can be given for *land*.

4. Becauſe the decline of trade diminiſhes *our riches*. This is a conſequence of the above remarks; for having fewer goods capable of being exported by reaſon of their dear price, and our manufactures declining, muſt in time be loſt: therefore the importation of foreign goods, muſt naturally increaſe, and more money go out to pay for them.

Nations that have no mines of gold and ſilver, have no means to get them but by foreign trade; and according to the quantity of theſe metals they poſſeſs, the price of their commodities, and therewith the value of their lands riſe and fall in proportion, which ſhall now be proved.

According to Dr. Davenant, the whole rental of England, in 1600, did not exceed ſix millions per annum, and the price of *land* was twelve years purchaſe: in 1688 the rental was fourteen millions, and the price of *land* was eighteen years purchaſe; ſo that, within this period, the *landed* intereſt roſe from ſeventy-two to two hundred and fifty-two millions: and this advance was owing to an increaſe of trade.

The Britannia Langens. page 12, ſays, if there were but five hundred pounds in England, an ox could hardly be worth a penny: therefore the rent muſt bear its proportion to the riches. This appears by Maitland's Hiſtory of London; for he ſays that, in the year 961, *land* ſold at one ſhilling per acre. The reaſon that land then bore ſo low a price, was, the low price the produce ſold at; for he ſays, that, in the year 1000, an ox ſold for 2*s.* 6*d.* a cow for 2*s.* a ſheep for 12*d.* and a ſwine for 8*d.*

In 1445, wheat was at 4*s.* 6*d.* per quarter; in 1447 at

8*s.*

8s.; in 1448 at 6s. 8d.; in 1449, at 5s. A bullock, in 1445, was 5s. a sheep 9l. 5⅝d: a hog, 1s. 11½d: clothing for a year at the same period, of a common servant of husbandry 3s. 4d.; of a chief carter and shepherd, 4s.; of a bailiff of husbandry, 5s. In 1512 the mean price of wheat in Yorkshire was 6s. 2d.; the price of malt was 4s. and of oats 2s.: So that the nominal price of grain at this time was about a seventh of its nominal price for the last twenty years. The price of a fat ox at the same time and in the same county was 13s. 4d.; of a lean ox, 8s.; of a weather 1s. 8d.; of a calf, 1s. 8d. of a hog, 2s: so that the nominal price of meat was no more than about a fifteenth of its present price, and bore the same proportion to the price of corn that it would now bear, were it at half its present price. In an act of parliament of the 25th of Henry VIII. beef, veal, pork, and mutton, are mentioned as the food of the poor, and their price limited to about a halfpenny a pound. Beef and pork in particular were sold in London at 2½ lb. and 3lb. for a penny; at the same time that wheat was at 7s. and 8s. a quarter, and bore the same proportion to the price of flesh as it would bear now, were it about 4l. a quarter. In 1549, wheat was in London 12s. per quarter; malt 10s.; barley 9s.; rye 6s. 8d.; oats 4s.; a middling ox 1l. 18s. a weather 3s. butter 2 and a penny a pound; and cheese a halfpenny a pound. See the citations in the Supplement to Price's Obs. on Reversionary Payments, &c. p. 385, &c. This could be only owing to the little foreign trade the nation had at these respective periods, and, consequently, to the little quantity of gold and silver which trade had then brought in.

But if it should be asked, what is the reason that, at present, all things are naturally so much advanced in price, to what they were in those days? the answer is, that the quantities of gold and silver brought to Europe since the progress made by the Spaniards and Portugueze in America, have made those metals more common, and of less value than formerly, so that 20s. will hardly purchase what 1s. would before the discovery of the West Indies. To which may be added the great increase of our national debt and taxes, together with the circulation of the interest of the principal money of the public funds, and likewise that great circulation of paper credit in trade, occasioned by notes and bills, which, by promoting an artificial circulation of property, raise the price of commodities, and give the appearance of wealth to the nation; though they are really the characteristics of a declining state. Poll. Dict. Com.

The dearness of commodities and the cheapness of money are the same things.

LANDGRAVE, formed of the German *land*, *earth*, and *graff*, or *grave*, *judge*, or *count*, a name formerly given to those who executed justice in behalf of the emperors, with regard to the internal policy of the country. The title does not seem to have been used before the eleventh century. These judges were first appointed within a certain district of Germany: in process of time the title became hereditary, and these judges assumed the sovereignty of the several districts or countries over which they presided. *Landgrave* is now applied by way of eminence to those sovereign princes of the empire who possess by inheritance certain estates called *landgravates*, and of which they receive the investiture of the emperor. There are four princes who have this title, viz. those of Thuringia, Hessia, Alsace, and Leuchtenberg. There are also other *landgraves* who are not princes, but counts of the empire. See COUNT.

LANDSKIP, or LANDSCHAPE, the view, or prospect, of a country, extended as far as the eye will reach.

LANDSKIP, in *Painting*, are pieces representing some champaign, or rural subject, as hills, vales, rivers, and country-houses, where human figures are only introduced as accidents, or circumstances.

Landskip painting is esteemed one of the lowest branches of PAINTING.

LANE, in the *Military Art*, is used when men are drawn up in two ranks facing one another. This is called *making a lane*, and is generally done in the streets through which a great person is to pass, as a mark of honour. But soldiers are often drawn up in this manner, when an offender is to run the gantlope. See *Military* EXECUTION.

LANGREL-SHOT, is a sort of shot sometimes used at sea, made of two bars of iron, with a joint, or shackle, in the middle; by which means it can be shortened, and so put the better into the gun; and at each end there is a half bullet, either of lead or iron.

This shot, when discharged, flies out expanded, and so does more execution among the enemies rigging, &c. It is never used in royal ships, but very often by privateers and merchantmen.

LANGUAGE, a set of words which any people have agreed upon, whereby to communicate their thoughts to each other.

The first principles of all *languages*, F. Buffier observes, may be reduced to expressions, signifying, first, the subject spoken of: secondly, the thing affirmed of it: thirdly, the circumstances of the one and the other. But as each *language* has its particular ways of denoting each of these, a *language* is only to be looked on as an assemblage of expressions, which chance or caprice has established among a certain people; just as we look on the mode of dressing, &c. Usage and custom are the rule of a *language*; and these hold their empire independent of reason, or any other cause: nor has reason any thing to do in *language*, unless to study or teach it such as it is. Here then commences grammar; a just plan of which supposes a *language* already introduced by use; and, without pretending to alter or amend a tittle, only furnishes reflections, called *rules*, to which the manners of speaking used in that *language* may be reduced; which assemblage of reflections is what we call the *grammar of that language*. This remark may obviate an abuse introduced among grammarians, who are ever crying out, "Usage is, in this point, opposite to grammar; or the "*language* here frees itself from the rules of grammar, "&c."

It is chance then to which we owe usage, and usage that makes the rules and measures of *language*. Usage, indeed, is somewhat dubious, and may be divided into *good* and *bad*. If it be asked, wherein the difference between these lies? it is in this; that the one is better established, or authorized, than the other: and if it be asked, wherein that difference of authority consists? it is answered, that in dead *languages*, that which makes the good usage is the writings of the best authors in that *language*: and if it be farther questioned, which are the best? those are allowed such, who wrote when the state was in its greatest glory. Thus the age of Augustus, being the most distinguished by great men, who then flourished, we call that *good Latin* which is conformable to the manners of speaking used by authors who wrote within fifty years before, and fifty after, the reign of that emperor. As to living *languages*, the good usage, or mode, is that which obtains among the most eminent persons, whether as to quality and authority, or as to learning, and the reputation of writing well.

With this view it is, that M. Vaugelas defines usage of a *language*, the manner of speaking used by the soundest or best part of the court, conformably to the manner of writing among the best part of the authors of the time. But this definition, how judicious soever, may occasion infinite doubt, for which is to be deemed the best part of the court, and of the writers? each party, doubtless, thinks itself the best. F. Buffier, therefore, very justly, instead of the best part, substitutes the greatest part, which brings the matter nearer to a certainty: the most numerous part being something fixed and palpable; whereas the most sound part may be insensible, or arbitrary. There is found a constant resemblance between the genius or natural complexion of each people, and the *language* they speak. Thus the Greeks, a polite, but voluptuous nation, had a *language* perfectly suitable, full of delicacy and sweetness. The Romans, who seemed only born to command, had a *language* noble, nervous, and august; and their descendants, the Italians, are sunk into softness and effeminacy, which is as visible in their *language* as in their manners. The *language* of the Spaniards is full of that gravity, and haughtiness of air, which make the distinguishing character of that people. The French, who have great vivacity, have a *language* that runs extremely brisk and lively. And the English, who are naturally blunt, thoughtful, and of few words, have a *language* more concise and sententious, though far from being deficient in respect of copiousness. As *to the origin of speech* or *language*, learned writers have adopted different opinions. Diodorus Siculus, lib. i. and Vitruvius, Archit. lib. ii. cap. 2. imagined, that men at first lived like beasts in woods and caves, forming only strange and uncouth noises, until their wants caused them to associate together; and that upon becoming associated with one another, they came to correspond about things, first by signs, then to make names for them, and in time to frame and perfect a *language*; and that the *languages* of the world are different, because different companies of men associating together in various places would form different sounds or names for things, and thereby cause a different speech or *language*. But as this conjecture contradicts the Mosaic history, other writers have supposed that the primitive *language* was formed by God himself, and supernaturally communicated to Adam. Most of the Jews adopt this opinion; and some of them apprehend that this was done by acquainting him in general

neral with the roots and fundamental parts of the tongue only; but others imagine, that the Creator revealed to him the whole extent and propriety of the *language*, even the letters, points, and accents. Onkelos paraphrases the words, which we render, *man was made a living soul*, man was made a speaking animal. Some have carried this opinion so far as not only to think that Adam had a particular *language* as innate to him as a power of thinking or of reasoning, but that all his descendents have it too, and that they would of themselves speak this *language*. Plato, in Cratyl. p. 383. p. 425 ed. Serrani, seems to maintain, that the first *language* was of divine formation; for he supposes that the names of things had originally some natural connection or congruity with the things themselves, and that the first names must have been justly imposed, because they were imposed by the gods. But there is another opinion, which seems more reasonable in itself, and more consonant to the Mosaic history; viz. that speech was the immediate gift of God to the first man; not that God really inspired him with any distinct or primitive *language*, but that he made him sensible of the power with which he was endued, of forming articulate sounds, and the use he might make of them as signs of his ideas, and leaving the arbitrary imposition of them to Adam himself. This seems to be intimated Gen. ii. 19. So that speech was attained by gradual invention of arbitrary sounds, to denote first the most obvious things, and afterwards the less obvious, as they occurred. However, though it does not seem impossible, that mankind might of themselves, in process of time, form a perfect *language*; yet it is not easily conceivable that Adam could attain the use of speech so soon as is represented to us by Moses, without divine assistance. Shackford's Connect. vol. i. book ii. p. 111. See LETTERS.

There is an affinity between dialects of the same mother-tongue, but none between mother-tongues themselves, as being supposed of entirely different origin.

Grammarians and etymologists find many affinities between *languages*, and imagine many more. Hebrew being the reputed source of all others, there are few *languages* but what have been observed to bear a near affinity to it, not only the Greek, the Latin, the Runic, Saxon, Swedish, German, and Welch, but even the Chinese and the Lapponic. Vid. Thomass. Mech. Etud. Gram. lib. i. chap. 7. Pref. p. 107. It. lib. iii. chap. 9. seq. Rowl. Mon. Antiq. p. 275.

Besides the conformity between words of different *languages*, grammarians consider the affinity between words of the same *language* formed from each other, e. gr. adjectives from substantives, participles from verbs, &c. Hence the class of paronyms, or conjugates.

LANGUAGES, *the diversity of*, is generally allowed to have taken its rise from the confusion at the building of the tower of Babel. See CONFUSION *of tongues*, and DISPERSION *of mankind*.

As to *the point of antiquity and priority* among *languages*, that has been extremely controverted. Herodotus tells us, that in the dispute between the Egyptians and Phrygians about the antiquity of their *languages*, Psammetichus, king of Egypt, ordered two children to be brought up, with express prohibition not to have one word pronounced before them, but to leave nature to speak of herself; and the first word they spoke happened to be *becos*, which, in the Phrygian *language*, signifies *bread*. The Egyptians, however, were not convinced with this proof. The Arabs dispute the point of antiquity with the Hebrews; but the Jews, jealous, even to excess, of the honour of their nation, positively insist on it, that the Hebrew tongue, such as it is found in the Holy Scriptures, is the primitive *language*, and that spoken by the first man.

Several Christian writers, as Chrysostom, Austin, Origen, and Jerom, among the ancients; and among the moderns, Bochart, Heidegger, Selden, and Buxtorf, agree with the Jews in maintaining the antiquity of the Hebrew *language*. Some have urged the great simplicity of this *language*, when traced to what was probably its original form; alleging, that it comprizes few names and radical words, and that its words, stripped of their appendages, are monosyllables. Thus, says Dr. Sharpe, it is very remarkable, if not peculiar to the Hebrew, that scarce any theme or root exceeds three letters; which, producing eleven thousand one hundred and fifty-four primitives, are the most natural and proper number of letters. Hence it seems to follow, that the Hebrew, and such other *languages* as abound with primitive words, not exceeding three letters in each, approach nearest to, or have the most of original *language*. Origin of Languages, &c. p. 14.

But the chief argument is taken from the names of persons mentioned before the confusion of Babel, which, it is said, are plainly of Hebrew derivation, and bear a just relation to the words from which they are derived: as אדם, *Adam*, from אדמה, *adamah, the ground*, because God formed him out of the earth; חוה, *Eve* or *Havah*, from חיה, *vivit*, because she was the mother of all living; קין, *Cain*, from קנה, *acquisivit*, because his mother obtained him from the Lord, &c. But the etymology of these names is lost, if they are taken in any other language besides the original one in which they were given. Nevertheless Grotius, in Gen. xi. 1. & Not. ad lib. i. De Verit. Rel. Christ. and others, have replied, that we have no certainty that the names used by Moses were the original names, and not translated by him from the primitive tongue into the Hebrew, or at least altered, in order to accommodate what he wrote to the understandings of the Jews. Thus we find, in fact, that he altered his own name, which was *Mouse*, of Egyptian original, and composed of two Coptic or old Egyptian words, *mose, water*, and *se, to preserve*, into משה, from משה, *to draw out*.

Besides, if the names given by Moses were the true original names, some of them might accidentally admit of a Hebrew derivation; several of them are more pertinently derived from some other of the oriental tongues than from the Hebrew, as Abel from the Syriac יהב איל, *ihab oi*, q. d. *Deus dedit*, and Babel from the Syriac *balbel, to confound*. Moreover, etymological allusions may be accidental; and some of those mentioned by Moses may be deduced from other tongues as well as the Hebrew. Thus, the Latin name for man, *homo*, is derived from *humus*, the ground. Le Clerc further advances, that several of these names were not the proper names, by which the persons were called from their birth, but cognomina or surnames, which were given to them afterwards, on account of something remarkable in their lives.

Of all the oriental *languages*, except the Hebrew, the Syriac has had the greatest number of advocates, especially among the eastern authors. They have alleged, that a dialect of this *language* was spoken in Mesopotamia, Chaldæa, and Assyria, where mankind first settled after the flood, and where, it is presumed, the *language* of Noah and his sons remained: to which argument they add, that the names of persons and places mentioned by Moses, are easily derived from that *language*. Besides those kindred *languages*, which are commonly called the oriental tongues, the Armenian, the Celtic, and the COPHTIC, pleading the antiquity of their nations, and the Armenians, that the ark first rested in their country, the GREEK, on account of its great extent and copiousness, the TEUTONIC, from which some have pretended to derive even the Hebrew itself, and the CHINESE, have aspired to preference, in point of antiquity.

The pretensions of the Chinese in particular have been supported not only from the great antiquity of that nation, their early acquaintance with arts and sciences, and their having preserved themselves so many ages from any considerable mixture or intercourse with other nations; but also from the singularity of the tongue itself, which consists of few words, all monosyllables, and is most simple in its construction, having no variety of declensions, conjugations, or grammatical rules. Besides, it is urged, that the Chinese are the posterity of Noah, and that Fohi, the first king of China, was Noah.

Mr. Webb, an ingenious writer in the reign of Charles II. strenuously maintains, that this is the only original *language*, and that they now talk in China the *language* of Paradise.

Others maintain, that the *language* spoken by Adam is lost; and that the Hebrew, Chaldee, and Arabic, are only dialects of the original tongue. So far are they from giving the priority to the Hebrew, that they maintain Abraham spoke Chaldee before he passed the Euphrates; and that he first learned the Hebrew in the land of Canaan; so that this was not a special *language* consecrated to the people of God, but was originally the *language* of the Canaanites.

M. Le Clerc is of opinion, the Hebrew is far inferior to the Greek both in copiousness, elegance, and perspicuity; it is dry, and destitute of ornaments, insomuch that, wanting expressions to vary the phrase, the same periods are perpetually returning. The rabbins, converting its poverty into an excellence, say, it is so pure and chaste, that it has no proper names for the parts of generation, nor for those by which the excrements are discharged. See HEBREW.

The Arabic is held the most copious of all *languages*. See the Preliminary Discourse to Sale's Koran.

LANGUAGES are in general divided into *original* or *mother-tongues*; as the HEBREW and ARABIC, in the East; the TEUTONIC and SCLAVONIC, in the West.

LANGUAGES, *secondary*, or *derivative*, which are those formed

formed out of a mixture of ſeveral others, as Latin, French, &c.

Kircher will have the COPHTIC a mother tongue, independent of all others.

Du Jon maintains the GOTHIC a primitive *language*, and the mother of all the Teutonic tongues; that is, of all thoſe ſpoken in the North.

Some add the Baſque, or Biſcayan, and Bas Briton, to the number of mother tongues, imagining them to have been thoſe of the ancient Celtæ, or Gauls.

LANGUAGES, *learned*, or *dead*, are thoſe which only ſubſiſt in books, and which muſt be learned by the rules of grammar; as the GREEK, HEBREW, SYRIAC, and CHALDEE.

Raimond Lully ſolicited the eſtabliſhment of the ſtudy of the learned *languages* a long time, in the thirteenth and fourteenth centuries. At length, in the year 1312, pope Clement, and the council of Vienne, appointed, that in the court of Rome, and in the univerſities of Paris, Oxford, Bologna, and Salamanca, there ſhould be inſtituted profeſſors of each, who ſhould have ſalaries from the reſpective courts. The monks, however, vigorouſly oppoſed the ſpreading of theſe ſtudies; and with ſo much ſucceſs, that Eraſmus tells us, in his time, *Græce noſſe ſuſpectum, Hebraice prope hæreticum.*

LANGUAGES, *living*, are thoſe ſtill ſpoken in ſome country or other; and which may be learned by converſation. The moſt popular among theſe are the FRENCH, ITALIAN, SPANISH, and ENGLISH.

The Spaniards ſeem to place the nobleneſs and gravity of their *language* in the number of ſyllables, and the ſwelling of words; and ſpeak leſs to be underſtood, than to be admired. Their terms are ſonorous; their expreſſions haughty; pomp and oſtentation run through all they ſay; their *language* cannot paint a thought to the life; it always magnifies it; frequently diſtorts it; and does nothing, if it do not exceed nature.

The Italian tongue does not ſwell up things to that degree, but it adorns and embelliſhes them more; yet theſe ornaments and embelliſhments are not real beauties. The Italian expreſſions, thus rich and brilliant, are like thoſe faces covered with patch and paint, which make a fine ſhew; but the finery is all deceit.

The French *language* (as ſome of their authors expreſs themſelves) is ſimple, without loweneſs; bold, without indecency; elegant and florid, without affectation; harmonious, without ſwelling; majeſtic, without pride; delicate, without ſoftneſs; and ſtrong, without roughneſs. Though, as to the points of ſtrength and majeſty, the French muſt give way to the Engliſh; which in theſe, as well as in copiouſneſs, exceeds moſt of the living *languages*; as far as it is inferior to ſome of them in ſmoothneſs and delicacy.

Of all the modern *languages*, the French is generally allowed to be the moſt clear, and fit for philoſophical and critical ſubjects; the chaſteſt and moſt reſerved in its diction; the moſt judicious and ſevere in its ornaments. Of all others, the Engliſh is ſaid to be the moſt honeſt, open, and undeſigning. With all its ſublimity, it is gay and pleaſant on occaſion; but its gaiety is ſtill moderated and reſtrained by good ſenſe; it hates exceſſive ornaments; and, for the greater ſimplicity, would almoſt chooſe, as ſome ſay of the French, to go naked; it never dreſſes more than decorum and neceſſity require.

The Engliſh *language* is derived from ſo many and ſuch different ſources, that, on this account, it is deficient in regularity and analogy. Yet we have this advantage to compenſate the defect, that what we want in elegance, we gain in copiouſneſs, in which laſt reſpect few *languages* will be found ſuperior to our own.

Ennius and Cecropa are celebrated for their knowledge of many *languages*. Mithridates, king of Pontus, it is ſaid, underſtood twenty-two tongues, which was the number of different people over whom he commanded; and thoſe *languages* he knew ſo well, that he was able to harangue each of his people in their own tongue. It was a ſaying of Charles the fifth, "That ſo many *languages* as a man underſtands, ſo many times he is man." Sultan Soliman's interpreter ſpoke perfectly well ſeventeen different *languages*. But among the moderns, none has been more remarkable in this way than Poſſelius; who, beſides a perfect knowledge of all the dead *languages*, was ſo well acquainted with the living, that it is ſaid he could have made the tour of the globe, without the uſe of an interpreter.

Bibliander has written of the analogy and proportion of *languages* and letters, De Ratione Communi Linguarum, in 1548. Geſner, of the Difference of *Languages*, in 1572. Lazius publiſhed an Introduction to the Learning of the politer *Languages*, in a common Method, in 1548. Megiſſer, a ſcheme of forty different *languages*, and different dialects, ſpecimens of each whereof he gives in the Lord's prayer, in 1593. De Recoles, in his Addition to the World of Daviti, has publiſhed the Pater-noſter in all the *languages* ſpoken among Chriſtians; and Mr. Chamberlayne has propoſed to do the ſame in a hundred *languages*, a ſpecimen of which has been already publiſhed. Albericus Gentilis wrote of the mixture of *languages*, in 1633. And father Reignier's Diſcourſe on Etymologies, is a work of the ſame kind. In 1613, Duret publiſhed a treaſure of the hiſtory of all the *languages* in the univerſe. Guichart has a treatiſe of the etymological harmony of *languages*, publiſhed in 1610. Brerewood has given us curious enquiries into the diverſities of *languages* and religions, publiſhed in 1635.

LANGUAGE, *philoſophical*. See CHARACTERS, *univerſal*.

LANGUAGE is alſo uſed, in the order of Malta, for *nation*. The knights of Malta are divided into eight *languages*; three whereof are for France; viz. the *language* of Provence, of Auvergne, and of France; two for Spain, thoſe of Caſtile and Arragon; the other three are the *languages* of Italy, England, and Germany.

Each of theſe *languages* has its chief, who preſides in aſſemblies of the *language* to which he belongs. See MALTA.

LANGUAGE, *Frank*. See FRANK.

LANGUAGE, *Helleniſtic*. See HELLENISTIC.

LANGUED, *langue*, in *Heraldry*, is applied to ſuch animals whoſe tongues appear out of their mouths; being of a colour different from that of the body of the animal.

LANGUENTE, in the *Italian Muſic*, is uſed to denote a languiſhing and ſoft manner of ſinging.

LANGUOR, in *Medicine*, ſignifies a *faintneſs*, or relaxation of the members, ariſing either from a want or decay of ſpirits, through indigeſtion, or too much exerciſe; or from an additional weight of fluids, cauſed by a diminution of the excretion by the common diſcharges.

LANIARDS. See LANIERS.

LANIGEROUS, any thing that bears WOOL. Hence,

LANIGEROUS, or LANUGINOUS *trees*, among *Herbaliſts*, are thoſe trees that bear a woolly downy ſubſtance; as, the black, white, and trembling poplars, oſiers, and willows of all ſorts.

LANIS *de vexſantia Wallie tradueendis abſque cuſtuma*, &c. an ancient writ that lies to the cuſtomer of a port, to permit one to paſs wool without paying cuſtom, he having paid it before in Wales.

LANISTA, in *Antiquity*, is ſometimes uſed to ſignify an *executioner*, but more frequently for a maſter-gladiator, who taught the uſe of arms, and had always people under them, ready to exhibit ſhews of that kind. For which purpoſe they either purchaſed gladiators, or educated children, that had been expoſed, in that art.

LANISTA was alſo uſed to denote one who taught game-cocks to fight.

LANIUS. See BUTCHER *Bird* and FLUSHER.

LANNARIUS, in *Ornithology*, the name of a bird of the long-winged hawk kind; the *falco lanarius* of Linnæus, called in Engliſh the *lanner*, and the male the *lannaret*. Its beak and legs are blue, and its head and neck variegated with large ſtreaks of black and white; its back, wings, and tail, are not varhegated, unleſs with a few ſmall white ſpots; and its wings, when extended, are ſeen ſpeckled underneath with ſmall round white ſpots; its neck is very ſhort, as are alſo its legs. It is common in France, and abides the whole year there, and is very docile, and ſerves to all the purpoſes of hawking. In Italy the ſpecies ſeems ſomething different, having much of a yellowiſh brown about the ſhoulders, and being indocile and of no uſe in ſporting. Ray. See HAWK. This ſpecies breeds in Ireland, and is thus deſcribed by Mr. Pennant: it is leſs than the buzzard; the [illegible] a pale greeniſh blue; the crown of the head [illegible] and yellow clay colour; above each eye [illegible] of the head paſſes a broad white line [illegible] a black mark pointing down; the [illegible] breaſt tinged with dull yellow, and marked with [illegible] ſpots pointing downwards; the thighs [illegible] in the ſame manner; the back and covers of the [illegible] deep brown, edged with a pale; quills [illegible] the inner webs marked with oval [illegible] and the tail ſpotted like the wings. Brit. *Zool.* [illegible] p. 182.

LANNIERS, or LANIARDS, in a *Ship*, are ſmall ropes reeved into the dead-men's eyes of all the ſhrouds and chains. Their uſe is to ſtiffen, or ſet taught the ſhrouds. The ſtays alſo of all maſts are ſet taught by lanniers. That rope, which faſtens the ſlopper of the halliards to them, is called alſo a *lannier*: and the term is generally applied to any ſhort piece of cord or line, faſtened to ſeveral machines in a ſhip, and ſerving to ſecure them in a particular place, or to manage them more conveniently.

ly; such are the *laniards* of the gun-ports, the *laniard* of the buoy, of the cat-hook, &c.

LANSPESSADE, in *Military Affairs*. See ANSPESSADE.

LANSQUENET is the name of a game at cards.

LANTANA, in *Botany*, the *American viburnum*, a genus of the *didynamia angiospermia* class. Its characters are these: the empalement of the flower is cut into four segments; the flower is of an irregular shape, having a cylindrical tobe spread open at the bottom, where it is divided into five parts; in the centre is situated the germen, attended by four stamina, two being longer than the other; the germen changes to a roundish fruit, opening into two cells, inclosing a roundish seed. There are nine species.

LANTER-LOO, or LOO, is the name of a common game at cards.

LANTERN, or LANTHORN, a cover for a luminary, made of some transparent matter; serving to transmit the light, and, at the same time, to screen it from the wind and rain.

The word is derived from the French *lanterne*; and that from the Latin *laterna*, of *lateo, I am hidden*; *eo quod lucem habeat interius absconsam*, because the light is hidden within, say Isidore and Lambin. But, according to Pezron, *laterna* comes from the Celtic *latern*; and according to Salmasius, *lantern* comes from *lata*, of *fero*, because it bears a lamp, or a light.

Epictetus's *lantern* is said to have been sold for three thousand drachms; that of Diogenes was held in great veneration among the ancients; and that of Judas is still preserved in the treasury of St. Denys, as a very curious piece of antiquity.

Lanterns are made of glass, horn, paper, &c. Formerly they were made of the horn of a wild bull, called *urus*; which, when cut into thin laminæ, Pliny tells us, was very transparent. Those of horn were first introduced into England by king Alfred, about the year 887, in order to preserve his candle time-measurers from the wind. See LENS. And. Hist. Com. vol. i. p. 45.

LANTERN, *dark*, is a *lantern* with only one opening or light, which, too, may be closed up, when the light is to be entirely hid; and may be presented to the person one would see, without being perceived one's self.

The ancients had their dark *lanterns*, but they differed from our's: they were covered with four skins, one on each side, or light, three whereof were black, and only the fourth transparent. Casaubon, who gives us the description, took it from a manuscript of Julius Frontinus. These were principally used in their armies, when they were to march privately off from their enemies in the night time.

LANTERNS are used at sieges in the night-time, upon the batteries; but these must be blind or dark *lanterns*. There is always great provision of them in all store-houses.

Lanterns are also used in a ship, particularly for the purpose of directing the course of other ships in a fleet or convoy; such are the poop and top-*lanterns*, &c.

LANTERNS, *feast of*, in China, is a celebrated feast held on the fifteenth day of the first month; and is so called from the great number of *lanterns* hung out of the houses, and in the streets; insomuch that it rather appears a fit of madness, than of feasting. On this day are exposed *lanterns* of all prices, whereof some are said to cost two thousand crowns. Some of their grandees retrench somewhat every day out of their table, out of their dress, equipage, &c. to appear the more magnificent in *lanterns*. They are adorned with gilding, sculpture, painting, japanning, &c. and as to their size, it is extravagant; some are from twenty five to thirty feet diameter; they represent halls and chambers; and two or three such machines together would make handsome houses: so that in China they are able to eat, lodge, receive visits, have balls, and act plays, in a *lantern*.

To illumine them, they should have bonfires; but as that would be inconvenient, they content themselves with lighting up in them a great number of torches or lamps which at a distance have a beautiful effect. In these they exhibit various kinds of shews to divert the people.

Besides these enormous *lanterns*, there is a multitude of other smaller: these usually consist of six faces or lights, each about four feet high, and one and a half broad, framed in wood finely gilt and adorned; over these they stretch a fine transparent silk, curiously painted with flowers, trees, and sometimes human figures: the painting is very extraordinary, and the colours extremely bright; and when the torches are lighted, they appear highly beautiful and surprising.

LANTERN, in *Architecture*, denotes a kind of little DOME raised over a large one, or over the roof of a building, to give light, and to serve for an acroter to finish the building.

LANTERN is also used for a square cage of timber, with glass in it, placed over the ridge of a corridor, or a gallery between two rows of steps to illuminate them.

LANTERN, *magic*, in *Optics*, the name of a machine, which, in the dark, represents various images and spectres on a wall, or other white surface, so odd and surprising, that those who are not in the secret, think them the effect of MAGIC.

LANTERN-*fish*, the English name of a fish of the soal-kind, but smaller, and smoother to the touch, called in Latin *ammoglossus*.

LANTERN-*fly*, in *Natural History*, the name of a very singular kind of insect produced in the West Indies, and carrying a strong light with it in the night. The structure of the trunk in this insect is of the same kind with that of the cicada; and as it wants the power of making the noise for which the cicada is so famous, it belongs, according to Mr. Reaumur's distinctions, to that species of insect called the *procigale*, or *pseudocada*.

The glow-worm, and the luminous beetles, with all the other luminous insects we are acquainted with in this part of the world, diffuse their light from a part which is near the extremity of the body, and under the belly, but the *lantern-fly* gives it from its head. It differs also greatly in the degree of light; for this, in all the insects we are acquainted with, is very feeble; whereas, in this fly it is so strong, that Mrs. Merian, who is the first that well described it, says she could read a small print in a dark night by the light that one of them gave. The head of this creature, strictly speaking, is very short, not exceeding the length of one of the rings of the body, if it be measured from its joining with the corcelet to its joining with the *lantern*; but if that part be accounted a portion of the head, then the head is equal in length to the whole body. This *lantern* is wider than it is deep, or thick, and has near its origin a large protuberance, which gives it a bunched or humped look. There are several tubercles and lines on it of a reddish colour. The ground colour is an olive-brown, and underneath it has one large rib running all the way along it, from end to end, and dividing it into two, and by the sides of that there are some others. These are all reddish, and those nearest the edges have small rows of spines running along them. Over each of the eyes there is a round granulated prominence, which seems to have been a collection of smaller eyes; and if so, the animal is supplied with the organs of vision in a different manner from all other known creatures. But there requires an examination of the creature on the spot, and while alive, in order to find out this. The upper pair of wings are not perfectly transparent, they are dotted with white in some places, and are variegated near their origin with several blackish spots. The under pair are more transparent than the upper; they are much shorter, and are broader than the others: these have each a large and beautiful round spot near the extremity, resembling that on the wing of the peacock-butterfly. The colours of the circles of these eyes are brown and olive; the last colour very bright and clear, the other very dusky and obscure. The spots are so large, that they appear very beautiful. Reaumur, Hist. Inf. vol. ix. p. 247.

LANTERNISTS, a name assumed by the academicians of Thoulouse.

LANUGINOUS. See LANIGEROUS.

LANUGO, in *Botany*, *down*; that soft, hairy, or woolly covering, which grows on the leaves, stalks, or fruit, of divers plants.

Such is that found on the leaves of the rose-campion, and on the fruit of the peach-tree.

LANYARDS on *ship-board*. See LANIERS.

LAOCOON, in the *History of the Arts*, is a celebrated monument of Greek sculpture, executed in marble by Polydorus, Athenodorus and Agesander, the three famous artists of Rhodes. This remain of antiquity was found at Rome in the ruins of the palace of Titus, in the beginning of the sixteenth century, under the pontificate of Julius II. and since depositied in the Farnese palace. *Laocoon*, the priest of Apollo and Neptune, is here represented with his two sons, with two hideous serpents clinging round his body, gnawing it, and infecting their poison. Virgil has given us the following description of the fact:

Serpens amplexus uterque
Implicat & miseros morsu depascitur artus:
Corripuit, spirisque ligat ingentibus, & jam
Bis medium amplexi, bis collo squamea circum
Terga dati, superant capite, & cervicibus altis.

This statue exhibits the most astonishing dignity and tranquility of mind in the midst of the most excruciating torments: Pliny says of it, that is is, *opus omnibus picturæ & statuariæ artis præferendum*. Lib. xxxvi. c. 5.

LAPACTICS, from λαπαζω, *I evacuate*, a term used by the old writers in medicine to express such things as purged by stool, or at least gently loosened the belly. It was sometimes applied to the cathartic medicines, and sometimes to those foods which were of this tendency.

LAPARA, Λαπαρα, a word used by some writers to express the flanks, or that part which is situated on each side of the body, between the spurious ribs and the hips.

LAPATHUM, in *Botany*. See DOCK.

LAP-DOG, called also *melitæus* or *sfior*, and by Dr. Caius, in his System of British dogs, the spaniel gentle or comforter, is a species of the most generous kind of dogs. See DOG.

Mr. Pennant observes, that the Maltese little dogs were as much esteemed by the fine ladies of past times as those of Bologna are among the moderns. Old Hollingshed is ridiculously severe on the fair of his days for their excessive passion for these little animals; which is sufficient to prove it was in his time, viz. in the reign of queen Elizabeth, a novelty.

LAPHIATI, in *Zoology*, the name by which the people of Lemnos call a species of serpent, supposed by Belonius to be the same with the ELAPS, or *elaphis* of the ancients.

LAPIDARY, *Lapidarius*, an artificer, who cuts precious stones.

The art of cutting precious stones is very ancient; but, like other arts, its original was very imperfect. The French have succeeded in it the best; and the *Lapidaries* of Paris, who have been a corporation since the year 1290, have carried it, especially the cutting of diamonds called *brilliants*, to a very great perfection, but not superior to that of the English.

There are various machines used in the cutting of precious stones, according to the quality of the matter to be cut: the diamond, which is extremely hard, is cut and formed on a wheel of soft steel, turned by a kind of mill, with diamond dust tempered in oil of olives; and this serves to polish them as well as to cut them.

Oriental rubies, sapphires, and topazes, are cut and formed on a copper wheel, with oil of olives, and diamond dust: they are afterwards polished on another copper wheel with tripoli and water.

Emeralds, hyacinths, amethysts, garnets, agats, and other stones less hard, are cut on a leaden wheel, with smalt and water, and polished on a tin wheel with tripoli.

Turquois, of the old and new rock, lapis girasol, and opal, are cut and polished on a wooden wheel with tripoli.

LAPIDARY is also used for a virtuoso skilled in the nature, kinds, &c. of precious stones; or a merchant who deals in them.

LAPIDARY *style*, denotes the style proper for monumental or other inscriptions.

This is a kind of medium between prose and verse; the jejune and the brilliant are here equally to be avoided. Cicero has prescribed the rules of it: *Accedat oportet oratio purior, verborum, plena spiritus. Omnium sententiarum gravitate, omnium verborum ponderibus, est utendum.*

The *lapidary style*, which was lost with the ancient monuments, has been retrieved, at the beginning of this age, by count Emanuel Tesoro: it is now used various ways at the beginning of books; and even epistles dedicatory are composed in it, of which we have no example among the ancients.

LAPIDESCENT, any thing which has the faculty of petrifying, or turning bodies to a stony nature.

Naturalists speak of a *lapidescent* principle, a *lapidescent* spirit, a *lapidescent* juice, &c.

LAPIDESCENT *waters*, or *springs*, are such as, having stony particles dissolved and swimming in them, do deposit the same on wood, leaves, and other bodies immerged therein; which, being incrusted herewith, are commonly mistaken for petrifactions.

LAPIDIFICATION, in *Chemistry*, an operation whereby any substance is converted into a sort of stone.

This is done by dissolving a metal, for instance, in a corrosive spirit, or menstruum; and afterwards reducing that dissolution into the consistence of a stone.

Lapidification is practised in metals, fixed salts, and salts of plants.

The term is also used for the making of artificial stones.

LAPIS, in the general sense. See STONE.

LAPIS *Arabicus*, in the *Natural History of the Ancients*, the name of a stone of a fine white colour, resembling the purest ivory; and which, though naturally of a firm, solid, and compact texture, yet, when burnt, became light, porous, and spongy, and assumed the figure and appearance of a pumice; and was used like it in the compositions of the ancient physicians for cleaning the teeth.

LAPIS *arsefsi*, in *Natural History*, a name given to several sorts of stones, and other fossils, which had lain in the neighbourhood of copper-mines, and been impregnated with particles of copper, though not in a sufficient degree, to be thought worthy the name of *copper-ores*. See PYRITES.

The same sort of stones were also sometimes called *chalcites*, which made some confusion, as it gave occasion to confound them with the true chalcitis.

LAPIS *asbestos*. See ASBESTOS.

LAPIS *aëtites*. See ÆTITES.

LAPIS *Armenus*. See ARMENIAN *Stone*.

LAPIS *Assius*, in the *Natural History of the Ancients*, the name of a stone, called also sarcophagus, from its power of consuming flesh.

It was a stone much used among the Greeks in their sepultures, and is recorded to have always perfectly consumed the flesh of human bodies, buried in it, in forty days. This property it was much famed for, and all the ancient naturalists mention it. There was another very singular quality also in it, but whether in all, or only in some peculiar pieces of it, is not known; that is, its turning into stone any thing that was put into vessels made of it. This is recorded only by Mutianus and Theophrastus, except that Pliny has copied it from these authors; and some of the later writers on these subjects from him.

This effect might probably be a kind of incrustation, formed on substances inclosed in vessels made of this stone, by water passing through its pores, dislodging from the common mass of the stone and carrying with it particles of such spar as it contained; and afterwards falling in repeated drops on whatever lay in its way, it might again deposit them on such substances, in form of incrustations.

The place from whence the ancients tell us they had this stone was Assos, a city in Lycia, in the neighbourhood of which it was dug: and De Boot informs us, that in that country, and in some parts of the East, there are also stones of this kind, which if tied to the bodies of living persons, would in the same manner consume their flesh. Hill's Notes on Theophrastus, p. 14.

LAPIS *atramentarius*, the *copper-stone*. See PYRITES.

LAPIS *bezoardicus*. See BEZOAR.

LAPIS *Bononiensis*, the *Bolonian stone*, a peculiar species of stone found in Bologna. See BOLONIAN *stone*.

The whole art of preparing this stone, so as to make it shine in the dark, is described at large in Hook's Philosophical Collections, by sir Marc Antonio Cellio, and in a book of the same author, published at Rome in 1680, expressly on that subject.

The *stone* is found most easily after rain; when the earth being washed away, the several masses of it appear as bright as burnished silver, or with the glittering of talc, resembling the gloss of a looking-glass. It Fosforo de Marc Anton Cellio.

The *stone* is of no certain figure, but is sometimes round, sometimes oblong and cylindric, sometimes lenticular; the last kind usually proves the best of all, as being more shining and transparent. They are usually as big as an orange, and sometimes are found of five pounds weight, and are very light, considering their bulk. They are of various colours; some are ash-coloured, some of a sky-blue, some of a ferruginous colour, others yellow, others greyish white, and some almost perfectly white. The best for use are the sky-coloured and the white. When this *stone* is prepared, it affords an efflorescence, in which lies its principal virtue of receiving light; which it does either from the sun, the moon, the common day-light, or a flame, but in different degrees. When carried into the dark, it appears exactly like a burning coal, and the light it gives is sufficient to read by, if the letters be placed near the *stone*. It does not retain its light long, but requires often renewing; and when well prepared, its virtues will last five or six years, but seldom longer.

The way of seeing it to the greatest advantage, is after the eye has been kept for some time in a dark room, and the stone is brought in there immediately from being held in the sun.

The best method of preparing it is this: make a cylindric furnace of iron or copper-plates, seven inches in diameter, and as many in height. Line the inside of it with a strong lute; so that the inside may be six inches wide in the clear hollow; at the top of this there are to be made four notches of 2½ inches deep, and 1½ inch wide; to this make such a cylindrical part of the same diameter, but a little higher, and make at the bottom two ash-holes, or air-holes, big enough to put in one's hand. Line this, as the other, with good lute, and give it a bottom of lute, that it may the more strongly reflect the heat; and make a cover for the top, lining it in the same manner with the lute: into this furnace put an iron-wire grate near the bottom, to sustain the coals, and freely

admit the air. On this grate lay ſome pieces of lighted charcoal, and on theſe put others not lighted, all broken to the ſize of a walnut, or thereabouts. Some of the ſtones muſt be powdered, and thoſe which are to be calcined muſt be dipped in ſtrong aqua vitæ, and while wet rolled in this powder, or the powder itſelf may be made up into thin cakes with mucilage of gum tragacanth. Theſe ſtones, thus covered, or the cakes, muſt be laid upon the bed of charcoal cloſe to one another, and another bed of charcoal, in the like ſmall pieces, muſt be laid over them up to the top of the furnace: the cover of the furnace is then to be put on, and the fire lighted. When the charcoal is all burnt away, and the whole is cold, take out the ſtones, and taking out the cruſt from them, wrap them up in ſilk or cotton, and keep them in a cloſe box for uſe.

The cruſt which is taken off from the ſtones is to be preſerved; it ſhines as well as the ſtone, and is to be beat to powder, and rubbed over any thing that is to be made to ſhine; the thing being firſt daubed over with the white of an egg: This will make it ſtick on, and the whole will ſhine like the ſtone.

The furnace here deſcribed is not abſolutely neceſſary to the ſucceſs of the operation; but it is convenient to know the quantity of charcoal neceſſary to give the ſhining quality to the ſtone, ſince an exceſs of heat deſtroys it, and too ſmall a degree is not ſufficient to raiſe it. See LIGHT and PHOSPHORUS.

LAPIS *calaminaris*. See CALAMINARIS *lapis*.

LAPIS *calcarius*. See LIME.

LAPIS *cancer cancri*, in *Natural Hiſtory*, a name given by Geſner, and ſome other writers, to the foſſile ſhells, ſince called *tubuli marini concamerati*, and by ſome *polythalamia* and *scitha-ceratiæ*. See TUBULI *concamerati*.

LAPIS *ceratites*. See UNICORNU *foſſile*.

LAPIS *chius*. See CHIA-*ſtone*.

LAPIS *corneus*, *horn-ſtone*, a name given by many of the German authors to flint, which ſome of them have alſo very improperly called *pyrites*, or the fire-ſtone, becauſe it is uſed to ſtrike fire with.

Buttner, in his Coralliographia Subterranea, has a remarkable ſyſtem in regard to flint. He is of opinion, that all flints are foſſile corals. But it is to be obſerved, that the reſemblance of flints and corals are but very ſlight and ſuperficial, and we have no proof from their internal ſtructure of their being at all alike.

LAPIS *dentalis*. See DENTALIS.

LAPIS *divinus*, a ſpecies of jaſper, ſo called from its imaginary virtues, as a diuretic and expeller of poiſon. It is found on the ſhores of the Ganges, and other parts of the Eaſt-Indies.

The Turks are extremely fond of it in their curious works, particularly for the handles of their ſabres. This is alſo called JADE and NEPHRITIC *ſtone*.

LAPIS *hæmatitis*. See HÆMATITIS.

LAPIS *hyænius*. See HYÆNIUS *lapis*.

LAPIS *Hybernicus*. See *Iriſh* SLATE.

LAPIS *infernalis*, a cauſtic ſtone prepared various ways: ſometimes of ſtrong ſoap-lees evaporated to a dryneſs, and the remainder kept in a glaſs well ſtopped from the air. Sometimes it is made of calcined vitriol, tartar, and ſal ammoniac, and boiled in quick-lime water to a ſtrong lixivium; then ſtrained, and evaporated till dry.

The lunar cauſtic, or *lapis infernalis*, is made by putting cryſtals of ſilver into a Heſſian crucible, and placing the crucible in a furnace, which ought to draw little air, and ſurrounded by a very ſmall quantity of lighted coals. The heat at firſt ſhould be moderate; and while the ebullition gradually diminiſhes, the fire is to be increaſed; and when the matter is brought to a perfect and tranquil fuſion, it is to be caſt in an iron mould, previouſly heated, and greaſed in its inner ſurface, where it is to be left till it is fixed and cold, and then put into a bottle with a glaſs ſtopper.

The lunar cauſtic ought to be formed into ſmall cylindrical pieces, like pencils, of about a line in diameter, and the ſurgeon who uſes them puts them in a crayon or pencil caſe, to prevent his fingers being injured by touching them. The mould, for this purpoſe, conſiſts of five or ſix hollow cylinders, placed vertically and parallel to each other, to which a gutter is adapted, by means of which the matter is poured into them. This mould is compoſed of two pieces, which exactly fit each other, in each of which the ſame number of hollow ſemi-cylinders correſpond to thoſe of the other; and, therefore, when the lunar cauſtic is caſt and cooled, it is obtained in entire cylinders, by ſeparating the two pieces of the mould. See CAUSTIC, *lunar*, and CRYSTALS *of ſilver*.

LAPIS *Iſlebianus*. See ISLEBIANUS *lapis*.

LAPIS *Judaicus*. See JUDAICUS.

LAPIS *lazuli*. See LAZULI.

LAPIS *lucis*, the *ſtone of light*, in the *Materia Medica of the Arabs*, a name given to the braſſy marcaſite or pyrites. The Arabians have adopted this. Avicenna ſuppoſes this ſubſtance to be called ſo, becauſe it was uſed, after calcination, for diſeaſes of the eyes. It is very probable, that where vitriolic medicines take place, the caput mortuum of this foſſil, which is only a colcothar of vitriol, may be of uſe. But its virtues in this reſpect can never be ſuppoſed ſo eminent, as to have intitled it to the pompous name it bears. It ſeems more probable, that it was called the *ſtone of light*, either from its glittering appearance where freſh broken, or from its giving large ſparks of fire, when ſtruck againſt a ſteel. It was from this quality that it obtained the name of *pyrites*, or fire-ſtone, it giving fire on the colliſion with ſteel much better than flint does.

LAPIS *luminis*, is uſed by ſome authors in the ſame ſenſe as *lapis lucis*, that is, for the pyrites.

LAPIS *Lydius*. See LYDIUS *lapis*.

LAPIS *marmoreus*, a marble ſtone about twelve foot long and three foot broad, placed at the upper end of Weſtminſter-hall: where was likewiſe a marble chair erected on the middle thereof, in which our kings anciently ſat at their coronation dinner, and at other times the lord chancellor. Over this marble table are now erected the courts of Chancery, and King's-bench. Orig. Juridical. 37.

LAPIS *melitites*. See MELITITES.

LAPIS *molybdinus*, or *French chalk*. See MOLOCHITIS.

LAPIS *medicamentoſus*, or the medicinal ſtone, is a compoſition of roch alum, litharge, colcothar of vitriol, Armenian bole, and vinegar, boiled to the conſiſtence of a hard ſtone. It is uſed to faſten the teeth, preſerve the gums, heal and dry up ulcers and wounds; and is uſed in injections, and in compoſitions for ſore eyes.

LAPIS *muſicalis*, the *muſic-ſtone*, in *Natural Hiſtory*, a name given by Mr Sivers to a ſtone found in Pruſſia, carrying naturally on it all the muſical characters found on the ſcale, commonly called the *muſic-ſhell*. He deſcribes the ſtone, which ſeems to have been a ſingle ſpecimen, and as this author is the only one who ever met with it, it is much to be ſuſpected that either fraud or fancy has had a great ſhare in the matter.

LAPIS *nephriticus*. See NEPHRITIC *ſtone*.

LAPIDES *picti*, in *Natural Hiſtory*, a term uſed by Langius, to expreſs ſuch ſtones as are found with the delineations of fiſhes, trees, and ſhells, as well as leaves of ferns and other plants, very perfectly repreſenting the things themſelves, but ſcarce at all ſtanding out above the ſurface of the ſtone, and having in themſelves ſcarce any thickneſs. It is very evident, that the bodies repreſented are not here, in reality, but the whole configuration is owing to the natural veins of the ſtone, and the coaleſcence of the ſeveral ſmaller maſſes of which each large ſtone is compoſed, and to the vapours from within the earth, getting into the natural fine cracks in the ſtones, and tinging their ſides with blackneſs.

LAPIS *ſpecularis*. See SPECULARIS.

LAPIS *thyites*. See THYITES.

LAPLYSIA, in *Natural Hiſtory*, a genus of the *molluſca* order of worms: the body is covered with reflex membranes; there is a ſhield-like membrane on the back, a lateral pore on the right ſide, for the genitals; the vent is on the extremity of the back, and it has four feelers, reſembling ears. There is only one ſpecies, which ſome have called the ſea-hare.

LAPPA, in *Botany*. See BURDOCK.

LAPPAGO, in *Botany*, a name given by the old Roman authors to the plant we call aparine, or cleavers, or ſome herb nearly allied to it.

LAPPULA, in *Botany*, a name given by ſome to the great cauſalis, or rough-fruited ſtone-parſley, or *baſtard* PARSLEY.

LAPSANA, in *Botany*. See NIPPLE-*wort*.

LAPSARII. See INFRALAPSARII, SUBLAPSARII, and SUPRALAPSARII.

LAPSE, a ſlip or omiſſion of a patron to preſent a clerk to a benefice within ſix months of its being void: in which caſe, the benefice is ſaid to be in *lapſe*, or *lapſed*, and the right of preſentation devolved to the ordinary.

And if the ordinary neglect to preſent during the ſame time, the right of preſentation accrues to the metropolitan, and to the king by neglect of the metropolitan. This right of *lapſe* was firſt eſtabliſhed in the reign of Henry II. when the biſhops firſt began to exerciſe univerſally the right of inſtitution to churches: and therefore, when there is no right of inſtitution, there is no right of *lapſe*; ſo that no donative can *lapſe* to the ordinary, unleſs it hath been augmented by the king's bounty; but no right of *lapſe* can accrue, when the original preſentation is in the crown. In caſe the benefice becomes void by death, or ceſſion through plurality of benefices, there the patron is bound to take notice of the vacancy at his own peril; but in caſe of a vacancy by reſignation, or canonical deprivation, or if a clerk pre-

sented be refused for insufficiency, these being matters of which the bishop alone is presumed to be cognizant, here the law requires him to give notice thereof to the patron; otherwise he can take no advantage by way of *lapse*. Neither shall any *lapse* accrue thereby to the metropolitan or the king. If the bishop refuse or neglect to examine and admit the patron's clerk, without good reason alleged or notice given, he shall have no title to present by *lapse*: and if the right of presentation be litigious or contested, and an action be brought against the bishop to try the title, no *lapse* shall occur till the question of right be decided. If the bishop be both patron and ordinary, he shall not have a double time allowed him to collate in: and if the bishop doth not collate his own clerk immediately to the living, and the patron presents, though after the six months are lapsed, yet the presentation is good, and the bishop is bound to institute the patron's clerk. If the bishop suffer the presentation to *lapse* to the metropolitan, the patron also has the same advantage if he presents before the archbishop has filled up the benefice: yet the ordinary cannot alter *lapse* to the metropolitan, collate his own clerk to the prejudice of the archbishop. But if the presentation *lapses* to the king, the patron shall never recover his right, till the king has satisfied his turn by presentation; for *nullum tempus occurrit regi*. Blackst. Com. vol. ii. p. 276, &c.

LAPSED *legacy*. See LEGACY.

LAP-SIDED, in *Sea-language*, denotes the state of a ship, which is built in such a manner as to have one side heavier than the other, and consequently to retain a constant heel, or tendency towards the heavier side, unless when she is brought upright by placing a greater quantity of the cargo or ballast on the other side.

LAPWING, *capella*, in *Ornithology*, the black-breasted *tringa*, with a hanging creft, or TRINGA *vanellus* of Linnæus, commonly known in England by the name of lapwing or bastard plover, and called by some, in Latin, *vanellus*. It is a very well-known bird, about the size of a pigeon, and has a beautiful creft upon its head. Its legs are long and red, and it is remarkable for running swiftly: the female is rather less than the male.

Were the *lapwing* less common, it would be highly esteemed for its beauty. It is very frequent in our fenny countries, and in the wet places of most other parts of Europe.

It lays four eggs, of an olive caft, ſpotted with black, in a ſlight neſt made with a few bents. The young as ſoon as hatched run like chickens, and are preſerved with great anxiety and clamour by their parents from apprehended danger; which are ſaid to flutter along the ground to a conſiderable diſtance from their neſt, to elude purſuers, and to become more clamorous when moſt remote from it. The eggs are much valued for their delicacy, and are ſold by the London poulterers for three ſhillings per dozen. In winter, *lapwings* join in large flocks and are very wild; their fleſh is very good, their food being inſects and worms. During October and November, they are taken in the fens in nets, in the ſame manner as ruffs are, but are not preſerved for fattening, being killed as ſoon as caught. Ray and Pennant.

LARIARIUS, a kind of athleta among the ancients, who in one hand held a *laqueus*, i. e. a ſort of ſnare, wherewith to embarraſs and entangle his antagoniſt, and in the other a poignard to ſtab him.

LAQUER. See LACQUER.

LAQUEUS, in *ſurgery*, a *noose* or *ſnare*; or a kind of ligature, ſo contrived, that when ſtretched, by any weight, or the like, it draws up cloſe.

Its uſe is to extend broken or diſjointed bones, to keep them in their places, when they are ſet, and to bind the parts cloſe together.

LAR-BOARD, the left-hand ſide of a ſhip, when you ſtand with your face toward the head.

LARCENY in *law*, is a theft of perſonal goods or chattels, in the owner's abſence. See THEFT.

The word comes from the French *larcin*; and that from the Latin *latrocinium*, *theft*.

Larceny is diſtinguiſhed by the law into two ſorts; the one called *ſimple larceny*, or plain theft unaccompanied with any other atrocious circumſtance; and *mixt* or *compound larceny*, which includes in it the aggravation of taking from one's houſe or perſon.

In reſpect of the thing ſtolen, ſimple *larceny*, is either *great* or *ſmall*.

LARCENY, *Great*, is when the things ſtolen, though ſeverally, exceed the value of 12 *d*.

LARCENY, *Petty*, is when the goods ſtolen exceed not the value of 12 *d*.

Simple larceny is defined the felonious taking, and carrying away, the perſonal goods of another: ſo that in order to conſtitute this crime, there muſt be a taking, which implies the conſent of the owner to be wanting; and therefore no delivery of the goods from the owner to the offender, upon truſt, can ground a *larceny*. By the common law it was *no larceny* in a ſervant to run away with the goods committed to him to keep, but only a breach of truſt: but by ſtatute 21 Hen. VIII. c. 7. if any ſervant embezzles his maſter's goods to the value of 40 *s*. it is made felony, except in an apprentice and ſervants under eighteen years old. And if he had not the poſſeſſion, but only the care and overſight of the goods, as the butler of plate, the ſhepherd of ſheep, and the like; the embezzling of them is felony at common law. So if a gueſt robs his inn or tavern of a piece of plate, it is *larceny*; and ſo it is declared to be by 3 and 4 W. & M. c. 9. if a lodger runs away with the goods from his ready furniſhed lodgings. There muſt alſo be a carrying away; and a bare removal from the place in which he found the goods, though the thief does not quite make off with them, is ſufficient. But this muſt be felonious, i. e. done *animo furandi*, or as the civil law expreſſes it, *lucri cauſa*. The ordinary diſcovery of a felonious intent is where the party doth it clandeſtinely, or being charged with the fact denies it: beſides which, there are other circumſtances that evince a felonious intent, which are left to the conſideration of the court and jury. Moreover, this felonious taking and carrying away muſt be of the perſonal goods of another. Of things that adhere to a freehold, as corn, *grafs*, trees, and the like, or lead upon a houſe, no *larceny* could be committed by common law; but the ſeverance of them was, and in many things is ſtill, merely a treſpaſs: however if the thief ſevers them at one time, who only the treſpaſs is completed, and they are converted into perſonal chattels, in the conſtructive poſſeſſion of him on whoſe ſoil they are left or laid, and comes again at another time, when they are ſo turned into perſonalty, and takes them away, it is *larceny*, and alſo is the owner, or any one elſe, has ſevered them. And by 4 Geo. II. c. 32. to ſteal, or ſever with intent to ſteal any lead or iron fixed to a houſe, or in any court or garden belonging to it, is made felony, liable to tranſportation for ſeven years; and to ſteal underwood or hedges and the like, to rob orchards or gardens of fruit growing therein, to ſteal or otherwiſe deſtroy any trunks or the roots of maiden, when growing, are by 43 Eliz. c. 7. 13 Car. II. c. 2. 23 Geo. II. c. 26. and 31 Geo. II. c. 35. puniſhable criminally by whipping, ſmall fines, impriſonment and ſatisfaction to the party wronged, according to the nature of the offence. Moreover, the ſtealing by night of any trees, roots, ſhrubs, or plants, to the value of 5 *s*. is by 6 Geo. III. c. 36. made felony in the principals, aiders and abetters, and in the purchaſers knowing the ſame to be ſtolen; and by 6 Geo. III. c. 48 the ſtealing of any number-trees, as oak, beech, cheſtnut, walnut, aſh, elm, cedar, fir, aſp, lime, ſycamore and birch, and of any root, ſhrub, or plant, by day or night, is liable to pecuniary penalties for the firſt two offences, and for the third is conſtituted a felony, liable to tranſportation for ſeven years. Stealing ore out of mines is no *larceny*, except the ſtealing of ore out of mines of black lead, which is felony without benefit of clergy by 25 Geo. II. c. 10. Stealing of writings relating to a real eſtate is no felony, but a treſpaſs: bonds, bills and notes are goods of which *larceny* cannot be committed by common law; but by 2 Geo. II. c. 25. they are put upon the ſame footing with reſpect to *larceny*, as the money they were deſigned to ſecure. And by 7 Geo. III. c. 50 if any officer or ſervant of the poſt-office ſhall ſecrete, embezzle, or deſtroy any letter or packet, containing any bank-note or other valuable paper, ſpecified in the act; or ſhall fleal the ſame out of any letter or packet, he ſhall be guilty of felony without benefit of clergy. Or if he ſhall deſtroy any letter or packet with which he has received money for the poſtage, or advance the rate of poſtage, and ſecrete the money, he ſhall be guilty of ſingle felony. By 26 Geo. II. c. 19. plundering or ſtealing from any ſhip in diſtreſs, whether wreck or no wreck, is felony without benefit of clergy. For the laws relating to fiſh and game, ſee *Stealing of* FISH and GAME.

Of all valuable domeſtic animals, as horſes, and of all animals *domitæ naturæ*, which ſerve for food, as ſwine, ſheep, poultry, and the like, *larceny* may be committed; and alſo of the fleſh of ſuch as are *feræ naturæ*, when killed.

By the Roman law, the penalty of *ſimple* and *ſecret larceny* was the returning it two-fold; and of *manifeſt larceny*, four-fold: *manifeſt larceny* was, where the criminal was taken in the fact; *ſimple*, where he was not. The Lacedemonians never puniſhed *larceny*, provided the perſon was not caught in the fact; but, on the contrary, it was applauded as a mark of dexterity and addreſs.

The laws of Draco at Athens, which are ſaid to be written in blood, puniſhed it with death; but Solon afterwards changed the penalty into a pecuniary muct: and ſo the Attic laws in general continued. By the Jewiſh law, theft was only puniſhed with a pecuniary fine, and ſatisfaction

action to the party injured. Exod. chap. xxii. From these examples, as well as the reason of the thing, many learned and scrupulous men have questioned the propriety, if not lawfulness, of inflicting capital punishment for simple theft; and proposed either a pecuniary or a corporal punishment. Sir Thomas More in his Utopia, p. 42. and more lately the marquis Beccaria, Eſſ. on Crimes and Puniſhments, chap. xxii. have propoſed that kind of corporal puniſhment, which approaches the neareſt to a pecuniary ſatisfaction, viz. a temporary impriſonment, with an obligation to labour, firſt for the party robbed, and afterwards for the public, in works of the moſt ſlaviſh kind: neverthleſs the puniſhment of theft ſtill continues, through the greateſt part of Europe, to be capital. It is obſerved that our ancient Saxon laws nominally puniſhed theft with death, if above the value of 12 *d.* but the criminal was permitted to redeem his life by a pecuniary ranſom. But in the ninth year of Henry I. this power of redemption was taken away, and perſons guilty of great *larceny* directed to be hanged. See FELONY. *Petit larceny* by common law is only puniſhable by whipping, or by 4 Geo. I. c. 11. the puniſhment may be extended to tranſportation for ſeven years; but the puniſhment of *grand larceny*, or ſtealing above the value of 12 *d.* which ſum was the ſtandard in the time of king Athelſtan, eight hundred years ago, is at common law, regularly death; upon which Sir Henry Spelman obſerved, above a century ſince, when money was at twice its preſent rate, that while every thing elſe was riſen in its nominal value, and become dearer, the life of man had continually grown cheaper. And though the jury may exerciſe a kind of unwarrantable clemency, by bringing in *larceny* under the value of 12 *d.* and the benefit of clergy is allowed for the firſt offence; yet in many caſes of ſimple *larceny* this is taken away by ſtatute; as from horſe-ſtealing, taking woollen-cloth from off the tenters, or linen from the place of manufacture, ſtealing ſheep or other cattle ſpecified in the acts, thefts on navigable rivers above the value of 40 *s.* plundering veſſels in diſtreſs, or that have ſuffered ſhipwreck, ſtealing letters ſent by the poſt, and ſtealing deer, hares, and conies under the circumſtances recited in the *Waltham* BLACK *Act*.

The Circaſſians are ſaid to honour theft at this day; inſomuch that at their public feaſts, their youth are not ſuffered to drink, if they have not performed ſomething remarkable in that way. Solinus tells us, that in Sardinia there was a fountain that had the virtue of diſcovering a perſon that had committed *larceny*.

Compound or *mixed larceny* is that, which, beſides all the properties of the former, has the aggravation of taking from one's houſe or perſon. With reſpect to larceny from the houſe, ſee BURGLARY and HOUSE-*breaking*. It may be here obſerved, that the benefit of clergy is denied: 1. In all *larcenies* above the value of 12 *d.* from a church, or from a dwelling houſe, or booth, any perſon being therein. 2. In all *larcenies*, to the value of 5 *s.* committed by breaking the dwelling-houſe, though no perſon be therein. 3. In all *larcenies* to the value of 40 *s.* from a dwelling-houſe, or its out-houſes, without breaking in, and whether any perſon be therein or no. 4. In all *larcenies* to the value of 5 *s.* from any ſhop, warehouſe, coach-houſe, or ſtable, whether the ſame be broke open or not, and whether any perſon be therein or no: whether theſe offences are committed by day or by night. *Larceny* from the perſon is either by privately ſtealing; or by open and violent aſſault, uſually called robbery. The offence of privately ſtealing from a man's perſon, above the value of 12 *d.* as by privately picking his pocket or the like, without his knowledge, was debarred of clergy, ſo early as by the ſtatute 8 Eliz. c. 14. For the other kind of *larceny* from the perſon, ſee ROBBERY. See alſo FELONY.

Perſons who buy or receive any ſtolen goods, knowing the ſame to be ſtolen, ſhall be deemed acceſſaries after the fact: 3 W. c. 9. and by 4 Geo. c. 11. they may be tranſported for fourteen years: and by 5 Anne, c. 31. Such perſons and thoſe who conceal any felons or thieves ſhall be deemed acceſſary to the felony, and being convicted on the teſtimony of one witneſs ſhall ſuffer death as a felon convict. Perſons offering for pawn or ſale goods ſuſpected to be ſtolen, may be ſeized and conveyed by a conſtable or other peace officer before a juſtice, who may commit them for any time not exceeding ſix days for examination, and afterwards, if the goods were ſtolen or clandeſtinely obtained, to the common gaol or houſe of correction. 30 Geo. II. c. 24. Perſons advertiſing a reward for helping to ſtolen goods, and alſo the printer and publiſher of ſuch advertiſement, ſhall reſpectively forfeit 50 *l.* with coſts. 25 Geo. II. c. 36. And by 4 G. c. 11. thoſe who receive ſuch reward, without apprehending the felon and bringing him to trial, ſhall be guilty of felony in the ſame manner as if they had ſtolen the ſame.

The charges of proſecution and conviction in reſpect of any grand or petit *larceny* may, by order of court, and at the prayer of the proſecuter, be paid by the county treaſurer, with a reaſonable allowance for his time and trouble: 25 Geo. II. c. 36. And by 27 Geo. II. c. 3. reaſonable charges may be allowed and paid in the ſame manner, to a poor perſon who is required to give evidence in Middleſex: theſe charges muſt be paid by the overſeers of the poor where the perſon was apprehended. It is provided by ſtatute, that every perſon who ſhall apprehend any one guilty of houſe-breaking or private ſtealing, to the value of 5 *s.* and proſecute him to conviction, and all the executors or adminiſtrators of a perſon ſlain in endeavouring to apprehend a houſe-breaker or felon, ſhall have a certificate without fee, under the hand of the judge, certifying ſuch conviction, &c. which certificate ſhall be enrolled by the clerk of the peace of the county where it is granted, and may be once aſſigned over and no more. By virtue of this certificate the original proprietor, or aſſignee of the ſame, ſhall be diſcharged from all pariſh and ward offices, within the pariſh or ward where the felony was committed: 10 & 11 W. c. 23. Every ſuch perſon, and alſo the executors and adminiſtrators of a perſon killed as before, ſhall alſo have another certificate, which, on being tendered to the ſheriff and demand made, ſhall entitle him to the ſum of 40 *l.* without fee, in one month after the tender and demand; on pain of forfeiting double with treble coſts. 5 Anne, c. 31. See DISCOVERY of *Accomplices*.

The ſheriff on producing the certificates and the receipts for the ſaid rewards, may deduct the ſame from his accounts; and if he have not money in his hands, he ſhall be repaid out of the treaſury, on certificate from the clerk of the pipe; or he may immediately apply to the commiſſioners of the treaſury, who ſhall pay the ſame without fee. 3 Geo. c. 15.

LARCH-*tree*, *Larix*, in *Botany*. Linnæus refers this to the genus of PINE. The characters are theſe: it hath male and female flowers, growing ſeparate on the ſame tree; the male flowers are diſpoſed in a ſcaly katkin, without a petal; the female flowers are diſpoſed in a conical ſhape, having no petals, but a ſmall germen, which afterward becomes a nut with a membranaceous wing, incloſed in the ſcales of the cones.

The common cone-bearing *larch-tree* grows naturally upon the Alps and Apennines, and has been lately much propagated in England. Thoſe trees raiſed from ſeeds thrive beſt in the moiſt ſoil and ſituation. There are two varieties of this tree, one of which is a native of America, and the other of Siberia; neither of which thrive well in this climate. In Switzerland the wood of the common *larch-tree* is uſed for building and covering the houſes; and in other countries, where it abounds, it is preferred for every purpoſe to all the kinds of fir. In many places there are ſhips built of this wood, which are ſaid to be durable; and, therefore, this may be a very proper tree for planting upon ſome of the cold barren hills in many parts of England, which, beſides the profit they would yield to their proprietors, would alſo conduce to national benefit. The *Venice* TURPENTINE is extracted from the *larch-tree*. See CEDAR.

LARENTINALIA, in *Antiquity*, a feaſt held among the Romans on the 23d day of December, but ordered to be obſerved twice a year by Auguſtus; by ſome ſuppoſed to have been in honour of the Larea, but by others, with more probability, in honour of Acca Laurentia; and to have been the ſame with LAURENTALIA.

LARES, among the *Ancients*, derived by Apuleius, De Deo Socratis, p. 669, from *ſar*, *familiaris*; a kind of domeſtic genii, or divinities, worſhipped in houſes, and eſteemed the guardians and protectors of families; ſuppoſed to reſide more immediately in the chimney corner.

The *Lares* were diſtinguiſhed from the PENATES, as the former were ſuppoſed to preſide over houſe-keeping, the ſervants in families, and domeſtic affairs, and the latter were the protectors of the maſters of families, their wives and children: accordingly the *Lares* were dreſſed in ſhort ſuccinct habits, to ſhew their readineſs to ſerve, and they held a ſort of cornucopia in their hands, as a ſignal of hoſpitality and good houſe-keeping. According to Ovid there were generally two of them, who were ſometimes repreſented with a dog at their feet. Faſt. 5. v. 146.

Plutarch diſtinguiſhes good and evil *Lares*, as he had before done good and evil Genii.

There were alſo ſome public, others private *Lares*.

Apuleius tells us the domeſtic *Lares* were no more than the ſouls of departed perſons, who had lived well, and diſcharged the duties of their ſtation; whereas thoſe who had done otherwiſe, were vagabonds, wandering about, and frightening people, called *Larvæ* and LEMURES.

The *Lares* were alſo called *Privati*, and were worſhipped

under

under the figures of little marmosets, or images of wax, silver, or earthen ware.

The public *Lares* were also called *Compitales*, from *compitum*, a cross-way; and *Viales*, from *via*, a way, or public road; as being placed at the meetings of roads, and in the highways, and esteemed the patrons and protectors of travellers.

Their private *Lares* took care of particular houses and families: these they also called *Præstites*, from *præsto*;

Quod præstant aculis omnia tuta suis. Ovid. Fast.

They gave the name *Urbani*, i. e. *Lares* of cities, to those who had cities under their care; and *Hostilii*, to those who were to keep their enemies off. There were also *Lares* of the country, called *Rurales*, as appears by several antique inscriptions.

The *Lares* were also genial gods, and were supposed to take care of children from their birth. It is for this reason that when Macrobius tells us the Egyptians had four gods who presided over the birth of children, viz. the *Genius*, *Fortune*, *Love*, and *Necessity*, called *Præstites*, some interpret him as if he had said, the Egyptians had *Lares*; but they have mentioned that there was a great difference between the *Lares* of the Romans, and the Præstites of the Egyptians. However, the learned Mr. Bryant affirms that they were the same.

The ancients differ extremely about the origin of the *Lares*. Varro and Macrobius say, that they were the children of Mania; Ovid makes them the issue of Mercury, and the naiad Lara, whom Lactantius and Ausonius call *Larunda*; Apuleius allures us they were the posterity of the Lemures; Nigridius, according to Arnobius, made them sometimes the guardians and protectors of houses, and sometimes the same with the *Curetes* of Samothracia, which the Greeks call *Idæi dactyli*. Nor was Varro more confident in his opinion of these gods; sometimes making them the manes of heroes, and sometimes gods of the air.

T. Tatius king of the Sabines, was the first who built a temple to the *Lares*. The chimney and fire-place in the house were particularly consecrated to them.

Tertullian tells us the custom of worshipping the *Lares* arose from this, that they anciently interred their dead in their houses; whence the credulous people took occasion to imagine their souls continued there also, and proceeded to pay them divine honours. To this it may be added, that the custom being afterwards introduced of burying in the highways, they might hence take occasion to regard them as gods of the highways.

The victim offered to the *Lares*, in the public sacrifices, was a hog: in private, they offered them wine, incense, a crown of wool, and a little of what was left at the table. They also crowned them with flowers, particularly the violet, myrtle, and rosemary. Their symbol was a dog, which was usually represented by their side, on account of its fidelity, and the service it does to man, in watching his house. They were sometimes also represented as clothed in a dog's skin.

See farther on the *Lares*, in Arnobius, Lactantius, Augustine De Civit. Natalis Comes, Lambin. on Plaut. Aulul. and on Hor. Casaubon on Sueton. &c.

The term *Lares*, according to Mr. Bryant, was formed from *larus*, an ancient word by which the ark was represented: and he supposes that the *Lares* and MANES were the same domestic deities under different names; and that by these terms the Hetrurians and Latines denoted the *divi arkitæ*, who were no other than their arkite ancestors, or the persons preserved in the *larus* or ark; the genius of which was Isis, the reputed parent of the world. He observes farther, that they are described as dæmons and genii, who once lived on earth, and were gifted with immortality. Arnobius, lib. iii. p. 124. styles them, *Lares quosdam genios & functorum animas*; and he says, that according to Varro de Ling. Latin. lib. viii. p. 113, they were the children of Mania. Huetius Demonst. Prop. 4. p. 139, adds, that Mania had also the name of Larunda; and she is styled the mother of the dæmons. By some she is called Lara, and was supposed to preside over families; and children were offered at her altar in order to procure her favour. Macrob. Sat. lib. i. c. 7. p. 154. In lieu of these they in aftertimes offered the heads of poppies, and pods of garlick. Anal. of ancient Mythol. vol. ii. p. 449. &c.

The pantheons, or images representing several gods at once, were also called *Lares*. Harpocrates was one of these.

LARGE, a *Sea Term*, applied to the wind, when it crosses the line of a ship's course in a favourable direction, particularly on the beam or quarter. Thus, if a ship steer west, then the wind in any point of the compass to the eastward of the south or north, may be called *large*, unless when it is directly east, and then it is said to be right aft. *Sailing large* is, therefore, advancing with a *large* wind, so as that the sheets are slackened and flowing, and the bow-lines entirely disused. This phrase is generally opposed to sailing CLOSE-*hauled*.

LARGE, in the *Manege*. A horse is said to go *large*, or wide, when he gains or takes in more ground in going wider from the center of the volt, and describing a greater circumference. To make a horse go *large*, you must give him the aid of your inner heel. See ENLARGE.

LARGET, in *Music*. See CHARACTER.

LARGHETTO, in the *Italian Music*, signifies a movement something slow, yet a little quicker than LARGO.

LARGO, in the *Italian Music*, a slow movement, one degree quicker than adagio, and two than grave. See TIME.

LARK, *alauda*, in the Linnæan system of *Zoology*, a distinct genus of birds, of the order of the *passeres*: the characters of which are, that the tongue, which is bifid, has a rim or margin round it, and is membranaceous and pointed; the beak is straight and pointed, and bending towards the point; the maxillæ equal in size; and the claw of the hinder toe is longer than any of the other toes; the toes are also divided to their origin, and the nostrils are covered with feathers or bristles. We have in England four species of this bird. 1. The common *lark*. 2. The *wood-lark*. 3. The *tit-lark*. And, 4. The small-crested *lark*. And beside these there are several exotic species of birds, properly referable to this genus; as the LUCUSTELLA, CALANDRA, SPIOLA, SPINOLETTA.

The common field *lark*, or *sky-lark*, the *alauda arvensis* of Linnæus, is well known, and not less esteemed for its delicacy at table, than for its singing. This and the *wood-lark* are the only birds that sing as they fly; this rising as it soars, and lowering it all it quite dies away as it descends. It will often soar to such a height, that we are charmed with the music when we lose sight of the songster. It also begins its song before the earliest dawn. It continues its harmony several months, beginning early in the spring, on pairing. It is very fat in winter, and taken in prodigious numbers; it builds on the ground, beneath some clod, and lays four or five eggs. These birds are taken in greatest number, in the neighbourhood of Dunstable; the season begins about the fourteenth of September, and ends the twenty-fifth of February; and during that time some thousands are caught to supply the markets of London. Those taken in the day are caught in CLAP-*nets*, till the fourteenth of November. See DURING. But when the weather becomes gloomy, and also in the night, the larker makes use of a trammel net, twenty-seven or twenty-eight feet long, and five broad, which is put on two poles eighteen feet long, and carried by men under each arm, who pass over the fields, and quarter the ground as a setting dog. When they see or feel a *lark* strike the net, they drop it down, and thus the birds are taken. The darkest nights are the properest for this sport; and the net will not only take *larks*, but all other birds that roost on the ground, among which are woodcocks, snipes, partridges, quails, field-fares, and several others.

In the depth of winter people sometimes take great numbers of *larks* by nooses of horse-hair. The method is this: take a hundred, or two hundred yards of packthread; fasten at every six inches a noose made of double horse-hair; at every twenty yards the line is to be pegged down to the ground, and so left ready to take them. The time to use this is when the ground is covered with snow, and the *larks* are to be allured to it by some white oats, scattered all the way among the nooses; they will soon fly to these, and in eating will be hung by the nooses. They must be taken away as soon as three or four are hung, otherwise the rest will be frighted; but though the others are scared away just where the sportsman comes, they will be feeding as the other end of the line, and the sport may be thus continued a long time.

The *sky-lark* is a kind of mocking bird; for it will catch the note of any other which hangs near it, even after its own note is lost. On this account, the bird-fanciers often place the *sky-lark* next to one which hath not been long caught, in order, as they term it, to keep the caged *sky-lark* perfect.

The *wood-lark*, or *alauda arborea* of Linnæus, is smaller than the common *lark*, and is shorter bodied; the colours are paler, and its note is less fonorous and less varied, though not less sweet; it generally flies in large flocks, and as it is in the air sings with a voice more like that of the blackbird, than of the common *lark*, and it will also sing in the night; it has a circle of white feathers like a crown, reaching from one eye to the other across the head; the tip of its tail is white, and it sits on trees. These are its distinctions from the common *lark*. This, like

like the other, builds on the ground, and makes its nest on the outside with moss, and lays five eggs, which are dusky, and blotched with deep brown. The males of this and the last species are known from the females by their superior size.

The *wood-lark* is one of the sweetest of our singing-birds, and is indeed very little inferior to the nightingale, when in good health; for we are not to judge by such as are made feeble by improper food, or want of cleanliness in their cages.

It is one of the tenderest birds we have, and yet it breeds the soonest of any that we know of. They principally frequent gravel grounds, and the sides of hills, that are exposed full to the sun; and if there be any stumps of oaks in these places, they always resort to them. The females couple with the males in the beginning of February, at which time, and never before, they part with their last year's brood; immediately after coupling they betake themselves to building their nest. They generally build in lay, or grounds where the grass is rank, and is grown brown. The principal material they use is dry grass, and they always choose some place sheltered by a good tuft for their nest, to defend themselves from the cold winds, which are very severe at that season. They feed their young principally with a small red worm; but it is very difficult to find this kind, to feed a nest of them under our care, and they will not do well without it; so that they scarce ever come to any thing this way.

The young branchers are taken in June, July, and August. After this they may be taken in large numbers at the latter end of September, which is their general flight season, and then from the beginning of January to the beginning of February, at which time they get together to couple for breeding. Those that are taken in the summer months are usually taken in nets, by the help of a hawk.

The sportsman is to go out in a dewy morning, and fixing on some hill, he is to go to that side of it which faces the rising sun; for this place they are sure to frequent. He is to take out a hawk, and a small net, at the end of a stick; when he espies a bird he is to shew the hawk, on which it will squat down, and on his approaching nearer, and making the hawk flutter over the place, the bird will only lie so much the closer, so that he may go up and lay the net over it, and thus take it, without hurting it.

The best *wood-larks* that are kept in cages have been caught in this manner. A better way of taking numbers of them is to prepare a net made in the same manner as the common net for taking partridges, only with the meshes much smaller; three or four persons are to go out with this, and one of them is to take out a hawk, which serves in the same manner for the *larks* as the setting-dog does for the partridges.

Wherever a flock of these *larks* are seen together, as is very common, the whole flight keeping with the female till the next coupling season, the hawk is to be shewn, and on his hovering they will all lie still, and the net may be easily drawn to completely over them, that not one can escape. The best time for taking this bird for the cage, is in July, or the preceding or following month; those that are put into the cage at this time sing presently, but their song time is not lasting, for they soon fall to moulting, in which state many die; but if they get over it, they commonly prove very healthful afterwards, and become very tame and familiar, and sing sweetly. Those which are taken in the latter end of September, are generally very strong and sprightly; but they do not sing till after Christmas. Those taken in January and February finally prove the best of all; they generally begin singing in two or three days, or at the utmost in a week after they are taken.

The method of keeping them in health in the cage, is this: there must be two pans of food, the one containing meat, the other oatmeal and hempseed. A very good food is the following: boil an egg very hard, to which add the crumb of a halfpenny loaf, and as much hempseed; let the egg be chopped very small, and the hempseed bruised in the mortar; when these are mixed, the bread is to be crumbled in among the rest, and the whole to be rolled together with a common rolling-pin, and kept for use.

There must be some fine small gravel strewed at the bottom of the cage, and renewed at farthest once in a week. This will prevent the bird's feet from getting hurt by being clogged with the dung; and his basking in this will keep him also from growing lousy, after which few come to good. There must be a perch in the cage, and it must either be lined with green bays, or made of fine matting, which the *lark* is very fond of.

When the bird is first taken, some meat must be strewed upon the sand in the bottom of the cage; for the bird will be sometimes almost famished before he finds the meat in the pan.

The cock-bird of this kind is known from the hen by the loudness and length of his call, by his taller as he walks about the cage, and by his doubling his notes in the evening, as if he was going with his mate to roost. A better rule than all others, however, is his singing strong; for the hen *wood-lark* sings but very weakly.

Both the cock and hen of this kind are tender, and subject to many disorders; the principal of these are cramps, giddiness of the head, and breeding hen. Cleanliness is the best cure for the first and the last of these complaints, but we know of no cure for the other. A good strong bird, however, will often last very well five or six years, and often improve all the time.

The *lark* is not only a very agreeable bird for the cage, but it will also live upon almost any food, so that it have once a week a fresh tuft of three-leaved grass put into the cage with it.

The *sky* and *wood-lark* differ in the time of their breeding; the former not producing her young ones till May, the latter hatching them in March. In winter it is common to see vast flocks of *sky-larks*; and yet it is observed, that there are fewer of their nests found in the season, than of any birds that are in any degree common among us. The *sky-lark* sometimes builds among corn, sometimes among high grass, and seldom has more than three young ones at a brood, scarce ever more than four; so that it is the more wonderful whence the large flights we see come. The young may be taken out of the nest at a fortnight old, and are so hardy, that they will easily be brought up. The best food is sheep's heart chopped with egg, and afterwards oatmeal, bruised hempseed, and bread, with a little egg among it. They should have clean sand at the bottom of the cage, but they need no perches.

The *tit-lark* is called by authors the *alauda pratorum*, or *alauda pratensis*. This sits upon trees like the *wood-lark*, is smaller than the common *lark*, and has more of a dusky greenish hue, and is less beautiful in its colour than the common *lark*. This, like the other *larks*, builds its nest among the grass, and lays five or six eggs; it has a very remarkable fine note, singing in all situations, on trees, on the ground, while it is sporting in the air, and particularly in its descent. This bird, and many others, such as the thrush, blackbird, willow-wren, &c. become silent about Midsummer, and resume their notes in September. It is thought that we have in England, beside the common species of *tit-lark*, another kind, which differs from the common kind, in that it is larger, has less greenness in its colouring, has paler-coloured feet, and shorter heels.

The last, or crested *lark*, is the *alauda cristata minor* of authors: this is like the large crested *lark*, but is much smaller; its crest is very long in proportion to its size, and its feet are red; it is all over of a pale brown colour, and is seen in flocks in the northern parts of England.

There is another species, called the *red lark*, which is found in the neighbourhood of London, in North America, and in the south of Europe; though it is rarely met with in this country. It is equal in size to the common *lark*; a white line crosses each eye, and another passes beneath; the bill is thick; the chin and throat whitish; the head, neck, back, and coverts of the wings, of a ruffy brown, spotted with black; breast whitish, with dusky spots; belly of a dirty white; the middle feather of the tail black, edged with brown; the two exterior white; and the legs of a pale brown. This species was first discovered by Mr. Edwards, who observes, that, when the wing is gathered up, the third primary feather reaches to the tip of the first. Ray and Pennant.

LARK, *grasshopper*. See LOCUSTELLA.

LARK, *sea*, *cheiranthus littoreus* of Linnæus, is common on our shores in summer, but the number is not considerable. The bill of this species is half an inch long; the upper half orange-colour, the lower black; from hence to the eyes is a black line; the cheeks are of the same colour; the forehead white, bounded by a black band that passes from eye to eye; the crown of the head is of a fine light brown; the upper part of the neck is encircled with a white collar, the lower part with a black one; the back and coverts of the wings of a light brown; the breast and belly white; the tail brown, tipt with a darker shade; and the legs yellow. This bird lays four eggs, of a dull whitish colour, sparingly sprinkled with black. At the approach of winter it disappears. Pennant.

The *sea-lark* is also a name given by some authors to the STINT.

LARK, *willow*. See *Lesser Red* SPARROW.

LARKSPUR, or LARK'S-HEEL, *delphinium*, in *Botany*, a genus of the *polyandria trigynia* class. Its characters are these: the flower is composed of five unequal petals; the upper petal, extended at the hinder part into a tubular,

obtuse tail; it has a bifid nectarium, situated in the center of the petals, and many small stamina, with three oval germina, which become so many connected capsules, each having one cell, filled with angular seeds.

Miller enumerates eleven species of this plant, cultivated in the gardens of the curious, for the beauty of the flowers; and beside these a number of other varieties produced by a careful management of the seed saved from good flowers. They are to be raised by sowing the seeds in autumn, soon after they are ripe. Some sow them in spring, but the plants are thus never so strong, nor are the flowers so large. When the young plants have got a little strength, they should either be pulled up, or transplanted so as to have them at ten inches distance every way. They will now require no farther care, but will flower in July. See STAVESACRE.

LARMIER, in *Architecture*, a flat, square, massive member, of the cornice, between the cymatium and the ovolo; so called from its use, which is to disperse the water, and cause it to fall at a distance from the wall, drop by drop, or, as it were, by tears; *larme*, in French signifying a *tear*. See *Tab. Architect. Fig.* 9. *Fig.* 25, N° 2. The *larmier* is also called CORONA; and in English, the DRIP.

LARVA, in *Natural History*, a name given by Linnæus to insects in that state, called by other writers *eruca* or CATERPILLAR. See *Transformation* of INSECTS.

LARVÆ, in *Antiquity*, derived from the Hetrurian word *lar* or *lari*, signifying *prince* or *lord*, denoted the ghosts of the deceased, considered as wicked and mischievous. Hence is formed the term *larvatus*, i. e. *larved indeed* or DEMONIAC. The ingenious Mr. Farmer urges the etymology and use of this term to prove, that the heathen demons were human ghosts. Ess. on the Demoniacs, p. 27, &c.

The *larvæ* were also called LEMURES.

LARUS, in the *Linnæan System of Ornithology*, is a genus of the order of *anseres*: the characters of which are, that the bill is strong, strait, and bending near the end; that there is an angular prominence in the lower mandible; the nostrils are linear, wider in the fore part and situated in the middle of the bill; the tongue is a little cloven; the body light, and covered with a thick plumage, wings large, legs short, and feet fissil. They are great flyers, very clamorous and noisy, and feed on fish. Linnæus enumerates eleven different species. Ray observes, that there are properly two subordinate genera of these birds; the first is of those which are large, and have an even not forked tail, and have a tubercle in the lower chap of the bill; the other of the smaller ones, which have all forked tails without any tubercle. Of the first genus are the *great-gull*, the *herring-gull*, the *sea-mall*, the *sea-mew*, the *tarrock*, the *pewit*, the *gannet*, the *cotarakta*, the *martinmasse*, the *coddy-moddy*, the *winder-mew*, the *cepphus*, the *brown-tern*, and the *gavinita*: and of the second or smaller kind are the *sterna*, which Linnæus has made a distinct genus, the *fisherkin*, the *scare-crow*, and four species of the *larus fuliginosus*: all which see under their several heads. See GULL.

LARUS *fuliginosus*, in *Ornithology*, the name of a peculiar kind of bird, accounted by many to be of the *larus* or gull-kind, but having its feet not webbed, as in the other birds of that genus, but the toes loose, as in land-fowls. There are four known species of this bird. 1. A black one, something smaller than the common sea-swallow, and having a forked-tail. 2. A black kind, with a greyish white breast and belly, and remarkable for the length of its wings. 3. A grey kind, of the size of a black-bird, with a very long tail and short wings. 4. A brown one, with yellow spots. The first and last are common on our own coasts, the two others are described by Aldrovand. They all feed on fish. Ray.

LARYNGOTOMIA, in *Surgery*, formed of λαρυγξ, and τεμνω, *I cut*, the same with what is otherwise called BRONCHOTOMY.

LARYNX, λαρυγξ, in *Anatomy*, the upper part or head of the trachea, lying below the root of the tongue, and before the pharynx.

The *larynx* is one of the organs of respiration, and the principal instrument of voice.

Its body is almost wholly cartilaginous, and it is to be constantly open to give room for the air to pass and repass. Its figure is circular, though it jets out a little before; and is a little flatted behind, lest it should incommode the œsophagus, whereon it is placed.

The *larynx* is of different diameters, according to the different ages; in young people it is narrow, whence their voice comes to be acute; in those more advanced in years, it is more ample, which occasions their voice to be stronger and deeper. In men it is bigger than in women, for which reason men's voice is more grave than that of women.

It appears the less in women, because the glands situate at the bottom of the *larynx*, are bigger in women than in men. The *larynx* moves at the time of deglutition: when the œsophagus is lowered for the reception of the food, the *larynx* raises itself to compress it, and facilitate its descent.

There are five kinds of parts belonging to the *larynx*, viz. *cartilages*, *muscles*, *membranes*, *nerves* and *glands*. Its cartilages are the THYROIDES, CRICOIDES, ARYTÆNOIDES, GLOTTIS and EPIGLOTTIS, by means of which it can easily dilate and contract, shut and open itself. These form the whole body of the *larynx*, and grow dry, and harden, in proportion as the person grows old, when the *larynx* sometimes appears as if it were bony.

The biggest of these is the *thyroides* or *scutiformis*; this guards the fore-part, and has its name from some supposed resemblance that it bears to a shield. It is of a concavo-convex square figure, the hollow part being inward, and the gibbous outward, having a little prominence in the middle, called *pomum Adami*, as if some of the forbidden fruit had stuck in Adam's throat, and occasioned that swelling.

The second is called *cricoides*, or *annularis*, from its resemblance to a ring which the Turks put on their thumb for the drawing of their bows. The fore part of this is very narrow, coming under the other cartilage; but behind, it is broad, thick, and strong, being, as it were, the basis of all the others.

The third and fourth are called *arytænoides*, or *guttales*, from the figure of an ewer, which these two together somewhat resemble. At the juncture of these there is a little cleft, or chink, in form of a little tongue, and for that reason called *glottis*, or *lingula*. Through this chink the air descends into the lungs, and the pituitous matter ejected by coughing, in catarrhs, is let out. It serves also for modulating the voice, and is imitated in flutes, and the pipes of organs.

Over the glottis lies a fifth cartilage, called the *epiglottis*, which is very thin and soft, and in non-adults almost membranous, concave on the under-side, and convex on the upper: it defends the entrance of the *larynx*, and hinders the liquids, which in drinking slip over it into the œsophagus, from falling into the trachea.

The *larynx* has several pair of muscles, which serve to move its several cartilages, and to contract or dilate them at pleasure: two pair of them are common, the other proper: the proper are those which have both their origination and insertion in the *larynx*; the common have only their insertion there.

Of the former kind are the cricothyroides, or CRICOTHYROIDÆUS, which moves the cruciform cartilage; the CRICO-ARYTÆNOIDÆUS posticus, which serves, by its contraction, to draw the arytænoides cartilage, and to open the rima. The third is the ARYTÆNOIDÆUS, which serves to bring the two cartilages of that name together, and to shut the rima. The fourth is the CRICO-ARYTÆNOIDÆUS lateralis; and the fifth the THYRIDO-ARYTÆNOIDÆUS, which shuts the *larynx*.

The common muscles are the STERNO-THYROIDÆUS, which serve to draw down the thyroide cartilage, and the HYO-THYROIDÆUS which lift up that cartilage.

Winslow adds another class of muscles, which he calls collateral, being those that are inserted by one portion in the *larynx*, without appearing to contribute any thing to the motions of it: of this kind are the THYRO-*pharyngæi*, CRICO-*pharyngæi*, &c.

The *larynx* has but two membranes; the one *external*, which is a continuation of that which covers the trachea; the other *internal*, which is the same that lines the whole mouth.

It receives two branches of nerves from the recurrents, and is moistened by four large glands; two situate above called TONSILS; and two underneath, called THYROIDÆ.

The *larynx* is of very considerable use, not only in forming and modulating the voice, by the different aperture of its rima, or chink, but also in compressing the lungs to a greater or less degree, by the air; for if the internal diameter of the *larynx* had been equal to that of the trachea, the lungs could then have undergone little or no compression at all; nor, consequently, without the *larynx* could we have reaped any advantage from breathing, because the air would not have resisted that force wherewith it is driven out in expiration; nor, consequently, could the compression have been made in the lungs, which is found necessary for the commixtion of the globules of the blood, and the mixing of the two fluids, air and blood, together.

For the action of the *larynx* in sound, see GLOTTIS, and SOUND; see also EPIGLOTTIS, TRACHEA, &c.

LASANON, a word used by different authors in very dif-

ferent senses; some applying it to the trivet commonly used in kitchens; others to a close-stool; and others, among whom are Hippocrates, and the ancient physicians, for a sort of chair, contrived for a woman in labour to sit in, as being to made, that the weight of the child, when born, should help to draw away the secundines.

LASER *Cyrenaicum*, in the *Materia Medica*, a name supposed to be given by the ancient Greeks to the gum we at this time call ASSA *fœtida*. The word *asa*, or, as it was originally written, *afa*, was evidently formed on the *laser* of the Greeks; but there was also an *afa* mentioned by the old authors very different from this, being a fragrant and sweet-scented gum. This sweet gum was evidently the *laser* and *afa*, or *affa*, of the ancient Greeks; and the *silphium* was the plant which produced it. This plant grew in Cyrene, and furnished it a long time; but in the days of Pliny it was in a manner lost. The people of Cyrene found it more profitable to feed their cattle upon the *silphium*, than to gather its gum.

Pliny continues to tell us, that by the feeding cattle on this plant, it was so perfectly destroyed, in a course of years, that there had been, of a long time, only one plant of it seen, and that reckoned to great a curiosity, that it was sent as a present to the emperor Nero.

When Cyrene no longer afforded the *silphium*, it was sought for in other places. The original *afa*, or *laser*, had the smell of *myrrh*, but more mild and agreeable; and the *afa* of succeeding times had that of leeks or garlic, and thence was distinguished by the name *fœtida laserum*.

LASERWORT, *laserpitium*, in *Botany*, a genus of the *pentandria digynia* class. Its characters are these: it hath an umbellated flower, composed of many small umbels; the general umbel is uniform; the flowers have five equal heart-shaped petals, and five stamina; the roundish germen is situated under the flower, which afterward becomes an oblong fruit with eight longitudinal wings or membranes, resembling the fliers of a water-mill; the fruit divides into two parts, each containing one seed. There are nine species.

These plants grow naturally in the south of France, in Italy, and Germany, and are preserved in botanic gardens for the sake of variety; they have no great beauty. It is generally supposed, that the *silphium* of the ancients was procured from one species of this genus, but from which of them we are at present ignorant. All the species, if wounded, drop a very acrid juice, which turns to a resinous gummy substance, very acrimonious. This was externally applied by the ancients to take away black and blue spots that came by bruises and blows, as also to take away excrescences: it was also by some of the ancients prescribed in internal medicines, but others have cautioned people not to make use of it this way, from the effects which they mention to have been produced from the violence of its acrimony.

All these plants are extremely hardy, so will thrive in most soils and situations. They are propagated by seeds, which, sown in autumn, will afford plants in the spring, that may be transplanted in the following autumn. Miller.

LASH, or LACE, in the *Sea Language*, signifies to bind or make fast.

Lashing, which also denotes a piece of rope used to fasten or secure any moveable body in a ship, or about her masts, sails, and rigging, is chiefly used for binding up to the ship's side, muskets, buts of water or beer, or pieces of timber, to make spare top-masts.

LASHERS are properly those ropes only which bind fast the tackles, and the breeches of the ordnance, when they are haled or made fast, within board.

LASK, a term used by *Farriers*, for a looseness in horses, often fatal to them.

LASKETS, or LATCHES, in a *ship*, are small lines, like loops, fastened, by sewing into the bonnets and drablers, in order to lace the bonnets to the courses, or the drablers to the bonnets.

LA-KING, a sea-term for going large, or veering.

LASSITUDE, among *Physicians*, expresses that weariness, or heaviness, of members, that proceeds from a distempered state of body, and not from exercise; either from an increase of bulk, a diminution of proper evacuation, or too great a consumption of that fluid which is necessary to maintain the force and spring of the solids, as in fevers, and convulsions: or from a vitiated secretion of that juice, whereby the fibres are not supplied either in due quantity or quality.

The remedy, in the first case, is evacuation; in the latter, a proper diet, or such alterative medicines as influence such a secretion.

LAST, or LEST, in general, signifies the burden or load, of a ship.

LAST is also used for a certain weight and measure, which is various in various countries; though, in the general, the *last* is estimated at four thousand pounds WEIGHT. A *last* of cod-fish, white herrings, meal, and ashes for soap, is twelve barrels; of corn, or rape-seed, ten quarters; of gunpowder, twenty-four barrels, or two thousand four hundred pounds weight; of red-herrings, twenty cades; of hides, twelve dozens; of leather, twelve dickers; of pitch, or tar, fourteen barrels; of wool, twelve sacks; of flock silk, a thousand; of flax, or feathers, one thousand seven hundred pounds weight.

LAST, in the marshes of Kent, a court held by the twenty-four jurats, and summoned by the bailiffs; wherein orders are made to lay and levy taxes, impose penalties, &c. for the preservation of the said marshes.

LAST *Heirs*, is he to whom lands come by escheat, for want of lawful heirs; which in many cases, is the lord whereof they are held; but in others the king.

LAST *Will*. See WILL.

LAST, *Post*. See POST-*Last*.

LASTAGE, or LESTAGE, according to Rastal, is a duty exacted in some fairs and markets, for carrying things bought whither one will.

LASTAGE, according to another author, is properly that custom which is paid for wares sold by the *last*.

In the law of Ric. II. *Lastage* is taken for the BALLAST, or for lading of a ship.

LASTAGE is sometimes also used for garbage, rubbish, or such filth.

LATCHETS. See LASKETS.

LATE *Flowers*. See FLOWERS.

LATEEN-*Sail*, in *Sea Language*, a long triangular sail extended by a *lateen*-yard, frequently used by ashers, polacres, settees, and other vessels navigated in the Mediterranean sea.

LATENT *acids*. See ACID.

LATERAL. See COLLATERAL, MULTILATERAL, and QUADRILATERAL.

LATERAL *equation*, in *Algebra*, denotes a simple equation, an EQUATION whose root is only of one dimension.

LATERAL *line*. See LINE.

LATERAL *palsy*. See PALSY.

LATERAL *operation*. See LITHOTOMY.

LATERALIS *morbus*, a name given by some writers to the PLEURISY.

LATERALIS *nervi musculus*, in *Anatomy*, a name given by many authors to that muscle of the face which Albinus has called, from its office, the *levator labii superioris alæque nasi*. It is also called the *obliquus nasi*.

LATERALIS *rectus capitis*. See RECTUS.

LATERAN was originally the proper name of a man, whence it descended to an ancient palace in Rome, and to the buildings since erected in its place; particularly a church called *S. John of Lateran*; which is the principal see of the popedom.

LATERAN, *councils of the*, are those held in the basilica of the *Lateran*: of these there have been five, held in 1123, 1139, 1179, 1215, and 1513.

LATERAN, *Canons Regular of the Congregation of the*, is a congregation of regular canons, whereof that church is the principal place, or seat.

It is pretended there has been an uninterrupted succession of clerics, living in community from the time of the apostles; and that a number of these were established in the *Lateran* in the time of Constantine. But the canons were not introduced till the time of Leo. I. and these held the church eight hundred years, till the reign of Boniface, who took it from them, and placed secular canons in their room: one hundred and fifty years after, the regulars were reinstated.

A LATERE, a Latin term used to denote the qualification of cardinals, whom the pope sends as legates into foreign courts; who are called cardinals *à latere*, as being his holiness's counsellors in ordinary, and assistants. See LEGATE.

The guards of princes were heretofore called *laterones*, because always attending at their sides. *à latere*.

Du-Cange, in his Glossary, says, there were anciently comites *à latere*, and monitors *à latere*.

LATERCULUM, among the *Romans*, was used for a roll or list of all the magistrates and military officers under the Roman emperors, with an account of their respective offices and fees.

LATEX, in *Chemistry*, a name by which Van Helmont has, in some of his writings, called the famous menstruum, which he boasts Paracelsus and himself to have been possessed of, and which he usually calls ALKAHEST.

LATH, in *Building*, a long, thin, narrow slip of wood, nailed on the rafters of a roof, in order to sustain the covering. These are what Festus calls *imbrices*; in other Latin writers they are denominated *tegulæ*, and by Gregory of Tours, *ligneræ*.

Laths

Laths are divided into three kinds, with regard to the different woods they are made of; viz. *heart of oak laths*, *fap laths*, and *deal laths*; the two laſt are uſed only for ceiling and partitioning, and the firſt only for tiling.—*Laths* are alſo diſtinguiſhed, with regard to their length, into *five* feet, *four* feet, and *three* feet *laths*: though the ſtatute allows but of two lengths; viz. thoſe of five feet, and of three; each of which are to be an inch and half in breadth, and half an inch in thickneſs.

LATH-*bricks*, a particular ſort of *bricks* made in ſome parts of England of twenty-two inches long, and ſix inches broad, which are uſed in the place of laths, or ſpars, ſupported by pillars in *oaſts*, for the drying of malt. This is an excellent contrivance; for, beſide that they are not liable to fire as the wooden-*laths* are, they retain the heat vaſtly better; ſo that being once heated, a very ſmall quantity of fire will keep them ſo. Plot's Oxfordſhire, p. 257. See BRICK.

LATHE, or LEATHE, a very uſeful engine for the turning of wood, ivory, and other materials.

The invention of the *lathe* is very ancient: Diodorus Siculus ſays, the firſt who uſed it was a grandſon of Dædalus, named Talus. Pliny aſcribes it to Theodore of Samos; and mentions one Thericlis, who rendered himſelf very famous by his dexterity in managing the *lathe*.

The Greek and Latin authors make frequent mention of the *lathe*; and Cicero calls the workmen who uſed it *vaſcatarii*. It was a proverb among the ancients, to ſay a thing was formed in the *lathe*, to expreſs its delicacy and juſtneſs.

The *lathe* is compoſed of two wooden cheeks or ſides, parallel to the horizon, having a groove, or opening, between; perpendicular to theſe are two other pieces, called *poppets*, made to ſlide between the cheeks, and to be fixed down at any point, at pleaſure.

Theſe have two points, between which the piece to be turned is ſuſtained; the piece is turned round, backwards and forwards, by means of a ſtring put round it, and faſtened above to the end of a pliable pole, and underneath to a treddle, or board moved with the foot: there is alſo a reſt which bears up the tool, and keeps it ſteady.

As it is the uſe and application of this inſtrument that makes the greateſt part of the art of turning, we refer the particular deſcription thereof, as well as the manner of applying it in various works, to that head. See TURNING.

LATHE, in *Law*. See LEYHE.

LATHRÆA, in *Botany*, the name given by Linnæus to the plant called by Tournefort *clandeſtina*. This, in the Linnæan ſyſtem of botany, is alſo a diſtinct genus of plants of the *didynamia angioſpermia* claſs; the characters of which are, that the cup is compoſed of one leaf, ſtanding erect, and repreſenting a bell, with its rim deeply divided into four ſegments; the flower is compoſed of a ſingle petal, in form of a tube, longer than the cup, with a gaping and bellied mouth; the upper lip of the flower is hooded, and is broad and concave, with a narrow crooked extremity; the under one is ſmaller, crooked, obtuſe, and divided into three parts; the ſtamina are two pointed filaments, of the length of the flower, hid beneath the upper lip; the antheræ are two on each filament, obtuſe above, and narrower below; the piſtil has a roundiſh germen, a thread-like ſtyle of the ſame length with the ſtamina, and placed in the ſame manner with them, and a truncated ſtigma; the fruit is a roundiſh, obtuſe, but pointed capſule, containing one cell, having two valves, and is very elaſtic.

LATHREVE, LEIDGREVE, or TRITHINGREVE, was an officer under the Saxon government, who had authority over a third part of the county; and whoſe territory was therefore called trithing, otherwiſe a leid or leithin, in which manner the county of Kent is ſtill divided; and the rapes in Suſſex ſeem to anſwer to the ſame. As to the juriſdiction of this officer, thoſe matters that could not be determined in the hundred court, were thence brought to the trithing; where all the principal men of the three or more hundreds being aſſembled by the *lathreve*, or *trithingreve*, did debate and decide it; or if they could not, then the *lathreve* ſent it up to the county court, to be there finally determined.

LATHYRIS, in *Botany*, a name given by many authors to a ſpecies of tithymal, or SPURGE, commonly known by the name of *tithymalus latifolius*, the broad-leaved ſpurge, and called by ſome alſo CATAPUTIA.

LATHYRUS, in *Botany*. See *Chickling* VETCH.

LATIAR, a feaſt, or ceremony, inſtituted by Tarquinius Superbus, in honour of Jupiter Latiaris or Latialis.

Tarquin, having made a treaty of alliance with the Latins, propoſed, in order for perpetuating it, to erect a common temple, where all the cities, the Romans, Latins, Hernici, Volſci, &c. ſhould aſſemble themſelves every year, hold a kind of fair, exchange merchandizes, feaſt, ſacrifice, and make merry together. Such was the inſtitution of the *Latiar*. The founder only appointed one day for this feaſt; the firſt conſul added another to it, upon concluding the peace with the Latins; and a third was added, after the people who had retired to the Mons Sacer were returned to Rome; and a fourth, after appeaſing the ſedition riſed on occaſion of the plebeians aſpiring to the conſulate.

Theſe four days were called the *Latin* feriæ; and all things done during the courſe of the feriæ, as feaſts, ſacrifices, offerings, &c. were called *Latiares*.

LATIBULUM, a word uſed by ſome medical writers for the ſomes, or latent matter, which is the occaſion of ſevers and other diſorders.

LATICLAVIUM, or LATUS-CLAVUS, a garment which was a diſtinction and dignity among the Romans, contradiſtinguiſhed from the anguſticlavium.

The *lati-clavium* was a kind of tunic or long coat, faced with one or two ſlips of purple, applied lengthwiſe to the two ſides of the tunic.

In the *latus-clavus* theſe ſlips were pretty broad, and in the anguſtus-clavus narrower; though there is nothing about which the learned differ more than the difference between theſe two habits.

There were buttons ſet on the *latus-clavus*, which appeared like the heads of large nails; whence ſome think it took its name.

The ſenators, prætors, and the chief magiſtrates of colonies and municipal cities, had a right to wear it. The robe called prætexta was worn over the *latus-clavus*. When the prætor pronounced ſentence of death, he put off the prætexta; but retained the *latus-clavus*.

LATIN, a dead language, firſt ſpoken in Latium, and afterwards at Rome, and ſtill uſed in the Romiſh church, and among men of letters.

Some authors rank the *Latin* among the number of original languages, but by miſtake: it is formed principally from the Greek, and particularly from the Æolic dialect of that tongue; though it has a great number of words which it borrowed from the languages of the Etruſci, Oſci, and other ancient people of Italy; and foreign commerce and wars, in courſe of time, added a great many more.

The *Latin* is a ſtrong, nervous language, perfectly ſuitable to the character of the people who ſpoke it. The Romans were engaged in wars and commotions, foreign and domeſtic, which for ſeven hundred years engroſſed all their thoughts. Hence, therefore, ſays the ingenious Mr. Harris, their language became like their ideas, copious in all terms, expreſſive of things political, and well adapted to the purpoſes both of hiſtory and popular eloquence. But the Romans were no philoſophers; and hence the unfitneſs of their language to this ſubject; a defect, which even Cicero is compelled to confeſs, and more fully makes appear, when he writes philoſophy himſelf, from the number of terms he is obliged to invent. Harris's Hermes, p. 411, &c.

The *Latin* is more figurative than the Engliſh, leſs pliant than the French, leſs copious than the Greek, leſs pompous than the Spaniſh, leſs delicate than the Italian, but cloſer and more nervous than any of them.

For a while the *Latin* tongue was confined almoſt wholly within the walls of Rome; nor would the Romans allow the common uſe of it to their neighbours, or to the nations they ſubdued. Cicero obſerved, that even in his time, Greek was uſed almoſt among every people, but the *Latin* only confined to a very narrow compaſs. By degrees they were brought to grant the uſe of it as a favour; and, in time, became ſenſible of the neceſſity there was of its being generally underſtood, for the convenience of commerce: and, accordingly, uſed their utmoſt endeavours, that all the nations ſubject to their empire ſhould be united by one common language: ſo that at length they impoſed that as a law which they had before granted as a favour.

After the tranſlation of the ſeat of the empire from Rome to Conſtantinople, the emperors of the Eaſt, being always deſirous of retaining the title of Roman emperors, appointed the *Latin* to be ſtill retained in uſe, both in their reſcripts and edicts, as appears by the conſtitutions of the eaſtern emperors, collected in the Theodoſian Code; but at length the emperors, neglecting the empire of the Weſt, abandoned all care of the *Latin* tongue, and allowed their judges to paſs ſentence in Greek; and, accordingly, we find the emperor Juſtinian's Novels are compoſed in Greek.

Charlemagne, coming to the empire of the Weſt, appointed the law-proceedings in ſovereign courts to be made in *Latin*; and the notaries were to draw their acts

and inſtruments in ſame tongue: this practice continued a long time through a great part of Europe; but at length it gave way, and the French took place of the *Latin*, not only in France, but, in ſome meaſure, in England too; and the reaſon given for it was, that abundance of difficulties aroſe about the underſtanding of *Latin* terms.

The *Latin*, however, was prodigiouſly degenerated and corrupted, before it came to be laid aſide. The incurſions of the Goths and Vandals into Italy brought an inundation of foreign words and phraſes into it; inſomuch that Valla and Naud call Boethius the laſt *Latin* author. By command of Theodoric, king of the Goths, it was the hard fate of this worthy man, ſays Mr. Harris, to ſuffer death; with whom the *Latin* tongue, and the laſt remains of Roman dignity, may be ſaid to have ſunk in the weſtern world. But that was not all; when it once got into the courts of juſtice, it was ſtill worſe handled; till, at laſt, being introduced amongſt the monks, and become the common language of miſſals and breviaries, it was debauched to that degree, that it was almoſt become ſcandalous to uſe it.

In this condition it was found at the time of the Reformation, when Vives, Eraſmus, &c. began to open the way for its recovery; ſince which time monkiſh Latinity has been declining, and all endeavours have been uſed to retrieve the pure language of the Auguſtan age.

It was ſaid of cardinal Bembo, that he would never read the breviary for fear of corrupting his fine *Latin*.

LATIN *bible*. See BIBLE.

LATIN *character*. See CHARACTER.

LATIN *church*, is a term uſed for the *Romiſh* or *weſtern* CHURCH, by way of oppoſition to the GREEK *church*.

LATINÆ *feriæ*. See FERIÆ.

LATION, is uſed by ſome for the tranſlation or motion of a body from one place to another.

LATISSIMUS *dorſi*, in *Anatomy* a muſcle, ſo called from its ſhape, covering almoſt the whole back.

It has a thin, broad, tendinous beginning, which comes from the poſterior part of the ſpine of the ilium, from the ſuperior ſpines of the os ſacrum, from all the ſpines of the vertebræ of the loins, and from the ſeven lower of the thorax; it paſſes by the inferior angle of the ſcapula, from which ſome of its fleſhy fibres ſometimes ariſe; and is inſerted with the teres major, by a ſtrong and broad tendon, with which it pulls the arm downwards.

It is alſo called *ani ſcalptor*, becauſe it carries the arm to the anus. See *Tab. Anat. (Myol.) fig.* 6. *n.* 28.

LATITAT, in *Law*, a writ, whereby all men in perſonal actions are called originally to the king's bench.

It has this name, as ſuppoſing the defendant lurks, lies hid, and cannot be found in the county of Middleſex, to be taken by bill; but is gone to ſome other county, to the ſheriff whereof this writ is directed.

LATI-TENDINIS *muſculus*, in *Anatomy*, a name given by Spigelius and others to a muſcle, called by Winſlow *muſculus faſciæ latæ*, and by Albinus the *muſculus cruæus femoris*. See MEMBRANOSUS.

LATITUDE, LATITUDO, in *Geography*, the diſtance of a place from the equator; or an arch of the meridian, intercepted between the zenith of the place, and the equator. Hence *latitude* is either *northern* or *ſouthern*, according as the place, whoſe *latitude* is ſpoken of, is on this or that ſide of the equator. Thus London is ſaid to be in 51 degrees 32 minutes northern *latitude*.

Circles parallel to the equator are called *parallels of latitude*, becauſe they ſhew the *latitudes* of places by their interſection with the meridian.

If through the poles of the world we conceive innumerable great circles drawn, theſe are called *ſecondaries* of the equator; and, by their help, the poſition of every point, either on earth, or in the heavens, with regard to the equinoctial, [that is, the *latitude* of any point], is determined. See SECONDARY.

One of theſe ſecondaries, paſſing through any place on the earth's ſurface, is called the meridian of that place; and on it the *latitude* of that place is meaſured. See MERIDIAN.

The *latitude* of a place, and the elevation of the pole of that place above the horizon, are terms uſed indifferently for each other, becauſe the *latitude*, and the elevation of the pole, are always equal.

This will appear from *Tab. Geography. fig.* 3.—where the circle H Z Q repreſents the meridian, H O the horizon, Æ C Q the equator, Z the zenith, and P the pole.

Here the *latitude* of the place, or its diſtance from the equator, is the arch Z Æ; and the elevation of the pole, or its diſtance from the horizon, the arch P O.—Now the arch P Æ between the pole and the equator, is a quadrant of a circle; and the arch Z O, from the zenith to the horizon, is likewiſe a quadrant, therefore the two arches P Æ, and Z O, muſt be equal; and taking away the arch Z P, which is common to both, there will remain the arch Z Æ, equal to the arch P O; that is, the latitude of the place equal to the elevation of the pole above the horizon. Hence we have a method of meaſuring the circumference of the earth, or of determining the quantity of a degree on its ſurface; for by going directly northward, or ſouthward, till the pole be elevated one degree more or leſs, and then meaſuring that interval accurately, we ſhall have the number of miles in a DEGREE of a great circle of the earth's globe.

The knowledge of the *latitude* of the place is of the utmoſt conſequence, in geography, navigation, and aſtronomy; the methods of determining it, both at ſea and land, are as follow.

The altitude of the pole, it has been already ſhewn, is always equal to the *latitude*; for which reaſon the *latitude* might be beſt found by obſerving the pole's height; but as the pole is only a mathematical point, and no ways to be obſerved by our ſenſes, its height cannot be determined in the ſame manner as that of the ſun and ſtars, &c. for which reaſon another manner has been contrived.

In order to this, a meridian line is firſt drawn; the method of doing which, ſee under the word MERIDIAN. Place a quadrant on this line, ſo that its plane may be in the plane of the meridian; then take ſome ſtar near the pole, v. gr. the pole-ſtar (which never ſets), and obſerve both its greateſt and leaſt altitude.

Let the greateſt, v. gr. be SO (*Tab. Geography, fig.* 3.) and the leaſt PO; the half of the difference of which PS, or Ps, deducted from the greateſt altitude SO, or added to the leaſt PO, will give PO, the altitude of the pole above the horizon, which is equal to the *latitude* of the place.

The *latitude* may alſo be found by having the ſun's, or a ſtar's, declination, and meridian altitude, taken with a QUADRANT, or aſtrolabe. The method is this:

Obſerve the meridian diſtance of the ſun from the vertex or zenith, which is always the complement of his meridian altitude; correct for the DIP of the horizon and REFRACTION; and add to this the ſun's declination, when the ſun and the place are on the ſame ſide of the equator; or ſubtract the declination, when they are of different ſides; the ſum, in the former caſe, and the difference in the latter, will be the *latitude* required. But when the declination of the ſun is greater than the *latitude* of the place, which is known from the ſun's being nearer to the elevated pole, than the vertex of the place is, as it frequently happens in the torrid zone, then the difference between the ſun's declination, and his zenith diſtance, is the *latitude* of the place.

If the ſun or ſtar have no declination, but move in the equinoctial that day, then the elevation of the equator will be equal to his meridian altitude; and, conſequently, his meridian altitude is the complement of the *latitude* to 90.

This latter method is beſt accommodated to the uſes of navigation, as being practicable at ſea; but the former method preferable at land. But circumſtances frequently occur at ſea, which render it impoſſible to obſerve the meridian altitude of a celeſtial object: we ſhall, therefore, ſubjoin ſome of the readieſt and moſt approved practical methods of determining the *latitude* in caſes of this kind.

For this purpoſe take one, two, or more altitudes of the ſun in the forenoon, noting by a watch the time of each; and if the meridian altitude cannot be obtained, take one, two, or more altitudes of the ſun in the afternoon, noting alſo the times by the watch: if poſſible, let the morning altitudes, if 3, be taken at equal intervals of time; if not, let the afternoon obſervations be taken at the ſame altitudes with the morning ones. Then,

1. If one morning and one afternoon obſervation are taken, when the ſun has the ſame altitude, and the name of the elevated pole is known, to find the elevation, or *latitude*. To twelve hours add the morning and afternoon times ſhewn by the watch, and half the ſum gives the time by the watch, when the ſun was on the meridian of that place, ſuppoſing no change of declination. Let the interval of time between that noon, and the time of either obſervation, be turned into degrees and minutes for the hour-angle, which is ſuppoſed to be leſs than 90°, becauſe the obſervations are within ſix hours of noon: to the logarithmic coſine of the hour-angle add the logarithmic tangent of the ſun's diſtance from the elevated pole, their ſum is the logarithmic tangent of the firſt arc, of the ſame kind with the polar diſtance: add the arithmetical complement of the logarithmic coſine of the polar diſtance, the logarithmic ſine of the altitude, and the logarithmic coſine of the foreſaid firſt arc, their ſum is the logarithmic coſine of a ſecond arc, always leſs than 90°: the difference of the firſt and ſecond arcs is the complement of the required *latitude*, when the firſt arc exceeds the ſecond; otherwiſe the difference is the *latitude*.

2. When three zenith diſtances between the limits of 30°

and 70° are taken within an hour of noon, at equal intervals of time between 15 and 30 minutes. If the firſt and third zenith diſtances are equal, the middle one is the meridian zenith diſtance. If the two firſt or two laſt zenith diſtances are equal, from one of theſe take one eighth of the difference between it and the greater zenith diſtance, and the remainder is that on the meridian. When the three zenith diſtances are unequal, let the difference between the greateſt and middle be called A, the difference between the greateſt and leaſt be called B, the difference between B and 4 A be called C, and the difference between B and C be called D: then $\frac{C^2}{4B}$, will give a number of minutes, which, ſubtracted from the greateſt zenith diſtance, leaves the meridian zenith diſtance.

3. When three zenith diſtances, between the limits of 30° and 70° are taken within an hour and half of noon, at unequal intervals of time: let the difference in minutes between the greateſt and middle zenith diſtances be called A, and the interval of time *a*; the difference between the firſt and laſt be called B, and the correſponding interval of time *b*. From the logarithm of the difference of the products A*b* and B*a*, take the logarithm of *b*, and call the remainder N; then add the log. of N, twice the log. of the difference between *a* and $\frac{1}{2}$ *b*, the arithmetical complement of the difference between *a* and *b*, and the arithmetical complement of the log. of *a*, and the ſum will give a log. which call M. Find the numbers correſponding to N, M, and $\frac{1}{2}$ B, and call their ſum E. From 4E take B, and call the remainder C, and B—C call D. Then the log. of 4 D, taken from twice the log. of C, gives the logarithm of the correction in minutes; and the greateſt zenith diſtance diminiſhed by the correction, will give the meridian zenith diſtance.

4. When three altitudes are taken at equal intervals of time, at any diſtance from noon: find the natural ſines of the three given altitudes; call the difference between the firſt and third, D; and between the ſecond and third F. Let E=D+2F, when the degrees of the third altitude fall between thoſe of the firſt and ſecond; otherwiſe let E=D—2F. Add the log. cotang. of half one interval of time in degrees, the log. of E, and the ar. co. log. of D, each in numbers; and their ſum is the logarithmic tangent of an angle A, or of its ſupplement, if the firſt altitude exceeds the third; convert the angle A into time; to A add one interval; then the difference between this ſum and ſix hours will ſhew the time from noon, when the laſt obſervation was made. Hence, by the intervals, the other times are known relative to the noon of the place of obſervation. Add together the ar. co. log. coſine of A, the ar. co. log. ſine of one interval obſerved, and the log. of D; and their ſum is the log. of a number B; to the log. of which add twice the logarithmic ſine of half the leaſt time from noon; ſeek the number, and add it to the natural ſine of the greateſt altitude, which will give the natural ſine of the meridian altitude. The number B, leſſened by the natural ſine of the meridian altitude, gives the natural ſine of the midnight depreſſion: then the half ſum and the half difference, being taken, of the degrees and minutes anſwering to the ſines of the meridian altitude and midnight depreſſion, will give the *co-latitude* and declination. If the zenith falls between the equator and the ſun, the half ſum is the co-declination, and the half difference is the *latitude*.

5. When three altitudes are taken at unequal intervals of time: call the interval between the firſt and third times M, between the firſt and ſecond, *m*, between the ſecond and third, *n*, and convert M, *m*, *n*, into degrees; find the natural ſines of the three obſerved altitudes; call the difference between the firſt and third D, and between the ſecond and third F; add the log. ſines of $\frac{1}{2}m$ and $\frac{1}{2}n$, for the log. of $\frac{1}{2}$ A; and the log. coſine of $\frac{1}{2}m$ to the log. ſine of $\frac{1}{2}n$ for the log. of $\frac{1}{2}$ B: add the ar. co. log. of D, the log. of F, and the log. ſine of $\frac{1}{2}$ M, for the log. of $\frac{1}{2}$ C: take the difference between $\frac{1}{2}$ B and $\frac{1}{2}$ C, and call it $\frac{1}{2}$ E; or let $\frac{1}{2}$ E be the ſum of $\frac{1}{2}$ B and $\frac{1}{2}$ C, when the degrees in the third altitude fall between thoſe of the firſt and ſecond. From the log. of $\frac{1}{2}$ E take the log. of $\frac{1}{2}$ A, the remainder, adding 10 to the index, is the logarithmic tangent of an arc G; or of its ſupplement, when the firſt altitude exceeds the ſecond. Take the difference between G, and the complement of $\frac{1}{2}$ M, the remainder is an arc H, ſhewing the time from noon when the laſt altitude was taken: hence the other times are known. Add the ar. co. log. coſine of G, the ar. co log ſine of $\frac{1}{2}$ M, and the log. of D, their ſum is the log. of a number I: to log. of I add twice the log. ſine of $\frac{1}{2}$ H for the log. of K, which, added to the natural ſine of the third altitude, will give the natural ſine of the meridian altitude; and the number I, diminiſhed by the natural ſign of the meridian altitude, gives the natural ſine of the midnight depreſſion; the half ſum and half difference of the degrees ſhewing the meridian altitude and midnight depreſſion, will give the *co-latitude* and declination, or co-declination and *latitude*, when the zenith falls between the ſun and the equator.

6. When two altitudes of the ſun, the interval of time between the two obſervations, the ſun's declination, and the *latitude* by dead reckoning, are given; to find the true *latitude*. 1. Convert the interval of time into degrees, and take its half; take alſo the half ſum and half difference of the two altitudes. 2. Add the five following logarithms; viz. log. coſine of the half ſum of the two altitudes; log. ſine of the half difference of the two altitudes; ar. co. log. ſine of the half interval; ar. co. log. coſine of the declination, and ar. co. log. coſine of the *latitude* by account; their ſum is the log. ſine of an arc. 3. Half the difference between this arc and the half interval, is half a time from noon. 4. Then add the log. coſine of the declination, log. coſine of the *latitude* by account, and twice the log. ſine of half a time from noon, in degrees: the number anſwering to the log. of this ſum, doubled, is the correction; which being added to the natural ſine of the greateſt obſerved altitude, gives the natural ſign of the meridian altitude, whence the *latitude* is known. In order to know whether the *latitude* thus found be accurate, make a ſecond operation: thus, to the ſum of the firſt four logs. uſed in the ſecond article of the preceding operation, add the ar. co. log. coſine of the *latitude*, found by art. 4. the ſum is the log. ſine of an arc. Proceed by the third and fourth articles for a corrected *latitude*; and if it comes out the ſame, within a minute or two, as that found above, it may be eſteemed the true *latitude*; or, if the difference between the reſults of the two operations do not exceed about $\frac{1}{4}$th of the difference between the *latitude* aſſumed, and that firſt found, the laſt reſult may be accounted ſufficiently correct. But if the difference is much greater than the ſaid $\frac{1}{4}$th part, then a third operation with the laſt found *latitude* will generally give the *latitude* exact enough. When the *latitudes*, found by the firſt and ſecond operations, have one greater and one leſs than the *latitude* by account, or if they differ by a degree or more, make a third operation with the half ſum or mean of theſe two *latitudes*; and if the *latitude* found differs from the ſaid mean, then halt their ſum will generally give the *latitude* very near the truth. When both obſervations are made in the forenoon, or both in the afternoon, the half interval is half the difference of the times from noon, and the firſt found arc is half the ſum of the times from noon: but when the obſervations occur, one before and the other after noon, the $\frac{1}{2}$ interval is the $\frac{1}{2}$ ſum, and the firſt found arc is the half difference of the times from noon; the $\frac{1}{2}$ difference added to the $\frac{1}{2}$ ſum, gives the time of the obſervation fartheſt from noon; and the $\frac{1}{2}$ difference taken from the $\frac{1}{2}$ ſum, gives the time of the obſervation neareſt to noon. The times of obſervation are beſt when taken to ſeconds, or at leaſt to quarters or thirds of a minute of time: they are alſo beſt when taken between the times of 9 h. A. M. and 3 h. P. M. and the interval between them ſhould not exceed five hours, nor be much leſs than the time from noon at the taking of the greateſt altitude; or, in general, the interval ſhould not be much leſs than about $\frac{1}{4}$ of an hour.

Mr. John Douwes of Amſterdam contrived, in 1740, ſolar tables for the ſolution of this problem, which were publiſhed in 1759. Dr. Pemberton communicated to the Royal Society the whole conſtruction of theſe tables, &c. in a paper publiſhed in the Phil. Tranſ. vol. li. art. 81. But the preceding ſolution requires no other tables than are found in the common books of navigation; though the ſolar tables, ſuch as may be found in the Nautical Almanack for 1771, may ſave ſome time in the computation. See the principles on which the preceding problems are founded, mathematically demonſtrated, and their uſe illuſtrated by examples, in Robertſon's Elem. of Navigation, book v. and book ix. See alſo Nautical Almanack for 1771.

Mr. Richard Graham contrived an inſtrument for taking the *latitude* of a place at any time of the day. For this purpoſe, to the meridian of a globe properly divided, he adapts a piece of a like meridian, called the beam-compaſs, divided in the ſame manner, and ſliding under the meridian: to theſe circles, and to five minutes of their degrees, are fitted two ſliding Vernier's ſcales, in ſuch a manner, that a wire fixed at 0 degree at the center or end of the beam-compaſs, ſhall paſs through a hole at the beginning of the diviſions of one Vernier, which is to ſlide on the meridian, that wire ſerving as the center of motion of the beam-compaſs, when the Vernier is

ſkrewed

screwed to the meridian: the other Vernier is to slide on the beam compass, and carry with it a pointer, or index, at the beginning of its divisions.

With this instrument the problem is thus solved. At the time of the first observation, let the sun's bearing be also observed, and take the difference between the rhumb on which the sun was observed, and the rhumb on which the ship steered between the observations: then say,

As radius is to the cosine of that difference of rhumbs; so is the distance run between the observations, to the minutes of correction to be applied to the first zenith distance, and is to be added when the ship sails from the sun, otherwise it is to be subtracted.

Then slide the Vernier's scale on the meridian to the given declination, and the Vernier on the beam-compass to the first zenith distance as corrected, and let these scales be fixed by their screws: rectify the globe for noon, turn it till the hour-index points at the time of the first observation, there hold the globe fast, and move the beam-compass on its center, nearly into the azimuth of the sun at that observation, and describe an arc on the globe with the pointer of the Vernier; slide the Vernier on the beam-compass to the second observed zenith distance; turn the globe (the proper way) till the hour-index points at the time of the second observation, there hold the globe fast, and with the beam-compass cut the former arc, their intersection will shew the place of the ship at the time of the second observation: bring the meridian over that point, and the *latitude* is found; also the hour-index will point at the true time of the day when the last observation was made. Phil. Trans. N° 435. or abridg. vol. viii. p. 371.

LATITUDE, in *Astronomy*, is the distance of a star or planet from the ecliptic.

Or, it is an arch of a great circle, TS *(Tab. Astron. fig. 14. n. 2.)* intercepted between the center of the star S, and the ecliptic EL, and perpendicular thereto.

Through the poles of the ecliptic are supposed to pass an indefinite number of great circles, cutting the ecliptic at right angles, called *circles of latitude*, or secondaries of the ecliptic; by means of which every star, and point of the heavens, is reduced to the ecliptic, and has its place in regard thereto determined; the *latitude* of a star being an arch of one of these secondaries, intercepted between that star, and the point where it intersects the ecliptic.

In which the *latitude* differs from the *declination*, which is the distance of a star from the equator, towards one of the poles of the world.

So that the geographical *latitude* is the same thing with the astronomical declination; and the astronomical *latitude* a quite different thing.

The *latitude* of a planet is an angle, as PTR *(Tab. Astronomy, fig. 26.)* under which a planet's distance from the ecliptic PR is seen on the earth.

The sun never has any *latitude*, but the planets have; for which reason, in the common sphere, the zodiac has some breadth. The ancients only allowed six degrees on each side the ecliptic, but the moderns have extended it to nine.

When they have no *latitude*, they are said to be in the *nodes* of the ecliptic, or in the intersection of their orbit with that of the sun; and in this situation it is that they eclipse, or are eclipsed by, the sun.

LATITUDE, *circle of*, is a great circle, MST *m*, passing through the poles of the ecliptic. See CIRCLE.

LATITUDE *of the moon, north ascending*, is when she proceeds from the ascending node towards her northern limit, or greatest elongation.

LATITUDE, *north descending*, is when the moon returns from her northern limit to the descending node.

LATITUDE, *south descending*, is when she proceeds from the descending node to her southern limit.

LATITUDE, *south ascending*, is when she returns from her southern limit to her ascending node.

And the same holds good of the other planets. See ASCENDING and DESCENDING.

LATITUDE, *heliocentric, of a planet*, is its distance from the ecliptic, such as it is seen from the sun.

This when the planet comes to the same point of its orbit, is always the same, and unchangeable.

LATITUDE, *geocentric, of a planet*, is the distance of the planet from the ecliptic, as it is seen from the earth.

This, though the planet be in the same point of its orbit, yet is not constantly the same, but alters according to the position of the earth, in respect to the planet. See HELIOCENTRIC, and GEOCENTRIC.

Dr. Halley has some considerations, in the Philosophical Transactions, which make it probable, the *latitudes* of some of the principal fixed stars, particularly Palilicium, Sirius, and ARCTURUS, alter in time; whence it may be argued, the rest likewise alter, though the variation may be less conspicuous in these, because they are supposed at a greater distance from us.

LATITUDE, *difference of*, is an arc of the meridian, or the least distance of the parallels of *latitude* of two places; and it is found when these have the same name, by subtracting the lesser *latitude* from the greater; and when they have contrary names, by adding them together.

LATITUDE, *parallax of*. See PARALLAX.

LATITUDE, *refraction of*. See REFRACTION.

LATITUDINARIAN, among *Divines*, denotes a person of moderation, with regard to religious opinions, who believes there is a latitude in the road to heaven, which may admit people of different persuasions. This name was given by way of distinction to those excellent persons in England, who, about the middle and towards the close of the last century, endeavoured to allay the contests that prevailed between the more violent episcopalians on the one hand, and the more rigid presbyterians and independents on the other, with respect to the forms of church government and public worship, and also between the Armenians and Calvinists, with respect to certain religious tenets. Many of them were zealously attached to the forms of ecclesiastical government and worship that were established in the church of England, and they recommended episcopacy with all their eloquence; but they did not consider it as of divine institution, and absolutely necessary to the constitution of a Christian church; and therefore they maintained, that those who followed other forms of government and worship, were not, on that account, to be excluded from their communion, or to forfeit the title of brethren. Others had no great liking for the liturgy or ceremonies, or, indeed, the government of this church, but yet for the sake of peace and order conformed. As to the doctrinal part of religion, they took the system of the famous Episcopius for their model, and, like him, reduced the fundamental doctrines of Christianity, i. e. those doctrines, the belief of which is necessary to salvation, to a few points. By this manner of proceeding they shewed that neither the episcopalians, who, generally speaking, embraced the sentiments of the Arminians, nor the presbyterians and independents, who as generally adopted the doctrine of Calvin, had any reason to oppose each other with such bitterness and animosity, since the subjects of their debate were matters of indifference with respect to salvation, and might be variously explained and understood, without any prejudice to their eternal interests.

The chief leaders of these *Latitudinarians* were Hales and Chillingworth: to them may be added the respectable names of More, Cudworth, Gale, Whitchcot, Wilkins, and Tillotson. The first fruits of their charitable zeal were the odious appellations of atheists, deists, and Socinians, liberally bestowed upon them by the Roman catholics, and the more rigid of the protestant contending parties. However, they were afterwards raised to the first dignities of the church, and deservedly held in general esteem. And at this time the church of England is chiefly governed by *Latitudinarians* of this kind: and the spirit of moderation and mutual charity has generally prevailed, with that of liberal enquiry, among the various sects and denominations of Christians. Mosheim's Eccl. Hist. vol. iv. p. 535, &c. 8vo. and Birch's Life of Tillotson, p. 407. See COMPREHENSION.

LATOMIA, *Λατομια*, derived from the Greek *λας, stone*, and *τεμνω, I cut*, properly signifies a QUARRY, or place where stones are dug.

These were anciently used as gaols for criminals. Dionysius had a place of this kind dug in a rock near Syracuse, where an infinite number of people were shut up. Cicero reproaches Verres with imprisoning Roman citizens in *latomiæ*; so that *latomia* became a general name for a prison; and the prisoners inclosed in them were called *latomiarii*.

LATONA, in *Mythology*, a goddess of paganism, whose history is very obscure. Hesiod makes her the daughter of Titan Cœus and Phœbe, his sister. The fable adds, that Apollo and Diana were her offspring by Jupiter, and that they advanced her to the rank of celestial deities in spite of Juno. According to Herodotus, she was an Egyptian deity, and was worshipped at Buto in Egypt. The inhabitants of Delos erected a temple for her; but that at Argos was the most magnificent, and celebrated for her statue, executed by Praxiteles. *Latona*, Venus, and Diana, were the three goddesses most in veneration among the Roman women.

LATRIA, *Λατρια*, in *Theology*, a religious worship, due only to God.

The Romanists say, "They honour God with the wor-"ship of *latria*; and the saints with the worship of *du-*"*lia*:" but the terms, however distinct, are usually confounded.

The worship of *latria*, besides its inner characters, has

its external marks to diſtinguiſh it; the principal whereof is ſacrifice, which cannot be offered to any other but God himſelf, as being a ſolemn acknowledgement, or recognition, of the ſovereignty of God, and our dependence on him.

M. Daillé ſeems to own, that ſome of the fathers of the fourth century allowed the diſtinction between *latria* and *dulia*. See ADORATION and WORSHIP.

LATTIMO, in the *Glaſs-trade*, a name for a fine milk-white glaſs. There are ſeveral ways of making it, but the beſt of all is this: take four hundred weight of cryſtal frit, and ſixty pounds of calcined tin, and two pounds and a half of prepared manganeſe; mix theſe well with the frit, and ſet them in a pot in a furnace to melt and refine. At the end of eighteen hours this will be purified; then caſt it into water, purify it again afterwards in the furnace, and make a proof of it. If it be too clear add fifteen pounds more of calcined tin; mix it well with the metal, and let it ſtand one day to purify; it will then be of a whiteneſs ſurpaſſing even that of ſnow, and is fit to work into veſſels. Neri's Art of Glaſs, p. 98. See GLASS.

LATTIN, or LATTEN, a name by which we uſed to call the plates of iron covered with tin, and now uſually called *tin*, of which our mugs, and ſuch other things are made. The principal part of the work is to prepare the leaves, beat out to a proper thinneſs, ſo as that they ſhall readily receive the tin; for if there be but the ſmalleſt particle of duſt on them, or only the ſlighteſt ruſt in any part, the tin will never fix there.

This ſmoothing of the plates is effected by ſteeping them in acid water, till the ſurface is a little preyed upon by it, and then they are ſcowered with ſand, which makes them very ſmooth and fine. By this means a woman cleans more plates in an hour, than the moſt expert workman can do otherwiſe in many days. Mr. Reaumur, to whom the world owes the diſcovery of this proceſs, mentions ſeveral waters, any one of which will ſucceed, but the Germans themſelves uſe nothing but common water, made eager with rye. This they make a great ſecret of, but the preparation is very eaſy. After they have ground the rye groſsly, they leave it to ferment in common water for ſome time; and they are thus ſure of a ſharp and eager menſtruum, excellently fitted for their purpoſe. With this liquor they fill certain troughs, or tuns, and into theſe they put ſeveral bundles of the plates of iron: And to make the liquor be more eager, and act the better on them, they keep it in ſtoves, where it has little air, and is kept warm with ſmall charcoal fires.

There are ſeveral other ways of making iron ruſt, as keeping it in a moiſt cellar, expoſing it to the dew, ſprinkling it with ſimple water, or, which is ſtill better, with water in which ſal armoniac has been diſſolved, ſeveral times a day: and in thoſe countries where the pyrites is common, the vitriolic waters, which partake of it, will do it very well. This water may be prepared at little or no expence, only by heaping up large quantities of the pyrites, and letting it moulder in the air, then putting it into common water, and making a lixivium of it.

Whichever method of ruſting the plates be uſed, it is always neceſſary to ſcower them with ſand as ſoon as it is done; and when they are thus cleaned, they muſt be immediately plunged into water, to prevent their ruſting again, and they are to be left in this water till the inſtant in which they are to be tinned, or in the language of the workmen, *blanched*. The people, employed in this part of the operation, are called *blanchers*; and the others, who aſſiſt at the cleaning the plates, the *ſealers*. The blancher makes as great a ſecret of his art, as the ſealer does of his; and it was with great difficulty that Mr. Reaumur obtained it. The manner of doing it is this.

They fuſe the tin in a large iron crucible, which has the figure of an oblong pyramid with four faces, of which two oppoſite ones are leſs than the two others. The crucible is heated only from below, its upper part being luted with the furnace all round. The crucible is always deeper than the plates, which are to be tinned, are long; they always put them in downright, and the tin ought to ſwim over them. To this purpoſe artificers of different trades prepare plates of different ſhapes, but Mr. Reaumur thinks them all exceptionable. But the Germans uſe no ſort of preparation of the iron, to make it receive the tin, more than the keeping it always ſteeped in water till the time; only when the tin is melted in the crucible, they cover it with a layer of a ſort of ſuet, which is uſually two inches thick, and the plate muſt paſs through this before it can come to the melted tin. The firſt uſe of this covering is to keep the tin from burning; as if any part ſhould take fire, the ſuet would ſoon moiſten it, and reduce it to its primitive ſtate again. The blanchers ſay, this ſuet is a compounded matter. It is indeed of a black colour, but Mr. Reaumur ſuppoſed that to be only an artifice to make it a ſecret, and that it is only coloured with ſoot, or the ſmoke of a chimney; but he found it true ſo far, that the common unprepared ſuet was not ſufficient; for after ſeveral attempts, there was always ſomething wanting to render the ſucceſs of the operation certain. The whole ſecret of blanching, therefore, was found to lie in the preparation of this ſuet; and this he at length diſcovered to conſiſt only in the firſt frying, and burning it. This ſimple operation not only gives it the colour, but puts it into a condition to give the iron a diſpoſition to be tinned, which it does ſurpriſingly.

The melted tin muſt alſo have a certain degree of heat, for if it is not hot enough, it will not ſtick to the iron; and if it is too hot, it will cover it with too thin a coat, and the plates will have ſeveral colours, as red, blue, and purple; and upon the whole will have a caſt of yellow. To prevent this, by knowing when the fire has a proper degree of heat, they might try with ſmall pieces of iron; but, in general, uſe teaches them to know the degree, and they put in the iron when the tin is at a different ſtandard of heat, according as they would give it a thicker or a thinner coat. Sometimes alſo they give the plates a double layer, as they would have them very thickly covered. This they do by dipping them into the tin, when very hot, the firſt time, and when leſs hot, the ſecond. The tin, which is to give the ſecond coat, muſt be freſh covered with ſuet, and that with the common ſuet, not the prepared. Philoſ. Tranſ. N° 406. p. 634.

LATUS, in *Ichthyology*, the name of a fiſh of the coracinus, or umbra kind, caught in the Nile, and in the Adriatic and Mediterranean ſeas. It much reſembles the common coracinus, but is larger, and has not the beard which hangs from the chin in that ſpecies; and its body is ſomewhat rounder. It is eſteemed a very delicate fiſh. Rondelet. de Piſc. p. 130.

LATUS, in *Anatomy*, a name given by many authors to one of the muſcles of the anus, now generally called the *levator ani*.

LATUS *muſculus*, in *Anatomy*, is alſo a name given by Riolanus, and others, to a muſcle called by Albinus *latiſſimus colli*, and by others *platyſma myoides*, and *quadratus genæ*. Part of this muſcle ariſing from the cheek, is called by Santorini the *muſculus riſorius novus*. See QUADRATUS.

LATUS *pulſus*, a *broad pulſe*, a term uſed to expreſs that ſort of *pulſe*, in which the artery is very ſenſibly dilated at every ſtroke.

LATUS *rectum*, in *Conics*, the ſame with PARAMETER.

LATUS *tranſverſum* of the hyperbola, is a right line, intercepted between the vertices of the two oppoſite ſections; or that part of the common axis, which is between the vertices of the upper and lower cone.

Such is the line ED (*Tab. Conics, fig.* 1.) where alſo D*d*, and E*e*, may be the parameters belonging to the two oppoſite ſections DLRO, and OEOR.

To this *latus tranſverſum* anſwers the longeſt diameter in the ellipſis; which Apollonius calls the *tranſverſe axis*, or *diameter*.

LATUS *rectum* is a right line belonging to a conic ſection, drawn through the vertex of the ſection of the cone, and within it; as the line EE, or DD, in the figure above referred to.

LAVA, is a name given by the Italians to the liquid and vitrified matter, diſcharged by Veſuvius, Ætna, and other volcanos, at the time of their ERUPTION.

This *lava* is a mixture of ſtones, ſand, earth, metallic ſubſtances, ſalts, &c. calcined, rendered fuſible, and vitrified by the fire of the volcanos: but as the maſs of which it originally conſiſts is very heterogeneous, the *lava*, when cold, appears under various forms and colours.

The pureſt *lava*, is a hard black, homogeneous, compact glaſs: of this kind is the ſtone found in many parts of Peru, and called by the Spaniards *piedra di Gallinazo*. There is another ſpecies of *lava*, which is hard, heavy, and compact, like marble, and which is ſuſceptible of a very fine poliſh. This is converted at Naples to a variety of domeſtic uſes. There is another kind which is a groſſer ſtone, and commonly aſh-coloured, uſed for building and paving the ſtreets. That which is found on the ſurface is ſtill more groſs and ſpongy, and reſembles the ſcoria of metals.

LAVACRUM, in *Botany*, a name given by ſome authors to the common wild teaſel, or *diſpacus ſylveſtris major*. Ger. Emac. Ind. 2.

LAVARETUS, in *Ichthyology*, a name of a ſmall fiſh called by ſome the *gang fiſh*, and the *shingus*, and by Morgrave the *curimato*. It ſeems of a middle nature, between the trout and herring-kind, and is caught in vaſt quantities in the months of March and April, in ſeveral of the lakes in Germany, and is pickled, and ſent to

different parts of the world. It seldom grows to more than four inches long.

LAVATERA, *tree-mallow*, in *Botany*, a genus of the *monadelphia polyandria* class: the characters are; that the flower has a double empalement, the outer of one leaf, short, obtuse and trifid, the inner of one leaf and quinquefid, and both permanent; the flower hath five petals joined at their base, and spread open above; it has many stamina, joined in a column below, and loose above: they are inserted in the petal, and terminated by kidney-shaped summits; the germen is orbicular, and supporting a short cylindrical style, crowned by many briftly stigmas; the empalement afterwards becomes a fruit with several capsules, covered in front by a hollow kind of shield, each capsule having one kidney-shaped seed. Miller reckons eleven and Linnæus nine species.

LAVATION, in *Antiquity*, a feast of the Romans, in honour of the mother of the gods, instituted in memory of the day when the worship of Cybele was transferred from Phrygia to Rome, and celebrated on the twenty-fifth of March.

LAVATORY, or LAVADERO, a name given to certain places in Chili and Peru, where gold is got out of earth by washing.

M. Frezier gives us the following description of the *lavatories* of Chili: they dig deep into the earth, in such places as they have reason to expect gold in; and, in order to facilitate this digging, they turn a stream of water upon the spot, loosening the earth as much as possible all the time, that the current may have the greater effect, and tear up the earth more strongly. When they are got to the earth they want, they turn off the stream, and dig dry.

The earth that they now get is carried on mules, and discharged into a baſon, made somewhat in the manner of a smith's bellows, into which a little rivulet of water runs with a great deal of rapidity, dissolving the parts of the earth, and carrying every thing away with it, excepting the particles of gold, which, by their great weight, precipitate to the bottom of the baſon, and mix with a fine black sand, where they are almost as much hidden as they were before in the earth. See *History of* GOLD.

Sometimes they find very considerable pieces in *lavatories*, particularly some pieces of twenty-four ounces each. There are several *lavatories* where they find these pepitas, or pieces of virgin gold, of a prodigious size. Among others, they tell of one that weighed five hundred and twelve ounces, bought by the count de la Moncloa, viceroy of Peru.

Nine or ten leagues to the east of Coquimbo are the *lavatories* of Andacoll; the gold whereof is twenty-three carats fine. Their work here always turns to great profit, excepting when the water fails them. The natives maintain, that the earth is creative (*creatrix*); that is, it produces gold continually; because, after having been washed sixty or eighty years, they find it impregnated afresh, and draw almost as much out of it as at first.

LAUDANUM, a name given by the chemists to certain preparations, chiefly extracts of opium, on account of their excellent qualities; the word being derived from *laudare, to praise*.

We have divers kinds of *laudanum*; as Sydenham's *liquid laudanum, tartarized liquid laudanum*, &c. See OPIUM.

LAUDICOENI, among the *Romans*, formed of *laus, praise*, and *cœna, supper* or *entertainment*, applauders, or persons who, for a reward, attended the rehearsal of plays and orations, in order to raise, or join in the acclamation. See ACCLAMATION and APPLAUSE.

LAUDS, LAUDES, the second part of the ordinary office of the breviary, said after matins; though, heretofore, it ended the office of the night.

The *laudes* consist principally of psalms, hymns, &c. whence they took their name, from *laus, laudis, praise*.

LAVENDER, *lavandula*, in *Botany*, a genus of the *didynamia gymnospermia* class. Its characters are these: the flower, which has an oval permanent empalement of one leaf, is of the lip kind, with one petal, having a cylindrical tube spreading above; the upper lip is bifid and open, the under lip cut into three equal segments; it has four short stamina, two of which are shorter than the other; it has a germen divided into four parts, which turn to four oval seeds sitting in the empalement.

We have three or four species of this plant in our gardens, all which are propagated by planting their cuttings or slips, in March, in a place where they may be shaded. They must be watered till they have taken good root, which will be in about two months; after which they may be planted out where they are to remain. They thrive best in an open situation, and gravelly soil. They grow taller in richer ground, but they are there very subject to be destroyed in hard winters, and their flowers are never so well scented.

The flowers and summits of the narrow-leaved *lavender* are, in a very eminent degree, cephalic and nervine. They are often employed as a perfume, and medicinally as mild stimulants and corroborants, in palſies, vertigoes, lethargies, and tremors of the limbs, both internally and externally.

The flowers are sometimes used in the form of a conserve, into which they are reduced by beating them, while fresh, with thrice their weight of double refined sugar. Water extracts by infusion nearly all the virtue both of the leaves and flowers: in distillation with water, the leaves yield a small portion of essential oil; but the flower in their most perfect state about one ounce from sixty. This oil is of a bright yellowish colour, a very pungent taste, and posſesses, if carefully distilled, the fragrance of the *lavender* in perfection: it is given internally from one drop to five, and employed in external applications for stimulating paralytic limbs, and for destroying cutaneous insects. Rectified spirit extracts the virtue of *lavender* more completely than water. The simple spirit of *lavender*, prepared by pouring a gallon of proof spirit on a pound and a half of the fresh-gathered flowers, and drawing off five pints by the heat of a water-bath, is richly impregnated with the fragrance of the flowers. More compounded spirits, in which other aromatics are joined to the *lavender*, have been distinguished by the name of English or pally drops: the college of London directs three pints of the simple spirit of *lavender*, and one pint of spirit of rosemary, to be digested on half an ounce of cinnamon, half an ounce of nutmegs, and three drams of red saunders, as a colouring ingredient: the college of Edinburgh orders a gallon and a half of rectified spirit of wine to be drawn over from three pounds of fresh *lavender* flowers, one pound of those of rosemary, and three ounces of lemon peel; and afterwards three ounces of cinnamon, one of cloves, one of cubebs, and two of red saunders, to be macerated for three days in the distilled spirit. These preparations are taken internally on sugar or in any convenient vehicle from ten to one hundred drops, and used externally in embrocations, &c. Lewis's Mat. Med.

The broad-leaved *lavender*, to which foreign writers have given the name of SPIKE, appropriated by some of our's to the first, is stronger both in smell and taste than the other and yields in distillation almost thrice as much essential oil; but the flavour of the oil and of the plant itself is much less grateful: the oil is like wise of a much darker colour, inclining to green. Lewis. See *Oil of* SPIKE.

LAVENDER *cotton, santolina*, in *Botany*, a genus of the *syngenesia polygamia æqualis* class. Its characters are these: it has a compound flower, with a scaly hemispherical empalement; the flower is uniform, composed of many funnel-shaped hermaphrodite florets, which are longer than the empalement, cut into five parts at the top; and which turn backward: they have five very short hair-like stamina, terminated by cylindrical summits; and an oblong four-cornered germen, supporting a slender style, crowned by two oblong depressed horn stigmas; the germen becomes a single oblong four-cornered seed, which is either naked, or crowned with very short down, and ripening in the common empalement. Miller enumerates twelve species, one of which is known by the name of *female* SOUTHERNWOOD.

LAVENDER, *French*. See CASSIDONY.

LAVENDER, *sea, limonium*, in *Botany*, is joined by Linnæus to the genus of STATICE. Its characters are these: the flowers have an imbricated perianthium, and are funnel-shaped, composed of five petals; it has five awl-shaped stamina, crowned by prostrate summits; and a small germen crowned by pointed stigmas; the empalement of the flower becomes a capsule that close at the neck, but expanded above where the seeds are lodged. There are twelve species. Miller.

The common *sea-lavender* is an astringent, and is given with good success against diarrhœas, dysenteries, proluvia of the menses, and hæmorrhages of all kinds. The roots and leaves are the parts most used.

LAVENDER, *bulbous-rooted sea, or* SIDE-*saddle flower, statice*, in *Botany*, a genus of the *pentandria monogynia* class. Its characters are these: the flower has a double empalement, the under composed of three oval leaves which fall away, and the upper having five coloured leaves which are permanent; it has five oval inflexed petals, which include the stamina, whose tails are oblong, oval, and erect; and a great number of small stamina, terminated by target-shaped summits; in the centre is situated a roundish germen, supporting a short cylindrical style, crowned by a target-shaped, three-cornered stigma covering the stamina, and is permanent; the germen becomes a roundish capsule, with five cells, filled with small seeds. There are two species.

These plants are esteemed for the singular structure of their

their leaves and flowers; but there is some difficulty in getting them to thrive in England. They grow naturally on the bogs of North America and Carolina.

LAVER, in *Botany*. See TREMELLA.

LAVER *bread*, a sort of food made of a sea-plant, otherwise called the *oyster-green*, or *sea-liver-wort*. It is said to be used in the county of Glamorgan, and other parts of Wales.

LAVER, in *Scripture History*, a sacred utensil placed in the court of the Jewish tabernacle, consisting of a bason, whence they drew water by cocks, for washing the hands and feet of the officiating priests, and also the entrails and legs of the victims.

LAVERNA, in *Antiquity*, the goddess of thieves and cheats among the Romans, who honoured her with public worship, because she was supposed to favour those who wished that their designs might not be discovered. Varro says, that she had an altar near one of the gates of Rome; hence called *Porta Lavernalis*.

LAUGERIA, in *Botany*, a genus of the *pentandria monogynia* class: the corolla is divided into five segments; and the fruit is a drupe, including a five-celled nucleus.

LAUGHER, a name given to a particular species of pigeon, called by Moore the *columba rideus*. It is about the size of the common pigeon, and much of the same make; but it has a very bright pearl-coloured eye, almost white, and is a mottled red, or blue. They are said to be brought from Jerusalem, and the country thereabouts. When the cock of this species courts the hen, he has a guttural cooing, not unlike the gurgling of a bottle of water, when poured out hastily; and after this he always makes a noise, not unlike laughing, from the singularity of which he has obtained his name.

LAUGHTER, an action or passion peculiar to man. Authors attribute *laughter* to the fifth pair of nerves, which sending branches to the eye, ear, lips, tongue, palate, and muscles of the cheek, parts of the mouth, præcordia, &c. there hence arises a sympathy, or consent, between all these parts; so that when one of them is acted upon, the others are proportionably affected.

Hence a savoury thing seen or smelt, affects the glands and parts of the mouth, a thing seen or heard, that is shameful, affects the cheek with blushes; on the contrary, if it please and tickle the fancy, it affects the præcordia, and muscles of the mouth and face, with *laughter*; if it causes sadness and melancholy, it likewise affects the præcordia, and demonstrates itself by causing the glands of the eyes to emit tears.

Dr. Willis accounts for the pleasure of kissing from the same cause; the branches of this fifth pair being spread to the lips, the præcordia, and the genital parts; whence arises a sympathy between those parts.

LAVIGNON, the name of a French shell-fish, common on the coast of Poitou, of the chama-kind, having a very thin pair of shells for its covering, and which never can shut close, in the manner of the oyster or muscle, or other common bivalve shells. The fish therefore always buries itself in the mud by way of security. The shells are very smooth and polished, especially on the inside, and they are naturally white. This colour they always retain within, though their outer surface is often tinged black by the mud.

They are often buried five or six inches deep in the mud, but it is always easy to know where they are, because they must keep a free communication with the water above; by means of a round aperture, of about a tenth of an inch diameter, which opens from the surface of the mud to every shell fish. When the shells of this fish are opened to their utmost width, it is easy to see a sort of arm with which each is furnished, in the manner of the common muscle, for its progressive motion. This part serves them to bury themselves in the mud, and to raise themselves out of it again, when they are inclined to seek a new habitation; unto which it makes its way in a more speedy manner than would easily be thought.

When the creature is plunged to its proper depth under ground, it yet receives the benefit of the water above, by means of two pipes, or proboscides, which have each a double aperture at their ends. These take in water, and throw it out again, alternately, for the uses of the animal, and either of the two is indifferently qualified to answer either purpose. The fish has a power of lengthening, or shortening these pipes at pleasure, and, when it pleases, takes them wholly into the shell. Mem. Acad. Par. 1710.

LAVIN, in *Natural History*, a name given by the people of the Philippine Islands to a species of hawk, a bird of great beauty, being variegated all over with yellow, black, and white. They call it also SIGUR.

LAUNCE, in *Ichthyology*. See AMMODYTES.

LAUNCEGAYS, in our *Old Writers*, a kind of offensive weapons, now disused, and prohibited by the statute 7 Rich. II. cap. 13.

LAUNCH, in the sea phrase, is *to put out*: thus they say, *launch the ship*; that is, put her out of the dock, or out of the key, &c.

To facilitate the operation of *launching*, the ship, when she is first built, is supported by two strong platforms, laid with a gradual inclination to the water, on the opposite sides of her keel, to which they are parallel. Upon the surface of this declivity are placed two corresponding ranges of planks, which compose the base of a frame, called the CRADLE, whose upper part envelops the ship's bottom, to which it is securely attached. Thus, the lower surface of the cradle, conforming exactly to that of the frame below, lies flat upon it, lengthways, under the opposite sides of the ship's bottom; and as the former is intended to slide downwards upon the latter, carrying the ship along with it, the planes or faces of both are well daubed with soap and tallow. The necessary preparations for the *launch* being made, all the blocks and wedges, by which the ship was formerly supported, are driven out from under her keel, till the whole weight gradually subsides upon the platforms, which are accordingly called the ways. The shores and stanchions, by which she is retained upon the stocks till the time of *launching*, are at length cut away, and the screws applied to move her, if necessary. The motion usually begins at the instant when the shores are cut, and the ship slides downward along the ways, which are generally prolonged under the surface of the water to a sufficient depth, to float her as soon as she arrives at the farthest end thereof. When a ship is to be *launched*, the ensign, jack, and pendant, are always hoisted, the last being displayed from a staff erected in the middle of the ship. Ships of the first rate are commonly constructed in dry docks, and afterwards floated out, by throwing open the flood-gates, and suffering the tide to enter, as soon as they are finished. Falconer.

LAUNDER, in *Mineralogy*, a name given in Devonshire, and other places, to a long and shallow trough, which receives the powdered ore after it comes out of the box, or coffer, which is a sort of mortar, in which it is powdered with iron pestles.

The powdered ore, which is washed into the *launder* by the water from the coffer, is always finest nearest the grate, and coarser all the way down. See BUDDLE and *Dressing of* ORE.

LAURA, Λαύρα, primarily signifying *village*, *street*, or *hamlet*, a name given to the residences of the ancient MONKS. Authors cannot agree about the difference between a *laura* and a monastery: some pretend, that a *laura* was a monastery, wherein there lived at least a thousand monks; but this is in no-wise credible. The more natural opinion is, that the ancient monasteries were the same with the modern, consisting of large buildings, divided into halls, chapels, and cells, possessed by the monks, each of whom had his apartment; but the *lauræ* were a kind of villages, whereof each house was inhabited by one or two monks at the most; so that the houses of the Chartreux seem, in some measure, to represent the ancient *lauræ*, and those of the other monks proper monasteries. The term *laura* was only understood of the religious places in Egypt, and the East, where their houses stood apart from each other, and were not joined by any common cloister, the monks that inhabited them only meeting in public once a week.

LAURACES *lapis*, in *Natural History*, the name of a stone said to be of great virtues against the head-ach, but not known among us, nor described by the ancients.

LAUREAT, *poet*, is a well known office in the king's household. Sir John Hawkins observes, that there are no records which ascertain the origin of the institution of the office in this kingdom, though there are many that recognize it. It appears that as early as the reign of Henry III. there was a court poet, named Henry de Avranches, who is supposed to have had an appointment of a hundred shillings a year, by way of *salary* or *stipend*. In 1341 Petrarch was crowned with laurel in the Capitol by the senate of Rome; afterwards Frederic III. emperor of Germany, gave the laurel to Conradus Celtes; and ever since the counts palatine of the empire have claimed the privilege of solemnly investing poets with the bays. Chaucer, who was contemporary with Petrarch, and acquainted with him while abroad, assumed the title of *poet-laureat* on his return to England; and in the twelfth year of Richard II. obtained a grant of an annual allowance of wine. We read of persons under the same title in the reigns of Edward IV. Henry VII. and VIII. and of James I. who, in 1615, granted to his *laureat* an annual pension of one hundred marks. In the year 1630, this pension was augmented, by letters patent of Charles I. to 100*l. per annum*, with an additional grant of one terce of Canary Spanish wine, to be taken out of the king's store of wines yearly. Hawkins's Hist. of Music, vol. iv. p. 13.

LAUREATION, a term in the Scottiſh univerſities, uſed for the act of taking up the degree of a maſter of arts, to which the ſtudents are admitted after four years ſtudy in the univerſity.

LAUREL, *padus*, in *Botany*; Linnæus has joined this genus to the PLUM. Its characters are theſe: the empalement of the flower is bell-ſhaped, of one leaf, indented in five parts at the brim; and the flower has five large roundiſh petals which ſpread open, and are inſerted in the empalement; it has from twenty to thirty awl-ſhaped ſtamina, which are inſerted in the empalement; and a roundiſh germen ſupporting a ſlender ſtyle; the germen becomes a roundiſh fruit, incloſing an oval pointed nut, having rough furrows. Miller enumerates ſix ſpecies, one of which is called in America baſtard mahogany.

This tree is very eaſily propagated, by planting cuttings of it in September, in a cool ſhady border, where they will very ſoon take root, and the year afterwards are to be removed into beds, and placed at two or three feet diſtance; and when they have ſtood here two years, they will be fit for tranſplanting into the places where they are to ſtand. The beſt ſeaſon for making this laſt removal is April. This is the better method when they are deſigned for dwarfs; but if they are intended for high trees, they ſhould be raiſed from berries, as they then always grow much faſter. The berries ſhould be ſown as ſoon as they are ripe, covering them an inch thick with earth, and the young plants will appear the ſpring following, when they ſhould be cleared of weeds, and watered in dry weather. In the following autumn they ſhould be tranſplanted, and ſet at a foot diſtance; and when they are two years older, may be removed to the places where they are to remain.

Laurel berries are held to be carminative, emollient, and reſolvent. They are given internally in ſuppreſſions of urine and the menſes, in colics, in pains after delivery, and all nervous complaints. Externally they are uſed in emollient cataplaſms and fomentations.

The diſtilled water, and the infuſion of the leaves of the *laurel* are poiſonous; both the water and the infuſion having been obſerved to bring on convulſions, palſy, and death, when taken by the mouth, or anus.

This was diſcovered by the accident of two women dying ſuddenly at Dublin, after drinking ſome of the common diſtilled *laurel*-water. Several experiments were then made on dogs, and communicated to the Royal Society by Dr. Madden, and afterwards confirmed by Dr. Mortimer, which plainly ſhewed the poiſonous effect of *laurel*-water. See Phil. Tranſ. N° 418, 420.

The *laurel* being an ever-green, and abounding with a warm eſſential oil, it was at firſt imagined that other ever-greens might partake of the ſame poiſonous quality. But by Dr. Madden's experiments made on the leaves of the yew-tree, and on box-leaves, no ſuch quality appeared. Phil. Tranſ. N° 418.

The expreſſed juice of *laurel*-leaves has the like poiſonous effects with the diſtilled water and the decoction.

Several things were tried as antidotes to this poiſon, as bole, vinegar, and milk. The two former did little good, but the dog which drank the milk recovered, without any bad ſymptoms. However it is ſaid that infuſions of the leaves, made properly very weak, are commonly uſed in Holland in diſorders of the lungs.

LAUREL, *Alexandrian*. See BUTCHER'S *Broom*.

LAUREL, *dwarf*, of *America*. See KALMIA.

LAUREL, *ſea-ſide*, *phyllanthus*, in *Botany*, a genus of the *monoecia triandria* claſs. Its characters are theſe: it hath male and female flowers in the ſame plant; the empalements of the flowers in both ſexes are permanent, bell-ſhaped, and of one leaf, cut into ſix parts, which ſpread open; the flowers have no petals according to ſome, or no empalements according to others; the male flowers have three ſhort ſtamina, which join at their baſe, but ſpread aſunder at their top, and are terminated by twin ſummits; the female flowers have an angular nectarium ſurrounding the germen, which afterwards becomes a roundiſh capſule with three furrows, having three cells, each containing a ſingle roundiſh ſeed. Miller enumerates only one, and Linnæus ſix ſpecies. Miller.

LAUREL, *ſpurge*. See SPURGE *laurel*.

LAURELS, pieces of gold coined in the year 1619, with the king's head laureated, which gave them the name of *laurels*: the twenty-ſhilling pieces whereof were marked with XX. the ten-ſhillings X. and the five-ſhilling pieces with V.

LAURENCE, *canons of St.* an order of regular canons, ſo called from the monaſtery of St. Laurence d'Oulx, in Dauphiné.

This congregation is ſaid to have been founded by St. Benedict. It was deſtroyed by the Vandals, and continued uninhabited till the middle of the eleventh century. In 1057, Odo, count of Savoy, gave it to one Gerard, and his canons. This donation was confirmed in 1065, by Cunibert, biſhop of Turin, who added to it above forty other churches; by which means a very conſiderable congregation was formed, to whom the ſucceeding popes, and counts of Savoy, granted a great many privileges.

It had thirty priories; the chief, who is the prior of the congregation, bears the title of proveſt, and exerciſes a ſpiritual juriſdiction throughout his proveſtſhip.

LAURENTALIA, or LARENTALIA, called alſo *Larentinalia*, *Laurentales*, and *Larentales*, feaſts celebrated among the Romans on the tenth of the calends of January, or twenty-third of December, in memory of Acca Laurentia, wife of the ſhepherd Fauſtulus, and nurſe of Romulus and Remus.

Acca Laurentia, from whom the ſolemnity took its name, is repreſented as no leſs remarkable for the beauty of her perſon, than her laſciviouſneſs; on account of which, ſhe was nick-named by her neighbours, *lupa*, *ſhe-wolf*; which is ſaid to have given riſe to the tradition of Romulus and Remus being ſuckled by a wolf. She afterwards married a very rich man, who brought her great wealth; which, at her death, ſhe left to the Roman people; in conſideration whereof they performed her theſe honours; though others repreſent the feaſt as held in honour of Jupiter Latiaris. See LARENTINALIA and LARES.

LAURENTIA. See LOBELIA.

LAUREOLA. See SPURGE *laurel*.

LAURINUM. See DAPHNEIDON.

LAURO *ceraſo*, in *Botany*. See LAUREL.

LAUROTAXA, in *Botany*, a name uſed by Columna, and ſome other authors, for the narrow-leaved kind of *ruſcus*, or butcher's broom, called by others *biſſingua*.

LAURUS. See BAY-*tree*.

The gum BENZOIN, CAMPHOR, and SASSAFRAS, are obtained from different ſpecies of this genus.

LAURUSTINE, in *Botany*. See WAYFARING-*tree*.

LAW, a command or precept, conſtituting a rule of action, and coming from ſome ſuperior authority, which an inferior is obliged to obey; or, according to ſome, *law* is a command, or mandate of ſome perſon, or power, whoſe precept carries with it the reaſon of obedience.

The word is formed from the Saxon *lah*, *lage*, which ſignifies the ſame.

Thus, the commands of God with reſpect to men, of a city with reſpect to the citizens, and univerſally of all powerful beings in reſpect to thoſe who cannot reſiſt, are called their *laws*.

The nature of a *law* will be moſt clearly diſcovered by ſhewing wherein it differs from *covenant*, *counſel*, and *right* or *equity*; with all which it is frequently confounded.

Law is confounded with covenant, by thoſe who take *laws* to be nothing elſe but *ſynallagmata*, or forms of living determined by the conſent of mankind: among which is Ariſtotle, who defines a *law*, "a declaration deter-"mined by the common conſent of a city, ſhewing in "what manner things are to be done:" which is not ſo much the definition of a *law*, as of a *civil law*; nor yet properly of a civil *law*; for this common conſent is no more than a mutual covenant, which does not oblige any perſon, and conſequently is not any *law*, till ſome ſupreme power be conſtituted with a power to compel, and to make it penal to tranſgreſs it. Here then the covenant is confounded with the *law*, which leads into abſurdities; for a covenant is a promiſe; a *law*, a command.

The difference between a counſel and a *law*, is this.

A counſel is a precept, wherein the reaſon of obedience is taken from the thing itſelf preſcribed; a command is a precept, wherein the reaſon of obedience depends on the will of the preſcriber; for we cannot properly ſay, *ſic vole*, *ſic jubeo*, unleſs *ſtet pro ratione voluntas*. A *law* comes from a perſon who has a power over thoſe whom he commands; a counſel, from him who has no ſuch power. To do what is enjoined by a *law*, is an act of duty; what by a counſel, an act of choice, or freewill.

Law is confounded with right or equity, by thoſe who perſiſt in doing what is permitted by the *divine law*, though prohibited by the *laws* of the country. What is prohibited by the *divine law*, cannot be permitted by the *civil law*; nor what is commanded by the *divine law*, be prohibited by the *civil law*; but what is permitted by the *divine law*, may, notwithſtanding, be prohibited by the *civil law*: for the inferior *laws* have a power of reſtraining the liberty left the ſuperior *laws*, though they cannot enlarge it. Now right or equity is a natural liberty, not conſtituted by *laws*, but free of them; for take away *laws*, and liberty is complete.

This liberty is firſt reſtrained by the *natural* and the *divine law*, the reſt reſtrained by the *civil laws*; and what

remains

remains unreſtrained by the *civil laws*, may be again reſtrained by the conſtitution of particular cities and ſocieties. There is a great difference, therefore, between *law* and right, *lex & jus*; for *law* is a chain; but right, a liberty; and they differ as two contraries.

Law may be divided, with reſpect to its different origins, into *divine* and *human*.

LAW, *divine*, may be conſidered as twofold, with reſpect to the two different manners in which God notifies his will to man; viz. *natural* (or *moral*), and *poſitive*.

LAW, *natural*, is that which he has made known to all mankind, by an innate light, called *natural reaſon*.

LAW, *poſitive*, is that which he has revealed by his prophets or by perſons ſupernaturally commiſſioned and inſpired, and found only in the holy ſcriptures: as thoſe *laws* delivered to the Jews, relating to the divine worſhip and polity, which may be called *divine civil laws*, as being peculiarly directed to that people.—Again,

Natural law may be divided into that *natural law* of men, which in a peculiar ſenſe, is called *the* LAW *of nature*; and the *natural law* of countries, commonly called *the* LAW *of nations*.—The precepts are the ſame in both theſe: but becauſe, when ſocieties are once inſtituted, certain perſonal properties become veſted in men; that *law*, which, when we ſpeak of the duties of men ſeverally, we call *the natural law*; when tranſferred to cities or countries, we call *the law of nations*.

M. Regis ſays, that the *laws* of nature are the dictates of right reaſon, which teach every man how he is to uſe his natural rights; and the *laws* of nations, the dictates, in like manner, of right reaſon, which teach every ſtate how to act and behave themſelves toward others.

LAWS, *human*, are all civil. See CIVIL.

For, according to Hobbes, the ſtate of man, out of ſociety, is a ſtate of war; wherein, no one being ſubject to another, there can be no other *law* beſides the dictates of natural reaſon, which is the *divine law*.

LAWS, *civil*, may be divided, with regard to the difference of their ſubject-matter, into *ſacred* and *ſecular*.

LAWS, *ſacred*, are thoſe that relate to religion; that is, to the ceremonies and worſhip of the Deity, and which are not preſcribed by any poſitive divine *law*.

LAWS, *ſecular*, are thoſe that relate to property, &c. commonly called by the name *civil*.—Farther,

Civil laws, conſidered with regard to the two offices of the legiſlator; *viz.* to judge and to compel; may be divided into two branches; the one *diſtributive*, the other *vindictive*, and *penal*.

LAW, *diſtributive*, is that by which every man has his right; or, it is that which conſtitutes the rules and meaſures of things, whereby we know what belongs to us, and what to others; ſo as we may not diſturb or interrupt others in the enjoyment of their own, nor be interrupted by them; and what each man may lawfully do, or not do.

LAW, *vindictive*, is that branch by which the puniſhments to be inflicted on thoſe who violate the *laws*, are determined.

The diſtributive and vindictive are not two ſpecies of *laws*, but two parts of the ſame *law*. For if a *law* ſay no more than "Whatever you catch in your net, in the "ſea, ſhall be your's," it is in vain; for though another take from you what you have caught, it is ſtill your's; in regard, in the ſtate of nature, where all things are common, your's and another's are the ſame thing. So that what the *law* defines to be your's, was your's before that *law*, and will be your's after it, though poſſeſſed by another.—A *law*, therefore, is but an empty ſound, unleſs it determine the thing to be your's in ſuch a ſenſe, as to forbid every body elſe from diſturbing you in the poſſeſſion of it. But ſuch prohibition will be vain, unleſs there be a penalty annexed to it.—A *law*, therefore, muſt contain both theſe parts, that which prohibits, and that which puniſhes. The firſt whereof, which is called *diſtributive*, is prohibitory, and ſpeaks to all; the latter, called *vindictive*, or *penal*, is mandatory, and ſpeaks only to the public officers. Whence it follows, that to all *civil laws* there is annexed a penalty, either implicitly, or explicitly; and where that puniſhment is not aſcertained, either by writing, or by example, it is ſuppoſed to be arbitrary, and to depend on the pleaſure of the legiſlator: for that is no *law*, which may be violated impuné.

Civil or *municipal law* is well defined by judge Blackſtone to be "a rule of civil conduct, preſcribed by the "ſupreme power in a ſtate, commanding what is right, "and prohibiting what is wrong." And he obſerves, that every *law* may be ſaid to conſiſt of ſeveral parts: one, DECLARATORY, whereby the rights to be obſerved, and the wrongs to be eſchewed, are clearly defined and laid down: another *directory*, whereby the ſubject is inſtructed and enjoined to obſerve thoſe rights, and to abſtain from the commiſſion of thoſe wrongs; a third, *remedial*, whereby a method is pointed out to recover a man's private rights, or redreſs his private wrongs: to which may be added a fourth, uſually termed the *ſanction*, or *vindicatory* branch of the *law*, whereby it is ſignified what evil or penalty ſhall be incurred by ſuch as commit any public wrongs, and tranſgreſs or neglect their duty. Blackſt. Comm. book i. p. 54.

Civil laws, conſidered with regard to the different manners of promulgating them, are of two kinds; *ſcriptæ* and *non ſcriptæ*; or *written* and *unwritten*.

LAWS, *written*, are thoſe which require either the voice, or ſome other ſign of the legiſlator's will, to become *laws*.

LAWS, *unwritten*, are ſuch as need no other promulgation beſides the voice of nature, or natural reaſon; of which kind are all natural *laws*.

Hence it appears, that though the natural *laws* be deſcribed in the writings of the philoſophers, they are not therefore to be called *written laws*: nor are the writings of lawyers, *laws*, for want of the ſupreme authority; nor the *reſponſa prudentum*, or opinions of judges, *laws*, excepting ſo far as they are allowed by the ſupreme power, to paſs into uſe; and then they are called *leges ſcriptæ*, written *laws*; not becauſe of their uſe, but becauſe of the will of the ſupreme power, which is argued from their paſſing into uſe.

The firſt principle or *law* of nature, according to Hobbes, is ſelf-preſervation.—Thomaſius will have it to be our own happineſs, which falls in at laſt with the ſentiment of Hobbes.—Puffendorf maintains it to be ſociality.—Valentine Alberti, the belief that we are the image of God.—Henry and Samuel Cocceius, the will of God.—Grotius, right reaſon.—Velthemius, the intrinſic decency, or turpitude, of actions.—Strimeſius and Janus, that we are to love God, ourſelves, and our neighbour.

LAW is alſo applied to the ſeveral policies of ſtates and people, or the maxims and rules they have agreed upon, or received from their magiſtrates, whereby to live in peace and mutual ſociety.

The *laws* of the twelve tables, were the ancient *laws* of the Romans, for which the Decemviri were ſent into Greece, and which ſerved them for the ground-work of all their juriſprudence.

The celebrated *laws* of the more modern days, are thoſe of the Angli, the Werini, or Thuringi; of the Boii, or Bavarians; thoſe of the Burgundi, Germans, Danes, and Norwegians; of the Franks, the Friſons, the Lombards, the Gothic *laws*, the Martins, or Mercian *laws*; the *laws* of the Saxons, Scots, Sicilians, Viſigoths; the *laws* of Oleron, the Molmutin *laws*, and the Salic *laws*.

LAW, *lex*, among the firſt Romans properly ſignified an ordinance of the people, made at the requeſt of a magiſtrate, particularly a conſul.

Theſe ordinances differed from the plebiſcita, and ſenatus-conſulta, and even from other ordinances made at the requeſt of any other magiſtrate beſide a conſul, though thoſe too bore the name of *laws*.

Thus, though Aquilius and Falcidius were only tribunes when they made their requeſt, yet we ſtill ſay, the *Aquilian law*, the *Falcidian law*, &c.

The ſeveral *laws* of the Romans are diſtinguiſhed, 1. By the name of him at whoſe requeſt they were paſſed; as the *Cornelian law*, the JULIAN *law*, &c. 2. By the matter or ſubject of the *law*; and hence came the terms, *teſtamentary laws*, as the FURIAN, VOCONIAN, &c. *judiciary laws*, AGRARIAN *laws*, &c.

3. Sometimes by the crimes againſt which they were made. For inſtance: the *laws* touching *poiſoning*, *parricides*, &c. the *laws* of *concuſſion*, *peculate*, &c.

The CODEX and AUTHENTICÆ are the *laws* and conſtitutions of the Roman emperors; and the DIGEST is a compilation, made by the emperor Juſtinian's order, of the ſeveral opinions and judgments of the moſt learned in the Roman *law*; to which he gave the ſanction of *laws*, as appears by the epiſtle preſixed to the work; and it is this that properly conſtitutes the Roman *law*.

The *lex talionis*, or *law of like for like*, is the moſt ancient and equitable *law* in the world. It was obſerved by the Hebrews.

LAW *of England* may be divided into two kinds; the *lex non ſcripta*, the unwritten or common *law*; and the *lex ſcripta*, the written or ſtatute *law*. The former, i. e. the unwritten or common *law*, is properly diſtinguiſhable into three kinds. 1. General cuſtoms, which are the univerſal rule of the whole kingdom, and form the COMMON *law* in its ſtricter and more uſual ſignification. 2. Particular cuſtoms, which for the moſt part affect only the inhabitants of particular diſtricts. See CUSTOM and COMMON *law*. 3 Certain particular laws, which by cuſtom are adopted and uſed by ſome particular courts of pretty general and extenſive juriſdiction. See CANON *law*, and CIVIL *law*.

The *leges ſcriptæ*, or written *laws* of the kingdom, are Statutes

ſtatutes, acts, or edicts, made by the king's majeſty, by and with the advice and conſent of the lords ſpiritual and temporal and commons in parliament aſſembled. The oldeſt of theſe now extant, and printed in our ſtatute-books, is the famous MAGNA *charta*, as confirmed in parliament, 9 Hen. III. See STATUTE.

There is another diviſion of our laws, more large and particular; as into the prerogative or crown *law*; the *law* and cuſtom of parliament; the common *law*; the ſtatute *law*; reaſonable cuſtoms; the *law* of arms, war, and chivalry; eccleſiaſtical or canon *law*; civil *law*, in certain courts and caſes; foreſt *law*; the *law* of marque and reprizal, the *law* of merchants; the *law* and privilege of the ſtannaries, &c. But this large diviſion may be reduced to the common diviſion; and all is founded on the *law* of nature or reaſon, and the revealed *law* of God, as all other *laws* ought to be. 1 Co. Inſt. 11.

LAW has alſo a more ſpecial ſignification, wherein it is taken for that which is lawful with us, and not elſewhere: as, "Tenant by the courteſy of England."

Thus we alſo ſay, to *wage law (vadiare legem)*, and to *make* or *do law (facere legem)*. See WAGER, and MAKE.

LAW, *aſſigned by*. See ASSIGNED.

LAW, *covenant of*. See COVENANT.

LAW, *foreſt*. See FOREST.

LAW, *frank*. See FRANK.

LAW, *intendment of*. See INTENDMENT.

LAW, *martial*. See MARTIAL.

LAW, *Poyning's*. See POYNING.

LAW, *releaſe in*. See RELEASE.

LAW, *ſalic*. See SALIC.

LAW, *ſuit in*. See SUIT.

LAW, *ſumptuary*. See SUMPTUARY.

LAW, *ſurrender in*. See SURRENDER.

LAWS, *by*. See BY-LAWS.

LAWS, *cock-pit*. See COCKPIT.

LAWS *of the ſtage*. See STAGE.

LAW *of arms*, is that *law* which gives precepts how rightly to proclaim war, to make and obſerve leagues, to attack the enemy, and to puniſh offenders in the camp.

Common things concerning arms and war are under the cognizance of the conſtable and marſhal of England. 13 R. II.

LAW *of marque*, a *law* by which thoſe who are driven to make uſe of it, take the goods, or ſhipping, of the party that has done them wrong, and of whom they cannot get ordinary juſtice, wherever they can take him within their own bounds or precincts. 27 Ed. III. cap. 17.

LAWS *of Molmutius*. See MOLMUTIN *laws*.

LAWS *of Oleron*. See OLERON.

LAW *of the ſtaple*, the ſame with LAW *merchant*.

LAW *merchant*, a ſummary ſort of *law*, originally differing from the *common law*, though now adopted, and become a part of the *laws* of the kingdom. One point of it conſiſts in this, that if there be two joint merchants of wares, and one of them dies, his executor ſhall have the moiety; which is not allowed in the caſe of others, not merchants. See CUSTOM.

LAW, *ſpiritual*, is the eccleſiaſtical or canon *law*, allowed and authorized in this realm, ſo far as it is not againſt the common *law*, nor againſt the ſtatutes and cuſtoms of the kingdom. And according to ſuch eccleſiaſtical *laws*, the ordinary and other eccleſiaſtical judges proceed in caſes within their cognizance.

LAW is alſo uſed figuratively in ſpeaking of the rules or order wherein any thing is performed.

Thus we ſay, the *laws* of motion, the *laws* of mechanics, the *laws* of fluids, the *laws* of chance, of a game, &c. *Laws* of friction, of reſiſtance, of deſcent of bodies, &c. *Laws* of elaſticity, rarefaction, reflexion, refraction, &c. all which ſee under their proper heads.

LAW, in *Scripture Hiſtory*, one of the three diviſions of the Old Teſtament, comprehending Geneſis, Exodus, Leviticus, Numbers, Deuteronomy. See CANON.

LAW-*day*, *lagedayum*, in our old *Law Writers*, was any day of open court, and commonly uſed for the courts of a county or hundred. It is alſo called *view of frank-pledge*, or *court-leet*. *Et quieti ſint de ſectis comitatuum & hundredorum wapentorum, de viſu franci plegii & lawdayorum*, &c.

LAWFUL. See UNLAWFUL.

LAWFUL *moan*. See NAAM.

LAWING *of dogs*, a phraſe uſed in our ancient law-writers. Thus, maſtiffs muſt be *lawed* every three years, Crompton Juriſd. fol. 163, that is, three claws of the fore-foot ſhall be cut off by the ſkin, or the ball of the fore-foot cut out. See EXPEDITATION.

LAWLESS *court*, a court held on King's-hill, at Rochford in Eſſex, every Wedneſday morning next after Michaelmas day, at cock-crowing; at which court they whiſper, and have no candle, nor any pen and ink, but a coal. He that owes ſuit or ſervice there, forfeits double his rent, every hour he is miſſing.

This court is called *lawleſs*, becauſe held at an unlawful hour; or, perhaps, *quia dicta curia lege*, becauſe opened without any form. It is mentioned by Camden; who ſays, this ſervile attendance was impoſed on the tenants, for conſpiring at the like unſeaſonable time to raiſe a commotion.

LAWLESS *man*, *ex lex*. See OUTLAW.

LAWN, a ſpacious plain in a park or adjoining to a noble ſeat. Theſe ſpacious plains make a noble figure before grand houſes, and the great rule in regard to their dimenſions, is to make thoſe in large parks as large as the ground will admit, never leſs, if poſſible, than thirty or forty acres: but in gardens a *lawn* of eight or ten acres is ſufficient. *Lawns* ought always to lie open to the front of the houſe, and to be open to the neighbouring country, not pent up with trees; and the moſt happy ſituation is, when the beſt rooms of the houſe front the eaſt, or rather the ſouth-eaſt, and the *lawn* lies immediately before them; becauſe the ſun, in an afternoon, in this caſe, ſhines on the proſpect, and at the ſame time not into the rooms. The beſt ſituation for a *lawn*, except this, is on the ſouth ſide of a houſe; for if on the weſt, it expoſes the houſe to too much wind, and if on the north too much open to the cold. It is beſt therefore to plant trees and wilderneſſes on the weſt and north ſides of houſes.

As to the figure of a *lawn*, ſome recommend an exact ſquare, others an oblong ſquare, ſome an oval, and others a circular figure: but neither of theſe ſhould be invariably regarded; becauſe it ought to be contrived ſo as to ſuit the figure of the ground: and as there ſhould be trees planted for ſhade on the boundaries of the *lawn*, the ſides may be broken by irregular plantations of trees, ſome breaking forwarder than others, and not too cloſely crouded together, which make a better appearance than any regular plantations can do. When there are no good proſpects beyond the *lawn*, it will be proper to have it bounded on every ſide by plantations, which may be brought round pretty near to each end of the houſe, ſo that perſons may ſoon get into ſhade. For this purpoſe thoſe trees ſhould be preferred, which grow large, ſtrait and handſome. Of the deciduous trees, the moſt proper are the elm, oak, beech, and cheſnut; and if there are ſome clumps of ever-green trees intermixed with the others, they will add to the beauty of the whole, eſpecially in the winter ſeaſon: the beſt ſorts for this purpoſe are lord Weymouth's pine, and the ſilver and ſpruce firs. Miller.

LAWNS, in *Commerce*. See CAMBRIC.

LAWSONIA, in *Botany*, a genus of the *octandria monogynia* claſs. Its characters are theſe: the flower, which has a ſmall permanent empalement divided into four parts at the top, is compoſed of four oval ſpear-ſhaped petals which ſpread open, and eight ſlender ſtamina ſtanding by pairs between them; it has a roundiſh germen, which becomes a globular capſule, ending in a point, having four cells filled with angular ſeeds. There are two ſpecies, natives of both the Indies.

The leaves of this ſhrub are much uſed by the Egyptian women to colour their nails yellow, which they eſteem an ornament.

LAWYER, *(legiſta, legiſperitus, juriſconſultus)* by the Saxons called *lahmon*; is a counſellor, or one learned in the law: and *lawyers*, ſuch as counſellors, attornies, &c. are within the act 3 Jac. I. againſt extortion; but it has been held only to extend to officers. See COUNSELLOR, ATTORNEY, &c.

LAXATIVE, in *Medicine*, is uſed to ſignify a looſe ſtate or diſpoſition of the body; ſo as to go frequently to ſtool.

LAXATIVES, or LAXATIVE *medicines*, are ſuch as promote this diſpoſition; which they do by ſome ſmooth, ſoftening quality, taking away the tenſity of the fibres, and facilitating the paſſage of the contents of the inteſtinal tube through it; for which reaſon all oily ſubſtances come under this claſs. See CATHARTICS, EMOLLIENTS, &c.

LAXIOR *toga*. See TOGA.

LAY, the name of a kind of ancient poeſy, or poem, among the French, conſiſting of very ſhort verſes.

There were two ſorts of *lays*; the *great*, and the *little*.

LAY, *greater*, was a poem conſiſting of twelve couplets of verſes, of different meaſures.

LAY, *little*, was a poem conſiſting of ſixteen or twenty verſes, divided into four couplets.

Theſe *lays* were the lyric poetry of the old French poets, who were imitated by ſome among the Engliſh. They were principally uſed on melancholy ſubjects, and are ſaid to have been formed on the model of the trochaic verſes of the Greek and Latin tragedies.

Father Mourgues gives us an extraordinary inſtance of one of theſe ancient *lays*, in his Treatiſe of French Poetry:

Sur l'appuis du monde
Que faut il qu'on fonde
D'espoir ?
Cette mer profonde,
En debris feconde
Fait voir
Calme au matin, l'onde
Et l'orage y grande
Le soir.

LAY *the land*, in *Sea Language*. See LAND.

LAY-*land*, in *Husbandry*, denotes fallow ground, which lies untilled. See FALLOW, and PLOUGHING.

LAY-*brother*, among the *Romanists*, a pious, but illiterate perſon, who devotes himſelf, in ſome convent, to the ſervice of the religious.

The *lay-brother* wears a habit different from that of the religious, nor ever enters into the choir, or the chapter. He is not in any orders, nor does he make any vow, excepting of conſtancy and obedience.

Theſe *lay-brothers* make the three vows of religion.

In the nunneries are alſo *lay-ſiſters*, who never enter the choir, &c. and who are only retained for the ſervice of the convent.

The inſtitution of *lay-brothers* began in the eleventh century. The perſons on whom this title was conferred, were ſuch as were too ignorant to become clerks, and who therefore applied themſelves wholly to bodily labour. It ſeems to have taken its riſe from hence, that the laity in thoſe days had not, for the generality, the leaſt tincture of learning; whence alſo thoſe came to be called *clerks*, by way of diſtinction, who had ſtudied a little, and were able to read.

In ſome orders they are only retained by a civil contract, which, however, binds them for life; in other orders they are to paſs through four years of probation, as among the Jacobins; or ſeven, as among the Feuillants. The Capuchins admit none before nineteen years of age. The Jeſuits call them *coadjutors*.

LAY-*canons*. See CANON.

LAY-*communities*. See COMMUNITY.

LAY-*corporation*. See CORPORATION.

LAY-*fee*, *feudum laicum*, land held in fee from a *lay*-lord, by the common ſervices to which military tenure was ſubject, as diſtinguiſhed from the *eccleſiaſtical* holding in *frankalmoign*, diſcharged from thoſe burdens.

LAY-*patronage*. See PATRONAGE.

LAYS, *ſides*. See SIDE-*lays*.

LAY, *vaunt*. See VAUNT-*lay*.

LAYER, in *Huſbandry* and *Gardening*, a young tender ſhoot or twig of a plant, not far from the ground, which is bent down, and ſeveral joints or knots buried under ground, till, having ſtruck root below, it is cut and ſeparated from the parent ſtock, and commences a new plant.

Many trees may be propagated by *layers*, which do not produce ſeeds here. The young branches of the former year's ſhoots of trees, ſhould be choſen to make *layers*, becauſe theſe are generally more inclined to put out roots than the older wood. When theſe are produced near the ground, they may with greater facility be layed. Theſe ſhoots ſhould be diveſted of their ſide-branches, if they have any; and thoſe ſorts of trees which put out roots with difficulty, ſhould have a ſlit made upward at a joint, in that part which is to lie in the ground; or a piece of wire twiſted cloſe round the branch at the ſame place, which will check the mounting ſap, and cauſe them to put out roots; the ground ſhould be well dug, and the clods broken; then the ſhoots ſhould be layed five or ſix inches under the ſurface, driving down a peg to each to prevent their riſing, leaving the end of the ſhoots twelve or eighteen inches above ground in an erect poſition.

The ſeaſon for laying hardy trees that ſhed their leaves, is in October, but for ſuch as are tender, in March; but for ever-greens, July or Auguſt are good ſeaſons.

If you would *lay* young trees from a high ſtandard, the boughs of which cannot be bent down to the ground, then you muſt make uſe of ozier-baſkets, boxes, or pots, filled with fine-ſifted mould mixed with a little rotten willow-duſt, which will keep moiſture to aſſiſt the *layer* in taking root: this muſt be ſet upon a poſt or treſſel, and the bough be laid as before; covering the ſurface with moſs to prevent the earth from drying.

There are many kinds of trees and plants which will not put out roots from their woody branches, though laid down with the utmoſt care; yet if the young ſhoots of the ſame year are laid in July, they will often put out roots very freely: ſo that when any plants are found difficult to propagate by *layers* in the common way, they ſhould be tried at this ſeaſon; but as theſe ſhoots will be ſoft and herbaceous, they muſt not have too much wet, for that will cauſe them to rot. Miller.

LAYES, or LEYES, a term uſed in many parts of England for ſuch paſture ground as had been formerly tilled and ſown.

LAYMAN, a perſon not engaged in any order of eccleſiaſtics: accordingly, in the diſtribution of the people, *laity* is oppoſed to the CLERGY, and may be divided into three diſtinct ſtates, viz. the CIVIL, the MILITARY, and the MARITIME.

LAYMAN, among *Painters*, a little ſtatue, or model, either of wax or wood, whoſe joints are ſo made, that it may be put into any attitude, or poſture. Its chief uſe is for the caſting and adjuſting draperies, for the clothing of figures.

Some call it, after the French, *manequin*, q. d. *a little man*.

LAYR. See LAIR.

LAZARETTO, or LAZAR-HOUSE, a public building, in manner of a hoſpital, for the reception of poor ſick.

LAZARETTO, in ſome countries, is an edifice appointed for perſons coming from places ſuſpected of the plague, to perform QUARANTINE.

This is uſually a large building, at a diſtance from any city, whoſe apartments ſtand detached from each other, &c. where ſhips are unladen, and their crew is laid up for forty days, more or leſs, according to the time and place of their departure.

LAZARI *morbus*, a name given by ſome writers to the ELEPHANTIASIS.

LAZAROLE, in *Botany*. See MEDLAR.

LAZARUS, *St.* or LAZARO, a military order, inſtituted at Jeruſalem by the Chriſtians of the Weſt, when they became maſters of the Holy Land; whoſe buſineſs was, to receive pilgrims under their care, guard them on the roads, and defend them from the inſults of the Mahometans.

Some ſay, this order was inſtituted in 1119. Pope Alexander IV. confirmed it by a bull in 1255, giving it the rule of St. Auguſtine.

The knights of this order, being driven out of the Holy Land, part of them retired into France, and were eſtabliſhed there under Louis VII. who beſtowed on them the country of Boigny, near Orleans. Innocent VIII. ſuppreſſed the order of *St. Lazaro* in Italy in 1490, or, rather, he united it to that of Malta. Leo X. re-eſtabliſhed it in Italy in the beginning of the ſixteenth century. In 1572, Gregory XIII. united it in Savoy to that of St. Maurice, juſt inſtituted by duke Emanuel Philibert.

In France, this order was united to that of Notre Dame, of Mount Carmel in 1608, and had ſome new advantages conferred on it by Louis XIV. The knights of *St. Lazarus* are allowed to marry, and yet have penſions upon benefices.

LAZARUS, *Fathers of St.* called alſo LAZARITES, a name given to certain regular clerks of a congregation inſtituted in France, in the ſeventeenth century, by M Vincent.

They take the denomination from a houſe in the Fauxbourg St. Denis of Paris: they have a ſeminary in Paris, called the ſeminary *des bons enfans*. The vows they make are ſimple, and may be diſpenſed with on occaſion.

LAZIVRAD, in *Natural Hiſtory*, one of the oldeſt names by which we find the *lapis lazuli* expreſſed in authors.

LAZZI, a denomination given by the Saxons to that rank of people, who were born to labour, and being of a more ſervile ſtate than our ſervants, becauſe they could not depart from their ſervice without leave of the lord, but were fixed to the land where born and in the nature of ſlaves: hence the word *lazzi* or *lazy*, ſignifies thoſe of a ſervile condition. See EDHILING.

LAZULI. *Lapis* LAZULI, a ſort of precious ſtone, of a blue colour, veined and ſpotted with white and yellow.

This is the ſame with what is otherwiſe called *azure* ſtone, by the ancients *cyaneus*, and *cæruleum*; by Meſue, the *ſtarry* ſtone; and by Pliny, and many of the ancients, *ſapphirus*.

Waltherius conſiders this ſtone as a ſpecies of jaſper; and Cronſtadt, more juſtly, as a ſpecies of that order of earths which have been lately called ZEOLITES. It is found in ſeveral parts of Europe, in mines of gold, ſilver, and copper; as alſo in quarries of marble; which laſt is that generally in uſe. But the moſt coſtly comes from Perſia and the Eaſt Indies.

Naturaliſts diſtinguiſh three kinds of *lapis lazuli*: the firſt called of the *old rock*, which is pure, ſmooth, a fine blue, with beautiful yellow ſtreaks like veins of gold, which yet are frequently no more than veins of pyrites. The ſecond, called that of the *new rock*, is debaſed by a mixture of common ſtones; its colour is weaker, and its price lower: theſe two kinds are brought from Perſia and Siam. The third kind is brought from the mountains of Auvergne: this is mixed with the common rock whence it is dug; it is of a pale blue, and is ſprinkled with

with greeniſh ſpots, with veins of pyrites. This, when ſufficiently charged with ſpots of green, is often ſold for the Armenian ſtone, which may be readily diſtinguiſhed by its being leſs hard than the *lazuli*, ſoon loſing its blue colour in moderate fire, and raiſing an effervescence with acids; its baſis ſeeming to be a calcareous earth.

M. Margraaf, and alſo M. Cronſtedt, have made experiment on this ſtone, carefully cleanſed from all white, pyritous, or heterogeneous matters. From theſe experiments we learn, 1. That this ſtone is ſoluble in acids, without effervescence; and when it has been previouſly calcined, it forms gelatinous maſſes with acids. 2. That by calcination it is not deprived of its blue colour, till at leaſt that operation has been long continued. 3. By a violent fire it is fuſible, and forms a frothy glaſs, ſometimes whitiſh, and ſometimes of a duſky yellow colour, but always clouded with blue ſpots. 4. Fuſed with nitre, and thrown red-hot into water, it tinged the water with a blue colour, which diſappeared in ſome hours. By this operation the ſtone loſt its blue colour. 5. Some of this ſtone, powdered and mixed with glaſs frit, produced a tranſparent citron-coloured glaſs. With borax, it produced a glaſs of a chryſolite colour. 6. It gave no ſigns of its containing copper, notwithſtanding it has been conſidered as an ore of copper by moſt authors. 7. It ſhewed marks of iron, by forming a blue precipitate, like Pruſſian blue, when a phlogiſticated alkali was added to a ſolution of this ſtone in acids. 8. Margraaf ſays, that by adding vitriolic acid to ſolutions of this ſtone in nitrous and marine acids, a white precipitate was formed, which he ſuppoſes was calcareous earth. Nevertheleſs, Mr Cronſtedt affirms, that this ſtone does not effervesce with acids. Perhaps the calcareous earth was not eſſential, but only accidental. 9. Cronſtedt ſays, that a precipitate is formed by adding a fixed alkali to a ſolution of this ſtone in vitriolic acid, which, being ſcorified with borax, yields a regulus of ſilver. He ſays, that by ſcorification with lead, two ounces of ſilver have been obtained from a hundred pounds of the ſtone. Mr. Margraaf does not mention that he found any ſilver; or that he ſearched for any. Perhaps it is only accidental. Dict. Chem. art. *Lapis Lazuli*, note *(q)*.

The goldſmiths, lapidaries, and thoſe who make inlaid works with precious ſtone, uſe the *lapis lazuli* in ſeveral pieces of workmanſhip; but its moſt common uſe is in making that fine blue, ſo much valued by limners, which is called ultra-marine, and which is ſold ſo dear.

This blue is prepared according to Wallerius, in the following manner. The ſtone, firſt finely levigated and mixed with linſeed oil, is to be added to a paſte, made by mixing together equal parts of yellow wax, colophony, and pitch, i. e. half a pound of each, with half an ounce of linſeed oil, two ounces of turpentine, and two ounces of maſtic. To three or four parts of this paſte one part of the levigated ſtone, mixed with linſeed oil, is to be added, and after this mixture has been digeſted together during three or four weeks, it is to be thrown into hot water, and ſtirred till the blue colour ſeparates and diffuſes in the water, which is then to be poured off. The blue matter is left to ſettle, and, when dry, is the ultramarine required. See *Ultramarine* BLUE.

The *azure-ſtone*, or *lapis lazuli*, in order to be of a good quality, and proper to make the ultramarine, ought to be heavy, but little mixed with common rock, and to have veins of copper, of a deep blue, inclining to that of indigo. Care muſt be taken that it has not been rubbed with olive oil, which makes it look of a deeper blue than it would be naturally. This impoſition may be diſcovered by breaking the ſtone; if its colour be paler within than without, it is a proof that it was falſified. You may alſo know whether the azure ſtone be of good quality, by heating in the fire, till it be red hot, which ought not to change its colour; it ought, on the contrary, to receive a new degree of brightneſs from that trial.

Azure in powder, which is alſo called aſhes of azure, is nothing but the azure in ſtone, or ſmalt, pulverized, which comes from ſeveral places, and particularly from Germany and Holland. The latter is dearer, and more valued; becauſe in the uſe, its colour comes nearer to that of the ultramarine; whence it is called common, or Dutch ultramarine. The powder azure of Germany ought to be ſandy, well grained, and of as deep a colour as poſſible. As for the Dutch azure, the finer and paler it is, the more it is valued: for though its colour ſeems to be loſt, as it were, by being ground very fine, yet when uſed by the limner it recovers a very bright blue. At Amſterdam they diſtinguiſh its different qualities and degrees of goodneſs by certain letters; the beſt is marked with F F C; the ſecond with F C, and the third M C. There are alſo ſome inferior ſorts, which are valued according as they come nearer this laſt.

The *lapis lazuli* is of ſome uſe in medicine: they prepare it by calcining and waſhing it ſeveral times; which done, it makes an ingredient in the famous confection of alkermes. It has been thus given in doſes of half a dram and a dram, and ſaid to operate ſtrongly by ſtool and vomit. Some have recommended it in epileptics and intermitting fevers: Dolæus tells us, that in this laſt diſorder, the above doſes, taken on the approach of a fit, with two or three ſpoonfuls of brandy, were with him a ſingular ſecret.

It has been alſo recommended againſt apoplexies, and melancholy, as well as epileptic and quartan agues; but its violent operation as a purgative and emetic, has frighted people out of the uſe of it; and the preſent practice takes no notice of it in any of the above intentions. The chemical writers give us proceſſes for maſteries, tinctures, and elixirs of *lapis lazuli*, but they are wholly out of uſe.

There is alſo factitious or artificial azure, made with indigo, or the juice of violets, mixed and ground with a ſort of chalk. The common ſort is made with ſal armoniac and ſilver plates; or with ſulphur, quickſilver, and ſal armoniac.

The method of making the Venetian counterfeit *lapis lazuli* is this: melt in a pot, in a glaſs-houſe furnace, equal quantities of the faireſt LATTIMO, and the whiteſt cryſtalline glaſs; when this is in fuſion, mix into it, by ſmall parcels at a time, the blue ſmalt uſed by the painters; make frequent proofs of the colour, and when it is right let the whole ſtand twelve hours, and then work it. If the metal riſe in the pot, put in a piece of leaf gold to keep it down. This makes a fine plain blue ſubſtance, repreſenting the plain blue parts of the natural *lapis lazuli*. Neri's Art of Glaſs, p. 117.

A counterfeit *lapis lazuli* may be alſo made by fuſing ten pounds of either of the compoſitions for hard glaſs, (ſee *Colouring of* GLASS) with an ounce and a half of zaffer, and half an ounce of magneſia, till a very deep tranſparent blue glaſs be produced. When the maſs is cold, powder it, and mix it with three-quarters of a pound of calcined bones, horn, or ivory, by grinding them together: then fuſe this mixture with a moderate heat, till the ingredients are thoroughly incorporated, and form the melted maſs into cakes, by pouring it on a clean bright plate of copper or iron. In order to give it veins of gold, mix GOLD-*powder* with an equal weight of calcined borax, and temper them with oil of ſpike: let the cakes be painted with this mixture with freſh veins as are deſired, and put into a furnace of a moderate heat; and the gold will be cemented to the glaſs as firmly as if the veins had been natural.

LE *roy le veut.* } See LE ROY.
LE *roy s'adviſera.* }

LEA *of yarn*, is uſed in ſome parts of England for a certain quantity of *yarn*. At Kiddermiſter it ought to contain two hundred threads, on a reel four yards about. Stat. 22 & 23 Car. II.

LEACH-*brine*, a word uſed by the Engliſh ſalt-workers to expreſs the BRINE which runs out from the ſalt, when it ſtands in the baſket to drain, immediately after being taken out of the pan; and alſo the liquor left in the pan, when no more ſalt will ſhoot. This is alſo called the *mother-brine*, and BITTERN. In the German ſalt-works they always throw this liquor away. In our *brine*-ſalt works in Cheſhire they always preſerve it, and add it to the next boiling; and in the Newcaſtle, and other ſea-water ſalt-works, they ſave it for the making the bitter purging ſalt, called *Epſom-ſalt*.

LEAD, called by the chemiſts *Saturn*, a coarſe, heavy, impure metal, of a pale or livid white colour, the ſofteſt, and moſt flexible, the leaſt ductile and tenacious, leaſt elaſtic, and leaſt ſonorous of all the metals. Next to gold, platina, and mercury, it is the heavieſt metal, being upwards of eleven times heavier than an equal bulk of water. See *Specific* GRAVITY.

Lead is ſo ſoft and flexible, that it is eaſily cut with a knife, ſhaved with a plane, grooved for windows, by being drawn through the glazier's vice, and flatted, by paſſing betwixt wooden rollers, into large thin ſheets. When broke by repeated bendings, each piece appears drawn out ſmooth to an edge, like the fracture of well nealed gold and ſilver. It is not, however, ductile to any great degree, either in the form of wire or of leaf, being much inferior in this reſpect to all the other malleable metals; though its ſurface, when cut by a ſharp inſtrument, appears ſmooth, compact, and ſhining, it quickly tarniſhes in the air, and becomes covered by a ſlight greyiſh ruſt. Nevertheleſs it reſiſts much longer than iron or copper the combined action of air and water, before it is decompoſed and deſtroyed. *Lead* is very fuſible, and melts, long before it becomes red-hot, a little later than tin or biſmuth, but ſooner than any other metal;

tal; the degree of heat neceſſary for this purpoſe being about the 540th degree of Fahrenheit's thermometer. It loſes of its malleability in proportion as it is heated; and as ſoon as it melts, it calcines, and greyiſh aſhes are formed upon its ſurface. The calcination and fuſion of *lead*, in particular circumſtances, produce MASSICOT, MINIUM, LITHARGE, and GLASS *of lead*. In a ſtate of incipient fuſion, or when it is returning from a fluid to a conſiſtent ſtate, it may be eaſily divided into ſmall grains or powder, by GRANULATION, or formed into SHOT.

Lead is well known to be in its natural ſtate a metal ſo little ſonorous, that it is even a proverbial expreſſion uſed to any metal that is leſs ſonorous than others, that it is almoſt as mute as *lead*.

Mr. Lemery, however, once ſhewed Mr. de Reaumur, and afterwards to the Academy of Sciences at Paris, a lump of *lead*, which had been left in one of his veſſels, after ſome chemical operation, which, when ſtruck, gave a very loud and acute ſound.

Mr. Lemery had no occaſion afterwards to repeat the experiment, which had afforded him this remarkable *lead*, and left it to Mr. Reaumur to diſcover the manner of doing it, who luckily hit upon it, without the difficulty he had expected from the reſearch; and, it appears, that we have a thouſand times met with ſonorous *lead*, without knowing it to be ſo.

The common way of melting *lead*, in order to the caſting it into moulds, is in iron ladles. It very rarely happens, that all that is melted in the ladle is caſt into the mould; but a ſmall quantity remains, which ſoon forms itſelf into a maſs in the ladle, and this maſs is always ſonorous. Its figure is uſually either that of the ſegment of a ſphere or of a ſpheroid, and it is plane or flat on one ſide, and convex on the other. The maſſes of this kind, examined by Mr. Reaumur, were all very ſonorous: there are, doubtleſs, certain proportions of their thickneſs to their diameter, which may make them more or leſs ſonorous, but all are conſiderably ſo: poſſibly, alſo, figures of a different kind may prove ſonorous; but Mr. Reaumur tried one convex on each ſide, and found it to have no ſound at all. Larger and thicker diſks of *lead* are ſometimes found ſonorous, but never ſo much ſo, as the figures firſt deſcribed. There are alſo two circumſtances, in which the maſs from the ladle itſelf is not ſonorous; the one is, when it is covered with a coarſe ſpungy cruſt, and the other, when its edges are extremely thin for any conſiderable ſpace. It is not the form, however, which does this alone, ſince pieces of the ſame figure, made by hammering and cutting, have no more ſound than *lead* in any other ſhape.

Theſe ſpeculations are not without their uſe. It is not to be ſuppoſed, indeed, that any form, into which *lead* can be caſt, can make it capable of anſwering the purpoſe of the more ſonorous metals in bells, &c. but it is very probable, that the caſting metals, naturally ſonorous, into a ſhape or figure, which alone can render a metal, naturally mute, highly ſounding, would make their ſounds much more perfect, more loud and clear. Experiment alone can determine this, and diſtinguiſh what is only probable, and what is true. It ſhould ſeem that the preſent form of bells, had their origin from the obſerving that pots, and other veſſels, made for more immediately neceſſary uſes, gave a great ſound; and thence, when bells were to be made, they caſt them, as nearly as conveniently might be, of that figure. Had they had equal opportunities of obſerving the ſonorous quality of metals caſt into the ſhape of ſegments of ſpheres, it is very probable that all the bells in the world had now been of that form. The figure of bells, uſed at preſent, is indeed very convenient for the ſuſpending them in churches; poſſibly a proper metal, caſt into the form above mentioned, would be more fit than in any other for houſe-clocks, where a great ſound is required.

Thoſe who have made an analyſis of *lead*, find it to contain a little mercury, ſome ſulphur, and a great deal of bituminous earth.

It has been proved, by the experiments of different chemiſts, that *lead* contains a real running mercury. Kunkel and Becher both ſeparated mercury from it; and Mr. Groſſe, of the Paris academy, has juſtified their experiments by producing the ſame effect; by means not only very different from theirs, but abſolutely oppoſite and contrary. They ſuppoſe that the mercury contained in *lead* is fixed there, either by acids or by ſulphurs, and therefore they uſed alkaline materials to diſengage and ſupport it. On the contrary, Mr. Groſſe uſed only acids, and by means of theſe procured a pure running mercury from this metal. His method was to diſſolve thin plates of *lead* in ſpirit of nitre, weakened with an equal quantity of water. He then obſerved a grey-coloured powder precipitate, which when tried on gold or copper, ſhewed itſelf to be mercurial, and even in the powder he ſaw ſmall globules of quickſilver. Mem. de l'Acad. des Scienc. 1733.

As there could be no poſſibility of the acids forming mercury with *lead*, it is very plain that it muſt have been originally there. But this proceſs probably does not ſucceed with every kind of *lead*; or that aqua fortis made uſe of in this experiment has been impregnated with quickſilver, in which caſe the mercury would precipitate in proportion as the *lead* diſſolved: for Macquer and Beaume ſay, that they have, with all poſſible attention, repeated this experiment of Mr. Groſſe without having obtained mercury.

In the trying *lead* by the teſt of the burning glaſs, a piece of that metal laid on a charcoal very readily melts, and afterwards wholly diſſipates itſelf in fumes; if it be placed on a piece of ſtone it fumes very much, and becomes at length a thin fluid reſembling oil, or melted reſin; and this liquor, in cooling, fixes itſelf into a ſort of glaſs, which has this peculiar quality, that it is always compoſed of plates, or ſcales, in the manner of talc; it is of a greeniſh or yellowiſh colour, with ſome reddiſh ſpots, and is very ſoft to the touch. If it be kept longer in the focus of the glaſs it ſpreads abroad upon the ſtone, and by degrees penetrates its ſubſtance, and promotes its fuſion. If the common calx of *lead*, red-*lead*, or litharge, be uſed inſtead of plain *lead* in this experiment, the event is the ſame: the whole becomes a thin fluid matter, which in cooling affords a flaky glaſs, like talc. Mem. Acad. Paris, 1709.

If this talcky glaſs of *lead* be expoſed to the ſame focus, laid on a piece of charcoal, it preſently melts, and reaſſumes the form of *lead*; and, if then taken away, and ſuffered to cool, is no way different from common *lead*. If the calx of *lead*, or red-*lead*, or litharge, be in the ſame manner melted in the focus of the burning-glaſs on a piece of charcoal, they in the ſame manner immediately re-aſſume the form of *lead*.

It appears from the whole, that there is in *lead* an oily inflammable matter, which is eaſily driven off either by the ſolar or by a common fire; that the baſis of *lead*, which appears alone, when this is driven off, is a ſcaly or talcky earth; and that this oily matter of *lead* is no way different from the oils of vegetables, ſince the oil of charcoal is able perfectly well to ſupply its place, and to reſtore this talcky earth to the form of *lead* again. See PHLOGISTON.

Lead is found in various countries, but it abounds particularly in England. It is found, too, in ſeveral kinds of foſſils and ſtones, ſome whereof, beſides, contain gold, ſome ſilver, others tin, &c.

It is melted in a furnace provided for that purpoſe, with a ſtrong coal-fire upon it; as it melts, it runs through a canal on one ſide, leaving the earth, ſtone, and ſcoria, with the aſhes of the coals.

It is purified by ſkimming it before it be cold, and throwing ſoet and other fat bodies into it. See REFINING *of lead*.

The common ores of *lead* are nearly of the ſame colour of *lead* itſelf, and appear compoſed of cubes or parallelepipeds, ſometimes large and regular, ſometimes irregular and ſmall. The ores of ſilver, copper, and other metals, except tin and iron, have often a *lead* ore intermixed: the common *lead* ores conſiſt of *lead* in the ſtate of a calx, blended with ſulphur: minium, litharge, or other calxes of *lead*, melted with ſulphur, form a compound ſimilar to them both in appearance and quality. There are alſo white or greyiſh, and yellowiſh-green ores; but they are rarely met with. They are very ponderous and rich in metal. On barely expoſing them to the flame of a candle, the *lead* quickly and plentifully melts out: they are ſometimes cryſtalline and ſemi-tranſparent; ſometimes opake, and little different in appearance from common ſtones.

Mr. Boyle obſerves that there is great difference, diſcernible by the eye, between different *lead-ores*. Some is ſo like ſteel that the workmen call it *ſteel-ore*: and this being of more difficult fuſion than ordinary, they mix it with other ore, by them called *firm-ore*, when they commit it to the furnace. He ſays, he likewiſe took notice of an ore, which, for its aptneſs to vitrify, and ſerve potters to glaze their veſſels, the miners call *pattern-ore*, and ſell it dearer than other ore. *Lead-ore* often yields ſilver, but not always. Mr. Boyle mentions ſome *lead ore*, he tried, ſo rich, as to yield ſeventy *per cent.* of *lead*; yet did not, though tried by one of the moſt expert artiſts, give one grain of ſilver. Boyle's Works Abr. vol. i. p. 150.

It is pretended by ſome, that the famous *lead*-mineral found near Freyung, in the Upper Palatinate, is *native lead*: but this is an error; we have an account of it in the Philoſophical Tranſactions, which does not give any ground

ground for this opinion. All that is there ſaid of it, is that it was at that time much eſteemed among the aſſayers of metals, as containing no mixture of any other metal with the *lead*: this might well recommend it to them, as ſaving much conſuſion, or much trouble in ſeparating its heterogene contents; but it is ſaid expreſsly there, that it is an ore, not a *native* metal: there being two kinds of it, one a cryſtalline ſtone, almoſt all pure *lead*; the other not ſo rich, but of a more rough and coarſe texture. Neither of theſe could be *native lead*; and it is remarkable, that they had leſs appearance of being ſo than many of our common ores. Phil. Tranſ. N° 3.

However, Dr. Morris relates that native *lead* is found intermixed with the *lead*-ore of a mine in Monmouthſhire. Phil. Tranſ. vol. lxiii. and Linnæus ſays, that he has ſeen what externally appeared to be ſuch.

This metal, as in common uſe, always contains ſome ſilver, which is not in quantity enough to be worth the charges of ſeparating. The moſt common proportion is not more than two drams to a centner. This, though of little conſequence on any other occaſion, is carefully inquired into by the aſſayers of the ores of metals, particularly in regard to the ores of ſilver, for the ſeparation of which from its ore *lead* is employed; and it occaſions a very great error, when its computation is neglected, in eſtimating the value of an ore from the aſſays. This increaſing ſilver is therefore always ſubtracted by the more accurate aſſayers; and in order to do this with the leſs trouble, a large quantity of *lead* is granulated at once for this uſe, and mixed by ſifting; then the uſual quantity employed in the aſſaying an ore is to be tried alone in a copel, and the bead of ſilver it affords carefully preſerved. After this, when the bead produced from a ſilver ore is weighed; that bead of ſilver, given by the *lead*, is to be put in the oppoſite ſcale among the weights, and then the weights balancing the bead, will, without more trouble, give the weight of the ſilver from the given quantity of its ore. Cramer's Art of Aſſaying, p. 216.

When the *lead*-ore is dug out, they beat it ſmall, then waſh it clean in a running ſtream, and ſift it in iron rudders. Their hearth or furnace is made of the clay or fire-ſtone: this they ſet in the ground, and on it build their fire, which they light with charcoal, continuing it with young oaken gads, blown with bellows, worked by men's treading on them. After the fire is lighted, and the fire-place hot, they throw their *lead* ore on the wood, which melts down into the furnace, and then with an iron ladle they take it out, and upon ſand caſt it into what form they pleaſe.

The mine-men ſometimes find the vein run up into the roots of trees, and yet do not obſerve any difference between thoſe and other trees. When the mine is near the ſurface, the graſs is ſometimes found yellow. They make no account of the virgula divinatoria; yet ſay, that when a mine is open, they may gueſs by it how far the vein will lead. The ore runs ſometimes in a vein, ſometimes diſperſed in banks; it lies many times between rocks; ſome of it is harder, others milder; ſometimes they have branched ore in the ſpar; about the ore is ſpar and cauk; and another ſubſtance, which they call *crottes*.

The method of ſeparating *lead* from its common fuſible ore by aſſaying, is this: beat the ore into a coarſe powder, like grains of coarſe ſand; weigh two decimaſtical centners of this powder, and put it into a teſt. Put upon this a tile, or elſe another teſt: the ore muſt be ſpread wide all over the bottom of the teſt: roaſt it in a fire moderate at firſt, but afterwards increaſed, ſo far as to make the teſt red-hot; leave it thus for a few minutes, then take off the tile, and in a ſhort time the ore will change its blackiſh to a yelloviſh colour. This ſhews that great part of the ſulphur is now diſſipated.

Beat this roaſted ore into a fine powder, and add twice as much of the black flux, and of filings of iron not ruſty, and of ſandiver, of each half a centner; powder all theſe in a mortar to mix them well; then put them into a crucible large enough to contain twice or three times as much; cover them over a quarter of an inch thick with common ſalt, and preſs all down with a finger; put a tile on a ſmall crucible, and ſtop the joint with a lute that will bear the fire; then dry the veſſel with a moderate heat; then put the crucible into a wind-furnace, and heap coals upon it, covering it ſome inches high; when the crucible is red-hot, you will hear the ſalt crackle, and this will be ſucceeded by a gentle hiſſing noiſe; ſo long as this laſts, keep the ſame degree of fire, but when it is over, increaſe the fire till the whole maſs is melted, which will be done in a quarter of an hour, in a moderate melting fire; then take out the crucible, put it upon the hearth of the furnace, which muſt be very dry, ſtrike it a few times with a hammer, to get all the *lead* together in the bottom; when it is cold take it out, and you will find by the weight of the regulus how much *lead* the ore contains. Cramer's Art of Aſſaying, p. 287.

This metal may be procured from its ore, of whatever kind that be, by a ſtratification with charcoal.

Lead ores may be aſſayed by the following proceſs of Mr. Gellert: mix a quintal of roaſted *lead ore* with a quintal of calcined borax, half a quintal of glaſs finely pulverized, a quarter of a quintal of pitch, and as much of clean iron filings; put this mixture into a crucible wetted with charcoal duſt and water; place the crucible before the nozzle of the bellows of a forge, and when it is red, raiſe the fire for fifteen or twenty minutes; then withdraw the crucible, and break it when cold. Some very fuſible ores, as the galena of Derbyſhire, may be aſſayed, as large quantities of it are ſmelted without previous roaſting, and without addition, merely by fuſion, during a certain time. For this purpoſe nothing more is requiſite than to keep the ore melted in a crucible with a moderate heat, till all the ſulphur is deſtroyed, and the metal be collected. To prevent the deſtruction of any part of the metal after it is ſeparated from the ſulphur, ſome charcoal duſt may be thrown over the ore, when put into the crucible; but if the galena be mixed with pyrites, eſpecially arſenical pyrites, it requires much roaſting and ſaline fluxes.

The ores of *lead* are known to be ſoftened, in a moderate red heat, into the conſiſtence of a paſte, but do not flow thin in a ſtrong fire: if iron filings are mixed, the iron abſorbs the ſulphur, and at the ſame time revives the *lead* into its metallic form. This is one of the moſt compendious methods of ſmelting *lead ores*, where the operation is performed in veſſels; and is the method uſed with the *lead ores* at Dal in Sweden, which, containing from twenty to twenty-ſix ounces of ſilver on the hundred pounds, are thus ſmelted in crucibles, without any loſs of the ſilver; and Mr. Scheffer obſerves, that the produce of *lead* is greater than that obtained by any other means. The ordinary yield of *lead* is from about one-third to upwards of two-thirds of the weight of the ore, according as it is leſs or more free from ſpar, or other heterogeneous earthy matters.

Lead is found of a lighter or deeper colour, according as it is more or leſs purified; though ſome make a difference in the colour of the ore, always eſteeming that moſt which is the whiteſt.

Some very able naturaliſts obſerve, that the weight of *lead* increaſes on long keeping, either in the open air, or underground. Mr. Boyle obſerves this particularly of the *lead* of churches, which, he ſays, frequently grows both in bulk and weight, ſo as to become too ponderous for the timber that before ſuſtained it; which ſome account for from the impurity, heterogeneity, and looſe texture of its parts, by means whereof the particles of the air, getting admiſſion within its pores, are attracted, and eaſily aſſimilated to it. But others, who rely wholly on experience, abſolutely deny the fact, as alſo that it is reproduced in mines before exhauſted, by letting them lie long to the open air; which others aſſert.

Lead is ſoluble with all acids. When combined to ſaturation with nitrous acid, it forms, as ſilver does, a cryſtallizable nitrous ſalt, with metallic baſe, called nitre of *lead*, which is capable of decrepitating and detonating, without the addition of inflammable matter, in conſequence of the phlogiſton retained by the *lead*. Pure vitriolic acid, and that contained in neutral vitriolic ſalts, when mixed with a ſolution of *lead* in nitrous acid, unites with the *lead*, ſeparating it from the acid, and forming with it a metallic ſalt, or vitriol of *lead*, which cryſtallizes and appears in form of a white precipitate, when the liquors do not contain a ſufficient quantity of water to diſſolve it. This ſalt is the ſame as that made by directly diſſolving *lead* in vitriolic acid. Marine acid, and all the neutral ſalts containing it, precipitate *lead* from its ſolution in nitrous acid, and unite with it, forming a metallic ſalt, called PLUMBUM *corneum*, or *Saturnus cornuus*, from its reſemblance to the LUNA *cornea*. Vegetable acids alſo diſſolve *lead*, and particularly its calces, with eaſe; but only the combinations of this metal with vinegar are known, becauſe theſe are uſed in medicine and the arts. Of theſe there are the CERUSS or *white* LEAD, the VINEGAR *of lead*, and *ſalt or ſugar of* LEAD. Cauſtic alkaline lixivia, boiled on plates of *lead*, diſſolve a ſmall portion, and corrode a conſiderable quantity: the ſolution ſtains hair black. Expreſſed oils diſſolve calces of *lead* by boiling, in ſuch large quantity as to become thick or conſiſtent. The *drying* OIL uſed by painters is linſeed oil, thus thickened with *lead*; and in this way are formed plaiſters, cements for water-works, paint for preſerving nets, &c. Theſe maſſes of *lead* combined with oil may be decompoſed by acids, which unite with the *lead*, and ſeparate the oil from them; and this oil proves ſoluble, like eſſential oils, in ſpirit of wine; a phenome-

non firſt taken notice of by Mr. Geoffroy. *Lead* is eaſily united to ſulphur, and burnt and calcined by expoſing it at once to the action of ſulphur, fire, and air.

All the metals may be conſidered, in certain circumſtances, as acting in the manner of menſtruums on one another, and of theſe none has ſo much power as *lead*. When *lead* is expoſed to a moderate fire in an earthen veſſel, the ſurface of the melted maſs is ſoon covered with ſcoriæ, in form of a thin ſkin of many colours: when the fire is ſo far increaſed as to make the veſſels quite red-hot, this ſkin melts a little, and is thrown to the ſides of the veſſel in form of a ſurfuraceous matter, of various yelloviſh or whitiſh colours, called *litharge*. After this the melted *lead* ſmoaks, and ſmall drops, reſembling the firſt ſcoriæ, riſe, and ſwim like globules of oil upon the ſurface; theſe are one after another added to the litharge at the ſides; and if the fire be kept in this degree, the whole ſubſtance of the *lead* is totally turned into litharge.

If copper be added to *lead* thus ſmoaking, it cauſes a much briſker ebullition than before, and the copper burſts, and divides, and ſeems to become one homogene maſs with the *lead*; this maſs is brittle, and if made with equal parts of *lead* and copper, reſembles tempered ſteel when broken. On expoſing the miſture to a fire no greater than that in which *lead* melts, the *lead* almoſt entirely runs off by itſelf; and the little *lead* that is retained in the pores of the copper, may be ſcorified and melted out by a fire conſiderably leſs than is ſufficient to make copper flow. Gold and ſilver melted thus with *lead* become brittle alſo, and gold becomes pale by the ſmalleſt admixture of it. They are diſſolved by melted *lead* in a ſlight red heat.

Tin and *lead* melt together with a fire ſtrong enough to melt the *lead* alone, and form a compound more fuſible than *lead* by itſelf, and is therefore employed as a SOLDER for *lead*; but when this is increaſed, ſo as to make the veſſels red, the tin immediately riſes up above the *lead*, in form of little whitiſh duſty hillocks, ſo that the whole looks as if aſhes had fallen into the veſſel; and the tin thus calcined, when cold, is variegated in colour, with white, yellow, and red. *Lead*, ſo long as it keeps its metallic form, can never be made to join with iron, though urged by ever ſo violent a fire: on continuing the fire, the *lead* ſcorifying or calcining, abſorbs the phlogiſton of the iron, and conſequently promotes the calcination of that metal; and when both are reduced into calces, the fuſible ſaturnine calx diſſolves the chalybeate into an opake brown or bluiſh glaſs: hence *lead* may be employed to purify the perfect metals from iron, as from other imperfect metals.

The ſemi-metals are all eaſily melted with *lead* by fire, and added in too large a quantity they take away its malleability.

Lead and all its products turn into glaſs by a ſtrong fire; and this glaſs, or in the place of it litharge melted with ſtones, and other vitrifiable ſubſtances, makes them run into glaſs with a much leſs fire than they otherwiſe would do; and if a very large quantity of this glaſs or litharge be added, they become ſo far attenuated as to run through the ſides of the veſſels. Lime-ſtones ſuffer the ſame change by means of this matter; and the incombuſtible ſtones, with proper management, are ſubject to the ſame fate; but unleſs theſe proceſſes are carefully conducted, the litharge or glaſs of *lead* gets away alone through the veſſel. Among the metals litharge facilitates the fuſion of copper and iron by the fire, but it conſumes a conſiderable quantity of them, and runs itſelf, with what it poſſeſſes, into glaſs; and, finally, the whole tin and its calx are with difficulty vitrified by glaſs of *lead*, and they loſe nothing by it: but if gold and ſilver are very frequently melted with litharge, they will at length be found to have loſt a little of their weight; but this ſmall quantity is not deſtroyed, but may, by the proper operations, be again regained out of the litharge. For the affinities of *lead*, ſee AFFINITY.

Lead is a metal of much uſe: it eaſily melts, and mixes with gold, ſilver, and copper; but not being able to endure the violence of the fire which they undergo, it riſes to the ſurface, and carries with it all that was heterogeneous in them; ſo that neither gold nor ſilver are refined without *lead*. Hence *lead* is called by the chemiſts *balneum ſolis & lunæ, lavacrum regis & reginæ, ſapo metallorum*, &c. See REFINING.

To which may be added, that the coarſer kind of precious ſtones, heated in *lead*, are ſaid to be thereby rendered much more brilliant.

Borrichius aſſerts, that *lead* reverberated in minium, converted into glaſs, reduced into ceruſs, or burnt into litharge, immediately reſumes its original figure, upon the dexterous application of a liſivial ſalt.

All theſe calces and glaſſes of *lead* are more eaſily revived than thoſe of any other metal. They can ſcarcely be melted but ſome part of the *lead* is revived, although no inflammable principle has been added, which proves that they retain much phlogiſton. If a piece of common flint-glaſs be ſurrounded in a crucible with ſoot, powdered charcoal, or other ſuch inflammable matters, and cemented for ſome time with a fire ſufficient to melt it, the *lead* will be revived through the whole internal ſubſtance of the glaſs, into little drops; and if the matter is brought into fuſion, the *lead* ſubſides, collected into one butter at the bottom. From this glaſs Dr. Lewis has extracted one fourth of its weight of perfect malleable *lead*. The calces and glaſs of *lead* abſorb the inflammable principle even from ſome other metallic bodies: if glaſs of *lead* be melted in an iron veſſel, or ſtirred in fuſion with an iron rod, great part of the *lead* will reſume its metallic form, a proportionable quantity of the iron ſcorifying. It is ſaid, that *lead*, recovered from its calces, proves ſomewhat harder and lighter than at firſt, and leſs ſubject to tarniſh in the air. But Dr. Lewis obſerves, that the difference, if any, is certainly very ſmall. Neumann's Chem. by Lewis, p. 55.

Lead is much uſed in building, particularly for covering, gutters, pipes, and in glaſs-windows. For which uſes, it is either caſt into ſheets in a mould, or milled; which laſt, ſome have pretended, is the leaſt ſerviceable, not only on account of its thinneſs, but alſo becauſe it is ſo exceedingly ſtretched in milling, and rendered ſo porous and ſpongy, that, when it comes to lie in the hot ſun, it is apt to ſhrink and crack, and conſequently will not keep out the water. Others have preferred the milled *lead*, or flatted metal, to the caſt, becauſe it is more equal, ſmooth, and ſolid.

The *lead* uſed by glaziers is firſt caſt into ſlender rods, twelve or fourteen inches long, called *canes*; and theſe, being afterwards drawn through their vice, come to have a groove on either ſide for the panes of glaſs; and this they call *turned lead*.

The method of paling or ſoldering *lead* for fitting on of imboſſed figures, &c. is by placing the part whereon the figure is to be paled, horizontal, and ſtrewing on it ſome pulverized reſin; under this they place a chafing-diſh of coals till ſuch time as the reſin becomes reddiſh, and riſes in pimples; they apply the figure, and rub ſome ſoft ſolder into the jointing: when this is done, the figure will be paled on, and as firm as if it had been caſt on.

Lead is much uſed in varniſhes and painting with oil, both as a colour and as a dryer. It is alſo uſed in the preparation of ENAMELS and of PORCELAIN as a flux, and makes the baſis of the GLAZING of almoſt all pottery wares; and by means of *lead* the moſt perfect metals are refined and aſſayed. See REFINING and ASSAYING.

LEAD, in *Medicine*. This metal is celebrated by ſome chemical writers for its great medical virtues; but after all, it ſeems to be a metal which ought to be given internally with the greateſt caution, and to be rather calculated for outward application. Its ore is ſo poiſonous, that the ſteam, ariſing from the furnaces where it is worked, infects the graſs of all the neighbouring places, and kills the animals which feed on it. Its beſt preparation is *ſaccharum ſaturni*; which, though capable of doing great good in hæmorrhages, and ſome other caſes, is apt, however, to bring on colics of ſo violent a kind, that the remedy often proves worſe than the diſeaſe.

The poiſonous quality of this *ore* is ſuch, that the people who live in the countries where it is dug, and near the places where it is waſhed, can keep neither dog nor cat, nor any kind of fowl, but all die in a ſhort time; and it has been known that a little houſe, in which *lead ore* had been kept for ſome time, though afterwards made very clean, and bedded with fern, infected calves which were put into it, ſo that all died in a very ſhort time; and it is a too common melancholy obſervation, that children often die ſtrangely and ſuddenly about theſe places. Philoſophical Collections, N° 2. p. 6.

The internal uſe of *lead* is dangerous on account of the colics and palſies that are occaſioned by it. Culinary veſſels, lined with a mixture of tin and lead, which is the uſual tinning, are apt to communicate to acid foods pernicious qualities, and require to be uſed with great precaution. The ſame thing has been alſo ſaid of liquors kept in glazed ware, and of cyder made in veſſels, where *lead* is uſed, and of wines adulterated with litharge, &c. See COLICA *Pictonenſium*.

Mr. Navier has lately diſcovered, that liver of ſulphur, and particularly liver of ſulphur of Mars, is an excellent antidote againſt the poiſon of *lead*; and he adviſes patients labouring under its pernicious effects to drink largely of acidulated liquors, to make afterwards the liver of ſulphur the principal part of the cure, and to finiſh the cure with gentle purgatives.

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The Dutch have been charged with correcting the more offenſive expreſſed oils, as that of rape-ſeed, ſo as to ſubſtitute them for oil olive or oil of almonds, by impregnating them with lead: in order to detect this abuſe, mix a little of the ſuſpected oil with a ſolution of orpiment made in lime-water: on ſhaking them together, and ſuffering them to reſt, the oil, if it has any ſaturnine taint, will appear of an orange-red colour; if pure, of a pale yellowiſh. The *lead* is diſcovered in wines by the ſame ſulphureous ſolution, which changes the colour of wines impregnated with this metal to a brownish red or a blackiſh hue. However, the various preparations of *lead* are applied externally with ſafety and great benefit, on account of its ſedative, drying, and repellent qualities. The vinegar and ſugar of *lead*, and all the ointments and plaſters which contain ceruſs, minium or litharge, eminently poſſeſs theſe qualities. See the following articles and references.

For the laws relating to *lead*, and the ſtealing of it, ſee 27 Eli. III. ſtat. 2. c. 1. 3. 11: 38 Edw. III. ſtat. 1. c. 6. 4 Geo. II. c. 32. 29 Geo. II. c. 30.

LEAD, for the *manufacture of*, ſee PLUMBERY.

There are various preparations of *lead*, ſerving for various purpoſes.

LEAD, *baſſam of*, an external medicine, greatly famed for its effects in old and ſharp ulcers. It is made by mixing one ounce of ſugar of *lead* with two of oil of turpentine, and ſetting this mixture in a ſand-heat till the ſalt is diſſolved. By this means the oil acquires a red colour, and is called *baſſam of lead*.

LEAD, *burnt*, *plumbum uſtum*, is a chemical preparation uſed in medicine, made of plates of *lead* melted in a pot with ſulphur, and reduced by fire into a brown powder. *Lead* continued in fuſion and ſtirred, ſo that freſh ſurfaces may be expoſed to the air, will gradually change into a powdery duſky-coloured calx, bearing this name. *Burnt lead* is only intended for external uſe. It has the ſame virtues aſcribed to it, in ointments and plaſters, as litharge or minium. Mixed into an unguent with lard alone, it makes a good ointment for the piles.

LEAD, *butter of*, is a kind of liquid unguent made of vinegar and lead, incorporated with roſate oil, and commended for the cure of tetters. It is called *butyrum ſaturni*.

LEAD, *calcined*, or *calx of lead*. See CALX, CERUSSE, GLASS *of Lead*, LITHARGE, MASSICOT, MINIUM, *&c.*

LEAD, *caſting of*. See CASTING.

LEAD, *coheſion of*. See COHESION.

LEAD *duſt*, a preparation uſed by the potters; made by throwing charcoal duſt into melted *lead*, and ſtirring them a long time together; to ſeparate the coal again, they only waſh it in water, and dry it afreſh.—Its uſe is, to give a varniſh and gloſs to their works.

LEAD, *extract of*, or *Saturn*, is prepared by ſimmering together as many pounds of the LITHARGE of gold as quarts of vinegar for an hour and a quarter, and often ſtirring them; then taking it from the fire and, as ſoon as it is cool enough, pouring the clear liquor into bottles to be kept for uſe. If this liquor be made into the common conſiſtence of an extract, it muſt boil yet longer after its ſeparation from the maſs, and will acquire a reddiſh colour. This is Goulard's extract and the baſis of all his preparations of *lead*. It evidently differs in no reſpect from ſugar of *lead*, and vinegar of litharge, but in the degree of concentration. The only circumſtance in which the extract ſeems to have the advantage of ſugar of *lead*, appears to be in the greater quantity of the acetous acid contained in it, which proves an excellent antidote in many caſes, and the ſugar of *lead*, when once cryſtallized, cannot be brought back to that ſtate of ſolution in vinegar in which it was before; yet where a large quantity of watery menſtruum is added, as in Mr. Goulard's ſaturnine water, it is as well to make a ſolution of ſugar of *lead* in the water, and add the vinegar afterwards, as to mix them both together in the form of extract. Nikin's Obſ. on the external Uſe of Preparations of *Lead*, &c. p. 2. See VINEGAR *of Lead*.

LEAD, *glaſs of*. See GLASS *of Lead*.

LEAD, *marcaſſory of*, is the calx of *lead* purified and ſublimed. It is made of *lead* diſſolved in aqua fortis, pouring a filtrated ſalt water into it; whence reſults a magiſtery extremely white, which when ſoftened by ſeveral lotions, is mixed with pomatums for the face and complexion.

LEAD, *mock*, a name given to a glittering ſubſtance found in *lead*-mines. See GALENA *impura*, and BLENDE.

LEAD, *native*. See LEAD *ſupra*.

LEAD, *ointments of*, *preparations of*. See UNGUENT.

LEAD, *red*, a preparation of mineral *lead* calcined, and ruſſled; uſed by painters, potters, and ſurgeons. See MINIUM.

LEAD, *ſalt or ſugar of*, *ſaccharum Saturni*, is an eſſential ſalt of vinegar, incorporated with the proper ſubſtance of *lead*, or ceruſs, diſſolved in ſpirit of vinegar. See SACCHARUM *Saturni*.

LEAD, *tincture of*. See TINCTURA *Saturnina*.

LEAD, *vinegar of*, or of *litharge*. See VINEGAR.

LEAD, *water of*, *aqua Saturni*, is called by Mr. Goulard vegeto-mineral water, who makes it by dropping into a quart of pure water a hundred drops of the extract of ſaturn, and then adding to them four tea-ſpoonfuls of brandy. This is his ſpecific in external inflammations, particularly of the eye, for waſhing ulcers, cancers, ſcrophulas, contuſions, phlegmons, erypelas, piles, chilblains, tetters, gangrenes, *&c.* But a ſolution of the SACCHARUM *Saturni* will have the ſame effect.

LEAD, *white*. See CERUSSE.

LEAD *nails*. See NAILS.

LEAD, *black*, is a kind of mineral of a black or rather of a deep ſhining blue colour, but ſoft and unctuous, infomuch that it has been uſed, inſtead of oil or ſoap, to prevent the friction of machines, found chiefly in England, and appearing to be nothing elſe but a peculiar talcky earth. It is much uſed for pencils, or crayons for deſigning.

It is unfuſible by acids; unfuſible by fire, and in cloſe veſſels, reſiſts vehement degrees of it: but by long calcination in an open fire it is moſtly volatilized, emitting according to Lawſon, Diſſ. de Nihilo, inflammable blue flowers, and the reſiduum is a yellow calx, which being reduced by Mr. Quiſt, (ſee Swediſh Acts, 1754.) ſeemed to be a mixture of tin and iron. Hence it has been lately claſſed among the ſulphureous minerals, and called ſulphur ſatiated with iron and tin. Black *lead* in fine powder may be readily mixed with melted ſulphur, and though the compound remains fluid enough to be poured into moulds, it looks nearly like the coarſer ſorts of *black lead* itſelf. This was probably the method by which prince Rupert is ſaid to have made *black lead* run like a metal in a mould, ſo as to ſerve for *black lead* again. Birch's Hiſt. Royal Soc. vol. iii.

The German *black lead* pencils, and thoſe which are hawked about among us, are prepared in this manner: their melting or ſoftening, when held in a candle, or applied to a red-hot iron, and yielding a bluiſh flame, with a ſtrong ſmell like that of brimſtone, diſcovers their compoſition. Pencils of this kind are hard, and brittle, and cut or ſcratch the paper or wood inſtead of marking them. The true Engliſh pencils are formed of *black lead* alone, ſawed into ſlips, which are fitted into a groove made of the ſoftell wood, as cedar, and another ſlip of wood glued over them. Theſe pencils, however, are of different quality, on account of different ſorts of the mineral being fraudulently joined together in one pencil, the fore-part being commonly pretty good, and the reſt of an inferior kind. To avoid theſe inconveniencies, ſome take the finer pieces of *black lead* itſelf, which they ſaw into ſlips, and fix for uſe in port-crayons. Lewis's Commerce of Arts, p. 328.

The name ſeems given to this ſubſtance with ſome impropriety, the common *lead* being the true *black lead*, ſo called by way of contradiſtinction from tin, otherwiſe called *white lead*. Plott, in Phil. Tranſ. N° 240. p. 183. See LEAD and TIN. *Black lead* is otherwiſe popularly denominated *wad* or *wadd*, and *hollow*; by naturaliſts *wigrica fabrilis*, from its uſe in ſcoring; by analogy to the *rubrica fabrilis*, or rudile, which has the ſame uſe. Woodw. Meth. Foſſ. cl. 5. p. 43. See RUDDLE.

Black lead was known to the ancients under the names of *plumbago*, *galena*, and *molybdena*. Vide Ruland. Lex. Alchem. p. 370. voc. *Plumbago*. Caſt. Lex. Med. p. 355. voc. *Galena*. See PLUMBAGO, *&c.*

It is found in divers parts of Germany, *&c.* but the better ſort is the produce of England alone, and that reſtrained to the mines near Keſwick in Cumberland; beſides which, Dr. Woodward aſſures us, there is none found worth any thing in any other country. Woodw. Nat. Hiſt. Eng. Foſſ. tom. 1. p. 5.

It is ſomewhat difficult to aſcertain what claſs of minerals *black lead* belongs to. Metal it is not, as not being either ductile or even fuſible; nor can it be reckoned among ſtones, for want of hardneſs: it remains, therefore, that it muſt be placed among the earths, though it diſſolve not in water, as moſt earths will, except ſtiff clays and ochres; among the latter whereof Dr. Plott judges it may be reckoned, it ſeeming to be a ſort of cloſe earth, of very fine and looſe parts, ſo burnt as to become *black* and ſhining, diſcolouring the hands, as all ochres do. Whence the moſt proper name that can be given it, according to this author, is *ochra nigra*, or *black* OCHRE Phil. Tranſ. N° 240. p. 183.

Some writers ſpeak alſo of a factitious *black lead*, or *plumbago*, produced in furnaces, being found adhering to the ſides of thoſe where gold or ſilver are melted. Ruland. Lex. Alch. p. 373. voc. *plumbago*.

By

By our laws, entering mines of *black lead*, with intent to ſteal it, is made felony. See 25 Geo. II. c. 10. See LARCENY.

LEAD, in the *Manege*, is a term uſed to expreſs the part that begins any motion firſt. A horſe going in a ſtraight line always *leads*, or cuts the way with his right foot. This is called in French *entamer le chemin*.

LEAD-*walling*, in the *Salt-works*, on the ſalt-ſprings in ſome parts of England, is the term uſed for that quantity of brine that is neceſſary for twenty-four hours boiling in one houſe. The whole government of the works is in the hands of certain lords, who proportion the quantity to be worked by theſe *lead-wallings* to the ſeveral perſons who work it. At Namptwich, in Cheſhire, two hundred and ſixteen *lead-wallings* belong to all the owners of the pit, and no tradeſman, bachelor, or widow, can rent more than eighteen *lead-wallings*. All is under the direction of four ſworn officers, choſen every year, and theſe appoint how much ſalt ſhall be made each year, and how many houſes ſhall work at a time. Ray's Engliſh Words, p. 142.

LEADWORT, *plumbago*, in *Botany*, a genus of the *pentandria monogynia* claſs. Its characters are theſe: the flower has a tubulous permanent empalement, which is indented at the top in five parts, and has one funnel-ſhaped petal, with a cylindrical tube, narrow at the top; the brim is cut into five oval parts, and it has five awl-ſhaped ſtamina, ſituated in the tube, ſitting upon the valves of the nectarium, which includes the germen; the ſmall oval germen ſuſtains a ſingle ſtyle, the length of the tube, crowned by a ſlender five-pointed ſtigma; the germen becomes a ſingle oval ſeed, included in the empalement. Miller enumerates two and Linnæus four ſpecies.

This is a plant ſeldom or never uſed, being of a hot, and even of a cauſtic nature, like pellitory of Spain, and has been made uſe of, like that, for the tooth-ach, and thence called *dentillaria* or tooth-wort.

LEADERS, in the *Military Art*. See FILE-*leaders*.

LEÆNA, the *lioneſs*. See LIONESS.

LEAF, *folium*, in *Botany*, a part of a plant, ordinarily very thin and flat, growing in the ſpring, and uſually falling off in autumn. See PLANT.

The *leaf* of a plant or tree is diſtinguiſhed from that of flowers: the firſt is called *folium* and the other *petalum*: in this article the term is uſed in the former ſenſe.

There are ſome plants without *leaves*, as truffles and muſhrooms.

As to the ſtructure of *leaves*, Dr. Grew obſerves, that their fibres never ſtand on the ſtalk in an even line, but always in an angular or circular poſture, and their vaſcular fibres or threads are 3, 5, or 7. The reaſon of which poſition is for their more erect growth, and the greater ſtrength of the *leaf*. Another circumſtance obſervable in the fibres of *leaves* is, their orderly poſition: ſo as in ſome to take in an eighth part of a circle, as in mallows; in ſome a tenth, but in moſt a twelfth.

The ſame author obſerves ſix ſeveral parts intended by nature for the preſervation of germs, viz. *leaves*, furfoils, interfoils, ſtalks of *leaves*, hoods, and mantlings that cover them.

The ſkin or coat of the *leaves* is no more than that of the branches extended, as gold, by beating, is reduced into *leaves*. In the germ, the *leaves* are folded, ſometimes in two, and ſometimes in ſeveral plaits, ſomewhat after the manner of a fan. If the leaves be too thick to plait commodiouſly in two, and to be ranged againſt each other; or if they be in too ſmall a number, and their fibres too delicate, inſtead of being plaited, they are rolled up, and form either a ſingle roll, as the *leaves* of the mountain cowſlip, which are thick; or two rolls, which begin at each extremity of the *leaf*, and meet in the middle. There alſo ſome plants, whoſe *leaves* form three rolls, as fern: ſeveral *leaves* are covered with hair of ſeveral figures; thoſe of lavender, and the olive-tree have hairs reſembling ſtars. See LANUGO.

Botaniſts have obſerved, that ſome plants have very thick fleſhy *leaves*, whoſe pulpy ſubſtance is always moiſt: theſe are ſuch as naturally grow upon dry barren rocks, and are generally natives of warm countries, which, as they can draw in very little nouriſhment from the earth, perſpire only in a ſmall quantity. The *leaves* of ſuch plants have a thin compact ſkin over their ſurface, with minute pores, which prevent the deſcending moiſture from penetrating into their ſubſtance and deſtroying them. The ſame ſtructure is alſo obſervable in the *leaves* of thoſe trees and ſhrubs, which retain their verdure all the year; and they are known to imbibe and perſpire little moiſture in compariſon with the deciduous trees and ſhrubs: moreover, their nutritive juices are of an oily exterior in their own quality, which ſecures them from the froſt. In all *leaves* there are two orders of veins or nerves, one belonging to each ſurface: thoſe on the under ſide of the *leaf* have their ramifications larger than thoſe on the upper. And the two orders of veins are inoculated in ſeveral places. Their uſes are ſuppoſed to be different: the upper laminæ are conceived to be air-veſſels or trachææ through which the perſpirable matter is diſcharged, which often appears in the form of HONEY-DEW, and the air is inſpired.

Plants are known to receive and tranſpire more, in equal time, than large animals; hence it appears, that the *leaves* are neceſſary to preſerve the plants in perfect health: becauſe it has been found by accurate calculation and repeated experiments, that a plant of the ſun-flower receives and perſpires in twenty-four hours, ſeventeen times more than a man.

The lower laminæ are deſtined, as it is imagined, for receiving, preparing and conveying the moiſture imbibed from the riſing vapours of the earth, by which trees and plants are greatly nouriſhed: ſo that one principal uſe of *leaves* is to perform, in ſome meaſure, the ſame office for the ſupport of vegetable life, as the lungs of animals do for the ſubſiſtence of animal life; plants drawing through their leaves ſome part of their nouriſhment from the air.

The *leaves* of plants are of the utmoſt conſequence to the life of the whole. Air evidently paſſes in at the *leaves*, and goes through the whole plant, and out again at the roots. If the *leaves* have no air, the whole plant will die, as is eaſily proved by the air-pump; but in theſe experiments, if the *leaves* be leſs on the outſide of the receiver, and parted by a hole cemented with wax, and have air, the plant will thrive, and grow, though its roots and ſtalk are kept in vacuo in water. The *leaves* of plants perform the neceſſary work of altering the water received in at the roots, into the nature of the juices of the plant; and hence it is, that the life of the plants depend ſo immediately on their *leaves*. The huſbandman often ſuffers for want of this knowledge. A crop of ſaint-foin is a very valuable thing, and its root being perennial, will yield him increaſe many years; but it is often deſtroyed at firſt, by ſuffering it to be indiſcreetly fed upon by the ſheep, which eating up all the *leaves*, the root remains without the means of a ſupply of air, and the whole periſhes.

Leaves being thus neceſſary to plants, nature has, in all perennial plants, provided a reverſionary ſtock of them. The *leaves* of theſe plants are always formed in autumn, though they are not unfolded till the following ſpring. They then open and increaſe gradually, in proportion to the motion of the ſap, and the quantity of pabulum it then receives to be circulated. Theſe *leaves* may alſo, though not wholly appearing out of the bud, be ſufficient for the extremely ſmall motion of life, which the ſap of perennial plants, that drop their leaves, has in winter. Tull's Horſe-hoeing Huſbandry, p. 19.

Dr. Grew obſerved the formation of theſe autumnal *leaves*; but beſide theſe, there is another ſet of them formed in the ſpring, and expanded about midſummer. Theſe are of infinite ſervice to many particular trees, particularly to the mulberry, as they ſave its life when the ſpring *leaves* have been all eaten up by the ſilk-worms. People who ſtrip that tree for the food of theſe animals find, however, that ſome caution is neceſſary, in order to make the new ſupply of ſpring *leaves* ſave the life of the tree. For if they pull off the old *leaves* downward, ſtripping away ſtalk and all, the tree often dies, but if they pull them upwards, the tree lives without hurt; becauſe the ſtalk, in this caſe, is left, and often a piece of the bottom of the *leaf* upon it. Theſe ſerve, in ſome degree, in the place of the whole *leaves*, till the new ones are formed.

It is certain that no plant, to which nature has allotted *leaves*, can live without them, but will certainly die if they are pulled off as ſoon as they appear. The common graſs of our meadows and paſtures might ſeem an exception to this general rule; but it is to be conſidered, that though the ſheep eat this down very cloſe, and take off its *leaves* as ſoon as they grow, yet when it is thus devoured by cattle, it is only in the *leaf*, very little of it growing up into ſtalk at that time, and therefore leſs ſap is to be purified, and conſequently leſs of the operation allotted to the *leaves* required; and there is a conſtant ſucceſſion of new *leaves* growing up in the place of the old ones, and many of theſe being too ſhort to be bitten off, ſerve in the place of thoſe which are eaten.

The *leaves* of trees and plants afford the curious in microſcopic obſervations many very beautiful objects.

All *leaves* are full of innumerable veſſels, which convey perſpirable juices to the pores for their diſcharge. Whether there be any circulation in them, is not yet determined; but as their juices all become ſtiff and congu-

lated;

lated, when let out, it is probable that they have some motion, which keeps them fluid while in the veſſels of the plant.

The pores in the *leaves* of plants are almoſt innumerable. Mr. Leewenhoek found an hundred and ſeventy-two thouſand and ninety pores on one ſide of a *leaf* of box. The *leaves* of rue ſeem full of holes, like a honey-comb; all the kinds of St. John's wort appear likewiſe ſtuck full of pin-holes to the naked eye, but the microſcope diſcovers, that the places where thoſe holes ſeem to be, are really covered with a very thin and white membrane. The backſide of the herb mercury looks, as if rough-caſt with ſilver, and all the ribs are full of white, round, tranſparent balls, faſtened by ſlender ſtalks, like ſo many grapes. A ſage-*leaf* appears like a rug, or thag, full of knots and tufts of ſilver thrums, and embelliſhed with fine round cryſtal beads, or pendants, and theſe faſtened by ſlender foot-ſtalks. The back-ſide of a roſe-*leaf*, and particularly of that kind called *ſweet-briar*, appears diaperred with ſilver. Every one knows, that the *leaves* of ſtinging nettles are thick ſet with ſharp prickles, which penetrate the ſkin when touched, and occaſion heat, pain, and ſwelling. Theſe ſymptoms were imagined formerly to be owing to the prickles being left in the wounds they make, but the microſcope diſcovers ſomething much more wonderful in this plant, and ſhews that its prickles are formed for acting, in the ſame manner as the ſtings of animals; for every one of them is found to be a rigid body, hollow, and terminating in a very fine point, with an opening near its end. At the bottom of this prickle there lies a pelluced bag, containing a limpid liquor, which, upon the leaſt touching the prickle, is ſquirted out at the little outlet, and if it enters the ſkin, produces the miſchiefs before mentioned by the pungency of its ſalts. And hence it is, that the *leaves* of nettles, when they have dried a little in the ſun, ſting ſcarce at all. Baker's Microſcope, p. 259.

Beſides, the *leaf* ſerves, in a ſingular manner, to nouriſh the eye or germ of the plant, until, growing by degrees to a greater bulk, it preſſes the veſſels of the foot-ſtalk together, whereby the juice is by little and little ſtopped in the *leaf* till it cannot any more return through the foot-ſtalk; which, by the ceſſation of the afflux and reflux of the nutritious juice, grows putrid, and the *leaf* dies and falls off; which is the chief cauſe of the falling of the *leaves* in autumn. *Leaves* likewiſe ſhade the buds for the future ſhoots from the ſun, which would otherwiſe exhale and dry up their moiſture, and alſo the young fruit. Miller. See *Perſpiration of* PLANTS.

Botaniſts conſider the *leaves* of plants, with regard to their ſtructure, ſurface, conſiſtence, edges, ſituation, ſize, and figure. With regard to their ſtructure, *leaves* are either ſingle, as thoſe of the apple-tree, pear-tree, *&c.* or *double*, as thoſe of angelica, parſley, *&c.*

With regard to their ſurface, *leaves* are either *flat*, as the nummularia, aſarum, origany, *&c.* or *hollow*, as thoſe of the onion and aſphodel; or thick and ſolid, as ſeveral kinds of kali, and houſe-leeks.

With regard to their conſiſtence, *leaves* are either *thin* and fine, as thoſe of St. John's-wort, and dog's-graſs; or *thick* and groſs, as thoſe of portulaca; or *fleſhy*, as thoſe of ſeveral kinds of houſe-leeks; or *woolly*, as thoſe of the mullein.

With regard to the verge, or edges, *leaves* are either *cut ſlightly*, as ſome ſpecies of geum, and cannabis; or *deep*, as treſoil, *&c.*

With regard to their ſituation, *leaves* are either *alternate*, that is, ranged alternately, as the hounds-tongue; or oppoſite to each other, as the phillyrea; or ſtellated, as in the rubia. With regard to their ſize, *leaves* are either very *big*, as thoſe of the colocaſia, and ſphondylium; *moderate*, as thoſe of the fig-tree; *ſmall*, as thoſe of the apple-tree, pear-tree, peach-tree; or *very ſmall*, as thoſe of the mille-pertuis, or St. John's wort.

The figure of the *leaves* of plants may be repreſented by holding one to the ſmoke of reſin, camphor, a candle, *&c.* whereby the *leaf* acquires a blackneſs, which, when preſſed on white paper, gives the exact ſize, ſhape, and particular ramifications of the fibres. This method may be of uſe to botaniſts, when they have no ſkill in drawing. Boyle's Works abr. vol. i. p. 132.

The *leaves* of plants have ſeveral diſtinctions among botaniſts, according to their ſhape and diviſion, each of which has its peculiar name. See *Tab. of Leaves, Botany, Tab.* III. and IV.

Leaves are uſually divided into *ſimple* and *compound*, to which ſome alſo add *determinate*; each of which has its ſeveral ſubdiviſions.

LEAF, *acerous*, is a ſimple linear *leaf*, which ſtays on the tree, and is ever-green; as in the fir, yew, *&c.*

LEAF, *acinaciform*, or *ſcimitar-ſhaped*, is a ſimple *leaf*, which is fleſhy and compreſſed, with one of its edges convex and narrow, the other thick and ſtrait.

LEAF, *aculeated*, is a ſimple *leaf*, whoſe ſurface is covered with cartilaginous points, ſharp, rigid, and ſtrong enough to wound any tender part of the fleſh; and which adhere but ſlightly to the *leaf*, and may be eaſily ſeparated from it.

LEAF, *acuminated*, a ſimple *leaf*, terminated by a pointed and ſharp extremity, like an awl.

LEAF, *acute*, a ſimple *leaf*, which terminates in a ſharp point.

LEAF, *adpreſſ*, *folium adpreſſum*, is when the diſk of the *leaf* lies cloſe to the ſtem.

LEAF, *adverſe*, is one whoſe ſides reſpect the meridian, and not the heavens, as ginger.

LEAVES, *alated*, are thoſe divided into, or compoſed of ſeveral complete pinnated *leaves*, whether equal or unequal, uniform or diſform, as in the orobus, and other the like plants.

LEAVES, *alternate*, thoſe which do not ſtand oppoſite, but one over another, all the way up the ſtalk.

LEAF, *amplexicaule*, expreſſes a *leaf*, the baſe of which extends itſelf in ſuch a manner, that it environs and ſurrounds the ſtalk every way. In this caſe, the *leaf* is generally of a ſagittated, or heart-faſhioned ſhape, and is ſeſſile.

LEAF, *articulated*, is a compound *leaf*, formed by one growing on the top of another.

LEAF, *axillary*, is a determinate *leaf*, that grows from the inſertion of the branches.

LEAF, *bifid*, one divided into two parts at the top. When a *leaf* is thus divided into three parts, it is ſaid to be *trifid*; when into four, *quadrifid*, and ſo on. *Multifid* expreſſes a *leaf* divided into a great number of ſegments.

LEAF, *bigeminate*, a compound *leaf*, formed of a double conjugation of leſſer *leaves*; or one whoſe foot-ſtalk divides in parts, and connects four ſmall *leaves* on the top.

LEAF, *binated*, *binatum folium*, a kind of compound *leaf*, formed only of two folioles on one petiole.

LEAF, *bipartite*. See *Quinque partite* LEAF, infra.

LEAF, *canaliculated*, a ſimple *leaf*, which is hollowed all the way of its length with a channel.

LEAF, *carinated*, or *keel-ſhaped*, is a ſimple *leaf*, that has the under part of the diſk prominent through the whole length, and the upper concave, like the keel of a boat.

LEAF, *carnoſe*, a ſingle *leaf*, which is full of pulp, or of a fleſhy ſubſtance, contained between the membranes which form the upper and under ſurface.

LEAF, *cartilaginous*, a ſimple *leaf*, whoſe edge is ſurrounded with a kind of cartilage or border, thicker than the reſt, but of a different ſubſtance from the *leaf*.

LEAF, *cauline*, a determinate *leaf*, which grows not immediately from the root, but on the ſtalk of a plant.

LEAF, *ciliated*, a ſimple *leaf*, ſurrounded all the way with parallel hairs, or filaments, ſo as to give ſome reſemblance of the hairineſs of the eye-lids.

LEAF, *cirroſe*, or *cloſper*, is a ſimple *leaf*, that terminates with a cloſper or tendril.

LEAF, *clavate*, *folium ſiſſum*, a ſimple *leaf*, divided by linear ſinuſſes, and ſtrait margin; from the number of which diviſions they are called bifid, trifid, *&c.*

LEAF, *colowred*, is that which has other colours than green.

LEAF, *compound*, is that which is divided to the middle rib into ſeveral ſegments, and ſeems made up of ſeveral ſmaller *leaves*, as in liquorice, *&c.*

Compound leaf expreſſes, in general, a *leaf* that is formed of ſeveral other leſſer ones, ſtanding upon the ſame foot-ſtalk. In this large ſenſe, however, it is diviſible into ſeveral kinds. 1. The *compound one*, properly and diſtinctly ſo called. 2. The *decompound*. And, 3. The *ſuperdecompound*. Of each of which in its place.

In deſcribing theſe kinds of *leaves*, the whole *leaf*, which is the reſult of the combination, is called *folium*, and the ſmall *leaves*, which together compoſe it, are called *foliola*.

Compound leaf, properly ſo called, is only formed of one ſeries of folioles, or of one compoſition.

LEAF, *compreſſed*, a ſimple leaf, whoſe marginal ſides are ſo preſſed, that the ſubſtance of the *leaf* is larger than the diſk.

LEAF, *concave*, a ſimple *leaf*, whoſe middle is ſunk or hollowed.

Conferta FOLIA, *leaves* placed in cluſters, or ſo cloſe to one another, that it is not eaſy to diſcover their exact ſituation.

LEAF, *conjugate*, is a compound pinnate *leaf*, conſiſting of two folioles only.

Connata FOLIA, *leaves* cohering together, or whoſe baſes unite, ſo as to form but one body.

LEAF, *convex*, a ſimple *leaf*, whoſe middle riſes into a protuberant form.

LEAF, *cordated*, expreſſes a ſimple *leaf* of an ovated ſhape, hollowed a little on each ſide at the baſe, but without any angles.

LEAF, *obversely-cordated*, one of the same figure with the former, but affixed to its petiole not by the cordated part, which is the base in the former, but by the opposite end.

LEAF, *cordato-sagittated*, a *sagittated leaf*, the sides of which are convex.

LEAF, *crenated*, *crenatum folium*, a simple *leaf*, whose edges are furnished with indentings, which are contiguous to one another, and are neither turned toward the point, nor toward the base.

LEAF, *acute-crenated*, a *crenated leaf* in which the indentings are sharp at the ends.

Obtuse-crenated, that whose indentings terminate obtusely.

LEAF, *crisp*, *crispum folium*, a simple *leaf*, which is undulated or folded over and over at the edge, which must also be in some manner divided, not entire, viz. either dentated, serrated, or lacerated.

LEAF, *cuneiform*, is a simple *leaf*, of the shape of a wedge; or the length of which greatly exceeds its breadth, and the lower part of which grows smaller all the way.

LEAF, *decompofite*, expreſſes a compound *leaf*, the common petiole of which divides itſelf twice before it is furniſhed with *leaves*.

LEAF, *decurrent*, one which adheres immediately to the ſtalk or branch of a plant, without any pedicle; and which has its lower part extended and running along the branch.

LEAF, *deltoide*, a ſimple *leaf* with four angles, whereof thoſe of the ſummit are farther diſtant from the center than thoſe of the ſides.

LEAF, *demerſe*, is one which is hid beneath the ſurface of the water.

LEAF, *dentated*, a ſimple *leaf*, whoſe edge is beſet with horizontal points of the ſame matter with the *leaf* itſelf, and diſtinct and ſeparate one from another.

LEAF, *dependent*, is one whoſe ſummits point to the ground.

LEAF, *depreſſed*, is a ſimple *leaf*, whoſe diſk is more depreſſed than the ſides.

LEAF, *determinate*, is that which derives its character from ſome circumſtance foreign to its own particular ſtructure or configuration, as from its place, ſituation, inſertion, or direction.

LEAF, *digitated*, expreſſes a compound *leaf*, formed of a number of ſimple foliola, placed regularly on a common petiole. In a ſtrict ſenſe, however, it is uſed only to expreſs ſuch a *leaf* as is compoſed of more than four foliola.

LEAVES, *diſſect*, are thoſe which are ranged along only upon two ſides of the branches, as in the fir-tree.

LEAF, *dolabriform*, or *hatchet-ſhaped*, is a ſimple *leaf*, which is roundiſh, compreſſed, and obtuſe, gibbous on the outſide, the inſide ſharp-edged, and taper below.

Duplicato-pinnatum, or *pinnato-pinnatum*, expreſſes a *leaf* compoſed of ſeveral others, each of which is itſelf compoſed of ſeveral ſmaller *leaves* or foliola.

LEAF, *duplicato-ternated*, a compound *leaf*, conſiſting of *leaves*, which are themſelves compoſed of three *leaves* each.

LEAF, *emarginated*, a ſimple *leaf*, which has a little indenting on the ſummit. *Obtuſely emarginated*, is the term when the two points which form the indenting are obtuſe. When they are acute, it is ſaid to be *acutely emarginated*.

LEAF, *enſiform*, a compreſſed ſimple *leaf* of the ſhape of a ſword, which is thin, and edged, as it were, on the ſides, and which has a high rib running down its middle.

LEAF, *erect*, one ſo ſituated as to make an acute angle with the ſtalk.

LEAF, *erode*, *eroſum folium*, a ſimple *leaf*, which has ſeveral ſinuſes in its diſk, and alſo in the edge or border.

LEAVES, *faſciculate*, expreſs *leaves*, many of which ariſe together from the ſame point.

LEAF, *floral*, expreſſes one found near the flower, and which never appears but with the flower.

Frondes expreſs *leaves* conſiſting of ſeveral other *leaves*, and forming the whole plant; as in the caſe in the fern-kind, in which the fructification being on the back of the *leaves*, the ſingle *leaf* makes the whole plant.

LEAF, *gibbous*, is a ſimple *leaf*, which is convex on both ſides, the middle being fuller of pulp.

LEAF, *haſtated*, a ſimple *leaf*, in form like a ſpear's point. This expreſſes a triangular *leaf*, the ſides and the baſe of which are both hollowed, ſo as in ſome meaſure to give the reſemblance of a *leaf* compoſed of three parts.

Hirſutum folium. See *Piloſe* LEAF, infra.

LEAF, *hiſpid*, a ſimple *leaf*, whoſe ſurface is covered with more thick and rigid hairs than the *piloſe* LEAF.

LEAF, *horizontal*. See *Patent* LEAF, infra.

LEAF, *jagged*. See *Laciniated* LEAF, infra.

LEAVES, *imbricated*, *imbricata folia*, *leaves* placed over one another in the manner of the tiles of a houſe, or like the ſcales of fiſhes.

LEAF, *inflex*, *inflexum folium*, that which in growing from its baſe, turns its point again toward the plant.

LEAF, *intire*, *integrum*, or *indiviſum folium*, a ſimple *leaf*, which is not cut in with any ſinus in its diſk.

The term *integerrimum* applied to a *leaf*, denotes that it is free from all diviſions or indentations of any kind in the border any more than in the diſk.

LEAF, *lacerated*, *lacerum folium*, a ſimple *leaf*, the edge of which is compoſed of ſegments of different ſhape and figure.

LEAVES, *lacinulated*, are ſimple *leaves*, which are very deeply cut in, though not quite to the middle rib, yet are divided into ſeveral jagged portions: theſe are called alſo jagged *leaves*; and of this kind are thoſe of the horned-poppy, ragwort, and the like.

LEAF, *lanate*, or *woolly*, is a ſimple *leaf*, whoſe ſurface is covered with a kind of woolly ſubſtance, like the fleece wool of lambs.

LEAF, *lanceolated*, a ſimple *leaf*, which is ſhaped like a ſpear's point, or which is oblong, and growing ſmaller and narrower from the middle to the extremity, where it terminates in a point.

LEAF, *linear*, a ſimple *leaf*, the two ſides of which run almoſt parallel to one another: the *linear leaves* are uſually narrow, and ſomewhat broader in the middle than at either end.

LEAF, *linguiform*, a ſimple linear *leaf*, in ſhape of a tongue, which is obtuſe, fleſhy, depreſſed, convex on the under ſide, and uſually cartilaginous at the edge.

LEAF, *lobated*, is a ſimple *leaf*, divided to the middle into parts that ſtand wide from each other, and have their margins convex. From the number of theſe lobes they are called *bilobe*, *trilobe*, &c.

LEAF, *lunulated*, a ſimple *leaf*, in form of a creſcent: it is a ſuborbicular *leaf*, hollowed at the baſe, with two curvilinear angles in form of ſickles at its hinder part or baſe.

LEAF, *lyrated*, *folium lyratum*, a ſimple *leaf*, in form of a lyre; or it is a *leaf*, which divides itſelf in its lower part in ſuch a manner, that the inciſions below make ſegments, which ſtand out from the body of the *leaf*, and are detached from the larger ſegment, which forms the upper part.

LEAF, *membraneous*, a ſimple *leaf*, merely compoſed of membranes, with no pulp between.

LEAF, *naked*, *nudum folium*, expreſſes a *leaf*, whoſe ſurface is ſmooth and equal, without any particular marks.

LEAF, *natant*, one which floats upon the ſurface of the water.

LEAF, *nervoſe*, a ſimple *leaf*, whoſe veſſels are ſimple, and extend themſelves parallely from the baſe toward the ſummit, without any ramifications.

Nitidum folium, expreſſes a ſimple *leaf*, of a ſmooth and gloſſy ſurface, looking as if poliſhed by art.

LEAF, *oblique*, is one whoſe baſe regards the ſky, and ſummit the horizon.

LEAF, *oblong*, a ſimple *leaf*, the length of which is many times equal to its breadth, and the extremities of which are both too narrow to form ſegments of circles.

LEAF, *obtuſe*, a ſimple *leaf*, terminated by the ſegment of a circle. When the ſummit of a *leaf* is obtuſe, but terminated by a ſharp point, affixed, as it were, upon it, it is ſaid to be *obtuſum cum acumine*.

LEAF, *obverſely-ovated*, *obverſe ovatum folium*, a *leaf* of the ſame figure with the ovated *leaf*, only fixed to the petiole by its ſmaller end.

LEAVES, *oppoſite*, are thoſe which ſtand by pairs on each ſide of the ſtalk.

LEAF, *orbiculate*, a ſimple *leaf* of a round figure, the breadth of which is equal to its length, and every part of its edges equally diſtant from the center.

LEAF, *oval*, a ſimple *leaf*, approaching to round, but too long for its breadth; its two ends forming the ſame ſegments of circles. This might be more diſtinctly called *elliptic*.

LEAF, *ovated*, *folium ovatum*, expreſſes a ſimple *leaf*, the ſhape of which is like that of an egg, or which is longer than broad, and the baſe or lower part of which forms the ſegment of a circle, though the other extremity is too ſmall to be in proportion to it.

LEAF, *palmated*, a ſimple *leaf*, in form of an open hand. This expreſſes a *leaf*, divided into ſeveral ſegments, from the top down to the middle, or to the baſe.

LEAF, *panduriform*, one of the ſhape of a violin. This is an oblong *leaf*, larger at both ends than in the middle, where it is deeply cut, in a rounded manner.

LEAF, *papillofe*, a ſimple *leaf*, whoſe ſurface is covered with little roundiſh protuberances, or veſicles.

LEAF, *parabolical*, is a ſimple *leaf*, whoſe length exceeds its breadth, and is narrowed from the baſe upward.

LEAF, *partite*, or *divided*, is a ſimple *leaf*, divided into many parts to the baſe, ſo as to appear like many *leaves*, till they are examined. From the number of diviſions they are bipartite, tripartite, &c.

LEAF,

LEAF, *patent*, one which ſtands almoſt ſtrait out from the ſtalk, or nearly at right angles with it. When it forms perfectly right angles, it is called *horizontal*.

LEAF, *pedate*, or *footed*, a compound *leaf*, whoſe foot-ſtalk or petiole is divided, and has ſome ſmall *leaves* placed on the inner ſide.

LEAF, *peltated*, expreſſes a *leaf*, the petiole of which is affixed to the diſk, and not to the baſe, or to the edge of the *leaf*.

LEAF, *pentagonal*. See *Trigonal* LEAF, infra.

LEAF, *perfoliate*, that whoſe diſk is pierced by the ſtalk, the branch, or the peduncle; and does not any where touch or adhere to its edges.

LEAF, *petiolate*, one affixed to a plant by means of a peculiar pedicle, which in the caſe of a *leaf* is called *petiole*, though in caſe of fruit a *peduncle*. See PETIOLE, &c.

LEAF, *pilоſe*, a ſimple *leaf*, whoſe ſurface is furniſhed with hairs ſo large and long, as to be diſtinguiſhable by the eye ſeparately. A *leaf* hairy to a greater degree is expreſſed by the term *hirſutum*; and when it is covered with a coarſer hair or ſhag, *villoſum*; and with a ſhorter and finer, *lanigerum*.

LEAF, *pinnated*, or *pennated*, a compound *leaf*, formed in manner of a wing, and compoſed of two ranges or ſeries of ſoliоles, annexed to the two ſides of one common oblong petiole.

Of the *pinnated leaves* there are ſeveral kinds.

Pinnate with an odd one, when it is terminated by an odd ſoliole; *cirrhoſe pinnate*, when it terminates in a cirrhus or claſper; *abrupt pinnate*, when it is terminated neither by a ſoliole nor cirrhus; *oppoſitely pinnate*, when the ſolioles ſtand oppoſite to each other; *alternately pinnate*, when the ſolioles are produced alternately; *interruptedly pinnate*, when they are alternately leſs; *articulately pinnate*, when the petiole common to all the ſolioles is articulate or joined; *decurſively pinnate*, when the ſolioles are decurrent, or extend themſelves downwards along the petiole.

LEAF, *pinnatifid*, expreſſes a ſimple *leaf*, divided into ſeveral parts, in form of ale's, or which has three, four, or more lateral ſinuſes, ſeparated by long horizontal ſegments.

LEAF, *plane*, is a ſimple *leaf*, which has both ſurfaces every where parallel.

LEAF, *plicated*, a ſimple *leaf*, from the baſe or petiole of which there run at ſeveral diſtances veſſels or fibres, which extend themſelves to the extreme ſides, and ſome of which raiſe and others depreſs the diſk of the *leaf* in an alternate order, making acute angles.

LEAF, *præmorſe*, *præmorſum folium*, a ſimple *leaf*, which is truncated and terminated by very blunt unequal cuts.

LEAF, *punctated*, or *dotted*, is a ſimple *leaf*, beſprinkled with hollow points or dots.

LEAF, *quadrangular*, is a ſimple *leaf*, with four prominent angles round the diſk.

LEAF, *quadrifid*. See *Bifid* LEAF.

LEAVES, *quaternate*. See *Ternate* LEAF.

Quina FOLIA. See *Ternate* LEAF.

LEAF, *quinquangular*, a ſimple *leaf*, with ſtrait ſides, and five angles.

LEAF, *quinquefoliate*, is a compound *leaf* of the ſame form with the *trifoliate*, but made up of five ſegments; ſuch are the *leaves* of cinquefoil, &c.

LEAF, *quinqueſeparatite*, one which is ſeparated into five parts down to the very baſe, ſo as to ſeem made up of five ſeparate *leaves*, till cloſely examined. In the ſame manner a *leaf* is ſaid to be *bipartite*, &c. when it is divided into two, three, &c. parts.

LEAF, *radical*, a determinate *leaf*, which grows immediately from the root of a plant, not from the ſtalk.

LEAF, *radicant*, one which puſhes out roots from its ſummits, as ſome of the ferns do.

LEAF, *radicated*, *ſolium radicatum*, one which puſhes out roots from its diſk or lower ſurface.

LEAVES, *ramoſe*, thoſe which are ſtill more divided than the winged or alated *leaves*, and compoſed of one ſeries farther in their diviſion. Of this ſort are the *leaves* of female fern, and the like. Or,

Ramoſe leaf is a *leaf* of the claſs of determinate *leaves*, which grow not on its main ſtalk, but on its branches.

LEAF, *ramuloſe*, a kind of compound *leaf*, in which there are ſeveral ſolioles ſaſtained on a branched petiole.

LEAF, *reclinate* or *reflex*, one which has its ſummit lower than its baſe.

LEAF, *reniform*, a ſimple *leaf* of the ſhape of a kidney; or, is a *leaf* of a ſubcircular figure, hollowed a little at the baſe, but without any angle.

LEAF, *repandous*, *ſolium repandum*, a ſimple *leaf*, the border of which is marked all round with ſhort lobes, each making a ſegment of a circle, with obtuſe ſinuſes.

LEAF, *retuſe*, *retuſum folium*, a ſimple *leaf*, whoſe extremity is terminated by an obtuſe ſinus.

LEAF, *revolute*, *folium revolutum*, a *leaf*, the upper part of which rolls itſelf downward.

LEAF, *round*, *teres folium*, a ſimple *leaf*, which is not flatted as moſt are, but is of a cylindric figure, except the point. A *round leaf* denotes alſo one that has no angles.

LEAF, *rugoſe*, a ſimple *leaf*, whoſe veins are ſunk deep, and between which the membranous and fleſhy part of the *leaf* riſes in irregular forms, ſo as to give upon the whole a wrinkled ſurface.

LEAF, *ſagittated*, a ſimple *leaf*, formed like the iron head of an arrow. This is the triangular *leaf*, hollowed at its baſe for the inſertion of the petiole.

LEAF, *ſalbrous*, a ſimple *leaf*, which has ſeveral irregular prominences on its ſurface.

LEAF, *ſemamplexicaule*, one reſembling the *amplexicaule*, but with its lobes at the baſe too ſmall to entirely ſurround the ſtalk.

LEAF, *ſemicylindric*, is a ſimple *leaf*, which is round on one ſide, and flat on the other.

LEAF, *ſeminal*, a determinate *leaf*, which appears firſt from the ſeed of a plant, and is uſually different from the reſt.

LEAF, *ſerrated*, *folium ſerratum*, a ſimple *leaf*, whoſe edge or border is notched like a ſaw, or furniſhed with points which make acute angles, and placed one bending toward another, and all toward the top.

Retroverſum ſerratum folium, expreſſes a *leaf*, whoſe edge is furniſhed with the ſame ſort of indentings, but in which they are turned backwards, or all look toward the baſe of the *leaf*.

Obſolete ſerratum folium, expreſſes a *leaf* indented in the ſame manner, but the indentings obtuſe and weak.

Folium duplicato-ſerratum, denotes a *leaf ſerrated* as the firſt, but with the ſerratures large, and their edges *ſerrated* again with indentings of the ſame kind.

LEAF, *ſeſſile*, one which riſes immediately from the ſtalk, without any pedicle.

LEAF, *ſimple*, is that which is whole, or not divided to the middle rib, or ſeeming made up of different ſmaller *leaves*; as in ſage, mint, &c.

Simple leaf is otherwiſe defined, that of which the PETIOLE carries only one.

LEAF, *ſinuated*, a ſimple *leaf*, which has a number of ſinuſes on its ſides, but theſe ſeparated by lobes not very long, nor themſelves indented or notched at the edges.

Sinuate-dentated leaf, expreſſes a *leaf* like the former, but with the lateral lobes of a linear figure.

Retroverſum ſinuatum folium, a *leaf* with ſinuſes at the ſides, and with the lobes which divide them, pointed and turned toward the baſe, like the barbs of an arrow.

LEAF, *ſmooth*, *folium glabrum*, is that whoſe ſurface is ſmooth, and has no inequalities.

LEAVES, *ſparſe*, thoſe which are placed irregularly over the ſeveral parts of the plant.

LEAF, *ſpatulated*, is a ſimple *leaf*, of a roundiſh figure, but narrow at the baſe, and linearly lengthened.

LEAF, *ſpinoſe*, a ſimple *leaf*, whoſe diſk or edge is armed with cartilaginous points ſo firmly affixed, that they cannot be ſeparated without injuring the *leaf* itſelf: to which is oppoſed an unarmed or ſmooth *leaf*.

LEAVES, *ſtellate*, thoſe which grow more than ſix at a joint, and are arranged like the rays of a ſtar, called alſo *verticillate* or whorled.

LEAF, *ſtriated*, a ſimple *leaf*, with a number of longitudinal furrows on its ſurface.

LEAF, *ſubrotund* or *roundiſh*, a ſimple *leaf*, approaching to the figure of the orbicular *leaf*, but departing from it, either in being too long or too broad, or prominent, in ſome one or more parts.

LEAF, *ſubulate*, that which grows at the ramifications, or under that part of the ſtalk, from whence there grows one or ſeveral branches.

LEAF, *ſubulated*, is a ſimple *leaf*, of the ſhape of an awl. This expreſſes a *leaf* oblong and narrow, broadeſt at the baſe, and thence gradually decreaſing, till it terminates in a point.

LEAF, *ſulcated*, a ſimple *leaf*, which has a great number of ridges all round it, with obtuſe ſinuſes.

LEAF, *ſupradecompoſite*, a compound *leaf*, which has the common petiole divided more than twice, before it is charged with *leaves* or ſolioles.

LEAF, *ternated*, a compound one, conſiſting only of three *leaves* on a common petiole.

Ternate alſo expreſſes *leaves* which grow three at a joint, ſurrounding the ſtalk. When there are four or five, they are called *quaterna* and *quina*, and ſo on.

LEAF, *tetragonal*. See *Trigonal* LEAF, infra.

LEAF, *tomentoſe*, a ſimple *leaf*, whoſe ſurface is covered with hairs ſo ſhort and fine, that the eye does not diſtinguiſh them ſingly, though the *leaf* in general is evidently downy, both to the ſight and the touch.

LEAF, *triangular*, a ſimple *leaf*, compoſed of three reſti-

linear sides, and three angles, the two inferior ones of which are on a level with the base.

LEAF, *trifid*. See *Bifid* LEAF.

LEAF, *trifoliate*, is a compound *leaf*, made up of segments, placed in the same order as in the digitated *leaf*; but these segments are usually short, and are always three in number. Of this sort are the *leaves* of clover, grass, &c.

LEAF, *triganal*, a simple *leaf*, much like the triquetrous, only that in this the several faces are each hollowed in form of channels, and the ribs are sharp and membranaceous.

A *leaf* that has, instead of three ribs or edges, four or five, is in the same manner called *tetraganal*, *pentaganal*, &c.

LEAF, *trilobous*, one divided into three lobes. This is a *leaf* divided just down to the middle into three parts, which stand apart from one another, and are rounded at the edges.

LEAF, *triportite*. See *Quinqueportite* LEAF, supra.

Tripennate, or *tripinnate-pinnate*, is a compound *leaf*, whose petiole bears many folioles, each of which are bipinnate.

Tripinnate-ternatum, or *ternate-ternatum*, a compound *leaf*, the petiole of which divides three times into three branches, before any *leaves* or folioles are placed on it.

LEAF, *triquetrous*, expresses a simple *leaf*, which has three faces or sides, all flat. This is usually also foliulated, or grows smaller gradually from the base to the point.

LEAF, *truncated*, a simple *leaf*, whose summit or point seems to have been cut off, or is terminated by a strait line in a transverse direction.

LEAF, *tubulose*, a simple *leaf*, which is hollow within, and makes a kind of tube.

Vaginans expresses a *leaf*, the base of which is formed like a cylinder, and surrounds the stalk, as is the case in many of the grasses.

LEAF, *vessie*, a simple *leaf*, on the surface of which there are a vast number of branched vessels, which frequently unite in an odd manner one with another.

LEAF, *villose*. See *Pilose* LEAF, supra.

LEAF, *viscous*, is a simple *leaf*, which has its surface covered with a clammy moisture, that is not fluid.

LEAF, *undulated*, a simple *leaf*, whose exterior part of the disk is of more extent than a circle of the same diameter, so that the edges are necessitated to rise and fall in a regular manner.

The following remarks concerning the colouring substances of *leaves* are taken from Dr. Lewis. The green colour of the leaves of plants may be extracted by rectified spirit of wine and by oils. The spirituous tinctures are generally of a fine deep green, even when the *leaves* themselves are dull coloured, or yellowish, or hoary. The colour however seldom remains long in these liquors; and it remains a much shorter time when the colouring matter is separated in a solid form, and exposed to the air. The acanthus gives a more durable green colour to spirit than any other herb. Alkalis heighten the colours of the tinctures and of the juices; and acids weaken, destroy, or change them to a brownish colour. Lime-water improves the colour, and also the durability of the colour. By means of lime, not inelegant green lakes may be obtained from the leaves of acanthus, lily of the valley, and of several other plants. Few herbs communicate any part of their green colour to water; perhaps none give a green considerably deep. Nevertheless, a green dye is said to be given to woollen by the leaves of some plants, as of the wild chervil, or cow-weed, the common rag-wort, and devil's-bit. The leaves of many kinds of herbs and trees give a yellow dye to wool, previously boiled in a solution of alum and tartar. Weld particularly affords a fine yellow dye. Mr. Hellot observes, that all *leaves*, barks, and roots, which have an astringent taste, as the *leaves* of the almond, peach, and pear-trees, alh-bark, roots of wild patience, &c. yield durable yellows. From the *leaves* of two plants, blue colouring substances are produced, namely, INDIGO and WOAD. Mr. Hellot suspects that a similar blue feccula might be produced from many other vegetables. He supposes the green colour of vegetables to proceed from a mixture of blue and yellow particles, and that the former are frequently more permanent than the latter, so as to be capable of resisting the fermentation of the juice of the plants, while the yellow are destroyed by that fermentation. Dr. Lewis has tried, without success, to obtain blue dyes from other plants, by putrefying them in water.

LEAF, *Indian*, in *Botany*. See TAMALAPATRA.

LEAF, *water*, in *Botany*, *hydrophyllum*, a genus of the *pentandria monogynia* class. Its characters are these: the flower has a permanent empalement of one leaf, cut into five segments; it has one bell-shaped petal, divided into five parts; under each of these segments is fixed a nectarium, which is situated about the middle: it has five stamina, which are longer than the petal, and an oval pointed germen, which becomes a globular capsule with one cell, including one large round seed. We know but one species, which grows naturally in boggy grounds in North America. Miller.

Linnæus reckons two species, one growing in Virginia, and the other in Canada.

LEAF is also applied to the finest and most beautiful parts of flowers, more properly called *petals*.

It is true, all flowers have not *leaves* or petals; and it is sometimes difficult to determine which is to be called the *leaves*, and which the calyx of the same flower.

To prevent confounding the *leaves* of the flower with those of the rest of the plant, the former are called by botanists *petals*, the latter *folia*.

LEAVES, in *Architecture*, are an ornament of the Corinthian capital, and thence borrowed into the Compositе; consisting in the representation of a double row of *leaves* covering the vase, tympanum, or neck of the column.

These *leaves* are usually formed in imitation of those of the acanthus; sometimes of those of olive, and sometimes of laurel.

The *leaves* are divided; each making three ranges of lesser, and are bent atop, one third of their height.—*See Tab. Archi. fig.* 28.

LEAF-*gold*. See GOLD-*leaf*.

LEAVES in clocks and watches, are used for the notches of their PINIONS.

LEAD-*silver*. See SILVER.

LEAGUE, an extent of ground, considered lengthwise; serving to measure the distances of one place from another; and containing more or less geometrical paces, according to the different usages and customs of countries.

The word comes from *leuca*, or *lega*, an ancient Gaulish word, for an itinerary measure, and adopted in that sense by the Romans. Some derive the word *leuca* from *leuca*, white; because the Gauls, in imitation of the Romans, marked the spaces and distances of their roads with white stones.

A *sea-league*, is usually reckoned 3000 geometrial paces, or three English miles; the large *leagues* of France are usually 3000, and in some places 3500 paces: the mean or common *league* is 2500 paces, and the little *league* 2000. Cluver observes, that the ancient Gaulish *leagues* were but 1500 paces.

The Spanish *leagues* are larger than the French, 17 Spanish *leagues* making a degree, or 20 French *leagues*, or 69½ English statute miles. The *leagues* of Germany and Holland contain four geographical miles each.

The Persian *leagues* are nearly the same with the Spanish; that is, each is equivalent to four Italian miles; which come nearly to what Herodotus mentions of the parasanga, an ancient measure among the Persians, containing thirty stadia; eight whereof, according to Strabo, make a mile.

The Persians mark their *leagues* by trees, as the ancient Romans did by stones, *lapides*; for which reason they are also called *agagi*, a Turkish word signifying a *tree*. In Japan, the *league* consists of 1800 fathoms. These are all distinguished by little hillocks, raised on purpose by the road-side. See the *leagues* of most countries reduced to the Roman foot, under MILE.

LEAGUE also denotes an alliance or confederacy between princes and states for their mutual aid, either in attacking some common enemy, or in defending themselves.

The word comes from *ligo*, which, in the corrupt Latin, was used for a *confederacy*: *Quo quis cum alio ligatur*.

There have been several holy *leagues* entered into by the Christians, against the Saracens and infidels; called also *crusades*, or CROISADES.

The LEAGUE, by way of eminence, denotes that famous one on foot in France, from the year 1576, to 1593. Its intent was to prevent the succession of Henry IV. who was of the Reformed religion, to the crown; and it ended with his abjuration of that faith.

The *leaguers* or confederates, were of three kinds: the *zealous leaguers* aimed at the utter destruction, not only of the Huguenots, but also of the ministry. The *Spanish leaguers* had principally in view the transferring the crown of France to the king of Spain, or the infanta his daughter. The *moderate leaguers* aimed only at the extirpation of Calvinism, without any alteration of the government.

LEAGUE *solemn*. See COVENANT.

LEAK, *in Sea-language*, is a chink or breach in the decks, sides, or bottom of a ship, through which the water comes in. A ship is said to *spring a leak* when she begins to *leak*, or let in the water.

The manner of stopping a *leak* is, to put into it a ling wrapt in oakum, and well tarred, or in a tarpaulin, &c.

clout, which keeps the water out; or nailing a piece of sheet-lead on the place.

Seamen sometimes stop a *leak* by thrusting a piece of salt beef into it. The sea-water, says Mr Boyle, being fresher than the brine imbibed by the beef, penetrates into its body, and causes it to swell so, as to bear strongly against the edges of the broken plank, and thereby stops the influx of the water. Works Abr. vol. i. p. 147.

A ready way to find a *leak* in a ship, is to apply the narrow end of a speaking-trumpet to the ear, and the other to the side of the ship where the *leak* is supposed to be; then the noise of the water issuing in at the *leak* will be heard distinctly, whereby it may be discovered. See Philos. Trans. N° 201.

LEAKAGE, the state of a vessel that *leaks*; that is, lets water, or other liquid ooze, in or out.

LEAKAGE also denotes an allowance of twelve per cent. to merchants importing wine, out of the customs thereof; and of two barrels in twenty-two, and three in twenty-three, to brewers, *&c.* out of the excise. 12 C. II. c. 24.

LEAO, in *Natural History*, a mineral substance approaching to the nature of the *lapis* LAZULI, found in the East Indies, and of great use in the Chinese porcelain manufacture, being the finest blue they are possessed of. This stone is found in the strata of pit-coal, or in those of a yellowish or reddish earth in the neighbourhood of the veins of coal. There are often found pieces of it lying on the surface of the ground, and these are a sure indication, that more will be found on digging. It is generally found in oblong pieces of the size of a finger, not round, but flat. Some of this is very fine, and some coarse, and of a bad colour. The latter is very common, but the fine sort is scarce, and greatly valued. It is not easy to distinguish them at sight, but they are found by experiment, and the trying one piece is generally sufficient for judging of the whole mine; for all that is found in the same place is usually of the same sort.

Their manner of preparing it for use is this: they first wash it very clean, to separate it from the earth, or any other foulness it may have; they then lay it at the bottom of their baking furnaces; and when it has been thus calcined for three or four hours, it is taken out and powdered very fine in large mortars of porcelain with pestles of stone faced with iron. When the powder is perfectly fine, they pour in some boiling water, and grind that with the rest, and when it is thoroughly incorporated, they add more, and finally pour it off, after some time settling. The remainder at the bottom of the mortar, which is the coarser part, they grind again with more water, and so on, till they have made the whole fine, excepting a little dirt or grit. When this is done, all the liquors are mixed together, and well stirred. They are suffered to stand two or three minutes after this, and then poured off, with the powder remaining in them. This is suffered to subside gradually, and is the fine blue they use in their best works, our common smalt serving for the blue of all the common low-priced China-ware. Observat. sur les Coutumes de l'Asie, p. 326.

It is plain that this stone is a sort of *lapis lunulæ*; and the ultramarine blue, used by our painters, is made in a manner not wholly unlike this. It is much to be wished, that England were well searched for such a stone as this is, since our mines in Derbyshire afford many blue substances, which have not been sufficiently considered; and if it should be found that either this, or any other European nation, produces it, it will be a fine discovery, as we should not only have the means of giving a fine colour to our own manufactures of this kind, but we might trade with it in China to a vast advantage. If England does not possess it, it is very probable that Germany does, the mines there affording an almost inexhaustible store of coloured stones; and this being certainly no other than the flinty matter of some crystalline nodule, accidentally tinged with some particles of copper. See LAZULI *lapis*.

LEAP, in *Music*, is when the song does not proceed by conjoint degrees. For instance, when there is an interval of a third, fourth, fifth, *&c.* between two notes, the Italians call it a *leap*, *salto*.

It is to be observed, that there are two kinds of *leaps*, regular and irregular, called by the Italians, *salti regolari & irregolari*.

The *regular leaps* are those of a third major or minor, whether natural or accidental, fourth, fifth, sixth minor, and octave, and these either ascending or descending.

Irregular leaps are the tritone, sixth major, seventh major, the ninth, tenth, and in general all beyond the compass of an octave; at least, in vocal music.

Besides these there are others which may be used, but with discretion; such as the diminished fourth, the false fifth, and flat seventh. The difference between the regular and irregular *leaps* is, that the former are performed by the voice, without any great difficulty or effort; whereas the latter require more attention and pains to execute.

LEAP, in *Fishing*, is used for a net, engine, or weel, made of twigs to catch fish in. Stat. 4 and 5 Will. and Mary, cap. 23.

LEAP, in the *Manege*, an air of a STEP and a *leap*.

LEAP-YEAR, the same with BISSEXTILE.

It is thus called, because, in the common year, any fixed day of the month changes successively one day of the week; but in the *leap-year*, it skips or *leaps* over one day.

The common year hath three hundred and sixty-five days in it, but the *leap-year* three hundred and sixty-six days; and in this case February hath twenty-nine days; which, in the common year, hath but twenty-eight.

To find the *leap-year*, the rule is,

Divide by 4, what's left shall be,
For leap-year, 0; *for* first, 1, 2, or 3.

For example; is the year 1780 a *leap-year*, or common-year?

4)1780(445.

There is 0 remainder, to that it is *leap-year*.

LEAPING-*horse*, in the *Manege*, is one that works in the high manege, or one that makes his *leaps* with order and obedience between two pillars upon a straight line, in volts, caprioles, balotades, or croupades. Use excludes a gallop *a terra a terra*, and corvets from the number of *leaps*; because the horse does not rise so very high in these. Each *leap* of the horse ought not to gain, or make above a foot and a half of ground forward.

LEASE, from the French *laisse, dimittere, to let*, in *Law*, a demise, or letting of lands, tenements, or hereditaments, unto another for life, term of years, or at will, for a rent reserved.

A *lease* is either written, called an *indenture, deed-poll*, or *lease* in writing; or by word of mouth called *lease separal*. See PAROL.

All estates, interests of freehold, or terms for years in lands, *&c.* not put in writing and signed by the parties, shall have no greater effect than as estates at will; unless it be of *leases* not exceeding three years from the making; wherein the rent reserved shall be two thirds of the value of the things demised. Stat. 29 Car. II. cap. 3. *Leases* exceeding three years must be made in writing, and if the substance of a *lease* be put in writing, and signed by the parties, though it be not sealed, it shall have the effect of a *lease* for years, *&c.*

The party who lets a *lease*, is called the *lessor*; and the party to whom it is let the *lessee*.

LEASES *by statutes*. There are three kinds of persons, who may make *leases* for three lives or twenty-one years, and not exceeding this term, by statutes, that could not do so heretofore, viz. tenants in tail, binding their issue in tail, but not in remainder or reverſion; husband and wife, of the wife's land; and persons seized of an estate in fee-simple in right of the church, except parsons and vicars. By the stat. 32 Hen. VIII. called the enabling statute.

But this statute specifies several requisites in order to render the *leases* binding: they must be by indenture, and not by deed poll, or by any poll. They must commence from the day of making, and not at any greater distance of time: the old lease, if there be any, must be first absolutely surrendered, or be within a year of expiring: the *leases* must be of corporeal hereditaments, and not of such things as lie merely in grant; for no rent can be reserved out of these by the common law, as the lessor cannot resort to them to distrain: though now by 5 Geo. III. c. 17. a *lease* of tithes or other incorporeal hereditaments, alone, may be granted by any bishop or ecclesiastical or eleemosynary corporation, and the successor shall be intitled to recover the rent by an action of debt, which, in case of a freehold *lease*, he could not have brought at the common law. The *lease* must also be of lands and tenements commonly letten for twenty years past: and the customary rent for that term reserved: and *leases* must not be made without impeachment of waste.

By 1 Eliz. c. 19. called the diſabling or reſtraining ſtatute, it is enacted, that all grants by archbishops and bishops, other than for the term of twenty-one years, or three lives from the time of making, or without reserving the usual rent, shall be void: but this statute did not extend to grants made by any bishop to the crown; however these as well as those made to any subject, were comprehended in the prohibition of the statute 1 Jac. I. c. 3. The restrictions of this statute were extended by 13 Eliz. c. 10. explained and enforced by 14 Eliz. c. 11. and 14. 18 Eliz. c. 11. and 43 Eliz. c. 29. to certain other inferior corporations, both sole and aggregate. From all these it is collected, that all colleges, cathedrals and other ecclesiastical or eleemosynary corporations, and all parsons and vicars are restrained from making any *leases* of any kind, of their land, unless under the following regu-

lations: 1. They muſt not exceed twenty-one years or three lives from the making. 2. The accuſtomed rent, or more, muſt be yearly reſerved upon them. 3. Houſes in corporations or market-towns may be lett for forty years; provided they be not the manſion-houſes of the ſeſſors, nor have above ten acres of ground belonging to them, and provided the leſſee be bound to keep them in repair; and they may alſo be aliened in fee-ſimple for lands of equal value in recompence. 4. Where there is an old *leaſe* in being, no concurrent *leaſe* ſhall be made, unleſs where the old one will expire within three years. 5. No *leaſe* by the equity of the ſtatute ſhall be made without impeachment of waſte. 6. All bonds and covenants tending to fruſtrate the proviſions of the ſtatutes 13 and 18 Eliz. ſhall be void. There is another reſtriction with regard to college *leaſes*, by ſtat. 18 Eliz. c. 6. which directs, that one third of the old rent, then paid, ſhould for the future be reſerved in wheat or malt, reſerving a quarter of wheat for each 6 *s.* 8 *d.* or a quarter of malt for every 5 *s.* or that the leſſees ſhould pay for the ſame according to the price that wheat and malt ſhould be ſold for, on the market next adjoining to the reſpective colleges, in the market-day before the rent becomes due. This money ariſing from corn rents is now, *communibus annis*, almoſt double to the rents reſerved in money. The *leaſes* of beneficed clergymen are farther reſtrained, in caſe of their non-reſidence, by ſtatutes 13 Eliz. c. 20. 14 Eliz. c. 11. and 18 Eliz. c. 11. which direct, that, if any beneficed clergyman be abſent from his cure above fourſcore days in any one year, he ſhall not only forfeit one year's profit of his benefice to be diſtributed among the poor of the pariſh; but all *leaſes* made by him of the profits of ſuch benefice, and all covenants and agreements of like nature, ſhall ceaſe and be void; except in the caſe of licenſed pluraliſts, who are allowed to demiſe the living, on which they are non-reſident, to their curates only, provided ſuch curates do not abſent themſelves above forty days in any one year. Blackſt. Com. vol. ii. p. 321, *&c.*

An ASSIGNMENT differs from a *leaſe* only in this: that by a *leaſe* one grants an intereſt leſs than his own, *reſerving* to himſelf a reverſion; in aſſignments he parts with the whole property, and the aſſignee ſtands to all intents and purpoſes in the place of the aſſignor.

LEASES *of the king*. *Leaſes* made by the king, of part of the duchy of Cornwall, are to be for three lives, or thirty-one years; and not to be made diſpuniſhable of waſte, whereon the ancient rent is to be reſerved; and eſtates in reverſion, with thoſe in poſſeſſion, are not to exceed three lives, *&c.* 13 Car. II. c. 4.

LEASE *and Releaſe*, is a conveyance of right or intereſt in lands or tenements, to another that hath the poſſeſſion thereof. Though the deed of feoffment was the uſual conveyance at common law; yet ſince the ſtat. of 27 Hen. VIII. of uſes, the conveyance by *leaſe and releaſe* has taken place of it, and is become a very common aſſurance to paſs lands and tenements; for it amounts to a feoffment, the uſe drawing after it the poſſeſſion without actual entry, *&c.* and ſupplying the place of livery and ſeiſin, required in that deed: in the making of it, a *leaſe*, or bargain and ſale for a year, or ſuch like term, is firſt prepared and executed, to the intent that by virtue thereof the leſſee may be in actual poſſeſſion of the lands intended to be conveyed by the *releaſe*, and thereby and by force of the ſtatute 27 Hen. VIII. c. 10. for transferring of uſes into poſſeſſion, be enabled to take and accept a grant of the reverſion and inheritance of the ſaid lands, *&c.* to the uſe of himſelf and his heirs for ever. See RELEASE.

LEASH, or LEASHE, among *Sportſmen*, denotes three creatures of any kind; but chiefly greyhounds, foxes, bucks, and hares.

We ſay a *leaſh* of greyhounds, a couple and a half of hounds.

LEAT, is uſed for a trench to convey water to or from a mill. It is mentioned in the ſtatute 7 Jac. I. cap. 19.

LEATHER, in *Commerce*, the ſkins of ſeveral ſorts of beaſts dreſſed and prepared for the uſe of various manufacturers, whoſe buſineſs it is to make them up, according to their different employments. The butcher and others, who flay them off the carcaſes diſpoſe of them raw or ſalted to the tanner and tawyer; they to the ſhamoy, morocco, and other kind of *leather*-dreſſers, who prepare them according to their reſpective arts, in order to vent them among the curriers and *leather*-cutters, glovers, harneſs-makers, coach-makers, ſaddlers, breeches-makers, pale-*leather*-makers, chair-makers, ſhoe-makers, bookbinders, and all in any way concerned in the article of *leather*.

Leather has divers names according to the ſtate wherein it is, and according to the different kinds of ſkins whereof it is prepared, and its peculiar qualities when ſo prepared.

1. The ſkin is raw as it comes off the animal. 2. Some are ſalted with ſea-ſalt and alum, or with natron, which is a ſpecies of ſalt-petre, or white ſalt-wort, to prevent corruption in keeping, or ſending to diſtant tanneries during hot ſeaſons.

Skins dried with the hair on, are commonly thoſe of oxen and cows, or buffaloes, either tame or wild. Moſt of thoſe in France come from foreign countries. The places which furniſh the largeſt quantity, are Peru, the iſle of St. Domingo, Barbary, Cape Verd iſles, the river Senegal in Africa, Muſcovy, Ireland, the iſland of Cuba. Thoſe of this latter place are the moſt eſteemed; they are called Havanna ſkins, from the name of the capital city of that iſland, whither they are carried in order to be ſent to Spain, and from thence into other parts of Europe. After theſe ſkins are ſtript of their hair, they are ſold to the tanners. See CURRYING, TANNING, and SKINS.

The three principal aſſortments of *leather* are tanned or tawed, and oil and alum *leather*, all which are dreſſed in ſome yards.

The art of dreſſing *leather* in oil conſiſts in firſt ſoaking the ſkins; then throwing them into the lime-pit; and when they are taken hence, pulling them and delivering them to the freizer: they are then ſtruck with the oil and ſent to the mill; when they are milled ſufficiently, they are thrown into the ditch to be ſcoured, and by ſome ſcudded, and afterwards hung upon the hooks to dry. When they have been weighed and marked by the proper officers, in order to fix the exciſe duty, they are fit for ſale. The ſorts of ſkins dreſſed in oil are thoſe of deer, ſheep, and lambs, and ſome few of goat, and the oil uſed for this purpoſe is Newfoundland or cod's liver oil. The alum *leather*-dreſſers art conſiſts in properly ſoaking, liming, wringing, (an operation ſometimes omitted) and ſtriking them in a liquor compoſed of water, ſalt, and alum, and then drying them properly. The ſort of ſkins dreſſed in alum are thoſe of ſheep and lambs, and a large quantity of kid. Poſtleth. Dict. Com. art. *Leather*.

There are ſeveral ſtatutes relating to *leather*; the 27 Hen. VIII. c. 14. directs packers to be appointed for *leather* to be tranſported: but the 18 Eliz. c. 9. prohibits the ſhipping of *leather* on penalty of forfeiture, *&c.* Though by 20 Car. c. 5 tranſportation of *leather* is allowed to Scotland, Ireland, or any foreign countries, paying a cuſtom or duty; which ſtatute is confirmed by divers ſubſequent acts.

On exportation of hides or ſkins, tanned, tawed, or dreſſed and marked, and of boots, ſhoes, gloves, and other manufactures made of *leather*, chargeable for the duty by weight, a drawback ſhall be allowed of two thirds of the duty. 9 Ann. c. 11. 12 Ann. ſtat. 2. c. 9. Except that for tanned *leather* manufactured into boots, ſhoes, gloves and other wares, a drawback of 14*d.* for a pound weight ſhall be allowed inſtead of the ſaid two-thirds of the duty. 12 Ann. ſtat. 2. c. 9. And a drawback of 1*d.* for a pound weight of ſeal ſkins tanned or tawed ſhall be allowed in lieu of any other draw-back. 9 Geo. III. c. 39.

No perſon ſhall ingroſs *leather* to ſell again, under the penalty of forfeiture. None but tanners are to buy any rough hides of *leather*, or calves ſkin in the hair, on pain of forfeiture; and no perſon ſhall foreſtall hides, under the penalty of 6*s.* 8*d.* a hide. *Leather* not ſufficiently tanned is to be forfeited. In London, the lord mayor and aldermen are to appoint and ſwear ſearchers and ſealers of *leather*, out of the company of cordwainers, *&c.* And alſo triers of the ſufficiency of *leather*; and the ſame is to be done by mayors, *&c.* in other towns and corporations; and ſearchers allowing inſufficient *leather*, incur a forfeiture of 40*s.* Shoemakers making ſhoes or boots of inſufficient *leather* are liable to forfeit for every pair 30. 4*d.* and the value thereof. 1 Jac. I. c. 22. Red tanned *leather* is be brought into open *leather* markets, and ſearched and ſealed before it be expoſed to ſale, and on ſale is to be regiſtered, or ſhall be forfeited; and contracts for ſale otherwiſe to be void, 13 and 14 Car. II. c. 7. Hides of *leather* are adjudged the ware and manufacture of the currier, and ſubject to ſearch, *&c.* All perſons dealing in *leather* may buy tanned *leather* ſearched in open market; and any perſon may buy or ſell *leather*, hides, or ſkins, by weight. 8 W. & M. c. 33. Duties are granted on *leather*, and entries to be made of tan-yards under the penalty of 50*l.* And tanners and *leather*-dreſſers uſing any private tan-yards or concealing ſkins, *&c.* ſhall forfeit 20 *l.* leviable by juſtices of the peace, by diſtreſs, *&c.* 9 Ann. c. 11. 10 Ann. c. 26. See 5 Geo. I. c. 2. and 9 Geo. I. c. 27. Vide TANNER. Foreign manufactured gloves imported ſhall be forfeited, and may be ſearched for and ſeized by any officer of the cuſtoms or exciſe; and every perſon importing or ſelling the ſame, ſhall alſo forfeit 200*l.* with double value. 9 Geo. III. c. 19.

LEATHER, *blacking for*. See BLACKING.

LEATHER, *buff*. See BUFF.

LEATHER, *fossil, ollaria montana*, is a foliated AMIANTHUS, consisting of soft fibres interwoven together and frequently containing sparry crystals inclosed in it.

LEATHER, *gilt*. See *Japanner's* GILDING, and LACQUER.

LEATHER *mills*. See MILL.

LEATHER *money*. See MONEY.

LEATHER-*mouthed*, in *Ichthyography*, a term used as the English for MALACOSTOMOUS, the distinctive epithet of such fishes as have thick lips and no teeth in their jaws; as the carp, tench, bream, roach, &c.

LEATHER-*sellers, company of*. See COMPANY.

LEATHER, *shamoy or shammy*. See SHAMMY.

LEATHER, *Turkey, method of preparing*, &c. See DYING *of Leather*.

LEAVE *and take*. See TAKE.

LEAVEN, any thing that will make a body swell, and ferment.

The word is formed of the French *levain*, which signifies the same, of the verb *lever*, or Latin *levare, to raise*.

Beer, ale, wine, and cyder, only work by means of the *leaven* in them. Sour paste, barm, rennet, &c. are *leavens* used in baking bread, brewing beer, making cheese, &c.

LEAVER. See LEVER.

LEBERIS, in some *Medical Writers*, a word used to express the exuvie of serpents, or the skins which snakes cast off every year; these are by some greatly recommended for taking off freckles and sun-burns from the face.

LEBNI, in the *Materia Medica of the Ancients*, a name given by some to storax. Avicenna has treated of this drug in three separate chapters. The Greeks were very nice in distinguishing the several kinds of storax, and the Arabians seem to have followed their example; nay, they have even borrowed some of the terms, by which they called the particular sorts. The soft, or liquid storax of the Greeks, seems to have been very common among these people, and they have called it *mel lebni*, the honey of storax. This was a common word with them to express any thing soft.

LECANOMANTIA, ΛΕΚΑΝΟΜΑΝΤΕΙΑ, in *Antiquity*, a kind of divination performed in a basin with wedges of gold or silver. See HYDROMANCY.

LECCIA, in *Ichthyology*, a name given by several to a large fish caught in the Mediterranean, and known among the generality of writers by the name of AMIA; though by Aldrovand, and some others, called *glaucus*. See LERCHIA.

LECH, in *Metallurgy*, a term used by the miners to express the gold ore which has been powdered and washed, and afterwards run with the assistance of lime-stone. The *lech* is afterwards burnt in a fire of charcoal, in order to render it fit for the separation of the metal, by means of lead, which absorbing and vitrifying the extraneous matter, renders the gold pure.

LECHEA, in *Botany*, a genus of the *triandria trigynia* class, with a three-leaved calyx, three linear petals, and a triple-celled three-valved capsule, including a single seed.

LECHIA, in *Ichthyology*, a name given by Paulus Jovius, and others, to the fish called by others *amia* and *glaucus*, and by the ancient Greeks *amia* and *thynnus*. It is properly a species of the scomber, and is distinguished by Artedi by the name of the *scomber* with two fins on the back, and with the last bone, or ray of the hinder fin, very long. The Italians call it *lecchia*, whence Jovius's name.

LECITHOS, a word used by the old medical writers, and plainly signifying a sort of pulse; but authors have variously understood it; some applying it to the decorticated seed of the lentil; others to the meal of the same pulse; and others to the fruit of a peculiar species of *orobus*, or wild vetch.

LECTICA, among the Romans, a litter, or vehicle, in which people were carried. The *sella* differed from the *lectica*, as being higher, and because people always sat in it; on which account the *sella*, from the time it was first brought into use, was esteemed the more honourable carriage of the two. See LITTER.

The *lectica* was also used as a bier for carrying out the dead, who were dressed in habits suitable to their quality and sex. Pitiſc. in voc. See BURYING.

LECTICARII, among the Romans, servants who carried the LECTICA.

LECTICARIUS was also an officer in the Greek church, whose business it was to bear off the bodies of those who died, and to bury them. These were otherwise denominated *decani* and *copiatæ*.

LECTIO, *reading*. Considered in a medicinal view, it is said by Celsus, lib. i. cap. 4. to be bad, especially after supper, for those whose heads are weak; and in lib. ii. cap. 8. he recommends reading with an audible voice, for such as have weak stomachs. It is also directed by Paulus Ægineta as an exercise, lib. i. cap. 19.

LECTISTERNIUM, a religious ceremony among the ancient Romans; being a festival prepared, and solemnly served up, in a temple, at a time of public calamity and danger.

And because, according to the customs of those times, they placed beds around the tables, and set the statues of the gods on those beds, in the same manner as men sat at meals, they called the solemnity *lectisternium*, from *lectus*, *bed*, and *sternere*, of *sterno*, *to spread, prepare*.

In this ceremony the Sibylline decemvirs presided; till the year of Rome 558, and afterwards the Epulones. See EPULO.

Casaubon has observed, from a passage in the scholiast of Pindar, that the Greeks had also a sort of *lectisternium* in use.

Livy observes, that the first *lectisternium* seen in Rome, was that which held for eight days successively, in honour of Apollo, Latona, Diana, Hercules, Mercury, and Neptune; on occasion of a contagious disease which killed almost all their cattle, in the year of Rome 354; though Valerius Maximus mentions one before that.

LECTORES, among the Romans, servants in great men's houses, who were employed in reading while their masters were at supper. They were called by the Greeks ΑΝΑΓΝΩΣΤΑΙ.

LECTURERS, in England, are an order of preachers in parish-churches, distinct from the rector, vicar, and curate. They are chosen by the vestry, or chief inhabitants of the parish, supported by voluntary subscriptions and legacies, and are usually the afternoon preachers in the Sunday service. The term is also more generally applied to those who preach on Sunday, or on any stated day of the week, in churches, or other places of public worship. By 13 & 14 Car. II. cap. 4. *lecturers* in churches, unlicensed, and not conforming to the liturgy, shall be disabled, and shall also suffer three months imprisonment in the common gaol; and two justices, or the mayor in a town corporate, shall, upon certificate from the ordinary, commit them accordingly. Where there are lectures founded by the donations of pious persons, the *lecturers* are appointed by the founders, without any interposition or consent of rectors of churches, &c. though with the leave and approbation of the bishop; such as that of lady Moyer's at St. Paul's. But the *lecturer* is not entitled to the pulpit, without the consent of the rector or vicar, who is possessed of the freehold of the church.

LECTURES. See BOYLE's *Lectures*.

LECTURES *of divinity*, &c. in the universities. See REGIUS *professors*.

LECTUS *igneus*, among the Romans, a kind of instrument of torture first invented by Decius. The bottom of it was set with serrated teeth or spikes, and strewed with fire; while melted tallow was poured from above on the unhappy tortured person.

LECYTHIS, in *Botany*, a genus of the *polyandria monogynia* class: the calyx is composed of six leaves; the corolla has six petals; the nectarium is ligulated and staminiferous; and the pericarpium, whose circumference is cut, is polyspermous.

LEDGER. See BOOK.

LEDGERS, among *Builders*. See PUTLOCK.

LEDGES, in a *Ship*, small pieces of timber lying athwart ships, from the waste-trees to the roof-trees, which serve to bear up the nettings, or the gratings over the half-deck. See GUTTER-*ledge*.

LEDUM, in *Botany*. See *Wild* ROSEMARY.

LEE, a term variously used at sea; though its general use be to signify the part towards, or opposite to the wind. This expression is chiefly used when the wind crosses the line of a ship's course, so that all on one side of her is called *to-windward*, and all on the opposite side, *to-leeward*. Hence,

LEE-*shore* is that on which the wind blows; so that to be under the *lee* of the shore, is to be close under the weather-shore, or under wind; or at a short distance from the shore which lies to windward.

A LEE *the helm*. See A-LEE.

LEE, *hard a*. See HARD.

LEE-*board, take care of the*, is a word of command to the man at the helm, to take care that the ship do not go to the lee-ward of her course.

To LEE-*ward*, denotes towards that part of the horizon which lies under the *lee*, or whither the wind bloweth.

LEE-*ward ship*, is one that is not fast by the wind, or which doth not sail so near the wind, nor make so good way as she should: or which is much to *leeward* of her course, when sailing close-hauled.

LEE, *to lay a ship by the*, or *to come up by the* LEE, is to bring

bring her ſo, that all her ſails may lie flat againſt her maſts and ſhrouds, and that the wind may come right upon her broadſide.

LEE-*ſangs*, are ropes reeved into the cringles of a yacht's or hoy's ſails.

LEE-*larches*, ſignify the ſudden and violent rolls which a ſhip often takes to the *leeward* in a high ſea, particularly when a large wave ſtrikes her on the weather-ſide.

LEE-*ſide*, denotes all that part of a ſhip or boat, which lies between the maſt, and the ſide fartheſt from the direction of the wind; or that half of a ſhip which is preſſed down towards the water by the effort of the ſails, as ſeparated from the other half by a line drawn through the middle of her length; that part of the ſhip, which lies to the windward of this line, is accordingly called the weather-ſide. Thus, if a ſhip ſails ſouthward, with the wind at eaſt, then is her ſtarboard, or right ſide, the *lee-ſide*; and the larboard, or left, the weather-ſide.

LEE-*way*, or LEE-*ward-way of a ſhip*, is the angle made by the line on which the ſhip ſhould run according to her courſe, or the point of the compaſs ſteered upon, and the real line of the ſhip's way, occaſioned by contrary winds, and a rough ſea.

All ſhips are apt to make ſome *lee-way*; ſo that in caſting up the log-board, ſomething muſt be allowed for *lee-way*. But the *lee-way* made by different ſhips, under the ſame circumſtances of wind and ſails, will be different; and even the ſame ſhip, with different lading, and having more or leſs ſail abroad, will make more or leſs *lee-way*. The ordinary rules of allowing for it are theſe: they were given by Mr. John Buckler to the late Mr. William Jones, who firſt publiſhed them about the year 1702.

1. When a ſhip is cloſe-hauled, has all her ſails ſet, the water ſmooth, and a moderate gale of wind, ſhe is then ſuppoſed to make little or no *lee-way*. 2. Allow one point, when it blows ſo freſh, that the ſmall ſails are taken in. 3. Allow two points, when the top-ſail muſt be cloſe reefed. 4. Allow two points and a half, when one top-ſail muſt be handed. 5. Allow three points and a half, when both top-ſails are to be taken in. 6. Allow four points, when the fore-courſe is handed. 7. Allow five points, when trying under the main-ſail only. 8. Allow ſix points, when both main and fore-courſes are taken in. 9. Allow ſeven points, when the ſhip tries a-hull, or all ſails are handed. When the wind has blowed hard in either quarter, and ſhifts across the meridian into the next quarter, the *lee-way* will be leſſened. But in all theſe caſes, reſpect muſt be had to the roughneſs of the ſea with the trim of the ſhip; and hence the mariner will be able to correct his courſe.

LEEA, in *Botany*, a genus of the *monoecia pentandria* claſs. This genus has male and female flowers; the calyx and corolla of both are divided into five ſegments; the corolla has a cylindric nectharium; the fruit is a ſix-celled pericarpium, including a ſingle ſeed.

LEECH, *hirudo*, in *Zoology*, an oblong animal, deſtitute of feet, and of a black colour, with various ſpots and lines, and a mouth with three diſtinct openings.

This, in the Linnæan ſyſtem, is a genus of the inteſtine worms, comprehending nine different ſpecies. It moves by dilating the head and tail, and raiſing the body into an arched form.

The *leech* is a well known inſect, common in waters, and uſed to draw blood in medicine. The common ſtanding waters afford us two ſpecies of this inſect, a larger, called the *horſe-leech*, and a ſmaller, diſtinguiſhed from this not only in ſize, but by its whole ſurface, being covered with ſmall tubercles. The larger kind grows to five inches long, and is yellowiſh on the belly, and black upon the back; it is divided, in the manner of the earth-worm, into a number of annular joints, not leſs than an hundred, and is ſmaller toward the mouth than toward the tail. The ſmaller kind has a broad ſtreak of a greeniſh black running down its back, and on each ſide of that a reddiſh line, and beyond theſe there are other lines formed of large black ſpots; the belly is blackiſh, with a caſt of green. This is the kind that ſhould be uſed in medicine, and is eaſily diſtinguiſhed from the other. Mr. Ray obſerves, that there are ſometimes found great numbers of young *leeches* ſticking in cluſters to the belly of the old one.

The hiſtory of this animal, and the ſtructure of its parts, by means of which it becomes uſeful to us, in ſupplying very happily the place of the lancet, with every other particular circumſtance of its life and food, have been very accurately given by Mr. Morand, in the Memoirs of the Academy of Sciences, in the year 1739.

The more vulgarly known particulars of this animal are briefly mentioned by this gentleman; ſuch are the cutaneous annules of its outer coat, the beautiful arrangement of the ſeveral rays, the colours, the pyramids, and points, with which it is ornamented; the avidity with which this creature ſeizes the fleſh of animals; the manner of its applying its mouth; the vermicular motion obſerved within it while ſucking, which reſembles the common motion of deglutition; the time they have been known to live in the water without any viſible food; and the faculty they have, in common with many other animals, of moving when cut into ſeveral pieces: theſe the author ſuppoſes already ſufficiently known, and paſſes on to what is leſs ſo, the ſtructure of its inner parts.

The part of this animal, by which it pierces the ſkin of any creature to get at its blood, is generally called, ſimply, its *mouth*; but it really conſiſts of five different parts, which are confounded under that general name. Theſe are two regular lips, a cavity, which is properly the mouth, certain inſtruments to pierce with, others which ſerve it for ſucking, and finally a ſort of throat, or œſophagus, through which it ſwallows the blood. When the *leech* is in a ſtate of reſt, its upper lip forms a regular ſemicircle, and the lower a portion of a much larger circle.

When the creature lengthens its head to move, the ſemicircle of the upper lip becomes two oblique lines, the junction of which makes a ſaliant angle, which the creature applies to whatever it would fix itſelf to. That angle is marked by a regular black ſpot on the outer edge of the lip. The extreme ſoftneſs of the fibres of this part makes it very ſerviceable to the animal, in that it readily aſſumes any figure, according to the occaſion of ſeizing any thing ſolid, in order to move the reſt of its body; or on the fleſh of an animal, to give opportunity to the piercing inſtruments to exert their force and action.

Whether it be for either of theſe purpoſes, that the creature fixes its mouth, the two lips regularly fix, and make in this ſtate a ſort of acetabulum, like the hollow of the tail. This may be ſeen in their fixing on the ſides of a glaſs-veſſel in which they are kept, and the mouth, or aperture between the lips, is diſtinctly ſeen. This mouth is formed, like the lips, of ſuch extremely ſupple fibres, that it takes the figure of the part to which it is applied, and fixes perfectly cloſe to it. When the lips are fixed on the fleſh, in order to ſuck, this little mouth continues moveable under them, and ſearches over the compaſs of fleſh, incloſed in the larger circle of the lips, for the ſpot where it will be eaſieſt to draw much blood.

Within this mouth is placed the inſtrument for piercing the ſkin, which is more than the mere ſucker of the gnat, or the like kind of flies; ſince the quantity of blood to be ſucked by the *leech*, is much larger, and the aperture of the veſſel muſt therefore alſo be larger. The ſhape of this weapon may be diſcovered by examining the wound it leaves. This is compoſed of three cuts, making three rays, and uniting in a center, under equal angles. This ſtructure of the wound is moſt diſtinctly ſeen when the ſwelling is gone down, and the ſkin is clean; and this is uſually on the fourth day after the application. The three openings are then plainly ſeen not to be punctures, but abſolute wounds, or cuts, as if made by a fine lancet. In examining the creature, the organ, deſtined for making the wound, is found to be placed between the aperture of the lips and the bottom of the mouth; and on cutting up the animal, and drawing the finger carefully over this part of it, there is felt a roughneſs like that of a fine file, which evidently is owing to ſome rough ſubſtance, of the hardneſs of bone. This is, in reality, a number of fine and ſharp teeth; and when examined by a microſcope, they are found to be diſpoſed in three ſeries on three ribs, or, as they may be called, jaws; each of which is placed along the middle of a ſtrong muſcle of its own length; and theſe correſponding regularly to a triangular opening, which the creature has in its mouth. When that has ſeized on a proper part for the getting blood, and is fixed, theſe muſcles exert their action, and ſtrike in the teeth through the ſkin.

Theſe are the inſtruments which pierce the veſſel which is to afford the blood; and for the receiving it into the body of the animal, there is between theſe rows of teeth, or in the common center of the mouth, a ſmall aperture; and within this there is a little body to be diſcovered, which by its motion ſeems very plainly to be a tongue, and which probably acts as a piſton to take up the blood flowing from the triple wound, in the center of which it naturally ſtands, while the larger circle of the lips, &c. perform the office of the body of the pump, and the blood is eaſily, by this means, conveyed into the body of the animal. Finally, between the root of the tongue and the beginning of the ſtomach, there is a ſpace of two lines in length, in which it [illegible] cover two different arrangements of fibres, [illegible] are flat and plain, the others are circular, [illegible] dently have a power of widening or contracting [illegible] vity of the pump, and by that means facilitating [illegible] the

the plane ones contracting in length, to enlarge the capacity, and the circular ones determining the blood towards the ſtomach, by their power of contracting the hollow, when the blood is received. The blood from hence enters into a membranaceous ſort of ſack, which ſerves the animal for the ſtomach and guts, and occupies the greateſt part of the body of the creature. If the air is admitted into the body by the mouth, it may be ſeen to make its way down a longitudinal canal, and ſill, as it goes, a number of ſacks, or little bags, which are on each ſide. Theſe veſicles receive the blood, and becoming filled with it, ſwell out the body of the animal to a great ſize. It remains here many months, and nouriſhes the creature; and if any thing is excreted from it, it muſt be merely by an inſenſible perſpiration; ſince the creature has no anus, ſo far as can be yet diſcovered, nor any aperture which can ſupply the place of one.

Leeches are able to live in oil; and when removed out of this liquor into water again, they throw off a tender ſkin, or film, of the regular ſhape of their body, and reſembling the ſkin of an eel in miniature. Their living in oil ſeems a proof, that their organs of reſpiration are not placed on the outſide of their bodies, as they are in many ſmall animals, which therefore die on being only rubbed over with oil. But the *leech* ſeems to reſpire by the mouth; and this may be the more plainly diſcovered, if the water, in which it is kept, be gently heated; for then the animal being uneaſy, breathes hard, and very viſibly.

We have on the coaſt of Cornwall another inſect, much approaching to the nature of the *leech*. It is about ſix inches long, of a greyiſh colour, ſpotted with black, and is divided into about nineteen rings. It has a great number of a ſort of tubercles on the body, and is uſually found full of blood, or of a ſubſtance reſembling blood in colour. Ray's Hiſt. Inſect. p. 3.

If a *leech* be kept in an eight-ounce glaſs phial, about three-fourths filled with water, it will indicate the changes of the weather, in the manner of a weather-glaſs. Thus, if the weather continues ſerene and beautiful, the *leech* lies motionleſs at the bottom of the phial, rolled in a ſpiral form: if it rains either before or after noon, it is found at the top of its lodging, where it will remain until the weather be ſettled: if we are to have wind, the *leech* gallops about its limpid habitation with amazing ſwiftneſs, and ſeldom reſts until it begins to blow hard: if a remarkable ſtorm of thunder or rain is to ſucceed, for ſome days before it lodges almoſt continually without the water, and diſcovers great uneaſineſs, in violent throws and convulſive like motions. In froſt, as in clear ſummer weather, it lies conſtantly at the bottom; and in ſnow, as in rainy weather, it dwells at the very mouth of the phial.

The phial ſhould be covered at the mouth with a piece of linen rag, and the water ſhould be changed once a week in the ſummer, and once a fortnight in the winter. Gent. Mag. vol. xxiii. p. 28.

LEECH, *ſea*. See HIRUDELLA *marina*.

LEECHES, *bleeding with*. The method of bleeding by theſe animals was very early introduced into the practice of phyſic. *Leeches* ſhould always be choſen from clear and running waters; for thoſe from ſtagnant ones, and dirty ponds, ſeem to have ſomething malignant in their bite. The ſurgeons uſually chooſe ſuch as have ſlender heads, green lines on their backs, and bellies of a reddiſh yellow. But from whatever waters theſe creatures have been taken, the beſt method is to keep them many days in a glaſs of water, changing it often, that they may cleanſe themſelves.

Before the *leech* is applied to the ſkin, it ſhould be taken out of the water, and kept an hour in an empty cup, to drain itſelf, that it may thus be rendered thirſty and empty. They may be properly applied to the temples, or behind the ears, in diſorders of the head, and to the veins of the rectum in the blind piles. And applied to this part alſo, they often prove of great ſervice in hæmorrhages, ſpittings of blood, or bleeding by the noſe; eſpecially when theſe have been occaſioned by a ſtoppage of the uſual diſcharges that way; though where this is not the caſe, they do great ſervice merely by revulſion.

Before the *leech* is applied, the ſkin muſt be well rubbed, till it become hot and red, and then either hold the *leech* by the tail to the part, or let it crawl of itſelf out of the cup upon it. By this means they readily lay hold; but if they refuſe, the blood of a chicken or pigeon ſhould be rubbed on the part; and if that does not allure them, they muſt be laid aſide as uſeleſs, and others taken in their ſtead.

If much blood is required to be drawn, the tails of the *leeches* may be cut off as they are ſucking; by which means, the blood they have already ſucked will be diſcharged, as well as what they continue to take in; for they will not let go their hold, but continue ſucking as before.

If they do not let go after a ſufficient quantity of blood is drawn, they are not to be pulled off, for that often occaſions tumours and inflammations; but if a little ſalt be ſprinkled on the place, they quit their hold. The orifices ſhould be waſhed with warm wine or water, and they uſually heal readily of themſelves. Heiſter's Surgery, p. 312.

LEECH is alſo a name given by Boccone to a very particular water-animal, which he found ſticking to the ſides of the *xiphias*, or ſword-fiſh.

He calls it *hirudo, or ocus cauda utrinque pennata*, and obſerves, that it is ſlightly mentioned by Geſner, and by Johnſon, in their books of fiſhes. It is about four inches long; the belly is white and cartilaginous, and tranſparent; there is no regular head to be ſeen, but only a hollow ſnout, in the place of the head; this is covered with a very hard membrane, and differs extremely from the ſkin of the belly; this ſnout it thruſts up to the end into the body of the fiſh, and ſucks its blood with it; it has a tail ſhaped like a feather, and under it two ſlender filaments or fibres, longer than its whole body. By means of theſe, when it is not faſtened to the body of the fiſh, it clings to ſtones, or ſea-plants, to prevent its being carried away by the motion of the water; and when it is on the body of the fiſh, theſe ſerve it to hold much more faſtly with, than it otherwiſe could do. This creature miſerably afflicts the ſword-fiſh, but it is itſelf as much tormented by an animal that preys on its blood and juices. This is a ſort of louſe, which is always found upon it; it is of a browniſh colour, and is generally found faſtened toward the tail of the creature, ſticking as firmly as a limpet to a rock; it is nearly of the bigneſs of a pea, and when cruſhed a little, will thruſt out ſeveral ſlender filaments. This *leech* is not found, ſo far as has yet been obſerved, on any other fiſh but the ſword-fiſh; nor this louſe among other creatures, beſides this *leech*. Phil. Tranſ. N° 100.

LEECH, or LEETCH *of a ſail*, in a *Ship*, the outward edge or ſkirt of the ſail from the earing to the clew, or rather the middle of the ſail between theſe two.

The *leeches* of all ſails, whoſe tops and bottoms are parallel to the deck, and at right angles with the maſts, are denominated from the ſhip's ſide, and the ſail to which they belong, as the ſtarboard *leech* of the main-ſail, the *lee-leech* of the fore-top-ſail, &c. But the ſails which are fixed obliquely upon the maſts, have their *leeches* named from their ſituation with reſpect to the ſhip's length; as the *fore-leech* of the *mizen*, the *after-leech* of the jib, or fore-ſtay ſail, &c. Falconer.

LEECH, or LEETCH-*lines*, in a *Ship*, are certain ropes faſtened to the *leeches* of the main-ſail and fore-ſail, and communicating with blocks under the oppoſite ſides of the top, whence they paſs downwards to the deck, ſerving to truſs up thoſe ſails to the yard, as occaſion requires. See BRAILS.

LEECH-*rope*, is a name given to that part of the BOLT-*rope*, to which the border of a ſail is ſewed. In all ſails, whoſe oppoſite *leeches* are of the ſame length, it is terminated above by the EARING, and below by the CLUE. Falconer.

LEEK, *porrum*, in *Botany*. Linnæus joins this to the genus of ALLIUM. Its characters are theſe: the flower is bell-ſhaped, and hath ſix petals, collected into a ſpherical head, covered by a common roundiſh ſpathæ or ſheath, which withers; they have ſix ſtamina, three of them alternately broader than the others; and have forked ſummits in their middle; they have a ſhort, round, three-cornered germen, ſupporting a ſingle ſtyle, crowned by an acute ſtigma; the germen becomes a ſhort, broad capſule, with three lobes, having three cells filled with angular ſeeds.

We have two kinds of *leek* commonly cultivated in our gardens, the one called the common *leek*, and the other a broader leaved one, commonly called the London *leek*. There are ſome reaſons to ſuſpect that theſe are only varieties of the ſame ſpecies of plant, both ariſing from the ſame ſeeds.

The method of propagating theſe is by ſeeds, and they are commonly ſown along with onions; the onions growing up firſt; and after they are pulled up, the *leeks* have time enough to grow to their ſize. Miller.

Leeks are more uſed in the kitchen among ſoups and broths, than in medicine; they are warming and attenuating, good to cleanſe the lungs from tough phlegm, and to help ſhortneſs of breath, and ſtoppage of the ſtomach; they are likewiſe reckoned good againſt the bites of venomous creatures. The juice of them is uſed to diſſolve the gums in the *pilulæ fœtidæ*.

LEEK, *houſe*. See HOUSE-*leek*.

LEEK-*head*, in the *Manege*. See WART.

LEER, in *Glass-making*, a sort of third furnace, intended to anneal and cool, by proper degrees, the vessels when made. This properly comprehends two parts, the tower and *leer*. The tower is that part which lies directly above the melting-furnace, with a partition between them of a foot thick, in the midst whereof there is a round hole, placed exactly over the furnace, through which the flame and heat pass into the tower: on the floor of this tower the vessels are set to anneal. There are two openings, by which the vessels are put into this tower, and after standing there some time, they are put into iron pans, which by degrees are drawn out all along that part of this furnace, which is properly called the *leer*; which is five or six yards long, that the vessels may cool by degrees. This *leer* is continued to its tower, and arched all along, and is about four feet wide, and high within. The glasses are cool by that time they are come to the mouth of this, which enters into a room where the glasses are placed when taken out. Neri's Art of Glass, p. 243. See FURNACE and GLASS.

LEES, the grossest and thickest parts of wine, oil, and other liquors; or the sediment found at the bottom of the vessel.

The word comes from the French *lie*, and that either from *limus*, *mud*, or from *Lyæus*, one of the surnames of Bacchus; or, according to Du-Cange, from *lia*, a corrupt Latin word, signifying the same.

A kind of pot-ash, called *cinres clavellati*, is made with the *lees* of wine burnt, and prepared, used by dyers, &c. which ought to be remembered by people troubled with the stone, &c.

The vinegar-makers make a great trade of the *lees* of wine dried, and made into cakes, after having squeezed out the remains of the liquor in presses.

LEET, *leta*. See COURT-*leet*, and FRANK-*pledge*.

The business of the *leet* hath declined for many years, and is devolved upon the quarter-sessions. All freemen between the age of twelve and sixty, except peers, clergymen, and the king's tenants in ancient demesne, were bound to appear at this court.

LEG, *crus*. See LEGS.

LEGACY, *legatum*, in the *Civil Law*, a donation by testament; answering to what in common law is called a *demise*; and the person to whom it is given is styled the LEGATEE.

Legacy is usually defined some particular thing given by a last will and testament; because if a man thus dispose, or transfer his whole estate on another, it is called *hæreditas*; and he to whom it is given, is called *hæres*. Though, in common law, the distinction is this: that he to whom all a man's lands and hereditaments descend by right of blood, is *hæres natus*; the other, to whom it is bequeathed, is called *hæres factus*.

With regard to the payment of *legacies*, if a *legacy* when due be paid to the father of an infant, it is no good payment; and the executor may be obliged in equity to pay it again; and where any *legacy* is bequeathed to a femecovert, paying it to her alone is not sufficient, without her husband.

LEGACY, *contingent*. See CONTINGENT.

LEGACIES, *interest on*. See INTEREST.

LEGACY, *lapsed*, is where the legatee dies before the testator. See CONTINGENT.

LEGACY, in an *Ecclesiastical Sense*, was a soul-seat, a bequest to the church, or accustomed mortuary; which was to hold good, even though the testament itself were declared null and invalid.

LEGAL *column*, *economy*, *subrogation*, and *tutorage*. See the several substantives.

LEGALIS *homo*, in *Law*, a person who stands rectus in curia, not outlawed, nor excommunicated, nor infamous. And in this sense are those words so often used, *probi & legales homines*.

Hence all *legality* is taken for the condition of such a man.

LEGATE, a prelate, whom the pope sends as ambassador to any sovereign prince.

The term *legate* comes from *legatus*, which Varro derives from *legere*, *to choose*; and others from *legare*, *delegare*, *to send*, or *delegate*. Wicquefort.

There are three kinds of *legates*; viz. *legates à latere*, *legates de latere*, and *legates* by office, or *legati nati*.

Of these, the most considerable are the *legates à latere*; such are those whom the pope commissions to take his place in councils; who are thus called, because the pope never gives this office to any but his greatest favourites and confidants, who are always at his side, *à latere*; that is, to the cardinals.

A *legate à latere* may confer benefices without mandate, legitimate bastards to hold offices, and has a cross carried before him, as the ensign of his authority.

The *legates de latere* are those who, not being cardinals, are yet entrusted with an apostolical legation.

Legates by office, *legati nati*, are those who have not any particular legation given them; but who, by virtue of their dignity, and place in the church, become *legates*. Such are the archbishop of Rheims and Arles. But the authority of these *legates* is much inferior to that of the *legates à latere*. The power of a *legate* is sometimes also given without the title; some of the nuncios are invested with it.

LEGATE, *court of the*. See COURT.

LEGATE-*note*, in the *Italian Music*. Notes are said to be *legate*, when this ⌒, or this ⌣ mark is found over or under the heads of them. This is what we call *tying* them, and is done when they are properly but one note, but obliged to be separated into two, because part is found at the end of one bar, and the other part in the beginning of the following bar; or because the two halves of a note are in different parts of the measure. See SYNCOPE.

LEGATEE, or LEGATARY, in *Law*, the person to whom a LEGACY is left; which every person is capable of being, unless particularly disabled by the common law or statutes, as traitors, papists, and some others.

LEGATEE, *residuary*, in *Law*, is the person to whom the *residuum*, or what remains of an estate, after funeral charges, debts, and legacies, are paid, is left by will. See EXECUTOR.

LEGATINE *constitutions*. See CONSTITUTIONS.

LEGATIS *tenementis*. See TENEMENTIS.

LEGATO, in the *Italian Music*, signifies confined or constrained by certain rules for some design; thus they say, *canone legato*, &c.

LEGATORY, or LEGATARY, a term used in speaking of the government of the ancient Romans: Augustus divided the provinces of the empire into consular, *legatory*, and presidial.

LEGATORY *provinces* were those whereof the emperor himself was governor, but where he did not reside, but administered affairs by his lieutenant, or *legatus*.

LEGATORY, or LEGATARY, the same with *legatee* of a will. 27 Eliz. cap. 16. It is derived from the Latin *legatarius*.

LEGATUS, among the Romans, a military officer, who commanded as deputy of the chief general.

Of these there were divers kinds; viz. *legates* in the army under the imperator, or general, answering to our lieutenant-general; and *legatus* in the provinces, under the procontul, or governor.

When any considerable person among the Roman citizens had occasion to pass through any of the provinces, the senate gave him the title of *legatus*; that is, of envoy from the senate, to the end that he might be received with the greater respect; and that the cities and towns, through which he travelled, might defray his expences. This they called a *free legation*, *libera legatio*; because the person was not incumbered with any trust, and might lay it aside as soon as he pleased.

LEGEM, *ad communem*, *entry*, in *Law*, a writ of entry which lies where tenant for term of life, or for term of another's life, or by courtesy, &c. aliens and dies, when he in the reversion, shall have his writ against any one that is in possession of the land. New Nat. Brev. 461.

LEGEND, *legenda*, was originally a book used in the old Romish churches, containing the lessons that were to be read in divine service.

Hence also the lives of saints and martyrs came to be called *legends*; because the chapters were read out of them at matins, and in the refectories of the religious houses.

The first Greek *legend* which is known is that of Simon Metaphrastus of the tenth century, who writ the lives of saints adapted to every day of the year. The first Latin *legend* is

LEGEND, *golden*, or a collection of the lives of the saints, compiled by James de Varasc, better known by his Latin name of J. de Voragine, vicar-general of the Dominicans, and afterwards archbishop of Genoa, who died in 1298.

It was received into the church with great applause, which it maintained for two hundred years; but, in effect, it is so full of ridiculous and romantic accounts, that the Romanists themselves are now generally ashamed of it. The word *legend* itself is, on that account, come into disrepute.

LEGEND is also used by authors to signify the words or letters engraven about the margins, &c. of coins.

Thus, the *legend* of a French crown is, SIT NOMEN DOMINI BENEDICTVM; that of a moidore, IN HOC SIGNO VINCES; on those of the last emperors of Constantinople, we find IESVS CHRISTVS BASILEVS BASILEON, IHS XPS NIKA, IESVS CHRISTVS [illegible]

LEGEND is also applied to the inscription of medals, which serves to explain the figures or devices thereof.

In ſtrictneſs, the *legend* differs from the *inſcription*; this laſt properly ſignifying words placed on the reverſe of a medal, in lieu of figures.

It ſeems as if the ancients had intended their medals ſhould ſerve both as images, and as emblems: the one for the common people, and the other for perſons of taſte and parts; the images to repreſent the faces of princes; and emblems to repreſent their virtues, and great actions; ſo that the *legend* is to be looked on as the ſoul of the medal, and the figures as the body.

Every medal has properly two *legends*; that on the front, and that on the reverſe. The firſt generally ſerves only to diſtinguiſh the perſon by his name, titles, offices, &c. the latter is intended to expreſs his noble and virtuous ſentiments, his good deeds, and the advantages the public has reaped by him. This, however, does not hold univerſally; for ſometimes we find the titles ſhared between both ſides, and ſometimes alſo the *legend*.

In the medals of cities and provinces, as the head is uſually the genius of the place, or, at leaſt, ſome deity adored there, the *legend* is the name of the city, province, or deity, or of both together; and the reverſe is ſome ſymbol of the city, &c. frequently without a *legend*, ſometimes with that of one of its magiſtrates.

The ordinary ſubjects of *legends* are, the virtues of princes, the honours they have received, conſecrations, ſignal events, public monuments, deities, public vows, privileges, &c.

Legends, and inſcriptions of medals, are either in Latin, or Greek. The Greek character, conſiſting of majuſcule, or capital letters, appears uniform on all the medals; no change or alteration being found in confounting the ſeveral characters; though it is certain there was in the ordinary uſe and pronunciation. All we obſerve on medals is ſometimes a mixture of Greek and Latin letters. The character was preſerved in all its beauty, till the time of Gallienus.

From the time of Conſtantine, and for the ſpace of five hundred years, the Latin tongue was alone uſed in the *legends* of medals, even in thoſe ſtruck at Conſtantinople. Michael began the firſt, whoſe *legend* was in Greek; and from his time the language, as well as the characters, began to alter for the worſe. See MEDAL.

The Latin *legends* are all read from the left to the right: but the *legends* of ſome Greek medals are wrote the contrary way, from the right to the left. The letters of the circular *legends* are commonly placed with the bottoms inward; but ſometimes with the bottoms toward the edge.

LEGER-*line*, in *Muſic*, is uſed to ſignify a line added to the ſtaff of five lines, when the aſcending and deſcending notes run very high or very low. We often meet with ſeveral of theſe lines both above and below the ſtaff.

LEGGIARDO, or LEGGIARDAMENTE, in the *Italian Muſic*, is uſed to intimate, that the muſician is to ſing or play in a gay, briſk, and lively manner. See ALLEGRO.

LEGION, a kind of regiment, or body of forces, of a number whereof the Roman armies were chiefly compoſed.

The word comes from the Latin *legere*, to *chooſe*; becauſe, when the *legions* were raiſed, they made choice of ſuch of their youths as were the moſt proper to bear arms.

The number of ſoldiers and officers, whereof the *legion* conſiſted, was different at different times: but it is impoſſible to determine the preciſe time and manner of their alteration. In the time of Romulus, the inſtitutor of this corps, each legion contained three thouſand foot, and three hundred equites, or horſe: theſe were divided into three bodies, which make as many orders of battle: each body conſiſting of ten companies, or manipules, ranged at ſome diſtance from each other, though in the ſame front. Each body had two general officers to command it, called *tribunes*; and each manipule, two centurions.

Under the conſuls, the *legion* conſiſted of four thouſand, or four thouſand two hundred foot-ſoldiers, who made four bodies, commanded by a conſul, or one of his lieutenants; and each *legion* had its ſhare of cavalry, which was three hundred horſe.

About the year of Rome 412, it was compoſed of five thouſand foot; which was the number of a *legion* during Julius Cæſar's wars with the Gauls. Under Auguſtus, each *legion* conſiſted of ſix thouſand one hundred foot, and ſeven hundred and twenty-ſix horſe. After his death, they were reduced to five thouſand foot and ſix hundred horſe. Under Tiberius, the *legion* was raiſed again to ſix thouſand foot and ſix hundred horſe. In the time of Septimius Severus, the *legion* was compoſed of five thouſand men: under the following emperors, it was the ſame as it had been under Auguſtus.

In the time of Marius, thoſe four diviſions of the *legion* which had taken place under the conſuls, were united into one, and augmented; and cohorts were appointed from five to ſix hundred men, each under the command of a tribune. Each cohort conſiſted of three companies or manipules, each manipule of two centuries, and the *legion* was divided into ten cohorts, who made as many diſtinct battalions, diſpoſed in three lines; ſo that the *legion*, then, conſiſted of ſix thouſand men.

Iſidore tells us, that the *legion* conſiſted of ſix thouſand men, and was divided into ſixty centuries, thirty manipules, twelve cohorts, and two hundred troops. According to the French academy, the *legion* conſiſted of ſix thouſand foot, and ſeven hundred twenty-five horſe.

The *legion* conſiſted of four ſorts of ſoldiers, who differed in their age, arms, and names: they were called VELITES, HASTATI, PRINCIPES, and TRIARII. Till the deſtruction of Carthage, theſe were citizens of Rome, but after the Social War, the freedom of the city was granted to other towns in Italy, and legionary troops were raiſed which were called Roman, becauſe as they ſhared the privileges of Roman citizens, they were incorporated in the republic.

The *legions* were by far the moſt conſiderable part of the Roman army; their number in the time of Auguſtus, was thirty-three; they were compoſed wholly of Roman citizens. The allies formed a body of auxiliary forces.

The ſtandard borne by the *legions* was various: at firſt, a wolf, in honour of that which ſuckled Romulus; afterwards an hog; by reaſon, ſays Feſtus, war is only undertaken with a view to peace, which was concluded by ſacrificing an hog. Sometimes they bore the minotaur, to remind their general, that their deſigns were to be kept ſecret, and inacceſſible as the minotaur in the labyrinth. They alſo bore an horſe, a boar, *&c.* Pliny tells us, that Marius was the firſt who changed all theſe ſtandards into EAGLES.

The different *legions* were diſtinguiſhed according to the order in which they were raiſed into firſt, ſecond, and third, *&c.* by the names of the emperors who formed them, into *legio Auguſta*, *Claudia*, *Flavia*, *Trajana*, *&c.* by the provinces where they had ſerved, as *legio Parthica*, *Macedonica*, *&c.* and by ſome famous exploit or diſplay of valour.

LEGION, *ſquare*, *legio quadrata*, was a *legion* conſiſting of four thouſand men.

LEGIONUM, *domeſticus*. See DOMESTICUS.

LEGION, *thundering*. See THUNDERING.

LEGION, *Theban*, is a name given by ſome authors to a *legion* of Roman ſoldiers, who refuſing not to ſacrifice to idols, ſuffered martyrdom under the emperors Dioclefian and Maximilian, about the year of Chriſt 297. But the whole account of them ſeems to be fabulous.

LEGISLATOR, *lawgiver*; a perſon who frames the laws of a kingdom or ſtate founded by him.

The principal ancient *legiſlators* are—Moſes, *legiſlator* of the Hebrews; Mercurius Triſmegiſtus, and Boechyris, of the Egyptians; Italus, of the Œnotrians; Thelcus, Draco, and Solon, of the Athenians; Zoroaſter, of the Bactrians; Charondas, of the Cappadocians; and Charondas or Phaleas, of the Carthaginians; Andredamas, of the Chalcidians; Endoxus, of the Cnidians; Philo, of the Corinthians; Minos of the Cretans; Pythagoras, of the Crotoniates, and moſt of the cities of the Grecia Major; Parmenides, and Zeno, of Elea, in Lucania; Xamolxis, of the Getæ; Pherecus, of the Greeks; Bacchus of the Indians; Saturn of Italy; Macarius, of the Iſle of Leſbos; Zaleucus, of the Locrians; Nicodorus Athleta, of the city of Mutina; Hippodamia, of Miletus; Charondas, of Rheggio; Lycurgus, of the Lacedemonians; Archytas, of Tarentum; Philolaus, of the Thebans.

At Rome the people were in a great meaſure their own *legiſlators*; though Solon may be ſaid, in ſome ſenſe, to have been their *legiſlator*, as the decemviri, who were created for the making of laws, borrowed a great number from thoſe of Solon.

With us the legiſlative power is lodged in the king, lords, and commons aſſembled in PARLIAMENT.

LEGITIMATE *delivery*. See DELIVERY.

LEGITIMATE *tertian*. See FEVER.

LEGITIMATION, an act by which natural or illegitimate children are rendered legitimate. See BASTARD, *&c.*

By the French law, the father and mother, by marrying, render their children, begotten before marriage, legitimate; and this is called *legitimatio per ſubſequens matrimonium*.

The right of *legitimation* was a thing unknown to princes till the time of Conſtantine; but, ſince his time, has been exerciſed by moſt of them. The Greek emperors invented ſeveral kinds of *legitimation*.

Anaſtaſius put it in the power of the father to *legitimate* his natural children, by a bare adoption, provided he had no legitimate children. But Juſtin, by his conſtitu-

tion, and Juſtinian, by his Novel 74, aboliſhed this *legitimation*, as fearing the too eaſy acceſs to *legitimation* ſhould encourage concubinage.

In lieu of this, he eſtabliſhed a way of *legitimation* by the emperor's letters. This rendered baſtards capable of attaining to honours, and even of ſucceeding to inheritances, provided the perſons were *legitimated* with the conſent of their father and mother: which is agreeable to the canon law.

LEGNA, Λεγνα, among the *Ancients*, a name given to the borders of the *toga* and *pallium*, that were on each hand; the extremities above and below being called ORA.

LEGS, the lower extremes of the bodies of moſt animals, ſerving them for ſupport and motion. See ANIMAL, and EXTREME.

Some anatomiſts divide the foot of man into three parts, *viz.* the *thigh*, the *leg*, and the leſſer FOOT.

In the *leg* there are two conſiderable bones; the one called the *great ſuſſile*, or TIBIA; the other the *little ſocile*, or FIBULA.

In fractures of the two bones of the *tibia* and fibula, or either of them alone, the limb is to be extended, by aſſiſtants, both ways, while the ſurgeon replaces the bones, which done, the limb is to be rolled up with the proper bandage, and retained in the moſt proper poſture.

When both theſe bones are broken, they are ſeldom both broken juſt in the ſame place, but one a little higher than the other. If the *tibia* be broken alone, it is eaſily diſcovered by its lying ſo near the ſkin; but if the *fibula* alone, it is buried under ſo many muſcles that the fracture is not always ſo eaſily diſcovered, and the patient is ſo much leſs afflicted by it, as to be ſometimes able to walk.

If a fracture of the *tibia* be accompanied with an external wound, this muſt be firſt well cleanſed, and the ſplinters of the bone carefully removed, and then the broken bone, by the help of a proper extenſion, reduced to its proper place, the hæmorrhage ſtopped, and the whole bound up with the eighteen-headed bandage; but if any fragments of the bone ſtick out, ſo as to hinder its reduction, they muſt be firſt removed by a pair of ſharp forceps, or if neceſſary a fine ſaw. The limb, when ſet, is to be laid in a proper frame, or in a caſe of ſtraw, renewing the dreſſing and bandage daily till the wound be healed. Heiſter, p. 136.

LEGS, *ulcers of the*. Although no part of the body is free from inveterate and obſtinate ulcers, yet the *legs* are found to be much more ſubject to them than the reſt. The general cauſes of ulcers in the *legs* are the ſame with thoſe of ulcers in other parts, a bad habit of body, too great a thinneſs and acrimony in the juices, and obſtruction of the menſes in women; to theſe alſo may be added callofity of the lips of wounds, and caries of the bones within.

In perſons advanced in years, and naturally of a bad habit of body, it is moſt adviſeable not to attempt to heal theſe, ſince the effect of cure is often much worſe than the diſeaſe, and not unfrequently even death itſelf: for theſe ulcers are, in many caſes, rather to be looked on as a relief to nature than a diſorder, as they ſerve to drain off a vaſt quantity of noxious humours from the body. This, however, ſhould not be extended to young robuſt habits, though bad, becauſe theſe may be corrected in ſuch ſubjects, and the firſt cauſe of the ſtubbornneſs of the ulcers removed by abſtinence, or a regular way of living, or by opening iſſues, with the help of internal remedies; and the cauſe thus removed, the ulcer may be removed with perfect ſafety: and though in old perſons theſe ulcers are not to be healed, yet palliative methods may be taken with them, to the great comfort of the afflicted perſons, that pain, and other violent ſymptoms may be removed, and the ulcer kept from ſpreading, or new bad ſymptoms from coming on.

Abſtinence and a ſtrict regimen are the great objects, and gentle doſes of purging medicines are to be taken at times, and internal medicines, likely to do good in regard to the cauſe of the ulcer, may be alſo given: of this kind are eſſence of myrrh, balſam of Peru, and the like. Externally, care muſt be taken to keep the ulcer perfectly clean; twice a day it ought to be dreſſed, and every time wiped clean from the ſanies; it ſhould then be dreſſed either with dry lint, or with lint dipped in a decoction of walnut-leaves, or of birthwort, and over this a lead-plaſter, as that of the minium, or any of a like kind may be applied. Theſe ulcers treated in this eaſy manner will become very mild, of little trouble, and of great ſervice to the preſerving the life of the patient.

When inflammations and violent pains come on in theſe caſes, as they very frequently do from a blow, from cold, from dipping the *leg* in cold water, or from violent paſſions of the mind, or irregularity of diet, a linen compreſs muſt be applied in this caſe, dipped in Hungary-water, or ſpirit of wine with camphor, or with a mixture of equal parts of lime-water, and either of theſe liquors; theſe ſhould be applied warm; the patient ſhould be confined to his bed, and the limb carefully defended from the injuries of the external air, and ſmall liquors ſhould be frequently drank warm to promote gentle ſweating; when the inflammation runs very high, and threatens a gangrene, great care is to be taken, and the methods uſed in inflammations and gangrenes regularly applied, otherwiſe there is the greateſt danger that a ſphacelus and death will be the conſequence.

When the ulcers dry up of themſelves in old people, naufeas, horrors, and great weakneſs uſually ſucceed, which ſhew death at hand: in this caſe, the patient's ſtrength and ſpirits muſt be kept up as much as poſſible, and gentian and florentine iris-root muſt be applied in powder to the wound; and if theſe are of too little force, black hellebore-root, either in powder or formed into little balls; and laſtly, powder of cantharides, or ſmall pieces of the common bliſtering-plaſter. If theſe applications ſucceed, and produce a running of the ulcer again, the methods before directed muſt be again cautiouſly purſued; but if theſe fail of ſucceſs, there is little hope of life. Heiſter's Surgery, p. 253.

The *legs* and feet of the ſeveral animals, Mr. Derham obſerves, are exactly conformable to the poſture, make, nay, to the motion and exerciſes, of thoſe animals. In ſome they are made for ſtrength only, in others for agility and ſwiftneſs; in ſome for walking and running, in others for ſwimming, in others for digging, and in others for flying. In ſome, more lax and weak, for traverſing the plain land; in others, ſtiff and rigid, for ice and precipices. In ſome, ſhod with tough and hard hoofs, ſome whole, ſome cleft. In ſome the feet are compoſed of toes; ſome ſhort, for only going, others long, to ſupply the place of hands; ſome are armed with talons, to catch and tear their prey; and ſome with ſhort nails, to confirm their ſteps in running and walking.

In birds, the *legs* are curved, for their eaſy perching, rooſting, and reſt; as alſo to help them on the wing in taking their flight, and to be therein commodiouſly tucked up to the body, ſo as not to obſtruct their flight. In ſome they are long, for wading, *&c.*

LEGS *of flies*. Theſe furniſh us with ſeveral diſtinctions for this large claſs of inſects. All flies have indeed ſix *legs*, but though they are the ſame in number, they differ ſufficiently in many other reſpects. Some flies have very long *legs*, and others as remarkably ſhort ones.

The gnats and tipulæ ſeem mounted on ſtilts, and by that differ from other flies, whoſe form of body is the ſame; but what is yet more obſervable in regard to the *legs* of theſe inſects is, that though they are uſually all fixed to the corcelet, there are ſome ſpecies of flies which have the hinder pair faſtened to the rings of their body.

The *legs* of flies are often not only large or ſmall according to the ſize of the creature, but every portion of them comprized between two of the articulations, differs often from the other in length and thickneſs. What they all have in common is, that the foot, or bottom part of them, on which the creature reſts itſelf, is always provided with at leaſt two claws, or hooks, which terminate in points ſo extremely fine, that they are able to lay hold of what appears to us the moſt ſmooth and poliſhed bodies.

The blue fleſh-fly, and ſeveral other ſpecies, have alſo, as it were, two ſoles of feet; theſe are each of them nearly of a boat figure, and reſemble two ſmall balls; theſe touch at the part where they are connected to the foot, and leave between them an angular ſpace afterwards. Their external inferior ſurface is ſomewhat convex, and covered with very ſhort hairs very cloſely arranged; theſe hairs, like the points of the two claws, can find themſelves a paſſage into the pores of what appear to us the moſt poliſhed ſurfaces, and are of great uſe to the creatures, in their placing themſelves on vertical panes of glaſs.

Mr. Homberg has ſometimes found flies which could not walk upon glaſs in this poſition; and is of opinion, that there are ſuch, as by age had loſt the hairs from theſe balls on their feet. Thoſe alſo whoſe claws or hooks were become ſoft or blunt muſt find themſelves in the ſame ſituation: yet there are ſeveral ſpecies of flies which have not theſe balls; ſuch as the bee claſs, which yet are able to walk up our window glaſſes with great eaſe. Reaumur, Hiſt. Inſ. vol. iv. p. 259.

LEGS, in the *Manege*, the members that ſupport a horſe's body, and perform the motion when he goes. Of the four *legs*, the two before have ſeveral parts, each of which has a peculiar name: ſo that by the name of fore-*leg*, we commonly underſtand that part of the fore-quar-

ters that extends from the hough to the pastern-joint, and call it the *shank*; the part that corresponds to this in the hind-quarters is called the *instep*. But in common discourse we confound the fore and the hind-quarters; and without any distinction say the *four legs* of a horse. The French call a horse *droit sur les jambes*, i. e. straight membered, or straight upon his *legs*, when the fore-part of the pastern falls perpendicularly upon the *coronet*, and the shank and the pastern are in a straight line. See STRAIGHT and LONG-*jointed*.

The horseman's legs are likewise of singular concern in the manage, for the action of these given seasonably, and with a little judgment, constitutes one of the principal aids, which consists in approaching more or less with the *calf* of the *leg* to the horse's flank, and in bearing it more or less off as there is occasion. This aid a horseman ought to give very nicely, in order to animate a horse: and it is so much the finer, that it is hidden and private: for in stretching the hand he makes the horse dread the spur, and this spur has as much effect as the spur itself. See AID.

LEGS *of the mortises*, in a *Ship*, is used for those small ropes, which are put through the bolt-ropes of the main and fore-sail, in the leech of each. They are above a foot in length, and at either end are spliced into themselves: they have also a small eye, into which the *mortises* are fastened by two nitches, and the end is seized into the standing part of the *mortises*.

LEGS, *long*, in *Natural History*. See TIPULA.

LEGS *of a triangle*.—When one side of a triangle is taken as a base, the other two are called *legs*. See TRIANGLE.

LEGS, *arched*. See ARCHED.

LEGS, *compasses of three*. See COMPASSES.

LEGS, *hyperbolic*. See HYPERBOLIC.

LEGUME, among *Botanists*, a *pericarpium* of an oblong compressed figure, formed of two valves, joined by a visible suture, both on the upper and under part, and having the seeds affixed to the upper limbs of the two valves in an alternate order. See PERICARPIUM.

LEGUME or LEGUMEN, is applied, by botanists, to beans, peas, vetches, &c. otherwise called *pulse*.

Some will have them thus called, in regard they are gathered with the hand; by which they are distinguished from corn, &c. which are mowed or reaped: *segetes manu legitur & non secatur*.

Yet the ancient writers on husbandry consider corn, and even turneps, and all grains, and roots for family-use, as *legumina*.

LEGUMINOUS, an appellation given to those plants which yield legumes, or pulse.

Of this kind are most plants which grow in pods, as beans, peas, &c.

Ray ranks all plants as *leguminous*, which have a papilionaceous or butterfly-like flower.

LEGUMINOUS *flowers*. See FLOWER.

LEIBNITZIAN *philosophy*, or the philosophy of Leibnitz, is a system of philosophy formed and published by its author in the last century, partly in emendation of the CARTESIAN and partly in opposition to the NEWTONIAN. The very ingenious and learned author was born at Leipsick, in Saxony, in the year 1646; and though he lost his father, who was a professor in the university, at six years of age, yet availing himself of his father's library which was left him, and other advantages, he made a very considerable proficiency in general science, and was much taken notice of by the learned men of his time, when very young. In more advanced life, he was no less distinguished by his writings on the subjects of jurisprudence and theology, than on those of mathematics, metaphysics and philosophy. He died in the year 1716. The basis of Mr. Leibnitz's philosophy was that of Des Cartes; for he retained the Cartesian subtile matter, with the universal plenitude and vortices; and represented the universe as a machine that should proceed for ever, by the laws of mechanism, in the most perfect state, by an absolute inviolable necessity, though in some things he differs from Des Cartes. After Sir Isaac Newton's philosophy was published in 1687, he printed an essay on the celestial motions (Act. Erud. 1689), where he admits of the circulation of the ether with Des Cartes, and of gravity with Sir Isaac Newton; though he has not reconciled these principles, nor shewn how gravity arose from the impulse of this ether, nor how to account for the planetary revolutions and the laws of the planetary motions in their respective orbits. That which he calls the harmonical circulation is the angular velocity of any one planet, which decreases from the perihelium to the aphelium in the same proportion as the distance from the sun increases; but this law does not apply to the motions of the different planets compared together; because the velocities of the planets, at their mean distances, decrease in the same proportion as the square roots of the numbers expressing those distances. Besides, his system is defective, as it does not reconcile the circulation of the ether with the free motions of the comets in all directions, or with the obliquity of the planes of the planetary orbits; nor resolve other objections to which the hypothesis of the plenum and vortices is liable. Soon after the period just mentioned, the dispute commenced concerning the invention of the method of FLUXIONS, which led Mr. Leibnitz to take a very decided part in opposition to the philosophy of Sir Isaac Newton. From the wisdom and goodness of the Deity and his principle of a *sufficient reason*, he concluded that the universe was a perfect work, or the best that could possibly have been made; and that other things, which were incommodious and evil, were permitted as necessary consequences of what was best: the material system, considered as a perfect machine, can never fall into disorder, or require to be set right; and to suppose that God interposes in it, is to lessen the skill of the author, and the perfection of his work. He expressly charges an impious tendency on the philosophy of Sir Isaac Newton, because he asserts, that the fabric of the universe and course of nature could not continue for ever in its present state, but would require, in process of time, to be re-established or renewed by the hand of its Former. The perfection of the universe, by reason of which it is capable of continuing for ever by mechanical laws in its present state, led Mr. Leibnitz to distinguish between the quantity of motion and the force of bodies; and, whilst he owns in opposition to Des Cartes, that the former varies, to maintain that the quantity of force is for ever the same in the universe, and to measure the forces of bodies by the squares of their velocities. See FORCE.

This system also requires the utter exclusion of atoms, or of any perfectly hard and indivisible bodies; the advocates of it alledge, that according to the law of continuity, as they call a law of nature invented for the sake of the theory, all changes in nature are produced by insensible and infinitely small degrees; so that no body can, in any case, pass from motion to rest, or from rest to motion, without passing through all possible intermediate degrees of motion; whence they conclude that atoms or perfectly hard *bodies are impossible*; because if two of them should meet with equal motions, in contrary directions, they would necessarily stop at once, in violation of the law of CONTINUITY.

Mr. Leibnitz proposes two principles as the foundation of all our knowledge; the first, that it is impossible for a thing to be, and not to be at the same time, which, he says, is the foundation of speculative truth: the other is, that nothing is without a *sufficient reason* why it should be so rather than otherwise; and by this principle, according to him, we make a transition from abstracted truths to natural philosophy. Hence, he concludes, that the mind is naturally determined, in its volitions and elections, by the greatest apparent good, and that it is impossible to make a choice between things perfectly like, which he calls *indiscernibles*; from whence he infers, that two things perfectly like could not have been produced even by the Deity: and he rejects a vacuum, partly because the parts of it must be supposed perfectly like to each other. For the same reason he also rejects atoms, and all similar particles of matter, to each of which, though divisible *in infinitum*, he ascribes a *mind* (Act. Lipsiæ 1698, p. 435) or active kind of principle, endued, as he says, with perception and appetite. The essence of substance he places in action or activity, or, as he expresses it, in something that is between acting and the faculty of acting. He affirms absolute rest to be impossible, and holds motion, or a sort of *vis*, to be essential to all material substances. Each monad he describes as representative of the whole universe from its point of sight; and after all, in one of his letters, he tells us, that matter is not a substance, but a *phænomenum*, or *pheenomenon bien fondé*. He frequently urges the comparison between the effects of opposite motives on the mind, and of weights placed in the scales of a balance, or of powers acting upon the same body with contrary directions. His learned antagonist Dr. Clarke denies that there is a similitude between a balance moved by weights, and a mind acting upon the view of certain motives; because the one is entirely passive, and the other not only is acted upon, but acts also. The mind, he owns, is purely passive in receiving the impression of the motive, which is only a perception, and is not to be confounded with the power of acting after, or in consequence of, that perception. The difference between a man and a machine does not consist only in sensation and intelligence; but in this power of acting also. The balance for want of this power cannot move at all, when the weights are equal; but a free agent, he says, when there appear two perfectly alike reasonable

ways of acting, has ſtill within itſelf a power of chuſing; and it may have ſtrong and very good reaſons not to forbear. Collection of Papers which paſſed between Mr. Leibnitz and Dr. Clarke in 1715 and 1716, &c. 8vo. 1717, p. 121. See LIBERTY.

The tranſlator of Moſheim's Eccleſiaſtical Hiſtory obſerves, that the progreſs of Arminianiſm has declined in Germany and ſeveral parts of Switzerland, in conſequence of the influence of the *Leibnitzian* and Wolfian philoſophy. Leibnitz and Wolf, by attacking that liberty of indifference, which is ſuppoſed to imply the power of acting not only without, but againſt motives, ſtruck, he ſays, at the very foundation of the Arminian ſyſtem. He adds, that the greateſt poſſible perfection of the univerſe, conſidered as the ultimate end of creating goodneſs, removes from the doctrine of PREDESTINATION thoſe arbitrary proceedures and narrow views, with which the Calviniſts are ſuppoſed to have loaded it, and gives it a new, a more pleaſing, and a more philoſophical aſpect. As the Leibnitzians laid down this great end as the ſupreme object of God's univerſal dominion, and the hope to which all his diſpenſations are directed; ſo they concluded, that, if this end was propoſed, it muſt be accompliſhed. Hence the doctrine of NECESSITY, to fulfill the purpoſes of a predeſtination founded in wiſdom and goodneſs; a neceſſity, phyſical and mechanical, in the motions of material and inanimate things, but a neceſſity moral and ſpiritual in the voluntary determinations of intelligent beings, in conſequence of prepellent motives, which produce their effects with certainty, though theſe effects be contingent, and by no means the offspring of an abſolute and eſſentially immutable fatality. Theſe principles, ſays the ſame writer, are evidently applicable to the main doctrines of Calviniſm; by them predeſtination is confirmed, though modified with reſpect to its reaſons and its end; by them irreſiſtible grace (irreſiſtible in a moral ſenſe) is maintained upon the hypotheſis of prepellent motives and a moral neceſſity; the perſeverance of the ſaints is alſo explicable upon the ſame ſyſtem, by a ſeries of moral cauſes producing a ſeries of moral effects. Moſheim's Eccl. Hiſt. by Dr. Macleane, vol. v. p. 24. 8vo. edition.

For an account of Leibnitz's famous doctrine of a *pre-eſtabliſhed* HARMONY, we refer to that article.

See on the ſubject of this article Maclaurin's View of Sir Iſaac Newton's Philoſophical Diſcoveries, &c. book i. chap. 4. or p. 79, &c. quarto edition.

LEIOBATUS, in *Ichthyology*, a name given by Ariſtotle and Athenæus to a ſpecies of the ray-fiſh, called by many of the old authors *bos marinus*, and by the later authors *turtraia*, or *rana torpedo*. It is accurately diſtinguiſhed by Artedi, by the name of the variegated ray, with ten prickly tubercles on the middle of the back.

LEIOPODES, formed of λειος, *ſmooth*, and πους, *foot*, an epithet uſed by the old medical writers, to expreſs ſuch perſons who had feet perfectly ſmooth and even at the bottom, without the uſual hollow between the heel and the fore-part of the foot.

LEITURGI, Λειτουργοι, among the *Athenians*, perſons of conſiderable eſtates; who, by their own tribe, or the whole people, were ordered to perform ſome public duty, or ſupply the commonwealth with neceſſaries at their own expences.

LEMMA, Λημμα, of λαμβανω, *I aſſume*, in *Mathematics*, denotes a previous propoſition, laid down in order to clear the way for ſome following demonſtration; and prefixed either to theorems, in order to render their demonſtration leſs perplexed and intricate; or to problems, to make their reſolution more eaſy and ſhort. Thus, to prove a pyramid one third of a priſm, or parallelopiped, of the ſame baſe and height with it, the demonſtration whereof in the ordinary way is difficult and troubleſome, this *lemma* may be premiſed, which is proved in the rules of progreſſion, that the ſum of the ſeries of the ſquares, in numbers in arithmetical progreſſion, beginning from 0, and going on 1, 4, 9, 16, 25, 36, &c. is always ſubtriple of the ſum of as many terms, each equal to the greateſt; or is always one-third of the greateſt term multiplied by the number of terms. Thus, to find the inflection of a curve line, this *lemma* is firſt premiſed, that a tangent may be drawn to the given curve, in a given point.

So, in phyſics, to the demonſtration of moſt propoſitions, ſuch *lemmata* as theſe are neceſſary firſt to be allowed: that there is no penetration of dimenſions; that all matter is diviſible; and the like. As alſo in the theory of medicine, that where the blood circulates, there is life, &c.

LEMMA, λεμμα, in *Pharmacy*, a term uſed to expreſs the huſk or ſhell of certain fruits, as the almond, and the like; and in general, whatever is taken off in decortication: thus the huſks of oats, barley, &c. are the lemmata of thoſe ſeeds.

LEMMA is alſo a name given by ſome of the lower claſs of writers, in *Natural Hiſtory*, to an imaginary animal, which they deſcribe, as living in the woods of Aſia, and having the face of a woman and the body of a beaſt of prey.

LEMMA, in *Botany*, is alſo the name of a ſmall water-plant well known to the ancients, and called by Theophraſtus by this diſtinct name; but very improperly confounded by late writers among the duck-weed kinds. Called by Bauhine, Ray, Parkinſon, and others, *lenticula palluſtris quadrifolia*, the four-leaved duck-weed of Petiver, in his Gazophylacium Naturæ & Artis, *lenticula palluſtris foliis ſagittæ*, or the water-ſoldier with leaves like thoſe of wood-ſorrel.

Mr. Bernard Juſſieu has been at the pains of thoroughly inquiring into the nature and cruſtification of this plant, and to him alone we owe its true hiſtory; its flowers having never been ſeen or regarded, till that gentleman gave an account of them in the Memoirs of the Academy of Sciences of Paris; and many of the more eminent botaniſts, from its different appearance when in the water and when out of it, having miſtaken it for two different plants. It indeed differs extremely from itſelf in three different ſituations in which it is found. It is ſometimes found in the middle of large ponds of freſh water, and is then very large, fair, and full; ſometimes it is found in ſhallow-water, and is then conſiderably poorer, and ſometimes it is found on dry land, in which caſe it makes an extremely different figure; and is ſo ſtarved, and poor, as ſcarce to be known for the ſame herb.

The middle ſtate of theſe, that is when it grows in ſhallow water, ſeems its moſt natural appearance, and is the only condition in which it is found to produce its flowers and ſeeds. It is a ſpreading plant, its branches extend a great way far and wide; theſe ſend from their under part roots at certain diſtances, and from their upper four leaves ſuſtained by a long and ſlender ſtalk, and uſually there are ſeveral of theſe ſtalks from the ſame part of the plant, from the ſame parts of the branches from whence the leaves ariſe; there are alſo ſeen to ariſe other very ſlender and very ſhort ſtalks which bear ſmall capſules, within which is incloſed the flower, and afterwards the ſeed. The flowers are placed in ſeveral looſe ſegments in this ſhell, and are compoſed of ſtamina and piſtils, but have no petals. The piſtils are various in number in the different flowers from three to eight; the ſtamina are always very minute and very numerous. Mem. de l'Acad. Scien. Par. 1740.

Plukenet has deſcribed this plant very differently from this writer, but the difference ſeems only owing to this, that Plukenet deſcribed one he found in deep water, whereas Mr. Juſſieu formed his account from the more ordinary and perfect appearance of the plant in ſhallow water, where alone it ripens its flowers and ſeeds. We have it not in England, ſo far as is yet known, but it is common in the Eaſt and Weſt-Indies, and in France.

LEMMER, or LEMMING, in *Zoology*. See *Sable* MOUSE.

LEMNA. See DUCK-*weed*.

LEMNIAN *earth*, *Lemnia terra*, a kind of BOLE or fine earth uſed in medicine, of which there are three ſpecies, the white, the yellow and the red; but the red is moſt uſed. The characters by which they may be diſtinguiſhed from all other earths of the ſame colours are theſe:

Red *Lemnian earth* is a denſe compact earth of a cloſe firm texture, and pale red colour, and, when ſcraped, of a ſmooth and even, but not gloſſy ſurface. It does not break readily between the fingers, nor at all ſtain the hands; it is not readily diffuſible in water; melts ſlowly in the mouth; is very aſtringent to the taſte, and when in its native ſtate, is always ſomewhat harſh and gritty between the teeth; for what we find of it that is perfectly pure and free from ſand, is ſuch as has been waſhed and ſeparated from it, all the genuine earth naturally containing ſome. It adheres firmly to the tongue, raiſes a ſlight effervecence with aqua fortis, and acquires a conſiderable hardneſs, and burns to a fine deep red colour in the fire.

This is dug in the iſland of Lemnos, and in no other place, ſo far as is yet known; and the fine and true earth only in one pit, which is opened once every year, and no oftener, with great ſolemnity; and the earth, ſuppoſed ſufficient for the year's demand, is taken out and ſold to the merchants; ſome ſealed with various figures, other quantities unſealed; but what is there bought unſealed, is generally formed into ſmall maſſes, and ſealed before it is offered to ſale in Europe, the druggiſts ſuſpecting to find *Lemnian earth* ſealed.

This is a valuable earth, but it is too often adulterated frequently by the Turks upon the ſpot, either by mixing with other earths, or another earth alone being ſold in its place; but more frequently in Europe, where even wholeſale

wholesale dealer knows how to make a composition of his own clays, and properly tinge them with ochre, and afterwards give an impression resembling that of the genuine.

This earth was celebrated by the ancients as a sovereign remedy against poisons: and the Turks still retain that notion, for the cups out of which the grand seignior drinks, are made of this red earth, so that it is reserved chiefly for the sultan's use. But the alexipharmic and astringent property of this and the other boles is now in little or no esteem.

The white *Lemnian earth* is a fine bole of a dirty whitish hue with an ashen cast, and some very slight reddish streaks, of a coarse firm texture, and very heavy. It is not in the least unctuous or smooth, not even when prepared, but of a rough harsh surface; it scarce at all stains the fingers in handling, crumbles to pieces with difficulty, is difficultly diffusible in water, and melts in the mouth also, with difficulty; it is extremely impure and gritty, has a fine astringent taste, and scarcely adheres to the tongue when applied to it. This makes no effervescence with acids. In burning it acquires a great hardness, and outwardly is of a deep blackish brown, but inwardly of a deep brownish yellow colour. It is dug in the island of Lemnos, and used in the German shops as an astringent and sudorific, and said to be of great efficacy in dysenteries, hæmorrhages, and malignant fevers. The ancients knew this kind, but never used it in medicine, esteeming the other superior, but they employed it as the cimolia in cleaning linen and woollen cloths.

The yellow *Lemnian earth* is a very valuable earth, common in the shops, and more than all the other substances of this kind subject to be counterfeited.

It is a very pure and fine earth, of a lively florid yellow, of a close compact texture and smooth surface, considerably hard, and not at all staining the fingers in handling. It sticks firmly to the tongue, and melts pretty readily in the mouth, leaving not the least harshness between the teeth, and does not ferment with acid menstrua. In the fire it acquires a considerable hardness, and dusky colour. It is counterfeited two ways; the one by a yellow ochre, which may be discovered by its staining the hands, and the other by a yellow clay; but this is easily known by its want of the true florid colour, and having all the characters of a clay, not a bole. The genuine is found only in the island of Lemnos, and is the stratum next above the red. It is esteemed a sudorific, astringent and vulnerary. Hill's Hist. of Fossils, p. 8 and 13. Da Costa's Hist. of Fossils, p. 1. 14. and 22.

LEMNISCATE, in the *Higher Geometry*, is the name of a curve which has the form of the figure of 8. If we call AP, *x*, *Tab.* III. *Analysis*, *fig.* 62. and PM, *y*, and the constant line BC, *a*, the equation of the curve will be $ay = x\sqrt{aa - xx}$ or $a^2yy = a^2x^2 - x^4$, which is an equation of the fourth degree: it is also evident that a right line which passes through the double point A will cut this curve in four points, the double point being reckoned equal to two. See CURVE.

LEMON, *limon*, in *Botany*, derives its name from λειμων, *a meadow*, because the leaves of this tree and its fruit before it comes to maturity are of a green colour. Linnæus has joined this genus to the *citrus* or CITRON-*tree*. Indeed the terms citron and *lemon* have been often confounded together. What is commonly called citron by the French and Germans being our *lemon*, and their *lemon* our citron. Its characters are these: the flower is composed of five oblong thick petals which are a little concave and spread open; these sit in a small empalement of one leaf, indented in five parts at the top: it has about ten or twelve stamina, which are joined in three or four bodies; terminated by oblong summits; and an oval germen, which becomes an oval fruit with a fleshy rind, inclosing a thin pulp with several cells, each having two hard seeds: there are three species.

There are great varieties of this fruit, which are preserved in some of the Italian gardens; and in both the Indies there are several which have not yet been introduced into the European gardens: but these like apples and pears may be multiplied without end from seeds.

The common *lemon* and the sweet *lemon*, are brought to England from Spain and Portugal in great plenty; but the fruit of the latter is not much esteemed. The lime is not often brought to England, nor is that fruit much cultivated in Europe; but in the West Indies it is preferred to the *lemon*; the juice being reckoned wholesomer, and the acid more agreeable to the palate. The *lemon* and lime appear to be of different species.

The culture of the *lemon* is much the same with that of the ORANGE, but being somewhat harder, they will bring their fruit better to maturity with us, and require a greater share of fresh air in winter. Miller.

Lemons are cooling and grateful to the stomach, quenching thirst, and increasing appetite; useful in fevers, as well common as malignant and pestilential: they also provoke urine. The juice mixed with salt of wormwood, is an excellent medicine to stop vomiting, and to strengthen the stomach. The yellow rind is a grateful aromatic, and commonly used in stomachic tinctures and infusions, and for rendering other medicines acceptable to the palate and stomach. In distillation it yields an essential oil, extremely light, almost colourless, frequently employed as a perfume, and brought to us from the southern parts of Europe, under the name of essence of *lemons*. Six drams of the juice of *lemons* saturated with about half a dram of fixt alkaline salt, with the addition of a small quantity of some grateful aromatic water, as tincture of simple cinnamon water, is given in cases of nauseæ, reachings, and generally abates, in a little time, the severe vomitings that happen in fevers, when most other liquors and medicines are thrown up as soon as taken. It is also used as a saline aperient in ictherical, hydropical, inflammatory, and other disorders. A syrup made by dissolving forty-eight or fifty ounces of fine sugar in a quart of the depurated juice, is mixed occasionally with draughts and julaps, as a mild antiphlogistic, and sometimes used in gargarisms for inflammations of the mouth and tonsils. Lewis Mat. Med.

LEMONADE, a drink prepared of water, sugar, and citron, or lemon-juice.

This factitious liquor is so popular in Paris, that it has given its name to a new established company, called *lemonadiers*.

LEMUR, in *Zoology*, is a genus of the order of PRIMATES, in the class of *mammalia*. The animals of this genus have four upper fore-teeth, separate from each other, and six lower ones, which are longer, compressed, and parallel; the lanatii are single ones, and the molares are many, the fore ones being longer and sharper than the others. See LORIS, MAUCAUCO, and MONGOOZ.

LEMURES, in *Antiquity*, *sprites* or *hobgoblins*; restless ghosts of departed persons, who return to terrify and torment the living.

These are the same with *larvæ*, which the ancients imagined to wander round the world, to frighten good people, and plague the bad. For which reason, at Rome they had *Lemuria*, or feasts instituted to appease the manes of the defunct. See LARES.

Apuleius explains the ancient notion of manes thus: the souls of men, released from the bands of the body, and freed from performing their bodily functions, become a kind of dæmons or genii, formerly called *lemures*. Of these *lemures*, those that were kind to their families, were called *lares familiares*; but those who, for their crimes, were condemned to wander continually, without meeting with any place of rest, and terrified good men, and hurt the bad, are vulgarly called LARVÆ.

An ancient commentator on Horace mentions, that the Romans wrote *lemures* for *remures*; which last word was formed from Remus, who was killed by his brother Romulus, and who returned to earth to torment him.

But Apuleius observes, that in the ancient Latin tongue *lemures* signifies the soul of a man separated from the body by death.

LEMURIA, or LEMURALIA, a feast solemnized at Rome on the ninth of May, to pacify the manes of the dead, or in honour of the lemures.

The institution of this feast is ascribed to Romulus, who, to rid himself of the phantom of his brother Remus (whom he had ordered to be murdered) appearing always before him, ordained a feast, called after his name *Remuria*, or *Lemuria*.

In the *Lemuria* they offered sacrifices for three nights together; during which time all the temples of the gods were shut up, nor were any marriages permitted. There were many ceremonies in this feast, chiefly intended to exorcise the lemures, and prevent their appearing, or giving any disturbance, to the living.

LENÆA, Ληναια, in *Antiquity*, a festival of Bacchus, surnamed *Lenæus*, from ληνος, i. e. a *wine-press*. Besides the usual ceremonies at feasts sacred to this god, it was remarkable for poetical contentions, and tragedies acted at this time. Potter's Archæol. lib. ii. cap. 20. tom. i. p. 417.

LENGTH, in the *Manege*. *To passage a horse upon his own length*, is to make him go round in two treads, at a walk or trot, upon a spot of ground so narrow, that the horse's haunches being in the center of the volt, his own *length* is much about the semidiameter of the VOLT; the horse still working between the two heels, without putting out his croupe, or going at half faster or slower than at *first*.

LENGTHENING, in *Naval Architecture*, denotes the operation of cutting a ship down across the middle, and adding a certain portion to her length. This is performed by sawing her planks asunder, in different places of her

length, on each side of the midship frame, to prevent her from being weakened too much in one place; the two ends are then drawn apart, to a limited distance, which must be equal to the propoſed addition of length. An intermediate piece of timber is next added to the keel, upon which a ſufficient number of timbers are erected, to fill up the vacancy produced by the ſeparation. The two parts of the keelſon are afterwards united by an additional piece, which is ſcored down upon the floor-timbers; and as many beams as may be neceſſary are fixed acroſs the ſhip in the new interval. Finally, the planks of the ſide are prolonged, ſo as to unite with each other, and thoſe of the ceiling refitted in the ſame manner; by which the whole proceſs is completed. Falconer.

LENIS *ſpiritus*, in *Phyſics*. See SPIRIT.

LENITIVE, in *Phyſic*, ſometimes denotes a ſoftening, reſolutive remedy, that moiſtens the parts diſeaſed, and diſſipates any ſharp humour collected there.

LENITIVE is more frequently uſed for LAXATIVE.

LENITIVE *electary* is more peculiarly uſed for a gentle purging electary, compoſed of eight ounces of ſena, in powder, coriander-ſeeds, in powder, four ounces, mixed with pulp of tamarinds and of French prunes, of each a pound, and a ſufficient quantity of ſimple ſyrup, to reduce the whole into an electary. It is ſo called, becauſe it purges eaſily, and by reſolving.

A tea-ſpoonful of this electary taken two or three times a day generally proves an agreeable laxative. It likewiſe ſerves as a convenient vehicle for exhibiting more active medicines, as jalap, ſcammony, &c.

LENS, in *Dioptrics*, properly ſignifies a ſmall, roundiſh glaſs, of the figure of a *lentil*; but is extended to any optic glaſs, not very thick, which either collects the rays of light into a point, in their paſſage through it, or diſperſes them farther apart, according to the laws of refraction.

Lenſes have various figures; that is, are terminated by various ſurfaces, from which they acquire various names. Some are plane on one ſide, and convex on the other; others convex on both ſides; both which are ordinarily called *convex lenſes*; though, when we ſpeak accurately, the former are called *plano-convex*, and the latter *double convex*. Again, ſome are plane on one ſide, and concave on the other; and others are concave on both ſides, which are both uſually ranked among the concave *lenſes*; though, when diſtinguiſhed, the former is called a *plano-concave*, and the latter a *double concave*. Others, again, are concave on one ſide, and convex on the other; which are called *convexo-concave*, or *concavo-convex lenſes*, according as the one or the other ſurface is more curve, or a portion of a leſs ſphere.

When the particular figure is not conſidered, a *lens* that is thickeſt in the middle is called a *convex lens*; and that which is thinneſt in the middle is called a *concave lens*, without farther diſtinction.

It is to be here obſerved, that in every *lens* terminated in any of the forementioned manners, a right line perpendicular to the two ſurfaces is called the AXIS of the *lens*; which axis, when both ſurfaces are ſpherical, paſſes through both their centres; but if one of them be plane, it falls perpendicularly upon that, and goes through the center of the other. The points where the axis cuts the ſurface are called the vertices of the *lens*, and the middle points between them is called the center.

A *lens*, one of whoſe ſurfaces is convex, and the other concave, is called a *meniſcus*; the properties of which, ſee under MENISCUS.

See alſo the *Theory of* LENSES *demonſtrated* under REFRACTION; and the application thereof under MICROSCOPE, TELESCOPE, BURNING-GLASS, and FOCUS.

Some confine *lenſes* within the diameter of five or ſix lines, and will have ſuch as exceed that diameter called *lenticular glaſſes*.

Lenſes are diſtinguiſhed, with regard to the manner of their preparation, into *ground* and *blown*.

LENSES, *blown*, are little globules of glaſs, melted in the flame of a lamp, or taper. See MICROSCOPE.

LENSES, *manner of grinding*. A little piece of copper is cemented to the end of the arbor of a lathe, and turned, till it form a diſh, or baſon, of the diameter of the *lens* required. Then a piece of clear glaſs is cemented on one of its flat ſides, to the end of a little maundrel, with black Spaniſh wax; and thus ground, on the ſide not cemented, on a grindſtone, with water, till it have nearly acquired a convex figure. It is finiſhed in the lathe, by turning it in the baſon, with fine wet ſand, or grit-ſtone. The grit muſt be often repeated freſh till the *lens* appear very round; when it is come to that point, they ceaſe to take any freſh ſtone, but continue to turn it in the baſon, till the remains of the ſand be become ſo fine as to have poliſhed it. This they perceive, when, upon wiping it, the image of the window of the place is ſeen painted on its ſurface; if it does not, it is wetted in water without any ſand, and turned till it have got a poliſh. The baſon is then covered, withinſide, with two or three folds of linen, and the poliſh finiſhed with putty, or tripoly of Venice ſteeped in water. It is known to be perfectly poliſhed, when, viewing it with a magnifier, there appear no ſcratches of the ſand. The cement is then broken off, and the ſide poliſhed cemented, ground, and grind the other, as before, till the edges of the *lens* be become ſharp, and it be perfectly poliſhed on that ſide. When finiſhed, it is waſhed in ſpirit of wine, to take off all remains of the wax.

In the Philoſophical Tranſactions we have the figure of a machine for grinding *lenſes* ſpherically. It is a contrivance to turn a ſphere at one and the ſame time on two axes, interſecting each other at right angles, with an equal velocity and preſſure on each. See the Tranſactions, N° 439. ſect. 1. See GRINDING of *Optic Glaſſes*.

LENSES, *for convex*, the laws of their refraction, and their effects depending thereon, are as follow. 1. A ray of light, EG, near the axis (*Theo. Optics, fig.* 1.) and parallel thereto, ſtriking on the plane ſurface of a plano-convex *lens*, directly oppoſite to the luminous body, after refraction concurs with the axis in the point F: and if C be the centre of the convexity, CF will be to FL, that is, the diſtance of the centre from the point of concourſe, or focus, will be to the diſtance of the centre in the convex ſurface, in the ratio of the refraction.

For the plane ſurface being directly oppoſed to the luminous body, the ray EG is perpendicular to AB, and therefore will paſs unrefracted to H: thus it ſtrikes on AHB, ſtill parallel to the axis; and therefore coming out of a denſer medium into a rarer, it will meet with the axis of the *lens* in F; and ſo as that CF will be to FL in the ratio of the ſine of the refracted angle to the ſine of the angle of incidence: as will be demonſtrated under the head REFRACTION.

And, therefore, CF—FL or CL is to FL as the difference of theſe lines is to the ſine of the angle of incidence; and CF—FL or CL is to CF as the ſame difference is to the ſine of the refracted angle.

If then the refraction be out of a glaſs *lens* into air, CF: FL::3:2, or CL: FL::1:2; and therefore FL=2 CL; that is, parallel rays, near the axis, will concur with it at the diſtance of the diameter. Again, if the refraction were out of a water *lens*, i. e. out of a plano-convex *lens* filled with water, CF: FL::4:3, or CL: FL::1:3; and therefore FL=3 CL; i. e. parallel rays, near the axis, will concur with it at the diſtance of a diameter and a half. So that if a lighted candle be placed in the focus of a plano-convex *lens*, that is, in the point F, diſtant from the ſurface of the *lens* ALB, by the length of the diameter; and from the ſurface of the water *lens*, by a diameter and a half, its rays, after refraction, will become parallel.

2. If the ray KI (*Theo. Optics, fig.* 2.) near the axis of a plano-convex *lens*, and parallel thereto, ſtrike on its convex ſurface AHB, after a double refraction, it will meet the axis in F; ſo as that HG will be to GC, and GD to FD, in the ratio of the refraction.

For the ray KI, parallel to the axis EG, by virtue of the firſt refraction in I, will tend to the point G, ſo that GH will be to GC in the ratio of the ſine of the angle of incidence to the ſine of the refracted angle: therefore, by virtue of the ſecond refraction in I, it will concur with the axis in F; ſo that GD will be to FD in the ratio of the ſine of the refracted angle, to the ſine of the angle of incidence. See REFRACTION.

So that the ſemidiameter, and thickneſs of the plano-convex *lens*, with the ratio of refraction, being given, hence ariſes a method of determining the focus of parallel rays ſtriking on the convex ſurface. For, if the ratio of refraction be expreſſed by $n:m$, HG: GC::$n:m$; therefore $n-m:n$::HC: HG; and HG$=\frac{n}{n-m}\times$HC: from which ſubtracting the thickneſs of the *lens* DH, and GD$=\frac{n}{n-m}\times$HC—HD. Then ſince the ratio of GD to FD is the given ratio of refraction, FD$=\frac{m}{n-m}$CH—$\frac{m}{n}$HD$=$ (rejecting the quantity $\frac{m}{n}$HD as very ſmall) $\frac{m}{n-m}$CH.

Hence, if the *lens* be glaſs, FD$=2$CH—HD. So that if two-thirds of the thickneſs of the *lens* be inconſiderable (as in practice it uſually happens), parallel rays meet with the axis at the diſtance of the diameter from the *lens*, even when they ſtrike at the convex ſurface. So that, as to the place of the focus, it is no matter whether the plane ſurface, or the convex, be turned to a luminary of parallel rays; though it appears both

both from experience and trigonometrical calculations, that there are more rays united in a leſs ſpace, if the convex ſurface, than if the plane one, be turned towards the ſun.

If the *lens* were full of water, $FD=\frac{3}{4}CH-\frac{1}{4}HD$, wherefore if $\frac{1}{4}HD$ be inconſiderable, $FD=\frac{3}{4}CH$, or if $\frac{1}{4}HD$ be inconſiderable, $FH=\frac{3}{4}CH$. Parallel, and near rays, therefore, are united at the diſtance of a diameter and a half, if the refraction be in water, even when the convex ſurface is oppoſed to the luminous body.

3. Hence, alſo, ariſes a method of determining the focus of parallel rays ſtriking on a *lens* convex on both ſides, the two ſemidiameters, and the thickneſs of the *lens*, being given.

For if the ray HI, *Tab.* II. *Optics*, *fig.* 32) near the axis DG and parallel to it, fall on a *lens* convex on both ſides, after a double refraction, it will meet the axis in F, provided that GE : GC and DK : DO have the ratio of refraction. And GD will be to GK as GO to GF. Since EG : GC in the ratio of refraction, the ray HI will tend to the point G; and if DK be to DO in the ratio of refraction, after the ſecond refraction at its egreſs, it will meet the axis in F, and GD : GK :: GO : GF. See REFRACTION.

And therefore, GK : DK :: GO : FO. Let the ratio of refaction be that of $n:m$, then GE : GC :: $n:m$, and DK : DO :: $n:m$; and, therefore, $n-m:n::CE:GE$, and $n-m:n::KO:DK$; wherefore if the ratio of refraction and the ſemidiameters CE and KO are given, GE and DK may be found: and ſince GD = DK + EG − EK, and GK = GE − EK, and GO = GE + KO − EK, and GD : GK :: GO : GF; GF may be found: moreover GE − GF = EF. If EK be rejected as very ſmall, GD = DK + EG, GK = GE, and GO = GE + KO; and therefore, DK + EG : GE :: GE + KO : GF. Hence, if the *lens* be glaſs, ſince GE = 3 CE, and DK = 3 KO, 3 KO + 3 CE : 3 CE :: 3 CE + KO : GF; conſequently KO + CE : CE :: 3 CE + KO : GF. And ſubſtituting for KO, a, CE, b, and GF, x, $x=\frac{3bb+ab}{a+b}$, and FE or FK, (rejecting EK) $=3b-\frac{3bb+ab}{a+b}=\frac{3ab+3bb-3bb-ab}{a+b}=\frac{2ab}{a+b}$; therefore the ſum of the ſemidiameters KO + CE is to the double of one of them, or 2 CE, as the other KO is to FK the diſtance of the focus from the *lens*.

If the glaſs *lens* were equally convex on both ſides, then KO = CE, and 2 CE : CE :: 4 CE : GF, and therefore, $GF=2CE$; and $FK=\frac{2a^2}{2a}=a=EC$: *i. e.* the diſtance of the focus from the *lens* is equal to the radius of convexity.

If the *lens* were full of water, ſince GE = 4 CE, and DK = 4 KO, 4 KO + 4 CE : 4 CE :: 4 CE + KO : GF; conſequently KO + CE : CE :: 4 CE + KO : GF. Wherefore ſubſtituting as before $x=\frac{4bb+ab}{a+b}$, and FE or FK $=4b-\frac{4bb+ab}{a+b}=\frac{3ab}{a+b}$; conſequently the ſum of the ſemidiameters KO + CE is to the triple of either 3 CE as the other KO is to FK, the diſtance of the focus from the *lens*.

If this *lens* were equally convex on both ſides, we ſhould have 2 CE : CE :: 5 CE : GF; therefore $GF=\frac{5}{2}CE$; and $FK=\frac{3a^2}{2a}=\frac{3}{2}a$; i. e. the diſtance of the focus from the *lens* is two-fifths of the radius.

On theſe principles is founded the ſtructure of refracting BURNING-*glaſſes*, the ſun's light and heat being exceedingly augmented in the focus of the *lens*, whether convex or plano-convex; ſince the rays, falling parallel to the axis of the *lens*, are reduced into a much narrower compaſs; ſo that it is no wonder they burn ſome bodies, melt others, and produce other extraordinary phænomena.

4. If a luminous body be placed in a focus behind a *lens*, whether plano-convex, or convex on both ſides; or whether equally or unequally; the rays, after refraction, become parallel. In this caſe the refracted rays become the incident rays, and *vice verſa*, and conſequently the refracted are parallel.

Hence, by means of a convex *lens*, or a little glaſs bubble full of water, a very intenſe light may be projected to a vaſt diſtance.

And this furniſhes us with the ſtructure of a lamp, or lantern, to project an intenſe light to an immenſe diſtance: for a *lens*, convex on both ſides, being placed oppoſite to a concave mirror, if in the common focus of both be placed a lighted candle, or wick, the rays reflected back from the mirror to the *lens* will be parallel to each other; and after refraction will converge, till they concur at the diſtance of the ſemi-diameter, after which they will again diverge.—But the candle being likewiſe in the focus of the *lens*, the rays it throws on the *lens* will be parallel: and therefore a very intenſe light meeting with another equally intenſe, at the diſtance of the diameter from the *lens*, the light will be ſurpriſing: and though it afterwards decreaſe, yet the parallel and diverging rays going a long way together, it will be very great at a very great diſtance. Lanterns of this kind are of conſiderable ſervice in the night time to diſcover remote objects, and are uſed, with ſucceſs, by fowlers and fiſhermen, to gather their prey together, in order to take them.

If it be required to have the light, at the ſame time, tranſmitted to ſeveral places, as through ſeveral ſtreets, *&c.* the number of *lenſes* and mirrors is to be increaſed.

If the luminous body, placed in the focus, be of a larger extent, the rays flowing from points ſenſibly diſtant from each other, cannot be parallel; but they will conſtitute ſeveral trains, or parcels of rays, parallel to each other.

5. The images of objects, oppoſed in any manner to a convex *lens*, are exhibited, inverſedly, in its focus.

Hence, if a paper be applied to a convex *lens* (eſpecially in a dark room) at the diſtance of its focus, the images of objects ſhining upon it will be repreſented diſtinctly, and in their natural colours, thereon: nor is the focus of the ſun's rays any thing elſe, in effect, but the image of the ſun.—Hence, in ſolar eclipſes, the ſun's image, eclipſed as it is, may be burnt by a large *lens* on a board, *&c.* and exhibit a very entertaining phænomenon.

Hence alſo, if a convex *lens*, of any kind, be expoſed both to nearer and remoter objects, and a paper at the ſame time be applied, ſo as to receive the images of objects diſtinctly, the diſtance of the focus from the *lens*, and thence the diameter of the convexity, may be determined.

6. If a concave mirror be ſo placed, as that an inverted image, formed by refraction through a *lens*, be found between the centre and the focus, or even beyond the centre, it will again be inverted by reflexion, and ſo appear erect in the firſt caſe beyond the centre; and in the latter, between the centre and the focus. On theſe principles is conſtructed the CAMERA *obſcura*.

7. The diameter of the image of an object deſcribed beyond a convex *lens*, is to the object itſelf in the ratio of the diſtance of the image to that of the object.

Since then the image of a remoter object is leſs diſtant from the *lens* than that of the nearer, the image of the more remote will be leſs than that of the nearer. And becauſe the diſtance of the image from the *lens* is greater, if the *lens* be a ſegment of a greater ſphere than of a leſs; hence the image will be greater in the former caſe than in the latter. The image therefore will be of ſuch a magnitude, as it would be of, were the object to ſhine into a dark room through a little hole upon a wall, at the ſame diſtance from the hole, at which the focus is from the *lens*.—When an object is leſs diſtant from a *lens* than the focus of parallel rays, the diſtance of the image is greater than that of the object; otherwiſe, the diſtance of the image is leſs than that of the object: in the former caſe, therefore, the image is greater than the object; in the latter, leſs.

If the images be made greater than the objects, they will not appear diſtinctly; becauſe in that caſe there are fewer rays which meet after refraction in the ſame point; whence it happens, that rays proceeding from different points of an object terminate in the ſame point of an image, which is the cauſe of confuſion.—Hence it appears, that the ſame aperture of a *lens* may be admitted in every caſe, if we would keep off the rays which produce confuſion. However, though the image is then more diſtinct, when no rays are admitted but thoſe near the axis, yet for want of rays the image is apt to be dim.

8. If the eye be placed in the focus of a convex *lens*, an object viewed through it appears erect, and enlarged in the ratio of the diſtance of the object from the eye, to that of the eye from the *lens*, if it be near; but infinitely, if remote.

LENSES, *for concave, ſee* CONCAVE *lenſes* are as follow.—1. If parallel rays ſtrike on a plano-convex *lens* KL, and FC be to FB in the ratio of refraction, the rays will diverge from the axis; and the point of divergency, or diſperſion, called the *virtual* FOCUS, will be F. See *Tab. Opticks*, *fig.* 3.

For the ray HI, parallel to the axis, is perpendicular to KL, and will therefore paſs unrefracted to E. Wherefore, FC being to FB in the ratio of refraction, F will be the virtual focus.

If then the *lens* be glaſs, $FB=2BC$; *i. e.* the virtual focus F will be diſtant from the *lens* KL by the ſpace of the diameter 2 BC.

If the refraction be in water, $FB=\frac{3}{2}BC$; *i. e.* the vir-

tual focus F will be diſtant from the *lens* KL a diameter and a half 3BC.

2. If the ray AE, parallel to the axis FP, ſtrike on a *lens* concave on both ſides; and both FC be to FB, and IP to PH in the ratio of refraction; and FP: PH :: FB: BG; G will be the point of diſperſion, or the virtual focus. See *Tab. Optics, fig.* 4.

If therefore, the ratio of the refraction be $=n:m$, CB $=a$, and $IH=b$; $FB=\frac{ma}{n-m}$, and $PI=\frac{nb}{n-m}$; conſequently, diſregarding the thickneſs of the *lens*, FP $=FB+IP=\frac{na+nb}{n-m}$, and $PH=PI-IH=\frac{nb}{n-m}-b$ $=\frac{mb}{n-m}$: therefore, $\frac{n\times a+b}{n-m}:\frac{mb}{n-m}::\frac{na}{n-m}:BG$; i. e. $a+b:\frac{mb}{n-m}::a:BG$, or, $n-m\times a+b:mb::a:BG$; i. e. $\overline{n-m\times CB+IH}:m\,IH::CB:BG$.

If therefore the refraction be in a glaſs *lens*, ſo that $m=2$, $n=3$, and $a+b=2b:a:BG$; the ſums of the ſemidiameters CB and HI, will be to the diameter of the concavity of either, 2HI, as the ſemidiameter of the other CB, to the diſtance of the virtual focus from the *lens*, BG.

But if the ſemidiameters HI and CB are equal, or $a=b$, $BG=\frac{2a^2}{2a}=a$; or BG, the diſtance of the virtual focus from the *lens*, is equal to the ſemidiameter CB or HI. If the refraction be made in water, $m=3$ and $n=4$, and therefore, $a+b:3b::a:BG$; i. e. the ſum of the ſemidiameters CB and HI will be to a diameter and a half of either concavity, 3HI, as the ſemidiameter of the other CB to BG, the diſtance of the virtual focus from the *lens*: in this caſe, if $a=b$ or HI $=CB$, $BG=\frac{3a^2}{2a}=\frac{1}{2}a=\frac{3}{2}CB$ *i. e.* the diſtance of the virtual focus from the *lens*, BG, is to the ſemidiameter BC in a ſeſquialteral ratio.

Hence, the ſun's rays, ſtriking on a concave *lens*, their light, after refraction, will be conſiderably weakened; ſo that the effect of concave *lenſes* is oppoſite to that of the convex ones.

3. An object viewed through a concave *lens* appears erect, and diminiſhed in a ratio compounded of the ratios of the ſpace in the axis between the point of incidence, and the point to which an oblique ray would paſs without refraction, to the ſpace in the axis between the eye, and the middle of the object; and the ſpace in the ſame axis between the eye and the point of incidence, to the ſpace between the middle of the object, and the point the oblique ray would paſs to without refraction.

Though the properties of *lenſes* have been here conſidered principally with regard to rays falling near the axis, and parallel thereto; yet the reaſoning will be eaſily tranſferred to rays remoter from the axis, and falling, in any direction.—Thus we may ſay univerſally, that in a convex *lens*, all parallel rays become converging, and concur in a focus; that diverging rays either become leſs diverging, or run parallel, or converge; and that converging rays converge the more: all which alterations are more ſenſible in oblique rays, than in perpendicular ones, becauſe the angles of incidence in that caſe are greater.

In concave *lenſes* all parallel rays become diverging, and all diverging rays diverge more; converging rays either converge leſs, or become parallel, or go out diverging; all which things hold of oblique as well as direct rays, but more ſenſibly in the firſt.

LENS, or LENTICULA, was alſo the name of a kind of weight among the Romans; being the hundred and eighth part of a drachm; equal to a grain and a half.

LENS, the *lentil*, in *Botany*. See LENTIL.

LENS *paluſtris*, in *Botany*. See DUCK's *meat*.

LENT, *Quadrageſimo*, a time of mortification, during the ſpace of forty days, wherein Chriſtians are enjoined to faſt, in commemoration of our Saviour's miraculous faſting ſo long in the deſert, and by way of preparation for the feaſt of Eaſter.

In the ancient Latin church, *Lent* only conſiſted of thirty-ſix days. In the ninth century, to come ſomewhat nearer to the miracle, ſeveral took upon them to add four days more; which in time became a general practice; though the church of Milan is ſaid ſtill to take up with the ancient thirty-ſix.

According to S. Jerom, S. Leo, S. Auguſtine, and others, *Lent* muſt have been inſtituted by the apoſtles. Their way of reaſoning is thus: whatever is generally received throughout the whole church, and whoſe inſtitution we do not find in any council, muſt be eſteemed to have been eſtabliſhed by the apoſtles. Now ſuch, they ſay, is the faſt of *Lent*. Its inſtitution is not ſpoken of in any council; but many of the ancient councils, particularly that of Nice, that of Laodicea, &c. and ſome of the oldeſt fathers, particularly Tertullian, ſpeak of it as a thing of ſome ſtanding.

The Reformed, generally, hold *Lent* to be a ſuperſtitious inſtitution, ſet on foot by ſome vain enthuſiaſts, who durſt undertake to ape the miracles of Jeſus Chriſt; as, in effect, it appears to have been from a paſſage of Irenæus, quoted by Euſebius.

Some will have it to have been firſt inſtituted by pope Teleſphorus, in the ſecond century: others, who own that there was a kind of abſtinence obſerved in the ancient church before Eaſter, yet contend that it was entirely voluntary, and was never enjoined by any law till the third century. See FAST.

This religious ſeaſon is ſaid to have been firſt obſerved in England by our Saxon anceſtors in the year 640. Anderſon's Hiſt. of Commerce, vol. i. p. 25.

Political *Lents* have been often enjoined by ſtatute and royal proclamation. See ABSTINENCE.

King James I. iſſued a proclamation againſt eating fleſh in *Lent* in 1619, and another in 1625. A ſimilar proclamation was alſo iſſued by Charles I. in 1627 and another in 1631.

There was ſome difference between the practice of the Greek and Latin churches as to the buſineſs of *Lent*; the Greeks beginning it a week ſooner, but at the ſame time allowing more days of intermiſſion than the Latins: thoſe who held it ſeven weeks did not faſt on Saturdays, as thoſe who obſerved it but ſix did.

The ancient Latin monks had three *Lents*; the grand *Lent* before Eaſter, another before Chriſtmas called the *Lent of S. Martin*; and a third after Whitſunday, called the *Lent of St. John Baptiſt*; each of which conſiſted of forty days.

The Greeks, beſides that before Eaſter, obſerved four others; that of the *Apoſtles*, of the *Aſſumption*, of *Chriſtmas*, and of the *Tranſfiguration*: but they reduced each of them to the ſpace of ſeven days.—The Jacobites added a fifth, which they called the *Repentance of Nineveh*; and the Maronites a ſixth, called the *Exaltation of the Holy Croſs*.

By the ninth canon of the eighth council of Toledo, it is ordained, "That if any perſons, without evident neceſſity, "eat fleſh in *Lent*, they ſhall be deprived the uſe of it "all the reſt of the year."

By the fifth chapter of the fourteenth ſeſſion of the council of Trent, confeſſion is enjoined as peculiarly fit and acceptable at this ſeaſon. Hard. Conc. tom. x. p. 93.

The forty days in *Lent*, ſay ſome, are obſerved in remembrance of the forty days wherein the world was drowned; or, as others ſay of the forty years wherein the Jews wandered in the deſert; others, of the forty days allowed Nineveh for repentance; others, of the forty ſtripes by which malefactors were to be corrected; or, the forty days during which Moſes faſted at the receiving of the law; or the forty days faſt of Elias; or, finally, the forty days faſt of our Saviour.

LENTES *lapideæ*, *foſſile lentils*, the name given by many writers to a very remarkable foſſile ſubſtance, uſually found immerſed in hard ſtones, and of a roundiſh but flatted ſhape, reſembling not unaptly a pea or *lentil* flatted by preſſure. They generally lie in great quantities in the ſame maſs of ſtone; and are of a very different appearance, when their ſides or ends are ſeen, from that which they exhibit, when their flat ſurfaces come in view.

They are generally ſuppoſed to be *lentils* petrified and bedded in ſtone, and as their ſides come in view in ſome parts of the maſſes, they are not perceived to be a part of the ſame ſubſtances, but are called the remains of ſeeds of other plants, and the whole ſtone is uſually named *lapis frumentarius*.

We are not to ſuppoſe, that ſo ſoft a body as the *lentil* ſeed, or a common pea, could be eaſily petrified and preſerved in its own form in ſtone; ſince if theſe ſoft ſubſtances were readily capable of ſuch a change, they are ſo very common in their recent ſtate, that they muſt be expected to be found in this foſſile condition very frequently alſo, and in great variety. This, however, is not the caſe. But this improbability is not all the reaſon we have to conjecture, that theſe are not what they are vulgarly ſuppoſed to be, that is, foſſile ſeeds; for a ſtricter examination of the things themſelves proves this to be impoſſible. Seeds, and other ſuch things, are of ſome determinate growth; the ſize of which we know, and are well acquainted with their internal ſtructure, which is only a farinaceous matter contained in a thick ſuperficial ſkin or covering.

On the contrary, theſe foſſils, when examined, prove to be of various ſizes, from the minuteſt ſpeck viſible to the

eye, to near an inch in diameter, a size that no *lentil* could be ſuppoſed to arrive at. They are of two kinds; the one convex on both ſides, the other convex on one ſide only, and plane on the other. The firſt are thickeſt in the middle, and gradually leſſen in thickneſs all round, till they terminate in a thin edge; the others are juſt like the halves of theſe when ſplit horizontally. Thoſe which are convex on both ſides, have uſually ſeveral crooked lines, riſing from the umbilicus on each ſide, and tending toward the circumference; and the flat ones have uſually on the flatted ſide a number of concentric circles ſurrounding the umbilicus, and one another to the edge. When theſe are broken, they are found to conſiſt of a number of caſes, or coats, one within another, all of the ſame ſhape with the outer one; and ſome of them are ſtriated, or made up of tranſverſe fibres. They are plainly of animal origin, though they differ from all the parts of animals hitherto known. Woodward's Cat. of Foſſils, vol. ii.

Dr. Woodward, in one place, ſuppoſes them to have been the looſe bones which are found in the heads of ſome ſea-fiſhes, and are ſuppoſed to ſerve for hearing; but that they belong to ſome fiſh at preſent unknown, or that has not been yet examined in this particular: there is, however, another much more probable opinion, which he mentions afterwards, that they may have been opercula of ſhell-fiſhes, of the nature of the umbilicus Veneris, of which the fiſhes we know afford us a great variety; and the many others we are yet unacquainted with may furniſh numbers of other kinds very different from all we do know.

Theſe bodies are found in a hard greyiſh ſtone, and ſome of the large ones, which are flatted on one ſide, give great reaſon to judge that they are of this origin, as ſome of the large ones have on the flat ſide a reddiſh line, beginning at the centre, and thence continuing, in a ſpiral form for eleven or twelve turns, till it reaches the edge of the ſtone. This is exactly the formation and lineation of the common umbilicus Veneris, only that it has fewer ſpires. The ſtone, called by authors *lapis numiſmalis*, is generally allowed to be of the nature of theſe opercula, and this differs very little from theſe large *lentes lapideæ*, as they are called.

LENTIGO, a cutaneous diſorder, popularly called FRECKLES.

LENTIGO is alſo uſed, by Dr. Quincy, for a brown, ſcaly, or ſcurfy eruption upon the ſkin; ſuch, eſpecially, as is common to women in the time of child-bearing.

LENTIL, *lens*, in *Botany*, the name of a genus of plants, according to Tournefort, the characters of which are theſe: the flower is of the papilionaceous kind, and from the cup there ariſes a piſtil, which finally becomes a ſhort pod, containing orbicular ſeeds, and thicker toward the middle than at the edges.

In the Linnæan ſyſtem, this is a ſpecies of ERVUM.

The common *lentil*, or *ervum*, with compreſſed ſeeds, which are convex, is cultivated in many parts of England, either as fodder for cattle, or for the ſeeds, which are frequently uſed for meagre ſoups. This is an annual plant. It riſes with weak ſtalks a foot and a half high, garniſhed with winged leaves at each joint, compoſed of ſeveral pair of narrow lobes, terminated by a tendril or claſper, which faſtens to any neighbouring plant, and is thereby ſupported; the flowers come out in May upon ſhort foot-ſtalks from the ſide of the branches; they are ſmall, of a pale purple colour, and are ſucceeded by ſhort flat pods, containing two or three ſeeds, which are flat, round, and a little convex in the middle. The ſeeds of this plant are ſown in March on dry lands, and in April on wet land, and ripen in July: the uſual quantity allowed is from a buſhel and a half to two buſhels to an acre. If theſe are ſown in drills like peas, they will ſucceed better than when ſowed the common way; the drills ſhould be a foot and a half aſunder, to allow room for the Dutch hoe to clear the intervals.

Lentils make excellent ſweet fodder; and are therefore to be preferred to all other kinds for calves and other young cattle. They are likewiſe the beſt as well as cheapeſt food for pigeons.

The ſeeds of *lentils* are frequently the common food of the poor in ſome of the iſlands of the Archipelago, and other warm countries, when they can meet with no better fare.

Another ſort of *lentil* has of late years been cultivated in England, under the name of French *lentil*. This is the *lens major* of Caſpar Bauhine; and being twice the ſize of the common *lentil*, is by ſo much the better worth cultivating. This is called *tills* in many parts of England. Miller's Gard. Dict.

The ancients affirm that *lentils*, eaten with their ſkins on, bind the body, and ſtop a looſeneſs; and yet at the ſame time, that the liquor they are boiled in looſens the belly. They are but rarely uſed in phyſic, though the flour of them may be uſed outwardly in cataplaſms, for the ſame purpoſes as bean-flour.

LENTISCUS, the wood of an ever-green tree of the ſame name, of ſome uſe in phyſic: it is an aſtringent and fortifying, and is much uſed for tooth-picks. See MASTIC-*tree*.

It contains a kind of gum, or roſin, which is maſtic; the ſame with the incenſe of Perſia, ſo highly commended by Strabo.

The *lentiſcus* has nearly the ſame properties with the ſaunders; but it has more turpentine in it, and ſometimes paſſes by urine.

LENTISK, in *Botany*. See MASTIC-*tree*.

LENTISK, *African* and *Peruvian*. See *Indian* MASTIC.

LENTOR, in *Medicine*, a viſcidity or fizineſs.

A viſcid or fizy ſtate of the animal fluids is productive of many diſtempers. Thus, Boerhaave informs us, that a pinguious viſcidity, from vegetable aliment, is cauſed, firſt, by a diet of crude and unfermented farinaceous ſubſtance, and auſtere, immature vegetables. Secondly, by a defect of good blood; a ſufficient quantity of which is neceſſary to the aſſimilation of the aliment, and the converſion of their juices into good blood. Thirdly, by a debility of the veſſels and viſcera, or a defect and inactivity of the bile; which laſt is very powerful, when in a due ſtate and quantity, in attenuating viſcidities of alimentary ſubſtance. Fourthly, by a diminution of animal motion; for motion ſtrengthens the ſolids, attenuates the fluids, and promotes the due digeſtion and aſſimilation of the aliments. Fifthly, by a diſſipation of the moſt fluid parts of the blood, through the relaxed ſecerning veſſels; for it is evident, that when the moſt fluid parts are loſt, what remains muſt become more thick and viſcid. Hence the error of thoſe is obvious, who prepoſterouſly carry off the fineſt particles of the blood by enormous quantities of ſudorifics and diuretics. Sixthly, by the retention of the thicker parts of the fluids, on account of the debility of the excretory organs.

This viſcidity is originally formed in the firſt organs of digeſtion; from whence it is propagated to the blood, and the fluids thence derived; and when any of theſe viſcid particles paſs the lacteals, and get into the blood, their immediate effects are principally manifeſt in the lungs, where they cauſe a dyſpnœa, not being able to paſs readily through the ſmall veſſels thereof.

The effects of ſuch a viſcidity in the firſt organs of digeſtion are, an utter proſtration of appetite, ſometimes attended with the diſcharge of a viſcid ſubſtance, much reſembling frogs ſpawn; a ſenſe of repletion, naufea, and inclination to vomit; becauſe theſe acidities, adhering to the coats of the ſtomach, excite an uneaſy ſenſation, in the manner a feather does, when thruſt down the throat; and a crudity of the aliments taken in, becauſe they cannot be digeſted.

Hence, likewiſe, the bile is rendered inert and inactive, being, as it were, inviſcated by theſe viſcidities, and carried along with them through the inteſtinal tube, and loſt. Hence, alſo, ariſe pituitous, and, as it were, vitreous concretions of the ſtomach and inteſtinal tube, which are productive of exceſſive pains, when adhering to the coats of theſe organs. Coſtiveneſs, and tumors of the belly, are moreover excited, for want of a proper ſtimulus from the bile, and a retention of the groſs viſcid feces: this is frequent in children. Hence, alſo, a due preparation, perfection, and ſecretion of the chyle, is prevented. In the blood, fizineſs, patinch, and immeaſibility, are generated; in the veſſels, obſtructions and concretions: hence, alſo, pale and inſipid urine, viſcid ſaliva, and leucophlegmatic tumors. The due ſecretions are likewiſe prevented; and the more ſubtile parts of the fluids become deficient; whence a coalition of the ſmalleſt canals is induced.

With reſpect to the cure, it is to be performed, firſt, by a conſtant uſe of aliments and drink well fermented, and duly ſeaſoned with attenuating ſalts and aromatics; for fermentation deſtroys the viſcidity of all the farinaceous vegetables. Rice or oats, boiled, make a kind of jelly or glue, which is deſtroyed by fermentation. Beer well fermented does not cauſe phlegm, but ptiſans will: therefore in cold ſanguine diſeaſes ſtrong beer is proper; and in hot, inflammatory diſorders, ptiſans. Secondly, by broths made of animals abounding with exalted volatile ſalts; and theſe broths muſt be ſeaſoned with acrid vegetables. Thirdly, by ſtrengthening the veſſels and viſcera. Fourthly, by exerciſe and motion; for without a due degree of theſe, nothing can relieve, much leſs cure. Fifthly, by diluting, reſolvent, ſtimulating, biſſous, and ſaponaceous medicines. James, Med. Dict.

LEO, *Leon*, the fifth of the twelve ſigns of the zodiac.

The ſtars in the conſtellation *Leo* in Ptolemy's Catalogue are 27, beſides the informes, which are 8, in Tycho's

30, in the Britannic Catalogue 95; the names, places, longitudes, latitudes, and magnitudes whereof, are as follow.

Names and situations of the stars.	Bayer's Chs.	Signs.	Longit.	Latitude	Magnitude.
			° ′ ″	° ′ ″	
That in the noſtrils	π	♌	10 57 28	10 23 51 N	4
In the foremoſt toe of the ſouthern fore-foot	ω		11 12 57	5 35 27S	5
In the aperture of the mouth	λ		11 29 46	6 24 22S	6
In third toe of northern fore-foot	ξ		11 19 44	3 11 22S	4
5.					
Northern and following in claw	δ		11 27 50 1	4 41 12S	6
			11 24 26	0 1 52N	6
			11 26 51 10	2 4 54N	6
			11 24 21 5	0 55 48N	6
			11 29 59 58	0 59 54S	5
10.					
			11 27 44 23	0 10 48N	6
			11 24 24 14	10 41 9N	7.8
			11 24 45 16	11 23 26N	6
Following in ſouthern fore-foot	σ		11 29 56 8	3 40 50S	3.4
		♍	12 3 42 32	15 21 3N	6
15.					
In the preceding knee	ψ		12 19 10 4	0 19 3N	6
South. of three in the head	ι		12 16 22 16	9 41 4N	3
			12 20 30 28	1 53 23S	6
			12 29 49 26	1 42 11S	7
			12 18 7 32	7 32 58N	6
20.					
			12 21 31 2	1 9 33S	7
Middle one of the head	g		12 27 45 10	5 45 1N	6
			12 21 9 26	0 1 7N	6
North. in the head	μ		12 17 6 26	12 19 29N	3.4
			12 13 15 36	1 4 24S	6.7
25.					
			12 22 3 5	2 37 58N	7
Juſt before the heart	ρ		12 15 0 52	0 1 25N	4.5
			12 14 51 29	3 42 16S	7
In the following knee	π		12 24 59 4	3 56 18S	4
South. of three in the neck	ν		12 13 34 24	4 50 20N	3.4
30.					
In the breaſt below the heart	A		12 26 5 36	1 26 15S	5
The lion's heart, called alſo Regulus	α		12 25 31 20	0 26 38N	1 6.7
			12 24 44 0	4 8 45N	
			12 15 45 10	2 1 10N	7
			12 23 11 28	11 54 55N	6
35.					
North. in the neck	ζ		12 23 13 41	11 50 13N	3
			12 16 46 1	2 48 7N	6
			12 24 41 4	8 26 8N	6
			12 23 30 52	11 37 13N	6
			12 25 22 23	8 26 51N	6
40.					
Middle and ſubſeq. in the neck	γ		12 25 15 5	8 47 27N	2
			12 27 29 28	4 24 54N	6
		♎	0 27 47 10	3 20 14S	6
			0 30 39 1	2 27S	5.6
Preceding and leſſer			0 28 42 49	0 5 8N	6
45.					
Preced. of three in the belly	i		0 7 58 4	33 25N	6
In the axilla	g		0 2 3 50	0 7 48N	4
			0 3 24 5	1 52 27S	6
			0 2 49 25	0 16 10S	6
			0 0 54 21	7 0 48N	7.6
50.					
In the middle of the back	m		0 1 30 14	10 14 52N	6
North. of three in the belly	K		0 3 19 21	5 54 48N	6
South. and ſubſeq. in the belly	l		0 5 21 19	2 47 40N	6
Subſeq. over the back			0 1 10 21	16 28 40N	4.5
			0 10 34 32	5 39 57S	6.5
55.					
			0 8 33 28	0 55 51S	6.7
			0 10 48 37	5 54 38	6
South. of three under the belly	d		0 10 35 39	2 31 51S	6.5
Middle under the belly	c		0 9 40 53	0 13 16S	5
Preceding in the loins	b		0 4 31 0	12 54 5N	5
60.					
			0 13 13 40	8 3 1S	5
			0 12 42 21	5 34 35S	6
North. of three under the belly	K		0 10 12 9	1 20 21N	4.5
			0 4 23 50	16 16 29N	6
			0 12 43 44	3 26 1S	6
65.					
			0 14 8 56	6 24 8S	6
			0 14 4 56	17 35 54N	6
A bright one following in the loins	a		0 6 57 21	14 19 4N	2.3
			0 5 4 39	4 38 53S	5.6
North. in the hip	θ		0 9 5 31	9 39 50N	3
70.					
			0 8 26 34	11 35 5N	6
That over the bright one in the loins			0 6 8 13	16 46 2N	5
South. of two in the hip	η		0 10 18 7	7 51 41N	6
That before the hindmoſt claw	φ		0 17 10 19	7 39 58	4
			0 15 3 39	2 28 53S	6

Names and ſituations of the ſtars.	Bayer's Chs.	Signs.	Longit.	Latitude	Magnitude.
			° ′ ″	° ′ ″	
In the ham		♌	13 15 55 10	2 33 21S	7
South. in the thigh			13 14 22 35	1 40 56N	4.5
			13 13 12 58	6 5 10N	4
			13 16 51 53	2 10 55S	5.6
			13 15 57 51	0 0 35N	6
80.					
			13 11 14 0	11 41 40N	7
			13 16 27 27	0 18 5S	7.8
			13 16 53 22	0 32 7S	8
More ſouth. as in the leg			13 17 11 2	0 34 4S	4
			13 12 34 10	11 8 9N	6
85.					
			13 11 30 49	13 57 10N	6
South. in the nail of the hind-foot	ε		13 20 3 13	5 42 22S	4.5
			13 13 29 27	10 23 53N	6
			13 18 35 11	0 16 9N	6
			13 13 6 41	12 53 8N	6
90.					
North. in the nail of the hind-foot	ο		13 20 42 51	3 3 35S	4
			13 12 32 21	17 38 6N	6
That over the tail			13 14 38 5	17 18 9N	4
In the extremity of the tail	β		13 17 19 14	12 16 51N	1.2
That following the tail	ρ		13 18 19 27	13 53 21N	6

Cor LEONIS, *Lion's Heart*, a fixed ſtar, of the firſt magnitude, in the ſign *Leo*; called alſo *Regulus*, *Baſiliſcus*, &c.

LEO *Minor*, the *Little Lion*, in *Aſtronomy*, a conſtellation of the northern hemiſphere, including in the Britiſh catalogue, fifty-three ſtars, which are as follow:

Names and ſituations of the ſtars.	Signs.	Longit.	Latitude N.	Magnitude.
		° ′ ″	° ′ ″	
	♋	29 8 34	13 49 35	7
		29 33 4	13 37 5	6
		29 34 20	13 51 31	6
		29 51 59	13 7 25	7
	♌	1 58 9	14 59 28	7
5.				
		11 0 41	9 21 57	6
Anterior in left foot		9 45 57	17 54 6	6
		9 25 1	19 19 30	5
		9 18 52	20 45 37	6
In the opening of the mouth		9 28 32	20 42 40	4.5
10.				
		10 2 12	20 17 40	6
		10 28 11	19 57 53	5
		11 44 27	20 6 25	6
		11 17 21	19 42 34	6
		8 20 33	30 50 0	6
15.				
		11 26 33	24 52 19	6
		12 27 33	23 25 41	6
		11 53 42	18 54 38	6
In the head		12 18 40	26 43 27	5.6
Cor Leonis minoris		10 41 39	18 32 12	6
20.				
In the neck		10 39 30	12 4 0	5
In the belly		9 46 56	19 11 22	6.7
		10 52 51	17 16 42	5.6
		11 11 23	16 43 48	6
		10 30 33	29 12 8	6
25.				
		9 52 50	23 17 4	6
		10 27 27	22 5 22	6
		10 43 50	21 59 20	6
		10 21 16	23 41 50	6
		11 3 44	22 12 35	5.4
30.				
In the hinder part of the neck		10 11 36	25 2 43	5
		9 37 39	27 14 20	6
		10 53 16	21 23 45	4.5
Firſt in the back		10 6 10	23 55 27	4.5
		10 4 40	25 23 15	5.6
35.				
In the middle of the body		11 23 31	23 27 32	6
		11 24 29 50	21 56 28	8
		11 21 58 50	27 5 17	6
		11 26 43 30	27 39 52	6
In the left foot		11 27 50 24	26 46 10	6
40.				
In the end of the tail		11 29 9 15	13 56 46	5
In the hip		11 26 53 43	25 2 47	4.5
		11 27 44 5	20 8 14	6
		11 28 32 32	18 54 12	6
		11 28 24 50	19 4 43	6
45.				
Second in the back		11 26 50 4	24 55 50	4.5
		11 26 58 10	24 53 50	6
		11 0 40 4	17 0 55	6
		11 3 52 8	10 25 39	6
		11 1 52 10	17 14 40	6
50.				
		11 3 4 0	17 46 40	6
		11 3 18 20	18 14 20	5.6
		11 4 4 56	17 35 54	5.6

LEO, in *Botany*, a name used by some authors for the COLUMBINE, or *aquilegia*. Columella, beside others, calls it by this name.

LEO, the *lion*, in *Zoology*. See LION.

LEO *pulex*, a name given by Mr. Reaumur to a species of insects, which feeds on the *pulex arborens*, or common tree-puceron, in the same manner that the creature called the *formica leo* does on the ants: this being also, like that, an animal, yet in an imperfect state, and finally to be changed into a different creature. This author has kept up the remembrance of this analogy between them, by giving this a similar name.

The *leo pulex* is usually bred among the herds of the pulices, which he devours most unmercifully. He is a worm of the hexapode, or six-legged kind, and very soon arrives at the time of his change; after which he becomes a green fly with four wings. Another animal of this kind, and not less destructive of this small race of animals, is a six legged worm of a whitish colour, and smaller than the former, which finally becomes a round-bodied beetle. Another species of these devourers this author calls *vermis hystrix*, the porcupine-worm, from the vast number of spicula, or tender prickles, with which he is armed. This also finally becomes a round and small beetle. Reaumur, Hist. insect. tom. i. See LION *Puceron*.

LEOCROCOTTA, in *Natural History*, a name given by the ancients to an animal, said to be the swiftest of all creatures in the world. It is described as a mongrel or bastard animal, unable to propagate its own species, being begotten upon the bitches by the male hyæna of some of the larger kinds: but is one of those animals, the existence of which is much to be doubted. The Latin authors have made some confusion between this creature and the MANTICHORA, attributing the things that have been said of one to the other.

LEONINE, in *Poetry*, is applied to a kind of verses which rhyme at every hemistich, the middle always chiming to the end.

In this kind of verse we find several ancient hymns, epigrams, prophecies, &c. For instance; Muretus, speaking of the poetry of Lorenzo Gambara of Bresse, says,

Brixia conspirates, quæ condunt carmina vates
Non sunt nostrates tergere digna nates.

The following one is from the school of Salernum:

Ut vites pœnam, de potibus incipe cœnam.

The origin of the word is somewhat obscure: Pasquier derives it from one Leoninus, or Leonius, who excelled in this way, and dedicated several pieces to pope Alexander III. others derive it from pope Leo; and others, from the beast called *lion*, because it is the loftiest of all verses.

M. Fauchet makes the *leonine* rhyme the same with what the French call the *rich*, and we the *double rhyme*, i. e. where two syllables have the same orthography, accentuation, and pronunciation, with two others.

LEONTESERES, in the *Natural History of the Ancients*, the name of a species of agate, famous in early times for its imaginary virtues in taming the rage of wild beasts, and not a little esteemed among us for its beauty. It is the most variegated of all the agates. Its ground colour is yellow, and its variegations are flame coloured, white, black, and green.

Sometimes it is one irregular congeries of all these colours, but more frequently it is very beautifully variegated with them in form of clouds and veins; the black and green particularly are usually disposed in concentric circles round one or more points. It is found only in the East Indies, and is very scarce. Hill's Hist. of Foss. p. 487.

LEONTIASIS, a name used by some authors for the ELEPHANTIASIS.

LEONTICA, feasts or sacrifices celebrated, among the ancients, in honour of the sun.

They were called *Leontica*, and the priests who officiated at them *Leontes*, because they represented the sun under the figure of a lion radiant, bearing a tiara, and griping in his two fore-paws the horns of a bull, who struggled with him, in vain, to disengage himself.

The critics are extremely divided about this feast: some will have it anniversary, and to have made its return not in a solar, but in a lunar year; but others hold its return more frequent, and give instances where the period was not above two hundred and twenty days.

The ceremony was sometimes also called *Mithriaca*; Mithras being the name of the sun among the ancient Persians.

There was always a man sacrificed at these feasts, till the time of Hadrian, who prohibited it by a law. Commodus introduced the custom afresh, after whose time it was again exploded.

LEONTICE, in *Botany*, the name given by Linnæus to that genus of plants which Tournefort and others have called LEONTOPETALON.

LEONTICE is also a plant mentioned by the ancient Greeks, and called by them CACALIA.

Dioscorides tells us it had these names in common, and that it was of great virtue in curing diseases of the *aspera arteria*, or wind-pipe.

This medicinal plant of the Greeks was very different from that we now call CACALIA. Some have described it to have flowers like the oak, others like the olive tree, but the old manuscripts of Dioscorides all say, the flowers were like those of bryony. Hence it could by no means be the *cacalia* of the moderns; nor is it easy to say, from such short and uncertain accounts, what it was.

LEONTODERON, in *Natural History*, a name given by several authors to a species of agate, of a plain yellowish colour, without variegations.

LEONTODON, in *Botany*. See DANDELION.

LEONTOPETALOIDES, in *Botany*, the name of a genus of plants described by Dr. Ammian, being a species of the *leontice* of Linnæus. The characters of which are these: the flower is monopetalous, of the funnel-fashioned kind, and divided into several segments at the edge: this is succeeded by a bladder, or inflated fruit, which contains a number of oval seeds.

The plant is a native of the East Indies; its root is tuberose, and two inches thick in the middle: it is grey on the outside, and white within, and sends out but few fibres. There usually arise four stalks from each root; these are very tall, and of a finger's thickness; two of them usually bear each one large and beautiful leaf, very thin in its substance, variously jagged, and of a beautiful green. The two others bear each a tuft of flowers, which are large and yellow, and stand in cups of a fine green, composed each of one leaf, divided into some segments at the end: each flower is sustained on a pedicle of about an inch in length; these are succeeded by the fruit, which are green inflated bladders of an angular form, and of an inch diameter in the largest part, from whence they run to a point, where they are purple. The seeds are large, striated, and of a pale brick-colour. Act. Petrop. vol. viii. p. 209.

LEONTOPETALON, in *Botany*, the name of a genus of plants, called *leontice*, by Linnæus. See LION's *leaf*.

The *artanita*, or *leontopetalon*, of the ancients, is generally esteemed a synonymous name for the *cyclamen*, or SOW-*bread*, and is used as such by most authors; but if the Arabian writers are understood of it in this sense, it will be hard to reconcile their works with those of the Greeks on the subject of this plant.

LEONTOPODIUM, *lion's* foot, in *Botany*, a name given by some to a genus of plants, otherwise called *gnaphalium*. See CUD-*weed*.

LEONURUS, in *Botany*. See LION's *tail*.

LEOPARD, in *Zoology*, the English name of the long-tailed *felis*; a beast of prey, with the spots on the back and sides round, the lower ones variegated. It is a very nimble as well as fierce animal, so that scarcely any thing escapes it. Authors call the male PARDUS, and the female PANTHERA.

This creature, when carefully examined, is found to be very like a cat; particularly its head, teeth, tongue, feet, and claws. Its actions also are all like a cat's; it boxes with its fore-feet, as a cat does her kittens; leaps at its prey as the cat does; and will spit much in the same manner.

All the *leopard* kind as they walk, keep the claws of their fore-feet turned up from the ground, and sheathed, as it were in the skin of the toes, whereby they preserve them sharp for seizing their prey.

Notwithstanding the natural fierceness of the *leopard*, numbers of them are bred up tame, and kept for the Great Cham of Tartary's use, for the hunting of deer and other beasts.

They are most numerous in Africa and Syria.

The *leopard* of Buffon has its hair of a lively yellow colour; it is marked on the back and sides with small spots, disposed in circles and pretty close together; the face and legs are marked with single spots; the breast and belly are covered with longer hairs than the rest of the body, of a whitish colour; the spots on the tail are large and oblong: the length of this species, from nose to tail, is four feet, and that of the tail is 28 feet. This animal inhabits Senegal and Guinea, and spares neither man nor beast. The PANTHER destroys numbers of them: the negro women make collars of their teeth, to which they ascribe certain virtues. These animals are taken by the negroes in pit-falls, covered at the top with slight hurdles, on which they place a bait of flesh. The flesh is white and well-tasted, and eaten by them. The skins are valuable, and brought to Europe.

The leſſer *leopard*, kept a few years ago in the Tower, inhabits the Eaſt Indies; it has its face ſpotted with black; the ſkin white, and a large black ſpot on each ſide of the upper lip; the breaſt white, ſpotted with black; the back, ſides, and rump covered with hair of a bright yellow colour: the ſpots reſemble thoſe of the former, but are ſmaller; and the tail is ſhorter, tapering to a point, covered with ſhort hair.

The *hunting leopard* of India has a ſmall head, with the tip of the noſe black, and from each corner of the mouth to that of the eye, a duſky line; the ears are ſhort and tawny, and marked with a brown bar; the face, chin, and throat, are of a pale yellowiſh brown; the body of a light tawny brown, marked with many ſmall, round, black ſpots: the hair on the top of the neck is longer than the reſt; that on the belly white and very long: the tail is longer than the body, of a reddiſh brown colour, marked above with large black ſpots. This animal is of the ſize of a greyhound, of a long make, narrow cheſt and very long legs. It is tamed and trained for the chace of antelopes, which it overtakes by its rapidity. Pennant.

LEOPARD'S *bane*, *doronicum*, in *Botany*, a genus of the *ſyngeneſia polygamia ſuperflua* claſs. It has a flower compoſed of ſeveral hermaphrodite florets, which form the diſk, and female florets which compoſe the rays; theſe are included in one common empalement which has a double ſeries of leaves as long as the rays: in the bottom of the hermaphrodite florets is ſituated the germen, which becomes a ſingle, oval, compreſſed ſeed, crowned with hairy down: the female florets are formed like a tongue, and compoſe the border; theſe have a germen crowned by two reflex ſtigmas, but have no ſtamina; the germen becomes a ſingle furrowed ſeed without down. Miller enumerates four ſpecies, natives of Hungary and the Helvetian mountains, and of the Alps and Pyrenees.

The root has been ſometimes uſed in medicine; ſome have commended it as an expeller of the poiſon of ſcorpions; while others reckon it a poiſon itſelf; and affirm that it will deſtroy wolves and dogs. See DORONICUM.

LEPA, in our *Old Writers*, a meaſure which contained the third part of two buſhels. Whence we derive a *ſeed leap*.

LEPAS, in *Natural Hiſtory*, the name of a genus of ſhell-fiſh, the ſame as PATELLA, in the Linnæan ſyſtem is a genus of the teſtaceous worms, comprehending ten different ſpecies: its animal is the Triton; and the ſhell is multivalve, unequal, and fixed by a ſtem. The common Engliſh BARNACLE is of this genus.

LEPASTRUM, in *Natural Hiſtory*, the name of a genus of foſſils, of the claſs of the SELENITÆ, compoſed of filaments arranged into broad plates, and thoſe diſpoſed in the form of a radiated ſtar.

The word is derived from the Greek λεπις, *a ſcale* or *plate*, and αστρ, *a ſtar*.

Of this genus there are two known ſpecies; the one a bright browniſh white kind, with thinner flakes, the other a white dull-looking kind, with thick flakes. They are both found on the ſhores of Sheppey iſland in Kent, and form themſelves in the cavities of the ſeptariæ called by authors *ludus Helmontii*; and the ſeptariæ with theſe aſſixed to them, have been accounted a ſeparate ſpecies of that body, and called the *ſtarred waved coin*, or *ludus Helmontii ſtellatus*. The world in general has erred as to the origin of theſe beautiful foſſils, they having been ſuppoſed to be talcky ſpars; whereas their want of elaſticity, the great character of tale, and their not fermenting with acids, which is the fundamental diſtinction of the ſpars, prove them to be not at all of the nature of either of theſe bodies; and experiments on them plainly ſhew them to be a *ſelenites* of a particular kind. Hill's Hiſt. of Foſſ. p. 179. 148.

LEPERS. See ELEPHANTIASIS, and LEPROSY.

LEPIDIUM. See DITTANDER.

LEPIDOCARPODENDRON, a name given by Boerhaave to a genus of plants, called by Linnæus LEUCADENDRON.

LEPIDOIDES, Αεπιδοειδης, formed of λεπις, *ſcale*; and ειδος, *form*, *figure*, or LEPIDOIDES, in *Anatomy*, a name of the ſquamous or ſcaly ſuture of the CRANIUM.

LEPIDOPTERA, from λεπις, *a ſcale*, and πτερον, *wing*, in the *Linnæan Syſtem*, an order of INSECTA, with four wings, imbricated with ſcales; in the mouth is contained a ſpiral tongue, and the body is hairy. This order comprehends three genera, viz. the papilio or butterfly, the ſphinx, and the phalæna or moth; and each genus includes a number of ſpecies.

LEPIDOTES, in *Natural Hiſtory*, the name of a ſtone bearing a reſemblance to the ſcales of fiſhes. The word has been uſed by ſome, as the name of thoſe ſtones which are compoſed of ſmall flakes, or ſcales of tale, and by others to expreſs the ſtones containing fiſh, or the impreſſions of fiſh, found in many parts of Germany.

LEPISMA, in *Natural Hiſtory*, a genus of the *apterous* order of inſects; with ſix feet formed for running, a mouth having two ſetaceous palpi or feelers, and two rounded at their extremity, a ſetoſe tail, and a body covered with ſcales. This genus includes three ſpecies.

LEPIUM, in *Natural Hiſtory*, the name of a genus of foſſils of the claſs of the GYPSUMS; the characters of which are, that the bodies of it are moderately hard, compoſed of very ſmall particles, and of a duſky hue.

It is found in great plenty in Germany, and is one of the many ſubſtances which, from their uſe in faſing and caſting, the Germans call *ſpaad*. We have it in great plenty in Derbyſhire, and it is burnt into a ſort of plaiſter of Paris for the coarſer works; but it calcines very ſlowly and unequally. Hill's Hiſt. of Foſſ. p. 114.

LEPORARIA *aquila*, a name given by ſome authors to the *melanaëtos*, or *black* EAGLE, from his deſtroying great numbers of hares.

LEPORINUM *genus*, in *Zoology*, the name of a genus of animals, ſo called from their general reſemblance to the hare in ſhape, and other particulars; the characters by which they are diſtinguiſhed from other quadrupeds are theſe: they have feet divided into claws; they feed on vegetables; and they have two very long teeth in the forepart of their mouths. Ray's Syn. Quad. p. 204.

LEPRAS, in *Zoology*, the name of a ſea-fiſh of the TURDUS, or wraſſe-kind, remarkable for the great variety and beauty of its colouring. It is ſeldom caught of more than five or ſix inches in length, and is conſiderably broad and flat. It ſometimes grows to a foot long, but that only in the ocean, never in the Mediterranean Sea, where it is uſually caught; and even there very rarely. It is ſpotted all over like the body of a leopard. It is one of the moſt beautiful fiſh of the Mediterranean, but is not much eſteemed at table, being of an inſipid and watery taſte.

LEPROSO *amovendo*, in *Law*, an ancient writ that lay to remove a *leper*, or *lazar*, who thruſt himſelf into the company of his neighbours in any pariſh, either in the church or at other public meetings, to their annoyance. The writ lies againſt thoſe *lepers* that appear outwardly to be ſuch, by ſores on their bodies, ſmell, &c. and not againſt others: and if a man be a *leper*, and keep within his houſe, ſo as not to converſe with his neighbours, he ſhall not be removed.

LEPROSY, LEPRA, in *Medicine*, a foul, cutaneous diſeaſe, appearing in dry, white, thin, ſcurfy ſcabs, either over the whole body, or only ſome part of it; and uſually attended with a vehement itching, and other pains.

The word is derived from the Greek λεπρα, which ſignifies the ſame; and that from λεπις, *ſquamma*, *ſcale*.

The *leproſy* ſeems to ariſe from a great obſtruction of perſpiration, and a faulty ſerum; whereby the thin ſaline humours are thrown off from the blood, and detained by the denſity and cloſeneſs of the cuticula.

Hoffman thinks the ſeat of the various kinds of *leproſy* to be chiefly the fatty membrane of the ſkin, where the ſomes of the corrupt matter principally reſides; inſomuch that by corroding and inflaming the nervous fibrillæ of the ſkin, various kinds of puſtules are generated. In warm countries the *leproſy* was very infectious, but it does not appear to have been the caſe, at leaſt in the ſame degree, in colder climates. It is an hereditary diſeaſe, and has been ſometimes occaſioned by exceſſive terror, two inſtances of which occur in the Med. Obſ. vol. i. art. 18. The remoter cauſes are whatever diminiſh the vital heat and reduce the general ſtrength of the body.

This diſtemper has been much more frequent in former times than it is at preſent, and much more in the hot countries of the Eaſt, particularly among the Jews, than among us: perhaps becauſe the ſalts, which, by the appointment of nature, are to be eliminated through the pores of the ſkin, along with the recrementitious ſerum their proper vehicle, are, in hot countries, conveyed in greater plenty to the ſurface of the body, than in theſe northern regions they ordinarily are; and, ſticking in their paſſage in the thin dry membrane of the cuticle, the aqueous parts, which are their vehicle, flip away from them by inſenſible evaporation, and leave them there to corrode and fret it, till at length, through the quantity ſo gathered, the membrane becomes dry, brittle, and white, which is the cauſe of that defquammation, or falling away in white ſcales; that whiteneſs, as well as the brittleneſs, proceeding merely from the quantity of theſe ſalts, which are themſelves white; and when the moiſture is drawn from them, being aculeated, and having inſinuated themſelves into the pores of the cuticle, they diſſolve the continuity of it by their points and edges; which thus mortified and broken, is apt, on the leaſt friction, to fall off, as above mentioned.

The ancients diſtinguiſhed two kinds of *leproſy*, viz. the

lepra Græcorum, and *lepra Arabum*: though the two seem only to have differed in degree; the symptoms of the Grecian being farther heightened and aggravated in the Arabian.

Lucretius supposes the elephantiasis to be generated in Egypt, and no where else; but if the *leprosy* of the Jews is the same as that of the Negroes, which is highly probable, then it may be affirmed, that it is endemial to the southern and inland parts of Africa.

That it was contagious all histories, sacred and prophane, agree. Pliny acquaints us, that it did not invade Italy till the time of Pompey the Great, and that it was brought from Egypt, and is peculiar to that kingdom. Some have thought that the *leprosy* of the Arabians, or more properly of the Africans, was the parent of the lues venerea: however that be, it is certain, that since the pox has been curable, the elephantiasis seems to have disappeared, and the *leprosy* of the Greeks has been much less frequent than before.

In the West Indies this disorder is known by the name of the black SCURVY. Its approach is observed to be gradual; at first there are many spots of a yellow-brown cast, which soon turn purple, and of a copper colour; these increase and become thick and rough, with hard scales; a numbness is felt on the fingers and toes; the breath is fetid, the voice hoarse, the hard and scaly parts crack, and ulcers appear in different parts; but at length a fever comes on, which terminates in death.

An inveterate *leprosy* was judged to be absolutely incurable; but Aretæus says, when the disease is new and recent, there are great hopes of a cure. What he and Celsus prescribe in order to the cure is not worth repeating; for if any medicines will do, they must be of the Herculean kind. Authors are excessive in the praise of viper's flesh, which Hoffman judges to be quite insignificant. Joel advises bleeding, and purging with twelve grains of the extract of black hellebore, or three grains of the glass of antimony, in conserve of roses: but the vitrum ceratum is more safe, and may be given in a larger dose. Towne confesses, that the antimonial preparations yielded most relief in Barbadoes, but he could not say that they perfected the cure. On the other hand, mercury exasperated the distemper, irritated the ulcers, and made them spread the faster.

The impetigo or *leprosy* of the Greeks, begins with red pimples or pustules breaking out in various parts of the body; sometimes they appear single, sometimes a great number arise together, especially on the arms and legs. As the disease increases, fresh pimples arise, which joining the former, make a sort of cluster, all which enlarge their borders, and spread in an orbicular form. This *leprosy*, according to Turner, breaks out first in the elbows and knees, but soon spreads farther, and gradually shews itself over the whole body. The causes and seat of this disease are said to be the same as the former. Willis blames all dried and salted meats, especially hog's flesh, and fish, particularly shell-fish; because the poor people in Cornwall inhabiting near the sea-coast, were formerly much subject to leprous diseases, and had many hospitals erected on that account.

In the method of cure, says Hoffman, we should endeavour to discharge out of the body, the mass of corrupt glutinous and acrid humours, by sufficient bleeding, and abstinence, by purges, as well gentle as drastic; then by proper aliment, and a good regimen, promote the generation of wholesome juices; and likewise by external, deterfive, consolidating and drying remedies, to free the part from pain, tumors, itching, and ulcers. The purges may consist of the root and the resin of jalap, the extract of black hellebore, elaterium mixt with calomel, or æthiops mineral, and gum ammoniac. Among those things which stimulate the parts to an excretory motion, and more powerfully melt down the tenacious humours, the wood and bark of guaiacum exceed all others: the most considerable besides these, are the tartarized and acrid tincture of antimony, sulphur of antimony, cinnabar, and, if a venereal taint is suspected, a decoction of crude antimony; which medicines in a convenient dose in the morning, with purifying decoctions drank in bed, afford great relief. But if these fail, recourse must be had to mercury, which some, after extinction, mix with flowers of sulphur and camphor, and rub it on the joints to promote a salivation. Others more properly give mercurius dulcis, with double the quantity of crabs-eyes, and calx of antimony, rising gradually from three or four grains, to a scruple, in order to salivate with proper precautions.

The lesser degrees of *leprosy*, says Sir John Pringle, in his Obs. on Diseases of the Army, p. 306, are frequently confounded with the scurvy, and even itch; from which, however, it may be distinguished by the hardness of the skin in one or more parts of the body, attended with a dry scurf, sometimes oozing pustules, or dry scabs, and always with some degree of itching; whereas the true scorbutic spots are of a livid colour, not commonly scurfy or raised above the skin, and are attended with manifest signs of a lax state of the fibres, and corruption of the blood. For a real scurvy imports a flow, but general resolution or putrefaction of the whole frame; whereas the scabies, impetigo, or *leprosy*, may be found to affect those of a very different constitution.

This disorder is so far from being curable by externals only, that it is sometimes dangerous to attempt to remove the scurfs of *leprous* people in that manner. On the contrary, it is necessary to change the humours, by a spare diet, exercise, alterative mercurials, or frequent purges of the saline kind. Ibid.

Dr. Mead recommends the tincture of cantharides in this distemper.

Dr. Lysons has met with great success in the use of the following decoction, viz. R cort. interior. ulmi rec. ℥ iv. coq. in aq. pur. ℔ iv. ad ℔ ij colatur. cap. ℔ ß. one; continued for several weeks. If after using it, the efflorescences increase, the symptom is favourable.

Others have advised the same general course of diet and medicine for the cure of the leprosy as the scurvy. This distemper, which was so common in our country long ago, appears very seldom at present; which may be owing to the inhabitants of Britain eating more vegetable food than formerly, living more upon tea and other diluting diet, using less salted meat, being more cleanly, better lodged and cloathed, &c.

Lepra Arabum, is the same with what is otherwise called *elephantiasis*, because in this the patient's skin is rough and wrinkled like an elephant's hide. See ELEPHANTIASIS.

LEPTODECARHOMBUS, in *Natural History*, the name of a genus of fossils of the class of the SELENITÆ.

The word is derived from λεπτος, *thin, slender, fine*, and ῥομβος, *a rhomboid figure*, and expresses a thin or slender rhomboidal body, consisting of ten planes or sides, each of which is so nearly equal to that opposite to it, as very much to approach a decahedral parallelopiped; but as the broader and flatter planes, which form the top and bottom in this genus are not regularly equal to each other, so neither are the eight narrower to their opposites; but they usually differ in breadth, and in the angles they make. Of this genus there are five species enumerated by Dr. Hill in his Hist. of Fossils, p. 128 to 129.

LEPTOS *libanotis*, in the *Materia Medica of the Ancients*, a name given by some of the Greek writers to the small frankincense, that is such as came to their hands in small flakes, broken from the larger masses in the gathering or packing up. This was also called *manna thuris*, the manna of frankincense, the word *manna* being of old used to express any thing formed of granules, or small pieces. The ancients esteemed this *leptos libanotis*, or *manna thuris*, when pure, beyond any other kind, for they always valued that frankincense most, which was driest and most brittle. and such only as was so, could break off in these small flakes. The medicine, however, soon grew subject to adulteration, and lost its credit; for the dust of the frankincense being allowed to be put up among this *manna thuris*, Dioscorides tells us, that in his time people, greedy of gain, had found the way to adulterate it, by adding, instead of this genuine dust, the sifted powder of the resin of the pine-tree.

LEPTUM, in *Antiquity*, a small piece of money, which, according to some, was only the eighth part of an obolus; but others will have it to be a silver or brass drachm.

LEPTURA, in the *History of Insects*, the name of a genus of four-winged flies, the antennæ of which are oblong, slender, and setaceous; the exterior wings are truncated at their extremity, and the thorax is of a subcylindric figure.

This genus in the Linnæan system belongs to the order of *coleoptera*, and comprehends twenty-five species.

These flies have been, by the generality of authors, reckoned among the beetles. See SCARABÆUS.

LEPTURUS, The name is of Greek origin, and is formed of λεπτος, *slender*, and ουρα, *a tail*, expressing that the fish bearing this name has a very long and slender tail.

LEPUS, in *Zoology*. See HARE.

LEPUS, the *Hare*, in *Astronomy*, a constellation of the southern hemisphere; whose stars in Ptolemy's catalogue are twelve; in that of Tycho thirteen; in the Britannic catalogue nineteen; the names, places, longitudes, latitudes, and magnitudes whereof are as follow:

Names

Names and situations of the stars.	Signs.	Longit.	Latitude S.	Magnitude
	Boyer's Char.	° ′	° ′	
	♊	6 44	25 20 17	6
In the preceding anterior foot	♋	7 45	0 45 0 18	4
North. in the preceding ear	♋	11 27	20 34 45 30	5
South. of the same ear	♌	11 35	43 55 50 25	5
In the skin	♌	1 4	35 39 5 28	4
9.				
South. of the following ear	♌	13 37	47 16 13 59	4.5
North. of the following ear	♌	13 40	32 35 23 10	5.6
		14 34	52 17 3 42	6
That under the belly	♌	15 22	25 43 57 24	3
		16 18	14 41 6 50	6
10.				
In the middle of the body	♌	17 4	47 41 6 28	3
		19 50	0 15 46 6	6
Preced. and south. in the posterior foot	♍	20 36	20 15 49 58	4.5
In the loins	♍	21 39	52 36 15 30	4
North. and subsequ. in posterior foot	♍	22 50	9 04 17 19	4.3
15.				
Preceding in the tail	♎	24 35	48 17 39 27	4
		27 15	13 30 57 35	6
Subsequent in the tail	♎	27 37	34 38 24 20	4
	♊	28 9	50 42 38 23	6

LEPUS *aquaticus*, the *water-hare*, a name given to the crested DIVER, or colymbus of America, which is the same species with the larger European kind, though described by many authors as a different bird. It has the name of the *sea-hare* or *water-hare*, from its great nimbleness in the water. It is caught with much difficulty; and the Mexicans have a thousand fabulous stories about it.

LE ROY *le veut*, a form of words, by which the royal assent is signified by the clerk of the parliament to public bills; to private bills this assent is expressed by *soit fait comme il est desiré*.

LE ROY *s'avisera*. By these words to a bill, presented to the king by his parliament, is understood his absolute denial of that bill in a more civil way; and the bill thereby becomes wholly null and void. See ROYAL and PARLIAMENT.

LESBIAN *Cymatium*. See CYMATIUM.

LESBIUM *marmor*, a name given by the ancients to a species of marble of a bluish-white, sometimes used for the vases and other ornamental works, but principally in the walls of public buildings.

LESSEES, a term used by sportsmen for the dung of a wild boar.

LESSON, in the *Manege*, is used for any piece of instruction in that art, whether given to the scholar or the horse.

LESSON, among *Ecclesiastical Writers*, portions of the holy scripture, read in Christian churches, at the time of divine service.

In the ancient church, reading the scriptures was one part of the service of the catechumens, at which all persons were allowed to be present, in order to obtain instruction.

The church of England, in the choice of *lessons*, proceeds as follows; for the first *lesson* on ordinary days, she directs, to begin at the beginning of the year with Genesis, and so continue on, till the books of the Old Testament are read over, only omitting the Chronicles, which are for the most part the same with the books of Samuel and Kings, and other particular chapters in other books, either because they contain names of persons, places, or other matters less profitable to ordinary readers.

The course of the first *lessons* for Sundays is regulated after a different manner. From Advent to Septuagesima Sunday, some particular chapters of Isaiah are appointed to be read, because that book contains the clearest prophecies concerning Christ. Upon Septuagesima Sunday Genesis is begun, because that book, which treats of the fall of man, and the severe judgment of God inflicted on the world for sin, best suits with a time of repentance and mortification. After Genesis, follow chapters out of the books of the Old Testament, as they lie in order; only on festival Sundays, such as Easter, Whitsunday, &c. the particular history relating to that day is appointed to be read; and on the Saints days, the church appoints *lessons* out of the moral books, such as Proverbs, Ecclesiastes, Ecclesiasticus, &c. as containing excellent instructions for the conduct of life.

As to the second *lessons*, the church observes the same course both on Sundays and week days: reading the gospels and Acts of the Apostles in the morning, and the epistles in the evening, in the order they stand in the New Testament: excepting on saints-days and holy-days, when such *lessons* are appointed, as either explain the mystery, relate the history, or apply the example to us.

LESSON and LESSEE. See LEASE.

LET-*fall*, in *Sea Language*, the word of command for putting out a sail, when the yards are aloft, and the sail is to come down from the yard; but when the yards are stricken down, then the sail is loosed below, before they hoist the yard.

Let fall is not properly said of top-sails, because they lie on the top; and therefore the word for them is, *Heave out your top-sails*. Nor can it be applied to the mizzen; for the word is, *Strike the mizzen and set it*. So that in strictness the term *let-fall* belongs only to the main-sail, fore-sail, and sprit-sail, when their yards are hoisted up aloft.

To LET-*in*, among *Shipwrights*, is to fix a diminished part of one plank or piece of timber into a vacancy, formed in another for this purpose. See RABBETING.

LETHARGY, *Αηθαργια*, in *Medicine*, from *λαθω*, *oblivion*, and *αργια*, *slowness*, *laziness*, a disease consisting of a profound drowsiness or sleepiness, from which the patient can scarce be awaked; or, if awaked, he remains stupid, without sense or memory, and presently sinks again into his former sleep. See COMA.

The *lethargy* is usually accompanied with a fever and delirium. Boerhaave makes the *lethargy* a gentle APOPLEXY arising from the same causes, and to be known and cured in the same manner.

Some authors distinguish the *lethargy* from the CARUS, because this latter is without a fever, or at most is preceded with a violent one; whereas the *lethargy* is attended with a slow one, manifested by the frequency of the pulse, and a less frequent and febrile respiration. Celsus ranges the *lethargy* in the number of acute diseases, the patient usually dying on the seventh day. A *lethargy* frequently succeeds a frenzy. It does not invade so suddenly as an apoplexy, nor kill so soon: the worst symptoms attending it are a tremor of the limbs, and a cold sweat of the face.

From physiology, we learn, that natural sleep depends upon a more diminished and more languid influx of the nervous fluid into the nerves destined to sensation and voluntary motions; and that this languid influx is partly owing to a want of nervous fluid, partly to the slow circulation of the blood through the vessels of the brain, and membranes. It follows, that the immediate cause of sleepy affections is a very languid and diminished influx of the nervous fluid, from the cortical substance of the brain, into its medulla; and from thence into the nerves destined to sense and motion. The causes of the preternatural impediments of this influx seem principally three; first, either a too great want of the fluid itself; or secondly, a laxity of the tubes which convey it; or lastly, a pressure upon the cortical substance of the brain; and this arises either from the blood passing slowly through the brain, and the meninges thereof, or absolutely stagnating, or some foreign matter incumbent on the said cortical substance, by which the medulla, every where joined to the cortex, is pressed together, and, consequently, cannot receive a sufficient quantity of the fluid. The remote causes of these diseases are whatever diminishes the vis vitæ or obstructs its influence; as tumors pressing on the brain or turgescency of the vessels, from obstructed menses, hæmorrhoids, long absence of the gout, &c. a too free use of spirituous liquors, offensive vapours, blows on the head, &c.

A physician, in the cure of sleepy diseases, should regard these three intentions; first to rouse the patient from his sleep; next to remove the difficulty of circulation, the stagnation or extravasation of the blood or serum in the head; and thirdly, to restore the lost strength of the membranes and vessels of the brain.

For shaking off drowsiness, and awaking the patient, those remedies are efficacious which act upon the nervous parts, by agitating them, vellicating and inducing a tremulous and oscillatory motion through the whole nervous system: such are 1. Powerful acids; and of these the preference must be given to the spirit of vendigrise, which is nothing but a most concentred spirit of vinegar, mixed with the essence of castor: this applied to the nose, in stimulating and penetrating, is superior to all others. 2. Volatile salts, as urinous spirit of sal ammoniac prepared with quick lime; which being applied to the vertex, or, what is still better, put into the nose, excites sternutation, and greatly shakes off the torpor and drowsiness. 3. Foetid things, as galbanum, partridge-feathers, and others burnt, so that the strong scent may affect the nose. 4. Cold water suddenly poured all over the head, which, by strengthening at the same time the membranes of the brain, readily dispels sleep. 5. Cataplasms prepared of strong vinegar, rue, bay leaves, tops of savory, mustard-seed, castor, and camphor, applied to the head, when shaved, the forehead, and the temples. The efficacy of these is promoted, and, at the same time, the serous colluvies, if it is offensive, is derived from the head, by sternutatories; the best of which is salt of white

white vitriol, if ten grains of it are diſſolved in half an ounce of majoram water, and drawn up the noſe; by veſicatories of cantharides, ſomewhat large, and laid on the feet and neck; for theſe both give motion to the ſolid nervous parts, and make a revulſion of the ſerous humours; by cupping-glaſſes, either with or without ſcarification. 4. By ſtrong frictions of the inferior parts. 5. By acrid and ſtimulating glyſters, which are in ſuch caſes, of very great ſervice, to which ſal gemmæ, common ſalt, or the roots of ſcuills are added, with a view of increaſing the ſtimulation.

The patient, by the help of theſe, being rouſed from his drowſineſs, it remains, that an equal circulation of the humours through the whole body be reſtored, and then the debilitated parts ſtrengthened. The firſt end is anſwered by frequent bleeding, whilſt the ſleepineſs laſts, if the veſſels are turgid with blood; and much more ſhould it be performed, when the ſleepineſs is conquered, in order to prevent a relapſe; then likewiſe if the firſt paſſages are loaded with excrements, or ſeized with ſpaſms, the body ought to be opened with a gentle laxative. Nervous, mixed with diaphoretic medicines, contribute to diſperſe ſtagnations of the humours, and alſo to ſtrengthen the infirm parts; among theſe the eſſence of aloes-wood and amber, with the ſpirit of lilies of the valley, of ſal ammoniac, and acrid tincture of antimony, are of great efficacy, and ſalt of hartſhorn, with ſalt of amber, cinnamon of antimony, and be toardic mineral in the form of a powder, have very great and ſalutary effects.

Laſtly, relapſes into ſleepy diſorders may be prevented partly by a removal of the cauſes producing them; and ſince a ſuppreſſion of the ſanguine excretions, or habitual arthritic paroxyſms, contribute very much to the generation of thoſe diſorders, he will not do amiſs who endeavours to recall theſe fluxes and pains, and preſerve a regular ſucceſſion of them. In diet, idleneſs, drunkenneſs, meats difficult of digeſtion, and ſpirituous things, muſt be avoided; let the body be exerciſed carefully; all repletion is to be avoided; and faſting, and eating ſparingly, is of uſe: the patient muſt entirely abſtain from fiſh, milk, and cheeſe; and among fruits, all that are watery muſt be abſtained from; he muſt eat more roaſted than boiled fleſh. Bread muſt be entirely cleanſed of the darnel, with which it is often intermixed. Let old infirm men uſe wine, as their milk: let them not protract their ſleep too long; let them be cautious of affections of the mind; let them frequently enjoy the converſation of their friends; let them amuſe themſelves with convenient journeys; let them take care to preſerve the excretions, as well by ſtool, as by the pores of the ſkin; and let them not forget the uſual bleedings at their ſtated times. In every ſleepy diſorder it is proper to avoid warm baths, vaporous ſubſtances, and ſuch as ſwelling, by their fragrant and ſtrong ſmell, to ſleep. Much more abſurd it is to uſe narcotics, ſulphureous remedies, opiates, or medicines in which ſaffron or poppies are ingredients; to this claſs belong theriacal medicines which the ancients uſed to preſcribe in theſe affections; for this is adding fuel to the fire.

We muſt above all thing take care not to uſe ſternutatories in the beginning of this diſorder, to rouſe the patient from ſleep, eſpecially in plethoric perſons; becauſe, by an unſeaſonable remedy of this kind, a greater influx of humours to the head is cauſed, and from thence there is great danger of an apoplexy. James from Hoffman.

LETHE, *Aides*, in the *Ancient Mythology*, one of the rivers of hell, ſignifying oblivion or forgetfulneſs: its waters, according to poetic fiction, having the peculiar quality of making thoſe who drank them entirely forget every thing that was paſt; or, according to Virgil, *longa potant oblivia vitæ*.

LETHE, LETH, or LATHE, a meaſureor portion of lands making one of the ancient diviſions in England.

King Alfred divided England into COUNTIES, as it ſtands at preſent; thoſe counties he ſubdivided into hundreds or tithings. The hundred was a diviſion, wherein were a hundred officers to ſecure the peace; the *lethe* or *lathe* comprehended three or four of theſe hundreds.

LETHE was alſo the juriſdiction of a viſcount; or a kind of aſſiſe, held once a year in each village, about Michaelmas. Whether this was inſtituted by Alfred, or not, is a queſtion?

LETHUM, in *Ancient Mythology*, was diſtinguiſhed by the Roman poets from *mors*, or DEATH. See Petronius Arb. ver. 263.

Mr. Spence conjectures, that by *Lethum* they meant that general principle, or ſource of mortality, which they ſuppoſed to have its proper reſidence in hell; and by *mors* or *mortes*, the immediate cauſe of each particular

inſtance of mortality on our earth. The poets give him a robe, but mention his arms being exerted out of it, as reaching at his prey. They hint at his catching people in a net, and his hunting them as they did beaſts, within his toils. They repreſent *Lethum* as nearly related to ſleep; and Valerius Flaccus, in particular, acquaints us, that they were brothers. Val. Flac. viii. ver. 74. Spence's Polymetis, p. 261. 263.

LETTER, *litera*, a character either in print or writing, by which any people have agreed to expreſs one of the ſounds, uſed in conveying their thoughts to each other in ſpeech.

Letter is by ſome defined, a ſimple uncompounded ſound of the voice, that cannot be ſubdivided into any more ſimple, and generally marked with a particular character.

But it muſt be owned that, ſtrictly ſpeaking, a *letter* is not the ſound itſelf, but rather the ſign of a ſound: for γραμμα, *ſitera*, is derived from γεγραμμαι, of γραφω, to *write*; and *litera* is formed from *linea*, the participle of *linere*, *to ſmear*, or *mark*; whence *obliterare* ſignifies *to blot out*.

Where a ſign or character does not expreſs a ſound entirely ſimple, but one reſolvable into ſeveral, it is not ſo properly a *letter* as an abbreviation, containing in itſelf as many *letters* as its power does ſimple ſounds. This is evident in the Latin &, *ſi* and the Greek ξ, ψ, ϛ, &c. which are compoſed of *s*, *i*, *k*, *i*, *ss*, *ps*. *cs*, &c.

On the contrary, a ſimple ſound, though expreſſed by ſeveral characters, is yet to be eſteemed one *letter*; for *th*, *ph*, are *ſingle letters*; as much as φ, θ. and ſ.

The *letters f*, *g*, *h*, *i*, *q*, *u*, *y*, *z*, were unknown to the ancient Romans, as is proved by Dauſquius in his Orthography, where he traces the origin of the ſeveral *letters*. See F, G, H, &c.

Grammarians diſtinguiſh *letters* into *vowels* and *conſonants*; into *mutes*, *diphthongs*, *liquids*, and *characteriſtics*.

The Hebrews divide their *letters* into *gutturals*, as *a*, *h*, *ch*, *gn*, aleph, he, chaph, hain, expreſſed by אהחע; *dentals*, as *z*, *i*, *tz*, *r*, *th*, zain, ſamech, ſade, reiſh, ſchin, expreſſed by זסצרש; *labial*, as *b*, *m*, *v*, *p*, beth, mem, vau, phe, expreſſed by the word בומף *linguals*, or thoſe chiefly formed by the tongue, as *d*, *t*, *l*, *n*, *th*, daleth, reth, lamed, nun, thau, expreſſed by דטלנת; and *palatal*, as *g*, *i*, *c*, *k*, ghimel, jod, caph, koph, expreſſed by גיכק.

Printers diſtinguiſh their *letters* into capital, majuſcule, initial, or upper caſe *letters*, which ſerve for the titles of books, proper names, &c. And minuſcule, *ſmall*, or under-caſe *letters*; which are again divided, according to their ſize, into *pearl*, *nonpariel*, *pica*, *great canon*, &c. They have alſo their flouriſhed *letters*, engraven on wood or metal, which take place of the illuminted *letters* of the ancient manuſcripts.

There are *letters* of various ſizes, or bodies; each of which, again, are ſometimes caſt with the Roman, ſometimes an Italic, and ſometimes an Engliſh, or Black *letter* face. There are alſo bodies with Greek, Hebrew, Arabic, the muſic face, &c.

Letters make the firſt parts or elements of grammar; an aſſemblage of theſe compoſe *ſyllables*, of thoſe *words*, and of theſe *ſentences*.

The ALPHABET of every language conſiſts of a certain number of theſe *letters*, which ought to have a different ſound, figure, and ſignification.

As the difference of articulate ſounds was intended to expreſs the different ideas of the mind, ſo one *letter* was originally intended to ſignify only one ſound, and not, as at preſent, to expreſs ſometimes one ſound, and ſometimes another: which practice has brought a great deal of confuſion into the languages, and rendered the learning of the modern tongues infinitely more difficult than it would otherwiſe have been. This conſideration, together with the poverty of all the known alphabets, and their want of ſome *letters* to expreſs certain ſounds by, has occaſioned ſeveral attempts towards an univerſal alphabet, to contain an enumeration of all ſuch ſingle ſounds or *letters* as are uſed in any language. A thing of very conſiderable uſe; a ſpecimen of which is given us by Mr. Lodwick, in the Philoſophical Tranſactions. See *Univerſal* CHARACTER.

According to Crinitus, Moſes invented the Hebrew *letters*, Abraham the Syriac and Chaldee; the Phœnicians thoſe of Attica, brought into Greece by Cadmus, and thence by the Peláſgians into Italy; Nicoſtrata the Latin; Iſis the Egyptian; and Ulphilas, about three hundred and ſeventy years after our Saviour, thoſe of the Goths.

Yet as to the firſt *letters*, what they were, who firſt invented them, and among what people they were firſt in

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uſe, there is ſtill room to doubt; however, ſetting aſide conjectures and prejudice, the buſineſs of antiquity ſeems to lie between the Egyptians and Chineſe. Philo attributes the firſt invention of *letters* to Abraham; Joſephus, St. Irenæus, and others, to Enoch; Bibliander, to Adam; Euſebius, Clement Alexandrinus, Corn. Agrippa, &c. to Moſes; Pomponius Mela, Herodian, Rufus Feſtus, Pliny, Lucan, &c. to the Phœnicians; St. Cyprian, to Saturn; Tacitus to the Egyptians; and ſome to the Ethiopians.

The Egyptian mummies and obeliſks prove a great antiquity on the ſide of the hieroglyphics; but if the Chineſe chronology may be credited, their characters are much more ancient than thoſe of the Egyptians. The Chineſe make Fohi, the firſt of their kings, ſuppoſed by many learned and judicious writers to have been no other than the Patriarch Noah, the inventor of their *letters*, and compute him to have lived two thouſand nine hundred and fifty years before Chriſt; during all which time they pretend to have certain and written accounts in their books. If this holds true, their character muſt be older than Moſes by fourteen hundred years, and even prior to Menes, the firſt king of Egypt, by five hundred years; ſo that the Chineſe *letters* appear to be the moſt ancient of that kind; and the book Yekim, ſaid to be written by Fohi, the moſt ancient book.

But as China is ſo remote, and had ſo little communication with theſe parts of the world, we may reaſonably make another inquiry into the original of *letters* in the hither parts of Aſia, Egypt, and Europe. Here indeed, the Egyptians ſeem to have the beſt title. It is more than probable, from the obeliſks, &c. that their hieroglyphics were the firſt manner of writing, and the original characters in theſe parts, as being prior to Moſes; and were made, at leaſt in great meaſure, while the Iſraelites were ſlaves among them, and conſequently not well qualified for inventions ſo very curious and judicious.

To this ſource the learned Biſhop Warburton aſcribes the origin of alphabetical writing among the Egyptians: for as philoſophy advanced and their learned men wrote much, the exact delineation of hieroglyphic figures became too tedious and too voluminous; and they, therefore, by degrees perfected another character which he calls the running hand of HIEROGLYPHICS, reſembling the Chineſe characters, which being at firſt formed only by the outlines of each figures, became at length a kind of marks.

This running character was denominated by the ancients *hieroglyphical*, and led to the compendious uſe of *letters* by an alphabet, which method of writing, as the ancients inform us, was invented by the ſecretary of an Egyptian king, and firſt uſed for ſecrecy in the conveyance of letters of ſtate, whence it was called epiſtolary writing: but afterwards letters became common, and, as he obſerves, hieroglyphics ſecret and myſterious. This political alphabet, he adds, ſoon occaſioned the invention of a ſacred one, uſed by the prieſts and called *hieroglammatical*. But the preciſe time of the invention of Egyptian *letters* cannot be ſo much as gueſſed at, becauſe hieroglyphics continued in uſe long after *letters* had been found out: it is certain that they were very early, becauſe the invention of them was aſcribed to their Gods. Biſhop Warburton farther conjectures, that Moſes brought *letters* with the reſt of his learning from Egypt, and that he both enlarged the alphabet, becauſe the Hebrew alphabet which he employed in the compoſition of the Pentateuch is conſiderably fuller than that which Cadmus brought into Greece; and altered the ſhapes of the *letters*, reducing them into ſomething like thoſe ſimple forms in which we now find them, in order to prevent the abuſe to which they would be liable as hieroglyphic marks and ſymbolic images. He argues, that, conſidering the importance of *letters* among the Hebrews, with regard to the integrity of their religion, if God had been the immediate author of them, Moſes would have recorded the hiſtory of their invention, as the beſt ſanction of their uſe and beſt ſecurity from the danger of hieroglyphic writing, to which this people, ſo fond of Egyptian manners, were very powerfully inclined. Divine Legation, vol. ii. p. 1. 124, &c. See alſo on this ſubject Sharpe's Origin of Languages, p. 56, &c.

Many of the fathers and ſome learned men among the moderns, have imagined that the knowledge of alphabetic writing was either ſupernaturally imparted to our firſt parents, or diſcovered very ſoon after the creation by the effort of their own powers. Others have ſuppoſed that alphabetical *letters* were introduced very early after the deluge, about the time of the diſperſion of mankind, to which period the records of the Chaldean aſtronomy very nearly extend. Mr. Shuckford, who ſuppoſes that they were invented both in Aſſyria and Egypt, conjectures that the great project of Babel, next to the building of the Tower, was the improvement of language, by diſſolving the monoſyllables, of which the firſt language of mankind conſiſted, into words of various lengths, in order to obtain new ſets of names for new things; and that a project of this kind might gradually lead to the invention of alphabetical *letters*. Conn. of Sacred and Prof. Hiſt. vol. i. p. 248.

But to theſe conjectures it may be replied, that we have no authentic relation of any alphabetic character before the flood; the account of the inſcription upon pillars by the firſt Mercury from Manetho, or of Seth mentioned by Joſephus, being too fabulous to deſerve credit. Beſides, if they had been in uſe among the patriarchs after the deluge, many occaſions occur, in which they would not have been omitted: and as we have no account of the uſe of alphabetic characters in epiſtles or contracts, or for other purpoſes to which they would naturally be applied, we may infer that they were not known. To which we may add, that none of the revelations of God to the patriarchs, were enjoined to be recorded till the giving of the law. Others have aſcribed the invention of *letters* to the Arabs, before the time of Moſes; but when we conſider the rudeneſs of their lives and manners, this opinion is by no means probable: and, therefore, the greater number of writers, among Jews and Chriſtians, both ancient and modern, have contented themſelves with tracing their origin to Moſes, ſuppoſed to be the ſame with the Egyptian Thoth or Hermes, mentioned in the hiſtory of that nation; alledging that God taught him the uſe of alphabetic *letters*, in the exemplar of the two tables, wrote, as the text aſſures us, with the finger of God; which words can be underſtood to mean only that they were written by a divine order and direction, as is evident by comparing Exod. xxxiv. 27, 28, and ch. x. 4. It has been ſaid by ſome of the advocates of this opinion, that the elements of language were thus ſupernaturally revealed to Moſes upon the firſt arrival of the Iſraelites before Horeb, but that their characters, with the arrangement of them, might be left to his diſcretion. But it ſeems more probable, that *letters* were at this time well known to the Iſraelites, as God thought fit to deliver the firſt elements of their religion in that kind of writing: more eſpecially as the hiſtory of ſo momentous a circumſtance is not recorded; a circumſtance, the memory of which would have been one of the greateſt barriers againſt idolatry. From the Iſraelites, it is ſuppoſed this art of alphabetical writing paſſed to the Syrians, and from them it was communicated to the Phœnicians and Egyptians: though it ſeems probable that it was of a more ancient date among the latter than the time of the decalogue or the delivery of the law on mount Sinai.

Sir Iſaac Newton, in his Chronology, allows the Midianites, ſprung from Abraham by his concubine Keturah, to have inſtructed Moſes in the knowledge of writing.

Nevertheleſs, whether Cadmus and the Phœnicians learnt *letters* from the Egyptians, or from their nearer neighbours of Judea and Samaria, is a queſtion; ſince ſome of the books of the Old Teſtament, being written in *letters*, is more likely to have given them the hint, than the hieroglyphics of Egypt. But when or wherefoever the Phœnicians learnt this art, it is generally agreed, that Cadmus, the ſon of Agenor, firſt brought *letters* to Greece; whence, in the following ages, they ſpread over the reſt of Europe.

Herodotus in his fifth book intitled Terpſichore, informs us, that thoſe Phœnicians who accompanied Cadmus into Greece, and ſettled there, among many other arts and ſciences, introduced into that country the knowledge of *letters*, which the Greeks in his opinion were ignorant of till that time: their firſt *letters* were ſuch as were in uſe among the Phœnicians; but ſome time after they altered them a little, both with regard to their make and ſound; which alteration ſome have ſuppoſed to have been the change of the Hebrew Characters into thoſe that were afterwards called the Samaritan: and as at that time many of the neighbouring parts were inhabited by ſuch as were originally Ionians, who alſo had received their *letters* from the Phœnicians, they mixed the one with the other; and hence thoſe characters were termed Phœnician, becauſe they were brought out of Phœnicia into Greece. Herodotus alſo adds, that he ſaw at Thebes in Bœotia, in the temple of Iſmenian Apollo, three tripods, that had inſcriptions upon them in Cadmeian *letters*, which very much reſembled the Ionic. The time of this expedition of Cadmus into Greece is fixed by ſir Iſaac Newton to about the 1045th year before Chriſt. The number of *letters* which Cadmus brought into Greece, according to Ariſtotle, as cited by Pliny, was eighteen; but according to Plutarch and Pliny himſelf, ſixteen; to which Palamedes, in the time of the Trojan war, added four, and Simonides four: ſo that the Greek alphabet was gradually perfected. The alterations and improvements

introduced into Greece have led ſome writers to aſcribe the invention of the alphabet to the Greeks: thus Voſſius, de Artc Gram. lib. i. cap. 10. aſſerts that Cecrops, who was much older than Cadmus, was the firſt author of the Greek *letters*; and others aſcribe them to Lancus or to Palamedes. Diod. Sic. lib. iii. Tacitus lib. xi. cap. 14. But the more general opinion of the ancient writers is, that they were derived from the Phœnicians and Egyptians. Diodorus lib. v. ſays expreſsly, that they were invented by the Syrians, and communicated by them to the Phœnicians, who changed the forms of the characters, brought into Europe by Cadmus. Pliny, Nat. Hiſt. lib. vii. cap. 56. ſays, that he is of opinion, that they were Aſſyrian, though he acknowledges that others thought they were invented by the Egyptians, and that Mercury was their firſt author. Diodorus, lib. ii. aſcribes the invention of them to the ſame perſon; and likewiſe Plutarch Sympoſ. lib. xi. cap. 2. and Cicero de Natura Deorum, lib. iii. And the æra of this invention is computed by chronologers to be as early as the year of the world 2054, and before the incarnation 1950 years. The Greeks retained the names and orders of ſeveral of the oriental or Cadmean *letters*, though they altered the form of them; and there are ſeven *letters*, viz. Γ, Δ, H, K, Λ, P, T, whoſe original figures were retained by the Greeks with little variation. As to the Latins, all writers agree, that they received their *letters* from the Greeks, being firſt taught the uſe of them by ſome of the followers of Pelaſgus, who came into Italy about one hundred and fifty years after Cadmus came into Greece; or by the Arcadians, whom Evander led into thoſe parts about ſixty years after Pelaſgus. Pliny, lib. vii. cap. 56. and Solinus imagined the Pelaſgi to have been the firſt authors of the Latin *letters*; but Tacitus lib. xi. p. 131. was of opinion, that the firſt Italians were taught *letters* by the Arcadians; and Dionyſius Halicarnaſſus, lib. ii. expreſsly affirms the ſame thing. That the Latin *letters* were derived from the Greek ſeems very probable from the ſimilitude which the ancient *letters* of each nation bore to one another. Tacitus, Annal. lib. xi. obſerves, that the ſhape of the Latin *letters* reſembled that of the moſt ancient Greek ones; and the ſame obſervation was made by Pliny, lib. vii. cap. 58. and confirmed from an ancient table of braſs inſcribed to Minerva. Scaliger Digreſſ. ad Annum Euſeb. 1617, and Voſſius lib. i. cap. 24, 25. have adopted and ſupported the ſame opinions. See thoſe citations in Shuckford's Conn. vol. i. p. 223, &c.

Thus we find, that Greece was the centre from which the rays of ſcience ſhot into the weſtern world; and the barbarous nations who penetrated into Italy towards the cloſe of the Roman empire, carried arts and learning back into the North; or the knowledge of *letters* might be introduced among the northren nations from the borders of Aſia in an earlier age. Sharpe's Original Powers of *Letters*. Obſervations on Alphabetical Writing, 1772. See WRITING.

Rudbeck, who, in his Atlantica, claims the glory of all inventions, from all other nations, for the Swedes, maintains, that the Ionians had letters before Cadmus; that at the time of the ſiege of Troy, the Greeks had but ſixteen *letters*, whereas the Phœnicians had twenty-two; whence he concludes, that it was not either Cadmus, or the Phœnicians, who taught this art to the Greeks. But, becauſe the ancient northern nations had juſt ſixteen *letters*, like the Greeks, he concludes, the Greeks muſt either have taught them to the people of the North, or have learnt them of them. But becauſe the form and make of the Runic *letters* is more artleſs and coarſe than that of the Greek *letters*, he concludes, that theſe laſt muſt be derived from the former; taking it as a principle, that thoſe who derive any thing from another, poliſh and improve it. He even aſſerts, that by the golden apples which Hercules was obliged to ſteal, muſt be underſtood the *letters* in uſe among the Hyperboreans.

There are few things on which there has been ſo much written as on the original Hebrews *letters*. Origen, Euſebius Cæſarienſis, St. Jerom, &c. have made it the ſubject of their enquiry. See HEBREW and SAMARITAN.

The art of joining *letters* to form words, and of combining the one and the other an infinite number of different ways, is a ſecret unknown to the Chineſe. Inſtead of the alphabetical *letters*, they at firſt, like the Egyptians, uſed hieroglyphics; they painted, rather than wrote; ſtriving, by the natural image of things drawn on paper, to expreſs and communicate their ideas to one another.

To remedy the inconveniences of this method, they changed, by little and little, their manner of writing, making it more ſimple, though leſs natural. They even invented ſeveral characters, to expreſs things that did not come within the reach of painting to repreſent: as voice, ſmell, thoughts, paſſions, and a thouſand other objects that have no body or figure. From ſeveral ſimple ſtrokes they afterwards framed others more compound; and in this manner multiplied the *letters* and characters to infinity, contriving one, or more, for every word.

This multitude of *letters* ſeems the ſource of that ignorance which we find among the Chineſe; their whole lives being ſpent in learning their *letters*, they have no time to apply themſelves to the ſtudy of things, but think themſelves very learned when they are able to read. There are ſcarce any of them that know all their *letters*; they think it is a great progreſs they have made, when, after forty or fifty years hard ſtudy, they are able to underſtand fifteen or twenty thouſand. But the generality of their learned men come ſhort of this. Father Le Compte is of opinion, that the greateſt doctor among them never underſtood half of their *letters* well; for the whole number he reckons eighty thouſand. This is a prodigious inconvenience to foreigners, of which the miſſionaries in that country make loud complaints.

Among the Chineſe *letters*, there are ſome now almoſt wore out of uſe, and only preſerved out of reſpect to antiquity. There is a ſecond claſs, much leſs ancient than the former, only uſed in public inſcriptions. A third, much more regular and beautiful, uſed in printing, and even in ordinary writing. However, as the ſtrokes are to be diſtinctly formed, they cannot be wrote with any expedition. For this reaſon, they have invented a fourth kind, where the ſtrokes, being cloſer, and leſs diſtant from each other, allow them to be writ with more eaſe and readineſs; and this they call the *running letter*. See CHINESE *tongue*.

The Americans had no *letters* before the diſcovery of that country by the Spaniards. The Acauithus engrave their memorable events and epochas on ſtones and metals; their ſongs ſupply the reſt. In Peru and Chili, to keep an account of their goods and chattels, and to preſerve the memory of their particular affairs, the Indians have recourſe to certain knots of wool; which, by the variety of their colours and ties, ſerve inſtead of characters, and writing. The knowledge of theſe knots, which they call *quipos*, is one of their great ſciences; but which is always kept as a ſecret, and never revealed to the children, till the fathers think themſelves at the end of their days.

LETTER, *dominical*. See DOMINICAL.

LETTER *double*. See DOUBLE.

LETTER, *final*. See FINAL.

LETTER, *guttural*. See GUTTURAL.

LETTER, *foundery*. See FOUNDERY.

LETTER *founders furnace*. See FURNACE.

LETTER *founders mould*. See MOULD.

LETTER *labial*. See LABIAL.

LETTERS, *numeral*, are thoſe uſed inſtead of ciphers, to expreſs numbers.

The Roman numerals are, C, D, I, L, M, V, X; which are all formed by deſcribing a circle, and drawing two lines through it, croſſing each other at right angles in the centre. See CHARACTER.

LETTER, *mundinal*. See MUNDINAL.

LETTER is alſo a writing addreſſed and ſent to one. See EPISTLE.

By 9 Geo. I. cap. 22. amended by 27 Geo. II. cap. 15. knowingly to ſend any *letter* without name, or with a fictitious name, demanding money, &c. or threatening, without any demand, to kill, or fire the houſe of any perſon, is made felony, without benefit of clergy. And by 30 Geo. II. cap. 24. perſons ſending *letters* with or without a name, or with a fictitious name, threatening to accuſe any one of a crime puniſhable by law with death, tranſportation, pillory, or any other infamous puniſhment, in order to extort money or goods, ſhall be puniſhed at the diſcretion of the court, by fine and impriſonment, pillory, whipping, or tranſportation for ſeven years.

LETTERS *of abſolution* were formerly granted by an abbot to releaſe any of his brethren from the obligation of ſubjection and obedience, and to make them capable of entering into any other religious order.

LETTER *of attorney*, in *Law*, a writing authorizing an attorney to do ſome legal act in our ſtead: as, to give ſeiſin of lands, to receive debts, to ſue a third perſon, &c. And *letters of attorney* are either general or ſpecial. Weſt. Symb. par. i. ſtat. 7 R. II. cap. 13.

The nature of this inſtrument is to give the attorney the full power and authority of the maker, to accompliſh the act intended to be performed. Sometimes theſe writings are revocable, and ſometimes not ſo; but when they are revocable, it is uſually a bare authority only; and they are irrevocable, when debts, &c. are aſſigned to another; in which caſe the word irrevocable is inſerted.

LETTERS *close*, or *cloſe*, in *Law*, are oppoſed to LETTERS *patent*. See CLOSE-*rolls*.

LETTER *of credit*, among *Merchants*. See CREDIT.

LETTERS *communicatory*. See LITERÆ *communicatoriæ*.

LETTER *of exchange*. See BILL and EXCHANGE.

LETTER *of licence*, in *Trade*, an inſtrument, or writing, granted to a man who has failed, or broke, ſigned and ſealed by his creditors; which *letter* uſually gives a longer time for payment: ſo that the debtor, having ſuch an aſſurance, may go about his buſineſs without fearing an arreſt.

LETTERS *of mart*, or *marque*, are *letters* under the privy ſeal, granted to the king's ſubjects; impowering them to take, by force of arms, what was formerly taken from them by the ſubjects of ſome other ſtate, contrary to the law of mart. See MARQUE.

LETTERS *of marque*, in the Britiſh dominions, are to be granted by the admiralty; and they empower the commander of a merchant ſhip or privateer, to cruiſe againſt and make prizes of the enemy's ſhips and veſſels, either at ſea, or in their harbours.

LETTER, *miſſive*, in the *Ritoliion of a Biſhop*. See BISHOP.

LETTER, *miſſive*, in *Chancery*. If a peer is defendant in this court, the lord chancellor ſends a *letter miſſive* to him, to requeſt his appearance, together with a copy of the bill: if he neglects to appear, then he may be ſerved with a ſubpœna; if he continues ſtill in contempt, a ſequeſtration iſſues out immediately againſt his lands and goods, without any of the meſne proceſs of attachments, &c. which are directed only againſt the perſon, and therefore cannot affect a lord of parliament. The ſame proceſs iſſues againſt a member of the houſe of commons, except that the lord chancellor does not ſend him any *letter miſſive*.

LETTERS *patent*, or *overt*, are writings ſealed with the great ſeal of England, whereby a man is authorized to do or enjoy any thing, which of himſelf he could not do. They are ſo called, on account of their form; as being open, with the ſeal affixed, ready to be ſhewn for the confirmation of the authority given by them.

Common perſons may grant *letters patent*; but they are rather called *patents*, than *letters patent*; yet, for diſtinction, thoſe granted by the king are ſometimes called *letters patent royal*.

Letters patent conclude with *teſte meipſo*; charters, with *his teſtibus*. See PATENT.

LETTERS *of reſpite*, *letters* iſſued out by a prince, in favour of honeſt, untortunate debtors, againſt too rigorous creditors, whereby payment is delayed for a certain term.

The uſe of theſe *letters* is very ancient. Caſſiodorus obſerves, they were in uſe in the time of Theodoric, king of the Goths; others will have them introduced towards the end of the eleventh century, by pope Urban II. in favour of thoſe who went on the croiſades.

They are ſtill in uſe in France, and ſome other countries, and take their name, *à reſpirando*, becauſe they give the debtor a breathing time.

St. Louis granted three years reſpite to all who made the voyage of the Holy Land with him.

LETTERS *circular*, *dimiſſory*, *frank*, *monitory*, *pacific*, *paſchal*. See the ſeveral adjectives.

LETTERS *of ſafe-conduct*. See SAFE-*conduct*.

LETTERED, *letterates*. See LITERATI.

LETTUCE, *lactuca*, in *Botany*, a genus of the *ſyngeneſia polygamia æqualis* claſs. Its characters are theſe: the flowers are compoſed of ſeveral hermaphrodite florets, incloſed in a ſcaly oblong impalement; the florets have one petal, which is ſtretched out on one ſide like a tongue, and ſlightly indented at the end in three or four parts; theſe have five ſhort hairy ſtamina; the germen afterwards becomes one oblong pointed ſeed, crowned with a ſingle down.

We have the ſeveral ſpecies of *lettuce* cultivated in the kitchen-gardens about London, all of which are excellent ſallad herbs, and ſucceed one another in their ſeveral ſeaſons. The ſeveral kinds are, 1. The common *lettuce*. 2. The cabbage-kind. 3. The Sileſia or Cilicia. 4. The Dutch-brown. 5. The Aleppo. 6. The imperial. 7. The green capuchin-*lettuce*. 8. The Verſailles, or upright white cos-*lettuce*. 9. The black cos. 10. The white cos-*lettuce*. 11. The red capuchin-*lettuce*. 12. The Roman-*lettuce*. 13 Prince-*lettuce*. 14. The royal *lettuce*, and 15. The Egyptian cos-*lettuce*.

The firſt of theſe ſorts is very common in all gardens, and is commonly ſown for cutting very young, to mix with other ſallad herbs in ſpring; and the ſecond, or cabbage-*lettuce* is only this, tended by culture. It may be ſown at all times of the year, but in the hot months requires to be ſown in ſhady borders. The cabbage-*lettuce* may alſo be ſown at different ſeaſons to have a continuation of it through the ſummer. The firſt crop ſhould be ſown in February in an open ſituation; the others, at three weeks diſtance, but the latter ones under covert, but not under the drippings of trees.

The Sileſia, imperial, royal, black, white, and upright cos-*lettuces*, may be ſown firſt in the latter end of February or the beginning of March, on a warm light ſoil, and in an open ſituation; when the plants are come up, they muſt be either hoed out, or tranſplanted into another ſpot of ground, leaving them fifteen inches diſtance apart every way. They will then require no farther care than the keeping them clear of weeds; and the black cos, as it grows large, ſhould have its leaves tied together to whiten the inner part. Succeeding crops of theſe ſhould be ſown in April, May, and June, and toward the middle of September they may be ſowed for a winter crop, to be preſerved under glaſſes, or in a bed arched over with hoops, and covered with mats: and in ſpring they ſhould be planted out in a rich light ſoil, allowing them at leaſt eighteen inches diſtance every way.

The moſt valuable of all the Engliſh *lettuces*, are the Egyptian green cos, the white cos, or the Verſailles, the Sileſia, and the black cos. The brown Dutch and the green capuchin are very hardy, and may be ſown late, under walls, where they will ſtand the winter, and be valuable, when no others are to be had. The red capuchin Roman, and prince-*lettuce*, are very early kinds, and are ſown for variety, as are alſo the Aleppo ones for the beauty of their ſpotted leaves.

The young leaves of the ſeveral varieties of garden-*lettuce* are emollient, cooling, in ſome ſmall degree laxative and aperient, eaſy of digeſtion, but of little nouriſhment; ſalubrious in hot bilious indiſpoſitions, but leſs proper in cold phlegmatic temperaments. In ſome caſes they tend to promote ſleep by virtue of their refrigerating and demulcent quality. Lewis.

The milk of the common garden *lettuces* is hypnotic, while the root of the plant is cooling, effluent, and nouriſhing. Dr. Alſton. ap. Med. Eſſ. Edinb. vol. v. art. 12.

LETTUCE, *hare's*. See *Sow's Thiſtle*.

LETTUCE, *lamb*. See VALERIAN.

LETTUCE, *wild*, *prenanthes*, in *Botany*. Its characters are theſe: it hath a ſmooth cylindrical empalement, having many ſcales, which are equal, but have three at the baſe unequal: this common empalement includes from five to eight hermaphrodite florets, diſpoſed in a ſingle round order: they have one petal, which is ſtretched out like a tongue, and indented in four parts at the end; they have five ſhort hair like ſtamina, terminated by cylindrical ſummits; the germen is ſituated under the petal, ſupporting a ſlender ſtyle longer than the ſtamina, crowned by a bifid reflexed ſtigma; the germen afterwards becomes a ſingle heart-ſhaped ſeed, crowned with hairy down. Miller enumerates four, and Linnæus nine ſpecies.

Theſe plants are ſeldom admitted into gardens, but if any perſon is deſirous to cultivate them, and will ſow the ſeeds ſoon after they are ripe in a ſhady ſituation, the plants will require no other care than to keep them clear from weeds. Miller.

LEVANDIS *militum expenſis*. See EXPENSIS.

LEVANT, in *Geography*, ſignifies any country ſituate to the eaſt of us, or the eaſtern ſide of any continent or country, or that on which the ſun riſes.

LEVANT, in *Matters of Commerce*, &c. is generally reſtrained to the Mediterranean ſea; or, rather, to the country on the eaſtern part of it.

Hence, our trade thither is called the *Levant trade*; and a wind that blows from thence, out of the Streights mouth, is called a *Levant wind*.

France was the firſt nation that made treaties of commerce with the Porte. The ſieur de la Foret ſigned them in 1535, in the name of Francis I. and thereby obtained many privileges in favour of that kingdom; which they alone enjoyed, until the Venetians, the Engliſh, the Hollanders, and at length the Genoeſe, likewiſe, obtained particular privileges for themſelves.

LEVANT, *meaſures*. See MEASURE.

LEVANT, *bole of the*. See BOLE.

LEVANT *and couchant*, in *Law*, is, when cattle have been ſo long in another man's ground, that they have laid down, and riſen again to feed, which in general is held to be one night, at leaſt.

LEVARE *antiphonum*, in the *Muſic of the Romiſh Church*, is to begin or open the firſt note of an anthem.

LEVARI *facias*, in *Law*, a writ directed to the ſheriff for levying a ſum of money on a man's lands and tenements, who has forfeited his recognizance; in virtue of which the ſheriff may ſeize all his goods, and receive the rents and profits of his lands, till ſatisfaction be made to the plaintiff: but this writ has now given way to the remedy by ELEGIT. There is alſo a *levari facias damna diſſeiſitoribus*, for the levying of damages, wherein the diſſeiſor has been formerly condemned to the diſſeiſee; and alſo a *levari facias reſiduum debiti*, to levy the remainder of a debt upon lands and tenements, or chattels of the debtor, where part has been ſatisfied before. And further, a *levari facias quando vicecomes returnavit quod non habuit emptores*, commanding the ſheriff to ſell the goods of the debtor

debtor which he has taken, and returned that he could not ſell.

LEVATIO *arietum*. See ARIETUM.

LEVATOR, in *Anatomy*, an epithet which anatomiſts give to ſeveral muſcles, whoſe uſe is to riſe, or lift up, the parts to which they belong. See ELEVATOR.

There are *levators* of the eye-lids, of the omoplate, of the anus, of the ſcapula, &c.—See *Tab. Anat. (Myol.) fig.* 2. *n.* 3.

LEVATORES *ani*, in *Anatomy*. Theſe muſcles ariſe fleſhy from each ſide of the oſſa pubis, internally within the pelvis; as alſo from part of the os ſchium and ſacrum. From theſe places like lines drawn from a circumference toward a centre, their fibres deſcend over the muſculi maſſupiales, to their implantation at the lower end of the inteſtinum rectum in the anus. The uſe of theſe muſcles is principally to ſuſpend and draw the anus upward, leſt the fæces ſhould be burthenſome to the ſphincter. In their deſcent on each ſide forward, from the oſſa pubis, they paſs cloſely over the glandulæ proſtatæ, in a manner embracing them: by which mechaniſm they are rendered capable of compreſſing them; and by a retraction of the anus, at the ſame time act on the veſiculæ ſeminales, in order to promote the emiſſion of the ſeminal juices in coition.

LEVATOR *coccygis*, in *Anatomy*, a name given by many to the muſcle, now generally known by the name of COCCYGÆUS.

LEVATORES *breviores coſtarum*, in *Anatomy*, the modern name introduced by Albinus for certain muſcles of the ribs, called by others the *ſupracoſtales*, the *ſur coſtaux* of the French, and the *ſcaleni quarti* by ſome. Steno was the firſt who called them *levatores coſtarum*, from their office: he is followed in this by Morgagni and Albinus, who, adding the word *breviores*, by way of diſtinction from ſome other longer ones, called *ſupracoſtales longi* by authors, have formed the modern name.

LEVATOR *internus*, in *Anatomy*, a name given by Douglas, and ſome others, to a muſcle, now generally called only the *levator ani*.

LEVATOR *labii ſuperioris*, in *Anatomy*, a name given by Albinus to a muſcle, called by Santorini and Winſlow the *inciſorius*, and by Cowper the ELEVATOR *labii ſuperioris*, and by Spigelius *alas noſi abducens*.

LEVATOR *menti*, in *Anatomy*, a name given by Albinus to a muſcle of the face, called by Cowper and others ELEVATOR *labii inferioris*, and by ſome the INCISIVUS *inferior*.

LEVATOR *palpebræ ſuperioris*, in *Anatomy*, a name given by Albinus to a muſcle of the face, called by Cowper, Douglas, and the generality of writers, *aperiens palpebram* and APERIENS *palpebram rectus*.

LEVATOR *proſtatæ*, in *Anatomy*, a name given by Santorini, and ſome others, to a muſcle, called by Winſlow, *proſtaticus ſuperior*, and by Albinus *compreſſor proſtatæ*.

LEVATOR *ſcapulæ propriur*, in *Anatomy*, a long and pretty thick muſcle, about two fingers in breadth, lying above the ſuperior angle of the ſcapula, along the poſterior lateral part of the neck of that bone. It is inſerted above, in the extremities of the tranſverſe apophyſes of the four firſt vertebræ of the neck by four fleſhy branches, ending in ſhort tendons. Sometimes the ſecond, ſometimes the third, or both; and ſometimes the third of theſe branches is wanting, theſe defects being made up by the largeneſs of the reſt: from thence theſe branches run down a little obliquely, and then uniting together, they are inſerted in the ſuperior angle of the ſcapula, and in the edge of its baſis from thence to the ſmall triangular ſpace, being there covered a little by the rhomboides. This muſcle is eaſily divided into two through its whole length. It is covered by the trapezius, and its inſertions in the neck are ſometimes mixed with thoſe of the neighbouring muſcles. Winſlow.

LEVATUM. See TERRIS *& Catalis tentis ultra debitum*.

LEUCACANTHA, in *Botany*, a name uſed by Dioſcorides and the other Greek writers, for the acacia tree, which produces the gum arabic, but it was alſo uſed for a kind of prickly plant, called alſo AMGAILA by ſome of the Arabians; as being a plant whoſe roots were knotted and jointed. Theſe joints were ſeparated and dried, and then uſed in medicine as cardiacs and carminatives, under the names of BUNE or *bunion*. They were of a very agreeable aromatic ſmell, and very little taſte; and the ancients always preferred ſuch of them as were yellow and light, rejecting thoſe which were heavy and white, and which wanted ſmell. It is not well known at this time what theſe roots were; but it is neceſſary, in order to the right underſtanding the works of the ancients, to know that there were ſuch roots; and that though called by the ſame name with the gum arabic tree, they were of a very different nature.

LEUCACHATES, in *the Natural Hiſtory of the Ancients*, the name of an agate, not a peculiar ſpecies, but only a particular appearance of the lead-coloured agate called PHASISACHATES.

LEUCADENDRON, in *Botany*, a genus of the *tetrandria monogynia* claſs: the corolla of which is floſculous, conſiſting of two petals, joined to another which is trifid: the receptacle is hairy; this genus has no proper calyx, and the antheræ are connected at their baſe. Linnæus enumerates ſixteen ſpecies.

LEUCANTHEMUM, in *Botany*. See DAISY and *Corn* MARYGOLD.

LEUCELECTRUM, a name given by ſome authors to that ſort of AMBER, which is white and opake, and uſually of a fatty look.

LEUCIŚCUS, in *Ichthyology*. See DACE.

LEUCOCROTTA, in *Natural Hiſtory*, the name given by many authors to a beaſt, ſuppoſed to be the ſwifteſt of all creatures in the world: others have called it *leucocrotta*, but the true name is LEUCROCOTTA.

LEUCODENDROS, in *Botany*, a name given to the SILVER PINE-*tree*.

LEUCOGÆA, in *Natural Hiſtory*, a name by which ſome authors have called the ſubſtance, more uſually known by the name of MOROCHTHUS, and called in Engliſh, French chalk, or Briançon chalk.

LEUCOGRAPHIS, in *Natural Hiſtory*, the name uſed by ſome of the ancient writers, for the ſubſtance commonly called MOROCHTHUS, or *French chalk*.

LEUCOIUM, in *Botany*. See *Great* SNOW *Drop*.

LEUCOIUM *ſudeum & luteum*. See STOCK *Gilly Flower*.

LEUCOIUM *bulboſum*. See SNOW-*Drop*.

LEUCOLIBANON, in the *Materia Medica of the Ancients*, a name given to the white olibanum, or FRANKINCENSE, which they carefully diſtinguiſh from the reddiſh or yellowiſh olibanum. This was alſo called *argelibanum*, or the ſilver-coloured olibanum; and the yellow one *chalcelibanum*. This latter word is uſed in the Apocalypſe of St. John, and is miſunderſtood ſo far as to be tranſlated braſs, and ſuppoſed to be a kind of braſs from mount Lebanon. See CHALCOLIBANON.

LEUCOLITHOS, in *Natural Hiſtory*, a name given by ſome of the Greek writers to the *pyrites argenteus*, or ſilvery PYRITES. The ancients had a great opinion of theſe foſſils in diſeaſes of the eyes; they uſed all the kinds of pyrites, or marcaſite, after calcination, for this purpoſe; but as they diſtinguiſhed four kinds of them, they attributed theſe virtues, in different degrees, to the different kinds; therefore they had recourſe to ſo many peculiar names for diſtinguiſhing them; and the white kind was called *leucolithos*, to diſtinguiſh it from the duſky one called the *iron pyrites*, and the deeper and paler yellow kinds, called the *gold* and *braſſy marcaſites*.

LEUCOMA, Λευκωμα, among the Athenians, ſignified a public regiſter of the whole city, in which were written the names of all the citizens, as ſoon as they came to be of age to enter upon their paternal inheritance.

LEUCOMA, Λευκωμα, from λευκος, *white*, in *Surgery*, a little white ſpot on the cornea of the eye; called by the Latins ALBUGO.

LEUCOMÆNAS, in *Ichthyology*, a name by which ſome have called the SMARIS, a ſmall fiſh caught in great plenty in the Mediterranean.

LEUCÓ *narciſſi lirion*. See SNOW-*Drop*.

LEUCOPETALOS, in *Natural Hiſtory*, the name of a beautiful ſtone deſcribed by Pliny, as being of a fine gold yellow, variegated with white.

LEUCOPETRIANS, in *Eccleſiaſtical Hiſtory*, the name of a fanatical ſect which ſprung up in the Greek and Eaſtern churches towards the cloſe of the twelfth century: the fanatics of this denomination profeſſed to believe in a double Trinity, rejected wedlock, abſtained from fleſh, treated with the utmoſt contempt the ſacraments of baptiſm and the Lord's ſupper, and all the various branches of external worſhip, placed the eſſence of religion in internal prayer alone, and maintained, as it is ſaid, that an evil being, or genius, dwelt in the breaſt of every mortal, and could be expelled from thence by no other method than by perpetual ſupplication to the ſupreme Being. The founder of this enthuſiaſtical ſect, is ſaid to have been a perſon called Leucopetrus, and his chief diſciple Tychicus, who corrupted, by fanatical interpretations, ſeveral books of ſcripture, and particularly St. Matthew's goſpel. Moſheim

LEUCOPHAGIUM, a name given by ſome phyſicians to a ſort of medical aliment good in conſumptions, and other general decays. It is compoſed of ſweet almonds macerated in roſe-water, with the tender fleſh of a capon, all being finally boiled together to a pulp, capable of being paſſed through a ſieve.

LEUCOPHLEGMATIA, Λευκοφλεγματια, formed from λευκος, *white*, and φλεγμα, *pituita, phlegm*, a kind of dropſy, otherwiſe called ANASARCA.

The *leucophlegmatia* conſiſts in a tumor, or bloating, of the whole outer ſurface of the body, or ſome of its parts; white and ſoft, eaſily giving way to the touch, and pre-

ſerving the impreſſion made by the finger for ſome time. It may either be owing to ſome diſorder of the blood; which, in this diſeaſe, is of a pale colour, viſcid, and cold; or to an aqueous humour extravaſated, and gathered together in the muſcles, and the pores of the ſkin. See DROPSY.

LEUCOPIPER, in the *Materia Medica*, a name by which ſome authors have diſtinguiſhed the white pepper.

LEUCORHŒA, a name given by ſome medical writers to the whites, or FLUOR *albus*, a very troubleſome diſeaſe to women.

LEUCORODIUS, in *Ornithology*, a name by which ſome have called the platea, or SPOONBILL, a very remarkable kind of ſtork or heron.

LEUCOSTAPHYLOS, in *Botany*, a name given by ſome authors to the water-elder, or opulus.

LEVEL, an inſtrument wherewith to draw a line parallel to the horizon, and continue it out at pleaſure; and, by this means, to find the true *level*, or the difference of aſcent or deſcent, between ſeveral places, for conveying water, draining fens, &c.

The word comes from the Latin *libella*, the croſs beam that forms the brachia of a balance; which, to be juſt, muſt ſtand horizontally.

There are ſeveral inſtruments, of different contrivance and matter, invented for the perfection of *levelling*; all of which, for the practice, may be reduced to theſe that follow.

LEVEL, *air*, that which ſhews the line of *level*, by means of a bubble of air, incloſed with ſome liquor in a glaſs tube of an indeterminate length and thickneſs, whoſe two ends are ſealed hermetically, that is, are cloſed with the glaſs itſelf, by heating it with the flame of a lamp, till it becomes ſoft and tractable. When the bubble of air fixes itſelf at a certain mark, made exactly in the middle of the tube, the plane, or ruler, wherein it is fixed, is *level*. When it is not *level*, the bubble will riſe to one end.

This glaſs tube may be ſet in another of braſs, having an aperture in the middle, whence the bubble of air may be obſerved.

The liquor wherewith the tube is filled, is ordinarily either oil of tartar, or aqua fecunda; thoſe not being liable to freeze as common water; nor to rarefaction and condenſation, as ſpirit of wine is.

The invention of this inſtrument is aſcribed to M. Thevenot.

LEVEL, *air, with ſights*, is an improvement of that laſt deſcribed; which, by the addition of more apparatus, becomes more commodious and exact.

It conſiſts of an *air-level* (*Tab. Surveying, fig.* 13) about eight inches long, and ſeven or eight inches in diameter, ſet in a braſs tube, with an aperture in the middle. The tubes are carried in a ſtrong, ſtrait ruler, a foot long, at whoſe ends are fixed two ſights, exactly perpendicular to the tubes, and of an equal height, having a ſquare hole, formed by two fillets of braſs, croſſing each other at right angles; in the middle whereof is drilled a very little hole, through which a point on a *level* with the inſtrument is deſcried. The braſs tube is faſtened on the ruler by means of two ſcrews; one whereof, marked 4, ſerves to raiſe or depreſs the tube at pleaſure, for bringing it towards a *level*. The top of the ball and ſocket is riveted to a little ruler that ſprings; one end whereof is faſtened with ſcrews to the great ruler, and the other end has a ſcrew 5, ſerving to raiſe and depreſs the inſtrument, when nearly *level*.

This inſtrument is yet leſs commodious than the following one; becauſe, though the holes be ever ſo ſmall, yet they will ſtill take in too great a place to determine the point of *level* preciſely.

LEVEL, *air, with teleſcope ſights*. This *level*, repreſented in *Tab. Surveying, fig.* 14. is like the laſt; with this difference, that, inſtead of plain ſights, it carries a teleſcope to determine exactly a point of *level* at a good diſtance.

The teleſcope is in a little braſs tube, about fifteen inches long, faſtened on the ſame rule as the *level*. At the end of the tube of the teleſcope marked 1, enters the little tube 1, carrying the eye-glaſs, and a hair horizontally placed in the focus of the object-glaſs 2; which little tube may be drawn out, or puſhed into the great one, for adjuſting the teleſcope to different ſights. At the other end of the teleſcope is placed the object-glaſs; the ſcrew 3 is for raiſing or lowering the little fork carrying the hair, and making it agree with the bubble of air when the inſtrument is *level*; and the ſcrew 4 is for making the bubble of air agree with the teleſcope. The whole is fitted to a ball and ſocket.

M. Huygens is ſaid to have been the inventor of this *level*; which has this advantage, that it may be inverted, by turning the ruler and teleſcope half round; and if then, the hair cut the ſame point that it did before the turn, it is a proof the operation is juſt.

It may be obſerved, that one may add a teleſcope to any kind of *level*, by applying it upon, or parallel to, the baſe, or ruler, when there is occaſion to take the *level* of remote objects.

For the method of adapting a *level* to the meridian teleſcope. See TELESCOPE.

Mr. Hadley has contrived a ſpirit *level* to be fixed to a quadrant for taking a meridional altitude at ſea, when the horizon is not viſible. See the deſcription and figure of it in the Phil. Tranſ. N° 330, p. 167, &c. or Martyn's Abridg. vol. viii. p. 358, &c. See alſo the method of preparing and uſing a water *level*, and a mercurial *level*, annexed to Davis's quadrant, for the ſame purpoſe, by Mr. Leigh, in Phil. Tranſ. N° 451. p. 413. or Abr. vol. viii. p. 360, &c.

LEVEL, *foot*. See FOOT-*level*.

LEVEL, *artillery-foot*, is in form of a ſquare, having its two legs or branches, of an equal length; at a juncture whereof is a little hole, whence hangs a thread and plumbet, playing on a perpendicular line in the middle of a quadrant: it is frequently divided into 90 degrees, or rather into twice 45 degrees from the middle. See *fig.* 18. *lit.* F.

This inſtrument may be uſed on other occaſions, by placing the end of its two branches on a plane; for when the thread plays perpendicularly over the middle diviſion of the quadrant, that plane is allowedly *level*.

To uſe it in gunnery, place the two ends on the piece of artillery, which you may raiſe to any propoſed height by means of the plumbet, whoſe thread will give the degree above the *level*.

LEVEL, *carpenters and paviors*, conſiſts of a long ruler, in the middle whereof is fitted, at right angles, another ſomewhat bigger, at the top of which is faſtened a line with a plumbet; which, when it hangs over a fiducial line at right angles with the baſe, ſhews that the ſaid baſe is horizontal.

This and the maſon's *level*, though very common, are eſteemed the beſt for the practice of building, though the operations by them can only be *ſhort*.

LEVEL, *gunners*, for levelling cannons and mortars, is an inſtrument repreſented *Tab. Surveying, fig.* 16. conſiſting of a triangular braſs plate, about four inches high: at the bottom of which is a portion of a circle, divided into 45°, which number is ſufficient for the higheſt elevation of cannons and mortars, and for giving ſhot the greateſt range. On the centre of this ſegment of a circle is ſcrewed a piece of braſs, by means whereof it may be fixed, or moved, at pleaſure. The end of this piece of braſs is made ſo as to ſerve for a plumbet and index, in order to ſhew the different degrees of elevation of pieces of artillery. This inſtrument has alſo a braſs foot to ſet upon cannon or mortars, ſo as when thoſe pieces are horizontal, the whole inſtrument will be perpendicular.

The uſe of this *level* is obvious; and conſiſts in placing the foot thereof on the piece to be elevated; in ſuch manner as that the point of the plumbet may fall on the proper degree: this is what they call *levelling* the piece.

LEVEL, *maſon*, is compoſed of three rules, ſo joined as to form an iſoſceles triangle, ſomewhat like a Roman A; at the vertex whereof is faſtened a thread, from which hangs a plumbet, which paſſes over a fiducial line marked in the middle of the baſe, when the thing to which the *level* is applied is horizontal; but declines from the mark when the thing is lower on one ſide than the other.

LEVEL, *plumb*, or *pendulum*, that which ſhews the horizontal line, by means of another line perpendicular to that deſcribed by its plumbet, or pendulum.

This inſtrument, repreſented *Tab. Surveying, fig.* 18. conſiſts of two legs, or branches, joined together at right angles; whereof that which carries the thread or plumbet is about a foot and an half long. This thread is hung towards the top of the branch, at the point 2. The middle of the branch where the thread paſſes is hollow, that ſo it may hang free every where but towards the bottom, where there is a little blade of ſilver, whereon is drawn a line perpendicular to the teleſcope. The ſaid cavity is covered by two pieces of braſs, making, as it were, a kind of caſe, leſt the wind ſhould agitate the thread; for which reaſon the ſilver blade is covered with a glaſs G, to the end that it may be ſeen when the thread and plumbet play upon the perpendicular. The teleſcope 1 is faſtened to the other branch, or leg, of the inſtrument, and is about two feet long, having a hair placed horizontally acroſs the focus of the object-glaſs, which determines the point of *level*, when the ſtring and plumbet hang againſt the line on the ſilver blade.

All the accuracy of this inſtrument depends on the teleſcope's being fitted at right angles to the perpendicular. It has a ball and ſocket, by which it is faſtened to its foot; and is ſaid to have been the invention of M. Picard.

LEVEL, *reflecting*, is that made by means of a pretty long ſurface of water, repreſenting the ſame object inverted, which we ſee erect by the eye; ſo that the point where thoſe two objects appear to meet, is in a *level* with the place where the ſurface of water is found. This is the invention of M. Mariotte.

There is alſo another *reflecting level*, conſiſting of a mirror of ſteel, or the like, well poliſhed, and placed a little before the object-glaſs of a teleſcope ſuſpended perpendicularly. This mirror muſt make an angle of 45 degrees with the teleſcope; in which caſe, the perpendicular line of the ſaid teleſcope is converted into a horizontal line; which is the ſame with the line of *level*. The invention of this is owing to M. Caſſini.

LEVEL, *water*, that which ſhews the horizontal line by means of a ſurface of water, or other liquid; founded on this principle, that water always naturally places itſelf *level*.

The moſt ſimple is made of a long wooden trough, or canal, whoſe ſides are parallel to its baſe; ſo that being equally filled with water, the ſurface thereof ſhews the line of *level*. This is the chorobates of the ancients, deſcribed by Vitruvius, lib. viii. cap. 6.

This ſort of *level* is alſo made with two cups fitted to the two ends of a pipe three or four feet long, about an inch in diameter; by means whereof the water communicates from the one to the other cup: and this pipe being moveable on its ſtand, by means of a ball and ſocket, when the two cups become equally full of water, their two ſurfaces mark the line of *level*.

This inſtrument, inſtead of cups, may alſo be made with two ſhort cylinders of glaſs, three or four inches long, faſtened to each extreme of the pipe with wax, or maſtic. Into the pipe is filled ſome common or coloured water, which ſhews itſelf through the cylinders; by means whereof the line of *level* is determined: the height of the water with reſpect to the centre of the earth, being always the ſame in both cylinders. This *level*, though very ſimple, is yet very commodious for levelling ſmall diſtances.

LEVEL *of Mr. Huygens's Invention* conſiſts of a teleſcope, *A* (*Tab. Surveying fig.* 17.), in form of a cylinder; going through a ferril, in which it is faſtened by the middle. This ferril has two flat branches, *b b*, one above, and the other below; at the ends whereof are faſtened little moving pieces, which carry two rings, by one of which the teleſcope is ſuſpended to a hook at the end of the ſcrew 3; and by the other, a pretty heavy weight is ſuſpended, in order to keep the teleſcope in equilibrio. This weight hangs in the box 5, which is almoſt filled with ſtoned oil, oil of walnuts, or other matter that will not eaſily congulate, for more aptly ſettling the balance of the weight and teleſcope. The inſtrument carries two teleſcope, cloſe and very parallel to each other, the eye-glaſs of the one being againſt the object-glaſs of the other, that one may ſee each way without turning the *level*. In the focus of the object-glaſs of each teleſcope, muſt a little hair be ſtrained horizontally, to be raiſed or lowered as occaſion requires, by a little ſcrew. If the tube of the teleſcope, be not found level when ſuſpended, a ferril, or ring, 4, is put on it, and is to be ſlid along till it ſixes to a *level*. The hook on which the inſtrument is hung, is fixed to a flat wooden croſs; at the ends of each arm whereof there is a hook, ſerving to keep the teleſcope from too much agitation in uſing, or in carriage. To the ſaid flat croſs is applied another hollow croſs, that ſerves as a caſe for the inſtrument; but the two ends are left open, that the teleſcope may be ſecured from the weather, and always in a condition to uſe. The foot of this inſtrument is a round braſs plate, to which are faſtened three braſs ferrils, moveable by means of joints, wherein are put ſtaves: and on this foot is placed the box.

LEVELLING, the art or act of finding a line parallel to the horizon, at one or more ſtations, in order to determine the height of one place with reſpect to another; for the laying grounds even, regulating deſcents, draining moraſſes, conducting waters, &c.

One place is ſaid to be higher than another, or *out of level* with it, when it is more remote from the centre of the earth; and a line equally diſtant from the centre of it in all its points, is called the *line of true level*: whence becauſe the earth is round, that line muſt be a curve, and make a part of the earth's circumference, or an arch concentrical with it, as the line BCFG, *Tab. II. Surveying, fig.* 21. all the points whereof are equally diſtant from the centre of the earth *A*.

But the line of ſight, which the operations of levels give, is a tangent, or a right line perpendicular to the ſemidiameter of the earth; one extreme of which tangent being the point of contact, the other will be that of a ſecant drawn from the centre of the earth: and the point which determines it, will be above the ſurface of the earth, and of the true *level*, as much as that ſecant exceeds the radius, or ſemidiameter of the earth.

This extremity of the tangent is ſaid to be in the *apparent level*; as being that given by the ſight; but is eaſily reduced to the *true level*, becauſe we know, by trigonometry, how much each ſecant exceeds the radius; and becauſe, by meaſuring, we have diſcovered the preciſe length of that radius. Or, ſince the apparent *level* between the places B and C is BD, and the true *level* is the arc BC; it is plain that the former riſes above the latter by the line CD. But by a well-known property of the circle $2AC + CD \times CD = BD^2$, and the diameter of the earth being ſo great with reſpect to the line CD at all diſtances to which the operation of *levelling* commonly extends that 2 AC may be ſafely taken for 2 AC + CD without any ſenſible error, we ſhall have $2AC \times CD = BD^2$, and $CD = \frac{BD^2}{2AC}$ i.e. the difference between the true and apparent level is equal to the ſquare of the diſtance between the places divided by the diameter of the earth, or the riſe of the apparent above the true level is proportional to the ſquare of the diſtance. It was for want of the knowledge of this, that the ancients were not able to reduce the apparent level to the true one; and accordingly, to prevent falling into an error, never levelled above 20 feet at once, where ſuch reduction was not neceſſary.

By the table ſince made, it appears, that at the diſtance of 100 yards the apparent level is raiſed above the true one about one third of a line: ſo that the ancients, in this reſpect, were more ſcrupulous than needful. By means of this reduction, we are now able to level diſtances of one or two miles, at a ſingle operation, which the ancients could not do in leſs than three hundred.

The following table, for ſhewing the height of the apparent level above the true, was calculated by Mr. Ferguſon, to the extent of a whole degree of a great circle on the earth's ſurface; and it agrees ſo nearly with one of the ſame ſort in Dr. Long's Aſtronomy, as not to differ quite two inches therefrom at the end of the whole degree, which contains 60 geographical miles, equal to 69½ Engliſh miles. The uſe of this table is as follows:

If the quantity of an arc of a great circle on the earth's ſurface is given, in minutes or ſeconds of a degree, its meaſure may be found in feet and inches. Thus, ſuppoſe the arc contains 10 ſeconds, which is the ſixth part of a geographical mile, its meaſure is 1015 feet 8 inches. So an arc of one minute of a degree, which is one geographical mile, contains 6094 feet, or 2031 yards 1 foot; which is 171 yards 1 foot longer than an Engliſh mile. To find how far one can ſee in a true horizon (as at ſea) when the eye is raiſed to any given height above the horizon. Suppoſe the eye of an obſerver upon a ſhip at ſea to be 22 feet 2 inches above the ſurface of the water, he will then ſee 30470 feet all around him, or to the diſtance of 5 geographical miles.

Suppoſe the top of a mountain in the ſea to be ſeen at the diſtance of 60 geographical miles, or 1 degree, by an obſerver, whoſe eye is cloſe at the ſurface of the ſea; the height of that mountain is 3191 feet 1 inch, nearly, above the ſurface of the ſea. An Engliſh mile is 5280 feet, a geographical mile 6094.

Suppoſe a ſpring to be on one ſide of a hill, and a houſe on an oppoſite hill, with a valley between them; and that the ſpring, ſeen from the houſe, appears by a *levelling* inſtrument to be on a level with the foundation of the houſe, and is a mile from it; the apparent level of the ſpring is $10\frac{7}{10}$ inches above the true level of the houſe; and this difference would be ſufficient for the water to be brought in pipes from the ſpring to the houſe; the pipes being laid all the way in the ground.

If the diſtance of the object be greater than 60 minutes, or geographical miles, its height above the true level may be found thus. Suppoſe an eye at the ſurface of the ſea ſees the top of a mountain, which he knows to be 90 geographical miles, or a degree and a half, diſtant from him: take half that number of miles, and multiply the height of the apparent level above the true, anſwering to that half diſtance, by 4; and the product will give the perpendicular height of that mountain. Thus, the half of 90 is 45, againſt which (in the table) ſtands 1704 feet 11.763 inches; which being multiplied by 4, gives 7179 feet 11 inches for the perpendicular height of the mountain above the level of the ſea.

According to theſe meaſures, the earth's circumference is 131,650,400 feet, or 24,930 Engliſh miles.

At the diſtance of 1 ſecond of a degree (or $\frac{1}{60}$ of a geographical mile) the height of the apparent LEVEL above the true is .0020547 parts of an inch; at 2 ſeconds diſtance it is 4 times as much; at 3 ſeconds, 9 times; at 4 ſeconds, 16 times as much; and ſo on, always increaſing in proportion to the ſquare of the diſtance.

A TABLE shewing the height of the apparent level above the true, at any diſtance within a degree of a great circle on the earth's ſurface; calculated to the 1000th part of an inch.

Degrees	Feet	Inches	Inches	Minutes	Feet	Feet	Inches
1	101	0,8	0,003	1	6044	0	10,857
2	203	3,6	0,012	2	12088	1	0,856
3	304	8,4	0,027	3	18132	1	11,734
4	406	1,1	0,047	4	24176	2	10,591
5	507	10,0	0,074	5	30220	3	9,429
6	609	4,8	0,106	6	36264	4	8,250
7	710	11,6	0,144	7	42308	5	7,053
8	812	6,4	0,189	8	48352	6	5,839
9	914	1,2	0,239	9	54396	7	4,608
10	1015	8,0	0,295	10	60440	8	3,360
11	1117	2,8	0,357	11	66484	9	2,096
12	1218	9,6	0,425	12	72528	10	0,815
13	1320	4,4	0,499	13	78572	11	11,518
14	1421	11,2	0,578	14	84616	12	10,205
15	1523	6,0	0,663	15	90660	13	8,876
16	1624	0,8	0,754	16	96704	14	7,532
17	1726	7,6	0,850	17	102748	15	6,172
18	1828	2,4	0,952	18	108792	16	4,796
19	1929	9,2	1,057	19	114836	17	3,405
20	2031	4,0	1,170	20	120880	18	1,998
21	2132	10,8	1,288	21	126924	19	0,576
22	2234	5,6	1,412	22	132968	20	11,139
23	2336	0,4	1,542	23	139012	21	9,687
24	2437	7,2	1,676	24	145056	22	8,220
25	2539	2,0	1,817	25	151100	23	6,738
26	2640	8,8	1,963	26	157144	24	5,241
27	2742	3,6	2,114	27	163188	25	3,729
28	2843	10,4	2,271	28	169232	26	2,202
29	2945	5,2	2,435	29	175276	27	0,660
30	3047	0,0	2,604	30	181320	28	11,103
31	3148	6,8	2,779	31	187364	29	9,531
32	3250	1,6	2,960	32	193408	30	7,944
33	3351	8,4	3,146	33	199452	31	6,342
34	3453	3,2	3,338	34	205496	32	4,725
35	3554	10,0	3,536	35	211540	33	3,093
36	3656	4,8	3,739	36	217584	34	1,446
37	3757	11,6	3,948	37	223628	35	9,784
38	3859	6,4	4,163	38	229672	36	8,107
39	3960	1,2	4,384	39	235716	37	6,415
40	4062	8,0	4,610	40	241760	38	4,708
41	4164	2,8	4,843	41	247804	39	2,986
42	4265	9,6	5,081	42	253848	40	1,249
43	4367	4,4	5,325	43	259892	41	9,497
44	4468	11,2	5,576	44	265936	42	7,731
45	4570	6,0	5,832	45	271980	43	5,950
46	4671	0,8	6,095	46	278024	44	4,154
47	4773	7,6	6,363	47	284068	45	2,343
48	4875	2,4	6,638	48	290112	46	0,517
49	4976	9,2	7,919	49	296156	47	10,676
50	5078	4,0	7,207	50	302200	48	8,820
51	5179	10,8	7,501	51	308244	49	6,949
52	5281	5,6	7,802	52	314288	50	5,063
53	5382	0,4	8,109	53	320332	51	3,162
54	5484	7,2	8,423	54	326376	52	1,246
55	5586	2,0	8,743	55	332420	53	9,315
56	5687	8,8	9,070	56	338464	54	7,369
57	5789	3,6	9,403	57	344508	55	5,408
58	5890	10,4	9,743	58	350552	56	3,432
59	5992	5,2	10,089	59	356596	57	1,441
60	6093	0,0	10,441	60	362640	58	9,435

To find the diſtance of any object from the place of the ſpectator by obſervation.

Meaſure a baſe line, and obſerve the angle which it ſubtends to the object, as directed in a great circle plus the earth, amounts to the height of the ſpectator's eye above the ſurface of the earth.

If the diſtance of the object from the place of the ſpectator be

Feet	Inches	Inches
1000	0,8	0,003
2000	1,6	0,012
3000	2,4	0,027
4000	3,2	0,047
5000	4,0	0,074
6000	4,8	0,106
7000	5,6	0,144
8000	6,4	0,189
9000	7,2	0,239
10000	8,0	0,295
11000	8,8	0,357
12000	9,6	0,425
13000	10,4	0,499
14000	11,2	0,578
15000	12,0	0,663
16000	12,8	0,754
17000	13,6	0,850
18000	14,4	0,952
19000	15,2	1,057
20000	16,0	1,170
21000	16,8	1,288
22000	17,6	1,412
23000	18,4	1,542
24000	19,2	1,676
25000	20,0	1,817
26000	20,8	1,963
27000	21,6	2,114
28000	22,4	2,271
29000	23,2	2,435
30000	24,0	2,604
31000	24,8	2,779
32000	25,6	2,960
33000	26,4	3,146
34000	27,2	3,338
35000	28,0	3,536
36000	28,8	3,739
37000	29,6	3,948
38000	30,4	4,163
39000	31,2	4,384
40000	32,0	4,610
41000	32,8	4,843
42000	33,6	5,081
43000	34,4	5,325
44000	35,2	5,576
45000	36,0	5,832
46000	36,8	6,095
47000	37,6	6,363
48000	38,4	6,638
49000	39,2	6,919
50000	40,0	7,207
51000	40,8	7,501
52000	41,6	7,802
53000	42,4	8,109
54000	43,2	8,423
55000	44,0	8,743
56000	44,8	9,070
57000	45,6	9,403
58000	46,4	9,743
59000	47,2	10,089
60000	48,0	10,441

the diſtance of the object from the place of the ſpectator is

which is reduced to a great circle plus the earth, amounts to the height of the ſpectator's eye above the ſurface of the earth.

Fergufou's Tables and Tracts, p. 243, &c. See DEPRESSION *of the horizon*.

The operation of *levelling* is as follows: ſuppoſe the height of the point A (*Tab.* II. *Surveying*, *fig.* 22), on the top of a mountain, above that of the point B, and at the foot thereof, required: place the level about the middle diſtance, between the two points, as in D, and ſtaffs in A and B; and let there be perſons inſtructed with ſignals for raiſing and lowering, on the ſaid ſtaffs, little marks of paſteboard, or other matter. The level being placed horizontally by the bubble, &c. look towards the ſtaff A E, and cauſe the mark to raiſed to be lowered, till the middle, upper edge, or other moſt conſpicuous part, appear in the viſual ray. Then meaſuring exactly the perpendicular height of the point E, above the point A, which ſuppoſe 6 feet 4 inches, ſet that down in your book: then turn the level horizontal about, that the eye-glaſs of the teleſcope may be ſtill next the eye when you look the other way (if you have only plain ſights, the inſtrument need not be turned); and cauſe the perſon at the ſtaff B to raiſe or lower his mark, till ſome conſpicuous part of it fall in the viſual ray, as at C; then meaſure the perpendicular height of C above B, which ſuppoſe 16 feet, 16 inches: ſet this alſo down in the book above the other number of the firſt obſervation; ſubtract the one from the other, the remainder will be ten feet four inches, which is the difference of level between A and B, or the height of the point A above the point B.

Note. If the point D, where the inſtrument is fixed, be in the middle between the two points A and B, there will be no neceſſity for reducing the apparent level to the true level; the viſual ray, in that caſe, being raiſed equally above the true level.

If it be further required to know whether there be a ſufficient deſcent for conveying water from the ſpring A, to the point B, *Tab.* II. *Surveying*, *fig.* 23.—Here, in regard the diſtance from A to B is conſiderable, it is required that ſeveral operations be made. Having then choſen a proper place for the firſt ſtation as at I, ſet up a ſtaff in the point A, near the ſpring, with a proper mark to ſlide up and down the ſtaff, as L; and meaſure the diſtance from A to I, which ſuppoſe 2000 yards. Then the level being adjuſted in the point I, let the mark L be raiſed and lowered till ſuch time as you ſpy ſome conſpicuous part of it through the teleſcope, or ſights of the level, and meaſure the height A L, which ſuppoſe 13 feet 5 inches. But in regard the diſtance A I is 2000 yards, you muſt have recourſe to your table for a reduction, ſubtracting 10 inches 3 lines, which will leave the height A L, 12 feet 6 inches 9 lines; and this note down in your book. Now turn the level horizontally about, ſo as the eye-glaſs of the teleſcope may be towards the ſtaff at A; and fixing up another ſtaff at H, cauſe the mark G to be moved up and down, till you ſpy ſome conſpicuous part through the teleſcope, or ſights. Meaſure the height H G, which ſuppoſe 6 yards, 4 feet, 2 inches. Meaſure likewiſe the diſtance of the points I H, which ſuppoſe 1300 yards; for which diſtance, according to the table, 4 inches 3 lines muſt be ſubtracted from the height H G, which conſequently will but leave 6 yards, three feet, 9 inches, 9 lines, to be taken down in your book.

This done, remove the level forwards to ſome other eminence, as E, whence the ſtaff H may be viewed; as alſo another ſtaff at D, near the place where the water is to be conveyed. The level being again adjuſted in the point E, look back to the ſtaff H; and managing the mark as before, the viſual ray will give the point F. Meaſure the height H F, which ſuppoſe 11 feet 6 inches. Meaſure likewiſe the diſtance H E, which ſuppoſe 1000 yards; for which diſtance the table gives 2 inches, 5 lines of abatement; which being taken from the height H F, there will remain 11 feet, 3 inches, 7 lines, which enter in your book. Laſtly, turning the level to look at the next ſtaff D, the viſual ray will give the point D. Meaſure the height of D from the ground, which ſuppoſe 8 feet, 3 inches. Meaſure alſo the diſtance from the ſtation E to B, which ſuppoſe 900 yards; for which diſtance the table gives 2 inches, 1 line of abatement; which being taken from the height B D, there will remain 8 feet, 11 lines, which enter as before.

For the manner in entering down obſervations in your book, obſerve that when a proper place or ſtation for the level, between the two points, has been pitched upon, you muſt write down the two heights obſerved at that ſtation, in two different columns, viz. under the firſt column, thoſe obſerved in looking through the teleſcope when the eye was from the ſpring, or towards the point, which we may call *back-ſights*; and under the ſecond column thoſe obſerved when the eye was next the ſpring, which we call *fore-ſights*, in the manner following:

Back-ſights.		Fore-ſights.	
	feet in. line.		*feet in. line.*
Firſt height	2 : 6 : 9	Second height	21 : 09 : 9
corrected	2 : 6 : 9	Fourth height	8 : 00 : 11
Third height	11 : 3 : 7		29 : 10 : 8
	23 : 10 : 4		

Having ſummed up the heights of each column ſeparately, ſubtract the leſſer from the greater, the remainder will be the difference of level between the points A and B; as in this example,

feet. inch. line.	
29 : 10 : 08	
23 : 10 : 04	
6 : 00 : 04	—The difference of height, or level, between the points A and B.

If the diſtance of the two points be required, add all the diſtances meaſured together; and dividing the difference of height by the yards of the diſtances; for each 200 yards you will have a deſcent of about 2 inches 9 lines. This problem may be otherwiſe ſolved in the following manner: let the *line f g*, *Tab.* II. *Surveying*, *fig.* 24, repreſent the line of ſight of the teleſcope, drawn from *f*, the interſection of the croſs-hairs, through *g* the centre of the object-glaſs; and the points *b*, *b*, be the marks on the glaſs tube or ſpirit level *a b c*. While theſe parts of the inſtrument are immutably fixed with reſpect to each other, it is manifeſt, that as often as the air-bubble is exactly reduced to the mark *b*, the line of ſight will be always reduced to the ſame poſition with reſpect to the horizon or to a plumb-line. Nor is it at all neceſſary in the buſineſs of *levelling* that the line of ſight and plumb line ſhould be exactly at right angles; but only that the angles they make ſhall be always the ſame. Let *p* and *q*, *fig.* 25, be two given points in two remote places and let it be required to find which is the lower and how much. Let *p a* and *q b* repreſent two ſtraight ſtaffs or poles fixt upright, by means of a plumb-line. Having placed

placed the telescope by the side of the pole $p\,a$, and directed the line of sight to the pole $q\,b$, after its elevation by the screw adapted to this purpose, till the air-bubble rests exactly at the marks upon the tube. Then let an assistant mark the point b, which appears to be covered by the cross hairs; and also the point a exactly upon a level with the cross hairs; which is easily done by a common square applied to the side of the pole $p\,a$. Then remove the telescope to the pole $b\,q$, and here let the same things be repeated; that is, let d be the place upon a level with the cross hairs, and c the point upon the other pole $p\,a$, that appears to be covered by them while the air-bubble rests at the same mark as before. Bisect the interval $a\,c$ in g, and the interval $b\,d$ in h, and the points g, h will be upon a level; that is, if we suppose $g\,p\,q\,h$ to represent a long canal full of stagnating water, the points g, h will both be in its surface; and consequently taking the lesser depth $p\,g$ from the greater $q\,h$, their difference $q\,r$ shews how much the point q is below the point p or r.

If the places p, q cannot be seen from each other, or if the difference of their heights be greater than the length of any common poles, then one or more intermediate stations must be chosen; and by repeating the same practice between every two successive stations, we shall find the level of the extremes.

When the points g, h are once found upon two poles not far asunder, it will be convenient by moving the cross-hairs, to rectify the line of sight, so as to be nearly coincident with the line $g\,h$, or with a line parallel to it; for then in future levellings, at greater distances, the marks b, c will be less subject to fall above or below the poles.

This reciprocal way of levelling seems to be the most exact of any, especially if it be performed by two instruments made to agree together beforehand; which may be done by placing them together, and by altering the cross hairs in either of them, till the same mark upon a remote object is covered by both the crosses, while both the bubbles rest at their marks upon the tubes. Then may two observers find the marks upon the opposite poles at the same time; and consequently the refractions of the rays in the air, whatever be their quantities, will be equal as near as possible; and then the result of the practice will be as accurate as if there had been no refractions at all. For let the curve $b\,i\,o$ *fig.* 26, represent the course of the visual ray from b to a, and let the lines $a\,b$, $b\,t$ touch it at a and b. Then because the points a, b are very nearly upon a level, the density and constitution of the air and vapours at the same instant will be nearly the same in each place; and by consequence the curve $a\,i\,b$ and its tangents at a and b, will be equally inclined to the chord $a\,b$. For the same reasons the curve $e\,m\,d$ will be similar and equal to the curve $a\,i\,b$, being situated so very near to it. Therefore the angle $e\,d\,n$, under the chord $e\,d$ and tangent $d\,n$, will be equal to the angle $a\,b\,t$ or $b\,a\,b$; and consequently since the angles $q\,d\,n$, $p\,a\,t$ are made equal in the two observations, by taking away the equal angles $e\,d\,n$, $b\,a\,t$, caused by the equal refractions, the remaining angles $q\,d\,e$, $p\,a\,b$ will be equal to each other, as if there were no refractions at all.

If the reciprocal observations be made about the middle of the same day, when the air is the purest, there will scarce be any occasion for two instruments; but if they be made near the morning or evening, even on the same day, an equality of refractions cannot be depended upon, unless they are made at the same instant. The members of the Royal Academy of Sciences at Paris tell us, in their account of the Measure of the Earth, they often found, that an object which at break of day appeared in the level, and sometimes a little above it, did afterwards, when the sun was up, appear below it. And on the contrary, after the setting of the sun, objects far distant appeared to be raised so sensibly, that in less than half an hour their apparent height was augmented more than three minutes. As to the cause of these appearances they add, that the coolness of the night condenses the vapours, which descend to a lower place, leaving the air in the higher stations more pure than in the day time. And, on the contrary, when the heat of the sun has made a part of the vapours to mount to more elevated stations, there must be less difference of the mediums, and consequently a less refraction.

Setting aside the curvity of a ray, which Mr. Picard tells us is scarce sensible about noon, when the distance of the object does not exceed 1000 toises, the line of sight through the telescope may be set perpendicular to a plumb-line or parallel to the horizon in this manner. Having found two points g, h, *fig.* 27, upon a level as before, let $g\,i$ be perpendicular to $g\,c$ and cut $c\,h$ in i, and having computed the line $b\,i$ (as follows) and made a mark at i, place the level at g and alter the place of the cross hairs in the focus, till they appear to cover the point i when the air-bubble is at its marks, and the business is done. Now the line $b\,i$ is equal to the square of $g\,b$ applied to $2\,g\,c$, and consequently may be found by measuring the distance $g\,b$, and dividing its square by the diameter of the earth, which may be supposed equal to $2\,c$, though it is not exactly so, the earth being not exactly spherical. For bisecting $g\,b$ in k, draw $c\,k$ cutting $g\,i$ in l; and since the triangles $l\,g\,i$, $k\,g\,c$ are similar, we have $c\,k : k\,g :: g\,i : g\,l$, and by doubling them all, we have $b\,i : g\,b :: g\,b : 2\,k$. Mr. Picard computes that when the distance $g\,b$ is 300 toises or 1800 Paris feet, the line $b\,i$ is one inch; and hence any other $b\,i$ may be found for any other known distance; it being as the square of the distance $g\,b$.

Hence when the instrument is thus rectified, the point b upon the level with g, may be found by one observation; that is by marking the point i covered by the cross hairs, and by computing $i\,b$ by the rule above. As the intervals between the stations must be but small in this method, because of refractions, as was said above, the readiest way is to make them all equal; which may be known exact enough for this purpose, by observing whether the pole be removed to such a distance, that its image (or the image of any given part of it) in the focus of the telescope shall be always of the same length, being measured by the distance between two parallel hairs in the focus: and then the same allowance must always be made for the depth of the point b below i.

Lastly, by means of these parallel hairs, it is easy to find when the telescope is placed in the middle between two stations; and then the points upon a level at each pole are presently found, by directing the telescope first to one pole and then to the other, and by marking the points covered by the cross hairs. And these points will be upon a level, notwithstanding any refractions of the visual rays, because the refraction of each ray will be equal. Smith's Optics, book iii. chap. 14.

Dr. Halley suggests a new method of *levelling*, which has been put in practice by some of the French academy: this is performed wholly by means of the barometer, in which the mercury is found to be suspended to so much the less height as the place is farther remote from the centre of the earth. Hence it follows, that the different heights of the mercury, in two places, give the difference of level.

Mr. Derham, from some observations he made at the top and bottom of the Monument, found that the mercury fell one tenth of an inch at every 82 feet of perpendicular ascent, when the mercury was at 30 inches. Dr. Halley allows of one tenth of an inch for every 30 yards; which, considering how accurately the barometers are now made, an inch, in some of them, being divided into an hundred, or more parts, all very sensible, he thinks this method sufficiently exact to take the levels for the conveyance of water, and less liable to errors than the common levels.

The same author found a difference of three inches eight tenths, between the height of the mercury at the top and bottom of Snowdon-hill in Wales.

Mr. Ferguson has calculated the following table, for shewing how much the mercury would sink in a barometer at given heights above the earth's plane surface; and consequently, how the perpendicular height of any hill may be found thereby.

At the height of	Mercury sinks	At the height of	Mercury sinks	At the height of	Mercury sinks	At the height of	Mercury sinks
Feet.	Inches. Parts.	Feet.	Inches. Parts.	Feet.	Inches. Parts.	Feet.	Inches. Parts.
100	0 11	3400	3 54	6700	6 56	10000	9 40
200	0 22	3500	3 63	6800	6 67	10100	9 47
300	0 33	3600	3 73	6900	6 71	10200	9 54
400	0 44	3700	3 84	7000	6 80	10300	9 61
500	0 55	3800	3 90	7100	6 86	10400	9 68
600	0 67	3900	4 02	7200	6 97	10500	9 77
700	0 77	4000	4 12	7300	7 03	10600	9 84
800	0 87	4100	4 22	7400	7 13	10700	9 98
900	0 98	4200	4 32	7500	7 23	10800	10 03
1000	1 09	4300	4 37	7600	7 30	10900	10 07
1100	1 19	4400	4 49	7700	7 38	11000	10 14
1200	1 30	4500	4 58	7800	7 48	11100	10 21
1300	1 40	4600	4 67	7900	7 56	11200	10 28
1400	1 51	4700	4 77	8000	7 63	11300	10 36
1500	1 61	4800	4 86	8100	7 71	11400	10 43
1600	1 72	4900	4 96	8200	7 80	11500	10 50
1700	1 82	5000	5 04	8300	7 87	11600	10 57
1800	1 93	5100	5 14	8400	7 95	11700	10 64
1900	2 03	5200	5 22	8500	8 03	11800	10 72
2000	2 14	5300	5 32	8600	8 11	11900	10 79
2100	2 24	5400	5 40	8700	8 19	12000	10 86
2200	2 35	5500	5 49	8800	8 27	12100	10 93
2300	2 46	5600	5 58	8900	8 35	12200	11 00
2400	2 58	5700	5 67	9000	8 43	12300	11 07
2500	2 65	5800	5 76	9100	8 51	12400	11 14
2600	2 76	5900	5 85	9200	8 59	12500	11 21
2700	2 87	6000	5 94	9300	8 66	12600	11 28
2800	2 97	6100	6 02	9400	8 74	12700	11 35
2900	3 05	6200	6 12	9500	8 82	12800	11 42
3000	3 15	6300	6 20	9600	8 89	12900	11 49
3100	3 25	6400	6 28	9700	8 97	13000	11 56
3200	3 34	6500	6 37	9800	9 05	13100	11 63
3300	3 44	6600	6 45	9900	9 12	13200	11 70

At the height of	Mercu. sinks	At the height of	Mercu. sinks	At the height of	Mercu. sinks	At the height of	Mercu. sinks
Feet.	Inches.	Feet.	Inches.	Feet.	Inches.	Feet.	Inches.
13300	11 80	14000	11 34	14700	10 94	15400	10 57
13400	11 76	14100	11 30	14800	10 91	15500	10 54
13500	11 72	14200	11 26	14900	10 87	15600	10 51
13600	11 68	14300	11 22	15000	10 83	15700	10 48
13700	11 64	14400	11 18	15100	10 80	15800	10 45
13800	11 60	14500	11 14	15200	10 76	15900	10 42
13900	11 56	14600	11 10	15300	10 73	16000	10 39
14000	11 52	14700	11 06	15400	10 69	16100	10 36
14100	11 48	14800	11 02	15500	10 66	16200	10 33
14200	11 44	14900	10 98	15600	10 62	16300	10 30
14300	11 40	15000	10 94	15700	10 59	16400	10 27
14400	11 36	15100	10 90	15800	10 55	16500	10 24
14500	11 32	15200	10 86	15900	10 52	16600	10 21
14600	11 28	15300	10 82	16000	10 48	16700	10 18
14700	11 24	15400	10 78	16100	10 45	16800	10 15
14800	11 20	15500	10 74	16200	10 42	16900	10 12
14900	11 16	15600	10 70	16300	10 39	17000	10 09
15000	11 12	15700	10 66	16400	10 36	17100	10 06
15100	11 08	15800	10 62	16500	10 33	17200	10 03
15200	11 04	15900	10 58	16600	10 30	17300	10 00
15300	11 00	16000	10 54	16700	10 27	17400	9 97
15400	10 96	16100	10 50	16800	10 24	17500	9 94
15500	10 92	16200	10 46	16900	10 21	17600	9 91
15600	10 88	16300	10 42	17000	10 18	17700	9 88
15700	10 84	16400	10 38	17100	10 15	17800	9 85
15800	10 80	16500	10 34	17200	10 12	17900	9 82
15900	10 76	16600	10 30	17300	10 09	18000	9 79
16000	10 72	16700	10 26	17400	10 06	18100	9 76
16100	10 68	16800	10 22	17500	10 03	18200	9 73
16200	10 64	16900	10 18	17600	10 00	18300	9 70
16300	10 60	17000	10 14	17700	9 97	18400	9 67
16400	10 56	17100	10 10	17800	9 94	18500	9 64
16500	10 52	17200	10 06	17900	9 91	18600	9 61
16600	10 48	17300	10 02	18000	9 88	18700	9 58
16700	10 44	17400	9 98	18100	9 85	18800	9 55
16800	10 40	17500	9 94	18200	9 82	18900	9 52
16900	10 36	17600	9 90	18300	9 79	19000	9 49

By this table, and a common barometer tube, the perpendicular height of any hill may be found in the following manner.

The lower end of the tube being immersed in quicksilver in the common way, and the tube fixed to a board, let a scale, eighteen inches in length, be divided into inches, and each inch into a hundred equal parts, by diagonal lines, the divisions to be numbered downward from the top. This scale must be made to slide in a groove on the board, and have a cross index to slide upon it to any division.

Then, at the bottom or foot of the hill, place the scale so as the beginning of the divisions at its top may be just even with the top or surface of the mercury in the tube. This done, carry the machine up to the top of the hill; then set the index to the surface of the mercury, and it will shew how much the mercury has sunk in the tube, at the top of the hill, from the point where it stood when at the bottom; and the number of feet expressed in the table, against the like sinking of the mercury, will be the perpendicular height of the hill.

Thus, supposing the mercury has sunk 8 inches and 3 hundredth parts of an inch, the height of the hill must be 8500 feet, or a mile, and somewhat more than a quarter. Proportionable allowance is easily made for intermediate heights in the table, which are only to whole hundredths of feet.

Mr. Dentam found the difference of height of the mercury at the bottom and top of Snowdon-hill in Wales to be 3 inches 8 tenths (the same as 3 inches 80 hundredths) it shews that the height of that hill is 3700 feet or almost three quarters of a mile.

N. B. 660 feet make an eighth part of a mile, 1320 feet a quarter of a mile, 2640 feet half a mile, 3960 feet three quarters of a mile, and 5280 feet make a whole mile. See BAROMETER and ATMOSPHERE.

Dr. Desaguliers contrived an instrument, by which the difference of level of two places, which could not be taken in less than four or five days with the best telescope levels, may be taken in a few hours. The instrument is as follows:

To the ball C (*Tab.* II. *Surveying*, *fig.* 28.) is joined a recurved tube B A, of a very fine bore, with a small bubble at the top A, whose upper part is open. From the construction of this instrument, it is evident, that if it be inclined in carrying, no prejudice will be done to the liquor, which will always be right both in the ball and the tube, when the instrument is set upright. If the air at C be so expanded by heat, as to drive the liquor to the top of the tube, the cavity A will receive the liquor, which will come down again, and settle at D, or near it, according to the level of the place where the instrument is, as soon as the air at C returns to the same temperament as to heat and cold. For preserving the same degree of heat, when the different observations are made, the machine is fixed in a tin vessel, E F, filled with water up to *g h*, above the ball, and a very sensible thermometer has also its ball under water, that one may observe the liquor at D, in each experiment, when the liquor in the thermometer stands at the same height as before. The water is poured out when the instrument is carried, which may be done conveniently by means of the wooden frame, (*fig.* 29.) which is fet upright by three screws, S, S, S, and a line and plummet P P (*fig.* 30.) At the back part of the wooden frame (*fig.* 31.) from the piece at top, K, hangs the plummet P, over the brass point at N. M, *n*, are brackets for keeping the upright board, K N, at right angles with the horizontal one at N. The machine seen in front is represented *fig.* 32. supporting the fore part of the tin vessel transparent; and here the brass socket of the recurved tube, into which the ball is screwed, has two wings at I I, fixed to the bottom, that the ball may not break the tube by its endeavour to emerge, when the water is poured in as high as *g h*.

After Dr. Desaguliers had contrived this machine, he considered, that as the tube is of a very small bore, if the liquor should rise into the ball at A (*fig.* 28.) in carrying the instrument from one place to another, some of it would adhere to the sides of the ball A, and upon its descent in making the experiment, so much might be left behind, that the liquor would not be high enough at D, to shew the difference of the level; therefore, to prevent that inconveniency, he contrived a blank screw, to shut up the hole at A, as soon as one experiment is made, that in carrying the machine, the air in A may balance that in C, so that the liquor shall not run up and down the tube, whatever degree of heat and cold may act upon the instrument in going from one place to another. Now because one experiment may be made in the morning, and the water may be so cold, that when a second experiment is made at noon, the water cannot be brought to the same degree of cold it had in the morning; therefore, in making the first experiment, warm water must be mixed with the cold, and when the water has stood some time before it comes to be as cold as it is likely to be at the warmest part of that day, observe and set down the degree of the thermometer at which the spirit stands, and likewise the degree of the water in the barometer at D; then screw on the cap at A, pour out the water, and carry the instrument to the place whose level you would know; then pour in your water, and when the thermometer is come to the same degree as before, open the screw at top, and observe the liquor in the barometer.

The doctor's scale for the barometer is ten inches long, and divided into tenths; so that such an instrument will serve for any heights not exceeding ten feet, each tenth of an inch answering to a foot in height.

The doctor made no allowance for the decrease of density in the air, because he did not propose this machine for measuring mountains (though with a proper allowance for the decreasing density of the air, it will do very well), but for heights to be known in gardens, plantations, and the conveyance of water; where an experiment that answers to two or three feet in a distance of twenty miles, will render this a very useful instrument. Desaguliers' Exp. Phil. vol. ii. p. 372, &c.

For the common occasion of *levelling* to be performed without much apparatus of instruments, time or trouble, the following method may serve: set a pole upright in a spring, pond, river, or other place, whence water is to be brought, and mark how many feet, and inches, are above water. Then set up another pole, of equal length with the other, in the place to which the water is to come. Place the centre of a quadrant on the top of this last pole, the plummet hanging freely; spy through the sights the top of the pole that is in the water, and if the thread cuts any degree of the quadrant, the water may be conveyed by a pipe laid in the earth. If you cannot see from one extreme to the other, the operation may be repeated in the manner already directed.

LEVEL-*range*. See HORIZONTAL *range*.

LEVEL-*staves*, are instruments used in *levelling*; serving to carry the marks to be observed, and at the same time to measure the heights of those marks from the ground. They usually consist each of two long square wooden rulers, made to slide over one another, and divided into feet, inches, &c.

LEVEN, in *Natural History*, a term used by Boccone for the milky juice contained in the globules placed at the tops of the stalks of red coral. These round buttons are the only part of the coral, which are soft while under water, and from these the milky juice is easily expressed by a gentle squeezing between the fingers. The globules are each made up of five or six little cells, not communicating with one another, and each containing its own separate quantity of this white and thick fluid. When the coral is newly taken up out of the sea, this juice is of a sharp, acrimonious and astringent taste; but when it has been some time exposed to the air, it loses the acrimony, and the astringency of the taste only remains. This change in the taste is made in six or eight hours, in hot weather, and the juice, in the same time, loses its colour and consistence, growing hard and brown. Philos. Trans. N° 100.

LEVER, or LEAVER, in *Mechanics*, an inflexible straight bar, supported in a single point or on a fulcrum, or prop, and used for the raising of weights.

The

The word is formed of the French *levier*, which fignifies the fame; formed of the verb *lever*, or Latin *levare*, *to raife*.

The *lever* is the firft of thofe called mechanical powers, or fimple machines, as being, of all fuch, the moft fimple; and is chiefly applied for raifing weights to fmall heights.

In a *lever* there are three things conſidered: the weight to be raiſed, or ſuſtained, as O (*Tab. Mechanics, fig.* 1.) The power by which it is to be raiſed, or ſuſtained, as B. And the fulcrum or prop, D, whereon the *lever* is ſuſtained, or rather on which it moves round, the fulcrum remaining fixed.

Levers are of three kinds; ſometimes the fulcrum or centre of motion is placed between the weight and the power, as in *fig.* 1. this we call a *lever of the firſt kind*, or ceſtis DIEPHONOUNTOS; to which may be reduced ſciſſars, pincers, ſnuffers, &c. ſometimes the weight is between the fulcrum and the power, which is called a *lever of the ſecond kind*, as in *fig.* 2. Of this kind are the oars and rudder of a boat, the moſts of ſhips, cutting knives fixed at one end, and doors whoſe hinges are as the fixed point. And ſometimes the power acts between the weight and the fulcrum, which is the *lever of the third kind*. Such is a ladder lifted by the middle to reſt it up againſt a wall; theſe two are called ceſtes HOMOMOUNOI.

In this laſt, the power muſt exceed the weight in proportion as its diſtance from the centre of motion is leſs than the diſtance of the centre from the weight. And as the firſt two kinds of *lever* ſerve for producing a ſlow motion by a ſwift one, ſo the laſt ſerves for producing a ſwift motion of the weight by a ſlow motion of the power. It is by this kind of *levers* that the muſcular motions of animals are performed, the muſcles being inſerted much nearer to the centre of motion than the point where the centre of gravity of the weight to be raiſed is applied; ſo that the power of the muſcle is many times greater than the weight which it is able to ſuſtain. Though this may appear at firſt ſight a diſadvantage to animals, becauſe it makes their ſtrength leſs; it is, however, the effect of excellent contrivance: for if the power was, in this caſe, applied at a greater diſtance than the weight, the figure of animals would be not only awkward and ugly, but altogether unfit for motion; as Borelli has ſhewn in his treatiſe De Motu Animalium. The power of the *lever* is founded on the following theorem; viz. "That the ſpace, or arch, deſcribed by "each point of a *lever*, and conſequently the velocity "of each point of a *lever*, is as its diſtance from the "fulcrum, or prop."

From hence it follows, that the action of a power, and the reſiſtance of the weight, increaſe in proportion to their diſtance from the fulcrum.

And hence alſo it follows, that a power will be able to ſuſtain a weight, if the diſtance of the point in the *lever* to which it is applied, be to the diſtance of the weight, as the weight to the intenſity of the power; which, if it be ever ſo little increaſed, muſt raiſe the weight. See this doctrine demonſtrated under the word MECHANIC *Powers*; and farther illuſtrated under the word BALANCE; between which, and the *lever*, there is a great analogy; a *lever* of the firſt kind being a ſort of beam to raiſe weights.

The power and action of the *lever* will be fully illuſtrated by the following propoſitions:

1. If the power applied to a *lever* of any kind ſuſtain a weight, the power is to the weight in a reciprocal ratio of their diſtances from the fulcrum.

2. The weight of a *lever* of the firſt or ſecond kind A B, *fig.* 1. the diſtance of the centre of gravity from the fulcrum C V, and the diſtances of the weight, and the power A C and C B, being all given, to find the power that will ſuſtain it. Suppoſe the *lever* void of gravity, but in lieu thereof a weight hung at V; if then A C be made to C V, as the gravity of the *lever* to a fourth number, we ſhall have the weight which the *lever* is able to ſuſtain; and this ſubtracted from the given weight, the remainder will be the weight to be ſuſtained by the power. Let C B then be to C A, as the remaining weight to a fourth weight, and we ſhall have the power to be applied in B, in order to ſuſtain the given weight with the given *lever*.

3. The gravity of a *lever* of the firſt or ſecond kind A B, the diſtance of the centre of gravity from the fulcrum C V, the diſtances of the power, and the weight B C and C A, being all given, to find the weight to be ſuſtained. Find the part of the weight ſuſtained by the *lever* alone, as in the former problem: in the ſame manner find the other part of the weight, which the power applied in B is able to ſuſtain; and the two numbers together, and the ſum is the weight required.

4. The gravity, and centre of gravity F, of a *lever* of the ſecond kind C B, *fig.* 2. with the weight G, its diſtance from the fulcrum C A, and from the power C B being given, to find the power capable of ſuſtaining the weight. Suppoſe the *lever* void of gravity, but in lieu thereof a weight equal thereto hung in F, the power required to ſuſtain the *lever* alone; then find the power requiſite to ſuſtain the given weight G; add the powers together, and the ſum will be the power required.

5. If a power applied to a *lever* of any kind laſt a while, the ſpace of the firſt is to that of the laſt, as is this laſt to a power able to ſuſtain the ſame weight; whence it follows, that the gain of force is always attended with the loſs of time, and *vice verſâ*.

When the two arms of a *lever* are not in a right line, but contain any invariable angle at C (*Tab.* IV. *Mechanics, fig.* 49.) the *lever* is called a bended *lever*; and is evidently of the firſt kind, and the law of the equilibrium is the ſame; i. e. if the power P be applied at B to the arm C B, and the weight W acts by means of a pulley M, in the direction A M, perpendicular to the arm A, the power and weight will ſuſtain each other, if P be to W, as C A to C B, or P × C B = W × C A. If ſeveral powers act upon the arm C A, find their centres of gravity, A, on the arm C A, and ſuppoſe all the powers to be united there; and if the power P be to their ſum as C A to C B, it will ſuſtain them. The ſum of the powers being given, it is manifeſt that the farther their centre of gravity A is removed from the centre of motion C, the greater reſiſtance they will oppoſe againſt the power P, and it will require the greater force in the power to overcome them. Hence Galileo juſtly concludes, that the bones of animals are the ſtronger for their being hollow, their weight being given; as if the arm C B F repreſents their length, the circle C H D a ſection perpendicular to the length, P any power applied along their length, tending to break them; then the ſtrength or force of all their longitudinal fibres, by which the adheſion of the parts is preſerved, may be conceived to be united in A, the centre of the circle C H D, which is the common centre of gravity of thoſe forces, whether the ſection be a circle or annulus. But it is plain that when the area of the ſection, or the number of ſuch fibres is given, the diſtance C A is greater when the ſection is an annulus than when it is a circle without any cavity; conſequently the power with which the parts adhere, and which reſiſts againſt P, that endeavours to ſeparate them, is greater in the ſame proportion. For the ſame reaſon, the ſtalks of corn, the feathers of fowls, and hollow ſpears, are leſs liable to accidents that tend to break them than if they were of the ſame weight and length, but ſolid, without any cavity. In this inſtance, ſays Mr. Maclaurin, (View of Sir I. Newton's Phil. Diſc. book ii. chap. 3. § 134.) art only imitates the wiſdom of nature.

LEVERET, among *Sportſmen*, a young hare, in the firſt year of its age.

LEVIGATION, the reduction of hard and ponderous bodies, as coral, tutty, precious ſtones, &c. into a fine fubtil powder, by grinding them with water upon porphyry, or the like, as painters do their colours.

Levigation is much uſed in pharmacy and chemiſtry; but unleſs the grinding inſtruments be extremely hard, they will wear away, ſo as ſometimes to double the weight of the medicine thus managed.

LEVIRATE, in the *Jewiſh Cuſtoms*, a term uſed by authors who have written on the law and cuſtoms of the Jews, to denote particularly that law of Moſes, which obliges one brother to marry the widow of another, who died without children, to raiſe up ſeed to him.

The word is derived from *levir*, which fignifies, in Latin, the huſband's brother, or the brother-in-law; and the word *levirate* has been hence formed, to expreſs the law whereof we have been ſpeaking.

This law, which is an exception to that which condemns marriages between brothers and ſiſters, and between brothers-in-law and ſiſters in-law, ſeems to have been in uſe among the Hebrews and Canaanites before the time of Moſes; ſince Judah gave his firſt-born Er, and Onan his ſecond ſon, ſucceſſively to Tamar, and obliges himſelf to give her likewiſe to Selah his third ſon. Calm. Dict. Bibl.

LEVISTICUM, in *Botany*, a name given by ſome to *liguſticum*, or LOVAGE.

LEVITE, an inferior kind of miniſter in the Jewiſh tabernacle and temple, who had the care and management of the ſacred utenſils.

The word comes from the Greek ΛΕΥΙΤΗΣ, the root of which is the name *Levi*; which was given to that patriarch by his mother Leah, from the Hebrew ווֹלִי, *lavah*, *to be tied*, or *united*; Leah hoping, by the birth of this ſon, to be more cloſely linked to her huſband Jacob; and, therefore, in a large ſenſe, the *Levites* were the poſterity of this patriarch, and conſtituted one of the twelve tribes of Iſrael. But the ſons of Levi were appointed to this office, in conſequence of the extraordi-

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nary zeal they diſcovered againſt idolatry, in the caſe of the golden calf. Exod. xxxii. 26. 28. They were originally divided into three claſſes or families, from the three ſons of *Levi*, Kohath, Gerſhon, and Merari, but afterwards by David into twenty-four courſes.

The *Levites*, in the Jewiſh church, were an order inferior to the prieſts; and anſwered, in ſome meaſure, to deacons, in the Chriſtian church.

The *Levites* of the old law had no ſettled lands allotted them for their maintenance, as the other tribes had, but lived chiefly on the offerings made to God. They were diſtributed through all the tribes, each of which gave ſome of their cities to the *Levites*, amounting in all to the number of thirty-five, with grounds in their neighbourhood for the ſubſiſtence of their flocks. In the weeks of their attendance at the ſanctuary, they were maintained by the dues ariſing from the ſacrifices; beſides theſe dues, the firſt-fruits, which were brought to the temple, and the money paid for the redemption of the firſt born, contributed to their ſubſiſtence. But their maintenance chiefly aroſe from the tithes of the produce of the whole country, which was the law allotted to the tribe of Levi, Numb. xviii. 21. a tenth of which they paid to the prieſts.

According to the numeration made by Solomon, from the age of twenty there were thirty-eight thouſand *Levites* capable of ſerving; twenty-four thouſand of theſe he appointed for the daily miniſtry under the prieſts, ſix thouſand to be inferior judges in the cities and to decide matters relating to religion, and of no great conſequence to the ſtate; four thouſand to be door-keepers, and to take care of the riches of the temple; and the reſt to do the office of chanters, or ſingers.

LEVITICI, in *Church Hiſtory*, a ſect of heretics, who ſprung from the Gnoſtics and Nicolaitans.

LEVITICUS, a canonical book of the Old Teſtament, ſo called from its containing the laws and regulations relating to the prieſts, Levites, and ſacrifices.

LEVITY, the privation or want of weight in any body, when compared with another that is heavier.

In which ſenſe, *levity* ſtands oppoſed to GRAVITY.

The ſchools maintain, that there is ſuch a thing as *poſitive*, and *abſolute levity*, and impute to this the riſe or emergency of bodies lighter in ſpecie than the bodies wherein they riſe:

But we find by experience, that all bodies tend towards the earth, ſome ſlower, and ſome faſter, in all fluids, or mediums, whether water, air, &c. Thus, cork is only ſaid to be lighter than gold, becauſe, under equal dimenſions, the gold will ſink in, and the cork ſwim upon water.

Archimedes has demonſtrated, that a ſolid body will float any where in a fluid of the ſame ſpecific gravity; and that a lighter body will keep above a heavier. The reaſon is, that of bodies falling towards the earth, thoſe which have a like number of equal parts, have equal gravity; ſince the gravity of the whole is the ſum of the gravity of all its parts. Now two bodies have an equal number of equal parts, if under the ſame dimenſions there be no intervals deſtitute of matter; whence it follows, that as no portion of matter is ſo ſmall, but that the body wherein it is contained may be wholly divided into parts equally ſmall, there can be no reaſon for the deſcent of thoſe, which will not equally hold for the deſcent of that.

Hence it may be concluded, that thoſe bodies which do not equally gravitate under the ſame dimenſions, do not contain equal portions of matter; and, therefore, when we ſee, that a cube of gold ſubſides in water at the ſame time that an equal bulk of cork ſwims upon it, it is evident, that the gold muſt have a greater number of equal parts of matter, under the ſame bulk, than the cork; or the cork muſt have a greater number of vacuities than the gold; and that there is alſo in the water a greater number of vacuities than in gold. See FLUIDS, and *Specific* GRAVITY.

Hence we have a clear idea both of denſity or gravity, and of *levity*; and know, that the latter cannot, in a ſtrict ſenſe, be accounted any thing poſitive, but only a mere negation, or abſence, of body; which determines that body to be lighter than another which contains more matter.

Dr. Hook, it is true, ſeems to maintain ſomething like a poſitive *levity*; which, if we miſtake not, is what he means by the term *levitation*; viz. a property of bodies directly contrary to that of gravitation towards the ſun.

This, he thinks, he has diſcovered in the ſtreams of ſeveral comets; which, though they had a deſcent from the nucleus of the comet towards the ſun, yet they quickly returned, and went oppoſite to the ſun, and that to a prodigious extent. In effect, where the power of gravitation ceaſes, it ſhould ſeem ſome ſuch contrary force does begin; whereof we have inſtances in the phenomena of attraction. This is what ſir Iſaac Newton calls the *vis repellens*, and appears to be one of the laws of nature; without which it would be hard to account for rarefaction and ſome other appearances.

LEVY, *levare*, in *Law*, ſignifies to gather, or collect; as to *levy* money, to *levy* troops, &c.

LEVY ſometimes alſo denotes to erect, or ſet up; as, to *levy* a mill. *Levy* alſo ſignifies to raiſe or caſt up; as, to *levy* a ditch. To *levy* a fine of lands, is to paſs a *fine*.

LEWDNESS is puniſhable by our law by fine, impriſonment, &c. And Mich. 15 Car. II. a perſon was indicted for open *lewdneſs*, in ſhewing his naked body in a balcony, and other miſdemeanors, and was fined two thouſand marks, impriſoned for a week, and bound to his good behaviour for three years. 1 Sid. 168. In times paſt, when any man granted a leaſe of his houſe, it was uſual to inſert an expreſs covenant, that the tenant ſhould not entertain any lewd women, &c. See BAWD, INCEST, &c.

LEWING, in *Metallurgy*, the ſifting the ores of metal in water. This is done in fine ſieves moved backward and forward under water; and this is the method of ſeparating the finer parts of the ores which had ſubſided among the larger lumps, under that part of it ſeparated for uſe in the various waſhings. The coarſer matter, left in the ſieve, is powdered again with the larger maſſes, and all thus ſifted together for the blowing-houſe.

LEX, *Law*. See LAW.

LEX *amiſſa*, or *legem amittere*, in *Law*, is underſtood of an infamous, perjured perſon, who is ſaid to *loſe his law*; or, as Bracton has it, *non eſt uſurus ſignus legis*. See INFAMOUS.

LEX *judicialis*, is properly *purgatio, per judicium ferri*; ſometimes called ſimply JUDICIUM.

LEX *ſacramentalis*, *purgatio per ſacramentum*. See OATH, and PURGATION.

LEX *talionis*. See TALIO.

LEX *terræ*, the law and cuſtom of the land; by which name it is diſtinguiſhed from the *civil law*. See COMMON *law*.

LEGEM *terræ amittere*. See AMITTERE.

LEXIARCHI, Λεξιαρχοι, at Athens, ſix officers, aſſiſted by thirty inferior ones, whoſe buſineſs it was to lay fines upon ſuch as came not to the public aſſemblies, and alſo to make ſcrutiny among ſuch as were preſent.

The *lexiarchi* kept a regiſter of the age, manners, and abilities of all the citizens, who were always enrolled at the age of twenty.

LEXICON, Λεξικον, the ſame with dictionary.

The word is chiefly uſed in ſpeaking of Greek dictionaries: it is derived from the Greek λεξις, *word, diction*; of λεγω, *I ſpeak*.

LEY. See LIXIVIUM.

LEYDEN *phial*, in *Electricity*, is a glaſs phial or jar coated both on the inſide and outſide with ſome conducting ſubſtance, for the purpoſe of being charged, and employed in a variety of entertaining and uſeful experiments. See COATING and CHARGE.

It was thus called becauſe Mr. Cunæus, a native of Leyden, was ſuppoſed to have firſt contrived, about the cloſe of the year 1745, to accumulate the electrical power in glaſs by this method; and hence the operation of charging and diſcharging coated glaſs, in general, has been denominated the *Leyden* experiment; and a vacuum produced in a jar of this kind has been called the *Leyden vacuum*. But Dr. Prieſtley, the hiſtorian of electricity, informs us, that the perſon who firſt made this great diſcovery was Mr. Von Kleiſt, dean of the cathedral in Camin; who, on the fourth of November, 1745, ſent an account of it to Dr. Leiberkuhn at Berlin: however, thoſe, to whom Mr. Kleiſt's account was communicated, could not ſucceed in performing his experiments. The views which led to this diſcovery in Holland are ſtated by Dr. Prieſtley in the following manner: profeſſor Muſchenbroek and his friends, obſerving, that electrified bodies, expoſed to the common atmoſphere, which is always replete with conducting particles of various kinds, ſoon loſt their electricity, and were capable of retaining but a ſmall quantity of it, imagined, that if the electrified bodies were terminated on all ſides by original electrics, they might be capable of receiving a ſtronger power, and retaining it a longer time. Glaſs being the moſt convenient electric for this purpoſe, and water the moſt convenient non-electric, they firſt made theſe experiments with water in glaſs bottles; but no conſiderable diſcovery was made, till Mr. Cunæus, happening to hold his glaſs veſſel in one hand, containing water, which had a communication with the prime conductor by means of a wire; and with the other hand diſengaging it from the

the conductor, when he imagined the water had received as much electricity as the machine could give it, was surprised by a sudden shock in his arms and breast, which he had not in the least expected from the experiment. This experiment was repeated, and the first account of it published in Holland by Mr. Allamand and Mr. Muschenbroeck; by the abbe Nollet, and M. Sonnier, in France; and by Messrs. Grabath and Runger, in Germany. Mr. Grabath contrived to increase the strength of the shock, by altering the shape and size of the phial, and also by charging several phials at the same time, so as to form what is now called the *electrical* BATTERY. He likewise made the shock to pass through a number of persons connected in a CIRCUIT from the outside to the inside of the phial. He observed, that a cracked phial would not admit of being charged; and he discovered what is now called the RESIDUUM *of a charge*. Dr. Watson, about this time, observed a circumstance attending the operation of charging the phial, which, if pursued, would have led him to the discovery, which was afterwards made by Dr. Franklin. He says, that when the phial is well electrified, and you apply your hand to it, you see the fire flash from the outside of the glass, wherever you touch it, and it crackles in your hand. He also observed, that when a single wire only was fastened round a phial, properly filled with warm water, and charged, upon the instant of its explosion, the electrical corruscations were coming out from the wire, and to illuminate the water contained in the phial. He likewise found, that the shock in the discharge of the phial was *entirely farther*, as the points of contact of the non-electrics of the outside of the glass, which led to the ends of COATING glass in consequence of which he made experiments, that led him to conclude, that the effect of the *Leyden* bottle was greatly increased, if it was not principally owing to, not so much the quantity of non-electric matter contained in the glass as the number of points of non-electric contact within the glass, and the density of the matter of which those points consisted; provided the matter was, in its own nature, a ready conductor of electricity. He farther observed, that the explosion was greater from hot water inclosed in glasses, than from cold, and from his coated jars, warmed, than cold. For his manner of explaining the shock of the *Leyden* phial, see ARTIFICE.

Mr. Wilson, in 1746, discovered a method of giving the shock to any particular part of the body, without affecting the rest; he also increased the strength of the shock by plunging the phial in water, thereby giving it a coating of water on the outside as high as it was filled on the inside; he likewise found, that the law of accumulation of the electric matter in the *Leyden* bottle was always in proportion to the thinness of the glass, the surface of the glass, and that of the non-electrics in contact with the inside and outside thereof. Mr. Wilson made a variety of other experiments with the *Leyden* phial, which our limits will not allow us to recite.

Mr. Canton found, that if a charged phial was placed upon electrics, the wire and the coating would give a spark or two alternately; and that, by continuing this operation, the phial would be discharged; though he did not observe that the se alternate sparks proceeded from the two contrary electricities discovered by Dr. Franklin.

The abbe Nollet made several experiments with this phial. He received a shock from a bottle, out of which the air had been exhausted, and into which the end of his conductor had been inserted. He ascribed the force of the glass in giving a shock, to that property of it, whereby it retained it more strongly than conductors do, and was not so easily divested of it as they are. He also first tried the effect of the electric shock on brute animals, and enlarged the CIRCUIT of its conveyance.

M. Monnier is said to have been the first who discovered that the *Leyden* phial would retain its electricity for a considerable time after it was charged, and to have found it to do so for thirty-six hours, in time of frost; and it is remarkable, that the French as well as English philosophers made several experiments, which, with a little greater degree of attention, would have led them to the discovery of the different quality of the electricities on different sides of the glass. But this was reserved for the ingenious doctor Franklin, who, in explaining the method of charging the *Leyden* phial, observes, that when one side of the glass is electrified positively, or *plus*, the other side is electrified negatively or *minus*; so that whatever quantity of fire is thrown upon one side of the glass, the same is thrown out of the other; and if a phial not charged, none can be thrown into the inside, when none can be got out from the outside; and there is really no more electric fire in the phial after it is charged than before; all that can be done by charging being to take from one side, and convey to the other. Dr. Franklin also observed, that glass was impervious to electricity; and that, therefore, since the equilibrium could not be restored to the charged phial by any internal communication, it must be done by conductors externally joining the inside and the outside. These capital discoveries he made by observing, that when a phial was charged, a cork-ball, suspended on silk, would be attracted by the outside coating, when it was repelled by a wire communicating with the inside, and vice versa. But the truth of this maxim appeared more evident, when he brought the knob of the wire communicating with the outside coating within a few inches of the wire communicating with the inside coating, and suspended a cork ball between them; for, in that case, the ball was attracted by them alternately, till the phial was discharged.

Dr. Franklin also observed, that when the phial was charged, one side lost exactly as much as the other gained, in restoring the equilibrium. Hanging a small wire bent near the coating of an electrical phial, he observed, that whenever he brought his finger near the wire, the thread was attracted by the coating, for as the fire was taken from the inside, by touching the wire, the outside strove to get its quantity by the thread. He likewise proved, that the coating on one side of a phial received just as much electricity as was carried from the discharge of the other, in the following manner: he laid it on rubber, and this, charging a pallal to the conductor, he found it could not be charged, even though his hand was held constantly on it, because, though the electric fire might leave the outside of the phial, there was none collected by the rubber to be conveyed into the inside. He then took it off his hand from the phial, and forming a communication by a wire from the outside coating to the unelectrified rubber, he found that it was charged with ease. In this case, it was plain, that the very same fire which left the outside coating, was conveyed by the way of the rubber, the globe, and the conductor, and the wire of the phial, into the inside. This new theory of charging the *Leyden* phial led Dr. Franklin to observe a greater variety of facts relating both to charging and discharging it, than other philosophers had attended to. This matter, that whatever the phial takes in at one surface is lost at the other, led Dr. Franklin to think of charging several phials together with the same trouble, by connecting the outside of one with the inside of another; whereby the fluid that was driven out of the first would be received by the second, &c. By this means he found, that a great number of bottles might be charged with the same labour as one only; and that they might be charged equally high, were it not that every bottle receives the new fire, and loses its old with some reluctance, so that one gives some small reluctance to the charging. On this principle is constructed an *electrical* BATTERY.

When Dr. Franklin first began his experiments upon the *Leyden* phial, he imagined that the electric fire was all crowded into the substance of the non-electric, in contact with the glass; but he afterwards found, that its power of giving a shock lay in the glass itself, and not in the coating, by the following ingenious analysis of the bottle. In order to find where the strength of the charged bottle lay, he placed it upon glass; then first took out the cork and the wire, and finding the virtue was not in them, he touched the outside coating with one hand, and put the finger of the other into the mouth of the bottle; when the shock was felt quite as strong as if the cork and wire had been in it. He then charged the phial again, and pouring out the water into an empty bottle, imagined, expected, that if the force resided in the water, it would give the shock, but he found it gave none. He then judged that the electric fire must either have been lost in decanting, or must remain in the bottles; and the latter he found to be true; for, filling the charged bottle with fresh water, he found the shock, and was satisfied that the power of giving it resided in the glass itself. The same experiments was made with panes of glass, laying the coating on bothly, and changing it, as the water had been before changed in the bottle, and the result was precisely the same. He proved in other ways that the electric fire resided in the glass. Franklin's Letters and Observations, &c. Priestley's Hist. of Electricity, vol. i. p. 101, &c.

From the above account of Dr. Franklin's method of analyzing the *Leyden* phial, the manner of charging and discharging it, and the reason of the proceis, are eafily underflood. Thus, if a coated phial be placed near the prime conductor, (*Hift. Electricity, fig.* 4.) fo that the knob of its wire may be in contact with it; and the winch of the machine (*fig.* 5.) be turned, the index of the ELECTROMETER, E, fixed to the conductor, will gradually rife as far as 90° nearly, and then reft; which fhews that the phial has received its full charge; then if the difcharger (*fig.* 3.) be held by its glafs handle, and

one of its knobs be applied to the outside coating of the phial, and the other be brought near the knob of the wire, or near the prime conductor that communicates with it, a report will be heard, and luminous sparks will be discovered between the discharger and the conducting substances communicating with the sides of the phial; and by this operation the phial will be discharged. If, instead of using the discharger, a person touches the outside of the phial with one hand, and brings the other hand near the wire of the phial, the same spark and report will be observed, and a shock will be felt, that affects the wrists and elbows; and when the shock is strong, the breast likewise; and a shock may be given to any single part of the body, if that part alone be brought into the circuit. If a number of persons join hands, and the first of them touches the outside of the phial, and the last touches the wire communicating with the inside, they will all feel the shock at the same time. If the coated phial be held by the wire, and the outside coating be presented to the prime conductor, it will be charged as readily, only with this difference, that in this case the outside will be positive, and the inside negative: and if the prime conductor, by being connected with the rubber of the machine, be electrified negatively, the phial would be charged in the same manner; but the side that touches the conductor would be electrified negatively, and the opposite side would be electrified positively. But if the phial be INSULATED, and the same process repeated, the index of the electrometer will soon rise to 90°, yet the phial will remain uncharged; because the outside, having no communication with the earth, &c. cannot part with its own electricity, and, therefore, the inside can acquire no additional quantity; but when a chain, or any other conductor, connects the outside of the phial with the table, the phial may be charged as before. Moreover, if a phial be insulated, and one side of it, instead of being connected with the earth, be connected with the insulated rubber, whilst the other side communicates with the prime conductor, the phial will be expeditiously charged; because, whilst the rubber exhausts one side, the other side is supplied by the prime conductor; and in this way the phial is charged with its own electricity; or the natural electric matter of one of its sides is thus thrown on its other side. This last experiment may be diversified, by insulating the phial, and placing it with its wire at the distance of about half an inch from the prime conductor, and holding the knob of another wire at the same distance from its outside coating; then turning the winch of the machine, and a spark will be observed to proceed from the prime conductor to the wire of the phial, and another spark will pass at the same time from the outside coating to the knob of the wire, presented towards it; and thus it is seen, that as a quantity of the electric matter is entering the inside of the phial, an equal quantity of it is leaving the outside. If the wire presented to the outside of the phial be pointed, it will appear illuminated with a STAR; but if the pointed wire be connected with the coating of the phial, it will appear illuminated with a BRUSH of rays. See CHARGE, ELECTRICAL *Jhock*, and *Experiments*, &c. in ELECTRICITY.

Mr. Cavallo has described the construction of a phial, which, when charged by an electrical kite, in examining the state of the clouds, or in any other way, may be put into the pocket, and which will retain its charge for a considerable time. Besides the coating on the inside and outside, which this phial has like others of the same kind, a glass tube open at both ends is cemented into its neck, and passes within the phial, having a small wire fastened to its lower extremity, which touches the inside non-electric coating. The wire, with the knob of this phial, is cemented into another glass tube, which is nearly twice as long, and smaller than the tube cemented into the neck of the phial. The wire is cemented in such a manner, that only its knob projects out of one end, and a small length of it out of the other end of the tube. If this piece, with the wire, be held by the middle of the glass tube, it may be put in or out of the tube, which is in the neck of the phial, so as to touch the small wire at the lower extremity of it; and this may be done without discharging the phial, if it be charged. A phial of this kind has been kept in a charged state for six weeks. Cavallo's Elect. p. 340.

We shall close this article with an account of the method by which Mr. Cavallo repairs coated phials, that have been cracked or perforated, either by a spontaneous discharge, or other accident. He removes the outside coating from the fractured part, and then makes it moderately hot, by holding it to the flame of a candle; and whilst it remains hot, he applies burning sealing-wax to the part, so as to cover the fracture entirely; taking care that the thickness of this wax coating may be greater than that of the glass. Lastly, he covers all the sealing-wax, and also part of the surface of the glass beyond it, with a composition made with four parts of beef-wax, one of resin, one of turpentine, and a very little oil of olives. This he spreads upon a piece of oiled silk, which he applies in the manner of a plaster. In this way several phials have been so effectually repaired, that, after being frequently charged, they were at last broken by a spontaneous discharge, but in a different part of the glass. Phil. Trans. vol. lxxiii. part 2. p. 1011.

LEYGAGE, is used for wager of law.

LEYSERA, in *Botany*, a genus of the *frigenesia polygamia superflua* class, the receptacle of which is naked, the down chaffy, but plumose at the disc, and the calyx composed of leaves, dry at the margin, and rounding when touched.

LIBADION, in *Botany*, a name by which Pliny, and some other authors, have called the centaurium, or centory.

LIBANIUM, in *Botany*, a name given by Apuleius, and some other authors, to the common borago, or borrage.

LIBANOMANTIA, *Acromantia*, in *Antiquity*, a species of divination performed with frankincense; which, if it presently caught fire, and sent forth a grateful odour, was esteemed a happy omen, and *vice versâ*.

LIBATION, LIBATIO, a ceremony in the heathen sacrifices, wherein the priest spilt some wine, milk, or other liquor, in honour of the deity to whom the sacrifice was offered; after having first tasted it himself.

Alexander is said to have sacrificed a bull to Neptune; and, for an offering to the sea-gods, to have thrown the golden vessels used for the *libation* into the sea.

Libations were also in use under the law of Moses, being enjoined by God in Exodus xxix. and Numbers xv.

LIBAVIUS, *liquor of*. See LIQUOR.

LIBEL, *Famosus* LIBELLUS, a writing or report, unlawfully published abroad, containing injurious reproaches, or accusations, against the honour and reputation of any person, particularly of a superior, or governor.

Platina is of opinion, that a writing, how injurious soever it is, cannot be called a *libel*, if the author's name be to it. Libellers, among the ancient Romans, were punished with death, but in after-times they were only whipped. Augustus ranked *famosi libelli*, defamatory *libels*, among the crimes *laesæ majestatis*, of high treason, and under the emperor Valentinian it was made capital, not only to write, but to publish or even omit destroying them. F. Baldwin has published a comment on the imperial laws against *libels*. Scandalous pictures are reckoned amongst *libels*.

A *libel*, the lawyers say, may be either *in scriptis*, or *sine scriptis*: *in scriptis*, when a writing is composed, or published, to another's disgrace; which may be done either *verbis aut cantelenis*; as, where this is maliciously repeated, or sung, in the presence of others: or else *traditione*, when the *libel*, or any copy of it, is delivered out, to scandalize the party.

A *libel sine scriptis* may be twofold. 1. *Picturis*, as to paint the party in a shameful or ignominious manner: or, 2. *Signis*, as to fix a gallows, or other ignominious sign, at the door of the party, or elsewhere.

With regard to *libels* in general, there are two remedies; one by indictment and another by action. The former for the public offence; for every *libel* has a tendency to break the peace, or to provoke others to break it; which offence is the same, whether the matter contained be true or false: and, therefore, the defendant, on an indictment for publishing a *libel*, is not allowed to allege the truth of it by way of justification. In such prosecutions, the only facts to be considered are, first, the making or publishing of the book or writing; and secondly, whether the matter be criminal. The punishment of libellers, for making, repeating, printing, or publishing *the libel*, is fine, and such corporal punishment, as the court in their discretion shall inflict, according to the offence, and quality of the offender. But as the remedy by action on the case, which is to repair the party in damages for the injury done him, the defendant may as for words spoken justify the truth of the facts, and shew what the plaintiff has received no injury at all. Blackst. Com. vol. iii. p. 126. and vol. iv. p. 150.

LIBEL, of *libelli, a little book*, also signifies the original declaration of any action in the civil law.

LIBEL, in *the Laws of Scotland*, is used for a criminal accusation or INDICTMENT.

LIBELLA, in *Natural History*. See DRAGON *Fly*.

LIBELLA, among the Romans, was the tenth part of the DENARIUS.

LIBELLATICI, an ancient kind of apostates from Christianity, under the persecution of Decius; who, to prevent their being obliged to renounce the faith, and sacrifice to idols in public, made application to the magistrates, and abjured their faith in private; obtaining certificates

of

of them, either by intreaty, or by money; by which they were attested to have complied with the orders of the emperor; and were thereby sheltered from any farther molestation on account of their religion.

These certificates were called *libelli*; whence the people who obtained them came to be denominated *Libellatici*. Others, particularly the centuriators of Magdebourg, are of opinion, that the *Libellatici* were only such as furnished the magistrates with money, to screen them from perfecution, and from being obliged to renounce Christianity.

M. Tillemont retains something of each opinion; he thinks, the *Libellatici*, applying themselves to the magistrates, bought off the sacrificing and abjuration; and obtained letters, by which they were declared to have renounced Christ, and sacrificed to idols; though, in effect, they had done neither.

LIBELLULA, in *Zoology*, the name of a genus of the *neuropteru* class of insects: the mouth of which is furnished with jaws, the antennæ shorter than the thorax, the wings extended, and the tail terminated by a kind of forceps.

The species of this genus are very numerous, by Linnæus reckoned twenty-one, some carrying their wings erect when they sit, and others horizontally.

LIBER, in *Botany*, the bark or rind, principally of trees. This is to be conceived as consisting of a number of cylindric and concentric surfaces, whose texture is reticular, and in some trees plainly extrusible every way, by reason that the fibres are soft and flexible. While in this condition they are either hollow regular canals, or, if not so, they have interstitial spaces, which serve the office of canals. The nutritious juice, which they are continually receiving, remains in part in them, and makes them grow in length and thickness, and strengthens and brings them closer together; and by this means the texture, which was before reticular, becomes an assemblage of straight fibres, ranged vertically, and parallel to each other; that is, as they are thus altered behind one another, they, by degrees, become a new substance more woody, and called LIGNUM. See BARK.

LIBERA, in *Mythology*, the name of a goddess, which Cicero, in his book Of the Gods, represents as the daughter of Jupiter and Ceres. Ovid in his Fasti says that the name was given by Bacchus to Ariadne.

Libera is exhibited on Medals, as a kind of female Bacchus, crowned with vine-leaves.

LIBERAL *arts*, are such as depend more on the labour of the mind than on that of the hand; or, that consist more in speculation than operation; and have a greater regard to amusement and curiosity than to necessity.

The word comes from the Latin *liberalis*; which, among the Romans, signified a person who was not a slave; and whose will, of consequence, was not checked by the command of any master.

Such are grammar, rhetoric, painting, sculpture, architecture, music, &c. The *liberal arts* used formerly to be summed up in the following Latin verse:

Lingua, Tropus, Ratio, Numerus, Tonus, Angulus, Astra.

And the *mechanical arts*, which, however, are innumerable, under this:

Rus, Nemus, Arma, Faber, Vulnera, Lana, Rates.

See ARTS.

LIBERALIA, feasts celebrated by the ancient Romans, in honour of Liber, or Bacchus, the same with those which the Greeks called DIONYSIA, and *Dionysian*.

They took their name from *liber*, i. e. *free*, a title conferred on Bacchus, in memory of the liberty or freedom, which he granted to the people of Bœotia; or, perhaps, because wine, whereof he was the reputed deity, delivers men from care, and sets their mind at ease and freedom. Varro derives the name of this feast from *liber*, considered as a noun adjective, and signifying *free*: because the priests were free from their function, and eased of all care, during the time of the *Liberalia*: as the old women officiated in the ceremonies and sacrifices of these feasts.

LIBERANDIS, *terris*. See TERRIS.

LIBERATE, in *Law*, a writ that lies for the payment of a yearly pension, or sum of money, granted under the great seal, and directed to the treasurer, chamberlains, and barons of the exchequer, &c. for that purpose.

In another sense it is a writ to the sheriff of a county, for the delivery of possession of lands, and goods extended, or taken upon the forfeiture of a recognizance.

Liberate is also used for a writ issuing out of the chancery, directed to a gaoler for delivery of a prisoner, who hath put in bail for his appearance.

LIBERI *tauri libertas*. See TAURI.

LIBERIA, a feast held among the Romans, on the day whereon their children laid aside their juvenile habits, and assumed the robe called *toga liberia*.

The *liberia* were kept on the sixteenth of the kalends of April; that is, on the seventeenth of March.

LIBERTAS *ecclesiastica*, *church liberty*; a frequent phrase in old writers, who treat of ecclesiastical immunities. The right of investiture, extorted from our kings by the papal power, was at first the only thing challenged by the clergy, as their *libertas ecclesiastica*, but by degrees under the title of *church liberty*, they contended for a freedom of their persons and possessions, from all secular power and jurisdiction; as appears by the canons and decrees of the councils held by Boniface, archbishop of Canterbury, at Merton, ann. 1258, and at London, ann. 1260, &c.

LIBERTATE *probanda*, in *Law*, an ancient writ that lay for such as being demanded for villains, offered to prove themselves free; directed to the sheriff, that he should take security of them for their proving of their freedom before the justices of assize, and that in the mean time they should be unmolested.

LIBERTATIBUS *allocandis*, in *Law*, a writ lying for a citizen or burgess, impleaded contrary to his liberty, to have his privilege allowed.

If any do claim a special liberty to be impleaded within a city or borough, and not elsewhere, there may be a special writ *de libertatibus allocandis*, to permit the burgesses to use their liberties, &c. These writs are of several forms, and may be sued by a corporation, or by any single person, as the case shall happen.

LIBERTATIS *Angliæ custodes*. See CUSTODES.

LIBERTUS, or LIBERTINUS, among the Romans, a *freedman*, or a person set free from a legal servitude.

These still retained some mark of their ancient state: he who made a slave free having a right of patronage over the *libertus*; so that if the latter failed of shewing due respect to his patron, he was restored to his servitude; and if the *libertus* died without children, his patron was his heir. See SLAVE.

In the beginning of the republic, *libertinus* denoted the son of a *libertus* or freed-man; but afterwards, before the time of Cicero, and under the emperors, the terms *libertus* and *libertinus*, as Suetonius has remarked, were used as synonymous.

LIBERTINES, LIBERTINI, in *Ecclesiastical History*, a religious sect, which arose in the year 1525, whose principal tenets were, that the Deity was the sole operating cause in the mind of man, and the immediate author of all human actions; that, consequently, the distinctions of good and evil, which had been established with regard to those actions, were false and groundless, and that men, could not, properly speaking, commit sin; that religion consisted in the union of the spirit or rational soul with the supreme being; that all those who had attained this happy union, by sublime contemplation and elevation of mind, were then allowed to indulge, without exception or restraint, their appetites or passions; that all their actions and pursuits were then perfectly innocent; and that, after the death of the body, they were to be united to the Deity.

They likewise said that Jesus Christ was nothing but a mere *je ne sçai quoi*, composed of the spirit of God, and of the opinion of men.

These maxims occasioned their being called *Libertines*; and the word has been used in an ill sense ever since.

The *Libertini* spread principally in Holland and Brabant. Their leaders were one Quintin, a Picard, Pockefius, Ruffus, and another called Chopin, who joined with Quintin, and became his disciple.

This sect obtained a certain footing in France through the favour and protection of Margaret, queen of Navarre, and sister to Francis I. and found patrons in several of the reformed churches. This sect was probably a remnant of the more ancient BEGHARDS or BRETHREN *of the Free Spirit*.

LIBERTINES *of Geneva*, were a cabal of rakes rather than of fanatics: for they made no pretences to any religious system, but pleaded only for the liberty of leading voluptuous and immoral lives. This cabal was composed of a certain number of licentious citizens, who could not bear the severe discipline of Calvin, who punished with rigour not only dissolute manners, but also whatever bore the aspect of irreligion and impiety. In this turbulent cabal there were several persons who were not only notorious for their dissolute and scandalous manner of living, but also for their atheistical impiety, and contempt of all religion. To this odious class belonged one Gruet, who denied the divinity of the Christian religion, the immortality of the soul, the difference between moral good and evil, and rejected with disdain the doctrines that are held most sacred among Christians; for which impieties he was at last brought before the civil tribunal, in the year 1550, and condemned to death. The Genevan spirit of reformation, improperly directed by the violence

lence and zeal of Calvin, did at this time operate to a degree, which has marked the character of this great reformer with reproach. For in 1544, Sebastian Castalio, master of the public school at Geneva, who was a man of probity, and distinguished by his learning and taste, was, nevertheless, deposed from his office and banished the city, because he disapproved some of the measures that were pursued and some of the opinions entertained by Calvin and his colleagues, and particularly that of absolute and unconditional predestination. Jerome Bolsec also, a man of genius and learning, who became a convert to the protestant religion and fled to Geneva for protection, was cast into prison, and, soon after, sent into banishment, because, in 1551, he imprudently and indecently declaimed in full congregation and at the close of public worship against the doctrine of absolute decrees. Mosheim.

LIBERTY, LIBERTAS, is usually understood of that state wherein a man acts freely; or that power by which he determines himself voluntarily either to good or evil, to this thing or that.

In this sense *liberty* amounts to the same with FREEDOM, and stands opposite to NECESSITY.

Liberty may be defined an active indifference of the will, to will, or not to will, any thing.

Most of the Schoolmen confound *liberty* and the will together, and make one definition serve for both. Whereas Mr. Locke observes, that *liberty* does not belong to the will, but to the man or agent; and therefore, that the question, in the usual manner of putting it, whether man's will be free or no, is absurd and unintelligible. *Liberty*, which is but a power, belongs only to agents, and cannot be an attribute or modification of the will, which is also but a power. They distinguish *liberty* into a great many kinds; as,

LIBERTY *of contrariety*, *contrariatis*, which is a freedom of doing two things, not only different, but contrary to each other.

LIBERTY *of contradiction*, a power either of doing a thing, or letting it alone. See FREEDOM.

LIBERTY, *next*, *proxima*, is a full absolute freedom of doing any thing.

LIBERTY, *remote*, is a *liberty* that comprehends a natural power, though embarrassed with obstacles, which it is in our power to remove, and to attain to a next *liberty*.

LIBERTY *of conscience*, a right or power of making profession of any religion, or of serving God in any manner that a man sees fit.

This seems to be a natural right; it is vigorously opposed by the generality of the Romanists, and even by many of the Reformed, though it seems as if the reformation could scarce subsist without it. See TOLERATION and PERSECUTION.

The nature of *liberty* may be better understood by dividing it, with an excellent writer, into *physical*, *moral*, *religious* and *civil*.

LIBERTY, *physical*, is that principle of spontaneity or self-determination, which constitutes us agents; or which gives us a command over our actions, rendering them properly our's and not effects of the operation of any foreign cause. Without this *liberty*, or being under a necessity of always following some will different from his own, man would be a machine acted upon by mechanical springs, having no principle of motion in himself or command over events; and, therefore, incapable of all merit and demerit.

Whether man is endued with this kind of *liberty* or self-determining power has been a subject of much controversy: it was agitated at the beginning of this century between Leibnitz, Collins, &c. on one side, and Clarke, Jackson, &c. on the other; and has been lately revived by Dr. Priestley.

Cicero defines *liberty*, the power of living after a man's own will, without any cause or impediment to oblige him to do the thing rather than another.

F. Malebranche gives us a still more philosophical definition: the will he defines to be that impression, or natural motion, which inclines towards good in the general; and by *liberty*, he understands, that power which the mind has of determining this general impression towards such objects as please us; and so of directing our general inclinations to some particular things.

Whence it is easy to perceive, that though all natural inclinations be voluntary, yet they are not all free; or, we mean, with *liberty* of indifference, which includes a power of willing, or not willing; or of willing quite the contrary to that which our natural inclinations lead us to. For, though it is voluntarily and freely that we love good in general, it is absurd to suppose we should love any thing without the will, or that the will can ever be constrained; yet we do not love it freely (in the sense just laid down) because it is not in the power of the will not to desire to be happy.

It must be observed, however, that the mind, considered as determined towards good in general, cannot divert its motion to any particular good, unless the same mind, considered as capable of ideas, have some knowledge of that particular good: that is, in plainer terms, the will is a blind power, that cannot direct itself to any thing but what the understanding represents to it; so that the power which the will has to determine its impression towards general good, or its natural inclinations, variously, consists in the power it has to command the understanding to represent some particular good.

Thus, a person, for instance, represents some dignity to himself as a good to be wished for, immediately the will desires this good; that is, the impression which the mind continually receives towards good in general, determines it to this dignity. But as that dignity is not the universal good, nor is conceived clearly and distinctly as such by the mind (for the mind cannot conceive a thing clearly which is not), the impression we have towards good in general, is not entirely exhausted by that particular good; the mind has an inclination to go further; it does not love that dignity necessarily or invincibly, and in this respect is free.

Now its *liberty* consists in this, that, not being fully convinced that this good contains in it all the good it is capable of enjoying, it may suspend its judgment and its desire.

The case is nearly the same with regard to the knowledge of truth: we love this, as we do the enjoyment of good, by a natural impression; which impression is not invincible in the latter, excepting evidence be full, and our knowledge of the object complete. We have the same *liberty* in our false judgments, that we have in our irregular appetites. See JUDGMENT, and WILL.

Mr. Locke defines *liberty* to be the power which a man has to do or forbear doing any particular action, according as its doing or forbearance has the actual preference in the mind, which is the same thing as to say, according as he himself wills it: and he observes, that so far as a man has power to think or not to think, to move or not to move, according to the preference or direction of his own mind, so far is a man free. This will be acknowledged, it always determined by some, and for the most part, by the most pressing uneasiness or desire of happiness. The *liberty* for which he contends, and for the existence of which he appeals to experience, is a *liberty* of suspending our determinations. The mind, he says, having in most cases, as is evident in experience, a power to suspend the execution and satisfaction of any of its desires, and so all one after another, is at *liberty* to consider the objects of them, examine them on all sides, and weigh them with others. In this lies the *liberty* a man has. He has a power to suspend the prosecution of this or that desire, as every one daily may experience in himself. This seems to be the source of all *liberty*. In this seems to consist, as he thinks, that which is improperly called free-will. And he adds further, that perfect indifference in the mind, not determinable by its last judgment of the good or evil, that is thought to attend its choice, would be so far from being an advantage and excellency of an intellectual nature, that it would be as great an imperfection as the want of indifference to act or not to act, till determined by the will, would be an imperfection on the other side. Eff. vol. 1. book 2. chap. 21. From these concessions the advocates for necessity have pleaded the authority of Mr. Locke, though he does not seem to have been apprized of the consequences of his principles. Mr. Hobbes, who seems to have been the first who understood and maintained the proper doctrine of philosophical necessity, defines *liberty* to be the absence of all impediments to action, that are not contained in the nature and intrinsic quality of the agent. And Mr. Collins, the principal writer on the side of necessity, defines *liberty* to be a power in man, to do as he wills, or pleases; though he denies, that we are at *liberty* to will, or not to will; or to will one or the other of two or more objects, between which, all things considered, we perceive a difference; or that we are free in our choice among things indifferent or alike.

Dr. Clarke has remarked, that in the above definition, there is an ambiguity in the words, "wills or pleases," because they may either denote the last perception or judgment of the understanding, which is entirely passive; or the first exertion of the self-moving power, which is essentially active. "Now, though the self-moving power is an adequate cause of action, yet understanding, or judgment, or assent, or apprehension, or liking, or whatever name it is called by, can no more possibly be the efficient cause of action, than rest can be the cause of motion. Nothing can possibly be the cause of an effect more considerable than itself. Nothing that is passive can possibly be the cause of any thing

that

that is active: an occasion indeed, it may be; and action may be consequent upon perception or judgment; it may easily be supposed to be always consequent upon it, and yet at the same time there may be no manner of physical or necessary connexion between them. Besides, the word "do" in this definition of Mr. Collins, has no significa-tion. For his meaning is not, that the man "acts or "does" any thing; but the *liberty* or power in man to do as he wills or pleases, is with him exactly and only the same as the *liberty* or power in a balance would be to move as it wills or pleases; supposing the balance en-dued with such a sensation or intelligence, as enabled it to perceive which way the weights turned it, and to ap-prove the motion, so as to fancy that it moved itself, when indeed it was only moved by the weights. Mr. Collins makes the difference between a man and a clock, to consist only in sensation and intelligence, not in any power of acting: whereas the whole essence of *liberty* consists in the power of acting: so that action and *liberty* are identical terms.

The principal arguments in favour of *liberty*, as it is po-pularly understood and as it is defined in the beginning of this article, are the following: this principle is necessary to constitute man an AGENT; for, as far as it is true of a being that he acts, so far he must himself be the cause of the action, and, therefore, not necessarily determined to act: but if he has no absolute power over his own actions, i. e. if he be not a free agent, the actions, which he performs, cannot properly be said to be his own, but must be ascribed to some other power, by which he is led on to perform them; as a good clock or watch performs the motions assigned to it by the artist. This argument is excellently illustrated by Dr. Clarke: man, says he, either has within himself a principle of action properly speaking, i. e. a self-moving faculty, a principle or power of beginning motion; or he has not. If he has within himself such a principle, then he is a free, and not a ne-cessary agent: for every necessary agent is moved necessa-rily by something else; and then that which moves it, not the thing itself which is moved, is the true and only cause of the action. That any other thing operating upon an agent, should efficiently and necessarily produce self-motion in that agent, is a direct contradiction in terms. If man has not within himself a principle or power of self-mo-tion, then every motion and action of man is chiefly and properly produced by the efficiency of some extrinsic cause; which cause must be either what we usually call the motive or reason upon which a man acts; or else it must be some insensible subtile matter, or some other being or substance making an impression upon him. If, the reasons or motives upon which a man acts be the im-mediate and efficient cause of the action, then either abstract notions, such as all reasons and motives are, have a real subsistence, that is, are themselves substances; or else that which has itself no real subsistence can put a body into motion; either of which is manifestly ab-surd. If insensible subtile matter, or any other being or substance, continually making impression upon a man, be the immediate and efficient cause of his acting; then the motion of that subtile matter or substance must be caused by some other substance, and the motion of that by some other, till at last we arrive at a free agent; and then *liberty* is a possible thing, and man possibly may have *liberty*: and if he may possibly have it, then experience will prove that he probably, nay, that he certainly has it. If we never arrive at any free cause, then there is either *in infinitum* a progression of motions without any mover, of effects without any cause, of things acted without any agent; which is a manifest contradiction: or else motion exists necessarily of itself. If motion exists necessarily of it-self, it must be either with a determination every way, or one certain way; if with a determination every way, this is no motion at all; if with a determination one cer-tain way, then that determination is either necessary, and consequently all other determinations impossible, which is contrary to experience; or else there must be a parti-cular reason of that determination, and so backwards *in infinitum*, which comes to the forementioned absurdity, of effects existing without any cause.

Farther, *liberty* is the dictate of our own consciousness: we have, really, the same constant and necessary conscious-ness of *liberty* that we have that we think, choose, will, or even exist; and whatever men may say to the contrary, it is impossible for them, in earnest, to think they have no active self-moving powers, and are not the causes of their own volitions; or not to ascribe to themselves what they must be conscious they think and do. Mr. Hume, though he denies the reality of *liberty*, grants that we have a feeling of it; that the divine plan required that we should be so made, as to seem to ourselves free; that the whole constitution of things is as if we were free; and that being under a necessity of approving and disapproving actions and characters, we are so far under a necessity of believing ourselves and others free. After these con-cessions, it can hardly be imagined that the constitution of nature should be altogether imposition and deceit.

Besides, if man be not, in the strictest sense of the word, a free agent, he can be no moral agent. It is hard to say, what virtue and vice, commendation and blame, mean, if they do not suppose agency, voluntary motion, free choice and an absolute dominion over our resolutions. Can we approve or reproach ourselves for what we were no more the causes of than of our own beings, and what it was no more possible for us to prevent than the returns of the seasons, or the revolutions of the planets? On the system of necessity, conscience is an inexplicable principle: its censures or applause are equally futile and groundless: the approbation of mankind is an insult with regard to those on whom it is bestowed, because they can have no merit; and the reproach of men unjust and cruel, because there can be no demerit and ground of blame. Whatever difficulties, therefore, may attend the nature of that influence which we ascribe to motives, they cannot be the efficient necessitating cause of human actions: since, on this supposition, there could be but one agent in the universe; who must equally be the author of all the good and evil in the world, and on whom must ultimately be charged the sin and misery, as well as the virtue and happiness of his creatures.

Moreover, it has been urged by the advocates of *liberty*, that if men's determinations and actions flow necessarily from the previous state of their minds and the motives or influences resulting from a nature or condition imposed upon them without their own consent or choice, the idea of responsibility or accountableness must vanish, and there can be no propriety or use of rewards or punish-ments. God cannot reward without virtue, and there can be no virtue without a self-determining power: he cannot punish without guilt, and there can be no guilt when men do what they cannot avoid doing, and when their actions arise from circumstances in which their Creator placed them.

It is also equally unjust and useless to threaten punishment or inflict it on men to prevent crimes, when they are necessarily determined in all their actions. And if men are necessary agents, though we cannot well admit this verbal contradiction, it can be of no use to reason with them, to admonish or interest them; and God must be insincere in his addresses and invitations, and cruel in his requirements and commands. But such is the whole tenour of revelation, and, therefore, the conclusion is necessary, that man is a free agent, capable of good or evil, and of determining his pursuit of either, from the sole power of his own judgment or will. See on this subject Collins's Enquiry concerning Human Liberty, first printed in 1717. Clarke's Remarks, 1717, and Collec-tion of Papers which passed between Mr. Leibnitz and Dr. Clarke, in 1715 and 1716. Jackson's Vindication and Defence of Human Liberty, 1730. Price's Review of the principal Questions, &c. in Morals, p. 315, &c. edit. 1758. Priestley's Doctrine of Philosophical Ne-cessity, 1777. For the objections against *liberty* and the arguments in support of necessity, see NECESSITY.

LIBERTY, *moral*, is the power of following, in all circum-stances, our sense of right and wrong; or of acting in conformity to our reflecting and moral principles, without being controlled by any contrary principles.

LIBERTY, *religious*, is the same with LIBERTY *of con-science*, and signifies the power of exercising, without molestation, that mode of religion which we think best; or of making the decisions of our own consciences, re-specting religious truths, the rule of our conduct, and not any of the decisions of others.

LIBERTY, *civil*, is the power of a civil society or state, to govern itself by its own discretion; or by laws of its own making, without being subject to any foreign dis-cretion, or to the impositions of any extraneous will or power. Civil *liberty*, says Judge Blackstone, adopting the definition of the Institutes, consists in the power of doing whatever the laws permit; or it is natural *liberty*, or a power of acting as one thinks fit, without any re-straint or control, unless by the law of nature, so far restrained by human laws, and no farther, as is necessary and expedient for the general advantage of the public. Others have defined *civil liberty* in contradistinction from *political* LIBERTY to be that power over their own actions, which the members of the state reserve to themselves, and which their officers must not infringe. This ex-tends no farther than to a man's own conduct, and sig-nifies the right he has to be exempt from the control of the society or its agents, that is, the power he has of providing for his own advantage and happiness. It is a man's civil *liberty*, which is originally in its full force, and part of which he sacrifices when he enters into a state of society.

LIBERTY, *political*, sometimes used as synonymous with

tivil *liberty*, in a diſtinct ſenſe, conſiſts in the power, which the members of the ſtate reſerve to themſelves of arriving at the public offices, or at leaſt, of having votes in the nomination of thoſe who fill them: and this is that which a man may or may not require in the compenſation he receives for it. In countries where every member of the ſociety enjoys an equal power of arriving at the ſupreme offices, and conſequently of directing the ſtrength and the ſentiments of the whole community, there is a ſtate of the moſt perfect political *liberty*. On the other hand, in countries where a man is, by his birth or fortune, excluded from theſe offices, or from a power of voting for proper perſons to fill them; that man, whatever be the form of the government, or whatever civil *liberty* or power over his own actions he may have, has no power over thoſe of another; he has no ſhare in the government, and therefore has no political *liberty* at all. Nay, his own conduct, as far as the ſociety does interfere, is, in all caſes, directed by others.

LIBERTY, *perſonal*, conſiſts in the power of loco-motion, or of changing ſituation, or removing one's perſon to whatſoever place one's own inclination may direct, without impriſonment or reſtraint, unleſs by due courſe of law. See HABEAS *corpus*.

LIBERTY *of the tongue*, in the *Manege*, is a void ſpace left in the middle of a bit, to give place to the tongue of a horſe, made by the bit's arching in the middle, and riſing towards the roof of the mouth. The bit, according to the various forms of the *liberty*, acquires different names; hence we ſay a *ſmutzle-mouth*, a *Pignatelli*, i. e. with the *liberty* after Pignatelli's faſhion, and a *canon-mouth*, with the *liberty* like a pigeon's neck.

In forging the bit, care muſt be taken not to make the *liberty* too high, leſt it hurt, or at leaſt tickle the palate, and make the horſe carry low.

LIBERTY, in *Mythology*, was a goddeſs both among the Greeks and Romans. Among the former ſhe was invoked under the title Eleutheria; and by the latter ſhe was called *Libertas*, and held in ſingular veneration; temples, altars, and ſtatues, were erected in honour of this deity. A very magnificent temple was conſecrated to her on mount Aventin, by Tiberius Gracchus, before which was a ſpacious court, called *atrium libertatis*. The Romans alſo erected a new temple in honour of *Liberty*, when Julius Cæſar eſtabliſhed his empire over them, as if their *liberty* had been ſecured by an event which proved fatal to it. In a medal of Brutus, *Liberty* is exhibited under the figure of a woman, holding in one hand a cap, the ſymbol of *liberty*, and two poniards in the other, with the inſcription IDIBVS MARTIIS.

LIBETHRIDES, in *Mythology*, a ſurname given to certain nymphs which were ſuppoſed to inhabit near mount Libethra in Beotia; and the Libethreian fountain in Theſſaly led the poets to call the Muſes by this name. Virgil, Eclog. vii. v. 21.

LIBITINA, in the *Roman Mythology*, a goddeſs which preſided over funerals. This goddeſs was the ſame with the *Venus inferna* or *Epitymbia* of the Greeks. She had a temple at Rome, where was lodged a certain piece of money for every perſon who died, whoſe name was recorded in a regiſter called *Libitinæ ratio*. This practice was eſtabliſhed by Servius Tullius, in order to obtain an account of the number of annual deaths, in the city of Rome, and conſequently the rate of increaſe or decreaſe of its inhabitants.

LIBONOTUS, in *Phyſiology*, one of the twelve winds of the ancients. See WIND.

LIBRA, *balance*, one of the mechanical powers. See BALANCE.

LIBRA is one of the twelve ſigns of the zodiac; exactly oppoſite to Aries; ſo called, becauſe when the ſun is in this ſign, at the autumnal equinox, the days and nights are equal, as if weighed in a balance.

The ſtars in this conſtellation according to Ptolemy are ſeventeen, Tycho ten, Hevelius twenty, and Flamſtead fifty-one. Their names, &c. are as follow:

Names and ſituations of the ſtars.	Britiſh Chart.	Signs.	Longit.			Latitude			Magnitude
			°	′	″	°	′	″	
		♍	6	44	44	13	45	35S	5.6
			3	5	10	2	20	53N	7
			10	52	46	9	1	22S	6
			11	41	27	8	43	9S	6
			9	48	7	0	35	38N	6
5.									
			14	10	0	11	3	20S	5
Preced. in ſouth. ſcale		♎	9	51	43	2	3	54N	5.6
			10	42	35	0	24	26N	6
Bright ſtar of ſouth. ſcale		♎	10	46	40	0	22	51N	2
			12	39	14	1	45	30S	6

Names and ſituations of the ſtars.	Britiſh Chart.	Signs.	Longit.			Latitude			Magnitude
			°	′	″	°	′	″	
		♍	6	41	9	13	30	17N	6
			14	2	47	7	37	31S	6
First north. of ſouth. ſcale	ξ		10	22	31	4	34	38N	6
			10	58	48	8	11	55	6
Second	ξ		10	47	59	5	12	27N	6
15.									
			8	50	28	12	00	48N	5.6
			11	3	49	5	33	48N	7
			11	12	55	5	37	5N	6
That preced. in north. ſcale	β		10	58	54	8	10	34N	4-5
South. of inform. preced. below ſcales	γ		16	22	31	7	35	56S	3
20.									
Firſt ſouth. following ſcale	ſ		14	28	1	1	13	43N	5
Second	ι		14	34	16	1	1	32N	6
			17	11	25	7	25	50S	7
North. of inform. preced. below ſcales	ι		16	41	43	1	48	23S	4-5
			16	54	30	1	35	58S	6
25.									
			16	41	20	0	18	3N	6
Northern ſcale	θ		15	3	40	8	32	2N	2
			18	14	26	0	28	50N	6
Second following ſouth. ſcale	ε		17	36	48	2	49	47N	7
Another	ε		17	58	31	3	22	18N	6
30.									
Next after north. ſcale	ι		17	1	43	8	5	44N	4
	ζ		19	35	30	2	6	1N	0
	ζ		20	2	23	1	40	27N	7
	ζ		19	6	40	2	23	6N	6
Third following ſouth. ſcale	ζ		20	42	5	2	10	39N	4
35.									
			23	44	54	8	30	16S	6
Following in north. ſcale			19	10	41	8	56	5N	6
Nor. of 2 inf. follow. below ſcales, or before feet of ſouth	?		20	48	53	4	25	27N	5-4
			24	17	28	8	28	9S	4
40.									
			25	2	17	9	58	50S	4
			22	39	2	0	14	7N	6
			24	0	34	4	5	38S	6
Fourth of follow. ſouth. ſcale	ι		23	27	00	0	1	42N	4
Second below north. ſcale	υ		23	2	38	4	2	52N	4
Laſt follow. ſouth. ſcale	κ		26	9	45	0	7	50N	4
45.									
Follow. below north. ſcale	δ		25	53	4	3	30	4S	4
			26	22	37	0	9	12N	6
South. of follow. north. ſcale	ψ		26	4	4	6	7	48S	4
			27	4	55	4	4	22N	6
			25	32	16	12	00	5N	6
50.									
Midd. of thoſe follow. north. ſcale	ξ		26	58	45	9	16	29S	4-5

LIBRA alſo denotes the ancient Roman pound, borrowed from the Sicilians, who called it *litra*, λίτρα.

The *libra* was divided into twelve unciæ, or ounces, and the ounce into twenty-four ſcruples.

The diviſions of the *libra* were, the *uncia*, one twelfth; the *ſextans*, one ſixth; the *quadrans*, one fourth; the *triens*, one third; the *quincunx*, five ounces; the *ſemis*, ſix; the *ſeptunx*, ſeven; the *bes*, eight; the *dodrans*, nine; the *dextans*, ten; the *deunx*, eleven; laſtly, the *as* weighed twelve ounces, or one *libra*.

Learned writers are not agreed as to the true weight of the Roman pound. Villalpandus and Greaves, relying on the cenſus of Veſpaſian for its ſtandard weight, have from hence attempted to determine this intricate queſtion. This Roman cenſus contained ten pounds weight of wine: Villalpandus found by filling it with ſpring water, that it contained juſt ten modern Roman pounds, which are equal to 52560 Troy grains. About filled it to the ſame height, and, having weighed its contents twice, found a reſult very nearly agreeing with Greaves's meaſure, ſtated by Miller, in Phil. Tranſ. vol. li. p. 790. His greater weight was 63074 Paris grains, equal to 51695 Troy; his leſſer, 62780 Paris grains equal to 51482 Troy. The mean between both is 51591 Troy grains, which, divided by 10, give 5159 ſuch grains for the weight of the ancient Roman pound. Several objections have been made to this pound derived from the cenſus, which Mr. Roper, *ubi ſupra*, has collected into one view; from which he infers, that it is more probable, that this ſtandard ſhould give too great a Roman pound, than too ſmall a one. But as the reſult from hence muſt be uncertain, he has recourſe to the coins. Having weighed nine gold pieces in the Pembroke collection, containing 343 Roman ſcruples, he found their weight to amount to 608 Troy grains, which divided by 343, give 1771 for the ſcruple, whence the Roman pound ſhould weigh 507355 grains. From ſome other coins of the ſame kind, a ſcruple appears to be 174 grains.

grains. Instead of this scrupular standard, another was introduced by Sylla; and from the heaviest of four pieces of this standard, allowing thirty of them to have been coined out of the Roman pound, its weight is found to be 5040 grains. The standard of forty in the pound, mentioned by Pliny, succeeded this of Sylla, and continued to the establishment of the monarchy under Augustus: and from ten different coins of this standard, he deduces a mean AUREUS of 126 grains; and supposing the aureus of forty in the pound to weigh 126 Troy grains, the Roman pound must weigh 5040. In Pliny's time forty-five aurei were struck out of the pound; and the mean aureus from Nero to Titus, in whose reign Pliny died, was under 112 grains: and if the standard weight of the imperial aureus of forty-five in the pound did not exceed 112 grains, the Roman pound will weigh 5040 grains, as it is found from the consular aureus. Soon after the reign of Alexander Severus, in whose time the aureus came to be called solidus, the coinage became very irregular, till Constantine entirely modelled it anew, by coining seventy-two solidi of four scruples out of the pound of gold. From twenty-nine of these solidi in the interval from Constantine to Heraclius, it appears that the mean weight is 69 grains, which, multiplied by 72, gives but 4968 grains for the Roman pound. But if the standard weight of this coin amounted to 70 grains, the pound will weigh 5040, as before. If we take 5040 Troy grains for the weight of the Roman pound, the scruple will weigh 17½ grains: the consular aureus 126; the imperial aureus 112, and the solidus 70; and the consular denarius of 84 in the pound will weigh just 60 Troy grains. Phil. Trans. vol. lxi. part 2. p. 461, &c. See further on this subject the articles DENARIUS and MILIARENSIS.

The Roman *libra* was used in France for the proportions of their coin, till the time of Charlemagne, or perhaps till that of Philip I. in 1093, their sols being so proportioned, as that twenty of them were equal to the *libra*. By degrees, it became a term of account; and every thing of the value of twenty sols, was called a *livre*.

LIBRA *pensi*, in our *Law Books*, denotes a pound of money in weight.

It was usual, in former days, not only to tell the money, but to weigh it; because many cities, lords, and bishops, having their mints, coined money, and often very bad too; for which reason, though the pound consisted of twenty shillings, they always weighed it.

LIBRARII, among the ancients, were a sort of copyists, who transcribed in beautiful, or, at least, legible characters, what had been written by the notarii in notes and abbreviatures.

LIBRARY, an edifice or apartment destined for the placing of books; or the collection of books themselves lodged therein. See BOOK.

Some authors refer the origin of *libraries* to the Hebrews; and observe, that the care those took for the preservation of their sacred books, and the memory of what concerned the actions of their ancestors, became an example to other nations, particularly to the Egyptians. Osmanduas, king of Egypt, is said to have taken the hint first; who, according to Diodorus, had a *library* built in his palace, with this inscription over the door, ΨΥΧΗΣ ΙΑΤΡΕΙΟΝ. Nor were the Ptolemies, who reigned in the same country, less curious and magnificent in books.

The Scripture also speaks of a *library* of the kings of Persia, Ezra v. 17. vi. 1. which some imagine to have consisted of the historians of that nation, and of memoirs of the affairs of state; but, in effect, it appears rather to have been a depository of laws, charters, and ordinances, of the kings. The Hebrew text calls it the *house of treasures*, and afterwards the *house of the rolls*, where the treasures were laid up. We may, with more justice, call that a *library*, mentioned in the second of Esdras to have been built by Nehemiah, and in which were preserved the books of the prophets, and of David, and the letters of their kings.

The first who erected a *library* at Athens, was the tyrant Pisistratus; and yet Strabo refers the honour of it to Aristotle. That of Pisistratus was transported by Xerxes into Persia, and was afterwards brought back by Seleucus Nicanor to Athens. Long after, it was plundered by Sylla, and re-established by Hadrian. Plutarch says, that under Eumenes there was a *library* at Pergamus, containing two hundred thousand books. Tyrannion, a celebrated grammarian, contemporary with Pompey, had a *library* of three thousand volumes. That of Ptolemy Philadelphus, according to A. Gellius, contained seven hundred thousand, all in rolls, burnt by Cæsar's soldiers. See ALEXANDRIAN.

Constantine, and his successors, erected a magnificent one at Constantinople; which, in the eighth century, contained three hundred thousand volumes, all burnt by order of Leo Isaurus; and, among the rest, one wherein the Iliad and Odyssey were written in letters of gold, on the guts of a serpent.

The most celebrated *libraries* of ancient Rome, were the Ulpian, and the Palatine. They also boast much of the *libraries* of Paulus Æmilius, who conquered Perseus; of Lucilius Lucullus, of Asinius Pollio, Atticus, Julius Severus, Domitius, Serenus, Pamphilus Martyr, and the emperors Gordian and Trajan.

Anciently, every large church had its *library*; as appears by the writings of St. Jerom, Anastasius, and others. Pope Nicholas laid the first foundation of that of the VATICAN, in 1450. It was destroyed by the constable Bourbon, in the sacking of Rome, and restored by pope Sixtus V. and has been considerably enriched with the ruins of that of Heidelberg, plundered by count Tilly in 1622. One of the most complete *libraries* in Europe, was said to be that erected at Florence by Cosmo de Medicis; over the gate whereof is written, LAUDE ASSEQUI LABOREM; though it is now exceeded by that of the French king; begun by Francis I. augmented by cardinal Richelieu, and completed by M. Colbert.

The emperor's *library* at Vienna, according to Lambecius, consists of eighty thousand volumes, and fifteen thousand nine hundred and forty curious medals.

The Bodleian *library* at Oxford, built on the foundation of that of duke Humphry, exceeds that of any university in Europe, and even those of all the sovereigns of Europe, except the emperor's, and French king's, which are each of them older by a hundred years. It was first opened in 1602, and has since found a great number of benefactors; particularly Sir Robert Cotton, Sir H. Savil, archbishop Laud, Sir Kenelm Digby, Mr. Allen, Dr. Pococke, Mr. Selden, and others. The Vatican, the Mediccan, that of Bessarion at Venice, and those just mentioned, exceed the Bodleian in Greek manuscripts; which yet outdoes them all in Oriental manuscripts.

As to printed books, the Ambrosian at Milan, and that of Wolfenbuttle, are two of the most famous, and yet both inferior to the Bodleian.

LIBRARY, *king's*, at St. James's, was founded by Henry, eldest son of James I. and made up partly of books, and partly of manuscripts, with many other curiosities, for the advancement of learning. It has received many additions from the *libraries* of Isaac Casaubon, and others.

LIBRARY, *Cottonian*, originally consisted of nine hundred and fifty-eight volumes of original charters, grants, instruments, letters of sovereign princes, transactions between this and other kingdoms and states, genealogies, histories, registers of monasteries, remains of Saxon laws, the book of Genesis, thought to be the most ancient Greek copy extant, and said to have been writ by Origen in the second century, and the curious Alexandrian copy of manuscript, in Greek capitals. This *library* is kept in the British Museum, with the large and valuable *library* of Sir Hans Sloane, amounting to upwards of forty-two thousand volumes, &c. There are many public *libraries* belonging to the several colleges at Oxford and Cambridge, and the universities in North Britain. The principal public *libraries* in London, beside that of the Museum, are those of the college of heralds, of the college of physicians, of Doctors Commons, to which every bishop, at the time of his consecration, gives at least 50*l.* sometimes 50*l.* for the purchase of books, those of the Gray's Inn, Lincoln's Inn, Inner Temple, and Middle Temple; that of Lambeth, founded by archbishop Bancroft in 1610, for the use of succeeding archbishops of Canterbury, and increased by the benefactions of archbishops Abbot, Sheldon, and Tennison, and said to consist of, at least, fifteen thousand printed books, and six hundred and seventeen volumes in manuscript; that of Red-Cross street, founded by Dr. Daniel Williams, a presbyterian divine, and since enriched by many private benefactions; that of the *Royal* SOCIETY, called the Arundelian or Norfolk *library*, because the principal part of the collection formerly belonged to the family of Arundel, and was given to the society by Henry Howard, afterwards duke of Norfolk, in 1666, which *library* has been increased by the valuable collection of Francis Aston, esq. in 1715, and is continually increasing by the numerous benefactions of the works of its learned members, and others; that of St. Paul's, of *Sion* COLLEGE, the queen's *library*, erected by queen Caroline in 1737; and the surgeon's *library*, kept in their hall in the Old Bailey, &c.

Where a *library* is erected in any parish, it shall be preserved for the uses directed by the founder; and incumbents and ministers of parishes, &c. are to give security for it, and make catalogues of the books, &c. None of the books shall be alienable, without consent of the bishop, and then only when there is a duplicate of such books. If any book shall be taken away and detained, a

justice's

juſtice's warrant may be iſſued to ſearch for, and reſtore the ſame: alſo action of trover may be brought in the name of the proper ordinary, &c. And biſhops have power to make rules and orders concerning *libraries*, appoint perſons to view their condition, and enquire of the ſtate of them in their viſitations. Stat. 7 Anne, cap. 14.

LIBRATA *terræ*, a portion of ground, containing four oxgangs, and every oxgang thirteen acres.

With us, it is ſo much land as is yearly worth 20*s*. In Henry the third's time, he that had *quindecim librata terræ*, was to receive the order of knighthood.

Some ſay, that as money is divided into pounds, ſhillings, pence, and farthings, the ſame degrees are to be obſerved in the diviſion of lands; and, therefore, as *quadrans* ſignifies a farthing, ſo *quadrantata* is the fourth part of an acre; *obolata* an half; *denariata*, a whole acre; *ſolidata*, 12 acres; and *librata*, 20 times 12 acres; i. e. 240 acres.

This is the ſame with what in Scotland is called POUND-*land* of old extent.

LIBRATION, in *Aſtronomy*, an apparent irregularity in the motion of the moon, by which ſhe ſeems to *librate*, or waver about her own axis; ſometimes from the eaſt to the weſt; and ſometimes from the weſt to the eaſt. See MOON.

Hence it is, that ſome parts in the moon's weſtern limb, or margin, at one time, recede from the center of the diſc, and at another, move towards it; by which means, ſome of thoſe parts, which were before viſible, ſet and hide themſelves in the inviſible ſide of the moon, and afterwards become again conſpicuous.

This *libration* of the moon is owing to her equable rotation round her own axis, and her unequal motion in the perimeter of her orbit. For if the moon moved in a circle, whoſe center coincided with the center of the earth, and turned round its axis in the preciſe time of its period round the earth, the plane of the ſame lunar meridian would always paſs through the earth, and the ſame face of the moon would be conſtantly and exactly turned towards us. But ſince the real motion of the moon is in an ellipſis, in whoſe focus is the earth, and the motion of the moon about the earth is equable; or, which is the ſame thing, every meridian of the moon, by the rotation, deſcribes angles proportional to the times, the plane of no one meridian will conſtantly paſs through the earth.

LIBRATION *of the earth*, is a term applied by ſome aſtronomers to that motion, whereby the earth is ſo retained in its orbit, as that its axis continues conſtantly parallel to the axis of the world. See PARALLELISM.

This Copernicus calls the *motion of libration*; and may be illuſtrated thus: ſuppoſe a globe, with its axis parallel to that of the earth, painted on the flag of a maſt, moveable on its axis, and conſtantly driven by an eaſt wind, while it ſails round an iſland; it is evident, the painted globe will be ſo *librated*, as that its axis will be parallel to that of the world, in every ſituation of the ſhip.

LICE. See LOUSE.

LICE *of trees*. See APHIS.

LICENCE, *licentia*, in *Law*, a power or authority given to another to do ſome lawful act.

A *licence* is a perſonal power, and cannot be tranſferred to another, though a *licence* may be granted to a man and his aſſigns.

LICENCE *to alien in mortmain*. Alienations in mortmain to eccleſiaſtical perſons, &c. are reſtrained by ſeveral Statutes; but the king may grant *licences* to any perſon or bodies politic, &c. to alien or hold lands in MORTMAIN. 27 Ed. I. 7 & 8 W. III. cap. 37.

LICENCE is alſo uſed, in the *Civil Law*, for a permiſſion or leave granted by a ſuperior.

Juſtinian appointed four years to be ſpent in the ſtudy of the law; after which, thoſe who had diſcharged this obligation, were ſaid to have *licence* or permiſſion to retire from ſtudy.

LICENCE is alſo applied to the letters, or certificates, taken out in univerſities, whether in law, phyſic, or divinity.

Licence, in the Sorboune, denotes a period of two years, which the bachelors are obliged to paſs in aſſiſting at acts, and diſputing in them, to qualify themſelves for being admitted doctors. See DEGREE.

LICENCE, *letter of*. See LETTER.

LICENCE *to ſeiſe*, in *Law*, LICENTIA *ſurgendi*, is a liberty, or ſpace of time given by the court to a tenant, who is eſſoined *de malo lecti* in a real action, to riſe out of his bed, and go about his buſineſs.

LICENCE *for election of biſhops*. See CONGE *d'eſlire*.

LICENCE *of marriage*. Biſhops have power to grant *licences* for this purpoſe; and perſons marrying any perſon without publiſhing the banns of matrimony, or without *licence*, incur a forfeiture of 100*l*. &c. by 7 & 8 W. III. cap. 35. See MARRIAGE.

LICENCE, in *Painting*, are the liberties which the painter takes in diſpenſing with the rules of perſpective, and the other laws of his art.

LICENCE, *poetical*, is the liberty which poets claim of diſpenſing with the ordinary rules of grammar.

Anciently, poets had much greater *licences* than are now allowed. The Greeks, by having recourſe to the ſeveral dialects of their tongue, could lengthen out a word, if it were too ſhort, or retrench ſomething from it, if it were too long. The old poets did what they pleaſed with their language, and ſubjected it not only to all their caprices, but their caprices too:

Et data Romanis venia eſt indigna poetis.

But theſe became ridiculous in courſe of time; and the poets are now deſpoiled of moſt of their ancient privileges.

LICENSED *curate*. See CURATE.

LICENTIA *concordandi*, in *Law*, is that *licence* for which the *king's* SILVER is paid in paſſing a fine, mentioned in 12 Car. II. cap. 12.

LICENTIA *loquendi*. See EMPARLANCE.

LICENCIATE, or LICENTIATE, he who has obtained the degree of a *licence*.

Moſt of the officers of juriſdicture in Spain are known by no other name than that of *licenciates*. To paſs *licenciate* in the common law, civil law, or phyſic, they muſt have ſtudied ſeven years; in divinity, ten.

LICENTIATE, among us, is uſually underſtood of a phyſician, who has a *licence* to practiſe, granted him by the COLLEGE *of phyſicians*, or by the biſhop of the dioceſe.

A perſon practiſing phyſic without ſuch *licence*, in caſe his patient dies under his hands, is guilty of felony in the eye of the law.

LICETO, in *Ornithology*. See CENOTAQUE.

LICHANUS, in the *ancient Muſic*, the name of one of the founds of a tetrachord. It was next to the nete.

The word is Greek, λιχανος, and ſignifies *index*.

The reaſon of the appellation was, that the *lichanus* ſhewed whether, and how far the genus was *molle* or *intenſum*. For the more remote the *lichanus* was from the moſt acute ſound in the tetrachord, the more did the genus partake of the *molle*. And, on the contrary, the nearer the *lichanus* approached to this higheſt note, the genus was reckoned the more intenſe. Vide Wallis, Append. ad Ptolem. Harm. p. 160.

This is Dr. Wallis's account of the matter. And, indeed, the reaſon of the name *lichanus* is not at all myſterious, if we conſider that the ſound of this chord was different in every one of the genera, whereas the ſound of the partipate remained the ſame in three different genera, and could not therefore be an index or characteriſtic of thoſe genera, which were, the *chromaticum temperatum*, the *diatonicum molle*, and the *diatonicum intenſum*. See CHROMATIC and DIATONIC.

LICHANUS *hypaton*, λιχανος ὑπατων, in the Greek ſcale of muſic, was the penultimate note of the hypaton tetrachord, and anſwers to *D ſol re ut*. See Guido's ſcale. See DIAGRAM.

LICHANUS *meſon*, λιχανος μεσων, in the Greek muſic, was the penultimate note of the *meſon* tetrachord, and anſwers to Guido's *G ſol re ut*. See DIAGRAM.

LICHEN, in *Botany*. See LIVER-wort.

LICHEN, Λειχην, in *Medicine*, a cutaneous diſtemper, otherwiſe called IMPETIGO.

LICHENASTRUM, in *Botany*, the name of a genus of plants, called JUNGERMANNIA, in the Linnæan ſyſtem, ſo called from the *lichen* or *liver-wort*, the flowers of which thoſe of this genus ſomewhat reſemble. The characters of the *lichenaſtra* are theſe: the flower is naked, and of the antherocous kind, globoſe at its firſt appearance, but ſoon after burſting open into a ſtellate or cruciform four-leaved flower, of the reſemblance of one, much like that of the gallium; this ſheds a fine duſt, or true farina, and is ſuſtained on a pedicle ſingly, and coming out of a theca or cup, which in ſome is undivided, in others is divided into two or more ſegments, repreſents a true flower. All the moſſes which have this ſort of flower are to be ranked in this genus, however widely they differ from one another in their external general form.

The firſt order of the *lichenaſtra*, according to Dillenius, contains thoſe with ſhoots and branches of a determinate figure; and of theſe the firſt ſeries conſiſts of ſuch as have leaves all ſet one way. Dillen. Hiſt. Muſc. p. 486.

The ſecond ſeries of theſe *lichenaſtra* comprehends thoſe, which have their leaves ſet on each ſide the ſtalks, and reſemble in miniature the ſeveral kinds of the trichomanes and aſplenium: the firſt diviſion of theſe comprehends thoſe which have ſimple pinnæ, placed alternately againſt one another, and the middle rib naked.

The firſt ſubdiviſion comprehends thoſe which have whole pinnæ, or at the utmoſt ſuch as are only ſlightly crenated.

The

The second division of these *lichenastra* comprehends those which have pinnæ cut into two or three segments, or as it were prickly.

The third division of these *lichenastra* takes in those which are pinnated and resemble the trichomanes, but which have their middle rib hid, or covered by the auriculæ of the pinnæ, or else by secondary ones.

The first subdivision of these comprehends those which have the middle rib covered by the auriculæ of the pinnæ.

The second subdivision of these *lichenastra*, comprehends those which have the lower part of their middle rib covered with either one single foliage, or with a series of intermediate pinnæ.

The third series of these *lichenastra*, comprehends those which are imbricated, or have their pinnæ standing closer upon, and lying over one another, and standing less out from the surface of the stalks. The first division of these takes in those which have scales or pinnæ, as it were furnished with a secondary scale below.

The second division of these *lichenastra* contains those which have the ribs or nerves of the branches covered underneath by a sort of secondary squamæ.

The fourth series of these *lichenastra* takes in those which are every way surrounded with leaves.

The second order of these *lichenastra* comprehends those which have leaves variously and indeterminately divided, which creep upon the ground, and have no stalks except the pedicles.

The third order of the *lichenastra* comprehends a few species, of which the author was less perfectly informed than of the rest, not having seen their heads, or absolutely depending on the accounts of them.

LICHENOIDES, in *Botany*, the name of a genus of *algæ*, the characters of which are these: they are composed of parts of different figure and structure, not simple and uniform as the byssi; they have usually no stalk, but grow on the branches of trees, on stones, and other bodies, either in form of a mere crust, or of leaves variously divided, and raised. They have tubercles on the several parts of these, serving in the place of flowers or seeds, and growing closely upon the leaves without pedicles. Michell has described the flowers and seeds of these plants from microscopic observations, but these are too minute to form generical distinctions on. These plants have the name *lichenoides*, from their resemblance to the *lichen*, or liverwort, as they consist, like it, of leaves diffused every way. They have hence been called by some *lichenes*; but the difference between the two genera is very great, these having very imperfect flowers, the others the most perfect of all the moslea.

The *lichenoides* are a very numerous genus, and are therefore divided into several subordinate series, or orders.

Of the first order, are those which have no leaves, but are merely crustaceous. Dillen. Hist. Musc. p. 144.

The second order of the *lichenoides* comprehends those which have regular scutellæ appearing in manner of flowers; these are little hollowed cups, as it were, surrounded with a kind of rim.

This order comprehends the foliaceous *lichenoides*. Of these some are of a gelatinous substance, and have tubercles and scutellæ.

Of the gelatinous *lichenoides*, the following are the known species of the dry and more rigid kinds, which have regular scutellæ.

These have their scutellæ standing on pedicles, more or less long; the other kinds have them applied close to the surface of the leaves, and usually of one colour: the leaves of these are more or less broad, and generally grow out from stones, or the branches of trees.

These have all their leaves, more or less, free; but there are some species which have them closely adhering, in every part, to the stone or wood on which they grow.

The third series of the *lichenoides* takes in those which are dry and peltated, or clypeated, which have tubercles of a roundish, or oblong figure, sometimes flat, sometimes convex, but never concave, nor surrounded with any rim or margin, in the manner of the scutellæ of the former kinds.

The second division of these *lichenoides* contains those which have pileated heads or pelæ, sustained on short pedicles which are fixed to their middle.

To all these there are to be added some other species, the pelæ or shields of which very rarely, if ever, appear, so that they have not yet been observed.

LICINIUM, a word used by many chirurgical writers to express a tent.

LICNON, Λικνον, in the Dionysian solemnities, the mystical van of bacchus; a thing so essential to all the solemnities of this god, that they could not be duly celebrated without it. See DIONYSIA.

LICNOPHORI, Λικνοφοροι, in the Dionysian solemnity, those who carried the LICNON.

LICTORS, among the Romans, were officers established by Romulus, who always attended the chief magistrates when they appeared in public.

The duty of their office consisted in the three following particulars: 1. *Submotio*, or clearing the way for the magistrate they attended: this they did by word of mouth; or, if there was occasion, by using the rods they always carried along with them. 2. *Animadversio*, or causing the people to pay the usual respect to the magistrate, as to alight, if on horseback, or in a chariot; to rise up, uncover, make way, and the like. 3. *Præitio*, or walking before the magistrates: this they did not confusedly, or all together, not by two or three abreast, but singly following one another in a straight line. They also preceded the triumphal car in public triumphs; and it was also part of their office to arrest criminals, and to be public executioners in beheading, &c. Their ensigns were the FASCES and SECURIS.

As to the number of *lictors* allowed each magistrate, a dictator had twenty-four, a master of the horse six, a consul twelve, a prætor six; and each vestal virgin, when she appeared abroad, had one.

LIE, or LIE *under the sea*. See LYING, &c.

LIEGE, LIGE, properly signifies a *vassal*, who holds a kind of fee, that binds him in a closer obligation to his lord than other people.

The term seems to be derived from the French *lier, to bind*; on account of a ceremony used in rendering faith, or homage; which was by locking the vassal's thumb, or his hand, in that of the lord, to shew that he was fast bound by his oath of fidelity.—Chiflet, Vignerius, and Bignon, choose rather to derive the word from the same source with *leudis*, or *leudi, legali, faithful*.—But Du-Cange falls in with the opinion of those who derive it from *lici*, a kind of vassals, so firmly attached to their lord, on account of lands or fees held of him, that they were obliged to do him all manner of service, as if they were his domestics. He adds, this was formerly called *ligium servitium*, and the person *liger*. In this sense, the word is used, Leg. Edw. cap. 19. *Fuderi sub tutela regis ligeo debent esse*; that is, wholly under his protection.

By *liege* HOMAGE, the vassal was obliged to serve his lord towards all, and against all, excepting his father. In which sense, the word was used in opposition to *simple homage*; which last only obliged the vassal to pay the rights and accustomed dues to his lord; and not to bear arms against the emperor, prince, or other superior lord: so that a *liege man* was a person wholly devoted to his lord, and entirely under his command.

Omnibus, &c. Reginaldus, rex Insulorum, salutem. Sciatis quod devenit homo ligeus domini regis Angliæ Johannis, contra omnes mortales, quamdiu vixero; & inde ei fidelitatem & sacramentum præstitit, &c. MS. penes W. Dugdale.

But it muſt be observed, there were formerly two kinds of *liege homage*: the one, by which the vassal was obliged to serve his lord, against all, without exception even of his sovereign; the other, by which he was to serve him against all, except such other lords as he had formerly owed *liege homage* to.

In our old statutes, *leges*, and *liege people*, are terms peculiarly appropriated to the king's subjects; as being *leges, legi*, or *legati*, obliged to pay allegiance to him; 8 Hen. VI. 14 Hen. VIII. &c. though private persons had their *leges* too.

Rotuulus, Dei gratia, abbas Ramesiæ, præpositis & hominibus de Brancestre, & omnibus ceteris Francis & Anglis, fidelibus.. Sciatis me dedisse terram Ulfe, in dapedani (hodie dapedale) huic Beccelmo, & uxori ejus Alfæiæ—ea conditione quod effecti sint homines leges. Lib. Ramef.

LIEGE *vaſſalage*. See VASSALAGE.

LIENIS *infarctus*. See SPLEEN.

LIENTERY, *Lientheria*, in *Phyſic*, a kind of looſeneſs or DIARRHŒA, wherein the food paſſes ſo ſuddenly through the ſtomach and guts, as to be thrown out by ſtool, with little or no alteration.

The ancients were of opinion, that the *lientery* was owing to the too great ſmoothneſs and ſlipperineſs of the inſide of the inteſtines, by which they let the food ſlip off before it was digeſted: and hence they gave it this name, which is formed from λειος, *ſmooth, poliſhed*; and εντερον, *inteſtine*.

The *lientery* is generally owing either to a defect in the ferment of the ſtomach, or to a relaxation of the pylorus, attended with ſo briſk an irritation of the fibres of the ſtomach, that, inſtead of retaining the aliment, it lets it paſs, or to an obſtruction of the inteſtinal glands.

Exceſs of drinking ſometimes occaſions this diſeaſe, by relaxing the ſtomach, and eſpecially the pylorus, too immoderately.

Emuller propoſes to ſtrengthen the ſtomach with rhubarb, quinces, and ſuch means as check vomiting: Dr. Freind adviſes to gently ſtimulate the inteſtinal tube, and to de-

terge the obſtructed glands by means of gentle purges, and vomits of ipecacuanha at proper intervals. To theſe may be added moderate riding, and ſtomachic, warm, and ſtrengthening medicines. See COELIAC *paſſion* and DYSENTERY.

LIEUTENANT, *locumtenens*, a deputy, or officer, who holds the place of a ſuperior, and diſcharges in his abſence the duties of the office which he ought to exerciſe in perſon.

Of theſe, ſome are civil; as lords *lieutenants* of kingdoms; who are the king's viceroys, and govern in his ſtead, ſuch as the lord *lieutenant* of Ireland; and LORDS *lieutenants* of counties.

But the term is moſt frequent among military men, among whom there is a variety of *lieutenants*.

LIEUTENANT is the ſecond commiſſioned officer in every company of both foot and horſe, and next to the captain, who takes the command upon the death or abſence of the captain.

LIEUTENANT *of artillery*, is an officer of the artillery, in each company of which there are one firſt and three ſecond *lieutenants*. The firſt *lieutenant* has the ſame detail of duty with the captain, becauſe in his abſence, he commands the company. The ſecond *lieutenant* is the ſame as the enſign in an infantry regiment, being the youngeſt commiſſioned officer in the company, and it is his duty to aſſiſt the firſt *lieutenant*.

LIEUTENANT *of engineers*. See ENGINEER.

LIEUTENANT-*general*, a great officer, the next in rank to the GENERAL of an army: theſe officers ſerve in the field, or in ſieges, according to the dates of their commiſſions. In battle, the oldeſt commands the right wing of the army, the ſecond the left wing, the third the centre, the fourth the right wing of the ſecond line, the fifth the left wing, the ſixth the centre, &c. In ſieges, the *lieutenant*-generals always command the right of the principal attack, and order what they think proper for the advancement of the ſiege, during the twenty-four hours they are in the trenches, except the attack, which they are not to make without an order from the general in chief.

In France they have alſo *lieutenant-generals* of their naval forces, who command immediately under the admirals.

In Holland they have a *lieutenant-admiral*, which is the ſame with what we call a *vice-admiral*.

LIEUTENANT-*general of the ordnance*, is he who has the charge of the artillery, batteries, &c. under the maſter-general, or in his abſence. This officer was firſt eſtabliſhed in 1597. See ORDNANCE.

LIEUTENANT-*colonel of foot*, is the ſecond officer in a regiment; he commands in the abſence of the COLONEL, and in battle takes poſt at his colonel's left.

The dragoons have alſo a *lieutenant-colonel*; but the horſe have not, properly, any; the firſt captain of the regiment ſupplies the office.

LIEUTENANT-*colonel of horſe*, is only the firſt captain of the regiment, who commands in the abſence of the colonel, taking place of all other captains.

LIEUTENANT-*captain*. See CAPTAIN.

This denomination was abeliſhed in the Engliſh army in 1772, when it was ordered that for the future all *captain-lieutenants* ſhould have the rank and title of captains in the army.

LIEUTENANT *of a ſhip of war*, is the officer next in rank and power to the captain, in whoſe abſence he is charged with the command of the ſhip, and alſo the execution of any orders which he may have received from the commanders relating to the king's ſervice. The *lieutenant*, who commands the watch at ſea, keeps a liſt of all the officers and men belonging to it, in order to muſter it and report to the captain the names of thoſe who are abſent from their duty. During the night-watch, he occaſionally viſits the lower deck, or ſends thither a proper officer to ſee that order is obſerved. He is always to be upon deck in his watch, to give orders for trimming the ſails and ſuperintending the navigation, and for preſerving order; but he is never to change the ſhip's courſe without the captain's direction, unleſs it be to avoid an immediate danger. In time of battle, he is to ſee, that all the men are preſent at their quarters, to order and exhort them to perform their duty, and to inform the captain of any miſbehaviour. The youngeſt *lieutenant* of the ſhip, who is alſo called *lieutenant at arms*, is, beſides his common duty, to train the ſeamen to the uſe of ſmall arms, and in time of battle to attend and direct them for this purpoſe.

LIEUTENANT *de roy*, the deputy governor of all ſtrong towns in France, who is a check upon the governor, and commands in his abſence.

LIEUTENANT *reformed* is he whoſe company or troop is broke or diſbanded, but continued in whole or half-pay, and ſtill preſerves his right of ſeniority and rank in the army.

LIFE, *vita*, is a very ambiguous term. For both God, and man, and a ſoul, and an animal, and a plant, are ſaid *to live*: yet there is not any thing common to all theſe beſides a kind of active exiſtence; which, however, is of very different kinds. See ANIMAL and VEGETABLE.

Life, then, in the general, expreſſes a kind of active, operative exiſtence; and it is therefore conceived to conſiſt in motion. But particularly,

LIFE *of body, vita corporis*, conſiſts in an uninterrupted motion therein. A body therefore, ſaid *to be living*, muſt conſiſt of various parts or members, both internal and external, ſo framed and put together, as to conſtitute one whole. And theſe members muſt be moved and warmed by ſome fluid ſubſtance, permeating the whole frame; by which heat and motion, the vital functions are to be performed. Such are nutrition, generation, local motion, &c.

LIFE *of mind, vita mentis*, is held, by the Carteſians, to conſiſt in a perpetual cogitation, or uninterrupted courſe of thinking; which ſeems likewiſe to have been Ariſtotle's meaning when he calls the ſoul ἐντελέχειαν; which his interpreters call *actus*; thinking being the only proper act of the mind.

But Mr. Locke endeavours to refute this principle. See THINKING and SOUL.

LIFE *of man, vita hominis*, conſiſts of a continued communication of body and mind; or in operations, to which both the motions of the body and ideas of the mind contribute.

Thus, e. gr. the mind now thinking of ſomething, on occaſion of that thought there ariſes a certain motion in the body: and now again, the body moves firſt, which motion is followed by ſome thought of the mind.

In ſuch alternate or reciprocal operation does the *life* of man conſiſt; conſidered as he is a compound of body and mind. See SENSATION and MOTION.

LIFE is more particularly uſed for the duration of an animal's being; or the ſpace of time that paſſeth between its birth and death.

Some contend that the *life of animals* is preſerved by the acid parts of the air mixing with the blood in the lungs; which parts diſſolve or attenuate the blood, and preſerve its heat, and by both theſe keep up the motion of the heart. See Dr. Bryan Robinſon's Treat. of the Animal Oeconomy.

LIFE is alſo uſed for the conſtitution; or, that principle of heat and motion which animates bodies, and makes them perceive, act, and grow.

In which ſenſe, *life* is divided into *animal, ſenſitive*, and *vegetative*.

LIFE, in a medical ſenſe, is defined, the CIRCULATION of the blood.

LIFE, *prolongation of*, is made, by lord Bacon, one of the three branches of medicine; the other two relating to the preſervation of health, and the cure of diſeaſes.

The theory of prolonging *life* he numbers among the deſiderata. Some means, or indications, that ſeem to lead to it, he lays down as follow.

Things are preſerved in two manners; either in their *identity*, or by *reparation*. In their *identity*, as a fly, or ant, in amber; a flower, or fruit, or wood, in a conſervatory of ſnow; a dead carcaſe, in baliams. By *reparation*, as a flame, or a mechanical engine, &c. To attain to the prolongation of *life*, both theſe methods muſt be uſed; and the human body muſt be preſerved both as immutates, as flame, and as mechanical inſtruments are preſerved.

Hence ariſe three intentions for the prolongation of *life*: *retardation* of conſumption, proper *reparation*, and *renovation* of what begins to grow old. Conſumption is occaſioned by two kinds of depredation; a depredation of the innate ſpirit, and a depredation of the ambient air. Theſe may be each prevented two ways; either by rendering thoſe agents leſs predatory, or by rendering the paſſive parts (viz. the juices of the body) leſs liable to be preyed on. The ſpirit will be rendered leſs predatory, if either its ſubſtance be condenſed, as by the uſe of opiates, grief, &c. or its quantity diminiſhed, as in ſparc and monaſtic diets; or its motion calmed, as in idleneſs and tranquility. The ambient air becomes leſs predatory, if it be either leſs heated by the rays of the ſun, as in cold climates, in caves, mountains, and anchorets cells; or be kept off from the body, as by a denſe ſkin, the feathers of birds, and the uſe of oils and unguents, without aromatics. The juices of the body are rendered leſs liable to be preyed on, either by making them harder, or more moiſt and oily: harder, as by a coarſe ſharp diet, living in the cold, robuſt exerciſes, and ſome mineral baths: moiſter, as by the uſe of ſweet foods, &c. abſtaining from ſalts and acids; and eſpecially by ſuch a mixture of drink, as conſiſts wholly of fine ſubtile particles, without any acrimony or acidity.

Reparation is performed by means of aliment; alimentation is promoted four ways; by the concoction of the viſcera, ſo as to extrude the aliment; by exciting the exterior parts to the attraction of the aliment, as in proper exerciſes and frications, and ſome unctions and baths; by the preparation of the food itſelf, ſo as it may more eaſily inſinuate itſelf, and, in ſome meaſure, anticipate the

the digestion; as in various ways of dressing meats, mixing drinks, fermenting breads, and reducing the virtues of these three into one; by promoting the act of assimilation itself, as in seasonable sleep, some external application, &c. The renovation of what begins to grow old, is performed two ways; by the intineration of the habit of the body, as in the use of emollients, emplasters, unctions, &c. of such a nature, as do not extract, but impress; or by purging off the old juices and substituting fresh ones; as in seasonable evacuations, attenuating diets, &c.

The same author adds these three axioms: that the prolongation of *life* is to be expected rather from some stated diets, than either from any ordinary regimen, or any extraordinary medicines, more from operating on the spirits, and mollifying the parts, than from the manner of feeding; and this mollifying of the parts without, is to be performed by substantials, impriments, and occlusions. See LONGÆVITY.

LIFE-ANNUITIES, are annuities the payments of which are suspended on the continuance of any given life or lives; and they may be distinguished into annuities to commence *immediately*, and annuities to commence at some future period, or *reversionary life-annuities*.

The value of a *life-annuity* is properly the sum that will be sufficient to enable a *seller* (allowing for the chances of mortality) to pay the annuity without loss; and, supposing money to bear no interest, it is always equal to the *expectation* of the life.

For example. Observations shew, that according to the *mean* probabilities of the duration of human life, the *expectation* of a life aged ten is nearly forty years; or, in other words, that a set of lives at this age, will one with another enjoy forty years each of existence, some of them enjoying a duration as much longer as others enjoy a shorter. It is obvious, there ore, that supposing money to bear no interest, 40*l.* in hand for each life, would be sufficient to enable a *seller* to pay to any number of such lives 1*l.* per *ann.* for their whole duration; or, in other words, that 40*l.* is, on this supposition, the value of a life aged ten.

But if any improvement is made of money by putting it out to interest this will be *more* than the value; because it will be more than sufficient to pay the annuity; and as much more than sufficient as the improvement or the interest is greater. If, for instance, any *sum* now in hand may be so improved, by being put out to interest, at 4 *per cent* as to double itself in eighteen years; the seller of such an annuity will (in consequence of putting out *half* the purchase-money to interest) find himself at the end of eighteen years in possession of 42*l.* or of 2*nd.* more than is sufficient to pay the remainder of the annuities, though he should make no farther improvement of the purchase-money. If he puts out the money to higher interest he will be a greater gainer, if to less, he will be a less gainer; but at any rate of interest he must be a gainer. The truth is, that supposing the interest to be that just mentioned, or 4 *per cent* and all the improvement possible made of the money at this interest, he will find 13*l.* 10*s.* 6*d.* for each annuity (instead of 40*l.*) to be sufficient to enable him to make all his payments. (See the tables at the end of this article.) But that if he improves the money at 5 *per cent.* he will find 15*l.* to be sufficient.

It may seem to follow from hence, that we have nothing to do to find the value of a *life-annuity*, but to find the *expectation* of the life, and then to take out of the common tables the value of an annuity *certain* for a term of years equal to the expectation; and it may appear strange that this should not give the true value.

The truth is, that it will give the value *greater* than it is; or that a less sum than that found in this way will be sufficient to pay the annuity. Supposing the interest 4 *per cent.* the value of an annuity certain for forty years is 19*l.* 15*s.* (See *Tab.* III. ANNUITIES) but the value of a life aged ten, at this rate of interest is, as has been just said, no more than 17*l.* 10*s.* 6*d.* The principal reason of this is the difference between the value of forty payments of an annuity to be made *every* year regularly one after another, till in forty years they are all made; and the value of the same number of payments to be made at greater distances of time from one another, and not to be all made till the end of seventy or eighty years. In this last case there is more time given for the improvement of the purchase-money, and therefore a less sum will be sufficient to enable a seller to make his payments. All that is learned from knowing the expectation of a number of lives, is the *mean* number of payments that will be made to each of them, and not the *time* in which they will be made. For example. The expectation of a *life* at ten being forty years, it follows that to a hundred lives at this age, forty payments for each *life*, or four thousand in all, will be made. But, as all the lives will not be extinct in less than seventy or eighty years, many of the payments will not be made till after the expiration of forty years; and, therefore, a part of the purchase-money will be improved for a longer time than forty years. In general, it may be observed that about a *quarter* of the payments of a set of *life-annuities* will be made after the expiration of a term of years equal to the *expectation* of the lives; and that this quarter having a longer time for accumulation than the expectations of the lives, the value of the lives must be less than the value of annuities to be paid regularly every year for a time equal to the expectation. Thus 1980*l.* will, in consequence of being improved at 4 *per cent.* pay a hundred annuities of 1*l.* for forty years. But a less sum (or 1750*l.*) will pay a hundred such annuities to a set of lives whose common expectation is forty years; because a *quarter* of the payments will not be made till after the end of forty years, and some not till after the end of seventy or eighty years; and consequently a *quarter* of the purchase-money will be improved for more than forty years, and some of it for more than seventy or eighty years.

These observations demonstrate, that it is a mistake to reckon the value of a *life-annuity* the same with the value of an annuity certain for a term of years equal to the *expectation* of the *life*. But it is a greater mistake to reckon it the same with the value of an annuity for a term certain, equal to that which a life has an even chance of existing. This is the error into which Mr. Weymar Lee, Mr. Dale, and some others have fallen. The former in particular has taken great pains to support this error in a book which is entitled, An Essay to ascertain the Value of Annuities for Years and Lives; and which affords a remarkable instance of pains misapplied and gross ignorance united to an over-bearing confidence.

The reasoning just stated is sufficient to prove this method of calculating the values of *life-annuities* to be wrong. But there is a particular consideration which sets the absurdity of it in the strongest light. Were it a right method of calculation, it would follow that an annuity on a *life* exposed to such danger in a particular year as to create an equal chance whether it will not fail in that year, would, at the beginning of the year, be worth *nothing*, though supposed to be sure of continuing for ever, if it escaped that danger.

The true method of computing the values of *life-annuities* may be explained in the following manner. Let us suppose that the duration of the annuity is to be only *one* year. That is, that 1*l.* is to be paid a year hence, provided a *life* now of a given age should be then in being. Were it *certain* that this *life* would not fail in the year, the value of the annuity would be the same with the value of it payable a year hence, or with the sum which, now put out to interest, would increase to 1*l.* in a year; and this sum, supposing interest at 4 *per cent.* is 19*s.* 2*d.* as may be seen in the table of the values of 1*l.* payable at the end of any number of years given under the article ANNUITIES.

But the payment not being to be made, should the *life* happen to fail in the year, this sum ought to be diminished in proportion to the degree of the uncertainty, which there is, whether the *life* will continue to exist through the year; and it is easy to see that this *uncertainty* or *chance* is in the proportion of the number of persons at that age living at the *end* of the year, to the number living at the *beginning* of it, as shewn by observations. For example: If it has been found in any situation that but half the number of persons of the given age living at the *beginning* of the year, are living at the end of it, the uncertainty will be as ½, and the value just mentioned ought to be lessened one half. If it appears that two-thirds or nine-tenths or ninety-nine hundredths are living at the end of the year, the same value must be diminished only one-third, one-tenth, or one hundredth. That is, it will be necessary to multiply it by ⅔ or ⅘ or ⅘⅘. Universally then, the present value of any sum to be paid a year hence, provided a given *life* should be then existing, is that sum multiplied by the value of 1*l.* payable at the end of the year (taken out of *Table* II. under the article ANNUITIES) and also by the fraction formed by making the number of the living at the age of the given *life* (taken out of the Table of *Observations*) the *denominator*, and the number of the living at the next succeeding age, (or at the end of the year) the *numerator*. For example. Let the value be sought of 1*l.* payable a year hence, if a child aged ten should be then living, reckoning interest at 4 *per cent.* The value of 1*l.* reckoning this interest and payable a year hence, is (as has been just said) 19*s.* 2*d.* or (in decimal parts of a pound, as given in the common tables of interest) .951 5 (See *Table* II. under the article ANNUITIES). The number of the living at the age of ten (in *Table* III. at the end of this article) is 56751 and at the next succeeding age

(or eleven) is 5623. It follows, therefore, that according to this table, out of 5675 living at the age of ten, only 5623 are living at the end of the year; or, in other words, that the chance or probability of a life aged ten existing through the year is as $\frac{5623}{5675}$, which fraction, therefore, multiplied by .9615 gives the value fought, or .9526 equal to 19s. 0½d.

Again, let us suppose, that the duration of a *life-annuity* of 1*l.* is to be two years, or that one payment of 1*l.* is to be made a year hence, provided a given *life* should exist a year, and a second payment of the same sum at the end of two years, provided the same life should be in existence at the end of two years. The method of finding the value of the first payment has been already explained; and by the very same reasoning it may be eafily difcovered, that the value of the fecond payment muft be the value of 1*l.* payable at the end of two years, *diminished* in proportion to the uncertainty that the given *life* will exift two years; or (which is the fame) *multiplied* by the fraction formed by making the number of the living at the given age the *denominator*, and the number of the living at the next fucceeding age but one, or at the end of two years, the *numerator*.

Example. Let the value be required of 1*l.* payable yearly for two years, provided a child aged ten fhould live two years, reckoning intereft at 4 *per cent.*

The value of the payment at the end of the firft year has been juft found to be .9526 in decimal parts of a pound, or 19s. 0½d.

The value of the payment at the end of the fecond year is the value of 1*l.* payable two years hence, leffened by the uncertainty that a life aged ten will live two years; or in the proportion of the number of the living in the table of obfervations at the age of twelve to the number of the living at the age of ten. That is, it is .9245 (the faid value of 1*l.* payable at the end of two years, taken out of *Table* II. under the article ANNUITIES) *multiplied* by the fraction $\frac{5473}{5675}$, or .9038 equal to 18s. 2d. See Table III. at the end of this article. To this value add the former value, or .9526*l.* and the total, or 1.8604*l.* will be the value of both payments, or of an annuity of 1*l.* on a *life* aged ten for two years.

By proceeding in this way it will appear that the value of the fame annuity for three years is .8889 × 1.3333 + 7.8604 = 2.725*l.* and for eighty-fix years (or the whole duration of life according to the table of obfervations) 17.5238*l.* It is evident, that in the fame method the value of an annuity of 1*l.* on a *life* at any other age is to be found; and that fuppofing the annuity any other fum than 1*l.* its value will be this fum multiplied by the value of an annuity of 1*l.*

The calculations of the values of *life-annuities* may be otherwife explained in the following manner. Suppofe a *life* annuity of 1*l.* payable yearly to every one of 5675 perfons, all now aged ten, the firft payment of which is to be made a year hence. It appears from the *Northampton* Table of Obfervations (or Table III. in the following collection of Tables) that only 5623 of thefe perfons will be living at the end of a year; and, confequently, that the money then to be paid will be only 5623*l.* The prefent value, therefore, of the firft payment of the annuities will be the fum which now put out to intereft will increafe in a year to 5623*l.* That is, it is 5623*l.* difcounted for a year, or 5406*l.* 10*s.* for this fum added to its intereft for a year (reckoned at 4 *per cent.*) will juft make up 5623*l.* From the fame Table of Obfervations, it appears farther that of 5675 perfons living at ten years of age, only 5573 will be living at the end of two years. The prefent value, therefore, of the *fecond* payment of the annuities will be the fum which being now put out to compound intereft at 4 *per cent.* will increafe to 5573*l.* in two years. This fum is 5152*l.* 4*s.* In like manner 5523, 5473, 5423, *&c.* being the number living at the end of three, four, five, *&c.* years, the value of the third, fourth, fifth, *&c.* payments of the annuities will be 5523*l.* 5473*l.* 5423*l.* *&c.* difcounted for three, four, five, *&c.* years, refpectively, and continued to the year in which all the lives become extinct. The total of all thefe values is 50443*l.* which, therefore, is the fum that would be fufficient, if improved at 4 *per cent.* to make good the payment of an annuity of 1*l.* for *life* to every one of 5675 perfons aged ten, according to the *Northampton* Table of Obfervations. The value, therefore, of fuch an annuity payable to only one of this number muft be the 5675th part of 50443*l.* or 17*l.* 10*s.* 6*d.*

In the Table of Obfervations from which the examples here given have been taken, and alfo in the Table framed by Dr. Halley, from the bills of mortality at Breflaw in Silefia, it may be obferved that the numbers dying every year out of a given number born, continue in the middle ftages of *life* nearly the fame for many years together. It was this circumftance that led Mr. De Moivre to form his hypothefis of an equal decrement of *life* through all its ftages after ten. In this hypothefis, the limit or utmoft probable extent of life is fixed to the age of eighty-fix; and out of any number living at a given age an equal number is reckoned to die every year, till at eighty-fix all the lives become extinct. Thus, for inftance, if there are feventy-fix perfons living at ten, one of them by this hypothefis will die annually during the term of feventy-fix years, at the end of which time the laft ferving *life* will have failed. Or, in other words, feventy-five will be living at the end of the firft year, feventy-four at the end of the fecond year, feventy-three at the end of the third year, and fo on for feventy-fix years; from whence it follows that the probability of one perfon's living to the end of the firft, or fecond, or third year will be $\frac{75}{76}$, $\frac{74}{76}$, $\frac{73}{76}$, *&c.* refpectively, where it appears that the fractions, and confequently the probabilities they expreſs, decreafe *arithmetically*. The number of years which a *life* wants of the age of eighty-fix is in this hypothefis called the COMPLEMENT of the *life*, and half this complement is always the EXPECTATION of the *life*. That is, according to what has been already faid, it is the number of years which one with another a fet of lives at that age will exift; or, as the writers on this fubject fometimes fpeak, it is the *fhare of life* due to each of them:

It is extremely eafy to calculate the values of *life-annuities* on this hypothefis. For, by what has been juft faid, the value of an annuity on a *life* aged 10, is the fum of the feries $\frac{75}{76} \times .9615 + \frac{74}{76} \times .9245 + \frac{73}{76} \times .8889$, &c. continued to $\frac{1}{76} \times .0527l. - .0615l. - .0245l. - .0889l.$ &c. and .0527*l.* being the values (reckoning intereft at 4 *per cent.*) of 1*l.* payable at the end of 1, 2, 3, &c. to 76 years; or, calling 1*l.* with its intereft for a year, r, and 76, n, the value of the *life* is $\frac{n-1}{nr} + \frac{n-2}{nr^2} + \frac{n-3}{nr^3} +$, &c. to $\frac{n-75}{nr^{75}}$ (See Tab. II. ANNUITIES). Now, as in this feries the probabilities of living are made to decreafe equally, the fum of it may be found at once by the following rule.

" Find in Table III. under ANNUITIES, the value of an " annuity of 1*l.* certain for a number of years equal to the " *complement*. Multiply this value by the *perpetuity* in- " creafed by unity, and divide the product by the com- " plement. The quotient fubtracted from the perpe- " tuity will be the value."

The complement in the prefent cafe being 76, the value of an annuity for 76 years being (fee Tab. III. ANNUITIES) 23.7311, and the perpetuity 25, the fum of the feries $\frac{n-1}{nr} + \frac{n-2}{nr^2} + \frac{n-3}{nr^3}$, &c. or the value of a life aged 10, will come out 16.881. In the fame manner may the value of a *life* at any other age be computed, according to this hypothefis; and thefe values are the fame with thofe in Mr. De Moivre's table of the values of lives.

But it is a neceffary obfervation, that in the firft and laft ſtages of life, this hypothefis differs too much from fact. This may be eafily feen, by comparing it with the following tables of the probabilities of human life, formed from real obfervations. The rejection of it will indeed render calculations of the values of *lives* (efpecially joint *lives*) a work of more labour and difficulty; but there is an eafy theorem given by Mr. Simpfon, in his book on the Doctrine of Annuities and Reverfions, and fince by Dr. Price, in his book on Reverfionary Payments, note (O), p. 312, 3d edit. which will remove much of this labour. We fhall here give the explanation and proof of this theorem from Mr. Morgan's Treatife on Annuities and Aſſurances, chap. ii. § 2. p. 50.

" Was it *certain* that a perſon of a given age would live " to the end of a year, the value of an annuity of 1*l.* " on fuch a life would be the prefent fum which would " increafe in a year to the value of a life one year older, " together with the value of the fingle payment of 1*l.* " to be made at the end of a year; that is, it would be " 1*l.* together with the value of a *life* aged one year " older than the given *life*, multiplied by the value of " 1*l.* payable at the end of a year. Call the value of a " *life* one year older than the given *life* N, and the va- " lue of 1*l.* payable at the end of a year $\frac{1}{r}$; then will " the value of an annuity on the given *life*, on the fup- " poſition of a *certainty* that it will exiſt a year, be " $\frac{1}{r} + \frac{1}{r} \times N$. But the fact is, that it is *uncertain* whe- " ther the given *life* will exiſt to the end of the year. " This laſt value, therefore, muſt be diminiſhed in the " proportion of this uncertainty; that is, it muſt be " multiplied by the probability that the given *life* will

" ſurvive one year; which ſuppoſing $\frac{b}{a}$ to expreſs this " probability, will make it $\frac{b}{a} \times \overline{1+N}$."

The great utility of this theorem will appear from the following examples. Suppoſe the probabilities of *life*, as they are given in the third of the following tables, or the table of obſervations for Northampton, and the rate of intereſt 4 *per cent.* or $r = 1.04$. By reaſoning in the manner already explained, the value of a *life* aged 95 will be expreſſed by the ſingle fraction $\frac{1}{2} \times .9615 = .2403$. The value of a *life* one year younger will be, by this theorem, $\frac{4}{9 \times 1.04} \times 1 + .2403 = .5300$. The value of a life two years younger, by the ſame theorem, will be $\frac{9}{16 \times 1.04} \times 1 + .5300 = .8270l.$ The value of a life three years younger, or at the age of 92, will be $\frac{16}{24 \times 1.04} \times 1 + .8270 = 1.1711.$ If we proceed in this manner, the value of every younger *life* will be deduced from that next preceding; nor will the number of multiplications neceſſary to determine the values (agreeably to any table of obſervations) of all *lives*, at all ages, much exceed the number of thoſe which muſt otherwiſe have been uſed for finding the ſingle value of the youngeſt *life*. See Tab. VIII.

Mr. Morgan, after giving this account of this theorem, and explaining a method of verifying all the operations in proceeding by it from one *life* to another, goes on to apply the theorem to the calculation of the values of joint *lives*; and, whoever will conſult this part of Mr. Morgan's Treatiſe, will be abundantly inſtructed in the beſt and moſt expeditious methods of making all calculations of this ſort.

But inſtead of following him in this, we ſhall reſume our account of the general principles on which the values of *life-annuities* are calculated. We have already explained theſe, as far as annuities on ſingle *lives* are concerned. From the ſame principles, the method of finding the value of annuities on the *joint continuance* of any two *lives*, may be underſtood. Suppoſe the ages of two perſons to be 50 and 60. It appears in Table III. that of 2857 perſons living at 50, only 2776 will live to be 51; or, in other words, that the *probability* that a perſon at this age will live a year, is $\frac{2776}{2857}$. Alſo, it appears from the ſame table, that the probability that a perſon aged 60 will live to 61, is $\frac{1874}{2038}$. The probability, therefore, that they will *both* live a year (or the former to be 51, and the latter 61) is the product of theſe two probabilities (or $\frac{2776}{2857} \times \frac{1874}{2038} = \frac{5202224}{5822566}$). For it is well known, that the probability that any two independent events will both happen, is always the product ariſing from multiplying the probability of one event by the probability of the other. See EXPECTATION.

In like manner, the probability that the former of theſe *lives* will live to be 52, 53, 54, &c. and the latter to be 62, 63, 64, &c. or that they will both live two, three, four, &c. years, is by the ſame table $\frac{2694}{2857} \times \frac{1874}{2038}$, $\frac{2612}{2857} \times \frac{1793}{2038}$, $\frac{2530}{2857} \times \frac{1712}{2038}$, &c. And according to the reaſoning already uſed, theſe probabilities multiplied by the values (in Tab. II. ANNUITIES) of *1l.* payable at the end of 1, 2, 3, 4, &c. years, will give the preſent value of the firſt, ſecond, third, fourth, &c. payments of an annuity dependent on the joint continuance of the two *lives*; and the ſum of theſe products for 1, 2, 3, 4, &c. years, will be the value of an annuity of *1l.* on the joint continuance of the two *lives* for 1, 2, 3, 4, &c. years; and if the products are continued to the extremity of the oldeſt *life*, their ſum will be the value of an annuity on the whole duration of the joint *lives*.

The values of annuities on the joint continuance of three, or any other number of *lives*, are found in a ſimilar manner. The ſeveral fractions expreſſing the reſpective probabilities of their continuing 1, 2, 3, 4, &c. years, being multiplied into one another, and alſo into *1l.* diſcounted as before; and the ſum of the products ariſing from theſe multiplications continued to 1, 2, 3, 4, &c. years, or to the extremity of the oldeſt of the *lives*, will be the values of the annuity for 1, 2, 3, 4, &c. years, or for the whole duration of the joint *lives*.

With reſpect to annuities on the *longeſt* of any number of *lives*, the reaſoning is not ſo ſimple. The following explanation, however, of the method of determining their values, when only *two* lives are concerned, will be eaſily underſtood. Suppoſe the ages of the two perſons to be 50 and 60; and for the ſake of more perſpicuity, let us ſuppoſe that the decrements of life are equal, according to Mr. De Moivre's hypotheſis, already explained. The chance of the youngeſt perſon's living one year is expreſſed by $\frac{33}{36}$; and the ſame chance with reſpect to the oldeſt by $\frac{23}{26}$. The chance of the youngeſt perſon's *not* living one year is $\frac{3}{36}$, ſubtracted from unity, or $1 - \frac{33}{36}$; and the ſame chance with regard to the oldeſt is alſo $1 - \frac{23}{26}$; for it muſt be remembered, that in the doctrine of chances, *certainty* is always denoted by *unity*; and that, conſequently, the difference between the probability of an event's happening and unity, muſt expreſs the probability of the event's *not* happening. Theſe two expreſſions, therefore, being multiplied into each other, will, according to what has been already obſerved, give the probability of their *both* dying in the year, which is equal to $1 - \frac{35}{36} - \frac{25}{26} + \frac{35 \times 25}{36 \times 26}$. For ſuppoſe the firſt fraction $1 - \frac{33}{36}$ to be multiplied into unity, it will ſtill remain equal to $1 - \frac{33}{36}$. Let it again be multiplied into $\frac{25}{26}$, and it will become equal to $\frac{25}{26} - \frac{25 \times 33}{26 \times 36}$. But $\frac{25}{26}$ was a *negative* quantity; therefore, the ſigns of the two laſt fractions muſt be changed, or they muſt be wrote down $-\frac{25}{26} + \frac{25 \times 33}{26 \times 36}$. Theſe being added to $1 - \frac{33}{36}$ will give $1 - \frac{35}{36} - \frac{25}{26} + \frac{25 \times 35}{26 \times 36}$ for the whole product of $1 - \frac{35}{36}$ into $1 - \frac{25}{26}$. Now ſince thoſe expreſſions give the probability that the two *lives* ſhall *both* fail in the year, it follows, that if they are ſubtracted from unity, they will give the probability that they ſhall *not* both fail in the year; that is, that one of them, at leaſt, will live to the end of the year. In order to ſubtract $1 - \frac{35}{36} - \frac{25}{26} + \frac{25 \times 35}{26 \times 36}$ from unity, it is evident, that nothing more is neceſſary than to change the ſigns of this expreſſion, and then add it to unity, in which caſe we ſhall have $1 - 1 + \frac{35}{36} + \frac{25}{26} - \frac{25 \times 35}{26 \times 36} = \frac{35}{36} + \frac{25}{26} - \frac{25 \times 35}{26 \times 36}$, for the true value of the above probability. In the ſame manner the chance of one of them at leaſt living to the end of the *ſecond* year, is expreſſed by $\frac{34}{36} + \frac{24}{26} - \frac{24 \times 34}{26 \times 36}$. The chance of one of them, at leaſt, living to the end of the *third* year, by $\frac{33}{36} + \frac{25}{26} - \frac{33 \times 23}{36 \times 26}$, and ſo on for a number of years equal to the complement of the youngeſt *life*, as it is plain that all the fractions will not vaniſh ſooner. If theſe ſeveral expreſſions are reſpectively multiplied into the ſum diſcounted for 1, 2, 3, &c. years, and the products are added together, we ſhall have the whole value of the annuity for the continuance of the longeſt of the two *lives*, whoſe ages are 50 and 60. By reaſoning in the ſame manner, the value of an annuity on the longeſt of *any* other two *lives*, and by any table of obſervations, may be determined. But if the values of the ſingle and joint *lives* are given, the value of an annuity during the continuance of the *longeſt* of them is immediately found; for it appears from what has been ſaid on ſingle and joint *lives*, that $\frac{25}{26}$ multiplied into *1l.* diſcounted for a year, expreſſes the value of the firſt payment of an annuity on a *life* whoſe age is 50; that $\frac{35}{36}$, multiplied into the ſame ſum, expreſſes the like value for a *life* of 60; and that $\frac{25 \times 35}{26 \times 36}$, multiplied into *1l.* expreſſes the value of the firſt payment of an annuity on the joint continuance of thoſe lives. It follows, therefore, that $\frac{35}{36} + \frac{25}{26} - \frac{25 \times 35}{26 \times 36}$ multiplied into *1l.* diſcounted for a year, and expreſſing the value of an annuity on the *longeſt* of two *lives* for one year, is equal to the difference between the value of the joint *lives*, and the *ſum* of the values of the ſingle *lives* for the ſame term. The like may be obſerved with reſpect to the *ſecond*, *third*, &c. years, from whence the general rule for finding the value of the longeſt of two *lives*, is obvious. See *Problem* VI. in the following collection of problems. See Mr. Morgan on Annuities and Aſſurances, p. 52, &c.

This account leads to an eaſy explanation of the method of finding the value of *reverſionary life-annuities* mentioned at the beginning of this article, that is of *life-annuities* which are to commence on the ſurviverſhip of one or more lives beyond others. For example: the value of an annuity on any ſingle *life* dependent on its ſurviving another ſingle *life*, and to commence at the time the ſurviverſhip takes place; or, in other words, the value of an annuity for what may happen to remain of a

single *life* after another must be the value of the *life* in expectation diminished by the value of the joint lives. For it is evident that the value of a single *life* may be divided into its value during its *joint continuance* with any other, and its value during its survivorship beyond that other *life*, and that consequently its value during its joint continuance deducted from its whole value will give its value during survivorship. See more on this subject under SURVIVORSHIP and REVERSION.

Problem I. To find the *expectation* of any given *life* according to any table of observations.

Solution. Find the sum of all the living in the table from the age of the given *life*. Divide this sum by the number of the living at that age; and the quotient lessened by half unity will be the expectation.

Example. The sum of all the living from the age of 10, in the Northampton Table of Observations (the Table III.) is 228599. This sum divided by 5675 (the number living at the age of ten) gives 40.28, which lessened by half unity, gives 39.78, or the expectation of a *life* at the age of ten according to the *Northampton* Table of Observations.

Problem II. To approximate to the value of a given *life* according to any given table of observations.

Solution. Take the difference between twice the expectation of the given *life by* the given table, and 86; and the value deduced from Mr. De Moivre's Table of the values of *lives* correfponding to that difference, provided it is not lefs than ten, will be the value of the *life*.

Example. The expectation of a *life* aged 15 is, by the Northampton Table of Observations (or Table III. in the following collection of tables) 36¼. The difference between twice this number and 86 is 13. And the value corresponding to the age of 13, in Mr. De Moivre's Table of the values of *lives* (or Table V.) is 16.604, reckoning interest at 4 *per cent.* and this is nearly the value of a *life* aged 15, by the Northampton Table.

Scholium. It muft be remembered that this rule is only an *approximation*, and fhould not be ufed except when recourfe cannot be had to tables giving the values of *lives* agreeable to given obfervations. The method of calculating fuch tables has been before particularly explained.

Problem III. To determine the value of any two joint *lives* by Mr. De Moivre's hypothefis, or on the fuppofition of an equal decrement of *life*, through all its ftages.

Solution. Referve the *difference* between the complement of the *youngeft life* and the complement of the *oldeft life* increafed by unity and by twice the perpetuity. Multiply this difference by the value of an annuity certain for a time equal to the complement of the oldeft *life*; and by this complement divide the product referving the quotient. From twice the perpetuity fubtract the referved quotient, and multiply the remainder by the perpetuity increafed by unity. This laft product divided by the complement of the *youngeft life*, and then fubtracted from the perpetuity will be the required value. *Example.* Let the joint *lives* be 10 and 15. Their complements by Mr. De Moivre's hypothefis are 76 and 71. The complement of the oldeft *life* increafed by unity and twice the perpetuity (or twice 25, reckoning intereft at 4 *per cent.*) is 122; which leffened by 76, the complement of the *youngeft life*, leaves 46 for the *referved difference*. This difference multiplied by 23.456 (the value of an annuity certain for 71 years by Table III. ANNUITIES) and the product divided by 71, (the complement of the *oldeft life*) gives 15.196, the *quotient* to be referved; which fubtracted from double the perpetuity (or from 50) and the remainder, (or 34.803) multiplied by the perpetuity increafed by unity (or by 26) gives 904.878; which, divided by 76 (the complement of the youngeft *life*) and the quotient fubtracted from the perpetuity, we have 13.097 for the value of two joint *lives* aged 10 and 15 by Mr. De Moivre's hypothefis.

By this rule, Table V. in the following collection of tables, has been computed by Dr. Price. See his Treatife on Reverfionary Payments, p. 309, and p. 328. 3d edit. There is no other table extant at prefent of the values of joint *lives* except Mr. Simpfon's for London, publifhed in his Select Exercifes, p. 266. But this table being founded on the ftate of human mortality in one of the worft of all ftreatums, or among the inhabitants of London taken in the groſs, it is by no means fitted for general ufe. The truth alfo is, as has been before obferved, that neither do the tables formed from Mr. De Moivre's hypothefis give the values of fingle and joint *lives* with the exactnefs neceffary to adapt them properly to general ufe. Being, however, the tables beſt known, and which have hitherto been moſt ufed, we have given them in the following collection of Tables, together with Mr. Simpfon's Tables for London, and one Table of the values of fingle *lives* at Northampton, calculated at an intereft of 4 *per cent.* in perfect agreement to the obfervations.

Problem IV. To determine the value of an annuity on a given *life* for any number of years.

Solution. Find the value of a *life* as many years older than the given *life* as are equal to the term for which the annuity is propofed. Multiply this value by 1*l.* payable at the end of this term, and alfo by the probability that the *life* will continue fo long. Subtract the product from the prefent value of the *life*; and the remainder multiplied by the annuity will be the anfwer.

Example. Let the annuity be 10*l.* The age of the given *life* 30 years, and the term propofed 15 years. The value of a *life* aged 45 (or 15 years older than the given *life*) appears by Table VIII. to be 12.283. The value of 1*l.* payable at the end of 15 years (by Table II. under ANNUITIES) is .5553, and the probability that the *life* will exift fo long is (by Table III. in the following collection) $\frac{11}{15}$. Thefe three quantities multiplied into each other are equal to 5.051, which being fubtracted from 14.781 (the prefent value of the given *life* by Table VIII.) we have 9.730; and this remainder multiplied into 10 (the annuity) gives 97.30*l.* for the value required.

Problem. V. To find the value of an annuity for three joint *lives*, A, B, and C.

Solution. Let A be the youngeft and C the oldeft of three propofed *lives*. Take the value of the two joint *lives* B and C, and find the age of a fingle *life* D of the fame value. Then find the value of the joint *lives* A and D, which will be the anfwer.

Example. Let the three given ages be 20, 30, and 60. The value, reckoning intereft at 4 *per cent.* of the two oldeft joint *lives* B and C (by Table VII.) is 7.779, anfwering to a fingle *life* D of 65 years (by Table VIII.) and the value of the joint *lives* A and D (by Table VII.) is 6.882, which will be the value required.

Problem VI. To find the value of the longeft of any two *lives*.

Solution. From the fum of the values of the two fingle *lives* fubtract the value of the two joint *lives*, and the remainder will be the value required.

Example. Let the ages of the two *lives* be 25 and 30, and let intereft be reckoned at 4 *per cent.* The value (by Table VI) of a *life* aged 25 is 15.315 and of a *life* aged 30 is 14.68. The fum of thefe two values is 29.99. The value of the joint *lives* is (by Table VII) 11.46; and this value fubtracted from 29.99 gives 18.53, or the value of an annuity on the longeft of the two *lives*.

Problem VII. To find the value of an annuity on the longeft of three *lives*, A, B, and C.

Solution. Let A be the youngeft, and C the oldeft of the three propofed *lives*. Find the value of the joint *lives* B and C, and find the age of a fingle *life* D of the fame value. Moreover, find by the rule in the laft problem the value of the longeft of the *lives* A and B, alfo that of the longeft of the *lives* A and C, and likewife that of the longeft of the *lives* A and D; then the laft of thefe three values fubtracted from the fum of the two former leaves the value fought.

Example. Let the three given ages be 20, 30, and 60. The value, reckoning intereft at 4 *per cent.* of the oldeft joint *lives* B and C, (by Table VII.) is 7.779 anfwering to a fingle *life* D (in Table VIII.) of 65 years. The value of the longeft of the two *lives* A and B, by the fame tables, is 18.864. Alfo that of the longeft of the two *lives* A and C is 16.941; and that of the longeft of the two *lives* A and D is 16.64. Therefore 19.165 is the value required.

Problem VIII. To find the value of an annuity granted upon three *lives*, A, B, and C, on condition of its ceafing as foon as any two of them become extinct.

Solution. Find the value of each pair of joint *lives*, viz. of A and B, of A and C, and of B and C. Then from the fum of thefe three values let twice the value of the three joint *lives* A, B and C, be deducted, and the remainder will be the anfwer.

Example. Let the ages of A, B and C, refpectively be 20, 30, and 60. By Table VII. the value of the joint *lives*

A, B } will be { 11.71
A, C } will be { 7.967
B, C } will be { 7.779

the fum of which three numbers is 27.457. Moreover the value of the three joint *lives* A, B, and C, by problem V. is 6.882; therefore 13.693 is the value required.

He that would inform himfelf more completely on this fubject fhould read the following books, *viz.* Mr. Simpfon's Doctrine of Life Annuities and Reverfions, and Select Exercifes; Mr. Morgan's Treatife on Annuities and Aſſurances; and Dr. Price on Reverfionary Payments.

TABLE I. Shewing the probability of the duration of *life* in London, deduced by Mr. Simpfon from obfervations on the bills of mortality in London for ten years, from 1728 to 1737. See this table under EXPECTATION.

TABLE II. Shewing the probabilities of the duration of *life* as deduced by Dr. Halley from the bills of mortality at Breſlaw in Sileſia.

Ages.	Perſons living.	Decr. of Life.	Ages.	Perſons living.	Decr. of Life.	Ages.	Perſons living.	Decr. of Life.
1	1000	145	31	523	8	61	232	10
2	855	57	32	515	8	62	222	10
3	798	38	33	507	8	63	212	10
4	760	28	34	499	9	64	202	10
5	732	22	35	490	9	65	192	10
6	710	18	36	481	9	66	182	10
7	692	12	37	472	9	67	172	10
8	680	10	38	463	9	68	162	10
9	670	9	39	454	9	69	152	10
10	661	8	40	445	9	70	142	11
11	653	7	41	436	9	71	131	11
12	646	6	42	427	10	72	120	11
13	640	6	43	417	10	73	109	11
14	634	6	44	407	10	74	98	10
15	628	6	45	397	10	75	88	10
16	622	6	46	387	10	76	78	10
17	616	6	47	377	10	77	68	10
18	610	6	48	367	10	78	58	9
19	604	6	49	357	11	79	49	8
20	598	6	50	346	11	80	41	7
21	592	6	51	335	11	81	34	6
22	586	7	52	324	11	82	28	5
23	579	6	53	313	11	83	23	4
24	573	6	54	302	10	84	19	4
25	567	7	55	292	10	85	15	4
26	560	7	56	282	10	86	11	3
27	553	7	57	272	10	87	8	3
28	546	7	58	262	10	88	5	2
29	539	8	59	252	10	89	3	2
30	531	8	60	242	10	90	1	1

TABLE III. Shewing the probabilities of the duration of human *life*, formed from the regiſter of mortality at Northampton for 46 years, from 1735 to 1780.
N. B. This Table has been communicated by Dr. Price, and will be publiſhed in a new edition of his Treatiſe on Reverſionary Payments, now in the preſs. It has been adopted by the EQUITABLE SOCIETY in Chatham Square, and is to form the baſis of all the future buſineſs of that ſociety. See ASSURANCE.

Age	Living	Decrements	Age	Living	Decrements
0	11650	1340	Yrs.		
1	10310	554	34	4085	75
2	9756	553	35	4010	75
3	9203	553	36	3935	75
		3000	37	3860	75
Years			38	3785	75
1	8650	1357	39	3710	75
2	7283	502			8015
3	6781	335	40	3635	76
4	6446	197	41	3559	77
		5401	42	3482	78
5	6249	184	43	3404	78
6	6065	140	44	3326	78
7	5925	110	45	3248	78
8	5815	80	46	3170	78
9	5735	60	47	3092	78
		5975	48	3014	78
10	5675	52	49	2936	79
11	5623	50			8793
12	5573	50	50	2857	81
13	5523	50	51	2776	82
14	5473	50	52	2694	82
15	5423	50	53	2612	82
16	5373	53	54	2530	82
17	5320	58	55	2448	82
18	5262	63	56	2366	82
19	5199	67	57	2284	82
		6518	58	2202	82
20	5132	72	59	2120	82
21	5060	75			9612
22	4985	75	60	2038	82
23	4910	75	61	1956	82
24	4835	75	62	1874	81
25	4760	75	63	1793	81
26	4685	75	64	1712	80
27	4610	75	65	1632	80
28	4535	75	66	1552	80
29	4460	75	67	1472	80
		7265	68	1392	80
30	4385	75	69	1312	80
31	4310	75			10418
32	4235	75	70	1232	80
33	4160	75	71	1152	80

Age	Living	Decrements	Age	Living	Decrements
Yrs.			Yrs.		
72	1072	80	85	186	41
73	992	80	86	145	34
74	912	80	87	111	28
75	832	80	88	83	21
76	752	77	89	62	16
77	675	73			11604
78	602	68	90	46	12
79	534	65	91	34	10
		11181	92	24	8
80	469	63	93	16	7
81	406	60	94	9	5
82	346	57	95	4	3
83	289	55	96	1	1
84	234	48			11650

TABLE IV. Shewing the value of an annuity on *one life*, according to the probabilities of *life* in London, as given in Table I. See EXPECTATION.

Age.	Yrs. purchaſe at 3 per Cent.	Yrs. purchaſe at 3½ per Cent.	Yrs. purchaſe at 4 per Cent.	Yrs. purchaſe at 4½ per Cent.	Age.	Yrs. purchaſe at 3 per Cent.	Yrs. purchaſe at 3½ per Cent.	Yrs. purchaſe at 4 per Cent.	Yrs. purchaſe at 4½ per Cent.	Age.	Yrs. purchaſe at 3 per Cent.	Yrs. purchaſe at 3½ per Cent.	Yrs. purchaſe at 4 per Cent.	Yrs. purchaſe at 4½ per Cent.
5	18.8	16.2	14.1	12.5	31	14.8	12.9	11.4	10.2	56	10.1	9.1	8.4	7.6
6	18.9	16.3	14.2	12.6	32	14.6	12.7	11.3	10.1	57	9.9	8.9	8.2	7.4
7	19.0	16.4	14.3	12.7	33	14.4	12.6	11.2	9.9	58	9.6	8.7	8.1	7.3
8	19.0	16.4	14.3	12.7	34	14.2	12.4	11.0	9.8	59	9.4	8.6	8.0	7.2
9	19.0	16.4	14.3	12.7	35	14.1	12.3	10.9	9.7	60	9.2	8.4	7.9	7.1
10	19.0	16.4	14.3	12.7	36	13.9	12.2	10.8	9.6	61	9.0	8.2	7.7	7.0
11	19.0	16.4	14.3	12.7	37	13.7	12.0	10.6	9.5	62	8.7	8.1	7.6	6.9
12	18.9	16.3	14.2	12.7	38	13.5	11.8	10.5	9.3	63	8.5	7.9	7.4	6.7
13	18.7	16.2	14.1	12.6	39	13.3	11.6	10.4	9.2	64	8.2	7.7	7.3	6.6
14	18.5	16.0	14.0	12.5	40	13.2	11.5	10.3	9.1	65	8.0	7.5	7.1	6.5
15	18.3	15.8	13.9	12.4	41	13.0	11.4	10.2	9.0	66	7.8	7.3	6.9	6.3
16	18.1	15.6	13.7	12.3	42	12.8	11.2	10.1	8.9	67	7.6	7.1	6.7	6.2
17	17.9	15.4	13.5	12.2	43	12.6	11.1	10.0	8.8	68	7.4	6.9	6.6	6.0
18	17.6	15.2	13.4	12.1	44	12.5	11.0	9.9	8.7	69	7.1	6.7	6.4	5.9
19	17.4	15.0	13.2	12.0	45	12.3	10.8	9.8	8.6	70	6.9	6.5	6.2	5.7
20	17.2	14.8	13.0	11.8	46	12.1	10.7	9.7	8.5	71	6.7	6.3	6.0	5.5
21	17.0	14.7	12.9	11.7	47	11.9	10.5	9.6	8.4	72	6.5	6.1	5.8	5.4
22	16.8	14.5	12.7	11.6	48	11.8	10.4	9.5	8.3	73	6.2	5.9	5.6	5.2
23	16.5	14.3	12.6	11.5	49	11.6	10.3	9.4	8.2	74	5.9	5.6	5.4	5.0
24	16.3	14.1	12.4	11.3	50	11.5	10.2	9.3	8.1	75	5.6	5.4	5.2	4.8
25	16.1	14.0	12.3	11.2	51	11.4	10.1	9.2	8.0					
26	15.9	13.8	12.1	11.1	52	11.2	9.9	9.0	7.9					
27	15.6	13.6	12.0	10.9	53	11.0	9.8	8.9	7.8					
28	15.4	13.4	11.8	10.8	54	10.7	9.6	8.8	7.7					
29	15.2	13.2	11.7	10.7	55	10.5	9.4	8.6	7.5					
30	15.0	13.1	11.6	10.5	56	10.3	9.3	8.5	7.4					

TABLE V. Shewing the value of an annuity on the joint continuance of any *two lives*, according to the probabilities of *life* in London, as given in Table I. See EXPECTATION.

Age of the youngeſt.	Age of the eldeſt.	Value at 3 per Cent.	Value at 4 per Cent.	Age of the youngeſt.	Age of the eldeſt.	Value at 3 per Cent.	Value at 4 per Cent.
	10	14.7	13.0	11.6		20	12.8	11.3	10.1
	15	14.3	12.7	11.3		25	12.2	10.8	9.7
	20	13.8	12.2	10.8		30	11.6	10.3	9.2
	25	13.1	11.6	10.2		35	10.9	9.8	8.8
	30	12.3	10.9	9.7		40	10.2	9.2	8.4
10	35	11.5	10.2	9.1	20	45	9.5	8.6	7.9
	40	10.7	9.6	8.6		50	8.8	8.0	7.4
	45	10.0	9.0	8.1		55	8.1	7.5	6.9
	50	9.3	8.4	7.6		60	7.4	6.9	6.4
	55	8.6	7.8	7.1		65	6.7	6.3	5.9
	60	7.8	7.2	6.6		70	6.0	5.7	5.4
	65	6.9	6.5	6.1		75	5.2	5.0	4.8
	70	6.1	5.8	5.5		25	11.8	10.5	9.4
	75	5.3	5.1	4.9		30	11.3	10.1	9.0
	15	13.9	12.3	11.0		35	10.7	9.6	8.6
	20	13.3	11.8	10.5		40	10.0	9.1	8.2
	25	12.6	11.2	10.1		45	9.4	8.5	7.8
	30	11.9	10.6	9.5	25	50	8.7	7.9	7.3
	35	11.2	10.0	9.0		55	8.0	7.4	6.8
	40	10.4	9.4	8.5		60	7.3	6.8	6.3
15	45	9.6	8.8	8.0		65	6.6	6.2	5.8
	50	8.9	8.2	7.5		70	5.9	5.6	5.3
	55	8.2	7.6	7.0		75	5.1	4.9	4.7
	60	7.3	7.0	6.5		30	10.8	9.6	8.6
	65	6.8	6.4	6.0		35	10.3	9.2	8.3
	70	6.0	5.7	5.4	30	40	9.7	8.8	8.0
	75	5.2	5.0	4.8		45	9.1	8.3	7.6

Age of the Annuitant.	Value at 3 per Cent.	Value at 4 per Cent.	Value at 5 per Cent.
30	50	8.5	7.8	7.2
	55	7.9	7.3	6.7
	60	7.2	6.7	6.2
	65	6.5	6.1	5.7
	70	5.8	5.5	5.2
	75	5.1	4.9	4.7
35	35	9.9	8.8	8.0
	40	9.4	8.5	7.7
	45	8.9	8.1	7.4
	50	8.3	7.6	7.0
	55	7.7	7.1	6.6
	60	7.1	6.5	6.1
	65	6.4	6.0	5.6
	70	5.7	5.4	5.1
	75	5.0	4.8	4.6
40	40	9.1	8.1	7.3
	45	8.7	7.8	7.1
	50	8.2	7.4	6.8
	55	7.6	6.9	6.4
	60	7.0	6.4	6.0
	65	6.4	5.9	5.5
	70	5.7	5.4	5.1
	75	5.0	4.8	4.6
45	45	8.3	7.4	6.7
	50	7.9	7.1	6.5
	55	7.4	6.7	6.2
	60	6.8	6.3	5.8
	65	6.3	5.8	5.4
45	70	5.6	5.3	5.0
	75	4.9	4.7	4.5
50	50	7.6	6.8	6.2
	55	7.2	6.5	6.0
	60	6.7	6.1	5.7
	65	6.2	5.7	5.3
	70	5.5	5.2	4.9
	75	4.8	4.6	4.4
55	55	6.9	6.2	5.7
	60	6.5	5.9	5.5
	65	6.0	5.6	5.4
	70	5.4	5.1	4.8
	75	4.7	4.5	4.3
60	60	6.1	5.6	5.2
	65	5.7	5.3	4.9
	70	5.2	4.9	4.6
	75	4.6	4.4	4.2
65	65	5.4	5.1	4.7
	70	4.9	4.6	4.4
	75	4.4	4.2	4.0
70	70	4.6	4.4	4.2
	75	4.2	4.0	3.9
75	75	3.8	3.7	3.6

TABLE VI. Shewing the present value of an annuity on a single *life*, according to Mr. De Moivre's hypothesis.

Age.	3 per Ct.	4 per Ct.	5 per Ct.	6 per Ct.
2	18,736	14,160	10,730	8,395
9	19,888	18,269	16,882	15,672
10	20,868	18,269	16,882	15,672
11	19,538	18,189	16,791	15,593
12	19,604	18,249	16,848	15,647
13	19,489	17,937	16,606	15,437
14	19,333	17,823	16,508	15,349
15	19,192	17,727	16,419	15,273
16	19,050	17,588	16,311	15,180
17	18,965	17,467	16,209	15,102
18	18,859	17,334	16,105	15,015
19	18,610	17,120	15,899	14,833
20	18,458	17,003	15,801	14,741
21	18,304	16,863	15,781	14,737
22	18,148	16,830	15,669	14,641
23	17,990	16,698	15,556	14,541
24	17,827	16,559	15,437	14,442
25	17,664	16,419	15,318	14,336
26	17,497	16,277	15,197	14,235
27	17,327	16,133	15,073	14,121
28	17,154	15,983	14,946	14,011
29	16,979	15,831	14,815	13,886
30	16,800	15,680	14,684	13,761
31	16,620	15,526	14,549	13,673
32	16,436	15,367	14,411	13,553
33	16,248	15,204	14,270	13,430
34	16,055	15,036	14,124	13,302
35	15,854	14,861	13,973	13,173
36	15,646	14,679	13,820	13,044
37	15,433	14,494	13,662	12,914
38	15,210	14,301	13,503	12,773
39	15,053	14,163	13,397	12,676
40	14,822	13,978	13,196	12,483
41	14,626	13,809	13,028	12,337
42	14,407	13,590	12,826	12,125
43	14,185	13,389	12,607	11,923
44	13,956	13,159	12,364	11,670
45	13,728	12,893	12,121	11,797
46	13,493	12,724	12,035	11,540
47	13,254	12,572	11,964	11,368
48	13,012	12,334	11,728	11,192
49	12,764	12,131	11,548	11,022
50	12,511	11,904	11,344	10,827
51	12,253	11,673	11,133	10,638
52	11,994	11,433	10,882	10,403
53	11,728	11,195	10,702	10,214
54	11,457	10,959	10,478	10,039
55	11,183	10,698	10,248	9,829
56	10,902	10,443	10,014	9,614
57	10,619	10,181	9,773	9,393
58	10,325	9,917	9,527	9,166
59	10,029	9,640	9,275	8,933
60	9,727	9,360	9,014	8,693
61	9,419	9,076	8,748	8,446
62	9,107	8,786	8,482	8,197
63	8,785	8,482	8,205	7,938
64	8,462	8,183	7,921	7,674
65	8,132	7,875	7,630	7,399
66	7,792	7,558	7,333	7,119
67	7,456	7,234	7,027	6,831
68	7,109	6,901	6,714	6,534
69	6,757	6,561	6,394	6,230
70	6,398	6,215	6,065	5,918
71	6,036	5,865	5,728	5,596
72	5,670	5,509	5,383	5,265
73	5,298	5,147	5,028	4,926
74	4,924	4,779	4,668	4,578
75	4,543	4,405	4,303	4,227
76	4,046	3,925	3,812	3,747

Age.	3 per Ct.	4 per Ct.	5 per Ct.	6 per Ct.	7 per Ct.
77	5,412	5,287	5,150	5,067	5,025
78	5,005	5,061	4,911	4,906	4,894
79	4,776	4,742	4,707	4,673	4,641
80	4,534	4,509	4,484	4,459	4,435
81	4,286	4,267	4,250	4,230	4,213
82	4,029	4,021	4,008	3,994	3,984
83	3,761	3,756	3,751	3,743	3,737
84	3,484	3,483	3,482	3,479	3,478
85	3,200	3,200	3,200	3,200	3,200

This Table is the same with Mr. De Moivre's Table of the values of single *lives*, published in his Treatise on *Life Annuities*, and carried as far as the age of 79 to three places of decimals by Mr. Dodson in his Mathematical Repository, vol. ii. p. 169.

TABLE VII. Shewing the value of an annuity on the joint continuance of two *lives*, according to Mr. De Moivre's hypothesis.

Age of the Annuitant.	Age of the Annuitant's Wife.	Value at 3 per Cent.	Value at 4 per Cent.	Value at 5 per Cent.
	10	15.200	13.342	11.855
	15	14.878	13.093	11.661
	20	14.503	12.808	11.450
	25	14.074	12.480	11.182
	30	13.585	12.102	10.884
	35	13.025	11.665	10.537
10	40	12.381	11.156	10.128
	45	11.644	10.564	9.646
	50	10.796	9.871	9.074
	55	9.822	9.059	8.391
	60	8.704	8.105	7.572
	65	7.417	6.980	6.585
	70	5.936	5.652	5.391
	15	14.574	12.800	11.478
	20	14.225	12.503	11.266
	25	13.822	12.181	11.022
	30	13.359	11.921	10.736
	35	12.824	11.501	10.402
15	40	12.207	11.013	10.008
	45	11.496	10.440	9.541
	50	10.675	9.767	8.985
	55	9.727	8.975	8.318
	60	8.632	8.041	7.515
	65	7.377	6.934	6.544
	70	5.932	5.623	5.364
	20	13.904	12.341	11.067
	25	13.531	12.051	10.840
	30	13.098	11.711	10.565
	35	12.594	11.314	10.278
	40	12.008	10.847	9.870
20	45	11.325	10.297	9.420
	50	10.536	9.648	8.880
	55	9.617	8.879	8.233
	60	8.549	7.967	7.448
	65	7.308	6.882	6.495
	70	5.868	5.590	5.333
	25	13.192	11.786	10.621
	30	12.704	11.468	10.367
	35	12.133	11.095	10.067
	40	11.476	10.655	9.708
25	45	11.130	10.131	9.278
	50	10.374	9.509	8.761
	55	9.488	8.766	8.134
	60	8.452	7.886	7.371
	65	7.241	6.826	6.440
	70	5.826	5.551	5.294
	30	12.434	11.182	10.133
	35	12.010	10.838	9.854
	40	11.502	10.428	9.514
	45	10.898	9.936	9.112
30	50	10.183	9.345	8.630
	55	9.338	8.634	8.058
	60	8.338	7.779	7.280
	65	7.161	6.748	6.373
	70	5.777	5.505	5.254
	35	11.632	10.536	9.600
	40	11.175	10.157	9.291
	45	10.622	9.702	8.913
35	50	9.955	9.149	8.450
	55	9.156	8.476	7.879
	60	8.202	7.658	7.172
	65	7.066	6.662	6.294
	70	5.718	5.450	5.203
	40	10.777	9.826	9.014
	45	10.283	9.418	8.671
40	50	9.677	8.911	8.244
	55	8.936	8.283	7.710
	60	8.038	7.510	7.039
	65	6.951	6.556	6.198
	70	5.646	5.583	5.141

Age of the youngest life.	Age of the oldest life.	Value at 3 per Cent.	Value at 4 per Cent.	Value at 5 per Cent.
45	45	9·863	9·063	8·379
	50	9·331	8·619	7·987
	55	8·662	8·044	7·500
	60	7·831	7·332	6·855
	65	6·827	6·425	6·080
	70	5·656	5·300	5·063
50	50	8·892	8·235	7·660
	55	8·312	7·738	7·230
	60	7·508	7·031	6·664
	65	6·523	6·158	5·926
	70	5·449	5·193	4·964
55	55	7·847	7·332	6·873
	60	7·220	6·781	6·386
	65	6·379	6·036	5·724
	70	5·291	5·053	4·833
60	60	6·737	6·351	6·001
	65	6·043	5·730	5·444
	70	5·081	4·858	4·653
65	65	5·537	5·277	5·031
	70	4·773	4·573	4·385
70	70	4·270	4·104	3·952

TABLE VIII. Shewing the value of an annuity on any single *life*, according to the probabilities of living at Northampton, as given in Table III. Interest reckoned at 4 *per cent.*

Age.	Value.	Age.	Value.	Age.	Value.	Age.	Value.
1	13·503	25	15·458	49	11·475	73	5·107
2	15·633	26	15·321	50	11·264	74	5·220
3	16·402	27	15·184	51	11·057	75	4·960
4	17·015	28	15·043	52	10·849	76	4·710
5	17·248	29	14·908	53	10·637	78	4·479
6	17·482	30	14·781	54	10·421	78	4·197
7	17·619	31	14·639	55	10·201	79	3·921
8	17·668	5	14·495	56	9·977	80	3·643
9	17·624	33	14·347	57	9·749	81	3·377
10	17·583	34	14·195	58	9·516	82	3 121
11	17·393	35	14·039	59	9·280	83	2·887
12	17·251	36	13·881	60	9·039	84	2·708
13	17·103	37	13·719	61	8·795	85	2·143
14	16·950	38	13·548	62	8·549	86	1·393
15	16·791	39	13·373	63	8·299	87	1·833
16	16·625	40	13·197	64	8·052	88	1·233
17	16·461	41	13·018	65	7·761	89	1·067
18	16·309	42	12·838	66	7·588	90	1·758
19	16·167	43	12·667	67	7·210	91	1·473
20	16·033	44	12·472	68	6·930	92	1·171
21	15·913	45	12·281	69	6·646	93	0·857
22	15·797	46	12·086	70	6·361	94	0·539
23	15·680	47	11·88	71	6·073	95	0·240
24	15·560	48	11·681	72	5·790		

LIFE-*annuities, payable half yearly.* Theſe are more valuable than *life-annuities* payable yearly, on the two following accounts. Firſt, the annuitant in this caſe receives one half of every payment half a year ſooner; and, ſecondly, he has the chance of receiving one half year's payment more than if he had been paid yearly. Mr. Simpſon, in his Select Exercifes, p. 283, obſerves, that the value of theſe two advantages put together (let the rate of intereſt and the number of *lives* on which the annuity depends be what they will) will always amount to $\frac{1}{4}$ of a year's purchaſe; and that if the payments are to be made *quarterly*, theſe advantages will be always worth $\frac{1}{8}$ of a year's purchaſe. But Dr. Price, in an eſſay in the Philoſophical Tranſactions, vol. lxvi. part i. p. 109, has ſtated the differences of value between *life-annuities* as they are made payable yearly, half yearly, or quarterly, with more preciſion; and from his inveſtigations it appears, that a *fifth* of a year's purchaſe is generally an addition more than ſufficient to the yearly value of an annuity, in order to obtain its value, payable half-yearly; and *three-tenths* of a year's purchaſe, in order to obtain its value, payable quarterly.

Dr. Price has given the following ſhort and eaſy theorems for finding in all caſes theſe differences of value.

Let r be (not 1*l.* with its intereſt, but merely) the intereſt of 1*l.* for a year; n the complement of a given *life*; y, h, q the values reſpectively of an annuity *certain* for n years, payable yearly, half-yearly, or quarterly; P the perpetuity; Y the preſent value of an annuity on a *life*, whoſe complement is n, payable yearly; H the value of the ſame annuity payable half-yearly; and L the value of the ſame annuity payable quarterly.

Then, $Y = P - \frac{1+r}{ry} \times y$

$$H = P - \frac{1+\frac{r}{2}}{hr} \times b$$

$$Q = P - \frac{1+\frac{r}{4}}{qr} \times q$$

Example. Let the *life* ſuppoſed be of the age of 36. The complement of ſuch a *life* is (by what has been already ſaid) 50, according to Mr. De Moivre's hypotheſis; and alſo nearly, according to Tables II. and III. in the preceding collection; therefore, n will be 50. Let the rate of intereſt be 4 *per cent.* or $r = 0.04$, $P = 25$, $Y = 21.482$ (ſee Table III. ANNUITIES) $b = 21.549$ (by the theorems given under annuities) $q = 21.582$, by the ſame theorems. Therefore,

$$Y = 25 - \frac{1.04}{50 \times 0.04} \times 21.482 = 13.829$$

$$H = 25 - \frac{1.02}{50 \times 0.04} \times 21.549 = 14.010$$

$$Q = 25 - \frac{1.01}{50 \times 0.04} \times 21.582 = 14.101$$

LIFE-*annuities ſecured by land*, differ from other *life-annuities* only in the ſingle circumſtance, that the annuitant, whenever he dies, is entitled to a payment for the time which has laplſed between the payment laſt due, and the moment of his death; whereas other annuities ſuppoſe nothing due for this time. In order to obtain the value of ſuch an annuity, $\frac{1}{2n}$ muſt be added to the expreſſion in the firſt theorem, if it is payable yearly; $\frac{1}{4n}$ muſt be added to the expreſſion in the ſecond theorem, if it is payable half-yearly; and $\frac{1}{8n}$ muſt be added to the expreſſion in the third theorem, if the annuity is payable quarterly. See Dr. Price's Eſſay, before quoted.

The value, therefore, in the laſt example of an annuity, payable *yearly* on a *life* aged 36, being 13.8295 its value, if ſecured by *land*, or to be enjoyed to the laſt moment of *life*, will be $13.829 + \frac{21.582}{100} = 14.043$; if ſecured by *land*, and payable half-yearly, its value will be $14.010 + \frac{21.549}{200} = 14.117$; if ſecured by land, and payable quarterly, its value will be $14.101 + \frac{21.582}{400} = 14.155$.

LIFE, *complement of.* See COMPLEMENT.

LIFE, *expectation of.* See EXPECTATION.

LIVES, *inſurance or aſſurance on.* See ASSURANCES *on lives.*

LIFE-*eſtate*, in our *Law*, are either for the *life* of the owner, or for the *life* of another, or others.

LIFE-*everlaſting*, a name by which the *ſiderythum*, or *gnaphalium*, of botanical writers, is ſometimes called. See CUDWEED.

LIFE-*guards.* See GUARDS.

LIFTING-*pieces*, in a clock, are thoſe parts which lift up and unlock the detents in the clock part.

LIFTS, in a ſhip, ropes belonging to the yard-arms of all yards. Their uſe is to ſtop the yard-arms, i. e. to make the end of the yards hang higher or lower, as occaſion ſerves. The top-ſail-*lifts* ſerve as ſheats for the top-gallant-yards, as well as *lifts* to the top-ſail-yards. The hauling of theſe ropes is called *topping the lifts*; thus they ſay *top a ſtarboard.* or *top a port*, i. e. haſe upon the ſtarboard or larboard *lift*.

The *lifts* for the ſprit-ſail-yard, are called *ſtanding lifts.*

LIGAMENT, in its general ſenſe, denotes any thing that ties or binds one part to another.

In which ſenſe the ancients applied the word to membranes, ſkin, fleſh, veins, and arteries; as being common *ligaments.*

LIGAMENT, in its more proper ſignification, denotes a white, tough, ſolid, inflexible part, ſerving to incloſe, and keep together, the junctures of the body.

It has no conſpicuous cavities; nor has it any ſenſe, leſt it ſhould ſuffer on the moving of the bones. It is found very different, according to the different parts where it is uſed. It is harder than a membrane, yet ſofter than a cartilage: its principal uſe is to gird and ſtrengthen the junctures, to prevent the diſlocation of the bones, and even to faſten them together, when they have no articulation. It alſo ſerves as a covering to the tendons, to ſeparate them from the muſcles, and to hold up the ſuſpended entrails, leſt their weight ſhould throw them down. Such are the *ligaments* of the liver, the bladder, and matrix.

Ligaments are of different ſubſtances; ſome hard, others ſoft, membranous, nervous, and cartilaginous; as alſo of different figures and ſituations: ſome ariſe from bones, others from cartilages, and others from membranes.

The *ligament* is held the moſt terreſtrial of all the parts of the body, after the bone and cartilage; being cold, dry, hard, and inſenſible, like them.

The principal *ligaments* of the body are the cartilaginous *ligaments*, which bind the four bones of the metacarpus with the carpus.

The *ligaments* of the ſpine are very ſtrong, being fitted to the articulations of the vertebræ, to prevent their luxation in violent motions. They are of two kinds; the one thick and fibrous, in form of a creſcent, which bind them both at top and bottom; and the other membranous, ſerving to faſten them the more ſecurely.

The *ligaments* of the liver are two in number; the firſt, called *ligamentum ſuſpenſorium*, holds it ſuſpended to the diaphragm, penetrating into the ſubſtance of the liver, to hold it the more firmly; the latter is larger, but more lax; it comes from the external coat of the liver, and is faſtened to the cartilago xiphoides. Some add a third, which is formed out of the umbilical veſſels; which, in adults, dry up, and become a *ligament*.

There are two *ligaments* belonging to the tongue; one which faſtens it, by its root, to the os hyoides; and another larger, inſerted into the middle and inferior part; this laſt is called the *frenum*, or bridle of the tongue. There are alſo *ligaments* belonging to the ſpleen.

The penis has a ſtrong *ligament*, called *ſuſpenſorium penis*, from its office in holding up the penis to the oſſa pubis; it ariſes from the fore-parts of thoſe bones, and is faſtened to the upper-part of the corpora cavernoſa penis: it has another *ligament*, which faſtens the prepuce to the glans.

The uterus has *four ligaments*; two of them called *lata, or broad*, and *two rotunda, or round*, from their figure: the broad *ligaments* are membranous, and ariſe from the proceſſes of the peritonæum, and are faſtened to the lateral parts of the bottom of the uterus; and ſerve to prevent it from falling down upon the neck, as ſometimes happens, when theſe *ligaments* are too much relaxed.

The round *ligaments* ariſe from the ſides of the womb, at the place where the tubæ Fallopianæ are joined to it. At their firſt riſe they are broad; but, by degrees, as they recede farther from the wound, grow round and ſmooth; and, as the ſpermatic veſſels do in men, paſs betwixt the duplicature of the peritonæum, and ſo out of the abdomen, through the foramina of the oblique and tranſverſe muſcles of the abdomen, and, running obliquely on the os pubis, terminate under the fat of the clitoris. By the paſſages of theſe *ligaments*, women, and girls eſpecially, are expoſed to inguinal ruptures, as men are by the paſſages of the ſpermatic veſſels.

The ſubſtance of the broad *ligaments* is membranous, looſe, and ſoft; whence ſome have compared them to the wings of a bat, and called them *alæ vespertilionum*. The round *ligaments* are of a firmer texture, and conſiſt of a double membrane, wrapping up in it veins, arteries, nerves, and lymphæducts; and both theſe, and the former have been ſometimes taken for muſcles. By theſe *ligaments* the uterus is kept ſo tight, that no violence of internal fluxes, or humours, can riſe it above its place. See *Tab. Anat. (Splanch.) fig. 9. lit. b. b. fig. 11. lit. i. i.* &c.

LIGAMENTS *of the hand*. See HAND.

LIGAMENTS *of the vertebræ*. Mr. du Vernoi has mentioned more *ligaments* of the vertebræ of the back, than are commonly deſcribed. See Comment. Acad. Petrop. tom. vi.

LIGAMENTUM *annulare*. See ANNULAR and WRIST.

LIGAMENTUM *ciliare*. See CILIARE *Ligamentum*.

LIGAMENTUM *cutaneum iſſii* (*os*) goes out anteriorly from the extremity of the os coccygis: it is very ſlender, and divides into two portions at the orifice of the anus, which run into the membrana adipoſa, and are inſerted in the ſkin on each ſide of the anus, by a kind of expanſion, and continuing to divaricate, are loſt on the two ſides of the perinæum.

LIGAMENTUM *Fallopii*. See *Ligamentum* FALLOPII and INGUINAL *Ligament*.

LIGAMENTUM *inter maxillare*, is a ligament on each ſide of the face, thus called by Winſlow. It connects the two jaws, and gives inſertion to the poſterior fibres of the buccinator muſcle. It is ſtrong and broad, fixed to the outſide of the upper jaw, above the laſt dens molaris, and at the ſide of the apophyſis pterigoidæus internus. By the lower end it is fixed on the outſide of the lower jaw, below the laſt dens molaris.

LIGAMENTUM *Poupartii*, or *Poupart's ligament*, is only the lower border of the deſcending oblique muſcle of the belly, ſtretched from the fore-part of the os ileum to the pubes.

LIGAMENTUM *pubis inter oſſium*, is a ſtrong triangular membrane, fixed by two of its edges in the inferior branches of thoſe bones, all the way up to their common ſymphyſis; the third edge, which is loweſt, is looſe, and this whole membrane, the middle of which is perforated by a particular hole, is ſtretched very tight between the two bones, and under their cartilaginous arch, to which it adheres very cloſely.

LIGAMENTUM *peculiare ſtapidis*, in *Anatomy*, a name given by Schelhammer, and ſome others, to what is properly a muſcle, and is called by Albinus *ſtapedium*, and by Cowper, and others, *muſculus ſtapidis* and *ſtapedicus*.

LIGATURE, in *Surgery*, any thing tied about a part of the body, more eſpecially a bandage, or fillet of cloth, or linen, ſerving to bind the arm, and facilitate the operation of bleeding.

They are called alſo *chords*, bands, or ſtrings, and are of different kinds, ſome fine, others coarſe and ſtrong, and are made either of flax, or hemp, or cloth, or ſilk, or horſe-hair, according to the nature of the diſorder; for theſe things are almoſt conſtantly required. They are uſed to replace or extend bones that are broken or diſlocated; to tie the patients down in lithotomy, amputations, and operations of that kind; to tie up the veins in phlebotomy; to tie up arteries after amputations, or in large wounds; to ſecure the ſplints that are applied to fractures; to tie up the proceſſes of the peritonæum, with the ſpermatic veſſels, in caſtration; and laſtly, in taking off warts, and other excreſcences by *ligature*, and in all other operations of this kind.

LIGATURE, LIGATURA, or LIGATIO, denotes alſo the act or manner of diſpoſing and applying bandages for the cloſing of wounds, and performing many of the operations in ſurgery.

LIGATURE, is alſo uſed to ſignify a kind of bandage, or fillet, tied round the neck, arm, leg, or other part of the bodies of men, or beaſts, to divert, or drive off, ſome diſeaſe, acciident, &c.

LIGATURE, among *Moſtic Divines*, ſignifies a total ſuſpenſion of the ſuperior faculties, or intellectual powers of the ſoul. They pretend, that when the ſoul is arrived at a perfect contemplation, the remains deprived of all her operations, and ceaſes to act, in order to be more ready and prepared to receive the impulſe and communications of divine grace. This paſſive ſtate of theſe contemplative people, they call their *ligature*.

LIGATURE is alſo uſed for a ſtate of impotency, in reſpect to venery, pretended to be cauſed by ſome charm, or witchcraft.

Kæmpfer tells of an uncommon kind of *ligature*, or knotting, in uſe among the people of Maſſacar, Java, Malaja, Siam, &c. By this charm, or ſpell, a man binds up a woman, and a woman a man, ſo as to put it out of their power to have to do with any other perſon; the man being thereby rendered impotent to any other woman, and all other men impotent with reſpect to the woman.

Some of their philoſophers pretend that this *ligature* may be effected by the ſhutting of a lock, the drawing of a knot, or the ſticking of a knife in the wall, at the point of time wherein the prieſt is joining a couple together; and that a *ligature*, thus effected, may be diſſolved, by the ſpouſe's urining through a ring. This piece of ſuperſtition is ſaid to obtain alſo among the Chriſtians of the Eaſt.

The ſame author tells us, that during the ceremony of marriage in Ruſſia, he obſerved an old fellow lurking behind the church-door, and mumbling over a ſtring of words; and, at the ſame time, cutting a long rod, which he held under his arm, into pieces; which, it ſeems, is a common practice at the marriages of great perſons, and done with deſign to elude and counterwork any other perſon, that might poſſibly be inducing the *ligature*.

The ſecret of inducing a *ligature*, is delivered, by the ſame author, as he was taught it on the ſpot, by one of their adepts; which, being a curioſity, we ſhall not ſcruple to add in his own words; not daring to make it ſpeak Engliſh. *Puella amantium, vel conjux magistrum ligaturus, aſſervet si concubitu actu, priusquam incidas—si feminis quantum poteſt excipiat. Hic probe cavendum ſub limine domus ſuæ in terram ſpuitat. Tu quamcito ſpuitum reliquerit, tumidum ejus baſtia in nullius prorſus quæ ſe ſanctitatis ſpecioſum obtendat, & prius ab hoc haveat cum liberis: quam ex cloaca limitari liberum ipſum introvertas, ut verſo, ut belli ſocium ligaturus, manifeſtatum ad os ſpuitum combinis; ex cunctibus cum propria urina ſubactis, ipſumque ſic ſicatum pronyi, vel, ſi cautes ſervandæ propinde non ſufficiant, eodem ſubigito cum puncto tibiæ, quem exprimenteſt. Formatum ſecum cauſæ efficatis, ſi cunque offervato hoc ſpacio, ac humectato cinereſcit. Mammilla ſi ſervaveris, omnes antes, dum ea ſiccum ſuum collimaverint, mammas conſtabescent: ipſe vero deficiet. Abrumpe hanc ſuum prius humectato, quamdiu ſe vacuabit, denuo ſuſpende, nemo prius ipſi parebit, quin & alios quotquot ſumma preparantes admiſerit.*

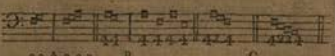
M. Marſhal mentions another ridiculous form of *ligature*, which he received from a brawin at Indoſtan: "If, "ſays he, the little worm in the wood lukeraa kara, be "cut into two, and the one part ſtay, and the other

" not, if the ſtirring part be bruiſed, and given with half " a beetle to a man, and the other half to a woman, the " charm will keep each from ever having to do with any " other perſon." Philoſ. Tranſ. N° 268.

LIGATURE, *ligatura*, in the *Italian Muſic*, ſignifies a tying or binding together of notes.

Hence ſyncopes are often called *ligatures*, becauſe they are made by the *ligature* of many notes. There is another ſort of *ligatures* for breves, when there are many of theſe on different lines, or in different ſpaces, to be ſung to one ſyllable.

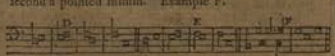
To underſtand this, it muſt be obſerved, that only breves are capable of this ſpecies of *ligature*, becauſe their figure admits of their being placed ſo cloſe together, as to ſeem one character only, though placed on different degrees, unleſs there be occaſion to place a ſemi-circle either above or below them, to ſhew that they are tied. This kind of *ligature* regards common time only. Breves again muſt be conſidered as ſimple, as having a tail, and as being of different colours. Firſt, if they be ſimple 𝅜 and aſcend, they contain their natural quantity, i. e. each two ſemi-breves, as in example A. But if they deſcend, then each is equivalent to four ſemi-breves, if only two follow one another, as in B. If there are three or four following ones, the firſt and laſt contain each four ſemi-breves, and thoſe in the middle but two, as in C.



A B C

Secondly, if they have tails 𝅜 and the tail be turned upwards, the breves contain only one meaſure, as well aſcending as deſcending. See Ex. D. But if it be marked downwards, the breve then contains its natural quantity. See Ex. E. This ſpecies of *ligature* was invented only becauſe the minim, being round, could not be uſed in this manner. And the ſemi-circle was not at that time in uſe.

It may be here remarked, that ordinarily the firſt breve alone of every *ligature* has a tail, and that uſually placed on the left ſide. Laſtly, if they be of different colours, i. e. if the firſt be white, or open in the middle, and the ſecond black, the firſt contains a ſemibreve, and the ſecond a pointed minim. Example F.



D E F

11 11 11 41 32 32 22 22

Theſe are the principal *ligatures*, beſides which there are many others, for which ſee CHARACTER.

LIGATURES, among *Printers*, are types conſiſting of two letters or characters joined together; as *ct*, *ſt*, *ff*, *ffi*, *fl*. The old editions of Greek authors are extremely full of *ligatures*; the *ligatures* of Stephens are, by much, the moſt beautiful.

Some editions have been lately printed without any *ligatures* at all; and there was a deſign to explode them quite out of printing. Had this ſucceeded, the fineſt ancient editions would, in time, have grown uſeleſs; and the reading of old manuſcripts would have been rendered almoſt impracticable to the learned themſelves.

LIGEANCE, *ligeantia*, in *Law*, is the true and faithful obedience of a ſubject to his ſovereign; and is alſo applied to the dominion or territory of the liege lord: thus children are ſaid to be born in or out of the *ligeance* of the king, &c. Stat. 25 Edw. III.

LIGHT, that ſenſation occaſioned in the mind, by the view of luminous bodies; or that property in bodies, whereby they are fitted to excite thoſe ſenſations in us.

LIGHT is alſo uſed to denote a certain action of the luminous body, or a medium between it and the eye; by means whereof, ſome ſuppoſe the one to act on the other. This they call *ſecondary* or *derivative light*; to diſtinguiſh it from that of luminous bodies, which is called *primary*, or *innate*.

Ariſtotle explains the nature of *light*, by ſuppoſing ſome bodies to be tranſparent, as air, water, ice, &c. but ſince, in the night-time we do not ſee any thing through thoſe bodies, he ſays, they are only tranſparent potentially; whereas, in the day, they become really and actually tranſparent: and ſince it is *light* alone that can reduce that power into act, he defines *light* to be the act of a tranſparent body, conſidered as ſuch. He adds, that *light* is not fire, nor is it any thing bodily radiating from the luminous body, and tranſmitted through the tranſparent one; but the mere preſence of fire, or ſome other luminous body, at the tranſparent one.

This is Ariſtotle's doctrine of *light*, which his followers miſtaking, have charged on him another, very different; making *light* and colours to be qualities of the luminous and coloured bodies themſelves, and, in all reſpects, like thoſe ſenſations which they occaſion in us: adding, that things lucid, or coloured, could not produce any ſenſation in us, unleſs they had ſomething ſimilar in themſelves, ſince *nihil dat quod in ſe non habet*.

But the ſophiſm is apparent; for we find, that a needle, in pricking the fleſh, gives us pain, which nobody ever imagined to exiſt in the needle. But that it is not neceſſary there ſhould be any ſimilitude between the quality of the object, and the ſenſation it produces, appears ſtill more evident from a glaſs prism, which is found to exhibit blue, yellow, red, and other colours extremely vivid; and yet nobody will ſay there is any thing in the glaſs priſm like to thoſe ſenſations.

The Carteſians have reaſoned conſiderably on this notion; and own that *light*, as it exiſts in the luminous body, is nothing but a power or faculty of exciting in us a very clear and vivid ſenſation; adding, that what is required to the perception of *light*, is, that we be ſo formed, as to be capable of ſuch ſenſations; that in the hidden pores of tranſparent bodies, there be a certain ſubtile matter, which, by reaſon of its exceeding ſmallneſs, may penetrate even glaſs, and yet be ſtrong enough to ſhake certain capillaments at the bottom of the eye; and, laſtly, that this matter be impelled by the luminous body, ſo as to move the organ of ſight.

Primary *light*, therefore, they ſay, conſiſts in a certain motion of the particles of the luminous body, whereby they are enabled to propel, every way, the materia ſubtilis, lodged in the pores of tranſparent bodies; and ſecondary or derivative *light*, in a conatus to motion, or an inclination of that matter to recede from the centre of the luminous body in right lines.

Father Malebranche explains the nature of *light*, from a ſuppoſed analogy between it and ſound.

Thus he ſuppoſes all the parts of a luminous body are in a rapid motion, which, by very quick pulſes, is conſtantly compreſſing the ſubtile matter between the luminous body, and the eye, and excites vibrations of preſſion. As theſe vibrations are greater, the body appears more luminous; and as they are more quick, or more ſlow, the body is of this or that colour.

This hypotheſis, how ingenious ſoever, is now deſervedly diſcarded, ſince the great diſcoveries made by Sir Iſaac Newton, on the nature of *light*. The primary *light* they talk of, we now know, conſiſts wholly in a certain motion of the particles of the lucid body, whereby they do not propel any fictitious matter, ſuppoſed to be lodged in the hidden pores of tranſparent bodies; but threw off, from the luminous body, certain very ſmall particles, which are emitted every way with great force: and the ſecondary or derivative *light* conſiſts not in a conatus, but a real motion of theſe particles, receding every way from the luminous body, in right lines, and that with an incredible velocity.

For if *light* conſiſted in a mere preſſion, or pulſe, it would be propagated to all diſtances, in the ſame inſtant of time; the contrary of which appears, from the phænomena of the eclipſes of Jupiter's ſatellites, whoſe immerſions, as the earth approaches towards Jupiter, are found to anticipate ſomewhat on the true time, and to commence ſooner; and again, as the earth retires from Jupiter, their immerſions, which alone in that caſe can be obſerved, happen later and later, or loſe time: deviating thus very conſiderably on either ſide, from the true time marked by the tables.

This was firſt obſerved by Mr. Roemer, and ſince by other aſtronomers; the reaſon of which is not owing to any eccentricity; but does apparently follow from this, that the *light* of the ſun, reflected from the ſatellites, has farther to travel, before it reaches the eye, in the one caſe than in the other, by a ſpace equal to the diameter of the earth's annual orbit.

The obſervations, whence this concluſion was deduced, were made at the obſervatory belonging to the Royal Academy of Sciences at Paris, from 1670 to 1675: the principal fact was, that the firſt ſatellite ſometimes emerged exactly at the time calculated by the tables, and ſometimes not, ſo much that the greateſt variation was about fourteen minutes. The particular obſervation that was the moſt ſtriking was the emerſion of this ſatellite obſerved at Paris, Nov. 9, 1676, ten minutes later than it had been obſerved in the month of Auguſt, when the earth was much nearer to Jupiter. Hence Caſſini and Roemer both concluded, that this circumſtance depended on the diſtance of Jupiter with reſpect to the earth; and that, in order to account for it, they muſt ſuppoſe that the *light* was about fourteen minutes in croſſing the earth's orbit.

But the concluſion was afterwards abandoned and attacked by

by Monſieur Caſſini. Mr. Roemer's opinion found an able advocate in Dr. Halley; who removed Caſſini's difficulty, and left Mr. Roemer's concluſion in its full force. In a memoir preſented to the Academy in 1707, Monſieur Maraldi endeavoured to give a new ſtrength to Caſſini's arguments; but Monſieur Roemer's doctrine found a new defender in Mr Pound. See Phil. Tranſ. N° 326. Phil. Tranſ. abr. by Lowth. vol. i. p. 409, 422. s'Grav. Phyſ. Elem. N° 2636, ſeq.

It has been ſince found, that when the earth is between the ſun and Jupiter, his ſatellites are eclipſed about eight minutes ſooner than they could be according to the tables, and that when the earth is nearly in the oppoſite point of its orbit, theſe eclipſes happen about eight minutes later than the tables predict them. Hence it is undeniably certain, that the motion of *light* is not inſtantaneous, ſince it takes about 16½ minutes of time to go through a ſpace equal to the diameter of the earth's orbit, which is at leaſt 190 millions of miles in length; and conſequently the particles of *light* fly about 191919 miles every ſecond of time, which is near a million of miles ſwifter than the motion of a cannon-ball. And as *light* is 16½ minutes in traveling acroſs the earth's orbit, it muſt be 8¼ minutes in coming from the ſun to us; therefore, if the ſun were annihilated, we ſhould ſee him for 8¼ minutes after; and if he were again created, he would be 8¼ minutes old before we could ſee him. In order to explain this progreſſive motion of *light*, let A and B, *Tab.* III. *Optics*, *fig.* 33. be the earth in two different parts of its orbit, whoſe diſtance from each other is 95 millions of miles, equal to the earth's diſtance from the ſun S.

It is plain, that if the motion of *light* were inſtantaneous, the ſatellite 1 would appear to enter into Jupiter's ſhadow FF, at the ſame moment of time to a ſpectator in A, as to another in B. But it is now well known, that the immerſion of the ſatellite into the ſhadow is ſeen 8¼ minutes ſooner when the earth is at B, than when it is at A. As the earth moves from D to C, through the ſide AB of its orbit, it is conſtantly meeting the *light* of Jupiter's ſatellites ſooner, which occaſions an apparent acceleration of their eclipſes; and as it moves through the other half H of its orbit, from C to D, it is receding from their *light*, which occaſions an apparent retardation of their eclipſes, becauſe their *light* is then longer before it overtakes the earth. That theſe accelerations and retardations are not occaſioned by any inequality ariſing from the motions of the ſatellites in excentric orbits is plain, becauſe it affects them all alike, in whatever parts of their orbits they are eclipſed. Beſides, they go often round their orbits every year, and their motions are no way commenſurate to the earth's. Therefore a phenomenon not to be accounted for from the real motions of the ſatellites, but ſo eaſily deducible from the *motion of the* EARTH, and ſo anſwerable to it, muſt be allowed to reſult from it. And this affords one very good proof of the earth's annual motion. See the ſequel of this article.

We ſhall here obſerve, that the firſt perſon, who conceived the thought of meaſuring the velocity of *light* was Galileo, who has given a particular deſcription of his contrivance for this purpoſe, in his Treatiſe on Mechanics, p. 59. He had two men with lights, one of whom was to obſerve when the other uncovered his *light*, and to exhibit his own the moment that he perceived it: this experiment was tried, as may naturally be imagined without ſucceſs, at the diſtance of one mile; but the members of the academy Del Cimento, reſumed the experiment, and placed their obſervers to as little purpoſe, at the diſtance of two miles. However the method uſed by M. Roemer, already mentioned, was the only one adequate to the diſcovery of the velocity of *light*.

Our excellent aſtronomer, Dr. Bradley, has found nearly the ſame velocity of *light*, from his accurate obſervations, and moſt ingenious theory, to account for ſome apparent motions in the fixed ſtars. Phil. Tranſ. N° 406. or Abridg. vol. vi. p. 150. And for a ſummary account of theſe obſervations, &c. ſee STAR.

To underſtand this, it muſt be premiſed, that the fixed ſtars are luminous bodies, and at reſt, with reſpect to our planetary ſyſtem, from which they are vaſtly remote. In this ſyſtem alſo the earth is conſidered as one of the planets, and moving about the ſun.

Suppoſe the ſun repreſented in S, *Tab.* III. *Optics*, *fig.* 34. and that the circle ABCD repreſents the path of the earth, or the ecliptic. At the center S ſuppoſe a perpendicular SP raiſed to the plane of the ecliptic, and that this perpendicular paſſes through any fixed ſtar. If a ſpectator were placed in S, he would ſee the ſtar in the ſame perpendicular; but if the ſpectator paſſes over the circle ABCD, the diameter of which is ſuppoſed to bear a ſenſible though ſmall proportion to the diſtance of the ſtar, it will be perceived to change its ſituation in the heavens. For a ſpectator in A would ſee the ſtar in the line APa; in C he would ſee the ſame ſtar in the line CPc; and ſo in any other point of his progreſs; whence it follows, that the ſtar would ſeem to deſcribe a circle in the heavens repreſented by *a b c d*. If the diſtance of the ſtar was ſo very great, that in reſpect of it the diameter of the earth's orbit AC might be eſteemed a point; in this caſe, the foreſaid circle would be entirely inſenſible; all the lines drawn from the points of the orbit to the ſtar might paſs for perpendiculars to the plane of the ecliptic, and in appearance would correſpond to the ſame point in the heavens with the perpendicular in S, in which point the ſtar would always appear, if its *light* could reach us in an inſtant. But if in this caſe, where the ſtar is ſo remote, the *light* is ſuppoſed to be propagated from the ſtar with a certain velocity, at the ſame time that the earth proceeds in its orbit, the ſtar will be ſeen in an oblique direction to the plane of the orbit; becauſe of the motion compounded of the motion of *light*, and that of the ſpectator.

Suppoſe the *light* to move in the line EG (*fig.* 35.) making an angle with the line FG, in which the ſpectator is carried along; whom we ſhall conceive placed in F. Let the velocity of the ſpectator be to the velocity of the *light*, as FG to EG. While the ſpectator moves along FG, the *light* does the ſame along EG; and the particle of *light* which is in F, when the ſpectator is in F, enters the eye only when he arrives at G. Now the direction of the *light*, with reſpect to the eye, makes with the line FG the angle EFG. For if we conceive the line FE drawn, and to be carried with a parallel motion along with the eye, ſo that in reſpect thereof it be at reſt, while this continues moving, the *light* will reach the eye in the direction of the ſaid line; for when the eye ſhall be in *f*, the middle point between F and G, the tranſferred line will cut EG in its middle point *g*, to which the particle of *light* has reached, and which is likewiſe the middle point of the tranſferred line *fg*; wherefore the particle of *light*, which was in E, in the extremity of the line EF, arrives at, and will enter the eye in the direction *fg*.

Let the angle EGF (*fig.* 36.) be a right one, and EG to FG as the velocity of the *light* to the velocity of the earth in its orbit; then EFG will be the angle, which the ray of *light* entering the eye, makes with the plane in which the earth moves round the ſun.

If the earth be in B (*fig.* 37.) it moves in the direction of the tangent to its orbit in this point; that is, if we ſuppoſe the ſpectator in the ſun, the direction of the earth's motion is parallel to SC; and making the angle *a*SC equal to the angle EGF, in the former figure, the line S*a* will repreſent the line in which the ſpectator would ſee the ſtar.

In the ſame manner when the earth is in D, the ſpectator in the ſun will ſee the ſtar in S*c*, the angles PS*c* and PS*a* being equal; and the line S*a* or S*c*, by its revolution about PS, would deſcribe a cone, whoſe baſe in the heavens would be a circle repreſenting the apparent path of the ſtar through a whole year. Let us ſuppoſe this circle to be *a b c d*, as in *fig.* 37.

When the ſtar is not in the perpendicular to the plane of the ecliptic, but the line PS (*fig.* 38.) is inclined to that plane, the lines which determine the apparent motion of the ſtar in the heavens, will form cones, as in the caſes already explained; only they would be oblique, and in both caſes the apparent path of the ſtar in the heavens would be determined as above; but in this laſt caſe it would be an ellipſis, the greater diameter of which would be equal to the diameter of the circle *a b c d*, of the former figures; ſo that knowing this ellipſis, the circle might eaſily be found which the ſtar would deſcribe, if placed in the perpendicular to the plane of the ecliptic.

The only way to determine, whether the ſtars deſcribe ſuch ellipſes, is by obſervations; in making which there are great difficulties, which however Dr. Bradley has with incomparable induſtry ſurmounted.

Nothing can immediately be determined concerning the foreſaid elliptic motion. The diſtance of the ſtar from the pole of the world muſt be meaſured at different times of the year; and from the different diſtances, the elliptic motion is to be determined by calculation, allowing for the motion of the pole itſelf during the ſpace of time between the obſervations; for the pole moves in a leſſer circle, one degree of which it paſſes over in ſeventy-two years.

Dr. Bradley, making all neceſſary allowances, obſerved ſeveral ſtars at different times of the year, whereby he immediately diſcovered, that their diſtances from the pole of the world varied; and was convinced that this variation could not be attributed to the nutation of the

pole; for he examined two ſtars at equal diſtances from the pole, but ſo oppoſite, that the one ought to have receded from the pole as much as the other acceded to it, if the motion was in the pole itſelf. But this did not fall out ſo; for the change of the one ſtar was double of that of the other; a proper allowance being always made for the pole's motion ariſing from the above revolution. However, this indefatigable obſerver inferred from his obſervations, that the ſtars in certain times receded from, and acceded to, the pole of the world with a motion entirely analogous to that which is performed in an ellipſis; and alſo that they move in ſuch curves, for each of which the motion in the ſame little circle, as *abcd* (*fig.* 38.) anſwers, when the ſtars are referred to the perpendicular in S to the plane of the ecliptic; and the diameter of this minute circle for them all is 40″½.

It is plain from obſervations, to which of the above mentioned cauſes we are to aſcribe the motion of the ſtar. For if the firſt takes place, the ſtar would be carried from *a* to *c*, while the earth paſſed over the part ABC of its orbit; but this being contrary to obſervation, this cannot be the true cauſe. But this change in the ſituation of the ſtar takes place according to the obſervations, while the earth deſcribes the part BCD of its orbit, which is juſt what the ſecond cauſe requires.

If both the cauſes took place at the ſame time, the arc, deſcribed by the earth, would differ from that indicated by either of them; beſides, this concurrence of the cauſes is contrary to the obſervations; unleſs, perhaps, it may be thought reaſonable to attribute a little influence to the firſt cauſe, but ſo very ſmall a portion, as not to be ſenſibly perceived in the obſervations.

Dr. Bradley himſelf conſidered this matter in the following manner: he imagined CA (*Tab.* III. *Optics*, *fig.* 39.) to be a ray of *light* falling perpendicularly upon the line BD; that, if the eye is at reſt at A, the object muſt appear in the direction AC, whether *light* be propagated in time or in an inſtant. But if the eye is moving from B towards A, and *light* is propagated in time, with a velocity that is to the velocity of the eye as CA to BA, then *light*, moving from C to A, whilſt the eye moves from B to A, that particle of it by which the object will be diſcerned when the eye comes to A, is at C, when the eye is at B. Joining the points B, C, he ſuppoſed the line CB to be a tube, inclined to the line BD in the angle DBC, of ſuch a diameter as to admit but one particle of *light*. Then it was eaſy to conceive, that the particle of *light* at C, by which the object muſt be ſeen, when the eye, as it moves along, arrives at A, would paſs through the tube BC, if it is inclined to BD in the angle DBC, and accompanies the eye in its motion from B to A; and that it could not come to the eye placed behind ſuch a tube, if it had any other inclination to the line BD. If, inſtead of ſuppoſing CB ſo ſmall a tube, we imagine it to be the axis of a larger; then, for the ſame reaſon, the particle of *light* at C would not paſs through that axis, unleſs it is inclined to BD in the angle CBD. In like manner, if the eye moved the contrary way, from D towards A, with the ſame velocity, then the tube muſt be inclined in the angle BDC. Although, therefore, the true, or *real* place of an object is perpendicular to the line in which the eye is moving, yet the *viſible* place will not be ſo, ſince that, no doubt, muſt be in the direction of the tube; but the difference between the true and apparent place will be, *ceteris paribus*, greater or leſs, according to the different proportion between the velocity of *light* and that of the eye. So that if we could ſuppoſe that *light* was propagated in an inſtant, then there would be no difference between the real and viſible place of an object, although the eye were in motion; for in that caſe, AC being infinite with reſpect to AB, the angle ACB, the difference between the true and viſible place, vaniſhes. But if *light* be propagated in time, it is evident, from the foregoing conſiderations, that there will be always a difference between the real and viſible place of an object, unleſs the eye is moving either directly towards or from the object. And in all caſes the fine of the difference between the real and viſible place of the object will be to the fine of the viſible inclination of the object to the line in which the eye is moving, as the velocity of the eye is to the velocity of *light*.

He then ſhews, that if the earth revolve round the ſun annually, and the velocity of *light* be to the velocity of the earth's motion in its orbit, as one thouſand to one, that a ſtar really placed in the very pole of the ecliptic, would, to an eye carried along with the earth, ſeem to change its place continually; and neglecting the ſmall difference on the account of the earth's diurnal revolution on its axis, would ſeem to deſcribe a circle round that pole every way diſtant from it 3′ ½; ſo that its longitude would be varied through all the points of the ecliptic every year, but its latitude would always remain the ſame. Its right aſcenſion would alſo change, and its declination, according to the different ſituation of the ſun with reſpect to the equinoctial points, and its apparent diſtance from the north pole of the equator would be 7″ leſs at the autumnal than at the vernal equinox.

The greateſt alteration of the place of a ſtar in the pole of the ecliptic, or which, in effect, amounts to the ſame thing, the proportion between the velocity of light and the earth's motion in its orbit being known, it will not be difficult, he obſerves, to find what would be the difference, upon this account, between the true and apparent place of any other ſtar at any time; and, on the contrary, the difference between the true and apparent place being given, the proportion between the velocity of *light* and the earth's motion in its orbit may be found.

From all which the following concluſions may be deduced: 1. That the ſecond cauſe above mentioned alone takes place in this caſe, viz. that the diſtance of the ſtars is ſo great, that the diameter of the earth's orbit has no ſenſible proportion to it. 2. That the angle FEG (*fig.* 35.) in the above mentioned triangle, is 20″,2; or, ſince the apparent declination of the ſtar γ Draconis, obſerved by Dr. Bradley, on account of the ſucceſſive propagation of *light*, would be to the diameter of the little circle which a ſtar would ſeem to deſcribe about the pole of the ecliptic as 39″ to 40″,2; the half of this is the angle ACB (*fig.* 39), which is equal to 20″,2; and conſequently the ratio of EG to FG, (*fig.* 35.) or of AC to AB (*fig.* 39.) or the velocity of the *light* to the velocity of the earth in its orbit, as 10210 to 1; whence it follows, that the *light* comes from the ſun to the earth in eight minutes and twelve ſeconds. This, Dr. Bradley obſerves, is very probably the truth, becauſe it is a medium between 7 and 11, which were the times which it had before been ſuppoſed to take up, according to different obſervations of the eclipſes of Jupiter's ſatellites. Comparing his obſervations on other ſtars, he afterwards concluded, that *light* is propagated from the ſun to the earth in 8′ 13″; and the near agreement of his obſervations induced him to think, that this ſuppoſition could not differ ſo much as a ſecond of a degree from the truth; ſo that the time which *light* ſpends in paſſing from the ſun to us may be determined by theſe obſervations within 5″ or 10″, which is ſuch a degree of exactneſs as we can never hope to attain from the eclipſes of Jupiter's ſatellites. 3. That the *light* proceeds with the ſame velocity from all the ſtars; for all have the ſame angle FEG. Whence (if we ſuppoſe that all the ſtars are not equally diſtant from us, as many arguments prove) it will follow, that the motion of *light*, all the way it paſſes through the immenſe ſpace above our atmoſphere, is equable or uniform. And ſince the different methods of determining the velocity of *light* thus agree in the reſult, it is reaſonable to conclude, not only that the phenomena above recited are owing to the cauſes to which they are aſcribed, but alſo that, in the ſame medium, *light* is propagated with the ſame velocity after it has been reflected, as before. 4. Laſtly, it muſt be conſidered, that very ſmall differences cannot be perceived; and no body will deny, but that in meaſuring a ſmall angle, an error of a ſecond may be committed, whatever care is uſed to prevent it; and therefore, although we have ſaid, that the firſt cauſe is to be rejected, we do not deny that the ſtars may poſſibly by its influence deſcribe a minute circle, whoſe diameter is 1″, or even a little more. s'Graveſande Phyſ. Elem. Math. lib. ii. cap. i. p. 708, ſeq.

Hence it appears, that the ſucceſſive propagation of *light* will cauſe an *aberration* in the appearances of the ſtars, planets, and comets. After Mr. Bradley had diſcovered this cauſe of error in the apparent places of the fixed ſtars, Mr. Clairaut and others inveſtigated ſeveral rules for the computation of this aberration. Mr. Euler alſo has lately given us a paper on this ſubject. Mem. Acad. Scienc. 1756. Mr. Simpſon, in his Eſſays. Mem. de l'Acad. de Berlin, tom. ii. p. 141, ſeq.

See remarks on the effect of the aberration of *light* on the time of a tranſit of Venus over the ſun, by Dr. Price, in Phil. Tranſ. vol. lx. art. 47. p. 536.

For an account of Mr. Melville's hypotheſis of the different velocities of differently coloured rays, ſee Colour.

But to return to the hypotheſis of preſſure, by which ſome have accounted for the propagation of *light*, it may be obſerved farther, if *light* were not a body, but conſiſted in a mere preſſion, or pulſion, it would never be propagated in right lines, but would be continually inflected ad umbram. Thus Sir Iſaac Newton: "A preſſure on "a fluid medium, i. e. a motion propagated by ſuch a "medium, beyond any obſtacle, which impedes any part "of its motion, cannot be propagated in right lines, but "will be always inflecting and diffuſing itſelf every way, "to the quieſcent medium beyond that obſtacle. The "power of gravity tends downwards; but the preſſure of

" water arising from it tends every way with an equable " force, and is propagated with equal eaſe, and equal " ſtrength, in curves, as in ſtrait lines. Waves, on the " ſurface of the water, gliding by the extremes of any " very large obſtacle, inflect and dilate themſelves, ſtill " diffuſing, gradually, into the quieſcent water beyond " that obſtacle. The waves, pulſes, or vibrations of the " air, wherein ſound conſiſts, are manifeſtly inflected, " though not ſo conſiderably as the waves of water; and " ſounds are propagated with equal eaſe, through crooked " tubes, and through ſtrait lines; but *light* was never " known to move in any curve, nor to inflect itſelf ad " umbram." The rays of *light*, therefore, are ſmall corpuſcles, emitted with exceeding celerity from the luminous body. As to the force wherewith theſe corpuſcles are emitted, ſo as to enable them to move at the inconceivable rate of 11,000,000 miles in a minute; the ſame great author obſerves, " Among bodies of the ſame " kind and virtue, by how much any one is ſmaller, by " ſo much is its attractive power greater in proportion " to its bulk. This power we find ſtronger in ſmall " magnets, than in large ones, regard being had to the " difference of their weights; and the reaſon is, that the " particles of ſmall magnets, being nearer each other, " more eaſily unite their forces intimately together, and " act conjunctly. For the ſame reaſon, the rays of *light* " being of all other bodies the moſt minute, it may be " expected, that their attractive powers ſhould be, of all " others, the ſtrongeſt; and how ſtrong in effect they " are, may be gathered from the following rules: the " attraction of a ray of *light*, according to the quantity " of its matter, is, to the gravity which any projected " body has, according, likewiſe, to the quantity of its " matter, in a ratio compounded of the velocity of the " ray of *light*, to the velocity of that projected body, and " of the bending or curviture of the line, which the ray " deſcribes in the place of refraction, to the bending of " the curvature, deſcribed by that projected body; pro- " vided, however, the inclination of the ray to the re- " fracting ſurface be the ſame with that of the projected " body to the horizon. From which proportion I ga- " ther, that the attraction of the rays of *light* is above " 1,000,000,000,000,000 times greater, than the gravity " of bodies on the ſurface of the earth, in proportion to " the quantity of matter in each, if the *light* paſs from " the ſun to the earth in the ſpace of ſeven minutes. " But now, as in algebra, where affirmative quantities " ceaſe, there negative ones begin; ſo in mechanics, " where attraction ceaſes, there the repelling power muſt " ſucceed: therefore a ray of *light*, as ſoon as it is caſt " off from the luminous body, by the vibrating motion " of its parts, and is got out of the ſphere of its attrac- " tion, is propelled with an immenſe velocity."

The wonderful divifibility of the parts of matter is nowhere more apparent, than in the minuteneſs of the particles of *light*. Dr. Nieuwentyt has computed, that an inch of candle, when converted to *light*, becomes divided into 269,617,040 parts, with 40 ciphers annexed; at which rate, there muſt iſſue out of it, when burning, 418,666, with 39 ciphers more, particles in the ſecond of a minute; vaſtly more than a thouſand times a thouſand million times the number of ſands the whole earth can contain; reckoning ten inches to one foot, and that 100 ſands are equal to one inch. See Relig. Philoſ. vol. iii. p. 805.

It muſt be acknowleged, that many difficulties and objections have been urged againſt the materiality of *light*, or the hypotheſis of *light*'s conſiſting of ſmall particles emitted from luminous bodies; and that many eminent philoſophers, both foreigners and Engliſh, have recurred to the opinion, that *light* conſiſts of vibrations propagated from the luminous body, through a ſubtile ætherial medium.

The ingenious Dr. Franklin, in a letter dated April 23, 1750, expreſſes his diſſatisfaction with the doctrine, that ſuppoſes particles of matter, called *light*, continually driven off from the ſun's ſurface, with a ſwiftneſs ſo prodigious. " Muſt not, ſays he, the ſmalleſt portion " conceivable, have, with ſuch a motion, a force exceed- " ing that of a twenty-four pounder, diſcharged from a " cannon? Muſt not the ſun diminiſh exceedingly by " ſuch a waſte of matter; and the planets, inſtead of " drawing nearer to him, as ſome have fear'd, recede to " greater diſtances through the leſſened attraction? Yet " theſe particles, with this amazing motion, will not " drive before them, or remove, the leaſt and lighteſt " duſt they meet with; and the ſun appears to continue " of his ancient dimenſions, and his attendants move in " their ancient orbits." Accordingly he conjectures, that all the phenomena of *light* may be more conveniently ſolved, by ſuppoſing univerſal ſpace filled with a ſubtile elaſtic fluid, which, when at reſt, is not viſible, but whoſe vibrations affect that fine ſenſe in the eye, as thoſe of air do the groſſer organs of the ear; and that different degrees of the vibration of this medium may occaſion the appearances of different colours. The elaſtic fluid, he ſays, is always the ſame, and yet weaker and ſtronger ſparks differ in apparent colour, ſome white, blue, purple, red; the ſtrongeſt, white; the weak ones, red. Franklin's Exp. and Obſ. &c. p. 264, &c. ed. 1769.

The celebrated Mr. Euler has alſo ſtrenuouſly maintained the ſame hypotheſis, in his Theoria Lucis & Colorum. In the ſummary of his arguments againſt the common opinion, recited in Acad. Berl. 1752, p. 272. beſides the objections above mentioned, he diſputes the poſſibility, that particles of matter, allowed to move with the amazing velocity of *light*, ſhould penetrate tranſparent ſubſtances with ſo much eaſe. In whatever manner they are tranſmitted, thoſe bodies muſt have pores, diſpoſed in right lines, and in all poſſible directions, in order to form canals for the paſſage of the rays: but ſuch a ſtructure muſt take away all ſolid matter from thoſe bodies, and all coherence among their parts, if they do contain any ſolid matter.

Dr. Horſley has taken conſiderable pains to obviate the difficulties ſuggeſted by Dr. Franklin; and, ſuppoſing that the diameter of each particle of *light* does not exceed one millionth of one millionth of an inch, and that the denſity of each particle is three times that of iron, that the *light* of the ſun traverſes the ſemidiameter of the orbis magnus in 7′, and that this ſemidiameter is 21919 ſemidiameters of the earth, he calculates, that the momentum or force of motion in each particle of *light* coming from the ſun, is leſs than that in an iron ball of $\frac{1}{4}$ of an inch diameter, moving at the rate of leſs than an inch in twelve thouſand millions of millions of Egyptian years. Hence he concludes, that a particle of matter, which is probably larger than any particle of *light*, moving with the velocity of *light*, has a force of motion, which, inſtead of exceeding the force of a twenty-four pounder diſcharged from a cannon, is infinitely leſs than that of the ſmalleſt ſhot diſcharged from a pocket piſtol, or leſs than any that art can create. Moreover, he thinks it poſſible, that *light* may be produced by a continual emiſſion of matter from the ſun, without any ſuch waſte of his ſubſtance as ſhould ſenſibly contract his dimenſions, or alter the motions of the planets, within any moderate length of time. In proof of this, he obſerves, that it is not neceſſary to the production of any of the phenomena of *light*, that the emanation from the ſun ſhould be continual in a ſtrict mathematical ſenſe, or without any interval; and likewiſe that part of the *light* which iſſues from the ſun is continually returning to him by reflection from the planets, and other *light* is continually coming to him from the ſuns of other ſyſtems. He proceeds by calculation to ſhew, that in 385,130,000 Egyptian years, the ſun would loſe $\frac{1}{1000}$th of his matter, and, therefore, that the gravitation towards the ſun, at any given diſtance, would diminiſh in the ſame proportion. But this alteration is much too ſmall to diſcover itſelf in the motion of the earth, or of any of the planets. He alſo computes, that the greateſt ſtroke, which the retina of a common eye ſuſtains, when the eye, in a bright day, is turned up directly to the ſun, does not exceed that which an iron ſhot, $\frac{1}{4}$ of an inch diameter, would give, moving only at the rate of 16,16 inches in a year; but the ordinary ſtroke is leſs than the $\frac{1}{2^{64}}$th part of this. Phil. Tranſ. vol. lx. art. 35. vol. lxi. part ii. art. 50.

One of the principal difficulties attending the hypotheſis of the materiality of *light*, is the non-interference of its particles with each other. There is probably, ſays Mr. Melville, Edinb. Eſſ. vol. ii. p. 17. &c. no phyſical point in the viſible horizon, that does not ſend rays to every other point, unleſs where opaque bodies interpoſe. *Light*, in its paſſage from one ſyſtem to another, often paſſes through torrents of *light* iſſuing from other ſuns and ſyſtems, without ever interfering, or being diverted from its courſe, either by it, or by the particles of that elaſtic medium, which ſome have ſuppoſed to be diffuſed through all the mundane ſpace. In accounting for this fact, he ſuppoſes that the particles of *light* muſt be incomparably rare, even when they are the moſt denſe; that is, that the ſemidiameters of two of the neareſt particles, in the ſame, or in different beams, ſoon after their emiſſion, are incomparably leſs than their diſtance from one another. This conſideration obviates the objection urged by Euler and others againſt the materiality of *light*, from its influence in diſturbing the freedom and perpetuity of the celeſtial motions. Boſcovich and others ſolve the difficulty concerning the non-interference of the particles of *light*, by ſuppoſing that each particle is endued with an inſuperable impulſive force; but in this caſe, their ſpheres of impulſion would be more liable to interfere, and they would, on that account, be more likely to diſturb one another. This difficulty, attending the ſuppoſition, that particles of *light* move through other

light, in all imaginable directions, without perpetual collisions among the particles, and continual deflections from a rectilinear courſe, is, in a great degree, obviated, by an eaſy computation of Mr. Canton. He obſerves, that it is neceſſary to allow only a very ſmall portion of time between the emiſſion of every particle, and the next that follows in the ſame direction. Suppoſe, for inſtance, that one lucid point of the ſun's ſurface emits 150 particles in one ſecond, which are more than ſufficient to give continual *light* to the eye, without the leaſt appearance of intermiſſion; yet ſtill the particles of which it conſiſts will, on account of their great velocity, be more than a thouſand miles behind one another; and thereby leave room enough for others to paſs in all directions. Phil. Tranſ. vol. lviii. art 45. p. 344.

If we adopt the concluſions drawn from the chevalier D'Arcy's experiments on the duration of the ſenſations excited by *light*, who ſtates it at the ſeventh part of a ſecond (Hiſt. Acad. Scienc. 1765, Mem. 2.) we may admit an interval of more than 20,000 miles between each particle. Some, in order to anſwer the chief objections of this kind againſt the materiality of *light*, have adopted the hypotheſis of M. Boſcovich; who aſſumes, in his Theoria Philoſophiæ Naturalis, that MATTER is not impenetrable, but that it conſiſts of phyſical points only, endued with powers of attraction and repulſion, taking place at different diſtances; that is, ſurrounded with various ſpheres of attraction and repulſion, in the ſame manner as ſolid matter is generally ſuppoſed to be: provided, therefore, that any body move with a ſufficient degree of velocity, or have ſufficient momentum, to overcome any powers of repulſion it may meet with, it will find no difficulty in making its way through any body whatever; for nothing will interfere or penetrate one another, but powers, ſuch as we know, do, in fact, exiſt in the ſame place, and counterbalance, or over-rule one another. Prieſtley's Hiſtory, &c. of *Light*, &c. p. 391. That *light* is a real ſubſtance, notwithſtanding the objections that have been urged againſt this hypotheſis, ſeems to be eſtabliſhed by the phenomena of the Bologna ſtone, and of other ſubſtances, which poſſeſs the remarkable property of imbibing *light*, of retaining it for ſome time, and afterwards of emitting it. See PHOSPHORUS.

The doctrine of the materiality of *light* is farther confirmed by thoſe experiments, which demonſtrate, that the colour and inward texture of ſome bodies are changed, in conſequence of their being expoſed to the *light*.

The firſt obſervation of this kind appears to have been made by M. Duhamel, who found that the juice of a certain ſhell-fiſh in Provence contracted a fine purple colour when it was expoſed to the *light* of the ſun, and that the ſtronger was the *light*, the more ſplendid was the colour. Pieces of cloth dipped in this liquor, and expoſed to the ſun, became red, though they were incloſed in glaſs; but they acquired none of this colour in the ſame expoſure, if they were covered with the thineſt plates of metal. It was afterwards obſerved by Beccarius, Com. Bonon. vol. iv. p. 75. that a quantity of lana cornea, expoſed to the rays of the ſun, became of a violet colour, whilſt part of the ſame compoſition, covered with black paper, remained white. This effect was found by M. H. Schulze to depend on the ſilver that happened to be in it. Ac. Cæſar. vol. i. p. 528, &c. G. Bonzius was thus led to ſome ſubſequent experiments, which ſeem to prove, that various colours are conſiderably affected by *light*, excluſive of heat, or any thing elſe. By expoſing ribbons of different colours to the rays of the ſun, for ſeveral days, in the open air, he found that all, except the yellow and light green, loſt part of their luſtre, and were conſiderably faded; but when the ſame ribbons were expoſed to a much greater degree of heat, in a dark room, none of the colours were affected, except that a ſmall part of their luſtre was loſt; nor was any ſenſible change made in them after remaining, for a conſiderable time, in a room that faced the north. By incloſing them in an exhauſted receiver, he found that the change was not occaſioned by the air; but no change could be produced in them by the light of torches. Beccarius alſo found by experiments on paper, and a great variety of ſubſtances, mineral, vegetable, and animal, that the *light* of the ſun produced many changes in the internal ſtructure of bodies, and that thoſe ſubſtances which imbibed *light* were much injured. The ſtronger the *light*, and the longer they were expoſed to it, the more injury they received; and the injury thus ſuſtained was found to be laſting. Com. Bon. vol. vii. p. 77, &c. See Prieſtley's Hiſtory, &c. p. 378, &c.

Some writers have attempted to prove the materiality of *light*, by determining the momentum of their component particles, or by ſhewing that they had a force, ſo as, by their impulſe, to give motion to *light* bodies. M. Homberg, Ac. Par. 1708. H. p. 25, imagined, that he could not only diſperſe pieces of amianthus, and other light ſubſtances, by the impulſe of the ſolar rays, but alſo that by throwing them upon the end of a kind of level, connected with the ſpring of a watch, he could make it move ſenſibly quicker; whence, and from other experiments, was inferred the weight of the particles of *light*. But M. Du Fay, and M. Maitan, made other experiments of a more accurate kind, which exhibited no ſuch effects as M. Homberg imagined. However, Dr. Prieſtley informs us, that Mr. Michell endeavoured to aſcertain the momentum of *light* with ſtill greater accuracy, and that his endeavours were not altogether unſucceſsful. Having found that the inſtrument which he uſed, acquired, from the impulſe of the rays of *light*, a velocity of one inch in a ſecond, he inferred, that the quantity of matter contained in the rays falling upon the inſtrument at that time, amounted to no more than one twelve hundred millionth part of a grain. In the experiment, the light was collected from a ſurface of about three ſquare feet; and as this ſurface reflected only about half what falls upon it, the quantity of matter contained in the rays of the ſun, incident upon a ſquare foot and half of ſurface, in one ſecond of time, ought to be no more than the twelve hundred millionth part of a grain, or upon one ſquare foot only, the eighteen hundred millionth part of a grain. But the denſity of the rays of *light* at the ſurface of the ſun is greater than at the earth, in the proportion of 45000 to 14 there ought, therefore, to iſſue from one ſquare foot of the ſun's ſurface in one ſecond of time, in order to ſupply the waſte by *light*, one forty thouſandth part of a grain of matter; that is, a little more than two grains a day, or about four millions ſeven hundred and fifty-two thouſand grains, which is about ſix hundred and ſeventy pounds, avoirdupoiſe, in ſix thouſand years; a quantity which would have ſhortened the ſun's ſemidiameter no more than about ten feet, if it was formed of matter of the denſity of water only. Prieſtley, ubi ſupra, p. 389.

The expanſion or extenſion of any portion of *light*, is inconceivable. Dr. Hook ſhews, it is as unlimited as the univerſe; proving it from the immenſe diſtance of ſome of the fixed ſtars, the *light* whereof becomes ſenſible to the eye, by means of a teleſcope: nor, adds he, are they only the great bodies of the ſun or ſtars that are thus liable to diſperſe their *light* through the vaſt expanſe of the univerſe, but the ſmalleſt ſpark of a lucid body muſt do the ſame, even the ſmalleſt globule ſtruck from a ſteel by a flint.

The method of meaſuring the intenſity of different *lights*, or of the ſame *light* in different circumſtances, affords a curious ſubject of inveſtigation. M. Bouguer has purſued it with particular attention, and deſcribed an apparatus which he has contrived for this purpoſe, in his Traité de Optique, publiſhed at Paris in 1760. It is well known that the action of a ſtrong *light* upon the eye, and alſo the impreſſion which it leaves upon the eye, makes it inſenſible to the effect of a weaker *light*. M. Bouguer found, that when one *light* is ſixty-four times leſs than another, its preſſure or abſence will not be perceived; and, allowing for different effects on different eyes, he ſuppoſes that the boundaries, with reſpect to different perſons, may lie between ſixty and eighty. Being unable to determine the variation of the *light* of the ſun, becauſe it is too ſtrong, and that of the ſtars, becauſe it is too weak, at different altitudes, he made his obſervations on the moon, the diminution of the *light* being in the ſame proportion in this caſe and in the others, and found that its *light* at 19° 16′ is to its *light* at 66° 11′, as 1681 to 2500; or the one is nearly one third of the other. When one limb of the moon touched the horizon of the ſea, its *light* was two thouſand times leſs than at the altitude of 66° 11′. But this proportion, he ſays, is liable to variations, the atmoſphere near the ſurface of the earth varying ſo much in its denſity. Hence he concludes, that, at a medium, *light* is diminiſhed in the proportion of about 2500 to 1681, in traverſing 7469 toiſes of denſe air. He alſo found, that the center of the ſun is conſiderably more luminous than the extremities of it; whereas both the primary and ſecondary planets are more luminous at their edges than near their centers. In comparing the *lights* of the ſun and moon, he compared each of them to that of a candle in a dark room, one in the day time, and the other in the night following, when the moon was at her mean diſtance from the earth; and, after many trials, he concluded, that the *light* of the ſun is about three hundred thouſand times greater than that of the moon; and, therefore, it is no wonder that philoſophers have had ſo little ſucceſs in their attempts to collect the *light* of the moon with burning-glaſſes; for the largeſt of them will not increaſe the *light* a thouſand times, which will ſtill leave the *light* of the moon, in the focus of the mirror, three hundred times leſs than the intenſity of the common *light* of the ſun. Dr. Smith,

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in his Optics, vol. i. p. 29, thought that he had proved, from two different conſiderations, that the *light* of the full moon would be to our day-*light* as 1 to about 90000, if no rays were loſt at the moon. His method of calculation follows, as far as it is juſt, ſays Mr. Robins, Math. Tracts, vol. ii. p. 225, directly from the propoſition for the ſame purpoſe of that excellent geometer, James Gregory, in his Geom. Par. Univerſ. p. 144; and the general propoſition there mentioned for diſtinguiſhing the proportion between the degrees of *light* received from any planet, and from the ſun repeated in David Gregory's Aſtronomy, lib. iii. prop. 58. Mr. Robins remarks, that though his eſtimate is founded on the ſuppoſition, that the moon reflects all the *light* it receives from the ſun; yet his argument is drawn from comparing the *light* of the moon ſeen in the day with the *light* of the clouds; that is, is deduced from the quantity of *light* actually reflected by the moon. In the firſt place he ſuppoſes, that the moon, enlightened by the ſun, is as luminous as the clouds are at a medium. He, therefore, ſuppoſed the *light* of the ſun to be equal to that of a whole hemiſphere of clouds, or as many moons as would cover the ſurface of the heavens. But upon this it may be obſerved, that the *light* of the ſun, ſhining perpendicularly upon any ſurface, would be equal to the *light* reflected from the whole hemiſphere, if every part of it reflected all the *light* that fell upon it; but the *light* that would, in fact, be received from the whole hemiſphere (part of it being received obliquely) would be only one half as much as would be received from the whole hemiſphere, if every part of it ſhone directly upon the ſurface to be illuminated. In his Remarks, &c. p. 17, he draws the ſame concluſion from a different method of induction; but in this caſe alſo he made a miſtake of one half, ſuppoſing all the enlightened hemiſphere of the moon to receive the direct rays of the ſun; whereas, in fact, no more can be received than would fall perpendicularly in the ſuperficial ſection of one great circle, which is juſt one half of the ſurface of the hemiſphere. Prieſtley, ubi ſupra, p. 540, &c.

Mr. Michell made this computation in a more eaſy and accurate manner. Conſidering the diſtance of the moon from the ſun, and that the denſity of the *light* muſt decreaſe in the proportion of the ſquare of that diſtance, he calculated the denſity of the ſun's *light* at that diſtance, in proportion to its denſity at the ſurface of the ſun; and in this manner he found that, if the moon reflected all the *light* it receives from the ſun, it would be only the 4500oth part of the *light* we receive from that greater luminary. Admitting, therefore, with M. Bouguer, that the moon reflects only a 300000th part of it, Mr. Michell concludes, that it reflects no more than between the ſixth and ſeventh part of the *light* that falls upon it. Phil. Tranſ. vol. lvii. art. 27, p. 234, &c.

Dr. Pemberton, in his Courſe of Chemiſtry, Lect. 2, ſtates the greateſt *light* which we can receive from the moon, when at the full, and neareſt to the earth, to exceed the *light* of the ſun more than 87,000 times, ſuppoſing that the moon reflected all the *light* of the ſun which falls upon it; but if it reflects only half the *light* that falls upon its ſurface, which is the moſt that can be ſuppoſed, then the *light* of the moon will be exceeded by the ſun's *light* more than 170,000 times; and in the mean diſtance of the moon from the earth, her *light* will be exceeded by the ſun more than 190,000 times.

Dr. s'Graveſande aſſerts, a lucid body to be, that which emits, or gives fire a motion in right lines; and makes the difference between *light* and heat to conſiſt in this, that to produce the former, the fiery particles muſt enter the eye in a rectilinear motion, which is not required in the latter: on the contrary, an irregular motion ſeems more proper for it, as appears from the rays coming directly from the ſun to the tops of mountains, which have not near that effect with thoſe in the valley, agitated with an irregular motion, by ſeveral reflexions.

Whether or no there be always *light*, where there is fire, is diſputed among authors; as alſo, whether or no there be any luminous body without heat; heat being a motion that may be infinitely diminiſhed, and *light* a matter that may be infinitely rare: to which we may add, that no heat is ſenſible to us, unleſs it be more intenſe than that of our organs of ſenſe. M. De Luc, in his Lettres Phyſiques et Morales, &c. 1780, obſerves, that the rays of the ſun, though not warm in themſelves, occaſion heat, by giving activity to a ſubſtance, which reſides in all bodies and conſtitutes a part of their maſs, and which in certain circumſtances is capable of producing heat; and that in conſequence of this influence, this ſubſtance becomes an elaſtic or igneous fluid. See HEAT.

Sir Iſaac Newton obſerves, that bodies and *light* act mutually on one another; bodies on *light*, in emitting, reflecting, refracting, and inflecting it; and *light* on bodies, by heating them, and putting their parts into a vibrating motion, wherein heat principally conſiſts. For all fixed bodies, he obſerves, when heated beyond a certain degree, do emit *light*, and ſhine; which ſhining, &c. appears to be owing to the vibrating motion of their parts; and all bodies, abounding in earthy and ſulphureous particles, if ſufficiently agitated, emit *light*, which way ſoever that agitation be effected. Thus, ſea-water ſhines in a ſtorm; quickſilver, when ſtaken in vacuo; cats, or horſes, when rubbed in the dark; and wood, fiſh, and fleſh, when putrefied.

Light proceeding from putrefecent animal and vegetable ſubſtances, as well as from glow-worms, is mentioned by Ariſtotle. Bartholin mentions four kinds of luminous inſects, two with wings, and two without; but in hot climates travellers ſay they are found in much greater numbers, and of different ſpecies. Columna, an induſtrious naturaliſt, obſerves, that their *light* is not extinguiſhed immediately upon the death of the animal. The firſt diſtinct account that occurs of *light* proceeding from putrefecent animal fleſh, is that which is given by Fabricius Ab Aquapendente in 1592. De Viſione, &c. p. 45. Bartholin gives an account of a ſimilar appearance, which happened at Montpelier in 1641, in his treatiſe De Lucc Animalium.

Mr. Boyle tells us of a piece of ſhining rotten wood, which, upon exhauſting the air from it, was extinguiſhed; but, upon its re-admiſſion, ſeemed to come to life again, and ſhone as before; being, no doubt, a real flame, and, like other flames, not to be preſerved without air. But he could not perceive that it was increaſed in condenſed air; though we have an account in Birch's Hiſt. of the Royal Society, vol. ii. p. 254, of the *light* of a ſhining fiſh, which, when the fiſh was put into a condenſing engine, was rendered more vivid by that means. The principal of Mr. Boyle's experiments were made in 1667. See his Works, vol. iii. p. 136, &c.

Whitings were the fiſh generally uſed by Mr. Boyle in his experiments; though in a diſcourſe delivered before the Royal Society in 1681, it was aſſerted, that of all fiſhy ſubſtances, the eggs of lobſters, after they had been boiled, ſhone the brighteſt. Birch's Hiſt. vol. ii. p. 70.

Mr. Boyle, in 1672, accidentally obſerved the *light* iſſuing from fleſh meat; and, among other remarks on this ſubject, he takes notice that extreme cold extinguiſhes the *light* of ſhining wood, as appeared, when a piece of it was put into a glaſs tube, and held in a frigorific mixture; probably, becauſe the extreme cold checked the putrefaction, which was the cauſe of the *light*. The ſhell-fiſh, called PHOLAS, is remarkable for its luminous quality. The *luminouſneſs of the* SEA has been alſo a ſubject of frequent obſervation. See IGNIS *fatuus*, PHOSPHORUS, and PUTREFACTION.

Mr. Hawkſbee, and many writers on the ſubject of ELECTRICITY ſince his time, have furniſhed us with a great variety of inſtances of the artificial production of *light*, by the attrition of bodies naturally not luminous; as of amber rubbed on woollen cloth in vacuo; of glaſs on woollen, of glaſs on glaſs, of oyſter-ſhells on woollen, and of woollen on woollen, all in vacuo.

On the ſeveral experiments of this kind, he makes the following reflections: that different ſorts of bodies afford remarkably different kinds of *light*, different both in colour, and in force; that the effects of an attrition are various, according to the different preparations, and managements of the bodies that are to endure it; and that bodies which have yielded a particular *light*, may be brought by friction to yield no more of that *light*.

M. Bernoulli found by experiment, that mercury amalgamated with tin, and rubbed on glaſs, produced a conſiderable *light* in the air; that gold rubbed on glaſs did it ſtill in a greater degree; but that, of all others, the moſt exquiſite *light* was that produced by the attrition of a diamond; being equally vivid with that of a burning coal briſkly agitated with the bellows.

"That the particles of *light* are attracted by thoſe of "other bodies," is evident from innumerable experiments. This phenomenon was obſerved by Sir Iſaac Newton, who found, by repeated trials, that the rays of *light* in their paſſage near the edges of bodies, whether opaque or tranſparent, as pieces of metals, the edges of knives, broken glaſſes, &c. are diverted out of the right lines, and always inflected or bent towards thoſe bodies. See INFLECTION and RAYS.

The curious obſervations that had been made on this ſubject by Dr. Hooke and Grimaldi, led Sir Iſaac Newton to repeat and diverſify their experiments, and to purſue them much farther than they had done. Having made in a piece of lead a ſmall hole with a pin, the breadth of which was the forty-ſecond part of an inch, he let into his darkened chamber, through this hole, a beam of the ſun's *light*, and found that the ſhadows of hairs, and other ſlender ſubſtances placed in it, were conſiderably broader

than they would have been, if the rays of *light* had paſſed by thoſe bodies in right lines. He, therefore, concluded, that they muſt have paſſed as they are repreſented in *Tab.* III. *Optics, fig.* 40. in which X repreſents a ſection of the hair, and AD, BE, &c. rays of *light* paſſing by at different diſtances, and then falling upon the wall QQ. Since, when the paper which receives the rays is at a great diſtance from the hair, the ſhadow is broad, it muſt follow, as he obſerves, that the hair acts upon the rays of *light* at ſome conſiderable diſtance from it; the action being ſtrongeſt on thoſe rays which are at the leaſt diſtance, and growing weaker and weaker on thoſe which are farther off, as is repreſented in the figure; and from hence it comes to paſs, that the ſhadow of the hair is much broader in proportion to the diſtance of the paper from the hair when it is nearer than when it is at a great diſtance. It is of no moment, whether the hair be ſurrounded with air, or with any other pellucid ſubſtance. The ſhadows of ſcratches made in poliſhed plates of glaſs, and the veins in the glaſs, caſt the like broad ſhadows; ſo that the breadth of ſhadow muſt proceed from ſome other cauſe than the refraction of the air.

The ſhadows of all bodies, metals, ſtones, glaſs, wood, horn, &c. in this *light*, were bordered with three parallel fringes, or bands of coloured *light*, of which that which was contiguous to the ſhadow was the broadeſt and moſt luminous, while that which was the moſt remote was the narroweſt, and ſo faint, as not eaſily to be viſible. The firſt or innermoſt fringe was violet, and deep blue next the ſhadow, light blue, green, and yellow in the middle, and red without. The ſecond fringe was almoſt contiguous to the firſt, and the third to the ſecond; and both were blue within, and yellow and red without; but their colours were very faint, eſpecially thoſe of the third. The colours, therefore, proceeded in the following order from the ſhadow: violet, indigo, pale blue, green, yellow, red; blue, yellow, red; pale blue, pale yellow, and red. The ſhadows made by ſcratches and bubbles in poliſhed plates of glaſs, were bordered with the like fringes of coloured *light*. He alſo obſerves, that by looking on the ſun through a feather, or black ribbon, held cloſe to the eye, ſeveral rainbows will appear, the ſhadows which the fibres or threads caſt on the retina being bordered with the like fringes of colours.

From comparing other experiments, in which a ray of *light* was made to paſs through a hole into a darkened chamber, and then through a hole in a paſte-board, firſt by the edge of a ſingle knife, and then by the edges of two knives placed parallel to one another, Sir Iſaac Newton concluded, that the *light* of the firſt fringe paſſed by the edge of the knife at a diſtance greater than the eight hundredth part of an inch, that the *light* of the ſecond fringe paſſed by the edge of the knife at a greater diſtance than the *light* of the firſt fringe, and that of the third at a greater diſtance than that of the ſecond; and that the *light* of which the ſtreams, obſerved in theſe experiments, conſiſted, paſſed by the edges of the knives at leſs diſtances than that of any of the fringes.

In another experiment, he placed at the hole a priſm to refract the *light*, and to form, on the oppoſite wall, the coloured image of the ſun; and he found that the ſhadows of all bodies, held in the coloured *light* between the priſm and the wall, were bordered with fringes, of the colour of that *light* in which they were held; and comparing the fringes made in the ſeveral coloured *lights*, he found, that thoſe made in the red *light* were the largeſt, thoſe made in the violet the leaſt, and thoſe made in the green were of a middle ſize. Whence he inferred, that the rays which made the fringes in the red *light*, paſſed by the hair at a greater diſtance than thoſe which made the like fringes in the violet; ſo that the hair, in cauſing theſe fringes, acted alike upon the red *light*, or leaſt refrangible rays, at a greater diſtance, and upon the violet, or moſt refrangible rays at a leſs diſtance, and thereby occaſioned fringes of different ſizes, without any change in the colour of any ſort of *light*. It may, therefore, be concluded, that when the hair in the firſt obſervation was held in the white beam of the ſun's *light*, and caſt a ſhadow, which was bordered with three fringes of coloured *light*, thoſe colours aroſe not from any new modifications impreſſed upon the rays of *light* by the hair, but only from the various inflections, whereby the ſeveral ſorts of rays were ſeparated from one another, which, before ſeparation, by the mixture of all their colours, compoſed the white beam of the ſun's *light*; but when ſeparated, compoſed *lights* of the ſeveral colours which they are originally diſpoſed to exhibit. But for a fuller account of the author's curious experiments, and the concluſions drawn from them with regard to the inflection of *light*, we muſt refer to his well known Treatiſe on Optics, *p.* 293, &c.

This action of bodies on *light* is found to exert itſelf at a ſenſible diſtance, though it always increaſes as the diſtance is diminiſhed; as appears very ſenſibly in the paſſage of a ray between the edges of two thin plates at different apertures; in which there is ſomething very peculiar; the attraction of one edge being increaſed as the other is brought nearer it. The rays of *light*, in their paſſage out of glaſs into vacuum, are not only inflected towards the glaſs, but, if they fall too obliquely, they will revert back again to the glaſs, and be totally reflected.

The cauſe of which reflexion cannot be attributed to any reſiſtance of the vacuum, but muſt be entirely owing to ſome force or power in the glaſs, which attracts or draws back the rays as they were paſſing into the vacuum. And this appears farther from hence, that if you wet the poſterior ſurface of the glaſs with water, oil, honey, or a ſolution of quickſilver, then the rays which would otherwiſe have been reflected, will paſs into and through that liquor; which ſhews that the rays are not reflected till they come to that poſterior ſurface of the glaſs, nor even till they begin to go out of it; for if at their going out they fall into any of the foreſaid mediums, they will not then be reflected, but perſiſt in their former courſe, the attraction of the glaſs being in this caſe counterbalanced by that of the liquor.

Experiments ſimilar to thoſe of Sir Iſaac Newton on inflected *light*, were proſecuted by M. Maraldi, whoſe obſervations chiefly reſpect the inflection of *light* towards other bodies, whereby their ſhadows are partially illuminated. Ac. Paris. 1723. M. p. 159. For an abſtract, ſee Prieſtley's Hiſtory, &c. of *Light*, &c. p. 521, &c.

M. Mairan, without attempting the diſcovery of new facts, endeavoured to explain the old ones, by the hypotheſis of an atmoſphere ſurrounding all bodies; and conſequently making two reflexions and refractions of *light* that impinges upon them, one at the ſurface of the atmoſphere, and the other at that of the body itſelf. This atmoſphere he ſuppoſed to be of a variable denſity, and refractive power, like the air. M. Du Tour ſucceeded Mairan, and imagined that he could account for all the phenomena by the help of an atmoſphere of an uniform denſity, and of a leſs refractive power than the air ſurrounding all bodies. Du Tour varied the Newtonian experiments, and diſcovered in the colours produced by the inflection of *light* more than three fringes, which he exhibited diſtinctly in the following manner. He took a circular board, ABED (*Tab.* III. *Optics, fig.* 41.) thirteen inches in diameter, the ſurface of which was black, except at the edge, where there was a ring of white paper, about three lines broad, in order to trace the circumference of a circle, divided into 360 degrees, beginning at the point A, and reckoning 180 degrees on each hand to the point E; B and D being each of them placed at 90 degrees. A ſlip of parchment three inches broad, and diſpoſed in the form of a hoop, was faſtened round the board, and pierced at the point E with a ſquare hole, each ſide being four or five lines, in order to introduce a ray of the ſun's *light*. Laſtly, in the center of the board C, and perpendicular to it, he fixed a pin, about one third of a line in diameter.

This hoop being ſo diſpoſed, that a ray of *light* entering the dark chamber, through a vertical cleft of two lines and a half in length, and about as wide as the diameter of the pin, went through the hole at E, and paſſing parallel to the plane of the board, projected the image of the ſun and the ſhadow of the pin at A.

In theſe circumſtances he obſerved, 1ſt, that quite round the concave ſurface of this hoop, there were a multitude of coloured ſtreaks; but that the ſpace mn AS, of about eighteen degrees, the middle of which was occupied by the image of the ſun, was covered with a faint *light* only.

2. The order of the colours in theſe ſtreaks was generally ſuch, that the moſt refrangible rays were the neareſt to the incident ray EC A; ſo that, beginning from the point A, the violet was the firſt, and the red the laſt colour in each of the ſtreaks. In ſome of them, however, the colours were diſpoſed in a contrary order.

3. The image of the ſun projected on each ſide of the point A, was divided by the ſhadow of the pin, which was bordered by two luminous ſtreaks.

4. The coloured ſtreaks were narrower in ſome parts of the hoop than others, and generally decreaſed in breadth in receding from the point A.

5. Among theſe coloured ſtreaks, there were ſometimes others which were white, a line, or a line and a half in breadth, which were always bordered on both ſides by a ſtreak of orange colour, at leaſt when the light of the ſun was intenſe, and the chamber ſufficiently dark.

From this experiment he thought it was evident, that the rays which paſſed beyond the pin were not the only ones that were decompoſed; for that thoſe which are reflected

back from the pin were decompofed alfo; from which he concluded, that they muft have undergone fome refraction. He alfo thought that thofe which went beyond the pin fuffered a reflexion, fo that they were all affected in a fimilar manner.

In order to account for thefe facts, our author defcribes the progrefs of a ray of *light* through an uniform atmofphere, which he fuppofes to furround the pin, and fhews that the differently refrangible rays will be feparated at their emergence from it; but he refers to fome experiments and obfervations in a future memoir, to demonftrate that all the coloured ftreaks are produced by rays that are both reflected and refracted. Memoires Preſentes, vol. v. p. 636. 641.

From other obfervations, M. Du Tour concludes, that the refracting atmofpheres, furrounding all kinds of bodies, are of the fame ſize; fay when he placed a great variety of fubftances, and of different ſizes alſo, he always found the coloured ſtreaks of the fame dimenſions. He alſo obſerves, that his hypotheſis contradicts an obſervation of Sir Iſaac Newton, viz. that thoſe rays which paſs the neareſt to any body are moſt inflected. Mem. de Mathem. & de Phyſ. vol. v. p. 630, &c. or Prieſtley, ubi ſupra, p. 53, &c.

M. Le Cat found that in ſome caſes, objects appear magnified by means of the inflection of *light*. Looking at a diſtant ſteeple, when a *wire*, of a leſs diameter than the pupil of his eye, was held pretty near to it, and drawing it ſeveral times betwixt his eye and that object, he was ſurpriſed to find that, every time the wire paſſed before his pupil, the ſteeple ſeemed to change its place, and ſome hills beyond the ſteeple ſeemed to have the ſame motion, juſt as if a lens had been drawn betwixt his eye and them. This diſcovery led him to ſeveral others depending upon the inflection of the rays of *light*. Thus, he magnified ſmall objects, as the head of a pin, by looking at them through a ſmall hole in a card; ſo that the rays which formed the image, muſt neceſſarily paſs ſo near the circumference of the hole, as to be attracted by it: he alſo exhibited other appearances of a ſimilar nature. Traité des Sens, p. 299, &c. Prieſtley, ubi ſupra, p. 537, &c.

From the mutual attraction between the particles of *light* and other bodies, ariſe two other grand phænomena, beſide the inflection of *light*, which we call the *reflexion* and *refraction* of *light*. We know that the determination of a body in motion is changed by the interpoſition of another body in its way: thus *light*, impinging on the ſurface of ſolid bodies, ſhould be turned out of its courſe, and beaten back or reflected, ſo as, like other falling bodies, to make the angle of its reflexions equal to that of incidence. This, it is found by experience, *light* does; and yet the cauſe of this effect is different from that juſt now aſſigned: the rays of *light* are not reflected by ſtriking on the very parts of the reflecting bodies, but by ſome power equably diffuſed throughout the whole ſurface of the body, whereby it acts on the *light*, either attracting or repelling it, without contact: by which ſame power, in other circumſtances, the rays are refracted; and by which alſo, the rays are firſt emitted from the luminous body; as is abundantly proved by great variety of arguments, by Sir Iſaac Newton. See Reflection and Refraction.

That great author puts it paſt doubt, that all thoſe rays which are reflected, though they approach the body infinitely near, yet never touch it; and that thoſe which do really ſtrike on the ſolid parts of bodies, adhere to them, and are as it were extinguiſhed and loſt.

If it be aſked, how it happens, ſince we aſcribe the reflexion of the rays to the action of the whole ſurface of the body without contact, that all the rays are not reflected from every ſurface; but, while ſome are reflected, others paſs through, and are refracted? the anſwer given by Sir Iſaac Newton is as follows:—Every ray of *light*, in its paſſage through any refracting ſurface, is put into a certain tranſient conſtitution or ſtate, which in the progreſs of the ray returns at equal intervals, and diſpoſes the ray at every return to be eaſily tranſmitted through the next refracting ſurface, and between the returns to be eaſily reflected by it: which alternation of reflexion and tranſmiſſion appears to be propagated from every ſurface, and to all diſtances. What kind of action or diſpoſition this is, and whether it conſiſts in a circulating or vibrating motion of the ray, or the medium, or ſomewhat elſe, he does not inquire; but allows thoſe who are fond of hypotheſes to ſuppoſe, that the rays of *light*, by impinging on any reflecting or refracting ſurface, excite vibrations in the reflecting or refracting medium, and by that means agitate the ſolid parts of the body. Theſe vibrations, thus propagated in the medium, move ſwifter than the rays, ſo as to overtake them; and when any ray is in that part of the vibration which conſpires with its motion, its velocity is increaſed, ſo that it eaſily breaks through a refracting ſurface: but when it is in a contrary part of the vibration, which impedes its motion, it is eaſily reflected; and conſequently, that every ray is ſucceſſively diſpoſed to be eaſily reflected or tranſmitted by every vibration which overtakes it. The returns of which diſpoſition of any ray to be reflected, he calls *fits of eaſy reflexion*; and thoſe of its diſpoſition to be tranſmitted, he calls *fits of eaſy tranſmiſſion*; and the ſpace between the returns, *the interval of the fits*. The reaſon, then, why the far moſt of all thoſe tranſparent bodies reflect part of the *light* incident on them, and refract the reſt, is that ſome rays at their incidence are in fits of eaſy reflection, and others of eaſy tranſmiſſion.

Light, *for the properties of reflected*. See Reflection, Mirror, &c.

Farther, a ray of *light*, paſſing out of one medium into another of different denſity, and in its paſſage making an oblique angle with the ſurface that ſeparates the mediums, will be refracted, or turned out of its right line; becauſe the rays are more ſtrongly attracted by a denſer than by a rarer medium.

That theſe rays are not refracted by ſtriking on the ſolid parts of bodies, but without any contact, by that ſame force wherewith they are emitted and reflected, exerting itſelf differently in different circumſtances, is proved in great meaſure by the ſame arguments which demonſtrate reflection to be performed without contact.

Light, *for the properties, &c. of refraction*, ſee Refraction, Lens, &c.

In *ſtained* Crystal is obſerved a kind of double refraction, very different from what we find in any other body: the rays that fall obliquely being not only diſperſed, with a double refraction in one and the ſame ſurface, but even the perpendicular rays themſelves are moſt of them divided into two beams, by means of the ſame double refraction; which beams are of the ſame colour with the incident beams, and are equal in degree of *light*, at leaſt nearly, to each other; whence the great philoſopher ſo often cited takes occaſion to ſuſpect, that there are in *light* ſome other original properties beſides thoſe hitherto deſcribed; and particularly, that the rays have different ſides, endued with ſeveral original properties.

For, of theſe refractions, the one is performed in the uſual manner, i. e. the ſine of incidence is to that of refraction as 5 is to 3; and the other in an unuſual manner: and yet the ſame ray is refracted ſometimes in the one manner, and ſometimes in the other, according to the various poſitions which its ſeveral ſides have, in reſpect to cryſtal. Theſe diſpoſitions, he ſhews, muſt have exiſted originally in the rays, without having undergone any alteration, in that reſpect, by the cryſtal.

Every ray of *light*, therefore, has two oppoſite ſides, the one originally endued with a property whereon its unuſual refraction depends, and the other not endued with that property.

Sir Iſaac Newton, having obſerved the vividly coloured image projected on the wall of a darkened room, by the ſun-beams tranſmitted through a priſm, to be five times as long as broad; ſetting himſelf to inquire into the reaſon of this diſproportion, was led from other experiments to the *experimentum crucis*; whence he diſcovered the cauſe of the phænomenon to be, that ſome of the rays of *light* were more refracted than others, and therefore exhibited ſeveral images of the ſun under the appearance of one, extended lengthwiſe.

Thence he proceeded to conclude, that *light* itſelf is an heterogeneous mixture of rays differently refrangible: and hence he diſtinguiſhes *light* into two kinds, viz. that whoſe rays are equally refrangible, which he calls *homogeneal*, *ſimilar*, or *uniform light*; and thoſe whoſe rays are unequally refrangible, which he calls *heterogeneal light*.

There are but three affections of *light*, wherein the obſerved its rays to differ, viz. refrangibility, reflexibility, and colour; and thoſe rays, which agree in refrangibility, agree alſo in the other two: whence they may be well defined homogeneal, though, in ſome other reſpects, they may poſſibly be heterogeneal.

Again, the colours exhibited by homogeneal *light*, he calls *homogeneal colours*; and thoſe produced by heterogeneal *light*, *heterogeneal colours*. Theſe definitions laid down, he advances ſeveral propoſitions.

As, firſt, that the ſun's *light* conſiſts of rays differing by indefinite degrees of refrangibility. Secondly, that rays, which differ in refrangibility, when parted from one another, do proportionably differ in the colours which they exhibit. Thirdly, that there are as many ſimple and homogeneal colours, as degrees of refrangibility; for to every degree of refrangibility belongs a different colour. Fourthly, whiteneſs, in all reſpects like that of the ſun's immediate *light*, and of the uſual objects of our ſenſes, cannot be compounded of ſimple colours, without an indefinite variety of them; for to ſuch a compoſition there are required rays endued with all the indefinite

degrees

degrees of refrangibility, which infer as many ſimple colours. Fifthly, the rays of *light*, do not act on one another in paſſing through the ſame medium. Sixthly, the rays of *light* do not ſuffer any alteration of their qualities, from refraction, nor from the adjacent quieſcent medium. Seventhly, there can no homogeneal colours be produced out of *li ht* by refraction, which are not commixed in it before: ſince refraction, as was before obſerved, changes not the qualities of the rays, but only ſeparates thoſe which have divers qualities, by means of their different refrangibility. Eighthly, the ſun's *Light* is an aggregate of homogeneal colours; whereas homogeneal colours may be called *primitive*, or *original*.

We have already obſerved, that the rays of *li ht* are compoſed of diſſimilar or heterogeneous parts: ſome of them being, in all probability, greater, others leſs. Now the leſſer the parts are, by ſo much the more refrangible they are, i. e. they are ſo much the more eaſily diverted out of the rectilineal courſe; and thoſe parts which differ in refrangibility (conſequently in bulk), he has alſo obſerved, differ in colour.

Hence ariſes the whole theory of colours; theſe parts, v. gr. which are the moſt refrangible, conſtitute a violet colour; that is, the moſt minute particles of *li ht*, when ſeparately impelled on the organ, do there excite the ſhorteſt vibrations in the retina, which are thence communicated by the ſolid part of the optic nerve into the brain, and excite in us the ſenſation of violet colour, the dulleſt and moſt languid of all colours: and thoſe particles, on the contrary, which are the leaſt refrangible, conſtitute a ray of red colour; i. e. the greateſt particles of *li ht* excite the longeſt vibrations in the retina, and ſo convey the ſenſation of a red colour, as being the moſt bright and vivid of all others. The other particles, being diſtributed into little rays, according to their reſpective magnitudes, and degrees of refrangibility, excite intermediate vibrations, and ſo occaſion ſenſations of the intermediate colours, in like manner as the vibrations of the air, according to their different magnitude, excite ſenſations of different ſounds. The colours then of theſe little rays, not being any adventitious modifications of them, but conſtant, primitive, and neceſſary properties, reſulting, in all probability from their different magnitudes, muſt be perpetual, and immutable, not to be altered by any reflection, refraction, or other ſubſequent modification.

Mr. Euler has advanced a new notion with reſpect to the origin of colours in opaque bodies: he ſuppoſed that coloured bodies reflect the ſun's incident white *light* from their anterior ſurface, but that the particular ſpecies of *light* by which they appear of different colours, is emitted by the parts of the body: e g. he imagines that vermillion does not appear red by a more copious reflection of red than of other incident rays, but by the new emiſſion of red rays, from the particular velocity of vibration, which its elaſtic parts are capable of being thrown into, by the impulſe of the incident *light*. Of this theory it is a ſufficient refutation, that no phenomena prove or require its exiſtence: beſides, according to this hypotheſis, a body of one colour placed in the homogeneous *light* of another, ought not to appear of the colour of the *light*, but of a middle one between that and its own natural colour, which is contrary to experience. Eſſays. Edi. vol. ii. p. 29.

For the doctrine of chromatics, ſee LIGHT, ſee COLOUR.

For the manner in which LIGHT *affects our ſenſes, and how it contributes to vi ion*, ſee VISION.

LIGHT *from diamonds and other bodies*. *Light* has of late ages become in a meaſure more common than it uſed to be among us. The chemical phoſphori have greatly increaſed its kinds, many electrical bodies are luminous, and many other bodies there are which are luminous without being electric.

The ancient naturaliſts, and ſince their time, ſeveral other writers, at different periods of time, have been acquainted with many of theſe properties in ſeveral bodies, though very imperfectly. They have obſerved them too carelеſsly, often exaggerated them in their accounts, and frequently deſtroyed the whole credit of the narration, by a mixture of falſity with the truth. Mr du Fay, who laboured extremely in theſe diſquiſitions, has been at the pains of collecting all the accounts of this kind from authors, and ſeparating truth and probability from what is falſe or abſurd in their accounts, has with them given many experiments of his own to the Academy of Sciences at Paris.

Among luminous bodies the DIAMOND is to be reckoned, as ſome diamonds are known to ſhine in the dark. But on account of the feebleneſs of their ſplendor, it is neceſſary for the perſon, who is to obſerve them, previouſly to ſtay in the dark at leaſt a quarter of an hour; that the pupil of the eye may be dilated and enlarged, and ſo rendered capable of receiving a larger quantity of the rays of *light*. M. du Fay has alſo obſerved, that the eyes ought to be ſhut for this time, or at leaſt one of them; and that, in that caſe, the light of the diamond is afterwards only ſeen by that eye, which has been ſhut. Before the diamond is brought into the dark room, it muſt be expoſed to the ſun-ſhine, or at leaſt to the open day-light, to imbibe a ſufficient quantity of rays; and this is done in one minute, or even leſs; eight or ten ſeconds having been found to furniſh as much *light* as a ſtone is capable of receiving: and when brought into the dark, its *light* continues about twelve or thirteen minutes, weakening all the while by inſenſible degrees. It is very remarkable, that in bodies ſo extremely ſimilar to each other as diamonds are, ſome ſhould have this property of imbibing the ſun's rays, and ſhining in the dark, and that others ſhould not; yet ſo it is found to be by experiment, and the moſt nearly reſembling ſtones ſhall be found one to have this property, and another to be deſtitute of it; while many of the moſt diſſimilar have this property in common. There ſeems to be no rule, nor even the leaſt traces of any imperfect rule of judging, which diamonds have, and which have not this property; their natural brightneſs, their purity, their ſize, or their ſhape, contribute nothing to it; and all that has been yet diſcovered of the leaſt regularity among them, is, that all the yellow diamonds have this property. This may probably ariſe from their having more ſulphur in their compoſition, and therefore illuminating more readily, or emitting a more viſible flame.

The burning of diamonds is a term uſed among the jewellers, for putting them into a fierce fire, as they frequently do, when they are ſouled with brown, or yellow, or the like; this always diveſts them of their colour, without doing them the leaſt ſenſible injury. M. du Fay, having been informed of this common practice, formed a conjecture, that the difference of diamonds in their ſhining, or not ſhining in the dark, was owing to it; and that either all thoſe which had been burnt, or all thoſe which had not, were thoſe which alone ſhone in the dark. But this was found an erroneous conjecture; for two diamonds, one lucid in the dark, the other not, were both burnt, and afterwards both were found to retain the ſame properties they had before. It is not only the open ſun-ſhine, or open day-*light*, which gives to theſe diamonds the power of ſhining in the dark; they receive it in the ſame manner, even if laid under a glaſs, or plunged in water or in milk.

Mr. du Fay tried whether it was poſſible to make the diamond retain, for any longer time, the *light* it naturally parts with ſo ſoon; and found, that if the diamond, after being expoſed to the *light*, be covered with black wax, it will ſhine in the dark, as well ſix hours afterwards, as at the time it was firſt impregnated with the *light*. Mem. Acad. Scien. Par. 1735.

The imbibing *light*, in this manner, being ſo nice a property as not to be found in ſeveral diamonds, it was not to be ſuppoſed that it would be found in any other ſtones: accordingly, on trial, the ruby, the ſapphire, and the topaz, were found wholly deſtitute of it; and among a large number of rough emeralds, one only was found to poſſeſs it. Such is the ſtrange uncertainty of theſe accidents.

All the other leſs precious ſtones were tried, and found not to poſſeſs this property of imbibing *light* from the day-*light*, or ſun-ſhine, but they all became luminous, by the different means of heating, or friction; with this difference, that ſome acquired it by one of theſe methods, and others by the other; each being unaffected by that which gave the property to the other. The diamond becomes luminous by all theſe ways.

Beccarius alſo diſcovered that diamonds have the property of the Bolognian phoſphorus, about the ſame time that it occurred to Mr. du Fay. Com. Bonon. vol. ii. p. 276. M. du Fay likewiſe obſerved, that the common topaz, when calcined had all the properties of this phoſphorus; and purſuing the diſcovery, he found the ſame property, in a great degree, in the belemnitis, gypſum, flint-ſtone, and marble. Though he was obliged to diſſolve ſome very hard ſubſtances of this kind in acids, before calcination could produce this change in them. And with ſome ſubſtances he could not ſucceed even by this means, eſpecially with flint-ſtones, river-ſand, jaſpers, agates, and rock-cryſtal. Ac. Paris, 1730. See more on the ſubject of this article under PHOSPHORUS.

LIGHT is alſo uſed to ſignify the diſpoſition of objects with regard to the receiving of *light*.

Thus we ſay, a painting is ſeen in its proper *light*, when its ſituation with regard to the *light*, is the ſame with that for which it was painted.

LIGHT, in *Sea Language*, is uſed in contradiſtinction to laden. A ſhip is accordingly called *light*, either when ſhe has no cargo, or when ſhe is not ſufficiently ballaſted.

LIGHT, in the *Manege*. A horſe is ſaid to be *light*, in French *un cheval leger*, that is a ſwift, nimble runner. We likewiſe call a horſe *light* that is well made, though he is neither ſwift nor active: for in this laſt expreſſion we conſider only the ſhape and make of a horſe, without regard to his qualities.

Light upon the hand; a horſe is ſaid to be ſuch, that has a good tractable mouth, and does not reſt too heavy upon the bit.

A coach-horſe is ſaid to be *light*, when he ſtirs nimbly, and dreads the whip; or when he has a *light* trot.

LIGHT-*hand*. See HAND.

LIGHT-*bellied*, in the *Manege*. A horſe is thus called that commonly has flat, narrow, contracted ſides, which makes the flank turn up like that of a grey-hound.

LIGHTS, in *Architecture*, denote doors, windows, and other places, through which the air and *light* have a paſſage.

In the PANTHEON, all the *lights* comes from on high; it has no *lights* but in the dome.

LIGHTS, *ſtopping of a houſe*, is a nuiſance; but ſtopping a proſpect is not, being only matter of delight, not of neceſſity. If a man has a vacant piece of ground, and builds thereupon a houſe, with good *lights*, which he ſells or lets to another; and afterwards builds upon ground contiguous, or lets the ſame to another perſon, who builds thereupon, to the nuiſance of the *lights* of the firſt houſe; the leſſee of the firſt houſe may have an action of the caſe againſt ſuch builder, &c. And though formerly they were to be *lights* of an ancient meſſuage, that is now altered.

LIGHTS, in *Painting*, are thoſe parts of a piece which are illuminated, or that lie open to the luminary by which the piece is ſuppoſed to be enlightened; and which, for this reaſon, are painted in bright vivid colours.

In this ſenſe, *light* is oppoſed to *ſhadow*.

Different *lights* have very different effects on a picture, and occaſion a difference in the management of every part. A great deal therefore depends on the painter's chuſing a proper *light* for his piece to be illuminated by; and a great deal more, in the conduct of the *lights* and ſhadows, when the luminary is pitched upon.

The ſtrength and relievo of a figure, as well as its gracefulneſs, depend entirely on the management of the *lights*, and the joining of thoſe to the ſhadows.

The *light* a figure receives is either direct or reflected; to each of which ſpecial regard muſt be had. The doctrine of lights and ſhadows makes that part of painting called CLAIR-*obſcure*.

LIGHTS, *ſcaff of*. See DEDICATION.

LIGHT is alſo uſed for the luminous body that emits it. There are various kinds of *lights*; *general lights*, as the air; *particular lights*, as a fire, a candle, and even the ſun.

LIGHT-*horſe*, an ancient term in our Engliſh cuſtoms, ſignifying an ordinary cavalier, or horſeman lightly armed, and ſo as to enter a corps or regiment; in oppoſition to the men at arms, who were heavily accoutred, and armed at all points. See *Light*-HORSE.

LIGHT-*houſe*, is erected upon a cape or promontory on the ſea-coaſt, or upon ſome rock in the ſea, and having a great fire, or *light* formed by candles, upon its top, in the night time, which is conſtantly attended by ſome careful perſon, ſo as to be ſeen at a great diſtance from the land. It is uſed to direct the ſhipping on the coaſt, that might otherwiſe run aſhore, or ſteer an improper courſe when the darkneſs of the night, and the uncertainty of currents, &c. might render their ſituation, with regard to the ſhore, extremely doubtful. Lamp-lights are, on many accounts, preferable to coal-fires or candles; and the effect of theſe may be increaſed by placing them either behind glaſs-hemiſpheres, or before properly diſpoſed glaſs or metal reflectors. See an account of the *light-houſes* at Liverpool, in their preſent improved ſtate, in Hutchinſon's Treatiſe on Practical Seamanſhip, 4to. 1777. See BEACONS.

LIGHT-*room*, is a ſmall apartment incloſed with glaſs windows, near the magazine of a ſhip of war. It is uſed to contain the lights by which the gunner and his aſſiſtants are enabled to fill the cartridges with powder, to be ready for action.

LIGHTEN, in the *Manege*. To *lighten* a horſe, or make him *light* in the fore-hand, is to make him freer and *lighter* in the fore-hand than behind. If you would have your horſe *light*, you ought to keep him always diſpoſed to a gallop, when you put him to a trot; and after galloping ſome time, you ſhould put him back to the trot again.

LIGHTER, a large open veſſel, generally managed with oars; common on the river Thames; where it is uſed for the carriage of timber, coals, ballaſt, and any goods to or from a ſhip, when the is to be laden or delivered. There are alſo ſome *lighters* furniſhed with a deck throughout, in order to contain thoſe merchandizes, which would be damaged in rainy weather: theſe are uſually called cloſe-*lighters*.

LIGHTER-*man*. See COMPANY.

LIGHTNESS. See LEVITY.

LIGHTNING, in *Phyſology*, is a large, bright flame, darting ſwiftly through the air, and extending every way to a conſiderable diſtance, of momentary duration, and commonly attended with THUNDER. Some have accounted for this phenomenon by ſuppoſing, that, from the particles of ſulphur, nitre, and other combuſtible matter, which are exhaled from the earth, and carried into the higher regions of the atmoſphere, is formed an inflammable ſubſtance, which, when a ſufficient quantity of fiery particles is ſeparated from the vapour buoyed up into the air, with theſe particles adhering to them, by the colliſion of two clouds or otherwiſe, takes fire, and ſhoots out into a train of light, larger or leſs, according to the ſtrength and quantity of the materials. Others have explained *lightning* by the fermentation of ſulphureous ſubſtances with nitrous acids: ſee THUNDER. But in the preſent advanced ſtate of the ſcience of ELECTRICITY, this is univerſally allowed to be an electrical phenomenon. Philoſophers had not proceeded far in their experiments and inquiries on this ſubject, before they were ſtruck with the obvious analogy between *lightning* and electricity, and they produced many arguments, *a priori*, to aſcertain their ſimilarity. But the method of verifying this hypotheſis was firſt propoſed by Dr. Franklin, who, towards the cloſe of the year 1749, conceived the practicability of drawing *lightning* from the clouds: having found, by previous experiments, that the electric fluid is attracted by points, he apprehended, that *lightning* might likewiſe poſſeſs the ſame property; though the effects of the latter muſt, in an aſtoniſhing degree, ſurpaſs thoſe of the former. The other circumſtances of reſemblance between *lightning* and electricity remarked by this ingenious philoſopher, and abundantly confirmed by later diſcoveries are the following: flaſhes of *lightning*, he obſerved, are generally ſeen crooked and waving in the air; and the electric ſpark drawn from an irregular body at ſome diſtance, and when it is drawn by an irregular body or through a ſpace in which the beſt conductors are diſpoſed in an irregular manner, always exhibits the ſame appearance.

Lightning ſtrikes the higheſt and moſt pointed objects in its way, preferable to others, as high hills, trees, ſpires, maſts of ſhips, &c. and all pointed conductors receive and throw off the electric fluid more readily than thoſe which are terminated by flat ſurfaces. *Lightning* is obſerved to take the readieſt and beſt conductor; and this is the reaſon why electricity in the diſcharge of the LEYDEN phial; whence the doctor infers, that in a thunder ſtorm, it would be ſafer to have one's cloaths wet than dry. *Lightning* burns, diſſolves metals (ſee FUSION), rends ſome bodies, has been often known to ſtrike people blind, deſtroys animal life, deprives magnets of their virtue and reverſes their poles; and theſe are well-known properties of electricity.

Lightning not only gives polarity to the magnetic needle, but to all bodies, that have any thing of iron in them, as brick, &c. and by obſerving which way the poles of theſe bodies lie, it may be known, with the utmoſt certainty, in what direction the ſtroke paſſed. Signior Beccaria ſuppoſes, that perſons are ſometimes killed by *lightning*, without being really touched by it; a vacuum of air only being ſuddenly made near them, and the air ruſhing out of their lungs to ſupply it; and with ſo much violence that they could never recover their breath. In proof of this opinion he alledges, that the lungs of ſuch perſons are found flaccid; whereas, when they are properly killed by the electric ſhock, the lungs are found inflated: but this hypotheſis is controverted by Dr. Prieſtley. In order to demonſtrate the identity of the electric fluid with the matter of *lightning*, by actual experiment, Dr. Franklin contrived to bring *lightning* from the heavens, by means of an electrical kite, which he raiſed, when a ſtorm of thunder was perceived to be coming on; and with the electricity thus obtained, he charged phials, kindled ſpirits, and performed all other electrical experiments, which are uſually exhibited by an excited globe or tube. This happened in June, 1752, a month after the electricians in France, of whom the moſt active were Meſſrs. Dalibard and Delor, followed by Mr. Mazeas and M. Monnier, perfoing the method which he had propoſed, had verified the ſame theory; but without any knowledge of what they had done. In April and June, 1753, he diſcovered that the air was ſometimes electriſied poſitively, and ſometimes negatively, and found that the clouds would change from poſitive to negative electricity ſeveral times in the courſe of one thunder-guſt. He

ſoon

soon perceived that this important discovery, was capable of being applied to practical use, and proposed a method which he soon accomplished, of securing buildings from being damaged by *lightning*, by means of CONDUCTORS. The English philosophers had not been less attentive to this subject than their neighbours on the continent; but for want of proper opportunities for trying the necessary experiments, and from some incidental circumstances that were unfavourable, they had failed of success. However, in July, 1752, Mr. Canton succeeded; and in the following month, Mr. Wilson and Dr. Bevis observed nearly the same appearances which Mr. Canton had observed before. Mr. Canton also soon after observed, in a number of experiments, that some clouds were in a positive and some in a negative state of electricity; and that the electricity of his conductor would sometimes change from one state to the other, five or six times in less than half an hour. This variable state of thunder clouds was discovered by S. Beccaria, before he heard of its having been observed by Dr. Franklin or any other person; and he has given a very exact and circumstantial account of the external appearances of these clouds. From his observations of the *lightning* abroad, and of his apparatus within doors, he inferred, that the quantity of electric matter, in an usual storm of thunder, is almost inconceivably great, considering how many pointed bodies, as trees, spires, &c. are perpetually drawing it off, and what a prodigious quantity is repeatedly discharged to or from the earth. This quantity is so great, that he thinks it impossible for any cloud or number of clouds to contain it all, so as either to discharge or receive it. Besides, he observes, that, during the progress and increase of the storm, though the *lightning* frequently struck to the earth, the same clouds were the next moment ready to make a still greater discharge, and his apparatus continued to be as much affected as ever; and, therefore, the clouds must have received at one place, in the same moment when a discharge was made from them in another: and, upon the whole, he infers, that the clouds serve as conductors to convey the electric fluid from those places of the earth that are overloaded with it, to those which are exhausted of it. This electric matter, the rise of which, from the earth into the higher regions of the atmosphere, is ascertained by the great quantities of sand, ashes, and other light substances, carried up with it, and scattered uniformly over a large tract of country, wherever it issues, attracts to it, and bears up with it the watery particles that are dispersed in the atmosphere. It ascends into the higher regions of the atmosphere, being solicited by the less resistance it finds there than in the common mass of the earth, which, at these times, is generally very dry, and consequently highly electric. The same cause which first raised a cloud, from vapours dispersed in the atmosphere, draws to it those that are already formed, and continues to form new ones, till the whole collected mass extends so far as to reach a part of the earth where there is a deficiency of the electric fluid. Thither too, will those clouds, replete with electricity, be strongly attracted, and there will the electric matter discharge itself upon the earth: a channel of communication being, in this manner, formed, a fresh supply of electric matter will be raised from the overloaded part, and will continue to be conveyed by the medium of the clouds, till the equilibrium of the fluid between the two places of the earth be restored. When the clouds are attracted in their passage by those parts of the earth, where there is a deficiency of the fluid, those detached fragments are formed, and also those uniform descending protuberances, which are, in some cases, the cause of water-SPOUTS and HURRICANES.

That the electric matter, which forms and animates the thunder-clouds, issues from places far below the surface of the earth, and that it buries itself there, is probable from the deep holes, that have, in many places, been made by *lightning*; and from the flashes that have been seen to arise from subterraneous cavities and from wells; as well as from the inundations accompanying thunder-storms, and occasioned by water bursting out of the bowels of the earth. The greatest difficulty attending this theory of the origin of thunder-storms relates to the collection and insulation of electric matter within the body of the earth. With respect to the former, this ingenious philosopher has nothing to say; some operations in nature are certainly attended with a loss of the equilibrium in the electric fluid, but no person has yet assigned a more probable cause of the redundancy of the electric matter, which, in fact, often abounds in the clouds, than what we may suppose possible to take place in the bowels of the earth: and supposing the loss of the equilibrium possible, the same cause that produced the effect, would prevent the restoring of it; so that not being able to force a way, at least one sufficiently ready, through the body of the earth, it would issue at the most convenient vent into the higher regions of the air, as the better passage. S. Beccaria observes, that a wind always blows from the place from which the thunder-cloud proceeds; and it is certain, that the sudden congregation of such a prodigious quantity of vapours must displace the air, and repel it on all sides. A great number of observations relating to the descent of *lightning*, confirm his theory of the manner of its ascent; for, in many cases, it throws before it the parts of conducting bodies, and distributes them along the resisting medium, through which it must force its passage. Upon this principle, the longest flashes of *lightning* seem to be made, by its forcing into its way part of the vapours in the air. One of the principal reasons why those flashes make so long a rumbling, is their being occasioned by the vast length of a vacuum, made by the passage of the electric matter. For although the air collapses the moment after it has passed, and the vibration, on which the sound depends, commences at the same moment; yet, if the flash was directed towards the person who hears the report, the vibrations excited at the nearer end of the track will reach his ear much sooner than those excited at the more remote end; and the sound will, without any repercussion or echo, continue till all the vibrations have successively reached him. Mr. Lullin, in order to account for the production of electricity in the clouds, made a long insulated pole to project from one side of the Alps, and observed, that when small clouds of vapour, raised by the heat of the sun, rose near the foot of the mountain, and ascended along the side of it; if they touched the extremity of the pole only, it was electrified; but if the whole pole, and consequently part of the hill on which it stood, was likewise involved, it was not electrified. Whence he concludes, that the electricity of the clouds is produced by their passing through the air while the sun shines upon them. But to which of these two circumstances, namely, the motion through the air, or the action of the sun's rays, this was owing, he could not determine, though he made several experiments for this purpose.

Upon the whole, it is easy to conceive, that when particular clouds or different parts of the earth possess oppositie electricities, some being electrified positively, and others negatively, a discharge will take place within a certain distance; or the one will strike into the other, and in the discharge a flash of *lightning* will be observed. But how the clouds or earth acquire this state, is still a question not absolutely determined. Mr. Canton queries, whether the clouds become possessed of electricity by the gradual hearing and cooling of the air; and whether air suddenly rarefied, may not give electric fire to, and air suddenly condensed receive electric fire from, clouds and vapours passing through it. Mr. Wilcke supposes the air to contract its electricity, in the same manner as sulphur and other substances do, when they are heated and cooled in contact with various bodies. Thus the air, being heated or cooled in the neighbourhood of the earth, gives electricity to the earth, or takes it from it, and the electrified air, being conveyed upwards by various means, communicates its electricity to the clouds. Others have queried, whether, since thunder generally happens in a sultry state of the air, when it seems replenished with some sulphureous vapours, that the electric matter then in the clouds may not be generated by the fermentation of sulphureous vapours with mineral or acid vapours in the air.

Dr. Franklin advises persons who are apprehensive of danger from *lightning*, to sit in the middle of a room, provided it be not under a metal lustre suspended by a chain, sitting on one chair, and laying their feet on another. It is still safer, he says, to bring two or three mattrasses, or beds into the middle of the room, and folding them double, to place the chairs upon them, for as they are not so good conductors as the walls, the *lightning* will not chuse to pass through them; but the safest place of all is in a hammock hung with silken cords, at an equal distance from all the sides of a room. Dr. Priestley observes, that the place of most absolute safety must be the cellar, and especially the middle of it; for when a person is lower than the surface of the earth, the *lightning* must strike it before it can possibly reach him. In the fields, the place of safety is within a few yards of a tree, but not quite near it. Nevertheless, S. Beccaria cautions persons not to depend upon the neighbourhood of a higher, or, in all cases, a better conductor than their own body; since, according to his repeated observations, the *lightning* by no means descends in one undivided track; but bodies of various kinds conduct their share of it at the same time, in proportion to their quantity and conducting power. See on the subject of this article Franklin's Letters; Beccaria's Lettre dell'

Electricismo; Priestley's History, &c. of Electricity, passim. Lord Mahon observes, that damage may be done by *lightning*, not only by the main stroke and lateral explosion, but likewise by that which he calls the returning stroke, that is, by the sudden violent return of that part of the natural share of electricity (of any conducting body, or of any combination of conducting bodies) which had been gradually expelled from such body or bodies respectively, by the superinduced elastic electrical pressure of a thunder cloud's electrical atmosphere. See an account of his theory and experiments, relating to this subject, in his Principles of Electricity, &c. quarto. 1779.

LIGHTNING, *artificial*. The phosphorus, when newly made, gives a sort of artificial *lightning* visible in the dark, which would surprise those who are not used to such a phenomenon: the usual method of keeping this preparation is under water, and if the coruscations are desired to be seen to the greatest advantage, the glass in which it is kept should be deep and cylindric, and not more than three-fourths filled with water. The phosphorus put into this water will send up coruscations at times, which will pierce through the incumbent water, and expand themselves with great brightness in the empty upper part of the bottle.

If we compare this artificial coruscation to the real *lightning*, we shall find, that as in this the fire passes unaltered through the water, so in that the flashes of *lightning*, which come at intervals, pass uninterrupted through the most dense clouds, and are not obstructed by the heaviest storms of rain, but like the beams of the sun, or any other fire, pass uninterrupted through glass and water. The season of the weather, as well as the newness of the phosphorus, must concur to produce these flashes; for they are as uncommon in winter as *lightning* is, but in warm weather both are very frequent.

The flame of *lightning* is generally inoffensive, and does not, except upon particular circumstances, set fire to any thing that it falls upon; and, in like manner, the flashings of the phosphorus through the water will not burn the flesh, nor even fire the most combustible things; though the phosphorus itself, like the *lightning*, under proper circumstances, may be a very consuming and terrible fire. The warmth of the air, or the immediate beams of the sun, will set fire to the condensed body of the phosphorus, and it then becomes this terrible fire; and in the same manner, *lightning* when condensed and contracted, and wrapped up in a vehicle of air, so that it does not so easily diffuse itself through the yielding ether, sets fire to trees, houses, or whatever it comes near.

The phosphorus, while burning, acts the part of a corrosive, and when it goes out resolves into a menstruum, which dissolves gold, iron, and other metals; and *lightning*, in the same manner, melts the same substances. From the whole, it appears that there is much more resemblance between this phosphorus and *lightning*, than between gunpowder or aurum fulminans, and that fire; though these have often been supposed to be nearly allied to its nature. See PHOSPHORUS.

LIGNEA *casse*. See CASSIA.

LIGNICENSIS *terra*, in the *Materia Medica*, the name of a fine yellow bole dug in many parts of Germany, particularly about Emerie, in the circle of Westphalia, and used in cordial and astringent compositions. It is a common succedaneum for the yellow Silesian bole, where that is not to be had, and is generally esteemed very nearly, if not absolutely equal to it in its virtues.

It is moderately heavy, naturally of a smooth surface, and of a beautiful gold colour. It easily breaks between the fingers, and does not stain the skin in handling, melts freely in the mouth, and leaves no grittiness between the teeth, and is immediately diffusible in water. It makes no effervescence with acids; and burns to a fine red colour, and almost to a stony hardness.

Charlton (Foss. p. 5.) says it is more frequently known by the name of *terra sigillata Goldbergensis*.

There is another white bole known by this name. See GOLTBERGENSIS *terra*.

LIGNITES, the name of a stone described by Ludovicus Dulcis, as having the veins and appearance of wood, and the transparence of glass. He celebrates it for many imaginary virtues, nor does the stone itself indeed seem much less imaginary; this author, as De Boot observes, having described many stones which he never saw, and no small number that never existed.

LIGNUM *aloes*, or *wood of aloes*. See ALOES.

LIGNUM *balsami*. See BALSAM.

LIGNUM *Campechianum*. See LOG-WOOD.

LIGNUM *casiæ*. See CASSIA.

LIGNUM *colubrinum*. Garcias tells us of the wonderful effects of this drug against the bites of venomous serpents, and describes two kinds of the plant which produces it; one having leaves like the pomegranate, and the other like the peach-tree: these, he says, both grow in the island of Ceylon; and Acosta mentions two other species of plants producing this wood, both different from either of those described by Garcias, and both growing in Malabar. We have also accounts in the Geographus Nubiensis of another *lignum colubrinum*, different from these, growing in Æthiopia, and possessed of the same virtues against the bites of serpents as the others. This last is called in the Arabic *hond albar*, the plain verbal translation of which is snake-wood, or *lignum colubrinum*. He tells us, that it has some resemblance in form to pyrethrum, and that the wood is always contorted.

Alba cavarba is another of its Arabic names, and this is the word by which Avicenna, and the other Arabian writers, interpret the *pyrethrum* of Dioscorides; but it is not certain, whether the similitude of sounds between two or more Arabic words, may not have occasioned some confusion or error here. Dicearchus, in his fragment of mount Pelion, describes the root of a tree growing there, which is not only a sovereign remedy for the bites of serpents, but even destroys them by its smell. This is also a *lignum colubrinum*; but whether the same with any of the others, or different from them all, we have not descriptions enough to determine.

It appears, upon the whole, that little can be depended on in the accounts of the medicine called *lignum colubrinum* by any author, unless he has himself experimented what he relates, and described the plant which produces the drug; for much imaginary virtue has been at all times given to many things against the bitings of serpents, and the *lignum colubrinum* of one author is not the *lignum colubrinum* of another.

LIGNUM *nephriticum*. See NEPHRITIC.

LIGNUM *vitæ*, the wood of a genus of trees, called by botanists *thuya*. See TREE *of life*.

Lignum vitæ is much valued by turners; making extremely beautiful cups, bowls, boxes, and other curiosities.

Lignum vitæ is also a name given to GUAIACUM.

LIGULA, a word used by medical writers in very different senses. Some express by it the clavicle, others the glottis; others use it as the name of a measure, for things either liquid or dry, being a quarter of a cyathus, equal to a forty-eighth part of a pint with us; others finally use it for a weight, less than half an ounce by two scruples, or ten scruples.

LIGULA *marina*, a name given by some botanical writers to a plant of the fucus or sea-wrack kind, called by others *fucus in ligulas divisus*. It usually grows in places always covered by the sea, not on the banks, which are dry at the ebbing of the tides; and is for the most part composed of a sort of long cords or strings. The stalk is solid, and not hollow, as in the *fucus vesiculosus*, or the stringy fucus of Mr. Ray; at least the stalk of this plant is full of a thick and tough viscous matter, like that found in the bladders, at the extremities of the branches of the common fucus, at the time when the seeds are ready to fall. This gluey matter is of a whitish green, and the colour of the plant itself is a deep olive; there is no rib or nerve to be seen in any part, but its texture is very close and compact.

The indefatigable Mr. Reaumur discovered irregular flowers in this plant; they are each composed of a number of short and slender filaments, issuing out of a little hole, which serve them as a cup. These filaments are disposed in a circular order upon the stalk; and resemble, in miniature, the common radiated flowers of the hawkweed, and the like plants; but their diameter is not more than the twentieth part of an inch. Notwithstanding the smallness of these flowers, they are however easily distinguished, because they are green; whereas the stalk is olive-coloured. Mem. Acad. Par. 1711.

LIGULATED *floscules*, *ligulati flosculi*, in *Botany*, a term used by authors to express a part of the floscules, or small separate flowers, which together form the whole head or flower of the compound flowered plants. The *ligulated floscules* generally stand on the edge, and have a flat straight end turned downwards, and armed with three teeth, but not divided into any segments.

LIGURINUS, in *Zoology*, a name used by many authors for the bird more commonly known by the name of SPINUS, and called in England the *siskin*.

LIGURIUS, in *Jewish Antiquity*, a precious stone on the high priest's breast-plate. It is called *leshem* in Hebrew. Theophrastus and Pliny describe the *ligurius* to be a stone like a carbuncle, of a brightness sparkling like fire.

The *ligurius* was the first stone in the third row upon the high priest's pectoral, and the name of God was inscribed upon it. Ælian, De Animal. lib. iv. cap. 17. Pliny, lib. viii. cap. 38. & lib. xxxvii. cap. 3. Calm. Dict. Bibl. See LYNCURIUS *lapis*.

LIGUSTICUM, or LEVISTICUM, in *Botany*. See LOVAGE.

LIGUSTICUM *marmor*, in *Natural Hiſtory*, a name by which ſome authors have called the *Carrara marble*, the *marmor lunenſe* of the ancients. It is a fine white marble, harder than the Parian or ſtatuary kind, and uſed for tables, chimneys, &c. as the other for carving. See LUNENSE *marmor*.

LIGUSTRUM, in *Botany*. See PRIVET.

LIKE *quantities*, in *Algebra*, are thoſe which are expreſſed by the ſame letters, under the ſame power, or equally repeated in each quantity.

Thus $2b$, and $3b$, and $9ff$, and $3ff$, are *like quantities*; but $2b$, and $3bb$, and $9ff$, and $3fff$, are unlike ones, becauſe the quantities have not every-where the ſame dimentions, nor are the letters equally repeated.

LIKE *ſigns*, or *ſymbols*, in *Algebra*, are when both are affirmative, or both negative.

If one be affirmative, and the other negative, they are unlike ſigns.

Thus $+6d$ and $+5d$, have *like* ſigns; but $+9f$ and $-7f$, have unlike ſigns.

LIKE *figure*, in *Geometry*, are ſuch as have their angles equal, and the ſides about thoſe equal angles proportional. See SIMILAR.

LIKE *arches*, in the projection of the ſphere in plano, are parts of leſſer circles, containing an equal number of degrees with the correſponding arches of greater ones.

LIKE *ſolid figures*, in *Geometry*, are ſuch as are contained under *like* planes, equal in number.

LILAC, *ſyringa*, in *Botany*, a genus of the *diandria monogynia* claſs. Its characters are theſe: the flower has a ſmall tubulous permanent empalement of one leaf, indented in four parts; it has one petal with a long cylindrical tube, cut into four obtuſe ſegments at the brim, which ſpread open, and two very ſhort ſtamina, terminated by ſmall ſummits, ſtanding within the tube; it has an oblong germen, ſupporting a ſhort, ſlender ſtyle, crowned by a thick, bifid ſtigma; the germen afterward turns to an oblong, compreſſed, acute-pointed capſule, with two cells, opening with two valves, contrary to the partition, including in each cell one oblong acute-pointed ſeed, with a membranaceous border. Linnæus reckons two ſpecies, and Miller three.

Theſe are frequently cultivated in gardens; and ſome growing, with good management, to eighteen or twenty feet high, are with their large tufts of flowers very ornamental.

The common way of propagating theſe ſhrubs is by ſuckers, which they always produce in very great abundance; theſe ſhould be taken off from the old plants in October, and carefully planted in a nurſery, in rows three feet aſunder, and one foot diſtant in the rows, where after they have ſtood a year or two to get ſtrength, they will be fit to plant in autumn, where they are to remain; after which they require no farther care than the digging about their roots once a year, and taking away their ſuckers, which are not only very unſightly, but ſtarve the plant. Miller. They will grow almoſt any where; but they are obſerved to flower beſt in a light, rich ſoil, as indeed do moſt other ſhrubs, though they grow faſteſt in a wet one.

LILI, the name of one of the favourite remedies of Paracelſus, the baſis of which is antimony; but he has not given us the proceſs for preparing it.

LILIAGO, in *Botany*, a name uſed by Cordus and ſome other authors for the phalangium or SPIDERWORT.

LILIACEOUS, in *Botany*, a term uſed to expreſs the flowers of ſome plants, which approach to thoſe of the lily in ſhape.

The characters of a *lilaceous* flower are theſe: it is compoſed of ſix leaves, or elſe of three leaves divided into ſix; but this is more rarely the caſe; the piſtil, or cup of this flower, always becomes finally a ſeed-veſſel divided into three cells.

Of this ſort are the flowers of the tulip, hyacinth, aſphodel, ephemerum, and the like; many of which, though they leſs reſemble the lily flowers than the others, yet are to be diſtinguiſhed by this title, becauſe they leave behind them the *lilaceous* ſeed-veſſel, which is long, and divided into three cells. Tourn. Inſt. p. 343. See *Tab.* IX. *of Botany, Claſs* 9.

LILIASTRUM, in *Botany*. See *Aſphodel* LILY.

LILIO *aſphodelo*. See *Aſphodel* LILY.

LILIO *fritillaria*. See FRITILLARY.

LILIO *hyacinthus*. See SQUILL.

LILIO *narciſſus*. See AMARYLLIS.

LILIUM *lapidarum*, a name given by the writers, in *Natural Hiſtory*, to a foſſile body found in ſome parts of Germany; which plainly ſhews, that it was once a ſpecies of ſtar-fiſh; though the animal be not, at this time, known in its recent ſtate. Klein, who has well conſidered this body, in compliance to the vulgarly received names of things, calls this the *entrochus ramoſus*, or *branched entrochus*; and the reſemblance ſome of its parts have to the common entrochi, ſhews plainly, that their origin has been the ſame, and that they are fragments either of this ſpecies or of the Magellanic ſtar-fiſh. The recent fiſh not being found from which the *lilium lapidarum* is formed is no peculiar fate, but is common to it, and to the *cornua Ammonis*, and many other animal remains.

LILLO, in *Ichthyology*, a name given by the Rhodians to the LABRUS.

LILLY *of Paracelſus*. See TINCTURE *of metals*.

LILY, *lilium*, in *Botany*, a genus of the *hexandria monogynia* claſs. Its characters are theſe: the flower, which is of the open bell-ſhape, has no empalement, but has ſix petals reflexed at their points; each petal having a narrow longitudinal nectarium at its baſe: it has ſix erect ſtamina with a cylindrical oblong germen, which afterward becomes an oblong capſule, with ſix rough furrows hollowed at the top, having three cells filled with flat ſeeds lying above each other in a double order. Miller enumerates thirteen and Linnæus nine ſpecies.

All the ſorts of *lilies* may be propagated by off-ſets from their roots; or by ſowing their ſeeds; and if the ſeeds are carefully ſaved from good flowers, the mariagons very frequently afford very beautiful varieties.

The manner of ſowing them is this: ſome ſquare boxes ſhould be provided of about ſix inches deep, with holes bored in the bottoms to let out the wet; theſe muſt be filled with freſh light ſandy earth, and the ſeeds muſt be ſown on them pretty thick in the beginning of October, ſoon after they are ripe, and covered over about half an inch deep with light ſifted earth of the ſame kind. They ſhould be then placed where they may have the morning ſun; and, if the weather prove dry, they muſt be watered at times, and the weeds carefully picked out. In the beginning of November, the boxes are to be removed to a place where they may have as much ſun as poſſible, and be ſecured from the north and eaſt winds. In ſpring about the beginning of April, the young plants will appear, and the boxes are then to be removed into their former ſituation; they ſhould be watered at times during the ſummer; and in Auguſt the ſmalleſt roots are to be emptied out of theſe boxes, and ſtrewed over a bed of light earth, and covered with about half an inch depth of light earth ſifted over them; they muſt here be watered and ſhaded at times, and defended from the ſeverity of the winter, by a light covering of ſtraw, or peas haulm, in the hardeſt weather. In February the ſurface of the bed ſhould be cleared, and a little light earth ſifted over it. When the leaves are decayed, the earth ſhould be a little ſtirred over the roots, and in the month of September following a little more light earth ſifted on. In the September, of the following year, the roots muſt be tranſplanted to the places where they are to remain, and ſet at eight inches diſtance, the roots with their buds uppermoſt, being placed four inches below the ſurface: this ſhould be done in moiſt weather. They will now require the ſame care as in the preceding winters; and the ſecond after they are tranſplanted, the ſtrongeſt roots will begin to flower. The fine ones ſhould then be removed at the proper ſeaſon into flower-beds, and planted at great diſtances from one another, that they may flower ſtrong.

The roots of the *white lily* are emollient, maturating, and greatly ſuppurative. They are uſed externally in cataplaſms for theſe purpoſes with ſucceſs. The common form of applying them is boiled and bruiſed; but ſome prefer the roaſting them till tender, and then beating them to a paſte with oil, in which form they are ſaid to be excellent againſt burns. Gerard recommends them internally in atrophies.

For this purpoſe, bread was made of barley-meal, with the juice of the roots, and conſtantly uſed for a month or ſix weeks; but Dr. Lewis obſerves, that there are inſtances of ſimilar cures by the uſe of common bread; and that probably in one caſe, as well as in the other, abſtinence from liquids was the remedy. The flowers are chiefly uſed for ſtavouring expreſſed oils, which, by infolation with freſh parcels of them, continued about three days each time, are ſuppoſed to receive from them, along with their ſmell, an anodyne and nervine virtue. The diſtilled water has been ſometimes uſed as a coſmetic.

LILY, *belladonna*, *daffodil*, *Guernſey*, *Mexican*, and *Japan*, names uſed by different authors for the AMARYLLIS, or *lilio Narciſſus* of Linnæus and Tournefort.

LILY, *aſphodel*, *crinum*, in *Botany*, a genus of the *hexandria monogynia* claſs. Its characters are theſe: the flower has one petal, funnel-ſhaped, deeply cut at the top into ſix parts, which are reflexed; and has ſix long ſtamina, which are inſerted in the tube of the petal, ſpreading open; the germen is ſituated at the bottom of the flower, which afterward becomes an oval capſule with three cells, each

each containing one oval seed; the flowers are included in a two-leaved spatha. There are four species. See *Tab.* IX. of *Bot. Class* 6.

LILY, *daffodil*. See DAFFODIL.

LILY, *day*, or *St. Bruno's lily*, *hemerocallis*, in *Botany*, a genus of the *hexandria monogynia* class. Its characters are these: the flower has no empalement; in some species the flower is of one petal, cut into six parts, in others it has six petals; there are six awl-shaped declining stamina surrounding the style: the roundish furrowed germen is situated in the middle, and becomes an oval three-cornered capsule, with three lobes opening with two valves, filled with roundish seeds. Miller reckons four, and Linnæus two species.

LILY, *hyacinth*. See SQUILLS.

LILY, *Mexican*. See LILY *of the valley*, infra.

LILY, *Persian*. See FRITILLARY.

LILY, *superb*, *gloriosa*, in *Botany*, a genus of the *hexandria monogynia* class. Its characters are these: the flower has no empalement, but has six spear-shaped petals, which are waved and reflexed to the bottom; it has six stamina, which spread each way, terminated by prostrate summits; in the centre is situated a globular germen, which becomes an oval thin capsule with three cells, filled with globular seeds disposed in a double range. There are two species, natives of the East.

LILY-*thorn*. See *Lily*-THORN.

LILY *of the valley*, *convallaria*, in *Botany*, a genus of the *hexandria monogynia* class. Its characters are these: the flower has one petal, which is bell-shaped, spread open and reflexed, but has no empalement; it has six stamina inserted into the petal; in the centre is situated a globular germen, which becomes a globular berry with three cells, containing one roundish seed. Miller enumerates ten and Linnæus eight species.

The plant commonly called *one blade*, and by Caspar Bauhine *folium convallium minus*, is usually esteemed a species of this genus, but improperly; it being one of the smilaxes. Tourn. Inst. p. 77. See SMILAX.

The name *lily* is very improperly given to this genus of plants, as they have not the least affinity to the *lily*.

The flowers of the white *lily of the valley* are cephalic and nervine, and prescribed for vertigoes, apoplexies, palsies, &c.

It is principally from the volatile parts of these flowers, that medicinal virtues have been expected in nervous and catarrhous disorders; but probably their fixed parts also have no small, perhaps the greatest, share in their efficacy: the flowers, dried and powdered, and thus divested of their odoriferous principles, prove strongly sternutatory. Watery or spirituous extracts made from them, given in doses of a scruple or half a dram, act as gentle stimulating aperients and laxatives; and seem to partake of the purgative virtues, as well as of the bitterness of aloes. Lewis's Mat. Med.

LILY, *water*, *nymphæa*, in *Botany*, a genus of the *polyandria monogynia* class. Its characters are these: the empalement of the flower is composed of four or five coloured leaves; the flower has many petals sitting on the side of the germen, for the most part in a single series; and it has a great number of short plain incurved stamina, with oblong summits; it has a large oval germen, but no style; with an orbicular, plain, target-shaped stigma; the germen becomes a hard, oval, fleshy fruit with a narrow neck, crowned at the top; and divided into ten or fifteen cells, full of pulp, with many roundish seeds. There are two species, which grow naturally in standing waters; Linnæus reckons four.

The best method to propagate these plants is to procure some of the seed-vessels just as they are ripe and ready to open; these should be thrown into canals or large ditches of standing water, where they will sink to the bottom, and in the following spring the plants will appear floating on the surface of the water, and in June or July produce their beautiful large flowers: when they are once fixed to a place, they will multiply exceedingly; in small gardens they are cultivated in large troughs of water lined with lead, where they thrive very well; but few persons care to be at that charge. Miller.

The roots, flowers, and sometimes the leaves, have been employed both internally and externally, as demulcent, anti-inflammatory, and in some degree anodyne: they are cooling and drying, and accounted good to stay all kinds of fluxes and lasciviousness, and the gonorrhœa and nocturnal emissions; by their softening cooling qualities allaying the acrimony of the semen, and thereby rendering persons less disposed to venery. The leaves are good to be applied to hot humours and inflammations.

LILY, *water yellow*, *water*. See *Nup*-BEAN.

LIMANDA, in *Ichthyology*, a name by which some authors have called the flat-fish, which we in English call the DAB, the *pesce liscio* of authors.

LIMARIA, in *Ichthyology*, a name given by Gaza and some other writers to the THYNNUS or TUNNY-*fish*, called the *Spanish mackrel*.

LIMATURA *mortis præparata*. See IRON.

LIMAX, in the *History of Insects*, the name of a genus of these animals, comprehending all the naked snails. See SNAIL.

This belongs to the order of mollusca or soft worms in the Linnæan system. The animals of this genus have no shell, and are furnished with members.

The body of the *limax* is of an oblong figure, approaching to cylindric, and is perforated at the side with a hole, which serves for its genitals and discharge of excrements; above is a fleshy kind of buckler, formed convexly and flat beneath; the tentacula are four in number, and two of them have the appearance of eyes.

Of this genus authors enumerated eight species.

LIMAX *marinus*, in *Zoology*, a name given by some to the *lepparis*, or, as it is commonly termed in English, the *sea-fowl*, caught in plenty at the mouths of rivers in Yorkshire, and some other places. See CYLINDRUS.

LIMB, in *Anatomy*, is used to denote certain parts of the human body, proceeding from the trunk.

LIMBS, *motions of the*. By a sort of natural mechanism, and that without any acquired habitude, we are capable of easily making with one hand, or even with both hands at once, exactly the counter action to that motion, which the other hand naturally and most easily is found to make, and the contrary of which it cannot itself make without difficulty, and repeated trials and custom. It is owing to this, that we can with the left hand easily make the very contrary strokes with the pen, that we are accustomed to make with the right; if we suffer that left hand to move, without giving our particular attention to what it is doing, as in the playing on some instruments of music, the fingers being after practice left, as it were, to themselves, succeed more happily than when the attention is more engaged in what they are doing. The letters or figures thus made by counter strokes from the unforced action of the left hand, though they appear strange and confused at first sight, yet if held up against a looking-glass, they will be found sufficiently determinate and expressive.

This difficulty of making motions, at the same time, contrary to one another with two *limbs*, either of which motions singly would be no difficulty to either, is not peculiar to the arms; if we sit down and try the experiment with the feet, the success is found the same, and even the moving differently the like fingers or toes of the different hands or feet, is found of proportionate difficulty.

We, in the same manner, are not able, by any means, to direct our two eyes to two different objects, placed in contrary situations at the same time; but in this the difficulty, though great in the structure of our eyes, is not universal to all creatures. The chamæleon being able to do this, and to look before and behind, or in any other two different directions, both at the same time. Mr. Winslow was led by a great number of observations of this kind, diligently to examine the dispositions of the nerves, and their different origins in the brain, the cerebellum, the medulla oblongata, and the spinal marrow. The first thing on which this accurate anatomist made his observation, was the crucial interlacement of the nerves in the medulla oblongata, first discovered by M. Petit, and accurately described and figured by him; and the observations of the same author, of different persons, who, within his own knowledge, had become paralytic in the *limbs* on the contrary side of their body to the affected part of the brain also. The being able determinately to bring on the like symptoms in brutes, from injuries to the contrary sides of the brain, and the regular evolling of the filaments which pass transversely on the medullary arch, commonly called the callous body of the brain, and of other of the nervous fibres, seemed to promise to give some light into the explication of the difficulty of these contrary motions being performed at the same time. When this accurate observer had sufficiently informed himself of these crossings of the nerves, and the other reciprocal communications of the several parts of the brain, or its two lateral halves, as well as by the two large transverse cords, as by the thick transverse fibres of the small inferior and triangular surface of the arch, he bestowed his particular observation on the structure of the spinal marrow. This he carefully examined by the microscope; and beside the transverse fibres, which make the communication between the two columns of this marrow, and which M. Petit had before nicely described, there appeared to M. Winslow, in the thickness of each of these columns, a long train very distinct, and made up of a less white and more cloudy matter than the rest; or a medullary cord, which had not been before observed

observed by any body, any more than the fmall cords and tranſverſe fibres of the ſummit of the arch of the brain, or the croſſing of its tranſverſe fibres.

By theſe ſeveral croſſings, and reciprocal communications of the medullary filaments, which are, as it were, the roots of the nerves of each half, or each ſeveral ſide of the human body, it ſeems not impoſſible to explain the reaſon of the before obſerved difficulty of making the contrary motions with the two oppoſite *limbs* at the ſame time; eſpecially when it is obſerved, that the two ſmall parcels of medullary filaments, which compoſe the primitive trunks of every pair of nerves that are propagated from the ſpinal marrow, have their paſſage through the lateral apertures of the vertebræ, and before that ſeem to proceed partly from the neighbouring column or moiety of the ſpinal marrow, and partly from the other column or moiety, by means of the croſſing before mentioned; and conſequently, that by this reciprocal croſſing, or interlacing, one of the primitive parcels or bundles of filaments of each primitive trunk of the nerves of one ſide of the body, muſt communicate with the fellow-parcel or bundle of filaments of the nerves of the other ſide.

Every body almoſt knows that the motion of the muſcles, and ſenſation by the touch, are performed by means of the nerves and their filaments; but no one has ever yet diſcovered the true means: this however is certain, that when we would put to motion, at one time, the two legs, or the two arms, or the fingers or toes of each hand or foot, at that time the croſſed filaments of the primitive trunks of the nerves, which go to their correſpondent muſcles on each ſide, immediately come mutually into contact and conſent with one another; and their ſo meeting, in the time of their motion, communicates certain impreſſions reciprocally to the ſeveral nerves, which from them are propagated to the two different ſides of the body, and continue them to act in concert on the ſeveral muſcles of both the arms or legs at the ſame time, and communicate to both that principle of motion, which we meant to give alone to one. Mem. Acad. Scien. Par. 1739.

The *limbs*, as well as the life of a man, are of ſuch high value, in the eſtimation of the law of England, that it pardons even HOMICIDE, if committed *ſe defendendo*, or in order to preſerve them.

LIMB, LIMBUS, the outermoſt border, or graduated edge, of an aſtrolabe, quadrant, or the like mathematical inſtrument.

The word is alſo uſed for the primitive circle in any projection of the ſphere in plano.

LIMB alſo ſignifies the outermoſt border or edge of the ſun or moon, when the middle or diſk is hid in an eclipſe of other luminary.

Aſtronomers obſerve the lower and the upper *limb* of the ſun in order to find its true height, which is that of the centre.

LIMB is alſo uſed, among *Botaniſts*, for the outer edge or border of plants, their leaves and flowers. See PETAL.

LIMBECK. See ALEMBIC.

LIMBERS, in *Artillery*, a pair of advanced train joined to the carriage of a cannon, upon a march. It is compoſed of two ſhafts, wide enough to receive a horſe betwixt them, which is called the *fillet horſe*: theſe ſhafts are joined by two bars of wood, and a bolt of iron at one end, and have a pair of ſmall wheels; upon the axle-tree reſts a ſtrong iron ſpike, upon which the train of the carriage is put. But when a gun is upon action, the *limbers* are run out behind it.

See the dimenſions and figure of a *limber* carriage, in Muller's Treatiſe of Artillery, p. 187, &c.

LIMBER-*holes*, in a ſhip, little ſquare holes cut through her floor-timbers, ſerving to let the water to the well of the pump, which otherwiſe would lie between thoſe timbers, where the keel rope runs.

Every floor-timber has two *limber* holes cut through it; viz. one on each ſide of the keelſon.

LIMBER-*boards*, are ſhort pieces of plank, which form a part of the ceiling or lining of a ſhip's floor, cloſe to the keelſon, and immediately above the *limber-s*. They are occaſionally removed, in order to examine and clear the *limber*-holes.

LIMBER-*rope*, is a long rope, frequently retained in the *limber*-holes of a ſhip, and communicating from one to another, in order to clear them, by pulling the rope backwards and forwards, ſo as to ſoften the ſand or dirt by which they may occaſionally be choaked.

LIMBUS, or LIMB, is a term in the *Roman Theology*, uſed for that place where the patriarchs are ſuppoſed to have waited for the redemption of mankind, and where they imagine our Saviour continued from the time of his death to that of his reſurrection.

Du-Cange ſays, the fathers calls this place *limbus, ex quod ſit limitis confervatio*, as being the margin or frontier of the other world.

LIMBUS is alſo uſed by catholics for the place deſtined to receive the ſouls of infants, who die without baptiſm; who have not deſerved hell, as dying in innocence; nor yet are worthy of heaven, becauſe of the imputation of original ſin.

LIME, *ſalt of ſtone*, a white, ſoft, friable ſubſtance, prepared of ſtone, marble, chalk, or ſome other ſtony ſubſtance, by burning in a KILN.

The great uſe of *lime* is in the compoſition of mortar for building; the fire taking away a great part of its humidity, and opening its pores, ſo that it becomes eaſily reducible to powder, and miſcible with ſand or burnt clay. See MORTAR.

LIME, *quick*, or *caſtic lime*, is ſuch as it comes out of the kiln, or furnace. And thoſe earths or ſtones, which yield this acrimonious, friable ſubſtance, are called CALCAREOUS or calcinable. The method of converting earths and ſtones into *quick-lime* is very ſimple: it conſiſts in expoſing them to the action of fire, in kilns made for this purpoſe, till they become of a white-red heat, and in keeping them in this degree of heat during twelve or fifteen hours: good *quick-lime* may alſo be made with a leſs heat continued for a longer time, or in leſs time with a more intenſe heat; but care muſt be taken that the heat is not ſufficiently violent to vitrify the calcareous ſtone. The effects of CALCINATION, and the principal properties that diſtinguiſh *quick-lime* from uncalcined calcareous earths, are the following: the earths and ſtones, from which *quick-lime* is produced, contain a large quantity of air in a fixed ſtate, called *fixed* AIR, and by ſome writers calcareous gas, which, in calcination, is expelled; and therefore, in this proceſs, they are rendered more friable, and their weight is very conſiderably diminiſhed. See HEAT *Potential*.

Mr. Jacquin, in his Examen Doctrinæ Meyerianæ, (ſee ACTUUM *Pinyon*) obſerves that *lime-ſtone* contains ⅓ of its weight of gas, and ⅓ of water. In conſequence of this diſcharge of air, ſtrong *quick-lime*, though diſſoluble in all the acids, with conſiderable heat, raiſes no effervescence, or emits no air-bubbles, which the uncalcined earths do in great abundance. Moreover, if the calcined ſtones be left expoſed to the air, they crumble into a fine white powder, called *lime ſlaked in the air*, and recover great part of their original weight. If the *quick-lime*, while newly made and very ſtrong, be put into water, inſtead of expoſing it to the air, it preſently cracks and ſplits with noiſe, exhaling a hot watery vapour, and ſoon crumbling to as fine a powder as if it had been a long time expoſed to the air. But the crude *lime*-ſtone, before its calcination, exhibits none of theſe phenomena, with air or with water. *Lime*-water not decompoſed, which is nothing elſe but water ſaturated with *quick-lime*, produces the ſame appearances with acids and other ſubſtances as the *quick-lime* itſelf, excepting that its combination with theſe ſubſtances is not accompanied with ſo much heat. *Quick-lime* and *lime*-water have not only the acrimonious taſte, but alſo all the other properties of fixed alkalis. Thus *quick-lime* changes the blue colours of flowers to a green, precipitates all metallic ſolutions, and even ſome ſalts with earthy baſes, ſuch as alum, and decompoſes ammoniacal ſalts, from which it diſengages the volatile alkali. It has ſome action upon oils, ſpirit of wine, and eſpecially upon ſulphur, which it reduces to an hepar. Theſe alkaline ſaline properties diſtinguiſh *quick-lime* from uncalcined calcareous earths, which, however, in a ſmall degree poſſeſs ſome of the ſame properties. The theory of *quick-lime* has been very much improved by the modern diſcoveries relating to *fixed* AIR. We learn from the experiments of Hales, Black, Jacquin, and others, that if calcareous ſtones are calcined in an apparatus of cloſe veſſels, ſo that whatever is expelled by fire may be retained, they may be converted into *quick-lime*, without the concurrence of the external air; that, during this calcination, a certain quantity of aqueous liquor is expelled from calcareous ſtones, though they have been previouſly well dried, and moreover, that a conſiderable quantity of a volatile vapour is diſengaged during the calcination, and that this vapour is the ſame as the gas or fixed air, which is expelled by adding acids to calcareous earth, and which occaſions the effervescence that ariſes upon mixing theſe ſubſtances. From this diſcovery of the exiſtence of gas in calcareous earths, and of the total privation of this fluid in *quick-lime*, we obtain a clear and ſatisfactory explication of the various properties of *quick-lime* and alſo of other ſimilar ſubſtances. Dr. Black has taught us, that *lime*-ſtone and other calcareous earths become *quick-lime*, when they are deprived by calcination in fire, ſolution in acids, precipitation with ſubſtances void of air, of the gas or air uſually combined with them in their natural ſtate. His experiments likewiſe prove, that when alkalis, fixed or volatile, are deprived of their gas, by any means, and

particularly by combination with *quick-lime*, they are thereby rendered more caustic, incapable of effervescing with acids, and of crystallization, and more powerfully solvent; and the *quick-lime*, &c. by thus communicating causticity to alkalies, loses its own causticity, and acquires all the properties of uncalcined calcareous earth: and he has shewn more generally, that by recombining this gas with *quick-lime*, magnesia, or alkalies, which had been previously deprived of it, their former weight and properties are destroyed. From the greater acrimony communicated to *quick-lime* and to alkalies, by thus depriving them of their contained gas, he has distinguished them, when thus deprived, or uncombined with gas, by the epithet caustic, as caustic calcareous earth, or caustic fixed alkali, or caustic volatile alkali; and when these earths or alkalis are combined with gas, he calls them mild. See ALKALI.

Dr. Black contrived an apparatus by which the gas extricated from an effervescing mixture, could be conveyed into a caustic alkaline liquor, and shewed that by this method the caustic alkali could be rendered mild, and recover its effervescing and crystallizing properties.

His apparatus consisted of two phials communicating by means of a bent tube, one end of which is inserted into the mouth of one phial, and the other end into the mouth of the other phial. In one of the phials he put some caustic spirit of sal ammoniac, and into the other phial some mild alkali or mild calcareous earth. Upon this mild alkali or mild calcareous earth, he poured through a hole made in the side of the phial, some acid liquor, which immediately produced an effervescence as usual, that is, it carricated from the alkali or earth their contained gas. The gas thus disengaged, passed through the bent tube into the phial containing the spirit of sal ammoniac, with which it combined, and which it changed from a caustic into a mild state. For the spirit is, by this process, rendered capable of effervescing with acids, and if it be much concentrated, it will be seen to crystallize during its impregnation with gas.

Dr. Macbride employed a similar apparatus to impregnate *lime*-water with gas, by which means he changed the caustic earth or *quick-lime*, which was dissolved in the water, to a mild calcareous earth, which, not being soluble in water, as *quick-lime* is, was therefore precipitated: he has also shewn, that this gas is capable of being absorbed by water, and that the water thus impregnated, precipitates the *lime* from *lime*-water. See some other properties of this gas recited under the article *fixed* AIR.

Dr. Black has farther determined, by experiments, the relative powers of the several alkaline substances to unite with this elastic fluid, or the AFFINITIES of this fluid towards these substances. He found that this gas was more disposed to unite with caustic calcareous earth or *quick-lime* than with any other substance; next with fixed alkali; then with magnesia; and lastly with volatile alkali. Whence he shews, that mild volatile alkali may be deprived of its gas or rendered caustic by applying to it magnesia deprived of its gas, or caustic fixed alkali, or *quick-lime*; and at the same time the magnesia, fixed alkali, or *quick-lime*, are thereby rendered mild. Magnesia also may be deprived of its gas by means of caustic fixed alkali, or of *quick-lime*; and lastly, mild fixed alkali may be rendered caustic by means of *quick-lime*, which is at the same time rendered mild. Hence soap-boilers in order to increase the activity or dissolving power of their alkali, boil it in water with *quick-lime*. According to this doctrine fully established by many experiments, the causticity and other peculiar properties of *quick-lime* and caustic alkali are the original properties of these substances, while they are pure and uncombined, and not communicated to them by any supposed absorption of matter from the fire in calcination, as Meyer and other chemists maintain. See ACIDUM *Pingue*.

From the now well-known property of fixed air in correcting air which has been injured by animal respiration or putrefaction, Dr. Priestley is led to conjecture, that *lime-kilns*, which discharge great quantities of fixed air, may be wholesome in the neighbourhood of populous cities, the atmosphere of which abounds with putrid effluvia. See on the subject of this article, Edinburgh Essays, vol. ii. Macbride's Essays, eff. v. and Chemical Dict. art. *Quick-lime*, and Appendix, ed. 2d.

LIME, *slaked*, is that diluted or drenched in water, and received for the making of mortar.

The best *lime* is that made of the hardest, firmest, and whitest stones; and which is slaked at its coming out of the furnace.

It may easily be determined whether a stone will calcine, by letting fall a few drops of aqua fortis, or any strong acid, on the stone, which will boil, and dissolve a part of it, if the stone is calcinable; but will lie upon the stone, like oil, and not ferment, if it will not calcine.

Sir H. Wotton looks on it as a great error in the English, to make *lime*, as they do, of refuse and stuff, without any choice; whereas the Italians, at this day, and much more the ancients, burnt their firmest stones, and even fragments of marble, where it was plentiful; which, in time, became almost marble again for its hardness, as appears in their standing theatres, &c.

We have two kinds of *lime* in common use in England; the one made of hard stone, the other of a soft, calcareous, or chalky stone; whereof the former is much the strongest. That made of soft stone, or chalk, is fittest for plastering of ceiling, and walls within doors; and that made of hard stones for buildings, and for plastering without doors.

Good *lime* may also be made of mill-stone, not coarse and sandy, but fine and greasy; as also of all kinds of flints; though it is hard to burn them, unless in a reverberatory furnace, as being apt to run to glass.

Dicuillant recommends *lime* made of sea-shells as the best; but Goldman finds fault with it, as being impatient of moisture, and therefore easily peeling off from the outsides of walls: it is, however, the common *lime* used in the Indies.

Before the stones be thrown into the kiln, they are to be broken to pieces; otherwise the air contained in their cavities, too much expanded by the heat, makes them fly with so much violence, as to damage the kiln. According to Alberti and Palladio, *lime* will not be sufficiently burnt in less than sixty hours intense heat.

The marks of a well-burnt *lime*, according to Alberti, are, that its weight be to that of the stone in a sesquialterate proportion; that it be white, light, and sonorous; that when slaked, it flicks to the sides of the vessels; to which Boeckler adds, that, when slaked, it sends forth a copious thick smoke; and Dicuillant, that it need a great deal of water to slake it. To preserve *lime* several years, slake, and work it up; dig a pit under ground, into which let it pass through a hole open at the bottom of the vessel. As soon as the pit is full, cover it up with sand, to prevent its drying; thus keeping it moist till it be used. Boeckler gives another method: cover a stratum of *lime* two or three feet high with another of sand of the like height; pour on water enough to slake the *lime*, but not to reduce it to dust after slaking. If the sand cleave into chinks, as the smoke ascends, cover them up, so as no vent may be given thereto. This *lime*, he adds, kept ten or twelve years, will be like glue; and will, farther, be of particular use in painting on walls, as being no way prejudicial to the colours. See MORTAR.

Lime is much used by tanners, skinners, &c. In the preparation of their leather; by soap-boilers for dissolving the oil, and facilitating its union with the alkaline salt; and by sugar-bakers for refining their sugar.

It is also of some medicinal use; being applied externally in deficative and epulotic medicines.

It is also used as a depilatory; and has been sometimes made into an unguent with honey for rheumatic and other obstinate fixed pains of the joints or limbs: this unguent is much commended by Fuller, who observes, that it is almost caustic. As an absorbent earth, it is anti-acid, and capable of absorbing the acid matters which are produced in digestion from the weakness of the stomach, in diseases proceeding from a spontaneous acid, so well described by Boerhaave. It is the fittest in these diseases, which are commonly the effect of the inactivity and weakness of the fibres, as it possesses a tonic quality, which other absorbent earths have not. Besides, persons afflicted with these diseases are subject to much wind, which is perhaps nothing else but gas; and *quick-lime* is very capable of absorbing that fluid. As *quick-lime* is also drying, a little caustic, and consequently cicatrising, it may contribute to cure certain ulcers, especially those of the soft parts. Accordingly, several able physicians have prescribed it successfully for internal suppurations, and in the phthisis pulmonalis. Moreover, the property which *quick-lime* has of attenuating viscid matters, and of decomposing ammoniacal salts, has been advantageously applied to dissolve stones in the bladder and kidneys. But the best method of administering *quick-lime* internally has been thought to be by giving the LIME-*water*; because this water is supposed to possess all the medicinal virtues of *quick-lime*, and because the earthy particles are thus reduced to the greatest fineness, and are consequently susceptible of the most perfect distribution. However, this should be administered with great caution, and much diluted; and, after all, it is doubted, whether the *lime-water*, thus diluted, has all the medicinal qualities which might be expected from *quick-lime*. MACQUER.

Lime affords a great variety of figures in its salts. The most perfect concretions among them seem to be double pointed figures, thick toward one end and growing slim toward the other; some are flat and of a quadrilateral figure,

figure, and others flat and very thin but hexangular; some are of the shape of a wedge, being cut off taper near one end, and blunt at the other. *Soda*, or pot-ash, made of the plant *kali*, is very elegant and various in its shoots. Some are beautiful prisms, with the angles cut off near each end; others are oblong, and less regularly formed, some square and very thin; others oblong, with a tendency to a rhomboidal shape, and some roundish. These are a few, out of a great number of experiments, made by the accurate Lewenhoeck, and since repeated by other observers. The salt, with the figures of these shoots, are published at large in the Philosophical Tranfactions. *Lime* makes the greatest improvement upon light sandy lands, or upon a dry gravel: but a cold clay seldom is much benefited by it. If it be mixed with dung, or with mud, drawn from the bottom of the rivers, it makes an excellent mixture, especially where the soil is very sandy; and in Westmoreland they procure fine crops of barley from their sandy lands, by manuring them with *lime* and cow-dung mixed together. The nature of *lime* on land is like that of chalk, it works downwards, as the farmers express it; it is therefore best to treat it in the same manner, laying it upon a lay the year before it is to be plowed up. *Lime* is reckoned to make corn grow with a thin husk; but it is not a lasting manure, seldom holding for more than five crops. When *lime* is used to land, which lies upon a descent, it should be mixed with dung, and laid principally on the higher part of the land; the consequence of which, will be, that the rain will wash out the virtue of the *lime* and dung together, and carry the whole to the lower parts as it runs down. Dung and *lime* mixed together will do better for any land than either of them alone.

All *lime* is a very good manure, but that made of stone is much better than what is made of chalk. The common allowance is a bushel to a pole square, or a hundred and fifty bushels to an acre.

This they cover with earth, and so leave it till the rains fall and slake it, and after this they spread it as evenly as possible upon the ground. They always find that if it be carried hot out of the kiln, and laid upon the land to cool, it does much better than in any other way.

The improvement it makes upon land is owing chiefly to its heat, and the salt it contains. It is in much the same manner that coal-ashes, and the soot of coal become useful upon the like sort of lands; but the farmers always find that a mixture of good earth and *lime*, that has lain a considerable time together, is better for this purpose than fresh *lime* alone. Moreton's Northampt. p. 481.

LIME, *bird*. See BIRD-*lime*.

LIME, *cream of*. See CREAM.

LIME-*galls*, in *Natural Hiſtory*, a ſort of *galls* or vegetable protuberances, formed on the edges of the leaves of the *lime*-tree in ſpring-time; they are very common in the plantations of *lime*, and are irregularly ſhaped, but uſually oblong and rugged, and of a reddiſh colour, they occupy only the edges of the leaves, and are of a red colour, ſometimes very beautiful. As theſe are very plentiful, Mr. Beaumur was of opinion, that they might be of ſervice in the dying trade; he made trial by rubbing them on ſome parts of his linen, and found that they gave a very beautiful red colour, which did not come out in the firſt waſhings afterwards. It is extremely probable, that there wants only inquiry to prove that we have many valuable productions of this kind, which, though diſregarded at preſent, might prove of great uſe in the ſeveral mechanical arts as well as in medicine.

Theſe *galls* of the *lime* leaves are formed by a worm, which inhabits them during its term of life, being found in them of *all ſizes*, from the moſt minute to that of the full growth, which is about half an inch in length; but when its period of life, as a worm, draws near, it deſerts this habitation, and goes elſewhere to paſs into its chryſalis ſtate. This alſo is the caſe with the worms that inhabit many *galls*, which are frequently found to contain them in the worm ſtate, but never in that of the chryſalis, which they always paſs into elſewhere.

Beſides theſe *galls* of the leaves of the *lime*-tree, they have ſometimes another appearance not leſs ſingular, and this is alſo owing to an inſect; though many curious obſervers have miſſed the finding it there. In this ſtate the whole leaf of the *lime*-tree reſembles a common ſpoon, being ſunk into a hollow in the middle, and in its pedicle making the handle. The edge of the leaf in this caſe is always turned, and forms a rib or ridge, running round the whole circumference in the ſhape of a cord: this is uſually found during the time that the leaf is growing to its ſize, and to this is owing the whole figure it aſſumes afterward; for the leaf being unable to extend itſelf farther toward the circumference by reaſon of this ring, naturally forms a ſort of hollow or baſon in its ſucceeding growth. The protuberance, in this caſe, ſurrounding the leaf is a kind of *gall*, and owes its origin in the manner of all the other excreſcences of that kind to an inſect. This, however, has been ſought for in vain by many, who inquired after it too late; but Mr Beaumur ſearching the leaves in the beginning of May, found in every protuberance of this kind, ſeveral ſmall worms of a white colour, and conſiderable length, though not exceeding a horſe-hair in thickneſs. The reaſon that theſe are not found in the ſame place afterwards, probably, is, that they either go out of it, as the inhabitants of many other *galls* do, in order to paſs into their chryſalis ſtate, or elſe that this life in the worm ſtate, and the duration of that in the chryſalis, are both very ſhort, and that they have generally eſcaped in the form of flies before the time that they are ſought for in the leaves. See *Tab. of Inſects*, N° 27. and Reaumur's Hiſt. of Inſ. vol. vi. p. 180.

LIME-*kiln*. See KILN.

LIME-*ammoniacal*, a kind of phoſphorus, invented by Mr. Homberg, and made of ſal ammoniac and lime. See *Ammoniacal* PHOSPHORUS.

LIME, *in Building*. See LEMON.

LIME, *brook*. See BROOK-*Lime*.

LIME-*ſtone*, *lapis calcarius*, is a ſtone of a coarſe grain, which, being burnt in a kiln, makes an ingredient in mortar, plaiſter, &c.

LIME-*tree*, or LINDEN-*tree*, *tilia*, in *Botany*, a genus of the *polyandria monogynia* claſs. Its characters are theſe: the flower has a concave coloured empalement, which is cut into five parts; it has five oblong blunt petals, which are crenated at their points; and many awl-ſhaped ſtamina, terminated by ſingle ſummits; it has a roundiſh germen, ſupporting a ſlender ſtyle of the length of the ſtamina, crowned by an obtuſe five-cornered ſtigma; the germen becomes a thick globular capſule with five cells, opening at the baſe with five valves, each containing one roundiſh ſeed. There are four ſpecies according to Miller, and two in the Linnean ſyſtem.

The ſeveral ſpecies of the *tilia* or *lime-tree* are all eaſily propagated by layers, which in one year will take good root, and ſhould then be removed to the nurſery, planting them at two feet diſtance in rows, and the plants two feet aſunder in each row. The beſt ſeaſon for removing them is Michaelmas. They ſhould remain four or five years in the nurſery, and ſhould afterwards be removed to the places where they are to remain. The ſoil they love is a ſtrong fat loam, in which they grow very faſt.

The timber of the *lime-tree* is uſed by the carvers, becauſe it is a ſoft light-wood; and alſo by architects for framing the models of their buildings: the turners likewiſe uſe it for making light bowls, diſhes, &c. but it is too ſoft for any ſtrong purpoſes. Miller.

Lime-tree flowers are ſuppoſed to have an anodyne and anti-ſpaſmodic virtue: Hoffman ſeems to entertain a great opinion of them in theſe intentions, and as his theory deduces moſt diſeaſes from ſpaſms and ſpaſmodic ſtructures, they are accordingly very frequent in his preſcriptions. He ſays he knew a chronical epilepſy cured by the uſe of an infuſion of them drank as tea.

LIME-*water*. The general opinion of *lime* acting as a cauſtic, and conſuming the bodies it was made to act upon, by means of the great quantity of particles of fire it contained, long denied any preparation of it a place among internal medicines; at length, water poured upon it was found to take in a part of its virtues, and to be a valuable medicine, and very ſafely to be given internally in large quantities.

For this purpoſe, a gallon and a half, or two gallons of water, are poured by degrees upon a pound of freſh-burnt *quick-lime*; the veſſel ſhaken when the ebullition ceaſes, and then ſet by, till the undiſſolved *lime* has ſettled; after which, the liquor is poured off, and paſſed through a filter. Only a ſmall portion of the *lime* is diſſolved by the water, and the remainder gives a ſtrong impregnation to large quantities of freſh water, though not ſo ſtrong as the firſt; great part remaining at laſt undiſſolved: this reſiduum, calcined again, becomes *quick-lime* as before; and by repetitions of this proceſs, nearly the whole may be diſſolved. The ſolution has a ſtrong, ſtyptic taſte; and its effects in chemical mixtures are ſimilar to thoſe produced by *quick*-LIME. In veſſels quite filled with *lime-water*, and exactly cloſed, it may be kept unchanged for many months; but in open veſſels, the calcareous matter ſoon ſeparates from the aqueous fluid, and forms a cruſt or CREAM upon the ſurface, inſipid and indiſſoluble as the earth in its natural ſtate, and again convertible into *quick-lime* by repeated calcination. It is obſerved, that the quantity of calcareous matter that is thus ſeparated from *lime-water*, is even greater than it ought to be, if it was exactly proportioned to the evaporation of the water; the cauſe of which is, that the

quick-lime gradually recovers from the air as much gas as is necessary to deprive it of its properties of *quick-lime*, and to reſtore it to its ſtate of ſimple calcareous earth, mild, effervescing, and unſoluble in water. Hence, *lime-water*, by long expoſure to air, loſes much of its ſtrength, and at laſt becomes almoſt inſipid. It is neceſſary alſo, when this liquor is employed as a menſtruum, to add ſome *quick-lime* in ſubſtance, in order to continue the impregnation of the water with the *lime*.

All *lime* is not equally good for the making this water; but the ſeveral kinds differ, according to the ſubſtances they are made from. In Holland they at this time make *lime* of ſea-ſhells, which they find in vaſt abundance on their ſea-ſhores. This was alſo a practice in the time of Dioſcorides; but the *lime* thus made is not fit for making *lime-water*. The water made from it does not keep long, and is leſs ſtyptic, and ſweetiſh to the taſte, and is greatly inferior to the water made with *lime* burnt from ſtones. The newer the *lime* is, the leſs it has been expoſed to the air, and the drier it has been kept, and finally, the more it has held together without crumbling, or mouldering to powder, the better it is for making *lime*-water. Mem. Acad. Par. 1700.

It appears now from the ingenious Dr. Alſton's experiments, that one part of quick-*lime* is ſufficient for five or ſix hundred parts of water. Water will diſſolve but a certain portion of quick-*lime*; and how much that is cannot be eaſily aſcertained. So far ſeems certain from Dr. Alſton's experiments, that one pound of quick-*lime* is ſufficient for making ſix hundred pounds of good *lime-water*; and that thoſe who with Charas have ſuppoſed, that the ſecond and third *lime-water* is weaker than the firſt, have been led into an error by the ſmall quantity of water they uſed. And it has been generally believed, that in order to obtain good *lime-water*, the quick-*lime* muſt not only be recent and fully calcined, but alſo for one part of quick-*lime* only eight, ten, or, at moſt twelve parts of water taken; as if it could impregnate no more. But the Doctor ſays he has found by many experiments, that it is altogether indifferent whether the water be hot or cold, poured on gradually, or at once, the water poured on the *lime*, or the *lime* thrown into the water; whether the quick-*lime* be in ſhells, or flaked; or even expoſed to the air for ſeveral months, for ſuch quantities of the water as are commonly uſed; and if the quick-*lime* be freſh, whether for one pound of it, eight, ten, twenty, fifty, or five hundred pounds of water be taken. Only it is neceſſary, even for the firſt water after the ebullition is over, to ſtir and mix the *lime* with the water, and allow it time to impregnate itſelf; which is beſt known by the cruſt formed on its ſurface. Filtration indeed is not neceſſary, if it be not to prevent any undiſſolved *lime* being mixed with it; or cruſts diminiſhing its tranſparency.

The Doctor, for his own uſe, poured about eight pounds of boiling water upon a pound of ſtone quick-*lime* in a glazed earthen veſſel. He drank about a pint and an half of this *lime-water*, daily for about ſixteen months; filling up the veſſel, when neceſſary, with freſh water, ſometimes hot and ſometimes cold, without obſerving any difference in the *lime-water*, which he conſtantly filtered through grey paper, before he drank it. He obſerved, that the *lime* was not exhauſted after two years and two months, nor was the water ſenſibly weaker, when it ſtood a ſufficient time on the *lime*, which he knew by the cruſts that were formed. But the *lime* becoming conſiderably lighter, after it is long thus uſed, it at length requires ſeveral days to ſubſide, and form the cruſts, and after the cruſts are formed, it does not leave half the water clear, as it did at firſt. On the whole, this ſingle pound of *lime* afforded the Doctor about ſix hundred pounds of *lime-water*. He adds, that having taken *lime-water* made indifferently of *lime* ſtone, or of chalk, or of ſhells, and ſometimes made of all the three together, he was never able to diſcover any difference in their effects. But ſo much *lime-water* is not to be obtained from *quick-lime*, unleſs it be freſh, completely calcined, and free from heterogeneous ſubſtances; for if defective in any of theſe, it will yield proportionably leſs *lime-water*. Lewis's Mat. Med. and Chem. Dict.

M. Butlet has an ample account of its effects in the French Memoirs, chiefly from his own experience. But he obſerves, it ſucceeded much better in Holland, &c. than in France. It is a powerful alterant, and, like a pure alkaline water, ſuited to blunt and deſtroy acid ferments, which are the principles of all obſtructions, and the cauſe of moſt chronic diſeaſes. Its principal uſe is in cachexies, green-ſickneſs, dropſy, ſcurvy, obſtructions of the liver, ſpleen, &c.

Experience has the ſtrongeſt teſtimony to be an excellent medicine in many caſes; in the gravel and ſtone particularly. And it has alſo been found very ſerviceable in the gout, in habitual relaxations of the bowels, and in other caſes of relaxation. In ſome kinds of the ſcurvy likewiſe it is of uſe; and is often applied with ſucceſs, externally, to ulcers, &c.

Fabricius ab Aquapendente aſſures us, he cured a ſchirrous ſpleen, and the dropſy, by a continued uſe of ſponges dipped in common *lime-water*, and placed near the part affected. Boyle's Works abr. vol. i. p. 80.

Lime-water, which was long looked on as a cauſtic, was, in the laſt century, found to be a very ſafe and valuable remedy. It is uncertain who firſt ventured to give it internally; but Willis, Bates, and Moreton, ſeem to have uſed it much.

Lime-water kills worms, and many other, if not all, inſects. Hence Dr. Alſton concludes, it might prove a good anthelmintic for children; and experience has confirmed this notion.

It is probable, that *lime-water* may be of great uſe in long ſea-voyages, in preventing the corruption of water, or inſects breeding in it, as well as curing the diſeaſes to which ſea-faring people are moſt ſubject. The experiment is certainly ſafe, eaſy, and attended with no expence; one pound of freſh well-burnt quick-lime of any kind being enough for a hogſhead of water, which may not only be uſed for common drink by the diſeaſed, or for prevention by the healthy; but alſo by boiling, and expoſing it to the air for a ſhort time, it may be reſtored to ſweet water, and uſed in dreſſing the victuals of the moſt delicate.

The virtues of *lime-water* do not depend on its abſorbency; and it may as juſtly be called antalkaline, as antacid.

Lime-water prevents or long protracts the putrefaction of animal ſubſtances. Dr. Alſton alſo thinks that *gun-lime* in a ſhip's well, would effectually prevent the corruption of the water, and conſequently the putrid ſtreams, or foul air, thence ariſing, which ſometimes prove fatal to the crew.

The virtues of *lime-water* outwardly applied in many diſeaſes of the ſkin, in excoriations, ulcers, gangrenes, &c. are well known. Perhaps there is not a better gargariſm for ſeveral ſorts of ſores in the mouth and throat than *lime-water*. It has alſo been known to be of great uſe in the tooth-ach. Inwardly taken, *lime-water* has all the virtues of pure element, which are not a few; and on which probably depend the good effects of mineral waters, more than on the minerals they contain. Dr. Alſton never found it cauſed thirſt; on the contrary, he found it quenched thirſt, as well as ſimple water, and cuſtom rendered it agreeable. *Lime-water* is notably detergent and attenuating, even more ſo than ſoap itſelf, of mucous, viſcid, and other animal ſordes, which makes it preferable, in many caſes, to the pureſt, as well as to mineral waters. In a word, *lime-water* may be ſaid, in general, to purify the blood with as good reaſon, as any one medicine whatever, eſpecially from any putrid, purulent, or ſcorbutic foulneſs.

Dr. Lewis obſerves, that *lime-water*, drunk to the quantity of a quarter of a pint three or four times a day, has been found ſerviceable in ſcrophulous complaints, fluxes, ſeminal weakneſſes, and other diſorders proceeding from an impurity of the fluids, or laxity and debility of the ſolids. It generally promotes urine; oftentimes the criticular diſcharge; and where the ſtomach is oppreſſed with viſcid phlegm, expectoration. If for the moſt part binds the belly, and ſometimes occaſions a troubleſome coſtiveneſs, unleſs this effect be occaſionally prevented againſt by the interpoſition of proper laxatives. It anſwers beſt in cold, ſtuggiſh, phlegmatic, and corpulent habits; and is to be uſed more cautiouſly in hot, bilious diſpoſitions, and where the patient is much emaciated, or the appetite weak, and at the time of any critical or periodical evacuation. It has been cuſtomary to impregnate *lime-water* with different materials, partly for rendering it more acceptable to the palate and ſtomach, and partly for improving its medicinal efficacy againſt cutaneous diſeaſes. The college of Edinburgh directs, in this view, three ounces of the ſhavings of the wood and bark of ſaſſafras, one ounce and a half of ſhaved liquorice, and four drams and a half of bruiſed nutmegs; the college of London, half an ounce of ſaſſafras-bark, and one ounce of liquorice, with the addition, in ſome caſes, of four ounces of raſped guaiacum wood, and three drams of coriander ſeeds; to be macerated for four days in three quarts of *lime-water*, and the liquor ſtrained off for uſe. Theſe infuſions are taken in the ſame quantities as the ſimple *lime-water*, by themſelves, or with the addition of milk. Lewis's Mat. Med.

But Dr. Macbride obſerves, that the activity of *lime-water* is impaired by infuſing vegetable ſubſtances therein, which contain much fixed air, ſuch as the guaiacum or ſaſſafras; for theſe woods, abounding in reſin, give out their cementing principle, which, uniting with the diſ-

solved *quick-lime*, reſtores it to its original ſtate of an inactive calcareous earth: therefore, when it is intended that theſe woods, or any other ſubſtance of the like nature, ſhould give out their virtue to *lime-water*, and that the water ſhould, at the ſame time, contain its due proportion of diſſolved *lime*, ſome *quick-lime* ought to be added, during the time of maceration. He alſo obſerves, that as milk contains a large proportion of fixed air, it ought not to be mixed with *lime-water*, ſince it muſt neceſſarily take off from its activity. To the ſame purpoſe, Dr. Alſton has obſerved, that there is ſcarce any thing that is uſually mixed and given along with *lime-water*, that does not, more or leſs, deſtroy its efficacy; for which reaſon he recommended it always to be taken alone. Macbride's Eſſays, p. 250. 251.

It is obſerved by Dr. Lewis, that *lime-water* diſſolves, by the aſſiſtance of heat, mineral ſulphur, vegetable oils and reſins, and animal fats. It extracts alſo, in the cold, the virtues of ſundry reſinous and oily vegetables, and diſſolves thick phlegm, or mucous matters, and the curd of milk, with which laſt it forms a white liquid, nearly ſimilar to milk in its natural ſtate. But the diſſolvent power of *quick-lime* has been evinced by Dr. Macbride, and ſhewn to extend to a variety of different ſubſtances, as camphor, myrrh, gum guaiacum, aſa fœtida, aloes, caſtor, balſam of Tolu, maſtich, jalap, and the cortex Peruvianus, which were found to yield ſtrong ſolutions and tinctures; and theſe he ſays, are more elegant medicines, and perhaps may be found more efficacious than the ſpirituous tinctures, ſince they will never become turbid, or ſeparate on being mixed in any watery vehicle. And ſince the ſolvent power of *quick-lime* is found to depend on its depriving certain ſubſtances of that fixed air, which is their cementing principle, it was natural to imagine that it might be uſefully applied to the ſolution of the human calculus or ſtone.

Of all the various ſubſtances examined by Dr. Hales, with a view of determining their reſpective quantities of fixed air, the human calculus was found to contain the largeſt proportion; above one half of this maſs conſiſting of fixed air. Neverthleſs, if the cauſtic alkali, or *lime-water*, could be ſafely conveyed to it, theſe would abſorb the fixed air, and the earthy parts, deprived of what bound them together, muſt preſently fall to pieces. That *lime-water* is lithontriptic has been ſhewn ſufficiently by Dr. Hales, and more fully by Dr. Whytt. See his Eſſay on the Virtues of *Lime-water*, in the Cure of the Stone, and Edinb. Eſſ. &c. vol. i. art. 13. p. 383. vol. v. art. 69.

This gentleman prefers calcined oyſter-ſhell *lime-water* to any other; which, he ſays, proves a more active menſtruum for this concrete, than that made from the ſtone *lime*; the diſſolving power of the oyſter-ſhell *lime-water* ſeeming, from Dr. Whytt's experiments, to be more than double to that of the ſtone *lime-water*. Dr. Alſton ſeems to think this a matter of indifference, and was himſelf cured chiefly by the ſtone *quick-lime water* before mentioned. This lithontriptic quality of *lime-water* has been farther confirmed by Dr. Alſton, who has ſhewn the efficacy of *lime-water* in this reſpect, not only when made by the firſt infuſion, and aſſiſted by artificial heat, but even after fifty or more infuſions, and in the common air. The doctor thinks that the energy of *lime-water* in this caſe probably conſiſts in its penetrating detergency, whereby inſinuating itſelf among the ſolid parts of the calculi, or into their pores, it ſeparates them, or diminiſhes their cohæſion, but does not diſſolve them. See LITHONTRIPTICS.

But the efficacy of *quick-lime* and cauſtic alkali in this intention, is now known to depend principally, if not entirely, on its power of abſorbing the air, which binds calculous ſubſtances together. However, the alkali, when combined with oil, and made into ſoap, is not only ſo greatly obtunded thereby, as to loſe much of its power, but the ſoap itſelf is ſo naſeous, that few perſons can be induced to take it in a quantity ſufficient to prove of much effect: it would, therefore, be a happy diſcovery if any vehicle could be found out that would ſheathe the acrimony of the cauſtic alkali, ſo as to allow it to be taken in large and continued doſes. Poſſibly, ſays Dr. Macbride, veal broth, or a decoction of marſhmallow roots, might be found to anſwer this purpoſe; and *lime-water* might be taken at the ſame time, which would not at all interfere with the operation of the alkali, but rather add to its activity. Dr. Chittick's noſtrum, which is found, after a perſeverance of ſome months, actually to diſſolve the ſtone, is ſaid to be nothing more than the cauſtic alkali, given in veal broth. But *lime-water*, when taken alone, muſt often fail in producing any conſiderable effect as a lithontriptic, becauſe it will loſe much of its power, as Dr. Macbride has ſhewn, from the fixed air of the alimentary ſubſtances in the firſt paſſages, who, therefore, recommends it to be drank when the ſtomach is empty; and alſo, as Dr. Whytt and Dr. Macbride have proved by experiments, from the fixed air of the urine itſelf, which will ſaturate great part of the *quick-lime*, even when it hath reached the bladder. Macbride's Eſſays, edit. 5. paſſim.

Since there is but a ſmall proportion of *lime* in the water, it may be thought that taking a few grains of the *quick-lime* in ſubſtance would prove much more effectual in the ſtone, than large quantities of *lime-water*. But this is a miſtake; and hence Mrs. Stephens's egg-ſhells and ſnail-ſhells, if burnt to *quick-lime*, can never be equally ſucceſsful with *lime-water* for the STONE.

As for the *aqua benedicta compoſita*, or *compound lime-waters*, they are not to be compared with ſimple *lime-water* in the graſs; nor, in Dr. Alſton's opinion, in any diſeaſe requiring this water.

The doctor adds, in his appendix, that though he cannot yet determine how far *lime-water* may be proper, even in acute diſtempers, yet he has found it ſafe in ſeventh colds; and by the caſes he there mentions, it ſeems probable that *lime-water*, by its diluent and diuretic qualities, may prove more uſeful in fevers, than is at preſent believed.

However this may prove on farther trials, it may be ſaid, in general, that *lime-water* is diluent, detergent, antiſeptic, anthelmintic, diuretic, and vulnerary; uſeful in all diſeaſes proceeding from, or accompanied with obſtructions in the bowels or glands, viſcid phlegm, calculous concretions, or putrefaction; and commended for the ſcurvy, ſcrophulæ, gravel, conſumptions, empyema, aſthma, arthritis vaga, cutaneous ſwellings, diabetes, fluor albus, fluxes, &c. and outwardly for diſeaſes of the ſkin, ulcers, gangrenes, &c. It may be taken to the quantity of a pound, once, twice, or thrice a day; or uſed for common drink. See Dr. Alſton's Diſſertation on *Quick-lime*, and *Lime-water*, Edinb. 1752.

LIMER, or LIME-*hound*. See BLOOD-HOUND.

LIMEUM, in *Botany*, a genus of the *heptandria digynia* claſs. Its characters are, that the calyx is compoſed of five leaves; that it has five equal petals; and that the fruit is a globular capſule, with two cells. There is only one ſpecies.

LIMIT *of diſtinct viſion*, in *Optics*. See *Diſtinct* VISION.

LIMITATION, *limitatio*, in *Law*, is a certain time aſſigned by ſtatute, within which an action muſt be brought; and *limitation* of time is two-fold; viz. to make title to an inheritance by the common law; and in writs by ſeveral ſtatutes. There is a *limitation* in real and perſonal actions; and in the former, he that will ſue for any lands or hereditaments, ought to prove that he or his anceſtors were ſeiſed of the lands ſued for by writ of aſſiſe, or he cannot maintain his action; and this is called *limitation* of aſſiſe. Stat. Weſt. 1.

The 32 Jac. I. cap. 16. ordains, that all writs of *formedon*, &c. for title to lands *in fee*, ſhall be ſued and proſecuted within twenty years after the title ſued; but there is a proviſo in the ſtatutes, to relieve infants, feme covets, perſons beyond ſea, or in priſon, and the heirs of ſuch perſons, ſo as they commence their ſuits within the times limited after their impediments are removed. By ſtatute, actions of debt, actions upon the caſe, except for words, actions of account (except concerning merchandize), of detinue, trover and treſpaſs, are to be commenced within ſix years after the cauſe of action, and not after; actions of aſſault and battery, wounding and impriſonment, within four years; and for ſlander within two years after the cauſe of action, &c. 21 Jac. I. cap. 16.

LIMITATION *of eſtate*, in a legal ſenſe, imports how long the eſtate ſhall continue, or in rather a qualification of a precedent eſtate. As where one doth give lands to a man to hold to him and his heirs male, and to him and the heirs female, &c. here the daughters ſhall not have any thing in it, ſo long as there is a male; for the eſtate to the heirs male is firſt limited. Co. Litt. 313.

LIMITATION *of the crown*. The ſtatutes 1 W. & M. cap. 8. 12 W. III. cap. 2. and 1 & 2 Ann. cap. 17. 4 Ann. cap. 8. &c. are acts for the *limitation of the crown*, and veſting it on proteſtant heirs in the houſe of Hanover. See CROWN.

LIMITED *problem*, is that which admits but of one ſolution, or which can only be ſolved one way; as to make a circle paſs through three points given, not lying in a right line, to deſcribe an equilateral triangle on a line given, &c. See PROBLEM, and DETERMINATE.

LIMITROPHOUS *column*. See COLUMN.

LIMITS, in *Mathematics*, is ſometimes uſed, in general, for quantities, one of which is greater, and the other leſs than another quantity. Thus, in the quantities, *a*, *x*, *b*, if *a* be leſs than *x*, and *b* be greater than *x*, *a* and *b* are ſaid to be *limits* of *x*. The word occurs in this

ſenſe, when we ſpeak of the *limits* of the roots of equations.

Sometimes a quantity is ſaid to be a *limit* between two others, when it is greater than the one and leſs than the other. So a ratio is ſaid to be a *limit* between two other ratios, when it is greater than the one and leſs than the other.

But *limit* is often uſed in a more reſtricted ſenſe; thus, when a variable quantity approaches continually to ſome determinate quantity, and may come nearer to it than to have any given difference, but can never go beyond it; then is the determinate quantity ſaid to be the *limit* of the variable quantity.

Hence, the circle may be ſaid to be the *limit* of its circumſcribed and inſcribed polygons; becauſe theſe, by increaſing the number of their ſides, can be made to differ from the circle leſs than by any ſpace that can be propoſed, how ſmall ſoever.

The *limit* of a variable ratio, is ſome determinate ratio, to which the variable ratio may continually approach, and come nearer to it than to have any given difference, but can never go beyond it. Hence, the ratio of the ordinate to the ſub-tangent of a curve, is ſaid to be the *limit* of the variable ratio of the differences of the ordinates, to the differences of the abſciſſæ.

The word *limit*, in this ſenſe, ſignifies the ſame as what Sir Iſaac Newton calls a firſt or prime, and a laſt or ultimate ratio.

There are two caſes of a variable quantity, or variable ratio, tending to ſuch a *limit*, as we have been deſcribing. In the firſt caſe, the variable quantity, or ratio, will not only approach to its *limit* nearer than any given difference, but will actually arrive at its *limit*.

In the ſecond caſe, the variable quantity, or ratio, will only approach its *limit* within leſs than any given difference, but will never actually arrive at it.

Sir Iſaac Newton, to avoid the harſhneſs of the hypotheſis of indiviſibles, and the tediouſneſs of demonſtrations, according to the method of the ancients, by deductions *ad abſurdum*, has premiſed ſeveral lemmata, in the firſt ſection of the firſt book of his principles, relating to the firſt and laſt ſums, and ratios of naſcent and evaneſcent quantities; that is, to the *limits* of ſums and ratios. This doctrine chiefly depends on the firſt of thoſe lemmata; the words of which are, *Quantitates ut & quantitatum rationes, quæ ad æqualitatem tempore quovis finito conflanter tendunt, & ante finem temporis illius propius ad invicem accedunt quam pro data quavis differentia, fiunt ultimo æquales.*

The learned gentlemen, who have written in defence of Sir Iſaac, againſt the author of the Analyſt, are not agreed among themſelves, as to the preciſe meaning of this lemma. One of theſe gentlemen ſays, that the genuine meaning of this propoſition is, that thoſe quantities are to be eſteemed ultimately equal, and thoſe ratios ultimately the ſame, which are perpetually to each other, in ſuch a manner, that any difference, how minute ſoever, being given, a finite time may be aſſigned, before the end of which, the difference of theſe quantities, or ratios, ſhall become leſs than that given difference. See Preſ. State of the Rep. of Letters for Oct. 1735, and for Oct. 1736.

What Sir Iſaac Newton intends we ſhould underſtand by the ultimate equality of magnitudes, and the ultimate identity of the ratios propoſed in this lemma, will be beſt known from the demonſtration annexed to it. By that it appears, Sir Iſaac Newton did not mean, that any point of time was aſſignable, wherein theſe varying magnitudes would become actually equal, or the ratios really the ſame; but only that no difference whatever could be named, which they ſhould not paſs. The ordinate of any diameter of an hyperbola, is always leſs than the ſame continued to the aſymptote; yet the demonſtration of this lemma can be applied, without changing a ſingle word, to prove their ultimate equality. The ſame is evident from the lemma immediately following, where parallelograms are inſcribed, and others circumſcribed to a curvilinear ſpace. Here the firſt lemma is applied to prove, that by multiplying the number, and diminiſhing the breadth of the parallelograms *in infinitum*, that is, perpetually and without end, the inſcribed and circumſcribed figures become ultimately equal to the curvilinear ſpace, and to each other; wherein, it is evident, that no point of time can be aſſigned, wherein they are actually equal; to ſuppoſe this were to aſſert, that the variation aſcribed to the figures, though endleſs, could be brought to a period, and be perfectly accompliſhed; and thus we ſhould return to the unintelligible language of indiviſibles. The excellence of this method conſiſts in making the ſame advantage of this endleſs approximation towards equality, as by the uſe of indiviſibles, without being involved in the abſurdities of that doctrine. In ſhort, the difference between theſe two may be thus explained.

There are but three ways in nature of comparing ſpaces: one is by ſhewing them to conſiſt of ſuch, as by impoſition on each other will appear to occupy the ſame place: another is, by ſhewing their proportion to ſome third; and this method can only be directly applied to the like ſpaces as the former; for this proportion muſt be finally determined by ſhewing when the multiples of ſuch ſpaces are equal, and when they differ: the third method to be uſed, where theſe other two fail, is by deſcribing upon the ſpaces in queſtion ſuch figures as may be compared by the former methods; and thence deducing the relation between thoſe ſpaces, by that indirect manner of proof, commonly called *deductio ad abſurdum*; and this is as concluſive a demonſtration, as any other, it being indubitable, that thoſe things are equal, which have no difference. Thus Euclid and Archimedes demonſtrate all they have written concerning the compariſon and menſuration of curvilinear ſpaces. The method advanced by Sir Iſaac Newton for the ſame purpoſe, differs from their's, only by applying this indirect form of proof to ſome general propoſitions, and from thence deducing the reſt by a direct form of reaſoning. Whoever compares the fourth of Sir Iſaac Newton's lemmas with the firſt, will ſee, that the proof of the curvilinear ſpaces, there conſidered, having the proportion named, depends wholly upon this, that if otherwiſe the figure inſcribed within one of them, could not approach, by ſome certain diſtance, to the magnitude of that ſpace; and this is preciſely the form of reaſoning, whereby Euclid proves the proportion between the different circles. As this method of reaſoning is very diffuſively ſet out in the writings of the ancients; and Sir Iſaac Newton has here expreſſed himſelf with that brevity, that the turn of his argument may poſſibly eſcape the unwary, the reading of the ancients muſt be the beſt introduction to the knowledge of his method. The impoſſible attempt of comparing curvilinear ſpaces, without having any recourſe to the forementioned indirect method of arguing, produced the abſurdity of indiviſibles.

As the magnitudes, called in this lemma ultimately equal, may never abſolutely exiſt under that equality; ſo the varying magnitudes holding to each other the variable ratios here conſidered, may never exiſt under that, which is here called their ultimate ratio. Of this Sir Iſaac Newton gives an inſtance, from lines increaſing together by equal additions, and having from the firſt a given difference. For the ultimate ratio of theſe lines, in the ſenſe of this lemma, as Sir Iſaac Newton himſelf obſerves, will be the ratio of equality, though theſe lines can never have this ratio; ſince no point of time can be aſſigned, when one does not exceed the other.

In like manner, the quantities called by Sir Iſaac Newton vaniſhing, may never ſubſiſt under that proportion here eſteemed their ultimate.

In the caſe of drawing tangents to curves, where the ordinate bears the ſame proportion to the ſubtangent, as that wherewith the difference of the ordinates, to the difference of the abſciſſæ, vaniſh; theſe lines muſt not be conceived, by the name of an evaneſcent, or any other appellation, ever to ſubſiſt under that proportion; for ſhould we conceive theſe lines, in any manner, to ſubſiſt under this proportion, though at the inſtant of their vaniſhing, we ſhall fall into the unintelligible notion of indiviſibles, by endeavouring to repreſent, to the imagination, ſome inconceivable kind of exiſtence of theſe lines between their having a real magnitude, and becoming abſolutely nothing. Sir Iſaac Newton was himſelf apprehenſive, that this miſtake might be made; for as he thought fit (in compliance with the bad taſte which then prevailed) to continue the uſe of ſome looſe and indiſtinct expreſſions reſembling thoſe of indiviſibles, for which he has himſelf apologized, he expreſsly cautions us againſt miſinterpreting him in this manner, when he ſays: *Si quando dicam quantitates quam minimas vel evaneſcentes, vel ultimas, cave intelligas quantitates magnitudine determinatas, ſed cogita ſemper diminuendas ſine limite.* Thus expreſsly has he declared to us, that vaniſhing quantities, or whatever other leſs accurate appellation he names them by, are to be conſidered as indeterminate quantities bearing to each other under their different magnitudes, different proportions; which the quantities themſelves can never obtain, and the *limit* of theſe proportions is that, for the ſake of which theſe quantities are conſidered: inſomuch, that ſince theſe quantities have different proportions, while they obtain the name of vaniſhing quantities, the term ultimate is neceſſarily added to denote that proportion, which is the *limit* of an endleſs number of varying ones. The like remark is neceſſary, when theſe quantities are conſidered in the other light, as ariſing before the imagination: for then the

propor-

proportion intended must be specified, by calling it the first, or prime proportion of these quantities. And as this additional epithet is necessary to express the proportion intended, so it is absurd to apply it to the quantities themselves; as Sir Isaac Newton says, there are *rationes primæ quantitatum nascentium*, but not *quantitates primæ nascentes*. Philosoph. Transactions, N° 342. p. 205.

So that, according to the author we have been quoting, all the examples given by Sir Isaac in the before mentioned section, are to be understood of such *limits* or ultimate ratios, as are never attained to by the quantities and ratios limited, but to which these may approach indefinitely, that is, so as to differ less than by a given quantity.

On the other hand, a learned gentleman, who assumed the name of *Philalethes Cantabrigiensis*, thinks that Sir Isaac means, by the words of the lemma, and proves, in his demonstration, not that the quantities, or ratios are barely to be considered as ultimately becoming equal, or are to be esteemed as ultimately equal; though, in reality, they can never have that proportion to each other; but that they do at last become actually, perfectly, and absolutely equal. Pres. State of the Republic of Letters for November 1735. p. 371.

He also distinguishes, as above, between quantities and ratios which arrive at their *limits*, and those which do not. And it is insisted on, that every one of the examples given in the lemmata of this first section of the first book of Sir Isaac's Principles, are of such quantities and ratios as actually arrive at their respective *limits*; nor is there an instance there given of a quantity, or ratio, which never arrives at its *limit*, except one at the latter end of the scholium of this section (and that by way of illustration of a particular objection only) of two quantities, having a given difference, and being equally increased, *ad infinitum*, and whose ratio, it is admitted, never arrives at its *limit*. But decreasing quantities may really, and, in fact, be diminished *ad infinitum*: for they may vanish and come to nothing. The ratio therefore of these, says he, may arrive at its *limit*, though that of the others cannot.

Neither are these learned gentlemen agreed as to the sense of the word *vanishing or evanescent*, in the scholium of this first section of Sir Isaac's Principles.

The question is, whether the quantities that vanish, are understood to spend some finite time in vanishing, or to vanish in an instant, or point of time; and consequently, whether they bear to one another an infinite number of different successive ratios during the vanishing, or one ratio only, at the point, or instant of their evanescence.

This last is the sense in which *Philalethes* takes the word evanescent, or vanishing; and the dispute, on this head, as he observes, is of no other consequence, than to determine, whether the sense in which he uses the word be agreeable to Sir Isaac Newton's. For, if the quantities vanish in an instant, I take the only ratio with which they vanish; or they spend a finite time in vanishing, and I take the last of the ratios, which they successively bear to one another during that time; till the ratio, taken in either of these cases, will be one and the same. Pres. State of the Repub. of Letters for November 1735. p. 383. 384.

We cannot pretend to give the whole detail of this controversy, but must refer the curious to the *Present State of the Republic of Letters for 1735*. We shall only observe, that this disquisition is partly critical and partly scientifical. The critical inquiry is into the sense of Sir Isaac, so far as it may be determined from his own words, and here we cannot help thinking that this is somewhat doubtful. The other inquiry is about the true or scientifical notion, upon which this doctrine ought to be founded. With respect to which we shall only ask two questions, which every reader may resolve for himself, to wit, whether the conception or notion he has of the ratio or proportion of evanescent quantities, at the point or instance of their evanescence, be more clear and distinct than the notion of infinitesimals? And whether the notion of inscribed or circumscribed polygons to any curve, attaining their last form, and thereby coinciding with their curvilinear *limit*, be more clear and distinct than the notion of polygons of an infinite number of sides, in the method of infinitesimals?

Before we leave this subject, it may be proper to give the sentiments of an eminent mathematician about the doctrine of *limits*, or of prime and ultimate ratios, and to shew the connection of this doctrine with that of fluxions. Mr. Maclaurin, in his Treat. of Flux. art. 502. Sir Isaac Newton considers the simultaneous increments of flowing quantities as finite, and then investigates the ratio, which is the *limit* of the various proportions which those increments bear to each other, while he supposes them to decrease together till they vanish; which ratio is the same with the ratio of the fluxions. In order to discover this *limit*, he first determines the ratio of the increments in general, and reduces it to the most simple terms, so as that (generally speaking) a part at least of each term may be independent of the value of the increments themselves; then, by supposing the increments to decrease till they vanish, the *limit* readily appears.

For example, let a be an invariable quantity, x a flowing quantity, and o any increment of x; then the simultaneous increments of xx and ax will be $2xo+oo$ and ao, which are in the same ratio to each other, as $2x+o$ is to a. This ratio of $2x+o$ to a, continually decreases while o decreases, and is always greater than the ratio of $2x$ to a, while o is any real increment; but it is manifest, that it continually approaches to the ratio of $2x$ to a as its *limit*; whence it follows, that the fluxion of xx is to the fluxion of ax, as $2x$ is to a. If x be supposed to flow uniformly, ax will likewise flow uniformly, but xx with a motion continually accelerated: the motion with which ax flows, may be measured by aa; but the motion with which xx flows is not to be measured by its increment $2xo+oo$, but by the part $2xo$ only, which is generated in consequence of that motion; and the part oo is to be rejected, because it is generated in consequence only of the acceleration of the motion with which the variable square flows, while o, the increment of its side, is generated: and the ratio of $2xo$ to ao is that of $2x$ to a, which was found to be the *limit* of the ratio of the increments $2xo+oo$ and ao. See FLUXION.

It is objected against Sir Isaac Newton's method of investigating this *limit*, that he first supposes that there are increments; that when it is said *let the increments vanish*, the former supposition is destroyed, and yet a consequence of this supposition, i. e. an expression got by virtue thereof, is retained. But the suppositions that are made in this method of investigating the *limit*, are not so contradictory as this objection seems to import. He first supposes that there are increments generated, and represents their ratio by that of two quantities, one of which is given so as not to vary with the increments. If he had afterwards supposed that no increments had been generated, this indeed had been a supposition directly contradictory to the former. But when he supposes those increments to be diminished till they vanish, this supposition surely cannot be said to be to contradictory to the former, as to hinder us from knowing what was the ratio of those increments, at any term of the time while they had a real existence; how this ratio varied, and to what *limit* it approached, while the increments were continually diminished? On the contrary, this is a very concise and just method of discovering the *limit* which is required.

It is to be observed, that the limiting, prime, or ultimate ratio of increments, strictly speaking, is not the ratio of any real increments whatsoever. But as the tangent of an arch is the right line that *limits* the position of all the secants that can pass through the point of contact, though strictly speaking it be no secant; so a ratio may *limit* the variable ratios of the increments, though it cannot be said to be the ratio of any real increments. The ratio of the generating motions may be likewise said to be the last or ultimate ratio of the increments, while they are supposed to be diminished till they vanish, for a like reason. It may just be added, that there being two cases of variable quantities and ratios tending to a *limit*, it might have conduced to perspicuity, and prevented disputes, to have distinguished these different *limits* by some addition. As in the first case to have called it a *limit* or ultimate ratio *inclusive*; because the *limit* is the last of the quantities or ratios limited: and in the second, to have called it a *limit* or ultimate ratio *exclusive*; because the quantities limited never attain to the *limit*, though they approach to it indefinitely.

This distinction may perhaps receive some further illustration from the following example. It is known that the osculatory circle is a circle that touches a curve so closely that no other circle can be drawn through the point of contact between them, all other circles falling within or without them both; and hence the osculatory circle is supposed to have an equal curvature with the curve at that point. See Mr. Mac-Laurin's Flux. art. 364. Now if we conceive the osculatory circle at the end of the great axis of an ellipsis, it will fall entirely within the ellipsis; and the curvatures of the ellipsis and osculatory circle may both be said to be *limits* of the curvatures of all the circles falling wholly within, and touching the ellipsis at the end of its great axis. But the term *limit* will not in both cases have precisely the same meaning: for the osculatory circle is a *limit exclusive*, being the last of the circles limited; and the ellipsis is a *limit inclusive*, none of the circles limited ever coinciding with it. As to the circles which fall wholly without the ellipsis, and touch

toneh it at the end of its great axis, they have no *limit inclusive*, no circle touching the ellipsis so closely, that no other can pass between; the only *limit* here is *exclusive*, the ellipsis itself.

The contrary of this happens at the end of the leſſer axis. At any other point of the ellipsis one half of every oſculatory circle is a *limit inclusive* of the ſegments of the circles that fall within, and the other half is a *limit inclusive* of thoſe that fall without.

May we not aſk, if a curve is the *limit* of its inſcribed or circumſcribed polygons in any other ſenſe, than the curvature of the ellipſis is the *limit* of the curvatures of the circles before deſcribed, which approach nearer and nearer to the curve, but never coincide with it? It is true we hear it often ſaid, that the oſculatory circle is coincuveal, and ſo coincides with the ellipſis; but this ſeems a conſequence of the language of infiniteſimals. It would be more accurate to ſay, that the curvature of the ellipſis is the *limit inclusive* of all the before mentioned circles, and that the oſculatory circle is their *limit inclusive*. That excellent geometer, Mr. Simſon, in his Conic Sections, lib. v. prop. 36. cor. ſays only, after demonſtrating the chief property of the oſculatory circle, that *eadem ratione cum ellipſe tanica curvaturam dicitur*, giving this only as an appellation, but not as a propoſition. See on the ſubject of this article, Robins's Diſc. on Fluxions, in his Tracts, vol. ii.

LIMITS, in a *Military Senſe*, denote the diſtance which a century is allowed on his poſt, viz. fifty paces to the right, and as many to the leſt; and though the weather be ever ſo bad, he muſt not get under cover.

LIMITS *of a planet*, its greateſt excurſions or diſtances from the ecliptic. See PLANET.

LIMITANEI, among the Romans, an appellation given to the ſoldiers who were ſtationed on the frontiers of the empire.

LIMITOTROPH, among the Romans, the ſame with LIMITANEI.

LIMMA, Λημμα, *reſiduum*, in the *Ancient Muſic*, is the difference of the diateſſaron and the ditonus. It is expreſſed by $\frac{243}{256}$.

Euclid demonſtrates it to be leſs than the hemitone. Boethius calls the *limma*, *hemitonium minus*. Wallis's Appendix to Ptolemy's Harmon. p. 169, 170. Ibid. p. 170.

The *limma* here defined is that of Ptolemy. Modern muſicians have applied this name to ſeveral other intervals, ariſing from the ſubtraction of ſemi-tones from the tone major. Thus the difference between the ſemitone minor and the tone major which is $\frac{9}{10} : \frac{15}{16} = \frac{27}{25}$ is by Mr. Euler called *limma majus*; and the difference between the ſemitone major and tone major, he calls *limma minus*. This laſt is expreſſed by $\frac{15}{16} : \frac{24}{25} = \frac{125}{128}$. The octave is nearly equal to nine greater *limmas*, and to thirteen leſſer. Euler, Tentam. Nov. Theor. Muſic. p. 107, 108. Ibid. p. 108. See INTERVAL.

LIMNING, the art of painting in water-colours.

In which ſenſe *limning* ſtands contradiſtinguiſhed from PAINTING, properly ſo called, which is done in oil-colours.

Limning is much more the ancient kind of painting. Till a Flemiſh painter, one John Van Eyck, better known by the name of John of Bruges, found out the art of painting in oil, the painters all painted in water, and in freſco, both on their walls, or wooden boards, and elſewhere. When they made uſe of boards, they uſually glued a fine linen cloth over them, to prevent their opening, then laid on a ground of white; and, laſtly, they mixed up their colours with water and ſize, or with water and yolks of eggs, well beaten with the branches of a fig-tree, the juice whereof thus mixed with the eggs; and with this mixture they painted their pieces.

In *limning*, all the uſual colours are proper enough, excepting the white made of lime, which is only uſed in freſco. But the azure and ultramarine muſt always be mixed up with ſize, or with glair, becauſe the yolks of eggs give yellow colours a greenith tincture. But there are always applied two lays of hot ſize, before the colours, mixed even with ſize, are laid on; the compoſition made with eggs, and the juice of the fig-tree, being only uſed for touching up and finiſhings, and to prevent the neceſſity of having a fire always at hand to keep the ſize hot; yet it is certain, that the ſize-colours hold the beſt, and are accordingly always uſed in cartoons, &c. This ſize is made of ſhreds of thin leather, or of parchment.

To *lime* on linen, they cheriſe that which is old, half-worn, and aloſe. This they cover with white leaf, or a fine plaiſter beaten up with ſize; which once dry, they go over it with a layer of the ſame ſize.

The colours are all ground in water, each by itſelf; and in proportion, as they are required in working, are diluted with ſize-water. If the yolks of eggs are deſired, they dilute them with a liquor made of equal quantities of common water and vinegar, with the yolk, white, and ſhell of an egg, and the ends of the little branches of a fig-tree cut ſmall, all well beaten together in an earthen pan.

If it be deſired to varniſh the piece when finiſhed, they go over it with the white of an egg well beaten, and then with varniſh. This, however, is only to preſerve it from the wet; for the great advantage of *limning* conſiſts in its being without gloſs; becauſe all its colours, thus void of luſtre, may be ſeen in all kinds of lights; which colours in oil, or covered with varniſh, cannot.

LIMNITIS, a word uſed by the ancients to expreſs the concretion round reeds, or water plants, by ſome called AGARIC, or ſomewhat analogous to that.

LIMOCINCTI, among the Romans, a kind of prieſts, who officiated at public ſacrifices, and were dreſſed with a garment called LIMUS.

LIMNOPEUCE, in *Botany*. See HIPPURIS.

LIMODORUM, in *Botany*. See *Baſtard* HELLEBORE and ORCHIS.

LIMON, in *Botany*. See LEMON.

LIMONIA, in *Botany*, a genus of the *decandria monogynia* claſs. Its characters are that the empalement is divided into five parts; that it has five petals; and that the fruit is a three-celled berry, containing a ſingle ſeed: there is only one ſpecies.

LIMONIUM, in *Botany*. See *Sea*-LAVENDER.

LIMONIUM-*gall*, in *Natural Hiſtory*, the name of a ſpecies of gall or vegetable protuberance, ſerving for the lodging of an inſect, affording a very beautiful appearance on the plant, and very common in the eaſtern parts of the world.

This of the *limonium* is ſingular, in that it is produced from a butterfly egg, and is inhabited by a true caterpillar. The butterfly depoſits her eggs on ſeveral parts of the leaves and ſtalks of this plant, and the young caterpillar, as ſoon as hatched, eats its way through the ſurface; and continuing to eat when within, his depredations occaſion an abundant derivation of juices to the part, by means of which a gall, or protuberance, is formed, which is ſuſtained by a pedicle, and in all reſpects reſembles a fruit. This is of a roundiſh figure, and by degrees grows to the ſize of a nutmeg. It is compoſed of ſeveral coats, or cruſts; the exterior ones are ſoft and ſpungy, but the interior are harder, and more woody than the galls of the oak. As the generality of other caterpillars feed on the ſubſtance of the leaves of trees and plants, this eats only the inſide of its lodgment; and nature ſo readily ſupplies this defect by new matter, that the cavity, in which it is lodged, is never found to be very great.

This ſeems the only known inſtance of a gall formed by a genuine caterpillar; the inhabitants of the willow galls, though uſually eſteemed ſmooth caterpillars, being not ſo, but the worms of a four-winged fly. Reaumur's Hiſt. of Inſects, vol. vi. p. 227.

LIMOSA, in *Ornithology*, the SCOLOPAX *glottis* of Linnæus, the name of a long-legged water-bird, common in Italy, and called by ſome *gutter*, *totanus*, and *pluvialis major*. It is but a ſmall bird, its uſual weight being about ſix or ſeven ounces. Its beak is black, but ſomewhat reddiſh near the angle of the under jaw, which reflects a little upwards; the upper part of its head, neck, ſhoulders, wings, and the forepart of its back, are variegated with brown and grey; the middle of the head-feathers are black, and their ends whitiſh; over each eye paſſes a white line; its rump, and its whole breaſt, belly, and throat, are white; the long wing-feathers are brown; the inner covers of the wings are finely croſſed with double and treble rows of a duſky colour; the tail-feathers are variegated with brown and grey; its legs are very long, and are naked for two inches breadth above the knees. Theſe birds appear on our coaſts, and moſt grounds, in the winter, in ſmall flocks. Ray and Pennant.

LIMOSUS, in *Ichthyology*, a name given by Salvian to the common mackrel, and in his figures to the *thynnus*, or tunny-fiſh, called the *Spaniſh mackrel*.

LIMOSELLA, in *Botany*, *high water plantain*, a name given by Linnæus to a genus of plants of the *didynamia angioſpermia* claſs, called by Dillenius, and others, *plantago aquatica*; the characters of which are theſe: the perianthium is erect, one-leaved, ſlightly divided into five ſegments at the edge, and remaining after the flower is fallen; the flower conſiſts of one petal, which is ſmall, erect, acute, and ſlightly divided into five ſegments at the end; the ſtamina are four erect filaments; the antheræ are ſimple; the germen of the piſtil is oblong and obtuſe; the ſtyle is ſingle, and of the length of the ſtamina, and the ſtigma is globular; the fruit is an oval capſule, affixed to the baſe of the cup, compoſed of two valves, and including

two cells, in which are a great number of small seeds of an oval figure. There is only one species.

LIMPET, *patella*, in *Conchyliology*, the name of a genus of shell-fish, of the *testacea* class of worms in the Linnæan system, the characters of which are these: it is an univalve shell, of a gibbous shape, almoſt conic, without ſpires, always fixed in its natural ſtate to a rock or to ſome hard body, and having its apex or ſummit ſometimes ſharp-pointed, ſometimes obtuſe, ſometimes ſtrait, ſometimes crooked, ſometimes whole, and ſometimes perforated. There are ſeveral ſpecies of each of theſe kinds. See *Tab. of Shells*, N° 1, 2.

The animal inhabiting this ſhell is a ſlug. Linnæus enumerates thirty-ſix different ſpecies.

The Latins call this ſhell *patella* from its reſemblance to a diſh, and the Greeks named it *lepas*, as if they meant to call it a ſcale or flake of the ſtone. Indeed this fiſh always adheres to rocks, as if a part of the ſtone; and the rock ſerves it in the place of a ſecond ſhell, to defend it from the injuries of the weather. Aldrovand and Rondeletius have carried this thought ſo far, as to place the *limpet* among the bivalve ſhells; but no author has followed them in this.

The manner of the *limpet*'s faſtening itſelf to the rocks has not been well underſtood till the time of Mr. Reaumur, though the fact was ſo well known, as to become in ſome places a proverbial compariſon.

The ſhell of the *limpet* approaches to the figure of a cone; the baſe of this cone is occupied by a large muſcle, which alone has nearly as much ſtrength in it as the whole body of the fiſh. This muſcle is not covered by the ſhell, but ſerves the creature equally to move forward, or to fix itſelf by at pleaſure. When it is in a ſtate of reſt, which is the common caſe, it applies this muſcle every way round to the ſurface of ſome ſtone, and holds itſelf by that means fixed very firmly to it, inſomuch that it is impoſſible to take it off with the hands, and thoſe who would remove them are forced to uſe a knife for that purpoſe. and the removing the fiſh this way is not eaſy; for every where that the blade of the knife attempts to enter, the fiſh fixes its muſcle with double force to the ſtone. Mr. Reaumur, to try the force of the adheſion of this fiſh, tied lines with weights at their ends to the ſhells, when placed in a horizontal direction on the ſtone, and found that thirty pounds was the leaſt weight that would tear them off, and that they would reſiſt that for ſeveral minutes. It might be naturally ſuppoſed, that the cauſe of this ſtrong adheſion was the animal's thruſting the fibres of this muſcle into every ſmall pore of the ſtone, and there keeping them forcibly inflated: but were this the caſe, the adheſion muſt ceaſe with the life of the animal: but it does not ſo, for if a *limpet* be cut into ſeveral portions through the ſhell and body, yet every portion, thus ſeparated, will adhere with its due proportion of force to the ſtone. Neither can this force be reſolved on the principles of the adheſion of two poliſhed marbles, or that of leather to ſtone; for in both theſe caſes, whatever perpendicular force the adheſion can bear, the leaſt force applied horizontally makes them ſlip, or ſlide off from one another. But this is not the caſe in the adheſion of this fiſh, it equally reſiſting horizontal and perpendicular force.

The true cauſe of this adheſion is a viſcous juice, a ſort of glue thrown out by this muſcle, which, though imperceptible to the eye, is able to produce theſe great effects. This is eaſily perceived by the touch, however; for if immediately after removing a *limpet* from a ſtone, the finger be applied to the place, it is faſtened very ſtrongly to it by means of the glue left there. If *any* wet, however, have touched the ſtone after the fiſh was removed, there is no viſcoſity perceived on it, the whole ſubſtance of the glue being immediately diſſolved, and its effects wholly taken off by it.

Water is therefore made a ſolvent for this glue; the cloſe adheſion of the outer rim of the great circular muſcle prevents the external water from acting upon it, elſe it muſt always be deſtroyed as ſoon as diſcharged, and ſo be of no uſe; but the under ſurface of the body of the animal is all over covered with ſmall tubercles, containing water, at leaſt many of them do ſo. When the creature then has a mind to unfix itſelf for motion, it only diſcharges a quantity of this water, and the whole cement diſſolves before it, and ſets the creature free. Thoſe tubercles which do not contain water, probably contain the viſcous matter, or glue, whence it may be conveyed by proper veſſels to the circumference; ſo that when the animal has a mind to fix itſelf to a ſtone, it needs only ſqueeze the one ſet of theſe tubercles; and when it would unlooſe itſelf, the other.

This viſcous humidity allotted to this animal, for the fixing itſelf to the rocks, is not peculiar to it; the urtica *marina* has the ſame, and the horns of the *ſea*-URCHINS, by which they fix themſelves, are endued with a power of diſcharging a liquor of the ſame kind, which ſerves them for the ſame purpoſe. Mem. Acad. Par. 1711.

LIMUS, among the Romans, a garment reaching to the ground, and worn by the prieſts, who on that account were called LIMOSINCTI.

LINARIA, in *Botany*. See *Toad* FLAX.

LINARIA, in *Ornithology*. See LINNET.

LINCH-*clout*, in *Artillery*, the flat iron under the ends of the arms of an axle-tree, to ſtrengthen them, and diminiſh the friction of the wheels. See CLOUTS.

LINCH-*pins*. See LYNPINS.

LINCOLNSHIRE *plough*. See PLOUGH.

LINCTUS, a form of medicine, the ſame as LAMBATIVE, *lohock*, and *eclegma*.

LINE, in *Geometry*, a quantity extended in length only, without either breadth or thickneſs.

A *line* is ſuppoſed to be formed by the flux or motion of a point; and is to be conceived as the termination or limit of a ſurface, and not as a part of that ſurface, however ſmall. Hobbes, and ſome others, who have taken it in the latter ſenſe, have fallen into many abſurdities.

There are two kinds of *lines*; viz. *right lines*, and *curve lines*.

If the point A move towards B (*Tab.* III. *Geometry, fig.* 58.) by its motion it deſcribes a *line*; and this, if the point go the neareſt way towards B, will be a right or ſtrait *line*, whoſe definition therefore is the neareſt or ſhorteſt diſtance between any two points, or a *line*, all whoſe points tend the ſame way. If the point go any way about, as in the *lines* ACB, or AeB, it will trace out either a crooked *line*, as the upper AeB; or elſe two or more ſtrait ones, as in the lower AC, CB.

Right lines are all of the ſame ſpecies; but curves are of an infinite number of different ſpecies. We may conceive as many as there are different compound motions, or as many as there may be different ratios between their ordinates and abſciſſes.

Curve lines are uſually divided into *geometrical* and *mechanical*.

LINES, *geometrical*, are thoſe which may be found exactly and ſecurely in all their points. See GEOMETRICAL *line*.

LINES, *mechanical*, are thoſe, ſome or all of whoſe points are not to be found preciſely, but only tentatively or nearly.

Agreeably hereto, Deſcartes and his followers define *geometrical lines* thoſe which may be expreſſed by an algebraic equation of a determinate degree; which equation is alſo called *locus*.

The ſame perſons define *mechanical lines* thoſe which cannot be expreſſed by an equation of a determinate degree.

Others, conſidering that thoſe called by Deſcartes *mechanical lines*, notwithſtanding their not being of a determinate degree, are not leſs preciſe and exact, and conſequently not leſs geometrical than the others; it being this preciſion which conſtitutes the geometricity of the *line*: for this reaſon, they chooſe rather to call thoſe *lines* which are reducible to a determinate degree, *algebraical lines*; and thoſe which are not, *tranſcendental lines*.

Lines are alſo divided into thoſe of the *firſt order*, *ſecond order*, *third order*, &c. See CURVE.

Sir Iſaac Newton enumerated ſeventy-two *lines* of the third order, and Mr. Stirling found four more; ſince that Mr. Stone has found two others, which had eſcaped Sir Iſaac and Mr. Stirling. The two ſpecies added are to be reckoned among the hyperbolico-parabolical curves. Enumer. ſin. Tert. Ordin. Lineæ Tert. Ordin. Newtonianæ Oxon. 1717. 8vo. Phil. Tranſ. N° 450. § 6. See CURVE.

Lines, conſidered as to their poſitions, are either *parallel*, *perpendicular*, or *oblique*; the conſtruction and properties of each whereof, ſee under PARALLEL, PERPENDICULAR, &c.

Euclid's ſecond book treats muſtly of *lines*, and of the effects of them being divided, and again multiplied into one another.

LINES, *algebraic*, are divided into different orders, according to the degree of their equations. Theſe degrees are eſtimated, as in determined equations, by the degree of the higheſt term of the equation.

Thus $a+by+cx=0$, is a general equation, expreſſing the nature of *lines* of the firſt order, or of ſtrait *lines*.

The equation $a+by+cx+dyy+exy+fxx=0$, repreſents the *lines* of the ſecond order; that is, the conic ſections, and the circle, which is one of them.

And the equation $a+by+cx+dyy+exy+fxx+gy^3+hyyx+ixy^3+kx^3=0$, expreſſes in general the *lines* of the third order. And the *lines* of the fourth and higher orders may be expreſſed in the like manner. See Cramer, Introd. à l'Analyſe des Lignes Courbes, p. 52, ſeq.

Mr. Cramer uſes the terms, *line* of the ſecond, third, fourth,

fourth, &c. order, and *curve* of the second, third, fourth, &c. order, indifferently. Sir Isaac Newton has made a diſtinction, according to him. See CURVE.

LINES, *circular, converging, diverging, generating, heliſpherical, hyperbolic, logiſtic, magnetical, normal, proportional, quadratures, reciprocal, reflexion,* and *vertical.* See the reſpective adjectives.

LINE *of the apſides*, in *Aſtronomy*, is the *line* which joins the APSIDES; or it is the greater axis of the orbit of a planet.

LINE, *fiducial*, the *line* or ruler which paſſes through the middle of an aſtrolabe, or the like inſtrument; and on which the ſights are fitted; otherwiſe called *alhidade, index, dioptra*, and *mediolineum*.

LINE, *horizontal*, a *line* parallel to the HORIZON.

LINES, *ſolſtitial* and *meridian*. See the adjectives.

LINE *of the nodes*, in *Aſtronomy*, is the *line* which joins the NODES of the orbit of a planet, or the common ſection of the plane of the orbit with the plane of the ecliptic.

LINE, *horizontal*, in *Dialling*, is the common ſection of the horizon, and the dial-plane.

LINES, *horary*, or *hour-lines*, are the common interſections of the hour-circles of the ſphere, with the plane of the dial. See HORARY, and HOUR-*circles*.

LINE, *ſubſtylar*. See SUBSTYLAR.

LINE, *equinoctial*, in *Dialling*, is the common interſection of the equinoctial, and the plane of the dial.

LINE, *contingent*. See CONTINGENT.

LINES, *dialling*, and *meridian*. See the reſpective adjectives.

LINE, in *Fencing*, is that part of the body directly oppoſite to the enemy, wherein the ſhoulders, the right arm, and the ſword, ought always to be found; and wherein are alſo to be placed the two feet, at the diſtance of eighteen inches from each other.

In this ſenſe, a man is ſaid to be in his *line*, to go out of his *line*, &c.

LINE, in *Fortification*, is ſometimes taken for a ditch, bordered with its parapet; and ſometimes for a row of gabions, or ſacks of earth, extended lengthwiſe on the ground, to ſerve as a ſhelter againſt the enemies fire.

When the trenches were carried on within thirty paces of the glacis, they drew two *lines*, one on the right, and the other on the left, for a place of arms.

For the difference between trenches or approaches, and *lines*, ſee INTRENCHMENT.

Lines are generally made to ſhut up an avenue or entrance to ſome place; the ſides of that entrance being covered by rivers, woods, mountains, moraſſes, or other obſtructions, not eaſy to be paſſed over by an army. When they are conſtructed in an open country, they are carried round the place to be defended, and reſemble the *lines* ſurrounding a camp, called *lines* of circumvallation. *Lines* are likewiſe thrown up to ſtop the progreſs of an army; but the term is moſt commonly applied to the *line* which covers a paſs that can only be attacked in front. For conſtructing ſuch a *line*, in the place moſt convenient for the purpoſe, let a rope be run quite acroſs the way along the intended place of the *line*, pegging it to the ground at the diſtance of every four or five yards; and at the diſtance of about ten or twelve feet before the *line*, towards the enemy, let ſuch another *line* or row of ſtakes be carried in a poſition parallel to the firſt rope. When the labourers are properly ranged within theſe limits, let them dig up the earth in this breadth, and throw it on the other ſide of the firſt rope, until a bank of about five or ſix feet thick, and fit or ſeven feet high, be raiſed, ſloping the ſides according to the declivity neceſſary for the earth's rolling naturally down the bank; and let the digging be continued till the ditch is about five or ſix feet deep, the breadth of the bottom being about one-third of the breadth ſtaked out at top; the bank may be rendered more firm by being trod or rammed down. Let the inner ſide of the bank be pared with the ſpade into ſuch a ſlope, as a man ſtanding upright may eaſily touch, with his arm extended ſtrait before him; and at the foot of this bank, let a foot-bank or ſtep be raiſed, of ſuch a height, as a man ſtanding on it may eaſily fire his muſket over the bank, or let it be about four feet and a half lower than the top of the bank or breaſt-work. A gentle ſlope may alſo be made to the foot-bank, that the troops may more eaſily aſcend it; and let the crown or top of the breaſt-work be ſloped ſo, that a muſket laid flat on it may ſtrike the ground with its ſhot, about five or ſix feet beyond the ditch. The bank or breaſt-work will, in this caſe, ſecure the troops behind the *line* from the enemy's fire; and when they ſtand on the foot-bank, they are more than two-thirds covered, and, conſequently, the troops within may make three of their ſhots tell for one of the enemy; and by going off the foot-bank, they may be quite covered, while they load again; ſo that with this advantage, they are in no great danger of being forced from the *lines*, unleſs the enemy are greatly ſuperior in number and cannon.

The following table ſhews the dimenſions of *lines* commonly conſtructed, and the rate of expence attending the conſtruction of them.

Breaſt-work			Ditch			Expence	
Thickness at top	Height within	Height without	Upper breadth	Lower breadth	Depth	Solid content	Days works
Feet	Feet	Feet	Feet	Feet	Feet	Feet	
4	7½	6	8	2⅞	5	45	1
5	7½	6	10	3½	5½	65	1½
6	7½	6	12	4	6	88	2
7	7½	6	14	4½	6½	110	2½
8	7½	6	16	5½	7	132	3
9	7½	6	18	6	7½	155	3½

The day's work here is for one yard in length; and in the firſt, a hundred men will complete a hundred yards in length of this kind of *lines* in one day; two hundred men in half a day, &c. The *lines* above deſcribed are called temporary *lines*, and chiefly ſerve a preſent emergency. When *lines* are thrown up at leiſure, and deſigned for longer duration, then the ditch is uſually eighteen feet broad at top, ſeven or eight feet deep, and the ſides of the ditch are ſloped, ſo as to leave only ſix feet breadth at bottom; the breaſt-work, or parapet, is about ſeven feet thick on the top or crown, and ſeven or eight feet high. The heights, depths, and breadths, of the ſeveral parts of a *line* well deſigned and finiſhed, are exhibited in *Tab.* VII. *Fortification, fig.* 44. in which LL repreſents the ground *line*, or ſurface of the place; AB the breadth of the ditch at the top; CD its breadth at the bottom; FAC the ſlope or ſcarp of the parapet and ditch; DBK the counterſcarp; EF the top or crown of the parapet or breaſt-work; EG the inner ſlope of the parapet; HG the top of the foot-bank; HI the ſlope of the foot-bank; and BKL a ſmall ſloping bank, called the glacis. This ſection or profile may be drawn, by laying off in the ground-*line*, from any ſcale of equal parts, the diſtances $1a = 6$ feet, $ab = 1\frac{1}{2}$, $cd = 7$, $dA = 4\frac{1}{2}$, $Af = 6$, $fg = 6$, $gB = 6$, and $BL = 5$ feet. Through a, b, c, d, e, f, g, B, draw lines perpendicular to IL. Make $aH = 2\frac{1}{2}$ feet $= bG$, $cI = 7$ feet, $dF = 6$, $fC = 8$ feet $= gD$. Draw IH, HG, GE, EF, FAC, CD, and DB, which continue, till it meets the line FL, and the profile is conſtructed.

When *lines* are made to cover a camp, or a large traſt of land, where a conſiderable body of troops is poſted, the work is not made in one ſtrait, or uniformly bending *line*; but at certain diſtances, the *lines* project in ſaliant angles, called redents, reduits, or flankers, towards the enemy. The diſtance between theſe angles is uſually between the limits of two hundred and two hundred and ſixty yards; the ordinary flight of a muſket-ball, point-blank, being generally within thoſe limits; although muſkets, a little elevated, will do effectual ſervice at the diſtance of three hundred and ſixty yards. In *Tab.* VII. *Fortification, fig.* 45. are ſhewn the forms of the uſual *lines*, where the figures CAB, *cab*, are the redents or flankers; AC, AB, *ac*, *ab*, the faces; CB, *cb*, the gorges; AD, *ad*, the capitals; B*b* the curtin; and the angles CAB, *cab*, the ſaliant or flanked angles. The diſtance of the ſaliant angles is about two hundred and forty yards at a mean; the length of the capital is uſually between forty and fifty yards, and the length of the gorges is alſo about ſixty or ſeventy yards.

To make a plan of *lines* with redents: draw the *line* EEEE, &c. *Tab.* VII. *Fort. fig.* 46. in ſuch a manner, that, wherever theſe is a bend or angle, it may be either at once, twice, or thrice, &c. the length of about two hundred and forty yards from one another; ſo that there may be a redent where there is an angle. In this *line*, lay off the diſtance of two hundred and forty yards from E to E, E to E, &c. reckoning from the bends towards each end, whether it happens that the *line* will or will not be exactly meaſured by a repetition of the two hundred and forty yards. At each point, E, draw the capital EF in a perpendicular poſition to the direction of the *line* in that point, and make the capitals about forty or fifty yards long. On each ſide of E, take the half gorges EG, EG, each of about thirty or thirty-five yards, and draw the faces FG, FG; and thus the outline or maſter-line of the curtins and redents is formed. Parallel to each curtin and face draw *lines*, within, at the diſtances from the maſter-line of ſeven feet, eight feet, twelve feet, and eighteen feet; then the breadth of ſeven feet repreſents the plan of the parapet, that of one foot its inner ſlope, that of four feet the top of the foot-bank, and

and that of six feet the foot-bank slope. On the outside of the master-line, draw *lines* at the distances of 10½, 16½, and 22½ feet, parallel to each curtin and face; and these will represent the plans of the scarp, ditch, and counterscarp; observing that the saliant angles of the counterscarp are rounded before the angles of the redents. A plan of this kind formed from a small scale, as of twenty yards to an inch, is usually represented by four parallel *lines*; one without the master-line representing the counterscarp or out-line of the ditch, and two within, representing the breadths of the parapet and foot-bank. In some cases a short *line* is hastily formed by a number of CHEVAUX *de frise* chained together; and in countries abounding with wood, a *line* may be formed by laying, in a position pointing to the enemy, the stems of trees and their larger branches, piled on one another to a sufficient height, and the interstices filled with earth: such a work is called an ABBATIS. See Robertson's Marine Fort. p. 2, &c.

LINE, *fundamental*, is the first *line* drawn for the plan of a place, and which shews its area.

LINE, *capital*, in *Fortification*. See CAPITAL.

LINE, *central*, is that drawn from the angle of the center, to that of the bastion.

LINE *of defence*. See DEFENCE.

LINE *of defence flehant*. See DEFENCE.

LINE *of defence rasant*. See DEFENCE.

LINE *of approach*, or *attack*, signifies the work which the besiegers carry on under cover, to gain the moat, and the body of the place. See APPROACHES.

LINE *of counter-approach*. See COUNTER-*approach*. See *Tab.* VII. *Fortification, fig.* 33.

LINE *of circumvallation*, is a *line* or trench cut by the besiegers, within cannon-shot of the place, which ranges round their camp, and secures its quarters against any relief to be brought to the besieged. See CIRCUMVALLATION.

LINE *of contravallation*, is a ditch bordered with a parapet, which serves to cover the besiegers on the side of the place, and to stop the sallies of the garrison. See CONTRAVALLATION.

LINES *of communication*, are those which run from one work to another. See *Tab. Fortif. fig.* 21. *n.* 2. 2, &c. See also COMMUNICATION. But

The LINE *of communicating*, more especially so called, is a continued trench, with which a circumvallation, or contravallation, is surrounded; and which maintains a communication with all its forts, redoubts, and tenailles.

LINE *of the base*, is a right *line*, which joins the points of the two nearest bastions.

To LINE a *work*, signifies to face it, chiefly with brick or stone; e. gr. to strengthen a rampart with a firm wall, or to encompass a parapet or moat with good turf, &c.

LINE, *indented*, in *Fortification*. See REDENT.

LINES, among *Fowlers*, is used to express the strings by which they catch birds. The large and small land birds are equally easy to be taken by them, and sometimes the water-fowl.

These *lines* are made of long and small cords, knotted in different places, and containing in length as many fathom as the places where they are to be laid require. Plovers, and the larger wild fowl, are very conveniently taken by them. When these strings are to be used, they must be limed with the strongest bird-lime that can be got, and then coming to their haunts before the evening flights, that is before sun-set; or, for the morning flights, at least two hours before day, the sportsman is to carry a parcel of small sticks, each about two foot long, and sharpened at both ends, but having a little slit in one end like a fork. The plain end of each stick is to be stuck into the ground, in such a manner, that the stick standing aslant, its upper or forked end may be about a foot and a half from the surface. The limed strings are then to be carried along all these sticks, in different rows, some higher than others. Every row of the sticks is thus to be filled, and the whole haunt covered with the *lines*. The plover, and other birds that fly low, when they come to their haunts, fly directly in among these strings, and are taken in great numbers; the whole flight coming in at once, and covering all the place, so that those which are not yet alighted, have no opportunity of seeing the distress of their companions. There is no need for the sportsman to be constantly upon the watch for the taking of the birds; for when once they are taken they cannot loosen themselves, so that he may come and take them up at his own time. The water-fowl may be easily taken, in the same manner, by observing their haunts, and stretching these *lines*, in several rows, across the brook, or river, some higher and some lower, the lowest lying almost at the edge of the water. These must never be used in moon-light nights on the occasion; for the shadow of the strings in the water will then fright them away.

LINE, in *Genealogy*, is a series or succession of relations in various degrees, all descending from the same common father.

LINE, *direct*, is that which goes from father to son; which is the order of ascendants and descendants. See DIRECT.

LINE, *collateral*, is the order of those who descend from some common father related to the former, but out of the *line* of ascendants and descendants. In this are placed uncles, aunts, cousins, nephews, &c. See COLLATERAL.

LINE, in *Geography* and *Navigation*, is used, by way of eminence, for the EQUATOR, or EQUINOCTIAL *line*.

The *line* in the heavens is a circle described by the sun in his course on the 20th day of March, and the 23d of September. The *line* on the earth is an imaginary circle, answering to that in the heavens. It divides the earth, from east to west, into two equal parts, and is at an equal distance from the two poles; so that those who live under the *line*, have the poles always in their horizon.

The latitudes commence from the *line*.

The seamen use to christen their fresh men, and passengers, the first time they cross the *line*. See BAPTISM.

LINES, in *Heraldry*, the figures used in armories to divide the shield into different parts, and to compose different figures.

They are of different forms, and were it not for this, many arms would be one and the same, for a chief wavey differs from a plain chief, by the *lines* which compose them, and the heralds shew particular reasons for all these different forms of *lines*.

These *lines*, according to their forms and names, give denomination to the pieces or figures which they form, except the strait or plain *lines*, which are carried evenly through the escutcheon, and are four, *viz.* the perpendicular *line*, the horizontal, the diagonal *line* dexter, and the diagonal *line* sinister.

The crooked *lines*, which are carried unevenly through the escutcheon, rising and falling, are these: first the ingrailed or ENGRAILED, and inverted or INVECTED; these when represented together are somewhat known the one from the other, being opposite to one another, both being made, as it were of semi-circles. The ingrailed with the points upward, the invected with the points downward. But this is not a sufficient distinction; for suppose the space between them which they form be a fess, then the whole is only ingrailed, not invected; for the fess ingrailed must have the points on both sides turned toward the field, and the convex or gibbose parts toward the fess itself, and so of a bend, chevron, and other proper figures of heraldry; and if these be invected, then the convex parts of the *lines* are toward the field: but these *lines* are better distinguished when placed by way of bordure, with the letters within a bordure ingrailed or invected.

These two *lines* are more hard to be distinguished, when the field is divided into two equal parts, of different colours, as parted per pale, parted per fess, &c. Here we know not whether the *line* be ingrailed or invected, except we follow this rule, that the form of the *line* must be applied to the colour first named. The French terms for these two *lines* are for the ingrailed, *engrele*, and for the invected, *comole*; and the Latin writers express ingrailed by *ingredians, imbricatus*, and *striatus*, and the invected by the words *invertus* and *canaliculatus*.

The wavy, or WAVED *line*, is such an one as is formed in representation of the waves of the sea, as parted per fess wavy in arms and other waved *lines*, as the wavy bars all express that the person got his honours by sea service. Nebulee is another name of a *line* in heraldry; it expresses a clouded *line*, the French call it *nuancee*, and the Latins *nebuloffe lines*; this also has been given to persons, who have been eminently skilled in navigation.

Crenele, or EMBATTLED *line*, represent the battlements of a house, and are said to represent in heraldry the skill in architecture, for which the first of the family was famous; they were also given sometimes for eminent services, in assaulting or defending castles in time of war, and sometimes only as emblems of a house, to express a person who bare them, being of a noble house or family; for of old none were suffered to embattle their houses but persons of great distinction.

The Latin writers in heraldry use for the word *crenele*, the terms *pinnatus* and *pinnis asperatus*, according to Ursus in his blazons, and Sylvester Petra Sancta in his *mirakes pinnules*.

There is another *line* of this kind in heraldry, which Leigh calls the battled embattled *line*; this has one degree of embattling above another. When the upper points in this kind of *line* are represented sharp, it is called campagne, as if the *lines* ending in points, represented bastions, or the outer works of cities and camps;

and

and when the upper points are rounded, it is called crenele embattled arrondi.

The INDENTED *line* is notched so at the edges that it represents the teeth of a saw, and has its name from the Latin *dens*, a tooth; or from the law term *indenture*, a sort of deed, the top of which is always notched like the teeth of a saw.

The dancette is another *line*, very much resembling the indented *line*, but that it is always much smaller; it is therefore said by the heralds to be the same in quality but not in quantity. The dancette differs also from the indented *line*, in that it always consists but of a few teeth, though never less than three, according to Mr. Holmes, in his Office of Armory; whereas the indented *line* has always a great many teeth. The French express our indented *line* by the terms *danche* or *dentille*; and the dancette, when it has but very few teeth, and those very long, by the term *vivree*, which Menestrier takes to be the letter M, with its legs extended from side to side of the shield, because many who carry a partition, or sess, after that form, have the family name, beginning with that letter. The Latin writers express the term indented, by *dentatus*, *indentatus*, and *denticulatus*, and when the teeth are very long, as in the dancette, they call them *dentes decussati*. See also NEBULY and RAGULED.

There are yet two other *lines* mentioned by the heraldry writers; the first is the PATRE or DOVETAIL *line*, so called from its resemblance to a sort of joint used by our carpenters, in which one part goes alternately all the way down between two others; this is called by Morgan the linchet, or labelled line, because the points as they proceed from the ordinary, such as the chief or sess, represent not unlike the points, or rather the ends of labels. The other *line* is called URDE or *champagne* by Fresne; and by Upton, *vair*, because its points are formed like pieces of the fur called by heralds *vair*.

The two last of these are in very little use, the others are the common *lines* of arms, and are called the attributes or accidents of armorial figures which they form; and if any other *lines* are found in the figures or engravings of arms, which are not reducible to the one or the other of these, they are called *irregular*, and by the French heralds *elatte*. The knowledge and use of these forms of *lines* are necessary in the science of heraldry, to distinguish and difference many armorial bearings.

LINE, *labelled*. See LABELLED.

LINE, *lateral*, *linea lateralis*, in *Ichthyology*, a name given by naturalists to a *line* or streak, with which many kinds of fish are marked, passing along their sides. Few fish are without this *line*; but it is very variously formed in the several kinds, and makes a very considerable article in their description, if not in the distinction of the species. In some species it is made of a series of little points, or holes, as appears to the eye: of this nature is the *line* in eels, &c. In some others it is formed of a sort of duct, running along the center of a great number of scales. This is its structure in the generality of fishes. This *line*, in various kinds of fish, varies also in regard to number, situation, figure, and other properties. In regard to number, there is no *line* observed in the syngnathi and petromyzon, in almost all other fish, there is one on each side; and, finally, in some there are as it were two *lines* on each side: an instance of this we have in the ammodytæ. In regard to the situation, the differences are these. 1. In some it is near the back, as in the clupea, salmons, perch, and the like. 2. In others it is placed nearer the belly, and runs parallel with it, as in the cyprini. 3. In some it is placed in the center of each side between the back and the belly, as in the carassius. 4. In some it is placed against the interstices of the muscles, or the spina dorsalis, as in the murænæ. And, 5. In some it is placed above the interstices, as in the ammodytæ, &c. It has been supposed, by many, that this *linea lateralis* was always parallel to the interstices of the muscles, but this is evinced to be an erroneous opinion, by the observation of the pearch and mackrel. In regard to the differences of figure, this *line* is in some straight, as in the coregone, salmons, &c. 2. In others it is crooked, as in the cyprini, the gwarch, &c. and in the generality of fish is smooth to the touch, but in some it is rough and aculeated, as in the trachurus and pleuronectæ.

LINE *of the banquet*, in the *Manege*. See BANQUET.

LINE *of a volt*, in the *Manege*. See SQUARE and VOLT.

LINE *of direction*, in *Mechanics* and *Gunnery*. See DIRECTION.

LINE *of gravitation of a heavy body*, is a *line* drawn through its center of gravity, and according to which it tends downwards.

LINE *of the first act of descent of a heavy body*. See DESCENT and CYCLOID.

LINE *of a projectile*. See PROJECTILE.

LINES, in *Music*, are used for those strokes drawn horizontally on a piece of paper, on and between which the characters and notes of music are disposed. Their number is commonly five; when another is added for one, two, or more notes, it is called a LEGER-*line*.

Some say that it is to Guido Aretine that we owe their invention: they are very commodious, and greatly assist the imagination in distinguishing the low notes from the high. Upon their first introduction, the *lines* only were used, and the spaces between them entirely neglected.

Originally there were as many *lines* drawn for a song, as it required notes ascending; but at length the notes being placed in the intervals of the *lines*, these were reduced to four; so that there were nine places or degrees for nine different sounds, which was their extent: at last they raised the number to five, of which the lowest is reckoned first; and hereon they placed the characters for eleven different sounds, including the spaces above the fifth and below the first; and at the same time they had the liberty, at pleasure, to add more *lines*, if the song ran to a greater compass.

LINE, *geometrical*, in *Perspective*, is a right *line* drawn in any manner on the geometrical plane.

LINE, *horizontal*. See HORIZONTAL.

LINE, *terrestrial*, or *fundamental line*, in *Perspective*, is a right *line*, wherein the geometrical plane, and that of the picture, or draught, intersect one another.

Such is the *line* NI (*Tab. Perspective*, *fig.* 12.) formed by the interiection of the geometrical plane LNI, and the perspective plane, HI.

LINE *of the front*, in *Perspective*, is any right *line* parallel to the terrestrial *line*.

LINE, *vertical*, is the common section of the vertical, and of the draught.

LINE, *visual*, is the *line*, or ray, imagined to pass from the object to the eye.

LINE *of station*, in *Perspective*, according to some writers, is the common section of the vertical and geometrical planes. Others mean by it, the perpendicular height of the eye above the geometrical plane; others, a *line* drawn on that plane, and perpendicular to the *line* expressing the height of the eye.

LINE, *objective*, in *Perspective*, is any *line* drawn on the geometrical plane, whose representation is sought for in the draught or picture.

LINE *of distance*. See DISTANCE.

LINES *on the plain scale*, in *Trigonometry*, are the *line* of chords, *line* of sines, *line* of tangents, *line* of secants, *line* of semi-tangents, *line* of leagues. The construction and application whereof, see under SCALE, SAILING, &c.

LINES *on Gunter's scale*, are the *line* of numbers, *line* of artificial sines, *line* of artificial tangents, *line* of artificial versed sines, *line* of artificial sines of rhumbs, *line* of artificial tangents of the meridian *line*, and *line* of equal parts. The construction and application whereof, see under GUNTER'S *scale*.

LINES *of the sector*, are the *line* of equal parts, or *line* of *lines*; *line* of chords, *line* of sines, *line* of tangents, *line* of secants, *line* of polygons, *line* of numbers, *line* of hours, *line* of latitudes, *line* of meridians, *line* of metals, *line* of solids, *line* of planes; the construction and use whereof, see under SECTOR.

LINE, in the *Art of War*, is understood of the disposition of an army, ranged in order of battle; with the front extended as far as may be, that it may not be flanked.

An army usually consists of three *lines*; the *first* is the front, van, or advance-guard; the main body forms the *second*, in which is the general's post; the *third* is a reserved body, or rear-guard.

The second *line* should be about three hundred paces behind the first, and the reserve at about five or six hundred paces behind the second.

The artillery is likewise distributed along the front of the first *line*. The front *line* should be stronger than the second, that its shock may be more violent, and that, by having a greater front, it may more easily close on the enemy's flanks. See ARMY.

LINE, *to break the*, is to change the direction from that of a strait *line*, in order to obtain a cross-fire.

LINE, *turning out of the*. The *line* turns out without arms whenever the general commanding in chief comes along the front of the camp. When the *lines* turn out, the private men are drawn up in a *line* with the bells-of-arms; the corporals on the right and left of their respective companies; the picquet forms behind the colours, with their accoutrements on, but without arms. The serjeants draw up one pace in the front of the men, dividing themselves equally. The officers draw up in ranks according to their commissions, in the front of the colours; two ensigns taking hold of the colours. The field-

field-officers advance before the captains. The camp-colours on the flanks of the parade are to be struck, and planted opposite to the bells-of-arms; the officers ſpontoons are to be placed between the colours, and the drums piled up behind them; the halberts are to be planted between and on each ſide the bells-of-arms, and the hatches turned from the colours. Milit. Dict.

LINE, or LINE *of battle*, is alſo applied to the diſpoſition of a fleet on the day of ENGAGEMENT; on which occaſion the veſſels are uſually drawn up, as much as poſſible, *in a ſtrait line*, as well to gain and keep the advantage of the wind, as to run the ſame board.

This right *line*, or long file, is prolonged from the keel of the hindmoſt to that of the foremoſt, and paſſes longitudinally through the keels of all the others, from the van to the rear; ſo that they are, according to the ſea-phraſe, in the wake of each other. In the *line*, or order of battle, all the ſhips of which it is compoſed are cloſe-hauled, upon the ſtarboard or larboard tack, about fifty fathoms diſtant from each other. When a fleet is drawn up in *line*, in preſence of an enemy, it ſhould be formed in ſuch a manner as that the ſhips may mutually ſuſtain and reinforce each other, and yet preſerve a ſufficient ſpace in their ſtations, to work or direct their movements with facility during the action. The *line* cloſe-hauled is peculiarly choſen at the order of battle, becauſe if the fleet, which is to windward, were arranged in any other *line*, the enemy might ſoon gain the weather-gage of it; and even if he ſhunks it expedient to decline that advantage, it will yet be in his power to determine the diſtance between the adverſe fleets, in an engagement, and to compel the other to action. The fleet to lee-ward, being in a *line* cloſe-hauled, parallel to the enemy, can more readily avail itſelf of a change of the wind, or of the neglect of its adverſary, ſo as to get to windward of him; or, at leaſt, ſo as to avoid coming to action, if the enemy is much ſuperior, or to prevent him from eſcaping, if he ſhould attempt it. Beſides, in this order, the ſails of each ſhip are ſo diſpoſed as to counteract each other, and, therefore, the ſhips in general neither advance nor retreat during the action, and are thus enabled to keep their ſtations, and to proſecute the battle with vigour, and without diſorder. Whilſt the uniformity of the *line* is preſerved, the admiral's orders may be readily communicated by ſignals from the van to the rear; diſtreſſed ſhips may be more eaſily diſcovered and relieved, and the ſituation and circumſtances of the enemy's *line* will be open to the view of the commander in chief. Moreover, the ſhips of the *line* ſhould not only be ſufficiently cloſe to ſuſtain each other, but they ſhould be of the larger ſort, with the weighteſt metal. Many advantages concur to recommend the larger ſhips in a *line* of battle; they overlook thoſe of an inferior rate, which are accordingly laid open to the fire of their muſquetry. In a high ſea they can more ſafely employ the artillery of their lower deck than a ſmaller ſhip; and if both are obliged to ſhut their lower deck-ports, the advantage of the three-decked ſhips, with regard to their cannon, will yet be conſiderable; they have three tier againſt two, and two againſt one. The ſame ſuperiority ſubſiſts, in caſe they are diſmaſted, when the upper deck is encumbered with the ruins: the large ſhip being higher between decks, are leſs incommoded with the ſmoke, and their cannon is managed with greater facility; the large ſhips, having greater ſolidity of frame, are better calculated to reſiſt the effects of battle and tempeſt. In general alſo they ſail better than the ſmall ones, except in fine weather, or in a freſh wind, when the ſea becomes agitated, they have always the ſuperiority. The fire-ſhips do not ſucceed ſo well againſt large ſhips as the ſmaller ones; the artillery will ſink them, or oblige them ſooner to relinquiſh their deſign, and they are eaſily towed away by the great long-boats. The *line* of a fleet, which has many capital ſhips, need not be ſo much incloſed as that of an enemy, which has fewer. The former may be alſo leſs numerous, without being weaker. This circumſtance, however, ſhould not exclude a certain number of the third and fourth rates, which are neceſſary in all naval armaments.

The weather-*line* and the *line* to leeward have their ſeveral advantages and inconveniences. The chief advantages of the former are, that it may approach the enemy, ſo as to determine the time and diſtance of the action: if it is more numerous than the lee-*line*, it may eaſily appoint a detachment to fall upon the van and rear of the latter, and incloſe it between two fires. It is little incommoded by the fire or ſmoke of the cannon, and may diſpatch the fire-ſhips, under cover of the ſmoke, upon the diſabled ſhips of the lee-*line*, or ſo as to oblige the enemy to break the *line*, and bear away. But the weather-*line* has alſo its defects; when the ſea is rough, and the wind boiſterous, it cannot readily fight with the lower deck battery: it cannot decline the action, without the dangerous expedient of forcing through the enemy's *line*; and if it keeps the wind, the lee-*line* may incloſe and totally deſtroy it. The diſabled ſhips of the weather-*line* muſt tack, to avoid falling into the enemy's fleet; and if they are much ſhattered, they may be altogether ſeparated from their own fleet, particularly if they are in the rear of the *line*.

The advantages of the *line* to lee-ward are theſe: the ſhips of the former may uſe the guns of their lower decks, without the hazard of taking in much water at the ports in ſtormy weather, which the *line* to windward cannot do without great danger. The lee-*line*, though it cannot ſo eaſily double upon the van and rear of the enemy, and incloſe them between two fires, may nevertheleſs have opportunities of tacking, and cutting off a part of the enemy's rear. The diſabled ſhips to lee-ward are more eaſily removed from the fire than thoſe to windward; and the lee-*line* can with greater facility avoid the action than its adverſary, which is a circumſtance very favourable to an inferior ſquadron. But the defects of the lee-*line* are, that it cannot decide the time and diſtance of the battle, which may commence before it is ſufficiently formed; and it will perhaps be attacked by an enemy bearing down upon it in regular order. The fire and ſmoke of the weather-*line* are a great inconvenience to it; and it cannot eaſily break the enemy's *line* with its fire-ſhips, which are very ſlowly and with great difficulty conveyed to windward. The admiral's ſhip always preſerves her ſtation in the center of the *line*. The *line* is ſaid to be formed a-breaſt, when the ſhips ſides are all parallel to each other, *on a line* which croſſes their keels at right angles. This is moſt frequently uſed in purſuing or retreating, with the wind right-aft, ſo that the *line* forms a perpendicular with the direction of the wind. Falconer's Mar. Dict.

LINE is alſo a name given to ſeveral ſmall cords, of different ſizes, and uſed for various purpoſes at ſea.

LINE, *ſhip of the*, is a veſſel large enough to be drawn up in the *line*, and to have a place in a ſea-fight. See SHIP.

LINE, *knave*, in a ſhip. See KNAVE.

LINE *of meaſures*, is uſed by Oughtred to denote the diameter of the primitive circle in the projection of the ſphere in plano, or that *line* in which the diameter of any circle to be projected *falls*.

In the ſame ſenſe, the projection of the ſphere in plano, the *line of meaſures* is that *line* in which the plane of a great circle, perpendicular to the plane of the projection, and that oblique circle which is to be projected, interſects the plane of the projection; or it is the common ſection of a plane, paſſing through the eye-point, and the center of the primitive; and at right angles to any oblique circle, which is to be projected, and in which the center and pole of ſuch circle will be found.

LINE, *meaſure of a*. See MEASURE.

LINE *of demarcation*, or *alexander-an line*, is a meridian paſſing over the mouth of the river Maragnon, and by the capes of Hommas and Malabrigo; ſo called from pope Alexander VI. who, to end the diſputes between the crowns of Caſtile and Portugal about their boundaries, in 1493, drew an imaginary *line* on the globe, which was to terminate the pretenſions of each. By which partition, the Eaſt Indies fell to the lot of the Portugueſe; and the Weſt Indies, then newly diſcovered, to the Caſtilians.

LINE, *braiding, lunt, cravat, ſwabber, leg, thumb*, and *water*, ſee under the reſpective adjectives.

LINE alſo denotes a ſmall French meaſure, containing the 12th part of an inch, or 144th part of a foot.

The geometricians, notwithſtanding its ſmallneſs, conceive the *line* ſubdivided into 12 points.

The French *line* anſwers to the Engliſh *barley-corn*.

LINES, *nooſing*. The beſt materials for making theſe *lines* are *fine* and even horſe-hairs: the hair ſhould be round and twiſted even, for that greatly ſtrengthens it; and all the hairs ſhould be of an equal bigneſs, or as nearly ſo as may be. They ſhould be laid in the water about a quarter of an hour after twiſting, that it may be ſeen which will ſhrink; they are then to be twiſted over again. In this laſt twiſting ſome intermingle ſilk among them, but that is not to well. *Lines* made entirely of ſilk are not bad; but thoſe of ſilk and hair mixed are never found to do well. The beſt colours for a *line* are ſorrel, white, and grey; the two laſt are beſt for angling in clear waters; the former in muddy ones. The pale watery-green is alſo a very good colour, and may be made thus: boil in a quart of alum-water a large handful of marygold-flowers; there will ariſe a ſcum, which muſt be taken off; then add to this liquor copperas and verdigris, of each half a pound, beat to powder together; boil theſe up together; then put the hair into this liquor, and let

it lie ten or twelve hours; it will obtain a watery bluish green colour, which will not wash out afterwards.

LINE *of equated bodies*. See EQUATED *bodies*.

LINES, *gangs*, *plats*, and *rows*. See the several adjectives.

LINE, *white*, in *Printing*. See WHITE.

LINEA *alba*, in *Anatomy*, the concourse of the tendons of the oblique and transverse muscles of the abdomen; dividing the abdomen in two, in the middle.

It is called *linea*, *line*, as being ſtrait; and *alba*, from its colour, which is white.

The *linea alba* receives a twig of a nerve from the intercostals in each of its digitations or indentings, which are visible to the eye, in lean persons especially.

LINEA *medianа*. See MEDIANA.

LINEA *nubeculosa*. See NUBECULOSA *linea*.

LINEAL *descent*. See DESCENT.

LINEAL *exegesis*. See EXEGESIS.

LINEAMENT, a fine ſtroke or line obſerved in the face, and forming the delicacy thereof; being that which preſerves the reſemblance, and occaſions the relation of likeneſs, or unlikeneſs, to any other face.

It is by theſe that phyſiognomiſts pretend to judge of the temper and manners of people.

LINEAMENT is alſo uſed by the painters for the outline of a face. See CONTOUR.

LINEANS *punctum*. See PUNCTUM.

LINEAR *book*. See LEAF.

LINEAR *problem*, in *Mathematics*, is that which may be ſolved geometrically, by the interſection of two right lines. E. gr. To meaſure an inacceſſible height by the means of two unequal ſticks, &c.

This is alſo called a *ſimple* PROBLEM, and is capable but of one ſolution.

LINEAR *numbers*, are ſuch as have relation to length only. See NUMBER.

Such, e. gr. is a number which repreſents one ſide of a plane figure. If the plane figure be a ſquare, the *linear number* is called a *root*.

LINEATORES, in the Hippodrome at Conſtantinople, were the ſame with the *deſignatores* in the Circus at Rome. See HIPPODROMUS, CIRCUS, DESIGNATOR.

LINEN. There are various ſorts of *linen*, the principal materials of which are cotton, flax, and hemp. The *linen* trade of Europe is chiefly in the hands of the Ruſſians, Germans, Swiſs, Flemings, Hollanders, and French.

Linen is the ſtaple of Scotland; but it was long neglected. The Scots at preſent are not, however, in ſo bad a ſituation in reſpect to this trade, as the French were in the reign of king Henry IV. or the Iriſh at the Revolution; where by the force of public encouragement, it has arrived to an extraordinary pitch, and it is to be hoped will daily advance: the Scots have it not to begin, they want only to improve and extend it to the height it will admit.

The balance of trade between England and Scotland, and England and Ireland, is on the Engliſh ſide; and ſo far as England and its dependencies can be ſerved with *linen* from Scotland and Ireland, inſtead of Holland, France, Germany, and Ruſſia, ſo far will England be a gainer by this change in the courſe of trade. The more *linen* the Scots and Iriſh can ſell in England, the more of the Engliſh commodities will they be able to purchaſe: and it may be reaſonably ſuppoſed that their demands from England will always increaſe in proportion to the increaſe of their people and *linen* manufactures. It is then evidently the intereſt of England to promote and advance the manufacture of *linen* in Scotland and Ireland, and to give them all reaſonable advantages in the trade, in preference to foreigners; where the balance of trade is againſt us, and this ſeems to be the ſenſe of the nation, ſince all foreign *linen*, for home conſumption, pays a duty. Poſt. Dict. Com.

The *linen* trade of this country is regulated by ſeveral ſtatutes.

No perſon ſhall put to ſale any piece of dowlas *linen*, &c. unleſs the juſt length be expreſſed thereon, on pain of forfeiting the ſame. 28 Henr. VIII. cap. 5. Uſing means whereby *linen* cloth ſhall be made deceitfully, incurs a forfeiture of the *linen*, and a month's impriſonment. Stat. 1 Eliz. cap. 12. Any perſons may ſet up trades for dreſſing hemp or flax, and making thread for *linen* cloth, &c. 15 Car. II. cap. 15.

By 10 Ann. cap. 19. and 12 Ann. ſtat. 2. cap. 9. a duty of 3*s*. for every 100*l*. value, over and above other duties, is laid on all ſtriped and printed *linens* imported: and the ſaid printed *linens* are required to be ſtamped by the officers of the cuſtoms: and alſo by the ſame ſtatutes, a home duty of 3*d*. a yard in length, reckoning yard-wide, is laid on all *linen*-ſtuffs, printed, &c. in Great Britain; and for all CALLICOES *ſtuffs*, a yard, excepting thoſe callicoes, *linens*, which ſhall be dyed throughout of one colour only; and on all cottons, wholly made of cotton ſpun in Great Britain, printed, &c. 3*d*. a yard. 14 Geo. III. cap. 72. By 7 Geo. III. cap. 28. certain additional duties on importation are impoſed, viz. for every ell of *linen*-cloth or ſheeting, above one yard wide, except Flanders Holland cloth, 3*d*. and for every ell of *linen* cloth called drilling 3*d*. And by 7 Geo. III. cap. 58. for every ell of foreign *linen*, called packing-canvas, ſpruce-ſibing, or Queensborough-canvas, one farthing; for every ell of Dutch barras, and Heſſian canvas, one halfpenny; and for every yard of foreign lawn, bleached in Holland, commonly called Holland whited lawn, one penny. Houſes for printing, &c. *linen*, are to be entered, on pain of 30*l*. 10 Ann. cap. 19. And if other places are made uſe of beſides the uſual abode of the printer, &c. they are to be entered on pain of 50*l*. and forfeiture of goods. 1 Geo. ſtat. 2. cap. 36. Officers are to enter and take account without obſtruction, on pain of 20*l*. and the goods ſhall be entered once in ſix weeks, on oath, on pain of 50*l*. Concealment of goods to avoid the duty incurs a forfeiture of 20*l*. The duties ſhall be paid within ſix weeks after entry on pain of forfeiting double; and the goods ſhall not be removed before they are ſtamped, on pain of 20*l*. the ſurveyed goods are to be kept ſeparate from the others, and warrants may be iſſued in order to ſearch for goods unſtamped. 10 Ann. cap. 19. Such goods may be ſeized, and the perſon in whoſe cuſtody they are found ſhall forfeit 50*l*. 5 Geo. cap. 21. Counterfeiting the ſtamp is felony without benefit of clergy; and a perſon knowingly ſelling goods with a counterfeit ſtamp ſhall forfeit 20*l*. and ſtand in the pillory. 10 Ann. cap. 19. 13 Geo. III. cap. 56. Theſe goods having paid the duty may be exported, and there ſhall be a drawback of the duties. 10 Ann. cap. 19. 12 Ann. ſtat. 2. cap. 9. *Linen* of all ſorts made of flax or hemp, of the manufacture of this kingdom, may be exported, duty free. 3 Geo. I. cap. 7. CAMBRICS and lawns made in England are to be marked by the exciſe officers, and are regulated under ſeveral penalties. 4 Geo. III. cap. 37. 7 Geo. III. cap. 43. Stealing of *linen*, fuſtian, cotton goods, &c. from whitening-grounds or drying-houſes, to the value of 10*s*. or knowingly buying or receiving ſuch ſtolen goods, is felony without benefit of clergy. 18 Geo. II. cap. 27. Such alſo is breaking into houſes, ſhops, &c. and deſtroying any *linen*-cloth, or implements uſed in the manufacture of it, by 4 Geo. III. cap. 37. Affixing counterfeit ſtamps on foreign *linens* imported, in imitation of the ſtamps put on Scotch or Iriſh *linens*, and expoſing them to ſale, and affixing any counterfeit ſtamp on any *linen* of the manufacture of Great Britain or Ireland, in order to vend the ſame as *linens* duly ſtamped, and expoſing ſuch to ſale, incur forfeiture and a penalty of 5*l*. for each piece by 17 Geo. II. cap. 30. The reſtrictions relating to the importation, wearing, and ſelling of foreign cambrics and French lawns, are enacted by 18 Geo. II. cap. 36. 21 Geo. II. cap. 27. 32 Geo. II. cap. 32. and 7 Geo. III. cap. 43. See CAMBRIC.

A new manufacture has been lately ſet on foot in London, for embelliſhing *linen* with flowers and other ornaments of gold leaf. The *linen* looks whiter than moſt of the printed *linens*; the gold is extremely beautiful, and is ſaid to bear waſhing well. See STUFF.

There are many ſubſtances from which a juice or dye is obtained, that will ſtain *linen* of different colours. The juice of the ANACARDIUM, rubbed on *linen* or cotton, gives a reddiſh-brown ſtain, which ſoon deepens in the air into a black, and which has not been diſcharged by waſhing and boiling, with ſoap or alcaline ley. Hence the anacardium is ſaid to be uſed for marking *linen* and cotton cloths, and to be known all over India by the name of marking-nut. The juice of the CASHEW-*nut*, called by ſome the anacardium of the Weſt Indies, differs from the oriental anacardium in its colouring quality; that lodged between its ſhells being much paler, and giving to *linen*, cotton, or paper, only a brownish ſtain, which is durable, but does not change at all towards blackneſs.

Several ſpecies of the toxicodendron or POISON-*wood*, contain in their leaves a milky juice, which, in drying, becomes of a deep black, and communicates the ſame colour to the *linen* on which it is dropped: the *linen* thus ſtained, boiled with ſoap, came out without the leaſt diminution of its colour, nor does ſtrong ley of wood-aſhes make any change in it. Phil. Tranſ. vol. xlix. for 1755.

Dr. Lewis has found, that the milks of wild poppies, garden poppies, dandelion, hawk-weed, and ſow-thiſtle, gave brown, or brownniſh-red ſtains, which were diſcharged by waſhing with ſoap: the colourleſs juice which iſſues from hop-ſtalks when cut, ſtains *linen* of a pale-reddiſh or brownniſh-red, extremely durable: the juice of ſloes

floes gave likewise a pale brownish ſtain, which, by repeated waſhings with ſoap, and wetting with ſtrong ſolution of alkaline ſalt, was darkened to a deeper brown: on baking the floes, their juice turns red, and the red ſtain which it then imparts to *linen* is, on waſhing with ſoap, changed to a pale-bluiſh, which alſo proves durable. See DYING of *Thread*.

The late Dr. Smellie has recommended the following method of marking *linen*, ſo as not to waſh out again: take vermillion, as much as will lie on a half-crown piece, of the ſalt of ſteel a piece about the ſize of a ſmall nutmeg, grind or levigate them well together with linſeed oil; the compoſition may be diluted or thickened at pleaſure.

LINEN, *faſſil*. See AMIANTHUS and ASBESTOS.

LINEN-*cloth*. See MILL.

LINEN, *white*. See WHITE.

LINEN, *bleaching of*. See BLEACHING.

LING, in *Ichthyology*, the Engliſh name for a kind of fiſh, which is a ſpecies of the ASELLUS, according to the generality of authors, and is generally called *aſellus longus*. According to the new Artedian ſyſtem, it is a ſpecies of the *gadus*, and is diſtinguiſhed by the expreſſive name of the GADUS with two fins on the back, with a bearded mouth, and with the upper jaw longeſt.

Ling, which is the *gadus molva* of Linnæus, is eſteemed, both freſh and cured, for the table. It is a long-bodied fiſh, whence its name by corruption of *long*, being uſually from three to four feet, more approaching to the *merluccius* or hake, than to any other ſpecies; it is covered with very ſmall ſcales, which adhere cloſely to the ſkin; the back and ſides are of a bluiſh or greeniſh brown, and the belly white; its head is flat and large, and its ſnout conſiderably long; the upper jaw is longer than the under, and both are furniſhed with ſeveral rows of ſhort teeth, and the lower with one range of longer; and in the palate there are a large number of ſmall teeth, among which there are four or five large and long ones intermixed; the mouth opens very wide, and in the angle of the lower jaw has a ſingle ſhort beard; it has two fins upon the back, one near the head, conſiſting of fifteen rays, the other not far behind it, and reaching down almoſt to the tail, conſiſting of ſixty-five rays; the gill-fins are ſmall, the belly-fins are placed high, and the tail is rounded at the end, marked with a tranſverſe black bar, and tipt with white. See *Table II. of Fiſhes*, N° 18.

The *ling* abounds about the Scilly iſles, on the coaſts of Scarborough, and thoſe of Scotland and Ireland, and forms a conſiderable article of commerce. In the Yorkſhire ſeas they are in perfection from the beginning of February to the beginning of May, and ſome till the end of that month. They ſpawn in June, at which time the males ſeparate from the females. When the *ling* is in ſeaſon, its liver is very white and abounds with a fine flavoured oil, which afterwards becomes red like that of a bullock, and affords no oil. This oil is ſaid to be boarded up in the cellular membranes of fiſhes, to return into their blood, and to ſupport them in the engendering ſeaſon. Great quantities of this fiſh are ſalted for exportation, and for home-conſumption: for this purpoſe it muſt meaſure twenty-ſix inches or upwards from the ſhoulder to the tail, in order to be entitled to the bounty on exportation. Thoſe under this ſize are called *drizzles*. Pennant.

LINGUA, in *Anatomy*. See TONGUE.

LINGUA *avis*, *bird-tongue*, in the *Materia Medica*, the ſeed of the aſh-tree, or aſhen keys.

LINGUÆ *frænum*. See FRENUM.

LINGUÆ *muſculus*. See MUSCULUS.

LINGUÆ *ſecundus par*, a name given by Caſſerius to a pair of muſcles of the tongue, called by the generality of authors STYLOGLOSSUS.

LINGUADO, in *Ichthyology*, the name of a Weſt Indian fiſh, in ſhape reſembling a ſoal.

LINGUATULA, in *Ichthyology*, the name of a ſpecies of fiſh, ſomewhat reſembling the ſoal, but ſmaller and ſhorter, and much inferior to it in taſte. It is common in the Mediterranean, and brought to market at Rome, Venice, and elſewhere, and is called by other authors CYNOGLOSSUS, and *callionymus*, or *uranoſcopus after*.

LINGUIFORM-*leaf*, among *Botaniſts*. See LEAF.

LINGULA, in *Ichthyology*, the name of an extremely ſmall fiſh of the ſoal-kind. It is known from the reſt of this genus not only by its ſmallneſs, but by a ridge of ſmall ſcales which run along the line over the ſpine, and are much more elevated and diſtinguiſhable, both to the eye and touch, than thoſe of the reſt of the body. It is a well-taſted fiſh, and much firmer in its fleſh than the ſoal, but is very ſcarce, and is of little value, becauſe of its thinneſs. It is caught in the Mediterranean.

LINGULACA, in *Ichthyology*, a name by which ſeveral authors, particularly ſome of the older naturaliſts, have called the *paſtinaca*.

LINIFICUS *lapis*, a name given by ſome authors to a ſtone, which was ſaid to cure the epilepſy when taken internally. It ſeems to have been a name given by ſome fanciful writers to the ALUMEN *phrenſicum*.

LINIMENT, *Linimentum*, from the Latin *linire*, *to anoint gently*, in *Pharmacy*, a form of external medicine, made of unctuous ſubſtances, uſed to rub on any diſtempered part.

The *liniment* is of a mean conſiſtence between an oil and an unguent.

The uſe of *liniments* is to ſoften aſperities of the ſkin, moiſten parts that need humectation, reſolve the humours that afflict the patient, and give him eaſe. There are various kinds of *liniments* uſed, according to the various occaſions.

LINIMENTUM *album*, a form of medicine differing in nothing from the *unguentum album*, but in that it is a little ſofter: they are both preſcribed in the late London Pharmacopœia, and both made of the ſame ingredients. The preſcription for this is as follows: take oil-olive three ounces, ſpermaceti ſix drachms, white-wax two drachms; melt all together over a gentle fire, ſtirring it till it is perfectly cold.

This *liniment* may be applied in caſes of excoriation, where, on account of the largeneſs of the ſurface, the ointment with lead or calamine, might be improper.

LINIMENTUM *arcæi*. See ELEMI.

LINIMENTUM *ſaponaceum*, the ſoap-*liniment*, a form of medicine preſcribed in the late London Pharmacopœia, and meant to ſupply the place of the ointment well known by the name of *opodeldoc*. It is made thus: take ſpirit of roſemary a pint, hard Spaniſh ſoap three ounces, camphor one ounce; digeſt the ſoap with the roſemary ſpirit, till it is diſſolved, and then add the camphor; when this is melted, the whole is finiſhed.

A *liniment* of this kind may be prepared by rubbing an ounce of camphor, with two ounces of Florence oil, in a mortar, till the camphor be diſſolved. This anti-ſpaſmodic *liniment* may be uſed in obſtinate rheumatiſms, and in ſome other caſes, accompanied with extreme pain and tenſion of the parts.

LINIMENTUM *volatile*, a form of medicine preſcribed in the late London Diſpenſatory, and ordered to be made of oil of almonds, an ounce; ſpirit of ſal armoniac, made without lime, two drachms; theſe are to be ſhook together in a wide-mouthed vial, till they are perfectly mixed. Or this *liniment* may be prepared by ſhaking together an ounce of Florence oil, and half an ounce of ſpirit of hartſhorn. If the patient's ſkin is able to bear it, the *liniment*, made with equal parts of the ſpirit and oil, will be more efficacious. Sir John Pringle obſerves, that in the inflammatory quinſey, a piece of flannel moiſtened with this *liniment* and applied to the throat, to be renewed every four or five hours, is one of the moſt efficacious remedies; and that it ſeldom fails, after bleeding, either to leſſen or carry off the complaint.

A *liniment* for burns may be made by ſhaking well together in a wide-mouthed bottle equal parts of Florence oil, or of freſh drawn linſeed oil, and lime-water. This is found to be an exceeding proper application for recent ſcalds or burns. It may either be ſpread upon a cloth, or the parts affected may be anointed with it twice or thrice a day.

A *liniment* for the piles may be made by mixing two ounces of emollient ointment, and half an ounce of liquid laudanum, with the yolk of an egg, and working them well together.

LINKIO, in *Botany*, a kind of water-plant among the Chineſe, the fruit of which is of a triangular pyramidical form, prominent every way, with a green thick rind, that grows reddiſh towards the apex, and, when the fruit is dried, grows black. The internal ſubſtance is exceeding white, its taſte like that of a cheſnut, three or four of which it equals in bulk. The plant is found in ſtanding waters, and has very ſlender leaves, that ſpread themſelves over a large extent on the ſurface of the water, and the fruit lies concealed under water in great numbers.

LINNÆA, in *Botany*, the name of a genus of plants of the *didynamia angioſpermia* claſs, given by Gronovius in honour of his friend Linnæus, the characters of which are theſe: the cup is a double perianthium; the perianthium of the fruit conſiſts of two leaves; the perianthium of the flower ſtands upon the germen, and is narrow, erect, and acute, and compoſed of one leaf divided into five ſegments; the flower is monopetalous, of a campanulated form; it is twice as large as the cup, and is ſlightly divided into five ſegments at the edge; the ſtamina are four ſubulated filaments, inſerted in the baſe of the flower; two of theſe are very ſhort, but the two longer are not ſo long as the flower; the antheræ are of a very compreſſed figure, and can turn round upon the ſtamina; the germen of the piſtil is roundiſh,

roundish, and is placed within the cup; the style is straight and slender, and is of the length of the flower; it always bends toward one side, and is terminated by a globose stigma: the fruit is a dry oval berry of three cells, and is covered with the hairy and glutinous cup of the flower; the seeds are single and roundish. There is only one species.

LINNEAN *system of botany*. See BOTANY, FLOWERS, and SEXUAL *System*.

LINNET, *linaria*, in *Ornithology*, a genus of birds, of which there are several species. The general characters of the genus are these: the birds of it are somewhat smaller than the chaffinch: their general colour is a greyish-brown; their tail is a little forked, the outer feathers of it having white extremities: and they all sing very sweetly. We have in England four species of this bird.

1. The common brown *linnet*, well known to every one. These birds are much esteemed for their song; they feed on seeds of different kinds, which they peel before they eat: the seed of the *linum* or flax is their favourite food, whence the name of the *linnet* tribe.

2. The *linaria rubra major*, or greater red-headed *linnet*: the FRINGILLA *cannabina* of Linnæus. This has a fine red head, a grey neck, a dusky reddish-brown back, and its breast and belly are somewhat reddish. The female of this species, however, has no redness in its head or breast, but has somewhat of a greenish cast on the brown of its back, and is yellowish on the breast, with some brownish spots. It is a common braid in the birdshops in London, when a male bird is distinguished from a female by a red breast, as in the case of this bird, to stain or paint the feathers, so that the deceit is not easily discovered, without close inspection. This species of *linnet* is frequent on our sea-coasts, and is often taken in the time near London. It is a familiar bird, and becomes chearful in five minutes after it is caught.

3. The *linaria rubra minor*, or lesser red-headed *linnet*: the FRINGILLA *linaria* of Linnæus. This is the least of all the *linnets*, and on the back is of the same colour with the common *linnet*; the back part of its head is red, and also its breast, but the lower part of its belly is whitish. In this species, the female as well as the male, has a red head; that of the male being ornamented with a rich shining spot of a purplish red, and that of the female of a saffron colour; and both have their beaks much sharper, and their feet and legs blacker than in the larger kind. This is a gregarious bird, whereas the larger species commonly flies single. This seems to be the species known about London by the name of stone red-poll.

4. The last species is the *linaria montana*, or mountain-*linnet*. This is the largest of all the *linnets*, according to Willoughby's description, though Mr. Pennant says that it is in fize rather inferior to the common *linnet*. Its beak is very small; its head and back are of the same colour with those of the common *linnet*, and the feathers of its breast and belly are black, edged with white; the rump of the male is of a fine and beautiful red, and thus distinguishes it from the female. This species is common in Derbyshire, but seems not so frequent in other places. However it is taken in the fame manner near London with the *linnets*, and called a *twite*. It breeds, according to Mr. Pennant, only in the northern parts of our island. Ray and Pennant.

It is remarkable of the *linnet*, that when it builds in hedges, and when in furze-bushes on heaths, in both which places the nests are very common, they are made of different materials. When they build in hedges, they use the finest filaments of the roots of trees, and the down of feathers and thistles; but when they build in heaths, they use moss, principally, for the outer part, finishing it within with such things as the place will afford, chiefly with wool and hair. These birds will have young ones three or four times a year, especially if they are taken away before they are able to leave the nests. They lay five whitish eggs, spotted like those of the gold-finch.

When they are intended to be taught to whistle tunes, or to imitate the notes of any other bird, they are to be taken from the old one when they are not more than four days old; for at this time they have no idea of the note of the old ones, and will readily be taught to modulate their voice like any thing that is most familiar to their ears, and within the compass of their throats. The honourable Mr. Barrington observes, that in order to be certain that a nestling will not have the call of its species, it should be taken from the nest when only a day or two old; though a bird of this age requires great trouble in breeding, and the chance is greatly against its being reared. There requires more care in the feeding them when they are taken thus young, than when they are left in the nest till nearly fledged, but they will be reared very well upon a food half bread and half rape-feed, boiled and bruised: this must be given them several times a day. It must be made fresh every day, and given them sufficiently moist, but not in the extreme. If it be in the least sour, it gripes and kills them; and if too stiff, it is as mischievous, by binding them up.

They must be hung up as soon as taken from the nest, under the bird whose note they are intended to learn; or if they are to be taught to whistle tunes, it must be done by giving them lessons at the time of feeding; for they will profit more while young in a few days, than in a long time afterwards, and will take in the whole method of their notes before they are able to crack hard seeds. Some have attempted to teach them to speak, in the manner of the parrot, or other birds, and they will arrive at some sort of perfection in it with great pains.

Mr. Barrington mentions a *linnet*, which, being taken from its nest when only two or three days old, almost articulated the words *pretty boy*, as well as some other short sentences. See SONG *of birds*.

LINOZOSTIS, in *Botany*, a name given by the ancient Greek writers to two plants very different from one another; the one is the *mercurialis*, or English mercury, a plant common in uncultivated places, and eaten by many boiled in the manner of asparagus; the other the *epithimum*, or dodder, growing upon the plants of flax. Theophraftus, Dioscorides, and the ancient Greeks, use the word in the firft fenfe, and the modern Greeks in the latter.

The Latin authors call this *linozoftis*, or *epithimum*, sometimes *cuscuta lini*, and *podagra lini*, looking on it as a diseafe which chokes the plant it grows on, and caufes gouty tumors on the ftalks. See DODDER.

LINSEED, or LINE-SEED, a fort of grain, being the feeds of the common FLAX, which enters the compofition of feveral medicines, and yields, by expreffion, an oil, that has moft of the qualities of nut-oil, and is according generally ufed, in lieu thereof, in painting, and for burning.

Thofe who manufacture it in large quantities have mills turned by horfes or water, for the more expeditious difpatch of their work.

That drawn without the affiftance of fire, is of much eftcem in medicine, and fuppofed good in the cure of catarrhs, coughs, afthmas, and other diseafes of the breaft, &c.

The quantity of *linfeed* annually imported into England, Scotland and Ireland, is not lefs than 240,000 bufhels.

Linfeed, from which the oil has been expreffed, boiled in milk, and applied warm in a cloth to burnes, is much recommended in the Satyr. Sibelius. fpecim. 4. obf. 4.

Thefe feeds, in this ftate, are frequently employed in emollient and maturating cataplafms. The feeds, boiled in water, yield a large proportion of a ftrong flaxen-like mucilage; but to rectified fpirit they give out little or nothing. Thefe feeds have been fometimes ufed, in a feafon of fcarcity, inftead of grain; but they appear to be an unwholefome as well as unpalatable food. Tragus relates, that thofe who fed upon them in Zealand, had the hypochondres in a fhort time diftended, and the face and other parts fwelled; and that not a few died of thefe complaints.

LINSEED, *infufion of*. See INFUSION.

LINSPINS, or LINCHPINS, are fmall pins of iron, which keep the wheel of a cannon, or waggon, on the axle-tree; for when the end of the axle-tree is put through the nave, the *linfpin* is put in to keep the wheel from falling off.

LINSTOCK, a fhort ftaff of wood, about three feet long, having at one end a piece of iron divided into two branches, each of which has a notch to hold a piece of match, and a fcrew to faften it there; the other end being alfo fhod with iron, and pointed, to ftick into the ground, or in the deck when it is ufed at fea. It is ufed by the gunners in firing cannon. It is frequently ufed in fmall veffels, in an engagement, where there is commonly one fixed between every two guns, by which the match is always kept dry and ready for firing.

LINT, in *Surgery*, is the fcraping of fine linnen, ufed by furgeons in dreffing wounds. It is made into various forms, which acquire different names, according to the difference of their figures.

Lint made up in an oval, or orbicular form, is called a PLEDGET; if in a cylindrical form, or in the fhape of a date or olive-ftone, it is called a TOSTIL.

Thefe different forms of *lint* are required for many purpofes; as, 1. To ftop blood in frefh wounds, by filling them up with dry *lint* before the application of a bandage; though if fcraped *lint* be not at hand, a piece of fine linen may be torn into fmall rags, and applied in the fame manner. In very large hæmorrhages the *lint*, or rags, fhould be firft dipt in fome ftyptic liquor, alcohol, or oil of turpentine, or ftrinkled with a ftyptic powder.

2. To

2. To agglutinate and heal wounds; to which end *lint* is very serviceable, if spread with some digestive ointment, or balsam, or dipt in some vulnerary liquor. 3. In drying up wounds and ulcers, and forwarding the formation of a cicatrix. 4. In keeping the lips of wounds at a proper distance, that they may not hastily unite, before the bottom is well digested and healed. 5. They are highly necessary to preserve wounds from the injuries of the air. Small portions of *lint* tied round with a thread are chiefly used in dressing wounds and ulcers of the deeper kind. They are always applied to the bottom of such wounds, the remaining cavity being filled up with other portions of *lint*. By this means, the immediate removal of the dressings is not only provided for, but the possibility of leaving any part of them in the bottom of the wound is prevented.

In very large wounds, and especially in amputations of the limbs, which operations are frequently required in the army and navy, at times when *lint* is very scarce, it will be very sufficient to dress the bare bone and face of the wound with scraped *lint*, filling up the cavity with tow, and covering all with a large compress.

Surgeons of former ages formed compresses of sponge, feathers, wool, or cotton, linen being scarce; but *lint* is far preferable to all these, and is at present universally used. Heist. Surg. Introd. sect. 54.

LINTEL, in *Architecture*, the piece of timber which lies horizontally over door-posts and window-jambs; as well to bear the thickness of the wall over it, as to bind the sides of the walls together.

LINUPAR, in *Botany*, a name used by some of the writers of the middle ages, to express the water-lily. The Arabians gave this genus of plants the name of NILUFAR, and this word *linufar* is only formed of that, by transposing some of the letters.

LINUM, in *Botany*. See FLAX.

LINUM *carpasium*, *carpasian flax*, or *linen*, a term often occurring in the old writers, and used by different authors in very different senses.

The first use we find made of the word, is for the expressing a kind of *flax* which was finer and smaller, as well as brighter and more glossy than any other. Pliny uses the word in this sense, and tells us, that such *flax* was principally brought from Spain; and that both it, and the *linen* made of it, were, at his time, called by the name *carpasian*: from this it became a custom to call all very fine flax, or fine *linen*, *carpasian linen*, and the word signified no more than delicate, or fine.

The modern Greeks use the word in this sense, and Suidas expresses the finest *linen* veils by the term *carpasian*. The author of the Periplus Maris Erythræi, who was contemporary with Pliny, calls the *flax*, of which the Indian *linens* were made, *carpasos*; but none of the older Greeks have the word. This author is not, however, to be appealed to for ascertaining the purity of the language of the ancients; for it is plain that he has taken in many words which are not good Greek, nor ever were used by any author of credit, but are the mere technical terms of the tradesmen and merchants of that time.

Pausanias uses the word *carpasinon linum* in a very different sense from all these; for with him it is made to express the *flax* made of the stone ASBESTOS, and the *linen* made of this, which was thrown into the fire to be cleaned. Solinus uses the word also in the same sense: he says, that in Carystos there was found that kind of *flax* which remained unhurt in the fire; and Hieronymus Mercurialis thinks that the *carbasus* of the ancient Romans was a word properly used only to signify the *carpasian flax* of Pausanias, which was not to be destroyed by the fire, and was the true *linum incombustibile*, or threads of the asbestos stone, or *linen* made of that material. This, however, is not the sense of the word in later times, for we find it evidently used for all *linen* manufactures of whatever kind.

LINUM, *carystium*, in *Natural History*, a name given by Pausanias to the ASBESTOS. It was found plentifully, in this author's time, near Carystos, a town in the Negropont, and thence obtained its name.

LINUM *catharticum*, *purging-flax*, in *Medicine*, makes a common purge among the country people. It is almost as rough as that of *gratiola*.

It is a species of wild *flax*, distinguished by the name of meadow-*flax*, with small flowers which appear in July, and commonly called mountain-*flax*, growing without culture on chalky hills and dry pasture grounds in many parts of England, and is taken in infusion in ale.

This herb is said to be an effectual and safe cathartic: an infusion of a handful of the fresh leaves in whey or white wine, or a dram of the leaves in substance with a little cream of tartar and aniseeds, are directed for a dose. Linnæus recommends an infusion of two drams of the dry leaves as a mild laxative.

It is greatly recommended by some in dropsies; and to prevent its griping they mix anise or some other of the carminative seeds with it. It is given in most chronic cases, where people's constitutions are strong enough to bear it, and often with great success.

LINUM *vivum*, or *incombustible*, cloth made of a fossile, stony substance, of a whitish colour, and woolly texture, separable into threads, or filaments, which will endure the fire without consuming. See ASBESTOS.

As to the art of managing this mineral, and of spinning and weaving it, &c. the accounts we have are various. Marco Polo, the Venetian, gives us the manufacture of the *linum*, found in the province of Chinchintbelas in Tartary, from one Curfica, a Turk, superintendant of the mines of that country, as follows. The lanuginous mineral, being first dried in the sun, is then pounded in a brass mortar, and the earthy part separated from the woolly, which is afterwards well washed from filth; being thus purged, it is spun into thread like other wool, and after woven into cloth, which if foul or spotted, they cleanse, he says, by throwing it into the fire for an hour's time, whence it comes out unhurt, as white as snow: which very method, according to the account given us by Strabo, seems to have been used, in ordering the Cretan amianthus; with this addition, that after it was pounded, and the earthy part separated from the woolly, he says it was combed; and so does Agricola. Signior Ciampani, after describing four sorts of the *linum*, whereof he had specimens in his museum; the first sent him from Corsu, the second from Sestri di Ponente, the third coarser and darker than the rest, and the fourth from the Pyrenean; and after observing, that though he kept it three weeks in a glass-house fire, yet he found it unaltered, though it could not preserve a stick, wrapped in it, from the fire; he proceeds to shew the manner of spinning, and making it into cloth, which he effected thus:—He first laid the stone in water, if warm the better, for some time to soak; then opened and divided it with his hands, that the earthy parts might fall out of it, which are whitish like chalk, and serve to bind the thready parts together. This makes the water thick and milky. That operation he repeated six or seven times, with fresh water, opening and squeezing it again and again, till all the heterogenous parts were washed out, and then the flax-like parts were collected, and laid in a sieve to dry. As to the spinning, he first shews a method discovered to him, which is thus:—Lay the *linum*, cleansed as before, between two cards, such as they card wool withal, where let it be gently carded, and then clapped in between the cards, so that some of it may hang out of the sides; then lay the cards fast on a table, or bench; take a small reel, made with a little hook at the end, and a part to turn it by, so that it may be easily turned round; this reel must be wound over with white thread: then, having a small vessel of oil ready, with which the fore finger and thumb are constantly to be kept wet, both to preserve the skin from the corrosive quality of the stone, and to render the filaments thereof more soft and pliant; by continuing to twist about the thread on the reel in the asbestos hanging out of the cards, some of the latter will be worked up together in it; and, by little and little, the thread may, with care, be woven into a coarse sort of cloth; and, by putting it into the fire, the thread and oil will be burnt away, and the incombustible cloth remain.

But finding this way, of uniting the stone with the thread, very tedious; instead of the thread, he put some flax on a distaff, and, by taking three or four filaments of the asbestos, and mixing them with the flax, he found, they might be easily twisted together, and the thread thus made much more durable, and strong; so that there is no need of carding, which rather breaks the filaments, than does any good: only open and separate the filaments, after washing, on a table, and take them up with the flax, which is sufficient.

As to the making of paper, he says, in the washing of the stone there will remain several short pieces in the bottom of the water, of which paper may be made in the common method. He concludes with the best way of preserving the cloth, or any thing made of the linen, which, by reason of its excessive dryness, is very apt to break, and twist; and it consists in keeping it always well oiled, which is the only preservative. When the cloth is put in the fire, the oil burns off, and the cloth comes out white and purified. See ASBESTOS.

LION, *Leo*, in the Linnæan system of *Zoology*, is a species of quadrupeds, belonging to the FELIS or *cat* kind, with a long tail and pale-red or tawny body.

The head of the *lion* appears very large, in proportion to its body, and is the most fleshy of the heads of all the known animals; its jaw-bones also are remarkably large; the breast also appears very large, but this is only owing

to the great quantity of long hair that covers it, for the ſternum is ſmaller than that of moſt animals of the ſame ſize; the tail, which is very long, appears alſo of the ſame thickneſs all the way, but this is wholly owing to the growth of the hair; the tail itſelf is largeſt at the baſe, and thence goes taper to the point; but the hair being very ſhort near its baſe, and continuing to grow longer all the way, as that decreaſes in thickneſs, is ſo exactly proportioned in its growth, that it always gives the whole tail this regular appearance. The length of the largeſt *lion* from noſe to tail is above eight feet; the tail is four feet. See *Tab.* III. *of Quadrupeds*, N° 27.

The long hair that grows about the neck and breaſt, and makes what is called the mane of a *lion*, only differs from the hair of the reſt of the body in length, having no greater thickneſs or rigidity, like that of the manes of other animals. The claws of the *lion* have no caſes, as Pliny pretends that they have, for the animal to withdraw them into in walking; but Plutarch, Solinus, and ſome others, are much more in the right in ſaying that the *lion* draws them up backwards when he walks, and places them cloſely among the articulations of the toes.

The tongue of the *lion* is very rough and rigid, being covered with a great number of prominences of a hard matter, reſembling that of a cat's claws, and theſe are much in the ſhape of thoſe claws, and nearly of the ſame ſize, the baſe of each being a round fleſhy prominence on the ſurface of the tongue.

The eyes of the *lion* are clear and bright, even after the creature is dead. The common obſervation that this creature ſleeps with its eyes open, is founded on this, that it has a very thick membrane lodged in the greater canthus of the eye, which it can extend over the whole eye upon occaſion, as birds do their *membrana nictitans*, and thus will have no occaſion to ſhut its eye-lids, in order to exclude the light. It is very remarkable, that the common cat has all the ſingular ſtructure of the ſeveral parts as the *lion* has, its claws, feet, tongue, and eyes, being of the ſame kind, and its internal parts bearing as ſtrong a reſemblance.

The heart of a *lion* is much larger than that of any other creature of the ſame ſize, being ſix inches long, and four in diameter, in the largeſt part, and terminating in a very ſharp point; and the brain is as remarkably ſmall.

The *female* has no mane, or long hairs upon the neck and breaſt, which ſo remarkably characteriſes the *lion*. The noſe alſo is longer in the *female*, and the head more flatted in the upper part; the claws alſo are much ſmaller than thoſe of the male *lion*. This creature, when full grown, is about three feet high, from the fore-feet to the ridge of the back, and about five feet long from the end of the noſe to the inſertion of the tail, which is about two feet and a half long; the claws are of a fibrous texture, the fibres being very hard in themſelves, but eaſily ſeparable from one another. In other particulars, the *female* very little differs from the *lion*. See *Tab.* III. *of Quadrupeds*, N° 28.

The *lion* is an inhabitant of all parts of Africa, and the hot parts of Aſia, ſuch as India and Perſia, and ſome few are found in the deſerts between Bagdat and Baſſorah, on the banks of the Euphrates; but they moſt abound in the torrid zone, where their ſize is the largeſt, and their rage moſt tremendous, being inflamed by the influence of a burning ſun on a very dry ſoil. It is obſerved, that, though they reign abſolute maſters over every beaſt, their rage diminiſhes and their timidity increaſes as they approach the habitation of the human race. They have been alſo known to ſpare the weaker animals, and many inſtances are related by A. Gellius, Ælian, and Pliny, &c. of their gratitude. *Lions* are capable of being tamed; and the monarch of Perſia is ſaid on days of audience, to have two large *lions* chained on each ſide of the paſſage to the room of ſtate, led there by keepers in chains of gold. The *lion* preys on all kinds of animals; having rouſed them into view by his roar, he ſtarts on his prey, ſtriking it with his talons and tearing it to pieces. He alſo invades the folds, leaping over the fences with his prey, and his ſtrength is ſo great, that he can carry off a middling ox with the utmoſt eaſe. He ſometimes ſeizes his prey by ſurpriſe, and mankind falls a victim to his hunger, more through neceſſity, as it is ſaid, than choice. The Arabs have a notion of his ſparing the tender ſex, but Dr. Shaw informs us in his Travels, p. 244, that the *lion* obſerves no diſtinctions in theſe days. The fleſh is often eaten in Barbary, and is ſaid to reſemble veal in taſte. Pennant's Brit. Zool. p. 165, &c.

The French, when they had once a ſick *lion*, attempted to recover him from his ſickneſs by ſuch foods as nature never intended him, that is, by the tender and pure fleſh of young animals, without any of the external coat. They gave him young lambs ſkin'd alive for this purpoſe; but nature not having given this animal the ſubtlety to flay his food, and the hair, wool, feathers, &c. being as neceſſary to theſe beaſts of prey with the fleſh, as that fleſh itſelf, the new food bred too much blood, and proved a worſe diſeaſe than that he had before, ſo that he ſoon died.

LION, *ſea*. See SEA-*Lion*.

LION-*pucceron*, in *Natural Hiſtory*, the name given by Mr. Reaumur to a genus of worms which deſtroy the *pucerons* in the ſame manner that the *formica leo* does the ants.

Theſe little inſects are a prey alſo to a ſort of worm hatched from the egg of a two-winged fly. This has no legs, and is of ſeveral colours. See VER-*pucceron*.

Though theſe *lion-pucerons* be all hexapodes, yet they are of different origin; ſome being produced from the eggs of a four-winged fly, others from thoſe of a beetle. As the *formica leo* has two horns, the extremities of which ſerve him by way of mouths, our *lion-pucceron* has the ſame kind alſo; but as the former of theſe inſects can only move backwards, and is forced to make ſnares for his prey, not being able to hunt it, this creature runs very nimbly in the common way, and ſeizes its prey, without having recourſe to ſuch ſtratagems.

The body of the *lion-pucceron* is longer than that of the *formica leo*, and is flat; the breaſt is the thickeſt and broadeſt part of it, and from this it gradually tapers off to a point at the tail; it has two legs fixed to the breaſt, the other four to the anterior rings of the body, and when it moves, the poſterior end of the body ſerves it in the place of a ſeventh leg, for it always bends it downward, and draws it along the ſurface it walks upon. The back of this creature is not ſmooth or gloſſy, but is every where rough, and full of wrinkles, and ſeems as if every ring of it was compoſed of ſeveral other ſmaller rings.

This is the general deſcription of the creature, treating of it in the general way, theſe characters ſuiting all the kinds of it. There are others, however, by which the whole claſs may be divided into three principal kinds.

Theſe are much more voracious devourers of the *pucerons*, than the worms which feed on them. A ſmall *pucceron*, ſeized by one of them, is eaten in an inſtant, and the very largeſt is not the work of half a minute for them. Theſe creatures are very ſmall when firſt produced from the egg, and yet they immediately begin to feed. They are ſo ravenous of food alſo, that whenever they can they catch and eat one another. But as the *pucerons*, among which they live, are eaſier to be caught, they uſually eſcape one another's fury pretty well; unleſs where there is a ſcarcity of the *pucerons*, or when they offend one another.

It is eaſy to conceive that a creature, which feeds ſo very faſt, muſt ſoon arrive at its full growth; and this is the caſe with theſe animals, for within five or ſix days of their being hatched from the egg, they are ready for their final tranſformation, or the putting on the form of the animals to whoſe eggs they owed their origin. In order to this, the creature leaves the place where he has hitherto fed, and ſeeks the folds of a leaf, or ſome other ſuch convenient receptacle, where it ſpins a web of very fine ſilk, every way ſurrounding its body with it, and under this cover paſſes the ſtate of a nymph or chryſalis. The ſilk of this web is not only very ſtrong, but the threads are very cloſely laid together, ſo that it is much firmer than the webs of any of the caterpillar kind. It is of a roundiſh figure, and is ſomewhat ſmaller than a pea.

This round figure is owing to the form into which they roll up their body, which ſerves as a mould for it; and the orifice, out of which the ſilky matter is produced, is at the extremity of the poſterior part of the body. The creature continues in this ſtate about three weeks, if it be in the beginning of ſummer that it goes into it; but if toward autumn, it remains in it all the following winter; and is afterwards, in ſpring, ſeen to come out in the form of a very beautiful fly, of a remarkable large ſize, in proportion to the creature it is produced from, and the web out of which it comes. It is a very long bodied one, and much reſembles the libella or dragon-fly, only that its wings are larger in proportion to its body: theſe wings are of a moſt delicately fine ſtructure, the ſmall gawfe being coarſe and thick in compariſon to them. Theſe, when the creature is at reſt, are placed in an angle over the body, and form a ſort of canopy or tent for it, but they are ſo perfectly tranſparent that the body is eaſily ſeen through them. The body and breaſt are all green, and that of a very beautiful tinge; but the moſt remarkable beauty of this creature is in its eyes; theſe are large and prominent, and are of a fine gold colour, and of greater luſtre than the moſt highly poliſhed metal.

The eggs of this fly are a very ſingular object, and cannot have eſcaped the eye of any perſon who is converſant among the inſects which live on trees; though of the many who have ſeen them, perhaps few or none ever found what they really were. It is common to ſee on the

the leaves and pedicles of the leaves of the plum-tree, and several other trees, as also on their young branches, a number of long and slender filaments, running out to about an inch in length, and being of the thickness of a hair; ten or twelve of these are usually seen placed near one another, and a vast number of these clusters are often found on the same tree. The end of each of these filaments is terminated by a sort of swelling or tubercle of the shape of an egg. People who have observed these, have generally supposed them to be of vegetable origin, and that they were a sort of parasitical plants, growing out of others, as the mistetoe, mosses, &c. from the oak and other trees. They very much resemble in figure those species of mouldiness, which Malpighi and others have figured under the shape of little mushrooms, only they are much larger than those little plants, and bear the heat of the sun and other accidents uninjured, which would destroy the tender plants of that kind. There is a time, when these egg-like balls, which terminate every one of these filaments, are found open at their ends, and in this state they very much resemble flowers, and they are in this state figured by some authors under the name of flowers of a singular kind, found on the leaves of the willow. All this, however, is wholly erroneous, and the pursuing the history of our *lion-pucerons*, shews their true origin to be from the fly of that creature. What these authors took for flowers of the willow were only the egg of this fly, out of which the young animals had been hatched, and had made their escape. The leaves and branches on which these eggs are found, are usually seen covered over with the *pucerons*; and the creature providing a place where her young shall find nourishment as soon as hatched, places her eggs in the midst of these harmless and defenceless animals, fixing each on a slender pedicle, yet sufficiently strong to bear its weight. If these eggs be nicely examined, a worm may be discovered in them while yet whole; but the most certain way of judging of them, is, to put several of them into a box, in which case every one of them is found at a proper time to hatch, and to give an insect; which, when viewed by the microscope, appears plainly to be a *lion-pucerons* in all its parts, and requiring only increase in size, without any change of shape, to be one of those we have already described, as feeding so voraciously on the *pucerons*. Reaumur's Hist. Ins. vol. vi. p. 142.

LION, *ant*, in *Zoology*. See FORMICA *Leo*.

Conilia LION'S *foot, cotunnoides*, in *Botany*, a genus of the *syngenesia polygamia aequalis* class. Its characters are these: the flower is composed of many hermaphrodite florets, included in one common scaly empalement, which is permanent and elegant; the florets are of one leaf, tongue-shaped, indented in five parts, and they have each five short hairy stamina; the germen is situated below the flower, and becomes a single oval seed, compressed and crowned with bristles, inclosed in the empalement. There are two species.

LION'S *leaf, leontice*, in *Botany*, a genus of the *hexandria monogynia* class. Its characters are these: the empalement of the flower is made up of six very narrow leaves; the flower has six oval acute petals, and six nectaria, which are fixed by small foot-stalks to the base of the petals; it has six stamina; in the centre is placed an oval germen, which becomes a globular, swollen, succulent berry, with one cell inclosing two or three globular seeds. Miller reckons two species, and Linnæus four.

LION'S *tail, leonurus*, in *Botany*, a genus of the *didynamia gymnospermia* class. Its characters are these: the flowers have one petal of the lip kind, the upper lip cylindrical, hairy, and entire; the lower lip reflexed and cut into three parts; it has four stamina, two of which are shorter than the other; in the bottom of the tube, are situated four germina, which become four oblong angular seeds, sitting in the empalement. Linnæus has joined the species of this genus to the PHLOMIS, and has applied this title to the *cardiaca*. See MOTHER-*wort*.

LIONCELES, in *Heraldry*, a term for lions when there are more than two of them borne in any coat of arms, and no ordinary between them.

LIONINE, or LIONAGE, in the history of the *Coins* current in Ireland, a name given to certain coins, imported privately from France and other places. There were beside these many others of the same sort, impressed with eagles, roses, and the like, and called by names signifying those impressions. They were a very base and poor sort of money; the penny *lionine* or *lionine*, not coming up to the value of the halfpenny of the coin of the kingdom. They were discountenanced in the year 1300, and good money being struck there, it was made death, and confiscation of goods, to import any of them: and the run of them was thus stopped.

LIP, in *Anatomy*. See LIPS.

LIP *of a horse*, in the *Manage*, is the skin that covers the sides of the mouth, and surrounds his jaws. A horse is said to arm or guard himself with his *lips*, when his *lips* are so thick, that they cover their bars, and keep off the pressure of the curb.

LIPA, of νειπω, *fat*, a word used frequently by Hippocrates to express any thing fat or oily. He calls certain stools, which have a fatty appearance, by this name. These are esteemed a sign of great colliquation. He also applies it to a sort of fatty substance, often seen swimming on the surface of the urine like a spider's web: this the same great author gives as a sign of a consumption.

LIPARÆUS *lapis*, in the *Natural History of the Ancients*, the name of a stone usually found in Liparis, one of the Æolian Islands, and brought thence in the time of the Greeks among the pumices, of which that place always afforded them a large quantity.

It was a small stone, about the bigness of a filbert, of an irregular and uncertain shape, and porous and friable constitution, like that of the pumices, but more easily falling to pieces on rubbing between the fingers than even the softest of them; the colour was a dusky grey, and the whole external surface plainly shewed that it had suffered changes by the means of fire. The stone at present, however, is so little regarded, that the writers on such subjects have even forgot to name it. They are sometimes brought to us, to this day, among the pumices from the burning mountains, but are not regarded.

LIPARIS, in *Ichthyology*, the name of a fish of the general order of the anguilliformes, or eel-shaped, and most approaching to the blanda, of any species. Its head is shaped somewhat like that of a rabbit. It is brought to the table among other small fish, but is of an insipid taste, and generally either offends the stomach, or urges to stool. It is caught in the Mediterranean and other seas. The name is originally Greek, and is formed of the adjective λιπαρος, *fat*.

The *liparis* is a species of the CYCLOPTERUS in the Linnæan system.

LIPARIS is also used by some for the fish, called by authors the GUNNELLUS, and by the people of Cornwall the *butter-fish*.

LIPARIS, in *Botany*, a name given by some authors to the pinguicula, butterwort, or Yorkshire fanicle.

LIPARIS *austriaca*, in *Ichthyology*, the name of a small fish, common on the coasts of Yorkshire and some other parts of England, and called in English the *snail*, and LIMAX *marinus* by some authors. It is about five fingers long; on its back and sides it is of a bright brown, and on the belly of a fine white: these are its colours, when fresh taken, for when it has been kept ten or twelve hours, the whole surface of the body, except the fins, becomes of a paler and bright brown. The head is thick, and not flat, but rounded; it has no teeth, but its jaws are both rough like files.

The whole fish, head as well as body, is very soft and unctuous, and easily melts into a sort of oily liquor. It is caught principally at the mouths of great rivers where they open into the sea.

LIPOTHYMIA, or LIPOPSYCHIA, in *Medicine*, a sudden diminution, or failure, of animal and vital actions; otherwise called a *swooning* or *deliquium*.

The word *lipothymia* comes from the Greek λειπω, *deficio*, and θυμος, *animus*; and *lipopsychia* from ψυχη, and ψυχω, *the soul*.

This disease is usually confounded with the SYNCOPE, but is really different from it in many particulars.

The *lipothymia* is a very considerable abolition of the vital and animal faculties, at least to appearance; and the syncope is a plenary or total abolition of them, as far as appears to us at the time. It is easy to see, however, that these are only two different stages of the same distemperature. The *lipothymia* is sometimes an idiopathic, sometimes a symptomatic disease, and most frequently attends the scurvy, malignant fevers, and other disorders: the syncope is idiopathic, and attacks persons in health as well as those that are diseased. The *lipothymia* is always easily distinguished from a convulsed state of the body, by this, that the limbs are all flaccid in it. The syncope differs from death only in degree: and the body being flaccid in this, and growing rigid under the last convulsions in death, is the only distinction of them in extreme cases.

Causes of it. The general causes of swooning are sudden transitions from heat to cold, breathing hot foul *phlogisticated* AIR, great fatigue, excessive weakness, loss of blood, long fasting, fear, grief, and other violent passions of the mind.

Signs of it. The *lipothymia* is usually preceded by a remarkable anxiety about the heart, and this is succeeded by an immediate loss of life and motion for a time: the senses, and the animal motions, and even the pulse,

seeming all to be loſt for a time; and the heart flutters weakly, or trembles, and reſpiration is ſcarce ſenſible. In the ſyncope, the reſpiration as well as the pulſe ſeem wholly impeded, and the patient appears wholly dead; the face looks as pale as in a corpſe, and the limbs are wholly flaccid, and without motion. The extremities grow cold, and the eyes are either ſhut, or turgid, and inflamed; the mouth is ſometimes ſhut, but not clenched firmly together as in convulſions, and ſometimes it continues frightfully open; and as ſoon as the paſſion comes to himſelf he uſually ſighs ſeveral times, and reſpiration ſeems very much laboured.

Perſons ſubject to it. The idiopathic *lipothymy* is a very uncommon complaint, and the perſons ſubject to it are thoſe of weak nerves, delicate conſtitution, and of a tender and ſenſible diſpoſition, who are eaſily affected by the ſeveral paſſions, and particularly by fear; or ſuch as have been before frequently ſubject to it in diſeaſes, or are of a melancholic habit. People who uſe inceſſant ſtudy for a long time on many occaſions, alſo ſometimes fall into it, women with child are alſo ſubject to it from the preſſure of the breaſt from the abdomen; and unmarried women, when they faint at meals, give too much cauſe to ſuſpect this to be the caſe with them. Some people who are paſſionate, and ſuppreſs violent fits of it while at their meals, fall into faintings alſo.

The ſymptomatic *lipothymy* is a very common diſorder, and ariſes from a great number of different cauſes. Women who have ſuppreſſion of the menſes are very frequently ſubject to it. People fatigued with violent emetics alſo often fall into it, as do alſo perſons exhauſted by violent hæmorrhages, by profuſe ſweats, diarrhœas, violent pains of any kind, and by want of food. People, on the contrary, who are very voracious, and load the ſtomach with great quantities of food as often fall into it; and women after hard child-birth, or too great a flux of the lochia, are very ſubject to it. People who have taken poiſons, and ſuch as have taken violently cooling medicines alſo ſometimes are ſubject to it; and thoſe, who in fevers, ſuddenly cool themſelves, and check their ſweats, or who once load the ſtomach with great quantities of food immediately after recovering from illneſſes. The approach of epidemical malignant fevers is often preſaged by faintings; and finally, people are ſometimes ſubject to them from omitting any cuſtomary evacuations.

Prognoſtics in it. An idiopathic *lipothymy*, which happens in healthy, but very tender and ſenſible, or melancholic perſons, and has had a fright, or ſome other paſſion for its origin, is a thing of no great conſequence for the preſent; but it is apt to grow upon people if not taken care of, and they will be perhaps always ſubject to it afterwards. *Lipothymies*, when ſymptomatic, are of much more conſequence. In chronic diſeaſes they are leſs dangerous ſymptoms than in acute ones, if attended with faintings in the beginning; for theſe often prove dangerous. In other ſtages of acute diſeaſes, faintings are always bad ſymptoms; but when they are owing to the ſuppreſſion of ſome habitual excretion, during the courſe of the diſeaſe, they are of leſs danger than when they appear without ſuch cauſes. All faintings that attend other diſeaſes are however to be regarded only as ſymptoms, not treated diſtinctly; and when the diſtemper which occaſioned them goes off, they naturally follow it. Syncopes that often return upon a perſon, and continue for a long time, frequently leave fevers behind them. Syncopes from hæmorrhages are often dangerous, eſpecially in perſons not accuſtomed to them, and to ſuch as are of a timid diſpoſition; whence women in child-bed, who are ſubject to faint, are to be carefully watched, for they ſometimes die in theſe fits.

Method of cure. In idiopathic *lipothymies*, ſtimulating glyſters, the ſprinkling of cold water upon the face, and the penetrating ſmells, ſuch as thoſe of the volatile ſalts, ſpirit of hartſhorn, free air, and Hungary-water, all tend to recover the loſt motion. To theſe are to be added undreſſing, or looſening the cloaths, lying down in a warm bed, frictions, ſternutatory powders, and the laying a little pepper, or a ſmall morſel of ſome pungent volatile ſalt upon the tongue. The hands and face ſhould alſo be ſprinkled with vinegar; and the patient ſhould have a ſpoonful or two of water, if he can ſwallow, with about a third part of vinegar mixed with it poured into his mouth: if theſe ſhould not remove the complaint, it will be neceſſary to bleed the patient and to give him a clyſter: but with reſpect to perſons who are weak and delicate, and ſubject to nervous diſorders, bleeding is dangerous; perſons who faint in cloſe rooms ſhould be immediately carried into the open air; their temples ſhould be rubbed with ſtrong vinegar, or brandy, and volatile ſpirits or ſalt held to the noſe. They ſhould be laid on their backs with their head low, and have a little wine or other cordial poured into their mouths, as ſoon as they are able to ſwallow it. If they have been ſubject to hyſteric fits, caſtor or aſſa-fœtida ſhould be applied to the noſe, or burnt feathers, horn, or leather &c. After the patient is, by theſe means, brought to himſelf, a glaſs of warm wine, with ſome tincture of ſaffron, is very proper to recruit the ſtrength; and if there be danger of a fever coming on, that is to be guarded againſt, by giving powders of mirre, crabs eyes, diaphoretic antimony, and a little cinnabar. In caſes where faintings happen from an undue repletion of the ſtomach, or from a weakneſs of the primæ viæ, with crudities lodged there, and attended with eructations, the uſe of digeſtive medicines is proper; and vomits ſhould be now and then given with them. When the faintings happen from the violence of emetic medicines, burnt wine, with the ſpices, is to be taken occaſionally in the day-time, and a moderate doſe of the theriaca at night. When faintings have been brought on by violent paſſions, the patient ſhould be ſuffered to remain at reſt, and made to ſmell to ſome vinegar: after he is come to himſelf, he may drink freely of warm lemonade, or balm tea, with ſome orange or lemon put in it. If the fainting fits have been long and ſevere, the ſtomach and bowels may be cleanſed by a vomit or an emollient clyſter; and when the operation of theſe is over, the nitrous and abſorbent medicines ſhould be given for a day or two, to prevent a fever, which often attends faintings from ſuch cauſes. When they happen to people exhauſted by repeated hæmorrhages, or by diarrhœas, profuſe ſweats, or other evacuations, the analeptics are the proper medicines to carry them off, and reſtorative electuaries, with coral and the like, are to be given; and the frequent eating of jellies, nouriſhing broths, ſago gruel with wine, new milk, and other things of a light and cordial nature recommended by way of prevention. All that can be done in the fit is to let the patient ſmell to a boule of Hungary-water, eau de luce, or ſpirits of hartſhorn; to rub his temples with brandy, or to lay a compreſs dipped in it to the pit of the ſtomach. The crudities of the primæ viæ muſt be cleared off by digeſtives and purging medicines; the mind muſt be unbent from ſtudy, and kept free from the violence of all paſſions; the neceſſary and habitual excretions muſt be, by all means, promoted; and the patients ſhould always have ſalts, and volatile ſpirits about them, to uſe on occaſion of being threatened with a fit. Finally, moderate exerciſe is always to be adviſed. In the time of the fit ſtimulating glyſters are never to be given, before it has continued a quarter of an hour; and in general, where there remains any ſign of life, they are not neceſſary; and during the time of the fit, an internal medicine muſt be given with the greateſt caution; for they are apt to paſs into the aſpera arteria. People, juſt recovered out of a fainting fit, are not to be ſuffered to ſleep, if they ever ſo much deſire it; and after the paroxyſm is thoroughly over, a chearfulneſs of temper will do more towards a thorough cure, and the prevention of returns, than all the medicines in the world. If a fever comes on immediately after the fainting, then the uſe of a glaſs of wine, ſo beneficial on all other occaſions of this kind, is not to be allowed, but recourſe is immediately to be had to antifebrific medicines. Vomits are very proper in faintings occaſioned by paſſion or terror, in the time of eating a hearty meal, or immediately after it; for it is much better that the food ſhould be thrown up undigeſted, than remain ſo in the ſtomach.

Many people are ſubject to faintings after bleeding; in this caſe the arm ſhould be but gently tied up, and they ſhould never be blooded after a full meal, nor get up immediately after the bleeding is over.

It is very obſervable, that in faintings ariſing from a preſent cauſe, as in the laſt mentioned article of bleeding, the patient has as at firſt ſome power of motion, though on a confuſed principle, and will often, before he faints, violently attempt to prevent the ſurgeon from tying up the arm; but in thoſe faintings, which are preſages of future miſchief, the patient always falls down at once to the ground, and has no power of motion, or ſenſe of it, in its approach. Junker's Conſp. Med. p. 673, and Buchan's Dom. Med. p. 479.

LIPPIA, in *Botany*, a genus of the *didynamia angioſpermia* claſs. Its characters are theſe: the empalement of the flower is permanent, roundiſh, compreſſed, and divided into four notches; the flower hath one petal, which is of the ringent kind; and hath four ſhort ſtamina, two of which are longer than the other; and oval germen, which afterward turns to a compreſſed capſule with one cell, opening with

with two valves, which appear like the scales of the empalement, inclosing two seeds which are joined. Linnæus enumerates three species of this plant.

LIPPITUDO is used, by Celsus, for a disease in the eyes, otherwise called ophthalmia.

LIPPITUDO is also used, by modern writers, for a disorder popularly called *blear-eyed*, arising from a decay of the natural moisture of the eyes, which then feel dry, and appear red and angry. See SCLEROPHTHALMIA.

LIPS, *labia*, the edge, or exterior part, of the mouth; or that musculous extremity which shuts and covers the mouth, both above and below.

The *lips*, besides the common integuments, consist of two parts: the *exterior*, hard and musculous; the *interior*, soft, spongy, and glandulous, covered with a fine membrane, which seems to be both a continuation of the epidermis, and of that pellicle which covers the glandulous membrane of the cavity of the mouth, the fore and protuberant parts of which are red, and called *prolabia*; the substance that forms these parts being a collection of very fine, long, villous papillæ, is extremely sensible, and very painful, when the outer membrane is by any accident destroyed. The internal membrane of the upper *lip* forms a small middle FRÆNUM, above the first dentes incisorii. Authors generally content themselves with calling the substance of the prolabia, spongy; but, in reality, it is glandulous, as appears by the scrupulous and cancerous humours to which it is subject. The muscles, of which the outer parts of the *lips* consist, are either *common* to them with other parts, or *proper* the common are, the *semi-orbicularis*, of which the superior is often broader than the inferior, having also this peculiarity, that all its fibres do not go to the corner of the mouth, but terminate by degrees between the middle and the extremities of the arch of the *lip*, nearly like the semi-oval fibres of the upper palpebræ; but the inferior is commonly more uniform in the disposition of its fibres; the *supra-semi-orbicularis* being fibres, which increase the breadth of the two lateral portions of the superior semi-orbicularis upward; the BUCCINATORES, which are two in number, each of them situated transversely between the posterior part of the two jaws and the corner of the mouth; and the ZYGOMATICI *majores*, which are two muscles situated, one on each side, between the zygoma and the corner of the mouth. The upper *lip* has four pair of proper muscles, viz. the *zygomatici minores*, which are two small slender muscles, lying above the great *zygomatici*, and almost parallel to them; the two *caninæ*, each of which is fixed by a broad insertion in the upper jaw, above the socket of the *dens caninus*, in a depression below the inferior edge of the orbit, near the *os malæ*, running down from thence a little obliquely, and crossing the lower extremity of the *zygomæus major*, which covers it at this place; and terminating at the extremity of the arch of the semi-orbicularis superior, and communicating by some fibres with the triangularis; the *incisorii laterales*, each of which is a sort of biceps, its upper part being divided into two portions, which unite below; and the *incisorii medii*, which are two small short muscles situated near each other, below the septum narium. The proper muscles of the lower *lip* are four pair; viz. the *triangulares*, each of which is fixed by a broad extremity in the outside of the basis of the lower jaw, from the masseter to the hole near the chin, seeming to be a continuation of the caninus major; the *triangularium collateralis*; the *incisorii inferiores*, each of which is fixed by the superior extremity on the alveoli of the lateral incisores of the lower jaw; and the *cutanei*, forming a kind of fleshy membrane, that covers the whole foreside of the throat and neck, from the cheek and chin, all the way down below the clavicles; besides the *quadratus*, which forms the thick part of the chin, below the under *lip*. The common muscles of the *lips* either draw both the corners of the mouth at once, or only one at a time, according to the different direction of their fibres. The proper muscles pull the different parts of the *lips*, in which they are inserted; the buccinators, in particular, may serve to move the food in mastication. Winslow. See ATTOLLENS, DEPRIMENS, and DEPRESSOR *labiorum*, ZYGOMATICUS, ORBICULARIS, &c.

All these parts are served with blood by some branches of the carotids, which the veins carry back to the external jugulars. Their nerves come from the fifth, sixth, and eighth pair of the head, and some from the *par accessorium*. The *lips* have a great share in the action of speech, and are of good use in taking in the food, &c.

Hare-LIP, a disorder, in which the upper *lip* is in a manner slit or divided, so as to resemble the upper *lip* of a hare; whence the name.

Sometimes the division is so large, that it appears as if part of the *lip* was wanting; and sometimes again the division is double. A like fissure is also sometimes made in the lower *lip* by a wound that has been neglected, or improperly treated: this last species of the disorder is termed the spurious *hare-lip*; the true kind is born with the infant. The less and more equal the fissure of the *hare-lip* is, it is generally so much the more easily cured. In some infants, the division of the *lip* is so large and irregular, that there can be but little hopes of a cure, which may, however, be easily performed on the very same *lip*, when adult. Sometimes too we meet with a tooth projecting forward into the fissure; in this case it cannot be cured, without taking out the tooth. In a recent *hare-lip*, or one made by a wound, the cure is to be performed by the knotted future. See *Interrupted* SUTURE, and WOUND.

In curing the *hare-lip*, where part of the *lip* is wanting, no attempt can be made to supply what is deficient, but only to unite those parts which are divided; by taking off the skin from the edges of the fissure, and then causing them to unite and grow together, by passing through them two or three needles, made of gold or silver, pointed with steel, from the right to the left, beginning with the upper part of the fissure, and inserting them at about a straw's breadth from each other. The surgeon having thus entered the needle, and cleansed the bleeding *lips* with a spunge, he takes a piece of strong waxed thread or silk, and fastening it about one end of the needle, he winds it over the other end, and back again, and afterwards secures it by a knot; by this means the edges of the *lips* are brought close together, and the upper part or surface kept smooth and even. To heal the wound internally, it is dressed with soft lint, dipped in honey of roses, and put between the gums and *lip*; but this practice can only be followed with adults; the external part of the wound is at the same time dressed with balsam of Peru, or some other vulnerary unguent, covered with lint and compress, and over that a sticking plaster, with four heads, two of which are fastened on the left side of the *lip*, and two upon the right, and the whole secured by a sling or fillet. Whose extremities may be fastened about the head, either by a knot or pins. But it must here be observed, that when the fissure appears large and deep, so that the two parts of the *lip* cannot be easily joined, it will be necessary, before the above operation, to divide the frenulum of the upper lip from the gum, with a pair of scissars, but without wounding the gum, or uncovering the jaw. Though the hæmorrhage is often very plentiful in performing these operations on young infants, yet it is not dangerous, since it prevents an inflammation, and generally ceases after tying the bandages.

The dressings ought not to be moved before the third day, unless some accident makes it necessary: and then it must be done with great caution, to avoid separating the parts in contact. If the *lips* of the wound appear conjoined, three or four days after the operation, you may then venture to draw out the middle needle, when there are three, or the upper one, when there are only two; and two or three days after draw out the other: the cure must be completed, by dressing every day as at first.

LIPS, *wounds of*. Wounds of the *lips* are made either with sharp or with blunt instruments, or else with bullets. Those of the first sort, whether longitudinal or transverse, are generally to be cured by the dry future. The patient, while under cure, must avoid talking and chewing; his diet therefore must be spoon-meat. But in cases where the wound is very large, the bloody future is sometimes necessary. In wounds of the *lips* made by blunt instruments, by falls, or by bullets, the shattered parts must be brought to digestion; and the *lips* of the wound, after being cleaned, brought together, either by means of sticking plasters, or by the future used in the *hare-lip*. Heister's Surg. p. 81.

LIPS, *cancer of the*. See CANCER.

LIPS is also applied to the two extreme parts of the *pudendum muliebre*; between which is the *rima*, or fissure of the part.

These are more peculiarly called *labia pudendi*; being soft, oblong bodies; of a peculiar substance, not found in any other part of the body.

LIPS are also used to signify the two edges of a wound.

LIPTOTES, in *Rhetoric*, a figure, wherein, by denying the contrary of what we intend, more is signified than we would seem to express. Thus in the following verse of Virgil.

Quid precibus, quod me ipse animo non sperni, Amynta?

See Vossius, Rhet. lib. iv. p. 183.

LIPYRIA, a name given by some medical writers to a dangerous species of fever, in which the outside of the flesh is cold, while the inside is very hot.

LIQUAMEN *spirituum*, in *Natural History*, a name given by some authors to the liquid matter remaining in the pans in which the common vitriol is made; after which no more of that salt will shoot. It is otherwise called *liquamen of* VITRIOL.

LIQUAMUMIA, a term invented by some of the dispensatory writers, to signify human fat.

LIQUEFACTION, an operation, by which a solid body is reduced into a liquid; or the action of fire or heat on fat, and other fusible bodies, which puts their parts into a mutual intestine motion.

The *liquefaction* of wax, &c. is performed by a moderate heat; that of fal tartari, by the mere moisture of the air. All fats liquefy; and, mixed with alkalies, becomes inodorated by a very laborious fire, in the making of CASTILE soap.

In speaking of metals, instead of *liquefaction*, we ordinarily use the word FUSION.

LIQUET. See NON LIQUET.

LIQUID, a body which has the property of fluidity; and, besides that, a peculiar quality of wetting other bodies immerged in it, arising from some configuration of its particles, which disposes them to adhere to the surfaces of bodies contiguous to them. See FLUID.

LIQUIDA, *gravity of*. See DENSITY.

LIQUIDAMBAR, AMBER, *ambrella*, *liquidum*, *succiferæ*, *storax*, *gummi*. See the respective substantives.

LIQUID, among *Grammarians*, is a name applied to certain consonants opposed to *mutes*.

L, *m*, *n*, and *r*, are *liquids*. See L, M, N, &c.

LIQUID *amber*, in *Botany*, *sweet gum*, a genus of the *monœcia polyandria* class. Its characters are these: it hath male and female flowers on the same tree; the male flowers are disposed in long, loose, conical catkins; these have four-leaved empalements, no petals, but a great number of short stamina joined in one body; the female flowers are situated at the base of the male spike, collected in a globe, and have a double empalement; they have no petals, but an oblong germen fastened to the empalement, which turns to a roundish capsule of one cell, with two valves at the top, which are collected in a ligneous globe, containing many oblong acute pointed seeds. There are two species.

LIQUIDATE, *to*. See ACTION.

LIQUIDATION, the act of reducing and ascertaining either some dubious disputable sum, or the respective pretensions which two persons may have to the same sum.

LIQUOR. See DRINK, FLUID, &c.

LIQUORS, *fermented*. See FERMENTED *liquors*.

LIQUORS, *red*, among the *Dealers in Brandy*. See SPIRIT and TEST-*liquors*.

LIQUOR *anodynus mineralis*, the name given by Hoffman to a *liquor* of his own invention, famous at this time in Germany, and supposed by Sprengrave to be made in this manner: take oil of vitriol and Indian nitre, of each four ounces; diſtill the ſpirit gradually from this by a retort; pour two ounces of this ſpirit cautiouſly and ſucceſſively into fifteen ounces of ſpirit of wine highly rectified; diſtill this, and there comes over a very fragrant ſpirit. This is to be again diſtilled, to render it perfectly pure, adding ſalt to it a ſmall quantity of oil of cloves, and a quantity of water, equal to that of the ſpirit; after this, as ſoon as the watery vapours begin to ariſe, the whole proceſs is to be ſtopped, and the ſpirit kept alone in a bottle well ſtopt. This has great virtues, as an anodyne, diaphoretic, antiſeptic, and carminative. It is not certain that it is exactly the ſame with Hoffman's, that author having never publiſhed his manner of making it; but it appears the ſame to the ſmell and taſte, and has the ſame virtues.

M. Macquer ſays, that it is a mixture of very rectified ſpirit of wine, of æther, and of a little of the ſweet oil of vitriol; and that it is made by mixing an ounce of the ſpirit of wine, which riſes firſt in the diſtillation of æther, with as much of the *liquor* which riſes next, and which contains the æther, and afterwards by diſſolving in the mixture twelve drops of the oil which riſes after the æther has paſſed. This *liquor* has preciſely the ſame virtues with the æther, which phyſicians now ſubſtitute for it. See ÆTHER.

LIQUOR *of flints*. See FLINTS.

LIQUOR, or *ſmoking ſpirit of Libavius*, is a marine acid, very concentrated, ſmoking, and impregnated with nitre ſpirit. It is made by well mixing an amalgam of four parts of tin and five parts of mercury with an equal weight of corroſive ſublimate, by triturating the whole together in a glaſs mortar. This mixture is to be put into a glaſs retort, which is to be placed in a reverberatory furnace. To the retort is to be luted, with fat lute, a receiver, with a ſmall hole in it, in the ſame manner as is done for the diſtillation of concentrated mineral acids; the diſtillation is begun with a gradated and well managed fire. A very ſmoking *liquor* paſſes into the receiver, and towards the end of the diſtillation a very thick and even concrete matter. When the operation is finiſhed, the *liquor* in the receiver is to be poured quickly into a cryſtal glaſs bottle, with a glaſs ſtopper. When this bottle is opened, a white, copious, thick, and poignant fume iſſues, which remains long in the air without diſappearing. Chem. Dict. See ÆTHER.

LIQUORS, *Stygian*. See STYGIAN *liquors*.

LIQUORS, *clearing of*. See CLARIFICATION.

LIQUORICE, *Liquiritia*, in *Botany*, a genus of the *diadelphia decandria* class. Its characters are these: the flower has a permanent empalement of one leaf, divided into two lips; the flower is of the butterfly-kind, having a long erect ſtandard with oblong wings, and a two-leaved keel, which is acute; it has ten ſtamina, nine joined, and one ſtanding ſingle; in the bottom is ſituated a ſhort germen, which becomes an oblong or oval compreſſed pod with one cell, including two or three kidney-ſhaped ſeeds. There are three ſpecies.

The common *liquorice* is a plant propagated in many parts of England to very great advantage. It delights in a rich light ſandy ſoil, which ſhould be three feet deep at leaſt; for the greateſt advantage conſiſts in the length of the roots. The greateſt quantities of it propagated in England are about Pontefract in Yorkſhire, and about Godalming in Surry; though there is no inconſiderable quantity propagated in the gardens about London.

The ground deſigned for *liquorice* muſt be well dug, and dunged the year before, that the dung may be thoroughly rotted in it; and juſt before it is planted, the earth is to be dug three ſpades deep, and laid very light. The plants to be ſet ſhould be taken from the ſides or heads of the old roots, and each muſt have a very good bud, or eye, otherwiſe they are very ſubject to miſcarry; they ſhould alſo be about ten inches long, and perfectly ſound. The beſt ſeaſon for planting them is the end of February, or the beginning of March, and this muſt be done in the following manner: the rows muſt be marked by a line drawn across the bed, at two feet diſtance, and the plants muſt be ſet in theſe by making a hole of their full depth and ſomething more, that the eye of the root may be an inch below the ſurface: they muſt alſo be ſet at two feet diſtance from each other in each row. When this is done, the ground may be ſowed over with onions, which not rooting deep, will do the *liquorice* roots no injury for the firſt year. In October, when the ſtalks of the *liquorice* are dead, a little very rotten dung ſhould be ſpread over the ſurface of the ground. Three years after the time of planting, the *liquorice* will be fit to take up for uſe; and this ſhould be done juſt when the ſtalks are dead off; for if taken up ſooner, the roots are very apt to ſhrink greatly in their weight. The roots about London look browner than thoſe which have been propagated in a leſs rich ſoil; but then they are much larger, and grow quicker to their ſize. Miller.

New green *liquorice* ſhould be chooſen ſmooth and even, about the thickneſs of the middle-finger, ſtudy without, yellowiſh within, eaſy to cut, and of an agreeable ſmell. The root carefully dried and powdered is of a richer and more agreeable taſte than when freſh, and of a full yellow colour, with a caſt of brown. The *liquorice* powder commonly ſold is of a weaker taſte, and a paler and lighter yellow colour, probably from a mixture of other ſubſtances.

This root being lightly boiled in water, till the fluid has acquired a deep yellow tincture, and the water at length evaporated over a moderate fire, there remains a black, ſolid ſediment, of a pleaſant ſmell, of a dark reddiſh brown colour in the maſs, and, when drawn out into ſtrings, of a golden colour, which we alſo call *liquorice*, or *liquorice juice*, or ſometimes *Spaniſh juice*. Its quantity amounts to near half the weight of the root. Long boiling impairs the ſweetneſs of the juice, and gives it an unpleaſant bitterneſs.

The whitiſh and yellowiſh *liquorice* juices are good for nothing, being uſually no other than compoſitions of ſugar, ſtarch, a little gum tragacanth, and *liquorice* powder.

The *liquorice* root yields its ſweetneſs alſo to rectified ſpirit; but the quantity of ſpirituous extract amounts only to about one half of the aqueous; and rectified ſpirit, digeſted on the aqueous extract, diſſolves about one half of it.

The native *liquorice* juice is very ſweet upon the palate, even more than ſugar, or honey; and is yet accounted a great quencher of thirſt; on which account Galen preſcribes it in dropſies. It is very balſamic and detergent; inſomuch that there is ſcarce any medicinal compoſition for diſeaſes of the breaſt, in which it is not an ingredient.

LIQUORICE, *ſcotch*. See *Bitter* VETCH.

LIQUORICE, *wild*, *Liquorice* VETCH, or *Milk* VETCH, *aſtragalus*, in *Botany*. See ASTRAGALUS. See alſo CAPRARIA.

LIQUORICE-*wood*, *knobbed-rooted*. See GLYCINE.

LIRIODENDRUM, in *Botany*. See TULIP-*tree*.

LISIAN-

LISIANTHUS, in *Botany*, a genus of the *pentandria monogynia* class. Its characters are, that the flower is encompassed by a kind of ventricose tube, with recurved segments; the empalement is heel-shaped: the stigma has two lobes: and the fruit is an oblong capsule, with two cells. There are two species.

LISSA, or THYNNUS LESSA, in *Zoology*, a name by which some authors have called the fish more usually called *glissa*, a large sea-fish of the tunny kind.

LIST, in the *Manufactures*, denotes the border of a stuff, or that which bounds its width on each side.

Du-Cange derives the word from *licia*, which, in the age of corrupt Latin, was used for the inclosures of fields and cities, as being anciently made with cords interlaced; or from *lista, area campum circumdans in quo decertant pugiles*; as including the ground about the manner that a *list* does a piece of cloth.

All cloths, and stuffs of silk, wool, or cotton, have *lists*. *Lists* contribute to the goodness of the stuff, and farther serve to shew their quality; which has given occasion to several regulations relating to their matter, colour, work, &c.

LIST is also used to signify the inclosed field, or ground, wherein the ancient knights held their justs and combats. It was so called, as being hemmed round with pales, barriers, or stakes, as with a *list*.

Some of these were double, one for each cavalier; which kept them apart, so that they could not come nearer each other than a spear's length. See TOURNAMENT, and DUEL.

LIST, LISTEL, or LISTELLO, in *Architecture*, called also CINCTURE, FILLET, SQUARE, and REGLET, is a little square moulding, serving to crown or accompany larger mouldings; and, on occasion, to separate the flutings of columns.

LIST, in the *Sea Language*, the same with LURY.

LIST, *civil*. See CIVIL *list*, and REVENUE.

LISTENING, according to Robault, consists in extending or bracing the tympanum of the ear, and putting it into such a condition, as that it shall be the more affected by any tremulous motion of the external air. See EAR.

LISTENING, in the *Manege*, as when we say a horse goes a *listening* pace. See ECOUTE.

LISTENING *trumpet*. See TRUMPET.

LISTING, or INLISTING, in *Military Language*, denotes the retaining and enrolling soldiers, as volunteers, for the national service. When any person is *inlisted* as a soldier, he shall within four days be taken before the next justice of peace, or chief magistrate of a town; and before him shall be at liberty to declare his dissent to such *inlisting*; and on such declaration, and returning the *inlisting* money, and paying 20s. for the charges expended on him, he shall be forthwith discharged, in presence of such magistrate. But if he shall refuse or neglect in twenty-four hours to return and pay such money, he shall be deemed to be *inlisted*, as if he had given his assent before the magistrate. If he declare that he voluntarily *inlisted* himself, the magistrate shall certify under his hand, that such person is duly *inlisted*, setting forth the place of his birth, age, and calling, if known; and that the second and fifth sections of the articles of war against mutiny and desertion were read to him, and that he has taken the oath mentioned in the said articles of war; and if any person so certified as duly *inlisted* shall refuse to take the said oath of fidelity before such magistrate, the officer, from whom he hath received such money, may detain and confine him till he shall take it; and every military officer that shall herein offend, shall be cashiered and displaced from their office, and disabled from holding any military post, and forfeit 50*l*. See FORFEITURE *service*.

LITANY, an old church term, applied to the processions, prayers, and supplications, used for appeasing the wrath of God, averting his judgments, or procuring his mercies.

The word comes from the Greek λιτανια, *supplicatio*; of λιτανευω, *I beseech*. Perion would go farther, and derive the λιτανια, or λιτανευω, of the Greeks, from the Celtic *lit*, *fault*, *calamity*.

Ecclesiastic authors, and the Roman order, by the word *litany* usually mean the people who compose the procession, and assist at it: and Du-Cange observes, that the word anciently signified PROCESSION.

Simeon of Thessalonica mentions, that, in the ancient *litanies* the people went out of the church, to denote the fall of Adam; and returned into it again, to shew the return of a pious soul to God, by repentance.

LITANY, in a modern sense, denotes a form of prayer, sung or said in churches; consisting of several periods, or articles; at the end of each whereof is an invocation in the same terms.

Before the last review of the common prayer, the *litany* was a distinct service by itself, and used some time after the morning prayer was over. At present it is made one office with the morning service, being ordered to be read after the third collect for grace, instead of the intercessional prayers in the daily service.

LITCHI, in *Botany*, the name of an Oriental fruit very common in China, and greatly esteemed by the Chinese. They say it is of the exact middle temperature between hot and cold, and that, beyond all other vegetables, it gives vigour and strength to the body; they also commend it for the gravel, when properly prepared. This is a fruit that must be nicely watched, to find the time of its ripening, and when that comes it must be gathered, for it soon decays.

LITE, the name of a plaster much commended by the ancients: it consisted of verdegrise, wax, and resin. Whatever virtues this plaster possessed, might be probably found in the meanest plaster of the shops in general, and the late reformation made by the London Pharmacopœia, the virtues being generally given by our wholesale dealers with verdegrise, and not with the juice of the herb from which it took its name.

LITERÆ *communicatoriæ*, in *Church History*, letters granted by the bishops to penitents, when the time of their penance was finished, by which they were again received into the communion of the faithful.

LITERAL *degree*. See ALGEBRA.

LITERAL *chandler*. See CHARACTER.

LITTERALIS *calculus*. See CALCULUS.

LITERARY *property*, is that property which an author, or his assignee, may be supposed to have in his own literary compositions; so that no other person without his leave may publish or make profit of the copies. In case of a bargain for valuable consideration, or a free gift of the copy right, the retention is plainly contained in the original proprietor, or the whole property is transferred to another. It has been a question much agitated of late in the superior courts of judicature, and at length determined by the house of lords against authors and their assignees, whether the copyright of a book belongs to the author by common law. But, exclusive of such copyright as may subsist by the rules of the common law, the statute 8 Ann. cap. 19 has protected by additional penalties, the property of authors and their assigns for the term of fourteen years, and hath directed, that if, at the end of that term, the author himself be living, the right shall then return to him for another term of the same duration: and this is the sole right now vested in the proprietors of copies. A similar privilege is extended to the inventors of prints and engravings, for the term of twenty-eight years, by 8 Geo. II. cap. 13. and 7 Geo. III. cap. 38.

LITERARY *criticism*. See CRITICISM.

LITERATI, *learned*, lettered, an epithet given to such persons, among the Chinese, as are able to read and write their language.

The *literati* alone are capable of being made mandarins.

LITERATI is also the name of a particular sect, either in religion, philosophy, or politics; consisting principally of the learned men of that country; among whom it is called *jukiau*, i. e. *learned*.

It had its rise in the year of Christ 1400, when the emperor, to awaken the native affection of the people for knowledge, which had been quite banished by the preceding civil wars among them, and to the ap emulation among the mandarins, chose out forty-two of the ablest among their doctors, to whom he gave a commission to compose a body of doctrine, agreeable to that of the ancients, which was then become the rule, or standard, of the learned. The delegates applied themselves to the business with very great attention: but some fancied them rather to have wrested the doctrine of the ancients, to make it consist with their's, than to have built up their's on the model of the ancients.

They speak of the Deity, as if it were no more than mere nature, or the natural power or virtue that produces, disposes, and preserves the several parts of the universe. It is, say they, a pure, perfect principle, without beginning or end; it is the source of all things, the essence of every being, and that which determines it to be what it is. They make God the soul of the world: they say, he is diffused throughout all matter, and produces all the changes that happen there. In short, it is not easy to determine, whether they resolve God into nature, or lift up nature into God; for they ascribe to it many of those things which we attribute to God.

This doctrine, in lieu of the idolatry that prevailed before, introduced a refined kind of atheism. The work, being composed by so many persons of learning and parts, and approved by the emperor himself, was received with infinite applause by all the people. Many were pleased with it, because it seemed to subvert all religion; others approved

proved it, because the little religion that it left them, could not give them much trouble. And thus was formed the sect of the *Literati*; which consists of the maintainers and adherents to this doctrine.

The court, the mandarins, and the persons of fortune and quality, &c. are generally retainers to it; but a great part of the common people still hold to their worship of idols.

The *literati* freely tolerate the Mahometans, because they adore, with them, the king of heaven, and author of nature; but they bear a perfect aversion to all sorts of idolaters among them: and it was once resolved to extirpate them. But the disorder this would have occasioned in the empire prevented it: they now content themselves with condemning them, in general, as heretics; which they do solemnly every year at Pekin.

LITHAGOGI, of λιθος, *stone*, and αγω, *I bring away*, an epithet given by some medical writers to such medicines as work by urine, and are supposed to have the virtue of expelling the stone.

LITHANTHRAX, of λιθος, *stone*, and ανθραξ, *coal*, in *Natural History*, is used as the name of the common pit coal. See COAL.

LITHARGE, composed of λιθος, *a stone*, and αργυρος *silver*, a metalline substance, formed of the spume of lead; used in the composition of plasters, to give them a due consistence: for, it is lead deprived of great part of its phlogiston by fire, and in a state of imperfect vitrification.

This preparation of lead is of great use in roasting the stubborn ores of gold, silver, and copper; for it melts all kinds of stones and earth into glass, sooner than the metals; and by this means the metal, which is heavier, will fall through the glass, which is a thin and light substance, and will be collected under it into a regulus, with only a few dusty scoriæ adhering to it. But if it be copper that is thus separated, a small portion of it is always destroyed; and if gold or silver, a like small portion is always lodged and detained in the scorie.

But as the *litharge* penetrates through all sorts of vessels, and while melting rises into a scum, that often runs over their edges, the assayers never use it alone, but always mix with it such substances as may give it a clamminess, such as flints, sand, clay, or the like: they mix two parts of *litharge* with one part of any of these substances, and add some nitre, or common salt, that the whole may run the more easily. They shut up the vessels, which must be made very thick and solid, with a small cover or lid, cut close, and placing this in a wind-furnace, they keep it in fusion a quarter of an hour, looking at times into the ash-hole, to see if the glass have not escaped through the vessel, and run down thither. Very often it is found sweating through the sides of the vessel, like water, and falling in drops into the ash-hole; and in this case, there is no way to preserve the remainder, but to take the vessel out of the fire.

When the whole is cool, the vessel must be broke, and at the bottom there will be found a small quantity of a regulus of lead, revived by means of the salt; in the middle, the glass of lead, which must be kept for use; and at the top a saline crust, which is to be thrown away.

Some authors speak of two kinds of *litharge*; the one *natural*, the other *artificial*.

LITHARGE, *natural*, they say, is a mineral, sometimes found in lead mines, reddish, scaly, brittle, and somewhat resembling white-lead. This *litharge* is so exceeding rare, that the shops sell none but the

LITHARGE, *artificial*, which is of two kinds; viz. that *of gold*, and that *of silver*; or rather, it is the same, with this difference, that the one has undergone a greater degree of fire than the other.

Indeed naturalists are not very well agreed what the *artificial litharge* is: some consider it as a metallic scum, called on the surface of lead, when melted; after having served to purify gold, silver, or copper.

Others consider it as a metallic soot, or smoke, arising from those metals mixed with the lead used in purifying them; which, sticking to the top of the chimneys of furnaces, is there formed in a kind of scales.

Lastly, Others consider it as the lead itself used in refining of those metals, and especially copper; which last opinion appears the most credible: and the rather, on account of the great quantities of these *lithargers* brought from Poland, Sweden, and Denmark; where copper mines are much more frequent than those of gold and silver. The drossy or recrementitious parts, rising to the face of the ore, are the *litharge*; and, according to the degree of calcination, become of divers shades of a red colour: the deep is called *litharge of gold*, and the pale, *litharge of silver*.

Litharge may be easily revived into lead; accordingly, much of that which is produced by refining in great is reduced, by being melted upon burning coals. The part which is least altered by mixture with other metals is thus reduced, and thus good and saleable lead is obtained. The rest of the *litharge* of these refineries is sold and used for various purposes.

Lithargers are deficcative, detersive, and cooling: they make the consistence of several plasters. The potters use them to give a beautiful gloss to their ware; they are employed in the composition of some glasses, for they are very fusible, and assist the fusion of other substances; and they are also used by painters, dyers, skinners, and glaziers. When mixed with wine, they give it a bright sprightly colour, but render it extremely unwholesome. See LEAD.

LITHARGE, *plaster of*. See EMPLASTRUM *commune*.

LITHARGE, *vinegar of*. See VINEGAR *of Lead*.

LITHIASIS, λιθιασις, in *Physic*, the disease of the stone. See STONE and CALCULUS.

LITHIDIA, in *Natural History*, the name of a large class of fossils, including the flint and pebble kinds.

The *lithidia* are defined to be stones of a debased crystalline matter, covered by, and surrounded with an opake crust, and frequently of great beauty, and considerable brightness within, though of but a slight degree of transparence, approaching to the nature of the semipellucid gems, and like them found not in very large masses.

The bodies of this class are divided into two general orders, and under those into three genera. The first order of the *lithidia* contains those composed of a crystalline matter, but slightly debased, and that ever by one and the same earth, though diffused through them in different degrees, and always free from veins. The second order comprehends those of a more debased crystalline matter, blended with different portions of differently coloured earths. Of the first of these orders there is only one genus, which is that of the common FLINT.

Of the second order there are two genera. 1. The MOCHOIDES, which are of one plain and simple colour; and, 2. The *calculi*, which are composed of crusts of several different colours. Both these genera are comprised under the common English names of PEBBLES. Hill's Hist. of Foss. p. 505.

LITHOBOLIA, λιθοβολια, in *Antiquity*, a festival celebrated by the Trœzenians, in memory of Lamia and Anxesia, two virgins, that coming from Crete to Trœzene, in a time of tumult and sedition, became a sacrifice to the fury of the people, by whom they were stoned to death.

LITHOBOLIA, or *lapidation*, was also a common punishment inflicted by the primitive Greeks upon such as were taken in adultery.

LITHOCOLLA, or LITHOCOLLUM, formed of the Greek λιθος, *stone*, and κολλα; *glue*, a cement used by the lapidaries to fasten their precious stones, in order for cutting them.

It is composed of resin and brick-dust. For diamonds, they use melted lead, putting them into it before it be quite cold: for other cements, they mix marble-dust with strong glue; and, to fasten their sparks, add the white of an egg, and pitch. See CEMENT.

LITHODÆMON, or LAPIS *diæmonius*, a name given by some authors to JET.

LITHODENDRON, a name by which, according to Dioscorides, many of the ancients express the common red coral.

LITHOGENESIA, a term used by some authors to express the formation and origin of STONES.

LITHOLABON, a name given by some chirurgical writers to an instrument used in the operation of lithotomy; it is a forceps intended for taking hold of the stone.

LITHOMANTIA, λιθομαντια, in *Antiquity*, a species of divination performed with stones. Sometimes the stone called *sideritis*, was used: this they washed in spring-water in the night by candle-light: the person that consulted it, was to be purified from all manner of pollution, and to have his face covered: this done, he repeated divers prayers, and placed certain characters in an appointed order: and then the stone moved of itself, and in a soft, gentle murmur (or as some say) in a voice like that of a child, returned an answer. By a stone of this nature, Helena is reported to have foretold the destruction of Troy.

LITHOMARGA, *stone marle*, a name given by some authors to a spurry substance highly debased by earth, which is found in great plenty in the caves of the Hartz Forest in Germany, and used there in medicine, under the name of the *nucleus fossilis*, or fossile unicorn's horn, from its sometimes emulating that figure. See *Mineral* AGARIC.

LITHONTRIPTICON *Tulpii*, the name of a famous diuretic medicine, invented by Tulpius, and given with great success in cases of the stone, but requiring great judgment and caution in the administering it.

The preparation is this: take a drachm of cantharides without

without their wings, and 3 drachm of leſſer cardamoms without their huſks, powder them fine, and pour upon them an ounce of rectified ſpirit of wine, and half an ounce of ſpirit of nitre: ſet them to infuſe, without heat, for five or ſix days, ſtirring them from time to time. The vial muſt not be ſtopped cloſe; becauſe, if it be, the continual fermentation will burſt it. The doſe is from fourteen to fifteen, or twenty drops, in a glaſs of wine and water. It is to be taken in a morning, an hour after eating a meſs of broth, and may be repeated for three or four days.

It is remarkable, that this mixture never ceaſes fermenting for many years; but if it be too faſt corked, will break the glaſs, if but ſlightly ſtopped, it only throws out the cork with an explosion. Mem. de l'Acad. Par. 1709. p. 358. edit. Par.

LITHONTRIPTICS, from the Greek λίθος *ſtone*, and θραύω, *I break*, medicines proper to diſſolve the ſtone in the bladder, and kidneys. See CALCULUS and STONE.

The reward which the parliament of England gave to Mrs. Stephens, the inventreſs of ſome medicines, which were ſaid to be a perfect and certain cure for the *ſtone*, made the generality of the world believe, that they were really as efficacious as they were pretended to be; but it appeared, on examination, that the opinion of a cure in the very inſtances on the ſucceſs of which the reward was given, was erroneous; and that the *ſtones* had all the time remained in the bladders of the patients, though ſuppoſed to have been pulled, after being diſſolved and waſhed away by the medicines.

The principal inſtance of a ſuppoſed cure was Mr. Gardiner. This man was, in December, 1748, examined by able ſurgeons, and found to have a ſtone in his bladder; after this he took Mrs. Stephens's medicines for eight months without intermiſſion; and at the end of that time he declared himſelf free from all his uſual complaints; and on ſearching him there could no ſtone be found in the bladder. Mr. Gardiner died about three years afterwards, and his body was opened. When the bladder was examined, there were found in it ſix preternatural apertures of different ſizes; but the largeſt capable of admitting the end of a finger. Each of theſe apertures led to a ſeparate bag formed by an enlargement of the internal membrane of the bladder, protruded between the fibres of its muſculous coat. Theſe bags were eaſily ſeen on the back part of the bladder a little above the veſicular feminales, and when viewed on the outſide, they ſeemed to be but two, though in reality equal in number to the openings within, and divided from one another by the duplicature of the internal membrane, which formed a ſeptum between each of them. Philoſ. Tranſ. N° 469. p. 12.

As to Mrs. Stephens's medicine, it is a compoſition of ſoap and lixivia made of different aſhes, which every body knows to be highly cauſtic; and is therefore condemned by Dr. Mead, ſince its corroſive quality muſt be injurious to the bladder. However, under proper management, he thinks it may be of ſome ſervice in expelling gravel by the urinary paſſages; though it will never be able to break calculi of the hardneſs of ſtone: and beſides, its long continued uſe muſt be attended with great danger, for the reaſons above given. And as for its ſubſtitute, the ſoap-leſs, though it be a medicine of a more commodious form for taking, yet it will not prove much ſafer in its conſequences, for the ſame reaſons.

Dr. White of Edinburgh, after conſidering the inconveniencies, and ſometimes the miſchiefs alſo of this celebrated ſpecific, reſolved to omit the ſoap, and try what virtues LIME-*water* might have in diſſolving the calculus. His firſt experiments were made on ſeveral fragments of calculi, with lime-water *from* the common quick-lime; and afterwards reſolved to try the power of animal-lime, he repeated them with lime-water made with oyſter-ſhells and cockle-ſhells, well calcined, by pouring ſeven or eight pints of water on one pound of the freſh calcined ſhells. The experiments ſucceeded with both ſorts; but he ſoon found, that the oyſter and cockle-ſhell lime-water poſſeſſed a much greater power of diſſolving the calculus, than that of the ſtone-lime.

He therefore propoſes the drinking of ſhell-lime-water to the quantity of four pints, every day, for adults; and for children leſs in proportion; and he concludes with inſtances of the happy effects of this method. However, as ſtones of great hardneſs can never be diſſolved by any medicine whatſoever, Dr. Mead recommends, in theſe caſes, a new method of cutting for the ſtone. See LITHOTOMY.

Dr. Hartley has publiſhed, in the London Gazette, the following receipt for making a *lithontriptic* electary. Take five pounds of Alicant ſoap, ſtravd, and one pound of oyſter-ſhell-lime: put them into a tin veſſel, and pour upon them five quarts of water; make the water boil, till the ſoap be perfectly diſſolved in it, and then ſtrain all into a glazed earthen veſſel. Expoſe this maſs to the air, ſtirring it every day till it becomes both mild to the taſte, and of a proper conſiſtence to be formed into pills, or long pellets, without ſticking to the fingers. This may be expected to happen in two or three months. If it becomes ſufficiently mild before it has acquired a due conſiſtence, it may be brought to this, by being heated over the fire, in a tin veſſel: if it acquires a too hard conſiſtence, before it is ſufficiently mild, it muſt be ſoftened with water. This is what the Doctor calls the *lithontriptic* maſs or electary; which he orders to be made in a tin veſſel, becauſe a braſs or copper one would make it emetic.

He gives another more expeditious way of making it, which is this: pour two gallons of water upon a pound of oyſter-ſhell-lime, ſtir it two or three times, and when it has fallen to the bottom, pour off the clear part of the water. Repeat this fifteen or twenty times, or till the clear water, which is poured off, be almoſt taſteleſs; leaving about five pints of water upon the lime, after the laſt ablution. Then pour this mixture of water and ſlaked lime upon five pounds of Alicant ſoap, ſtravd, and proceed as directed in the firſt receipt. The maſs, prepared in this manner, will be fit for uſe in a few days, or even immediately; but then the Doctor prefers the foregoing receipt, where time can be allowed for it.

If the maſs of ſoap, and oyſter-ſhell-lime, diſſolved in either of the above mentioned ways, be made of the conſiſtence of an electary, it is then called the *lithontriptic* electary; which for cure is more convenient than the maſs, for thoſe who deſire to take the medicine diſſolved in a liquid vehicle, as milk, water ſweetened with honey or ſugar, water flavoured with brandy or rum, and ſmall beer.

Where a perſon is ſuppoſed to have a large ſtone in the kidneys or bladder, he ought to take every day as much of the maſs or electary, as contains two ounces of the ſoap, unleſs his pain and provocation to make water be violent; in which caſe it will be proper to begin with about half this quantity, and to increaſe it as he can bear. The medicine ought alſo in this caſe to be diluted in an extraordinary degree.

By this medicine, the Doctor thinks the generation of gravel and gravel-ſtones, may be eaſily prevented. See STONE.

It is likewiſe recommended in diſorders of the ſtomach and bowels, ariſing from, or attended with acidities there; and in gouty habits. The patient may, in many of theſe caſes, begin with ſuch a quantity every day as contains an ounce of ſoap, and afterwards increaſe or leſſen this quantity, as he finds occaſion.

LITHOPÆDION, a word uſed by ſome medical writers, to expreſs a preſent calculous concretion in the bladder.

The ſtone, in this caſe, is ſuppoſed to be more eaſily worked upon by medicines, than when of longer ſtanding; but the cruſtated ſtructure of theſe ſtones, when examined, plainly ſhews that they arrive at their bigneſs only by ſlow degrees, and therefore, that there is properly no ſuch thing as a recent calculous concretion capable of giving pain.

LITHOPHAGI, of λίθος, *ſtone*, and φαγεῖν, *to eat*, a name given to thoſe who are capable of eating and digeſting ſtones; inſtances of which are given by Boyle, Exp. Phil. p. ii. eſſ. iii. p. 80. Bulwer, Artificial Changeling, p. 307. and Paulian, Dict. Phyſique, art. *Digeſtion*.

LITHOPHYTA, in the Linnæan ſyſtem of *Natural Hiſtory*, belong to the genus of CORALLINA, in the claſs of zoophytes. Modern diſcoveries ſufficiently evince, that they are the habitations of animals, as well as the CORAL, and that the animals in this particular ſubſtance occaſion the vertical pain. See KERATOPHYTA.

One of the moſt remarkable ſpecies of the ſmall *lithophyta* we have any where an account of, is that deſcribed by Mr. Ellis in the Philoſophical Tranſactions, N° 486. p. 1430.

LITHOPHYTON, *τροφὸς*, a name given by Mr. Marchant to a ſpecies of plant, approaching to the muſhroom-kind, reſembling that fungous production, compared by ſome authors to the cluſters of the Æthiopian pepper.

Mr. Marchant's curious obſervations on this little regarded ſubject give many valuable hints towards the explaining the vegetation of great numbers of the other plants, whoſe fructification is leſs obvious to the eyes, and may lead to a knowledge of many of the fructifications of ſea-plants; which all our enquiries, on other foundations, have as yet left us unacquainted with.

This gentleman having cut down a maple in his garden, found after ſome months a number of little tubercles, of a fungous ſubſtance on the ſtump; they ſomewhat approached to the figure of an olive, with its ſtalk, and were then of a brown colour.

The outside of these tubercles was porous, and they appeared somewhat spongy through rigid, and on squeezing a little there issued out of the pores a small quantity of an aqueous humidity; the inside, when it was cut open, appeared composed of fine and closely compacted fibres. These plants, as they may properly be called, stood the whole winter, and in the following spring were found to be grown to their full size, which was about an inch and half long, and half an inch thick; they stood in clusters of near twenty together, and resembled a set of irregular and ill-proportioned fingers, and when pressed were found to be much harder than while young. Mem. Acad. Par. 1711.

The pores on their surface, which still continued visible, and were very different from any known plant of the mushroom-kind, gave the observer hopes of a discovery of something new in the fructification, and the stump of the tree being now perfectly dry, and unable to furnish any more nourishment to them, he cut them all off, with part of the stump, and carried them to his closet for observation.

Each plant was nearly circular in figure, and terminated in a roundish or pointed end, and had at several distances two or three circular lines, by means of which it resembled a toe or finger with its joints. The outer skin was now become wrinkled, and the pores were all surrounded with a sort of cutaceous rim, and within them there often appeared a number of fine slender filaments, having the appearance of stamina. On cutting the plants vertically, these pores were all found to correspond with certain round cavities within the plant, which were lined with a black matter. These cavities were formed in a white fibrous matter; all the fibres of which took their origin at the centre, and tended to the circumference, and of these was the whole inner substance of the plant composed.

Some months after this, on cutting more of these plants, the round cavities, in some of them, were found filled with a black matter, in form of a powder, composed of small granules, and looked as if filled up with very fine gunpowder. The help of a microscope shewed this matter to be composed of small black particles, resembling the seeds of the vanilla pods, only vastly less, and not so flaming. On the whole, Mr. Marchant, notwithstanding the external resemblance of this plant to some of the mushrooms, thinks, that when closely examined, it approaches more to the nature of the marine *lithophytons*.

It grows, as he observes, on hard bodies, without any appearance of roots in the manner of those sea-plants. Its bark, or outer covering, seems a sort of cutaneous or tuberous substance, much more resembling the bark of the sea-*lithophytons* than that of any land-plants: and its pores surrounded with cutaceous rims, and answering to certain cavities containing seeds within the body of the plant, bring it to a near resemblance with the sea-*lithophytons*, though they do not at all resemble any known land-plant.

LITHOPHOSPHORUS *Sublimis*, in *Natural History*, a name given by some authors to a species of spar, which, when it has been heated over the fire, retains a property of giving light in the dark. This is a quality that seems more or less in degree to be inherent in several sorts of spars. The Bononian stone is a fossil of this kind; and several of the green spars of the German mines have been found to possess this quality in some degree.

The *lithophosphorus* here meant has the appearance of a common purple spar. There is another kind, of an opake white colour, so common about the edge of the Hartzforest, that it is used as a flux for some of the coppery ores, readily burning into lime, and then acting as an alkali, and absorbing their sulphurs; this kind, when moderately heated, shews an elegant light on being put into a dark room, but when it is heated too much it bursts to pieces.

LITHOPTERIS, *flone-fern*, in *Natural History*, a name given by Mr. Lhwyd to some of the *fossile* PLANTS of the fern kind.

LITHOSPERMUM, in *Botany* See GROMWELL.

LITHOSTROTA, among the *Ancients*, pavements made up of small pieces of cut marble of different kinds and colours. See TESSELATED.

LITHOSTROTION, in *Natural History*, the name of a species of fossile coral, composed of a great number of long and slender columns, sometimes round, sometimes angular, joined nicely to one another, and of a starry or radiated surface at their tops. These are found in considerable quantities in the northern and western parts of this kingdom, sometimes in single, sometimes in complex specimens. See *Tab. of Fossils, Class* 7.

LITHOTOMY, formed of λιθος, *stone*, and τεμνω, *I cut*, in *Surgery*, an operation performed upon a human body, in order to extract the stone out of the bladder.

It appears, that cutting was in use for the stone even in the time of Hippocrates, though we are perfectly in the dark as to the manner in which they performed it: it was, however, wholly disused in the after ages; insomuch, that in the beginning of the fifteenth century, there was no body durst practise it. The faculty of medicine at Paris were obliged to petition the parliament, to obtain leave to make a trial on a criminal condemned to death, who had the stone in the bladder: the operation succeeding, the practice became popular.

When a STONE is suspected to be lodged in the bladder, besides the common symptoms of this case, it is useful for a surgeon to make a farther examination, by introducing a catheter, or sound, into the bladder, by which it is possible to feel the stone. In order to this, *Mr.* Sharp directs the following method: the patient being laid on a horizontal table, with his thighs elevated, and a little extended, puts the instrument, with the concave part towards you, until it meets with some resistance in *perinæo*, a little above the anus; then turning it without much force, push it gently on into the bladder, and if it meets with an obstruction at the neck, raise its extremity upwards, by inclining the handle of it towards you; and if it does not then slip in, withdraw it a quarter of an inch, and introduce your fore-finger into the rectum, lift it up, and it will seldom fail to enter. There is some art in turning the sound, in the proper place of the urethra, which surgeons not well versed in this operation cannot so well execute; therefore they may pass the instrument, with the concave side always towards the abdomen of the patient. If the stone is large, the operator, by introducing the sound, may perceive it strike against it, though he cannot thus certainly determine whether it be large or small. Sometimes the operator cannot discover a stone by examination, though there be one; for instances occur in which it is lodged in a fac. Before a patient is examined, he may use a little exercise, such as riding or jumping, by which means the stone may fall down to the neck of the bladder, and be more readily discovered. It is observed, that after the operation, children relapse more frequently than adults; and that adults run greater hazards in the operation than children do.

There are four principal ways of performing the operation; the *apparatus minor*, *apparatus major*, *apparatus altus*, and the *lateral* operation.

The first is by cutting through the perinæum near the suture, on the left side, after the stone, by the fingers of the operator, has been brought to that part. This is called *cutting upon the gripe*; but it is almost disused, because it subjects the patient to great hazards and inconveniencies.

This method was prescribed and practised by Celsus, and by Guido Cauliaco, and hence sometimes denominated the Celsian and the Guidonian method. Heister observes, that this method is practicable in boys under fourteen years of age, because the stone in them may be brought to the perinæum. He says, that he always performed it on children; and that it may be practised on adults, when the stone causes a suppression of urine, by its adhering to the neck of the bladder, but otherwise it is dangerous.

In the *great apparatus*, which is that ordinarily practised, after the patient is conveniently placed and bound, the operator introduces a proper instrument through the urinary passage into the bladder, in order to search for the stone; which being found, that instrument is withdrawn, and another grooved one is introduced the same way; which, bulging in the perinæum, serves to direct the knife to the neck of the bladder: after the incision, a third instrument is thrust into the aperture, till it join the former that was last introduced through the urinary passage, at which time that is withdrawn, whilst this remains to guide the forceps directly into the bladder, to bring away the stone. This way is called *cutting upon the staff*. It was invented by Franciscus De Romanis, a celebrated Italian physician of Cremona, and afterwards improved and published by his pupil Marianus Sanctus, and denominated Marianus's method; and from the large number of instruments used in it, *apparatus major*. But since other methods have been introduced, it has been called the vulgar or old method.

The third method, called also the *high operation*, because it is performed above the ossa pubis in the superior and anterior part of the bladder, and the *sectio hypogastrica*, because the place of the section is in the middle of the hypogastrium, first practised by Pet. Franco, has been since described, and strenuously pleaded for by a chirurgical writer, Rosset; but it soon fell into oblivion; from which it was only recalled about the year 1719, by Mr. Douglas, a surgeon of London, who collecting what scattered hints he could find relating to it, and improving them

them with his own observations, paved the way for its being brought into regular use, which before it never had been. He was soon followed by Mr. Cheselden, and some others. Of thirty-one patients cut by them in this manner, in a few years, twenty-five recovered. It is true, Mr. Cheselden afterwards quitted this method for the lateral operation. Of late years, the French have begun to adopt the high operation; and M. Morand, a surgeon of Paris, has written a book on the subject, chiefly taken from the English writers.

He argues, that the methods of Celsus, Frere Jacques, Raw, and Cheselden, are in the main the same. See Mem. de l'Acad. des Sciences, 1731.

Mr. Cheselden's method is described in his Anatomy, chap. xi. of the fifth edit.

The manner of proceeding herein, is this: after the bladder is inflated with a sufficient quantity of warm water, and the patient conveniently placed, the operator slowly makes an incision above the os pubis, along the linea alba, till he gets sight of the bladder, into which he directly plunges his knife, and afterwards draws out the stone.

The advantages attending this method, are, that it is performed in a very short time; that the wound easily heals; that the dilaceration of parts frequent in the other ways is prevented; and that there is no danger of the incontinencia urinæ. On the other hand, it is thought to be chiefly practicable upon young persons, and such as are lean; the wound in old and fat persons being apt to mortify: moreover, if the operator be not very cautious, he may easily let out the intestines. But Dr. Mead assures us, that now not only children and youths, but also persons advanced in years, may submit to this operation, without great danger; and in case the stone prove too big to be extricated without tearing the neck of the bladder, it is now no longer necessary to split the stone, before the extraction; the invention of which is ascribed to Ammonius, a Greek physician, who from thence was surnamed *lithotomus, the lithotomist*.

Mr. Houlton has collected a great many instances of stones lodged in ures formed in the bladder, from which it was impossible to extract them, without tearing the bladder, or cutting on one side of the os, which M. Garengeot did once with success. In some of the cases which he mentions, the vessels of the bladder were in appearance grown into the stone, and the extraction of the stone was attended with a mortal hemorrhage. See Mem. de l'Acad. de Chirurg. tom. i.

The distension of the bladder with a liquor in performing the high operation for the *stone*, is attended with difficulties, especially in women. Dr. Kulm has therefore contrived an elevatory catheter for that sex. The bending of the instrument is fitted to the turn of the os pubis, and its great curve, instead of being only furrowed, is pierced quite through. He introduces this with its convexity to one side, then gently raises it to the hypogastrium, and cuts securely upon it. See Nov. Act. Erudit. Lipsi Mart. 1732.

To these may be added the *lateral operation*, invented by Frere Jaques, a religious of the third order of St. Francis, towards the close of the last century, and practised by him with great reputation in the Franche Compté. But this reputation it lost again at Paris; which, however, did not hinder Mr. Raw, anatomy-professor at Leyden, from undertaking to rectify what was amiss in it: in which he succeeded, insomuch that the method is now known by his name, which has taken place of that of the first inventor. See Hist. Acad. Roy. Scien. ann. 1699. p. 34; item, an. 1728. p. 31.

Various improvements have been made in this method, and it is yet continued in practice. Mr. Sharp directs it to be performed in the following manner, from Mr. Cheselden, who adopted and improved it: the patient being laid on a table, with his hands and feet tied, and the staff passed, as in the old way, let an assistant hold it a little slanting on one side, so that the direction of it run exactly through the middle of the left erector penis, and accelerator urinæ muscles; then make an incision through the skin and fat very large, beginning in one side of the scam in perinæo, a little above the place wounded in the old way, and terminating a little below the anus, between it and the tuberosity of the ischium. This wound must be carried on deeper between the muscles, till the prostate can be felt, when searching for the staff, and having it properly, if it hath slipped, turn the edge of the knife upwards, and cut the whole length of that gland from within outwards, at the same time pressing down the rectum with a finger or two of the left hand, by which precautions the gut will escape being wounded; after this introduce the forceps to take out the stone. After the operation is finished, if there be an hæmorrhage from the prostate gland, a silver canula, three or four inches long, covered with fine rag, may be introduced into the bladder, and left there two or three days, for it rarely fails to check it: the patient may also take an opiate. If the wound does not bleed, a little dry lint, or a pledget of digestive may be laid in it. If a pain be felt near the bladder, soon after the dressings are finished, a bladder of warm water may be applied over it; and if it increase, as there will be much danger from it, bleeding and clysters will be necessary.

Among Cheselden's emendations, Douglas enumerates these: if he finds the patient's pulse low after the operation, he applies blisters to the arms, which effectually raise his spirits: if the wound becomes callous, he lays on a piece of blister-plaster to erode it, by which new flesh pullulates, and the wound unites: if the wound be putrid, he mixes a little verdegris with some digestive ointment.

Women are rarely afflicted with a stone in the bladder; but when they are, it may generally be extracted through the urethra, which may be gradually dilated to an incredible size. Stones have been extracted through dilated urethræ, which weighed more than five ounces.

Mr. Gooch, in his Cases, &c. vol. ii. p. 183, &c. gives an instance of extracting a stone four ounces in weight, through an incision which he made from the vagina into the bladder. This procedure was attended with very little trouble, either to himself or the patient: the ulcer soon healed by the use of soft balsamic injections, and no inconvenience was observed after the parts were healed. Sharp's Operations of Surgery, Heister's Surgery, part ii. sect. 5. See NEPHROTOMY. For a view of the instruments used in *Lithotomy*, see *Tab. Surgery*.

LITHOXOS. See COLAPTICE.

LITHOXYLUM, in *Botany*, a term used by Linnæus to express a heterogeneous substance on fern-plants, or marine productions, which has incrustations in imperfect points. See KERATOPHYTON.

LITHOZUGIA, in *Natural History*, the name of a genus of fossils, of the class of the SERAPIA, composed of a crystalline matter a little debased, and containing within them various extraneous bodies, as pebbles, &c.

Dr. Woodward has ranked this genus among the pebbles, because of the pebbles they contain; which is by no means a sufficient reason for confounding two such different fossils; the *lithozugia* approaching to the nature of flint.

Mercatus and other naturalists have called the *lithozugia*, *scalati lapides*; and among English lapidaries they are known by the name of *pudding-stones*. See OCULATUS *lapis*.

Of this genus we have three species.

Besides these, there are other *lithozugia* of a coarser texture, approaching to the nature of quarry stone; of these we have four species. Hill's Hist. Foss. p. 562, 562.

LITHUS, a name given by some authors to the magnet.

LITMUS, or LACMUS, in the *Arts*, is a blue pigment, formed from ARCHIL. It is brought from Holland at a cheap rate; but may be prepared by adding quick-lime, and putrified urine, or spirit of urine distilled from lime, to the archil previously bruised by grinding. The mixture, having cooled, and the fluid suffered to evaporate, becomes a mass of the consistence of a paste, which is laid on boards to dry, in square lumps. It is only used in miniature paintings, and cannot be well depended on, because the least approach of acid changes it instantly from blue to red. The best *litmus* is very apt to change and fly.

LITOTES, Λιτότης, in *Rhetoric*. See LITOTES.

LITTER, *lectica*, a kind of vehicle borne upon staffs; anciently esteemed the most easy and genteel way of carriage.

Du-Cange derives the word from the barbarous Latin *lecterium, straw or bedding for beasts*. Others will rather have it come from *lectus, bed*, there being ordinarily a quilt and a pillow to a *litter*; in the same manner as to a bed.

Pliny calls the *litter* the traveller's chamber; it was much in use among the Romans, among whom it was borne by slaves kept for that purpose; as it still continues to be in the East, where it is called a PALANQUIN.

The Roman *lectica*, made to be borne by four men, was called *tetraphorum*; that borne by six, *hexaphorum*; and that borne by eight, *octapherum*.

The invention of *litters*, according to Cicero, was owing to the kings of Bithynia: in the time of Tiberius they were become very frequent at Rome, as appears from Seneca; and even slaves themselves were borne in them, though never by more than two persons, whereas men of quality had six or eight.

LITTLE *bairam*. See BAIRAM.

LITTLE *capitan*. See CAPITAN.

LITTLE *mass*. See MASS.

LITTORAL *fossils*, among writers of *Natural History*, are such

such sea-shells as are always found near the shores, and never far off in the deep.

Those which are found in the bottom of the sea, remote from the shore, are called *pelagium*.

LITUITES, a name given to the stones formed in the lituus-shell.

LITURGY, denotes all the ceremonies in general belonging to divine service.

The word comes from the Greek λειτουργια, *service, public ministry*; formed of λαος *people*, and εργον, *work*.

In a more restrained signification, *liturgy* is used among the Romanists to signify the mass; and among us the common-prayer.

All who have written on *liturgies* agree, that in the primitive days, divine service was exceedingly simple, only clogged with a very few ceremonies, and consisting of but a small number of prayers; but, by degrees, they increased the number of external ceremonies, and added new prayers, to make the office look more awful and venerable to the people. At length things were carried to such a pitch, that a regulation became necessary; and it was found proper to put the service, and the manner of performing it, into writing, and this was what they called a *liturgy*.

Liturgies have been different at different times, and in different countries. We have the *liturgy* of St Chrysostom, that of St. Peter, of St. James, the *liturgy* of St. Basil, the Armenian *liturgy*, the *liturgy* of the Maronites, of the Cophtæ, the Roman *liturgy*, the Gallican *liturgy*, the English *liturgy*, the Ambrosian *liturgy*, the Spanish and African *liturgies*, &c.

In the more early ages of the church, every bishop had a power to form a *liturgy* for his own diocese; and if he kept to the analogy of faith and doctrine, all circumstances were left to his own discretion. Afterwards the practice was for the whole province to follow the metropolitan church, which also became the general rule of the church: and this Lindwood acknowledges to be the common law of the church; intimating, that the use of several services in the same province, which was the case in England, was not to be warranted but by long custom. The *liturgy* of the church of England was composed in the year 1547, and established in the 2d year of King Edward VI. stat. 2. and 3 Ed. VI. cap. 1.

In the fifth year of this king it was reviewed; because some things were contained in that *liturgy*, which shewed a compliance with the superstition of those times, and some exceptions were taken against it by some learned men at home, and by Calvin abroad. Some alterations were made in it, which consisted in adding the general confession and absolution, and the communion to begin with the ten commandments. The use of oil in confirmation, and extreme unction were left out, and also prayers for souls departed, and what tended to a belief of Christ's real presence in the eucharist. This *liturgy* so reformed, was established by the act of 5 and 6 Ed. VI cap. 1. However, it was abolished by Queen Mary, who enacted that the service should stand as it was most commonly used in the last year of the reign of King Henry VIII. The *liturgy* of 5 and 6 Ed. VI. was re-established with some few alterations and additions, by 1 Eliz. cap. 2. Some farther alterations were introduced, in consequence of the review of the Common Prayer Book, by order of King James, in the first year of his reign; particularly in the office of private baptism, in several rubricks and other passages, with the addition of five or six new prayers and thanksgivings, and all that part of the catechism which contains the doctrine of the sacraments. The book of Common Prayer, so altered, remained in force from the first year of King James, to the fourteenth of Charles II. But the last review of the *liturgy*, was in the year 1661, and the last act of uniformity enjoining the observance of it, is 13 and 14 Car. II. cap. 4. See COMMON *Prayer*. Many applications have been since made for a review, but hitherto without success.

LITUS, in *Medicine*, the same as LINIMENT.

LITUUS, among *Antiquaries*, the staff used by the augurs, made in form of a crozier.

We frequently see it on medals, along with other pontifical instruments. Aulus Gellius says, it was bigger in the place where it was crooked, than elsewhere.

LITUUS, in *Natural History*, a name given to a genus of shells of the class of the *polythalamia*, or those which consist of several consentaneous or chambers, parted from one another by shelly diaphragms, and communicating with one another by means of a siphunculus, which runs through the whole length of the shell. To this general character of the class, it is to be added, that the *lituus* is always a conic shell, running in a strait line from the mouth, through a great part of the length, and from the end of this strait part to the extremity, twisting into the shape of a cornu Ammonis, or spiral shell of that kind.

It is thus named from its resembling the instrument called *lituus* among the ancients. The stony matter often found cast in this shell, and resembling all its lineaments, is called by authors *lituites*, as those stones formed in the pecten *pectinites*, and those in the echini marini *echinites*.

LIVE *caves*, in *Mining*, a phrase used by many people, to express such caverns in the earth as have but little communication with the external air, and are found to abound with mineral productions. The workers in the lead-mines on Mendip-hills distinguish the numerous caverns in those places into the *live* or *quick caves*, and the *dead caves*; the latter are such as admit the air into them two or three ways, and are barren of any thing valuable; the others have only one passage, and that but narrow and winding, and generally lie at great depths. These abound in numerous elegant productions. They almost always contain ore in some form or other, and usually abound in elegant spars. Mr. Beaumont mentions one of these in the Philosophical Transactions, which lay at thirty-five fathom perpendicular depth, to which there was found a fine liver-coloured earth, of the nature of bole armenic, which in many places shoot up in a wonderful manner into a sort of spires of the height of three or four inches, formed with *ridges* and furrows, and usually covered with spar at the top; sometimes all the way down, to the bed of earth. Phil. Trans. N° 229.

LIVE *over*, in *Botany*. See OVERSE.

LIVE *to ground*. See VIOLET.

LIVER, in *Anatomy*, a large, glandulous viscus, of a dark red colour, a little inclined to yellow, situated immediately under the diaphragm, partly in the right hypochondrium, which it almost fills, and partly in the epigastrium; stretching itself over the right side of the stomach, towards the left hypochondrium, and reaching behind the cartilago ensiformis, growing gradually thinner and narrower; it serves to purify the mass of blood, by making a secretion of the bilious humour it contains. *See Tab. Anat. (Splanchn.) fig. 1. lit. a & fig. 3. lit. b. (Angiol.) fig. 4. lit. a a a, &c. fig. 5.*

Plato, and others of the ancients, fix the principle of love in the *liver*; whence the Latin proverb, *Cogit amare jecur*: and in this sense Horace frequently uses the word, as when he says, *Si torrere jecur quæris idoneum*. The Greeks, from its concave figure, called it ἧπαρ, *vaulted, suspended*; the Latins call it *jecur*, q. d. *jacitur cor*, as being near the heart. The French call it *foie*, from *focus*, *fover*, or fire-place; agreeable to the doctrine of the ancients, who believed the blood to be boiled and prepared in it. Erasistratus, at first, called it *parenchyma*, i. e. *effusion*, or *mass of blood*: and Hippocrates, by way of eminence, frequently calls it the *hypochondrium*.

The upper part of the *liver* is convex, and perfectly smooth: the under is concave, and somewhat more uneven, having four large fissures; one, through which the umbilical ligament passes; a second on the left side, receiving the pylorus, and the beginning of the duodenum; a third on the right side, near the margin, in which the gall-bladder is lodged; and the last in the upper part, affording the passage to the vena cava.

Its figure is somewhat approaching to round, with thin edges, not altogether even, but notched in some places. Its magnitude is various in different subjects, according to the proportion of the body; though in a fœtus, or very young animal, it is always larger, in proportion, than in adults. In dogs, and other animals of the quadruped kind, it is divided into several distinct lobes; but in men it is generally continued; having one small protuberance, which some account a little lobe. It is sometimes, however, observed, in men, to have been divided into two or three lobes.

The two lateral parts are usually called the lobes, and distinguished above by a membranous ligament, and below by a considerable fissure lying in the same direction with the superior ligament. The right or great lobe of the *liver*, which lies in the right hypochondrium, rests on the right kidney, and covers a portion of the arch of the colon and pylorus; about two thirds parts of the small or left lobe, lie in the middle of the epigastrium, and the remaining thick part advances over the stomach, towards the left hypochondrium. This small lobe is situated almost horizontally; the great lobe is very much inclined, and its thick extremity runs down almost in a perpendicular direction to the right kidney, on which it lies.

The *liver* is connected to several parts, but especially to the diaphragm, to which it is fastened by a broad, thin, but strong semicircular ligament, called the *suspensory ligament*, derived from the common capsula of the porta and gall-bladder. The continuity of this ligament, being interrupted by the perforation of the vena cava, has given occasion to some anatomists to divide it into two. It is likewise,

likewise, by another strong ligament, which has its original from the external coat of the *liver*, or, which amounts to the same, from the peritonæum, tied to the cartilago xiphoides; and by a third, which is formed out of the umbilical vessels, which, in adults, dry up, and become a ligament, it is connected to the tendons of the abdominal muscles in the linea alba, at the navel. These several ligaments serve to keep it in its due situation: besides which, it has some other connexions by the blood-vessels.

When the stomach is empty, or when we fast longer than ordinary, it is commonly said that the stomach pinches us: as the *liver* is not then sustained by the stomach and intestines, it descends by its own weight, and chiefly by means of the suspensory ligament, pulls the diaphragm along with it: it is in that place, therefore, that we have this uneasy sensation, and not at the superior orifice of the stomach, as is commonly believed.

The *liver* has a motion, though not proper to itself, but depending on that of the diaphragm; to which being very firmly connected, it must needs obey its motion: and in expiration be drawn up, and in inspiration be let down again. It is covered with a thin smooth membrane, derived from the peritonæum, which may be separated from the substance of the *liver*, though not without some danger of laceration. The substance of the *liver* is vascular and glandulous; which latter part is very soft and friable, and pretty easily scraped off from the vessels, to which the glands every way adhere, as it were in bunches; which has made the anatomists call the considerable ones, *the internal lobes of the liver*.

The glands adhering thus to the vessels, and constituting those lobes, are wrapped up together in proper membranes; whence this appearance of distinct lobes. Every one of these glands, according to Malpighi, is compofed of six unequal sides, or faces. They are all clothed with their proper membranes, and have each an excretory duct; several of which, joining together, form little trunks, which run all along with the branches of the porta; and these again, uniting, form longer trunks, which are always found full of bile, and constitute the porus biliarius; which, being distributed all over the *liver*, receives, in the foregoing manner, the bile; which is separated by these glands; and, terminating in the meatus hepaticus, and in the ductus communis, at length discharges the bile into the duodenum.

Besides this discharge by the porus biliarius, which is supposed to be the great one, the *liver* also delivers part of its bile into the gall-bladder, by a duct, called the *cysti-hepatic duct*, first discovered by Dr. Glisson; by means whereof, there is an immediate communication between the porus biliarius and the gall-bladder; a particular description of which laft part see under the words GALL, CYST-HEPATIC, &c.

Each lobule of the *liver* consists of an external friable, yellowish-red, cortical substance, and of an internal soft, pulpous, medullary part. The medullary substance is the pulpy extremities of the biliary ducts, proceeding from the cortical part. See Mr. Ferrein in Hist. de l'Acad. des Scienc. 1733.

The blood in the hepatic artery has bile secreted from it, and its remaining blood is conveyed by veins into the vena portarum, where a second secretion is made from it. Besides, the secretion of bile made from the hepatic artery and vena portarum, Mr. Ferrein has seen biliary ducts coming from the left ligament of the *liver*, the diaphragm, coats of the gall-bladder, and part of the vena cava; all which are visible upon injecting coloured liquors into the trunks of the hepatic ducts. The bile is equally bitter and strong in the smallest biliary canals as in the larger trunks; the thick yellow bile, sometimes found in the trunks, being the cystic bile, remounting from the common into the hepatic duct, on which account the hepatic is often larger than the common duct. The lymphatic vessels may be traced to the extreme branches of the vena portarum, and to the biliary ducts, by injecting liquors into the larger trunks of the external lymphatics. Ferrein, ubi supra.

Besides these gall-vessels, which are peculiar to the *liver*, it abounds with blood-vessels, especially veins; whereof the porta and cava are disseminated through the whole substance of it. And here it is particularly remarkable of the porta, that after the manner of arteries, it shoots itself from a trunk into branches; and being at last lost in capillaries, delivers the blood into the cava, by which it is immediately reconveyed to the heart.

The porta is formed out of the concurrence of divers veins, which, meeting together, make one of the most considerable venous trunks of the body, as to its bulk; though, contrary to the course of other veins, it runs not far in a trunk, but is soon distributed again by ramifications into the *liver*.

The blood conveyed into the *liver* by the porta, after the manner of the arteries, is received again, after having been purged of its bile in the glands of the *liver*, into innumerable veins, which empty themselves into the cava; and are vulgarly, though improperly, called *branches* of the cava; but they ought to be esteemed the proper blood-vessels of the *liver*, as the emulgents are of the kidneys; and which, as all the rest do, excep t the pulmonary vein, empty themselves into the cava; the common channel by which the blood returns to the heart.

The arteries, which are called the *hepatic*, come from the right branch of the coeliac. Dr. Glisson thinks the porta does so much the office of an artery, that no more arteries are necessary than those which furnish nourishment to the membranes and capsulæ; but Dr. Drake judges they serve for the nourishment of the whole part. These arteries are much bigger in men, than in other animals. Mr. Cowper had several preparations, wherein the stem of each hepatic artery was as large as a goose-quill, and the branches in the *liver* everywhere equal in magnitude to those of the porus biliarius, which they accompany. Dr. Drake conjectures, that in this viscus in a human body, a larger stream, and more direct impetus, of arterious blood is required to drive on the venous, because of the erect posture, than in animals of a horizontal position of body. For which reason horses, &c. though of much larger size, and having much bigger *livers*, have these arteries much smaller than men; and not only so, but curled like the tendrils of a vine, to break the impetus, which, in that posture, is not so necessary as in the erect. The *liver* has its nerves from the hepatic plexus, formed on the right hypochondrium by the branches of the intercostal, which, wrapping themselves about the arteries, make a sort of net-work; and after spreading themselves on the membrane and surface, disappear. The lymphe-ducts are numerous, though not easily discernible in human subjects, for want of live dissections; but in other animals, that may be dissected alive, they become very conspicuous, by applying a ligature to the porta, and the biliary duct.

LIVER, *for the use of the, in the secretion of bile*, see BILE.

Those things which increase or lessen the proportion of the weight of the heart to the weight of the body, do at the same time lessen or increase the proportion of the weight of the *liver* to the weight of the HEART. And consequently, when an animal grows fat from much food, much sleep, and little exercise, its heart lessens, and its *liver* increases; and, on the contrary, when an animal grows lean from little food, little sleep, and much exercise, its heart increases and its *liver* lessens. When the weight of the heart is too little for the weight of the body, the *liver* enlarges beyond its just magnitude, and presses too much on the contiguous parts, particularly on the stomach, intestines, and diaphragm, and by the pressure lessens the capacities of the stomach, intestines, and thorax; whence the appetite grows less, the peristaltic motion less, and respiration more difficult and uneasy.

The weight of the *liver* in proportion to the quantity of blood, is less at a medium in wild beasts than in tame, and in round fish than in flat fish.

In most chronical diseases the *liver* is larger than in health, as has been found by dissections. And it seems probable, that the weight of the heart, and quantity of blood, in those distempers, are both less than in health: most chronical diseases arising from too much food and too little exercise, lessen the weight of the heart and quantity of blood, but increase the *liver*. Hence, when this part is grown too large by intemperance and inactivity, it may be lessened and brought to a healthful magnitude by temperance and exercise. It may indeed also be emptied by art, but nothing can prevent its filling again, and consequently secure good and constant health, but an exact diet and exercise. Thus purging and vomiting may lessen the *liver*, but cannot prevent its increasing again, so long as persons live too full and use too little exercise. Dr. Robinson's Diss. on the Food, &c. of Hum. Bod. p. 111, &c.

The *liver* in fishes is generally very large in proportion to the rest of the body, and is generally placed in the left side of the abdomen; but this is not the case in all. In figure and proportion it differs greatly in the different kinds; it is in some simple and undivided, as in the pleuronectes, petromyzon, salmons, &c. In some it is divided into two lobes, as in pearch, and most of the cartilaginous kinds. As also in the torpedo, the squali, the lamiæ, the periophus, the psalthachs of authors, the cluper, the eels, the stromateus of Rondeletius, the dolphins, and all some of the hyeri. In some it is divided into three lobes, as in the cyprini, some of the gadi, the scorpænæ, the rays, the squatinæ, the tunny, the gasterosteus, and the labri, or Solen doree. Artedi, Ichthyol.

In regard to proportion, it is in some fish much shorter than the abdomen; as in pearch, clupea, osmari, coregones, salmons, esoces, and the greater part of fishes. In some it is nearly of the same length with the abdomen, as in the gasterosteus, &c.

The gall-bladder, which is an appendage to the *liver*, is never wanting in any kind of fish, but it is very differently situated in the different kinds. In the cartilaginous fishes, it is immersed in the substance of the *liver*; in other fish, it sometimes adheres closely to the lower part of it, as in the esoces, cyprini, pearch, and the greater part of fishes. In others it is hung to the *liver* by a long neck, as in the murænæ, conger, and ammodytes.

Liver, *abscess in the*. Abscesses in the *liver* have been usually accounted mortal, and wholly beyond the reach of remedy; we have, however, in the History of the Academy of Paris, an account of a very remarkable one, perfectly cured by Mr. Souiller, a surgeon of Montpelier, in the following manner. The patient was a young gentleman of about fourteen, who had contracted a violent fever, by putting his feet while very hot into some cold water. The consequence of this fever was a large tumor in the middle of the epigastric region, which raised the xiphoide cartilage, and pushed it two inches out of its place, and terminated below, two inches under the navel. The common means failing to do any service, the patient was sent to Montpelier, where the beforementioned surgeon opened the tumor; on this the *liver* was found abscessed in its anterior or convex part, and a cavity was found there capable of receiving half a hen's egg, and there issued out of it on a gentle pressure a thick and bloody, sometimes a yellowish bitter and inflammable matter. This last was true bile, and both with this and with the other discharge, there always came away small portions of the substance of the *liver*, and the small extremities of numbers of vessels might be perceived, some sanguineous, some bilious.

The great business for the surgeon, in this case, was the getting the matter out of the abscess, the preventing its remaining in the substance of the *liver*, or being again received into the blood. For this purpose, Mr. Souiller invented a particular canula, made very soft at the end, where it was to be passed into the *liver*, and having there six lateral holes capable of receiving the matter. This canula was of silver, and under its other end there was placed a thin plate of lead, to receive the matter which was discharged through it, which would otherwise have excoriated any part on which it fell. The abscess, which was, by this means, always kept perfectly clean, soon began to heal; the fever went off by degrees, the patient every day grew into a better state, and finally, the wound was cicatrized, and all perfectly cured in a very short time. Hist. Acad. Par. 1736.

One thing observable in the course of the cure, was the refutation of a common opinion, that the bile is neither bitter nor coloured, till it gets into the gall bladder; for, in this case, it was discharged yellow and bitter from the wounded vessels of the *liver*.

Wherever an abscess or imposthume is formed in the *liver*, all methods should be tried to make it break and discharge itself outwardly, as fomentations, poultices, ripening cataplasms, &c. Sometimes the matter of an abscess comes away in the urine, and sometimes it is discharged by stool; but these are efforts of nature, which no means can promote. When the abscess bursts into the cavity of the abdomen at large, death must ensue; nor will the event be more favourable when the abscess is opened by an incision, unless in cases where the *liver* adheres to the peritonæum, so as to form a bag for the matter, and prevent it from falling into the cavity of the abdomen; in which case, opening the abscess by a sufficiently large incision, will probably save the patient's life. Buchan. Dom. Med. p. 335. See Hepatitis.

Liver, *infarctions of the*. See Hepatis *Infarctio*.

Liver, in *Antiquity*, was much used in divination. See Hepatoscopia.

Liver *of antimony*, in *Chemistry*, results from the detonation of antimony with an equal weight of nitre. These two matters reduced into powder are to be mixed together, and put into a large crucible. The mass is then to be kindled, and the detonation to be made. When it has detonated, it is to be kept in fusion and then cooled. When the crucible is broken, at the bottom two distinct matters are found, which may be separated from each other by the stroke of a hammer. The upper matter is a saline scoria, nearly of the same nature as the scoria of the regulus of antimony. This is a true antimonial *liver* of sulphur, mixed with a certain quantity of vitriolated tartar. The lower matter is heavier. It is opake, compact, red and brittle. This is the *liver* of antimony. Its colour and appearance have been supposed similar to those of the *livers* of animals, whence its name. It is principally composed of the metallic part of antimony, half deprived of its sulphur, and dephlogisticated by nitre. This substance is of no use in chemistry, nor in medicine since the kermes mineral and emetic tartar have been introduced. Dict. Chem. See Antimony.

Liver *of arsenic*, is a combination of white arsenic with liquid fixed vegetable alkali, or by the humid way. The operation for making *liver* of arsenic is easy and simple: to strong and concentrated liquid, fixed alkali, previously heated, fine powder of white arsenic must be added, till the alkali is saturated, or has lost its alkaline properties. While the alkali dissolves the arsenic, it acquires a brownish colour, and a singularly disagreeable smell; and the mixture gradually thickens into a gluey consistence. Dict. Chem. See Arsenic.

Liver *of sulphur* is the combination of sulphur with alkaline matters; and this combination may be made either in the dry or humid way. In the dry way, or by fusion, a mixture of equal parts of fixed alkali and sulphur is put into a crucible and quickly fused. The melted mass is then poured on a greased stone, and then the *liver* of sulphur congeals and acquires a brown colour. It is to be required to be kept dry, it must be soon broken to pieces, and put, while it is hot, into a bottle well-corked, because it readily imbibes moisture from the air. In the humid way, which is less common, concentrated liquid fixed alkali, and fine powder of sulphur are to be boiled together, till the alkali has dissolved as much as it can: the liquor is then to be filtrated and evaporated.

Liver of sulphur is an important combination in chemistry, because it is in general a very powerful solvent of metallic matters; all which, excepting zinc, it attacks, particularly in fusion. It seems to dissolve gold more effectually than other metals. It dissolves also vegetable coals, even by the humid way; and the solution is of a green colour. Particular kinds of *livers* of sulphur may be formed by the combination of volatile alkali, of quicklime, or of absorbent earths, all which attack sulphur more or less. Dict. Chem. See Sulphur.

M. Navier has lately discovered, that the *liver* of sulphur, and particularly of *liver* of sulphur of Mars, hath the most salutary effects as an antidote against arsenic, corrosive sublimate, verdigrease and lead. Nav. Contre Poisons de l'Arsenic, &c. 1777.

Liver-*wort*, *hepar*, in *Botany*, the name of a large genus of *cryptogamia flagri*, according to Linnæus, but of mosses according to other writers: the characters of which are these: they have the most perfect fructification of all the mosses, having evident flowers as well as seeds; their flowering heads are of various figures, and have a number of monopetalous flowers in them, divided into a different number of segments; these have several filamentary, and among them have a large quantity of a farina, which when examined by the microscope appears of a globular figure; the seeds are produced in other parts of the plant, and are contained in certain cups, which stand without pedicles on the surface of the leaves; these are sometimes on the same individual plant, with the flowering heads, but sometimes they are on different plants of the same species.

Besides these and the flowering heads, there are also in some species of *lichen*, certain other heads of the shape of a button, standing on pedicles, and containing neither flowers nor seeds; these are always found on such plants as have no male flowers; the pedicles of these, as well as of the male flowers, are usually naked, or without any covering at the base. To this it may be added, that the leaves of the *lichens* are less pellucid, and more like the leaves of the larger plants than those of the other mosses; and that they are of an irregular and indeterminate figure, spreading themselves every way upon the ground, and sending out roots from the underside in various places. Dillen. Hist. Muscor. p. 516.

The *lichens*, being a numerous family of plants, are by Dillenius divided into different orders.

The first order comprehends the pileated *lichens*, or such as have not the starry flowering heads of the more common kinds, of these there are only five known species.

The second order of the *liver-worts* comprehends those which have radiated or stellated heads.

The third order of the *lichens* comprehends those, the flowers and seeds of which are less accurately distinguished than those of the former kinds.

There is scarcely any genus of plants, of which botanical writers have given more various accounts than that which is the subject of this article. Mr. Ray has interspersed the *lichens* among other mosses, under the character of *muscis floribus seu asperis*. Dr. Morison separated them from the herbaceous mosses; and, from the analogy they had with the fungus tribe, formed them into a genus under the name of *muscis fungus*, and enumerated above fifty species of them, dividing them into five orders, according to their different appearances. Tournefort was the first who adapted the generical term *lichen* to them,

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in consequence of his joining them to the *lichen* of the shops. Dr. Dillenius called them *lichenoides*, appropriating the word *lichen* to the liver-wort of the shops. Micheli, after Tournefort, adopts the term *lichen*, and comprehends all the species under it, except one or two which he calls *lichenoides*. This author describes the liver-wort of the materia medica under the name of *marchantia*. In his Nova Plantarum Genera, they are divided into thirty-eight orders or subdivisions. Dr. Haller retains Micheli's term, and enumerates one hundred and sixty kinds, in his Enumeratio Stirpium Helvetiæ, dividing them into seven different orders. Linnæus, and the followers of his method, who seem to have established their generical character from Micheli's discoveries, retain also his generical title. Micheli enumerates two hundred and ninety-eight species, but Linnæus recounts only ninety-five species belonging to this genus, which he distributes into nine orders, according to their different appearance, little or no regard being had to what are usually called the parts of fructification: they are as follow, 1. *Leproſi tuberculati*. 2. *Leproſi ſcutellati*. 3. *Imbricati*. 4. *Foliacei*. 5. *Coriacei*. 6. *Umbilicati, ſquamulati quaſi ſubrotæ*. 7. *Scyphiferi*. 8. *Fruticuloſi*. 9. *Filamentoſi*. Dillenius, in his Hiſtoria Muſcorum, has divided this Michelian genus into three, under the names of *muſci, coralloides*, and *lichenoides*. Under the firſt he comprehends the hairy tree-moſſes; under *coralloides*, he deſcribes thirty-nine ſpecies, diſtributed into three orders, and the genus of *lichenoides* comprehends one hundred and thirty-five ſpecies, divided into two orders, and ſubdivided into diſtinct ſeries or claſſes. Dr. Hill has diſpoſed them into two genera, *viz. Uſnea*, comprehending the hairy tree-moſſes; *phyſcia*, including the flat-branched tree-moſſes, lung-wort and others; *cladonia*, containing the archel and coralline moſſes; *pyxidium*, the cup-moſſes; and *placodium*, the cruſtaceous moſſes. The plants of this extenſive genus are very different in their form, manner of growing, and general appearance; on which account, thoſe authors, who preſerve them under the ſame name, were conſtrained to arrange them into different orders and ſubdiviſions, for the eaſier diſtinction of the ſpecies. So far as the parts of fructification are diſtinguiſhable in theſe plants, they appear in different forms upon different ſpecies; on ſome, in the form of tubercles; on others, in the form of little concave diſhes, called *ſcutellæ*; on others, of oblong flat ſhields or pelts. All theſe are conceived by Micheli and Linnæus to be receptacles of male flowers. The female flowers and ſeeds are ſuſpected by the ſame authors to be diſperſed in the form of farina or duſt, upon the ſame plants, and in ſome inſtances in ſeparate ones. Dr. Watſon has diſtributed them into ſeveral orders: viz. 1. The *lichens filamentoſi*, conſiſting of mere ſolid filaments, of a ſolid but flexible texture, having the appearance of fructification in the form of ſcutellæ, or flat round bodies growing from the ſides or extremities of theſe filaments, to this order he has reduced the uſnea of Dillenius and Hill, ſeveral of the ſpecies of the fifth order of *lichens* of Micheli, and the *lichenes filamentoſi* of Linnæus: 2. The *lichenes fruticuloſi*, conſiſting of a tough flexible matter, formed into ramifications, in ſome ſpecies almoſt ſimple, in others reſembling ſmall ſhrubs; in ſome of the ſpecies the branches are quite ſolid, in others tubular. This order comprehends the third of Dillenius's genus of *coralloides*, the whole *cladonia* of Hill; the ſecond and ſeveral ſpecies of the third order of Haller's *lichens*; ſeveral ſpecies of the fifth, and the whole ſixth order of Micheli; and the *lichenes fruticuloſi* of Linnæus. The orchel or argol belongs to this order. 3. The *lichenes pyxidati*, conſiſting of a firm tough flexible matter, formed into ſimple tubular ſtalks, whoſe tops are expanded into the form of little cups. This diviſion contains the cup-moſſes of authors; the ſecond order of *coralloides* of Dillenius; great part of the firſt order of *lichens* in Haller; the ſeventh, eighth, ninth, and tenth order of Micheli, and the *lichenes ſphyphiferi* of Linnæus. 4. The *lichenes cruſtacei*, conſiſting of a dry and friable matter, more or leſs thick, formed into flat cruſts, very cloſely adhering to whatever they grow upon. This diviſion contains the firſt order of the *lichenoides* of Dillenius; the fifth, ſixth, and ſeventh orders of Haller's *lichens*, the *lichenes leproſi* and cruſtacei of Linnæus, and ſeveral of the placodium of Hill. 5. The *lichenes ſubcacti ſcutellati*, conſiſting of a more lax flexible matter, formed into a foliaceous appearance, having the parts of fructification in the form of *ſcutellæ*. This diviſion contains, in general, the whole firſt ſeries of the ſecond order of *lichenoides* in Dillenius; the firſt diviſion of the ſecond ſeries, and the latter part of the ſecond diviſion, of the ſame; the *lichenes* imbricati and umbilicati of Linnæus, and many of the *placodium* of Hill. 6. The *lichenes craſſi ramoſi plani*, conſiſting of a firm tough matter, diſpoſed into flat and thin ramifications growing erect, and bearing their *ſcutellæ* upon the edges, ſurfaces, and at the extremities. This diviſion comprehends the flat-branched tree-moſſes of authors; many of the fourth order of Haller's *lichens*; the firſt part of the ſecond diviſion of the two ſeries in Dillenius; and the *phyſcia* of Hill; and 7. The *lichenes peltati*, conſiſting of a tough or coriaceous matter, diſpoſed into a foliaceous appearance; on the edges of which, in general, the parts of fructification are placed, in the form of ſtalkleſs oblong bodies, in theſe moſſes called ſhields or pelts. This diviſion contains the third ſeries of the ſecond order of Dillenius's *lichenoides*; the *lichenes coriacei* of Linnæus, and ſeveral of the *placodium* of Hill. The aſh-coloured ground liver-wort of Ray, ſo famous for the cure of the bite of a mad dog, belongs to this order. See an elaborate article on this ſubject in the Phil. Tranſ. vol. l. art. 91. p. 652.

There are two ſpecies of *liver-wort*, which have been, in a more diſtinguiſhed manner, uſed in medicine: viz. the common broad-leaved *liver-wort*, or *hepatica fontana*, and the aſh-coloured ground *liver-wort*. The firſt ſort grows on the ſides of wells, and in moiſt ſhady places, not only on the ground, but on ſtones, bricks, or wood. The ſecond ſort grows on commons and open heaths, where the graſs is ſhort, in moſt parts of England, eſpecially in declivities and the ſides of pits.

The Engliſh name *liver-wort* expreſſes the good opinion the world has had of it in all diſorders of the liver. It is grown out of uſe with us at preſent, but the German phyſicians preſcribe it, and it is ſaid with ſucceſs in jaundices, and alſo in bedtics. There are authors alſo who recommend it greatly in inflammatory fevers, in cutaneous eruptions, and in a gonorrhœa, but we have not ſo good accounts of the benefit received by it in theſe as in the other. Externally, it is recommended for ſtaunching the blood in freſh wounds; given in powder, in a doſe of about two ſcruples, it is excellent to ſtop the bleeding at the noſe, profluvia of the menſes, or any other hæmorrhages; it acts by incraſſating the blood. There are ſome families in the weſt of England who prepare a medicated drink, which they pretend to be a cure for cancers, in which this plant is the principal ingredient. The ancients recommended it as a remedy againſt laſſitude; they uſed it in baths and ointments. It has an Engliſh name, *cheeſe-rennings*, from its property of coagulating, or curdling freſh milk, and by a dry diſtillation it yields a manifeſt acid. See LAVER-*broad*.

The grey-ground *lichen* is famous for its virtues againſt the bite of a mad dog. It makes the baſis of the *pulvis antilyſſus* of the diſpenſatories.

The *lichen* is a principal ingredient in Dr. Mead's recipe for the bite of a mad dog. See MADNESS.

LIVER-*wort, noble, hepatica*, a ſpecies of the ANEMONE.

LIVERY, properly ſignifies a colour, to which a perſon has ſome particular fancy, and by which he chooſes to diſtinguiſh himſelf, or his retainers, from others.

Liveries are uſually taken from fancy, or continued in families by ſucceſſion. The ancient cavaliers, at their tournaments, diſtinguiſhed themſelves by wearing the *liveries* of their miſtreſſes: thus people of quality make their domeſtics wear their *livery*.

Father Meneſtrier, in his Treatiſe of Caroufals, has given a very ample account of the mixtures of colours in *liveries*. Dion tells us, that Cenomaus was the firſt who invented green and blue colours for the troops which, in the circus, were to repreſent land and ſea-fights.

The Romiſh church has alſo her ſeveral colours and *liveries*; white, for confeſſors and virgins, and in times of rejoicing; black, for the dead; red, for the apoſtles and martyrs; blue or violet, for penitents; and green, in times of hope.

Formerly, great men gave *liveries* to ſeveral, who were not of their family or ſervants, to engage them in their quarrels for that year; but this was prohibited by the ſtatutes 1 Rich. II. 1 Hen. IV. cap. 27. 2 & 7 Hen. IV. 8 Hen. VI. cap. 4. 8 Ed. IV. cap. 2. and no man, of whatever condition, was allowed to give any *livery*, but to his domeſtic officers, and counſel learned in the law. However, moſt of the above ſtatutes are repealed by 3 Car. I. cap. 4.

LIVERY, in *Law*, alſo denotes the delivery of poſſeſſion to thoſe tenants which held of the king in *capite*, or by knights ſervice. See POSSESSION.

LIVERY is alſo uſed for the writ, which lies for an heir to obtain the poſſeſſion or ſeiſin of his lands at the king's hands. By 12 Car. II. cap. 24. all wardſhips, *liveries*, &c. are taken away.

LIVERY *of ſeiſin*, is a delivery of poſſeſſion of land or tenements, or things corporeal, to him who hath right, or probability of right, to them.

Livery of ſeiſin, is a ceremony uſed in the common law,

in conveyance of lands, tenements, &c. where an eſtate in fee-ſimple, fee-tail, or other freehold, paſs; and is a teſtimonial of the willing departing of him who makes the *livery*, from the thing whereof the *livery* is made, as well as of a willing acceptance by the other party, of all that whereof the firſt has diveſted himſelf. *Livery of ſeiſin* is either in *deed* or in *law*.

The uſual manner of *livery of ſeiſin* in *deed* is thus performed. If it be in the open field, where is no houſe nor buildings, and if the eſtate paſs by deed, the feoffor, feoffor, or his attorney, openly reads it, or declares the effect of it; and after that is ſealed, the feoffor takes it in his hand, with a clod of earth, or a twig or bough, which he delivers to the feoffee, in the name of poſſeſſion, or ſeiſin, according to the purport of the deed. If there be a houſe or building on the land, the ceremony is to be done at the door of it, none being then left within; and the ring of the door is delivered to the feoffee, who enters alone, ſhuts the door, and preſently opens it again. If it be a houſe without land or ground, the *livery* is made, and poſſeſſion given, by delivery of the ring of the door and deed only; and where it is without deed, either of lands or tenements, there the party declares by word of mouth, before witneſſes, the eſtate he parts with; and then delivers ſeiſin, or poſſeſſion, as aforeſaid: in which caſe the land paſſes as well as by deed, by virtue of the *livery of ſeiſin*.

If the conveyance or feoffment be of divers lands, ſcattered in one and the ſame county, *livery of ſeiſin* of any parcel in the name of the reſt, ſufficeth for all; but if they be in ſeveral counties, there muſt be as many *liveries* as there are counties. If the lands be out on leaſe, though all lie in the ſame county, there muſt be as many *liveries* as there are tenants. In all theſe caſes it is prudent to endorſe the *livery of ſeiſin* on the back of the deed, ſpecifying the manner, time, and place of making it, together with the names of the witneſſes.

LIVERY, in *Law*, is where the fame is not made on the land, but only *in ſight* of it; the feoffor ſaying to the feoffee, "I give you yonder land, enter and take poſ-"ſeſſion." However, this *livery* in law cannot be given or received by attorney, but only by the parties themſelves.

Anciently, there were a pair of gloves, a ring, knife, an ear of wheat, &c. delivered in ſign of *livery* and *ſeiſin*.

LIVERYMEN *of London*, are a number of perſons choſen out of the freemen of each COMPANY. Out of this body the common-council, ſheriffs, aldermen, and other officers for the government of the city, are elected; and they only have the privilege of giving their votes in common-hall for members of parliament, &c. from which the reſt of the citizens are excluded. If any one of the company refuſe to become a *liveryman*, he may be fined, and an action of debt will lie for the ſum.

LIVERYMEN, in *Natural Hiſtory*, a name given by authors to a ſort of caterpillars, remarkable for their variety of colours. Theſe are of that claſs of caterpillars, which live in communities, and build themſelves neſts to defend them from the injuries of the weather. They may be ranked among the proceſſionary kinds, always following one another with great order in their marches; but what is moſt ſurpriſing, is to ſee them ſtraggle very far from their neſts, and this often, by ſeveral repeated windings and turnings, without loſing their way. Their art, in doing this, deſerves notice, and is the ſame by which Theſeus got out of the labyrinth of Crete. Phil. Tranſ. N° 470. p. 459.

Theſe creatures ſpin all the way they go. The firſt ſpins a thread as he crawls along, the ſecond follows him in the ſame track, and a third follows that, and ſo on, all ſpinning as they go; and their threads being all laid cloſe together, by means of their all purſuing the ſame track, they at length furniſh a fine ſhining track all the way they have gone. Theſe make a ſort of path, and ſeveral of theſe paths are ſeen running ſeveral ways from the neſt, which is the common center of them all. By means of theſe paths the creatures are able, at pleaſure, to run back directly to the neſt through all the ways they have gone from it.

If any one of theſe congeries of threads be broken in any part, all the caterpillars that are beyond that part, will be found at a terrible loſs, and running about in different directions, when they come to the place, without any knowledge of the true road to the neſt, till they are led by ſome one, who happens to find the way to the other broken end of the path, and by drawing his threads across the breach, unites the path again; as ſoon as this is done, all the reſt go on the ſame road, and arrive at the neſt.

LIVIA, in *Zoology*, a name given by ſome authors to a particular ſpecies of pigeon called *peleas* by the Greeks. It is very like the common pigeon in ſhape, but is ſomewhat ſmaller, its legs are red, and its beak white, except that it is a little purpliſh about the noſtrils.

It is all over grey, but that the ends of its tail-feathers are black, and there is a purpliſh and greenith variegation about the ſides and ſhoulders. And its wing-feathers have ſome white variegations, as has alſo the lower part of the neck. It is ſuppoſed by Mr. Ray, and ſome others, to be the ſame with the TASSAROLLA of the Italians, or *columba turbida*.

LIVONICA *terra*, in the *Materia Medica*, a kind of fine bole uſed in the ſhops of Germany and Italy, of which there are two ſpecies, the yellow and the red. The diſtinguiſhing characters of which are theſe.

The yellow Livonian earth is a pure and perfectly fine bole, of a ſhattery friable texture, conſiderably heavy, and of a dull duſky yellow, which has uſually ſome faint bluſh of reddiſhneſs in it. It is of a ſmooth ſurface, and does not ſtain the hands; it adheres firmly to the tongue, and melts freely in the mouth, leaving no gritlineſs between the teeth, and ferments not at all with acid menſtrua. In a moderate fire it acquires ſome additional hardneſs, and a darker colour. It is eſteemed a ſudorific and an aſtringent.

The red Livonian earth is an impure bole, of a looſe texture, and of a dull red. It is of a ſmooth ſurface, breaks eaſily between the fingers, and ſlightly ſtains the hands. It melts freely in the mouth, has a very ſtrongly aſtringent taſte, but leaves a gritlineſs between the teeth, and is alkaline. It acquires a conſiderable hardneſs in the fire, and becomes of a paler colour with a ſtrong caſt of yelloviſh-brown.

Theſe earths are both dug out of the ſame pit, in the place from whence they have their name, and in ſome other parts of the world. They are generally brought to us made up into little cakes, and ſealed with the impreſſion of a church, and an eſcutcheon with two croſs keys, and is recommended in diarrhœas, dyſenteries, &c.

LIVRE, a French money of account, conſiſting of twenty ſols; each ſol containing twelve deniers.

The origin of the word is derived hence, that anciently the Roman *libra*, or pound, was the ſtandard by which the French money was regulated; twenty ſols being made equal to the *libra*. By degrees the *libra* became a term of account; ſo that any coin juſt worth twenty ſols was a *livre*, or *libra*; and ſince the time of Charlemagne, all contracts have been made on the foot of this imaginary coin; though the ſols have frequently changed their weight and alloy.

The *livre* is of two kinds, *Tournois*, and *Pariſis*.

LIVRE *Tournois*, as above, contains twenty ſols Tournois, and each ſol twelve deniers Tournois.

LIVRE *Pariſis*, is twenty ſols Pariſis, each ſol Pariſis worth twelve deniers Pariſis, or fifteen deniers Tournois; ſo that a *livre Pariſis* is equivalent to twenty-five ſols Tournois; the word *Pariſis* being uſed in oppoſition to *Tournois*, on account of the rate of money, which was one fourth higher at Paris, than at Tours.

One penny ſterling was equal to thirteen and a half deniers Tournois; ſo that the Engliſh pound ſterling was equal to thirteen *livres* ſix ſols eight deniers, of French money; while the exchange was on the foot of fifty-four pence ſterling, to a French crown of ſixty ſols Tournois; which was the late par between England and France; but at preſent, the French crown is but equal to 27*d.* ſterling; on which footing the *livre* is but equivalent to 10*d.* ſterling. See COINS, and EXCHANGE.

There have ſince been pieces of gold ſtruck of twenty ſols value; and under Henry III. in 1575, pieces of ſilver of like value; both the one and the other were called *francs*; and thus the imaginary coin became real. It appears that the Romans alſo had a kind of money, which they called LIBRA, or *libella*; which was the tenth part of their denarius; ſo called, becauſe equivalent to an *as*, which, at firſt, weighed a *libra*, or pound of copper. Scaliger adds, that they uſed libra as a term of account, not as a coin: *Libra erat collecta ummorum, non ummus.*

LIXIVIOUS, LIXIVIAL, or LIXIVIATE, in *Chemiſtry*, is underſtood of ſalts extracted from burnt vegetables by lotion.

Lixivious ſalts are the fixed ſalts of plants, &c. extracted by exhaling the plants, or reducing them to aſhes, and afterwards making a lixivium of thoſe aſhes with water.

Mr. Boyle obſerves, that the difference between *lixivious* and common ſalts, conſiſts in this, that the former change the diſſolution of ſublimate in common water into a yellow colour, which the latter do not. See ALKALI and SALT.

LIXIVIUM, *ley*, a liquor made by the infuſion of wood-aſhes; and which is more or leſs pungent and penetrating, as it is more or leſs impregnated with ſalts, and fiery particles abounding therein.

What is left after the evaporation of such a liquor, is called a *lixivious salt*; such as all those are, which are made by incineration.

Lixiviums are of notable use, not only in medicine, but also in bleaching, sugar-works, &c. See BLEACHING, SUGAR, and POT-ASHES.

LIXIVIUM *martis*, in *Medicine*, a new form of medicine introduced into practice in the London Dispensatory. The manner of preparing it is to set the matter remaining in the retort after the sublimating the *flores martis*, in a damp place, where by means of the moisture of the air it will run into a liquor. See FLORES *martiales*, and IRON.

LIXIVIUM *saponarium*, *soap-lees*, a liquor now much used in medicine in cases of the stone; and when intended for this use, it is to be made something less strong than for the soap-boiler's use, and should be prepared in the following manner. Take Ruffia pot-ash, and quick-lime, of each an equal quantity; though pure alkaline salt requires commonly about twice its weight of quick-lime to render it completely caustic, which is known by the ley making no effervescence with acids: throw water on them by small quantities till the lime is fluked; then throw on more water, and ftir the whole together, fuffering it to ftand for a day or two, that the falt of the afhes may be diffolved; after fome time pour the liquor, filtered through paper, if neceffal, into another veffel. A true ftandard wine-pint of this liquor meafured with the greateft exactnefs, ought to weigh juft fixteen ounces Troy. If it be found on trial to be heavier than this, for every drachm it exceeds that weighs an ounce and a half of water is to be added to each pint: but if it be lighter than this, it muft be either boiled to this ftandard, or elfe poured upon frefh lime and afhes.

The makers of foft foap with us prepare their *lees* fo much ftronger than this, that to be reduced to this ftandard, it requires to be diluted with an equal quantity of fair water.

Quick-lime has the property of increafing confiderably the cauſticity of all fixed alkalis, by abforbing their fixable air or gas. See *Quick*-LIME.

This cauſtic ley evaporated to dryneſs, furniſhes an alkaline ſalt exceedingly acrid, which being melted in a crucible becomes what is called common CAUSTIC; becauſe when it is applied to the ſkin, it makes an eſchar, pierces it, and leaves an ulcer, the ſuppuration of which, when continued, is called an ISSUE. Cauſtic alkali has not only much greater diſſolving power, but is alſo much more deliquiſcent, and attracts much more powerfully the moiſture of the air, than ordinary alkali. This inconvenience is avoided by boiling down the ſoap ley only to one fourth part, and then, while the liquor continues boiling, ſprinkling in, by little and little, ſo much powdered quick-lime as will abſorb it ſo as to form a kind of paſte.

LIXIVIUM *tartari*, the name given in the London Diſpenſatory to the liquor called by moſt authors *oil of tartar per deliquium*. This is made of TARTAR, which is to be calcined to a whiteneſs, and then ſet in a damp place, where it will liquify by the moiſture of the air. The liquor thus procured is more pure than if the calcined tartar were diſſolved directly in water.

LIZARD, in *Aſtronomy*. See LACERTA.

LIZARD, in *Zoology*. See LACERTA.

LIZARD, *devil*. See MADOUJAS.

LIZARD, *fly-catching*. See GOBEMOUCH.

LIZARD'S *tail*, *ſaururus*, in *Botany*, a genus of the *hexandria tetragynia* claſs. Its characters are theſe: the flowers are diſpoſed in a katkin or tail; they have an oblong permanent empalement of one leaf; they have no petal, but have ſix long hair-like ſtamina, placed three on each ſide oppoſite, terminated by oblong erect ſummits; and an oval germen, with three lobes having no ſtyle, but crowned by three blunt permanent ſtigmas; the germen becomes an oval berry with one cell, including one oval ſeed. We have but one ſpecies in the Engliſh gardens, which is a native of North America, but is a plant of no great beauty. See PEPPER.

LIZIERE, the ſame with HERME, *foreland*, or *relais*.

When this ſpace is covered with a parapet, it is called a FAUSSE-*braye*, or low wall.

LLAMA, in *Zoology*. See GLAMA.

LLECH, the Welch name for a kind of monumental ſtone found in that country. See PILLAR.

LOACH, in *Ichthyology*, the Engliſh name of a fiſh, called alſo the *grendling*, and by the Germans the *ſmerle* or *ſmerling*. It is a ſpecies of the cobitis, and is diſtinguiſhed by Artedi, by the name of the *ſmooth-ſpotted cobitis* with a cylindric body.

LOAD, LODE, an Anglo-Saxon word, ſignifying *lead*, in *Mining*, is uſed, eſpecially in the tin-mines, for any regular vein or courſe, whether metallic or not; but moſt commonly *lode* means a metallic vein. See TIN.

It is to be obſerved, that mines in general are veins or cavities within the earth, whoſe ſides receding from or approaching to each other, make them of unequal breadths in different places, ſometimes forming large ſpaces, which are called *holes*; theſe holes are filled like the reſt with ſubſtances, which, whether metallic, or of any other nature, are called *loads*. When the ſubſtances forming theſe *loads* are reducible to metal, the *loads* are by the Engliſh miners ſaid to be alive, otherwiſe they are termed dead *loads*.

In Cornwall and Devonſhire the *loads* all hold their courſe from eaſtward to weſtward, though in other parts of England they frequently run from north to ſouth. The miners report, that the ſides of the *load* never bear in a perpendicular, but always overhang either to the north or ſouth above. The mines ſeem to have been ſo many channels, through which the waters paſs within the earth, and like rivers they have their ſmall branches opening into them, in all directions; theſe are by the miners termed the feeders of the *load*. Moſt mines have ſtreams of water running through them, and when they are found dry, it ſeems owing to the water having changed its courſe, which it ſeems ſometimes to have been compelled to by the *load*'s having filled up the courſe, and ſometimes to have fallen into other more eaſy channels. Phil. Tranſ. N° 401, p. 404. Price's Mineralogia Cornubienſis, 1778, p. 80, &c.

The *load* is frequently intercepted by the croſſing of a vein of earth, or ſtone, or ſome other metalline ſubſtance, in which caſe it generally happens, that one part of the *load* is moved to a conſiderable diſtance on one ſide. This tranſient *load* is, by the miners, termed a *ſtocking*; and the part of the *load* which is moved, is by them ſaid to be heaved. This fracture or heave of a *load*, according to Mr. Price ubi ſupra, p. 97, is produced by a ſubſidence of the ſtrata, from their primary poſitions, which he ſuppoſes to have been horizontal or parallel to the ſurface of the earth, and therefore ſhould more properly be called a depreſſion than a heave. This heaving of the *load* would be an inexpreſſible loſs to the miner, did not experience teach him, that as the *loads* always run on the ſides of the hills, ſo the part heaved is always moved toward the deſcent of the hill; ſo that the miner working toward the aſcent of the hill, and meeting a ſtocking, conſiders himſelf as working in the heaved part; wherefore, cutting through the ſtocking, he works upon its back up the aſcent of the hill, till he recovers the *load*, and *vice verſa*.

Sometimes, though not univerſally, the mine is lined with an intermediate ſubſtance between the *load* and itſelf. This is properly ſpeaking the wall of the *load*; though, in the common acceptation of that term, it ſignifies either ſuch intermediate ſubſtance, or the ſide of the mine where the *load* immediately unites itſelf to it. The ſprings in theſe parts are always hard, as they abound in ſtony or other mineral particles. From theſe particles, which are ſuſtained in large quantities in all theſe places, we frequently find the paſſages quite choaked up; the ſtony matter ſeparated from the water of the ſpring, gradually concreting to the walls of the mine, till it has in time blocked up the whole cavity, with a maſs of ſpar, of a coarſe texture and irregular figure: at other times this ſtony matter concretes more diſtinctly; in which caſe it ſeems to be governed in its formation by a plaſtic power, or peculiar modus of attraction, by which the particles before ſuſpended in the water are brought together under a peculiar form. This power in general ſo exerts itſelf over the harder particles of matter ſuſtained in the water, as to arrange them into the form of an hexangular pyramid, terminating an hexangular column of four, five, or more times its length. Thus is the common rock cryſtal formed; and when this power is unmoleſted, the columns of this body are carried to a great ſize.

Theſe cryſtals are of different tranſparences and colours, as the pure matter, of which they are compoſed, is more or leſs diſengaged from the mixture of foreign particles; or as thoſe, or other ſubſtances, are found capable of imparting theſe tinctures, or other qualities to them: but when the plaſtic particles are more numerous, there ſeems reaſon to believe that theſe very plaſtic particles, before they are fixed, are ſubject to the control and direction of any fixed plaſtic particle, within the verge of whoſe activity they happen to move. Notwithſtanding which, after they are once fixed, they exert their own plaſtic powers, and, in conjunction with the firſt plaſtic principle, govern the future concretion in ſuch manner, as to form a ſeemingly irregular cryſtal, though compoſed of two or more regular cryſtals.

Theſe cryſtalline concretions exert a ſtrong attraction on many metallic ſubſtances, ſo as frequently to contain lead, copper, and other metals, in very conſiderable quantities, embodied in them.

The waters of mines are, beſide cryſtal, impregnated alſo with

with a great quantity of sulphureo-saline particles, and these are in some of a vitriolic, and in others of an arsenical nature. The first of these, when pure, concrete into white cubes, resembling grains of silver; while the other, or arsenical sulphur, concretes into yellow cubes, resembling grains of pure gold. Both these concretions, whether single or in large confused clusters, are called by the miners *mundic*. The sulphureo-saline principle of concretion seems of the same nature with the plastic power in the formation of crystals; and these bodies, like the others, are in the same manner found sometimes simple, sometimes compound. On the sides of these the concretion may always be observed forming itself into threads, which in three sides run in different directions, but are always similar in the opposite sides. Phil. Trans. N° 401. p. 403. See MINERALOGY.

LOAD is also used for nine dishes of ore, each dish being about half a hundred weight.

LOAD, *master*, among *Miners*. See MASTER-*lead*.

LOAD, *turning a*. See TRAINING.

LOADING. See CARGO and LADING.

LOADMANAGE, in *Maritime Affairs*: the hire is sometimes so called, which the pilot of a ship receives of a master, for conducting a ship up the river, or into port.

LOADSTONE. See MAGNET.

LODESTONE, *floating*, an instrument invented and so called by Mr. Boyle, which he used to discover, whether guineas or other coins were counterfeit, by putting the instrument with the piece of coin to be tried and fastened to the bottom of it, into a tall glass or other vessel of water: marks being so made on the slender metalline pipe, which forms the upper part of the instrument, that the hollow ball which made the lower part of it, would sink much lower, at least two inches, if the coin be true gold, than if it be not: and according as the water reaches to one or other of the aforesaid marks, an estimate may be made, whether the piece of coin, if counterfeit, be made of tin, brass, copper, silver, or lead. The instrument might be applied to any coins, either of gold or silver, provided that they were of any considerable bulk. Birch's Hist. of the Royal Society, vol. iii. p. 115.

LOAM, in *Natural History*, the name of a class of fossile bodies, the characters of which are these: they are compound earths composed of dissimilar particles, hard, stiff, dense, harsh, and rough to the touch, not easily ductile while moist, readily diffusible in water, and usually composed of sand and a tough viscid clay.

Of this class there are two genera. 1. The THRAUSTOMICTRES; and, 2. The GLISCHROMICTRES. The first are composed of sand and a less viscid clay, and are of a friable or crumbly nature; the second are composed of sand and a more viscid clay, and are of a more tough and viscid texture. Hill's Hist. of Fossils.

Da Costa distinguishes them by their colour into black and white, which are not acted upon by acids; yellow *loams*, some of which are not acted upon by acids; and other alkaline, brown *loams*, some acted upon by acids, to which class belongs the Windsor *loam*, so well known and so much used for making bricks, building furnaces, flues, &c. and others alkaline; and the green *loams* not acted upon by acids. Hist. Fossils, p. 112, &c.

LOAM is also used for a sort of mortar made of this earth, by tempering it with water, straw, &c.

LOASA, in *Botany*, a genus of the *polyandria monogynia* class: the characters are, that the calyx is a five-leaved permanent perianthium; the corolla has five large and very wide petals; the staminæ are capillary filaments, longer than the nectarium, which is composed of five small leaves, the fruit is an oval germen, which becomes a single-celled, three-valved capsule, containing several small seeds; there is only one species.

LOBBY, in *Architecture*, is a small hall or waiting-room: it is also an entrance into a principal apartment, where there is a considerable space between that and a portico or vestibule, and the length or dimensions will not allow it to be considered as a vestibule or an anti-room. See ANTICHAMBER.

LOBE, *Λοβος*, among *Anatomists*, is applied to each of the two parts whereof the lungs consist.

This separation into *lobes* is of use in dilating the lungs, by causing them to receive more air, and preventing their being too much squeezed, when the back is bent. For this reason it is, that beasts, which are always inclining towards the earth, have more *lobes* in their lungs than men: even their *liver* is divided into *lobes*, whereas that of man is continued. See *Tab. Anat. Splanch. fig.* 14. *lit. d d*, &c. See LIVER.

LOBE is also used for the tip of the ear; which is more fat and fleshy than any other part thereof.

Du Laurent says, that the word *lobe*, in this last sense, comes from the Greek, *λοβεω, to shame*, or *be ashamed*; this part of the ear being said to blush when the person is ashamed.

LOBE is also used in speaking of fruits and grains.

Thus the bean consists of two equal parts, called *lobes*, which compose the body thereof, and are encompassed with the outer skin.—And all other grains, even the smallest, are divided, like the bean, into the two *lobes*, or equal parts; as Dr. Grew has shewn in his Anatomy of Plants.

LOBELIA, in *Botany*, a genus of the *syngenesia monogamia* class. Its characters are these: the empalement of the flower is indented in five parts; the flower has one petal, irregular, and the fruit is a capsule under the petal, with two cells, and two seeds: the species are twenty-eight according to Linnæus, who has joined this genus to the *Rapuntium*, or CARDINAL'S-flower of Tournefort, but Mr. Miller maintains that they should be distinguished.

LOBLOLLY, a sea-faring dish, otherwise called BURGOO.

LOBLOLLY-*boy*, in *Botany*. See GOUANIA.

LOBS, in *Mining*, are steps that ascend or descend within the mines, as stairs up to and down from a chamber.

LOBSTER, in *Zoology*, a species of the SQUILLA, according to some writers; but in the Linnæan system a species of the CANCER or CRAB. The common *lobster* is distinguished by a smooth thorax; short serrated snout; very long antennæ, and between them two shorter, bifid; claws and fangs large, the greater tuberculated, the lesser serrated in the inner edge; four pair of legs; six joints in the tail; and caudal fins rounded.

Lobsters inhabit all the rocky shores of our island, but chiefly in the deepest and clearest water at the foot of rocks that impend over the sea. In summer they are found near the shore, and thence to about six fathoms depth in water; in winter they are seldom taken in less than twelve or fifteen fathoms. They are brought in vast quantities from the Orkney isles, and many parts of the eastern coast of Scotland to the London markets. Sixty or seventy thousand are annually brought in well-boats, from the neighbourhood of Montrose alone. Some of them are taken by the hand; but most in pots, which are a sort of trap formed of twigs, and baited with garbage, resembling a wire mouse-trap, so that when the *lobster* gets in, there is no return. These are fastened to a cord sunk into the sea, and their place marked by a buoy. In the neighbourhood of Scarborough, the fishermen use a bag-net fixed to an iron hoop, about two feet in diameter, and suspended by three lines like a scale, and baited with fish guts tied to the bottom and middle of the net. They are caught in the night, and seldom in the day, unless the water be thick and opake. *Lobsters* begin to breed in the spring, and continue breeding most part of the summer. They propagate *more humano*, and are extremely prolific. Dr. Baster counted twelve thousand four hundred and forty-four eggs under the tail, besides those that remained in the body, unprotruded. See *Fecundity of Fish*. These eggs are deposited in the sand, where they are soon hatched. When they first appear under the tail of the female or hen *lobster*, they are very small and black; but become as large as ripe elder-berries before they are deposited, and change into a dark-brown colour. When she deposits her eggs, she is said to be in berry; and this is the case at all times of the year, but chiefly in winter; though they seem to come to life only during the warm summer months of July and August. *Lobsters* change their cruft annually; but the female does not cast her shell in the same year in which she deposits her eggs. Previous to this change, they appear sick, languid, and restless: they acquire a new coat in a few days; and whilst the shell is soft, they seek some lonely place for security, and they only grow in size when their shells are membranous and soft. *Lobsters* and CRABS will also renew their claws in a few weeks, if they are torn off by accident. They are said to fear thunder and any great noise, and are apt to cast their claws on such occasion. When frightened, they will spring tail-foremost, from a considerable distance to their hold in the rock; the fishermen can by them pass about thirty feet, and by the swiftness of their motion, suppose they may go much farther. They are more active in warm weather than cold.

The large *lobsters* are generally in their best season from the middle of October, till the beginning of May. Many of the small ones, and some few of the larger sort, are good all the summer. They are chosen for the table, by their being heavy in proportion to their size, and by the hardness of the shells on their sides, which, in perfection, will not yield to moderate pressure. Barnacles and other small shell-fish adhering to them, shew likewise their superior goodness. Cock-*lobsters* are in general better than the hens in winter: they are distinguished by the narrowness of their tails, and by their having a strong spine upon the centre of each of the transparent processes beneath the tail, which support the four middle plates

of

of their tails. The fifh of a *lobfter*'s claw is more tender, delicate, and eafy of digeftion than that of the tail. Pennant's Brit. Zool. vol. iv. p. 9. &c.

The fhell calcined and drank in wine, is faid to break and carry off concretions in the kidneys; and it is likely enough to have fome effect in fuch cafes, becaufe the fhells of fifh calcined, are a fort of lime; and the falts of lime are the grand diffolvents of ftony concretions. It is now well known, that whatever good effects Mrs. Stevens's medicine for the ftone may have, are owing to the falts of lime. See LIME-*water*, and LITHONTHRIPTICS.

Lobfters, as a food, are highly alcalefcent, and of conſequence muſt be very proper when an acid acrimony prevails in the ſtomach and general habit: but the contrary in caſe of a tendency to an alcaline putrefactive. They are eſteemed very nouriſhing and good in a conſumption. James.

LOBULE, LOBELLUS, in *Anatomy*, a little *lobe*.

Each lobe of the lungs is divided into ſeveral leſſer lobes, or *lobules*, which are faſtened on each ſide, to the largeſt branches of the trachea.—Each *lobule* conſiſts of a great number of little round veſicles, which have all a communication with one another. It is into theſe veſicles that the air enters, by the trachea, in inſpiration; ſtill quitting them again in expiration. See *Tab. Anat. (Splanch.) fig. 14. lit. f f*, &c.

LOBUS *echinatus*, in the *Materia Medica*, a name by which ſome authors have called the *burdock*, or bonour-nut

LOCAL, ſomething ſuppoſed to be tied or annexed to ſome particular place.

Thus, in *Law*, a thing is ſaid to be *local*, i. e. annexed or fixed to the freehold.—An action of treſpaſs for battery, &c. is tranſitory, not *local*; that is, it is not neceſſary that the place where battery was committed, ſhould be ſet down as material in the declaration; or if it be ſet down, the defendant cannot traverſe it, by ſaying, he did not commit the battery in the place mentioned in the declaration, and ſo avoid the action.

LOCAL, *choſe*. See CHOSES.

LOCAL *cuſtoms*, are thoſe peculiar to ſome lordſhip, or other diſtrict, and not agreeable to the general cuſtoms of the country. See CUSTOM.

LOCAL, *treſpaſs*. See TRESPASS.

LOCAL *problem*, in mathematics, is ſuch an one, as is capable of an infinite number of different ſolutions; becauſe the point, that is to ſolve it, may be indifferently taken within a certain extent; e. gr. any where in ſuch a line, within ſuch a plane figure, &c. which is called a *geometrical locus*.

A *local problem* may be either *ſimple*, as when the point ſought is in a right line; *plane*, as when the point ſought is in the circumference of a circle; *ſolid*, as when the point required is in the circumference of a conic ſection; or *ſurſolid*, as when the point is in the perimeter of a line of a *higher kind*, as the geometers call it.

LOCAL, or *artificial memory*. See MEMORY.

LOCAL *colours*, in *Painting*, are ſuch as are natural and proper for each particular object in a picture.

They are ſo called, to diſtinguiſh them from the clair obſcure, which conſiſts wholly of black and white.

LOCAL *motion*. See MOTION.

LOCATION, in the *Civil Law*, an act by which any thing is let out, on rent.

The ſecond title of the nineteenth book of the *Digeſt* is on the ſubject of *location* and conduction. *Location* and *conduction* are relative terms, and are uſed as well for the action of him that lets, as for that of him who takes on that letting.

LOCATION, *tacit*, is, when the perſon who takes, continues on the premiſes beyond the term of his leaſe; which, by the civil law he is allowed to do, at leaſt for the ſpace of a year, on the ſame terms.

LOCH, in the *Materia Medica*, a name given by Avicenna, and others to the gum lac. They call it alſo *keikem* and *kenkem*, and are too apt to confound it with the CANCAMUM, ſandarach, and other gums, with which they made their ſeveral ſorts of varniſh.

LOCH, or LOHOCH, in *Pharmacy*, a compoſition of a middle conſiſtence between a ſyrup and a ſoft electary; chiefly uſed for diſeaſes of the lungs.

The word is originally Arabic; but continues ſtill in uſe among the apothecaries.

The Latins call it *linctus*, and the Greeks, λειχὼν, becauſe the manner of taking it is by licking.

LOCHE, or *Sea*-LOCHE, a name uſed in ſome parts of England for the MUSTELA, called in other places, particularly in Cornwall, the WHISTLE-*fiſh*.

LOCHIA, or LOCHES, Λοχία, the evacuations conſequent on the delivery of a woman in child-bed.

As ſoon as the uterus is eaſed of its load, its fibres, as alſo thoſe of the peritonæum, the muſcles of the abdomen, &c. which have been extremely diſtended during the laſt period of geſtation, begin to contract themſelves, and their veſſels; particularly the uterus, which by this means expels the blood amaſſed in it.

The flux of the *lochia*, or of blood and humours from the uterus, about the time of parturition, is of two kinds; the one called *legitimate*, which happens after the excluſion of the foetus, as its proper time; the other *abortive*, which attends miſcarriages, and does not indeed follow them, but either precedes, or happens immediately in the act of abortion, and that uſually in a very violent and terrible manner. The legitimate is alſo often too copious.

Signs of it. The legitimate *lochial* flux is an excretion of blood from the genitals for eight, ten, twelve, or fourteen days after child-birth, and ſometimes for a longer time than that. During the firſt days, pure blood, grumous, and coagulated, is diſcharged, or at leaſt a fluid coloured with blood; after the fourth or fifth day, this diſcharge is attended with a diſagreeable, and ſometimes with a plainly foetid ſmell; in the ſucceeding days the humour becomes leſs bloody, and more and more yellowiſh, and after this it gradually becomes pale and watery, till it loſes all colour and ſmell: all this while alſo the flux becomes more and more moderate in quantity, till at length it wholly ceaſes of itſelf. This is the natural ſtate of this flux; but if the fecundines are too long retained, or if a part of them be torn off and left in the uterus, then the flux frequently exceeds its due bounds, and many pains and ſpaſtic motions are felt about the uterus, and throughout the abdomen.

In the *lochial* fluxes attending abortions, the blood uſually flows out gently and moderately before the act, then it comes on, during the excluſion of the foetus, with great violence. Sometimes alſo, when violent paſſions of the mind have preceded, it comes on with all this violence at the firſt attack, before the foetus is excluded; this is followed by the foetus, or falſe conception, whichever is in the uterus; and this is attended uſually with faintings, and with violent pains in the belly. Perſons ſubject to frequent abortions, have leſs trouble and pain with them than others, and the *lochial* flux is with them in leſs quantity.

The too great flux of the *lochia* is a thing of dangerous conſequence, and the perſons principally ſubject to it are thoſe of plethoric habits, and ſuch as are ſubject to violent paſſions; ſuch as are uſed to much wine, or other ſtrong liquors, and to high-ſeaſoned foods, as alſo ſuch as have omitted bleeding at the proper times during their being with child, and ſuch as have been accuſtomed to too copious fluxes of the menſes. In caſes of abortions, thoſe are moſt of all ſubject to immoderate fluxes of them, who have not been duly treated, or properly purged and cleanſed, after a former lying in. The principal occaſions of large fluxes of the *lochia* after child-birth, are either a plethoric habit, or the uſe of violent medicines to promote delivery, or the retention of part of the fecundines in the uterus.

Prognoſtics from it. The flux of the *lochia*, when moderate and regular, is of the utmoſt benefit to the perſon, and the ſuppreſſion of it is ever attended with danger. This is, of all other fluxes of blood, the moſt ſubject to exceed the uſual quantity; and in abortions, after the third month of pregnancy, is uſually greater than in parturitions at the full time. When this flux is immoderately great, the patient's ſtrength is conſumed by it in a very little time; and when it is not thus violent for a continuance, but returns, after ſhort intervals, with violent effects, it is a ſign that the womb is not properly cleanſed, and the perſon is afterwards frequently either barren, or ſubject to repeated abortions. In caſes of a threatened abortion, when there has once been a copious diſcharge of blood, there ſhould be no attempt made to retain the foetus in its place.

Method of treating. When the flux of the *lochia* is moderate, it requires no aſſiſtance from the phyſician, but nature is to be left to her own courſe; if they flow too immoderately, the patient ſhould be laid with her head low, kept cool, and the ſame means are to be uſed as in caſes of violent fluxes of the UTERUS. If the flooding proves violent, linen cloths, which have been wrung out of a mixture of equal parts of vinegar and water, or red wine, ſhould be applied to the belly, the loins, and the thighs: theſe muſt be changed as they grow dry; and may be diſcontinued as ſoon as the flooding abates. The medicines which have power to quiet the violent emotions of the blood are to be often repeated, ſuch are nitre, the alkaline abſorbents, as crabs eyes, and the like, and a little cinnabar: if theſe are inſufficient, recourſe is to be had to the milder aſtringents, ſuch as the *crocus martis antimoniatus*, and tincture of ſalt of ſteel, and the decoction, or extract of the common yarrow. In a violent flooding after delivery, Dr. Buchan ſays, that he has ſeen very good effects from the following mixture. Take of penny-royal water, ſimple cinnamon-water, and ſyrup of poppies,

pies, each two ounces, acid elixir of vitriol, a dram; mix them and take two table-spoonfuls every two hours, or oftener, if neceſſary. The abortive flux of the *lochia* is to be treated in the ſame manner with the too violent one attending parturition at the full time. The abortion is always to be haſtened, and the fœtus, mole, or whatever, to be taken out as ſoon as poſſible, when the flux becomes violent, leſt the patient faint and periſh under it. The way to prevent an immoderate flux of the *lochia* in parturition, is to bleed often during the time of pregnancy, and, if neceſſary, this may be done even juſt before delivery. The proper ligatures on the belly, after the exceluſion of the fœtus, are alſo of great ſervice in this view, and the keeping perfectly quiet, and avoiding much talking, are greatly conducive to it. The return of abortions is principally guarded againſt by a ſufficient cleanſing of the womb at the time, and by bleeding in the arm about that time of pregnancy at which the abortion happened before.

Child-bearing women are to be conſidered, after parturition, as wounded perſons, in whom fevers are very eaſily brought on, and every thing that makes any commotion in the blood is to be carefully avoided by them. Aſtringent medicines are to be avoided as much as poſſible in theſe caſes; and where they are found abſolutely neceſſary, the milder only are to be given, and attemperating medicines muſt always be given between; and if this is neglected, inflammatory fevers, hectics, and often dropſies, are the conſequence.

LOCHIA, *ſuppreſſion of the*. Theſe are either plenary or partial. In the plenary ſuppreſſion there is no blood diſcharged at all, or if there was a beginning of a proper diſcharge, it ſtops during the firſt day. In the partial ſuppreſſion, or, as it is called by ſome writers, *the imminution of the lochia*, they keep their period of eight, ten, or twelve days, but are in ſo ſmall a quantity, as to be ſcarce allowable under the name of a flux of this kind. In the judging of this imminution, it is neceſſary to conſider the natural ſtate and conſtitution of the patient; and if in the time of her not being pregnant, ſhe has been uſed but to ſmall diſcharges by the menſtrual flux, there is not to be expected a large flux of the *lochia*; if the perſon has had children before, inquiry is alſo to be made into the quantity diſcharged at thoſe times, and from that is to be determined what is to be expected. The perſons ſubject to *ſuppreſſions of the lochia* are principally thoſe of a plethoric habit, and whoſe veins are ſmall; thoſe who are of a timid diſpoſition, and eaſily ſubject to fear, ſorrow, and the like paſſions. Theſe are principally the natural cauſes of a *ſuppreſſion of the lochia*, but to theſe are to be joined many accidental and adventitious ones; ſuch as the ſudden cooling of the body, the giving very forcing medicines to forward the delivery, and the improper uſe of hot medicines. Theſe are often given to promote the *lochia*, when they are judged not to flow in ſufficient quantity, and they often produce a plenary ſuppreſſion of them, inſtead of a cure. Myrrh, ſaffron, and the volatile ſalts, when given injudiciouſly, are of this tribe. Sometimes alſo ſuppreſſions of them are brought on by violent paſſions, and by the repeated and forcible efforts the perſon has been obliged to make during a hard labour.

Prognoſtics from it. There is no kind of hæmorrhage, the ſuppreſſion of which is attended with ſuch great or ſuch imminent danger, as this of the *lochia*. The natural ſuppreſſions are uſually either from too great a quantity of blood, with a ſpiſſitude of it, or from a turgeſcence and violent emotion of it. In the firſt caſe, the ſymptoms which ſucceed are leſs violent, in the latter they are more terrible. Of the firſt kind are inquietude, toſſing and turning about, anxiety, and ſtraitneſs of the præcordia, pains of the head, and want of appetite. In the latter caſe, fevers of the inflammatory kind often immediately enſue, and ſometimes miliary and purple fevers, with great malignity; ſome alſo immediately fall into delirions of the moſt violent kinds, and into quinſies. Such are the ſudden effects of theſe ſuppreſſions; but beſide theſe, there are often left coagulations, or grumos of blood in the uterus; theſe prevent future conception, or prevent the fœtus, when conceived, from receiving due nouriſhment, and bring on, by that means, abortion; and when this is not the caſe, they ſubject the patient to various hyſteric and convulſive diſorders, and frequent faintings.

Method of cure. When the ſuppreſſion is but partial, and the *lochia* to flow, though in too ſmall a quantity; in this caſe the more gently ſtimulating medicines are to be given, and even theſe only in very ſmall doſes. The tincture of myrrh and ſaffron, and eſſence of amber, may in this caſe be mixt and given, twenty, or twenty-five drops at a doſe twice a day: theſe often have a very ſpeedy and happy effect. When the ſuppreſſion is plenary, and eſpecially when it has already held the patient ſome days, it is in vain to expect to bring on a regular diſcharge of them at once by ſtimulating medicines; the cauſes of the ſuppreſſion are then to be enquired into, and the febrile emotions of the blood allayed by febrifuges, and by nitrous medicines; and when the blood is reſtored to its proper ſtate, they will again begin to flow regularly. The common method of bleeding to bring them on again, is ſeldom attended with much ſucceſs; when indeed the patient has omitted bleeding at proper times during pregnancy, this ſometimes proves ſerviceable; but rarely when the blood is faulty in quality, rather than in quantity. The generality of the world are afraid of nitre in theſe caſes, leſt it ſhould bring on diarrhœas, but it is only an immoderate uſe of it, that is liable to this objection; for given in doſes of four, five, or ſix grains, it will rather prevent, than occaſion a diarrhœa in theſe caſes. Junker's Conſp. Med. p. 6c, &c. Buchan's Dom. Med. p. 584, &c. See DELIVERY, and INFLAMMATION *of the womb*.

LOCHIAL *fevers*, a term uſed by medical writers to expreſs ſuch fevers as ariſe from ſuppreſſions or imminutions of the *lochial* diſcharges in lying-in women, or from any other irregularities during the time of that diſcharge. Junker's Conſp. Med. p. 252.

LOCIS *communibus*. See COMMUNIBUS.

LOCK, a little inſtrument uſed for the ſhutting and faſtening of doors, cheſts, &c. only to be opened by a key. The *lock* is reckoned the maſter-piece in ſmithery; a great deal of art and delicacy being required in contriving and varying the wards, ſprings, bolts, &c. and adjuſting them to the places where they are to be uſed, and to the various occaſions of uſing them.

From the various ſtructure of *locks*, accommodated to their different intentions, they acquire various names. Theſe placed on outer doors are called *ſtock-locks*; thoſe on chamber-doors, *ſpring-locks*; thoſe on trunks, *trundle-locks*, *pad-locks*, &c.

Of theſe, the *ſpring-lock* is the moſt conſiderable, both for its frequency, and the curioſity of its ſtructure. Its principal parts are, the main-plate, the cover-plate, and the pin-hole: to the main-plate belong the key-hole, top-hook, croſs-wards, bolt-toe or bolt-nab, drawback ſpring tumbler, pin of the tumbler, and the ſtaples; to the cover-plate belong the pin, main-ward, croſs-ward, ſtep-ward, or dap-ward; to the pin-hole belong the hook-ward, main croſs-ward, ſhank, the pot or bread, bow-ward, and bit.

LOCK, or WEIR, in *Inland Navigation*, the general name for all thoſe works of wood or ſtone, made to confine and raiſe the water of a river: the banks alſo which are made to divert the courſe of a river, are called by theſe names in ſome places. But the term *lock* is more particularly appropriated to expreſs a kind of canal incloſed between two gates; the upper called by workmen the ſluice-gate, and the lower called the flood-gate. Theſe ſerve in artificial navigations to confine the water, and render the paſſage of boats eaſy both in paſſing up or down the ſtream.

To LOCK, in *Fencing*, is to ſeize your adverſary's ſword-arm, by twining your left arm round it, after you cloſe your parade, ſhell to ſhell, in order to diſarm him.

LOCKER, in a *Ship*, a kind of box or cheſt made along the ſide of a ſhip, to put or ſtow any thing in.

LOCKER, *Gaz. Lam.* See HELLEBORE, and TROLLIUS.

LOCKER, *ſhot*, in *Sea Language*. See GARLAND.

LOCKMAN, in the Iſle of Man, the officer who executes the orders of the government, much like our under-ſheriff.

LOCKS, in the *Manege*, in French called *entraves*, are pieces of leather two fingers broad, turned round, and ſtuffed on the inſide, to prevent their hurting the paſtern of a horſe, round which they are clapped. An *entrave* is compoſed of two *entraves* joined by an iron chain, ſeven or eight inches long.

LOCKSPIT, among *Miners*, is the ſmall cut, or trench, made with a ſpace of about a foot wide, to mark out the firſt lines of a work.

LOCRIAN, in *Ancient Muſic*, the ſeventh ſpecies of the DIAPASON. It was alſo called *hypodorian*, and *common*.

LOCULAMENTUM, in *Botany*, denotes a cell or partition, in a ſeed-pod, for the SEED of a plant.

In ſome plants, we only find one *loculamentum* in a pod; in others two, three, or more.

LOCUS, *place*, in the general ſenſe. See PLACE.

LOCUS, among *Ancient Muſicians*, was uſed to ſignify the interval between one degree of acuteneſs, or gravity of ſound, and another. The Greeks uſed the word *τονος* in the ſame ſenſe, for the ſpace through which the voice moved. See MOTION.

This motion the Greeks diſtinguiſhed into two kinds; one continued, *τονος*, the other diſjunct, *διαστημα*.

Inſtances of the firſt kind are in ſpeaking; of the ſecond, in ſinging; and this they called melodic motion, or what was adapted to ſinging. Ptolemy in like manner divides ſounds of unequal pitch, *φθογγοι διαστηματικοι*, into continued and diſcrete, and ſays the firſt kind are improper, and the ſecond proper, for harmony.

Ariſtides Quintilianus interpoſes a third kind of motion between the two here mentioned, ſuch as that of a perſon reciting a poem.

LOCUS, the *boxthorn*, in *Botany*, is uſed by ſome for the tree whoſe juices afford us the gum anime of the ſhops. See LUCUS-*arbores*.

LOCUS, in *Rhetoric*, a topic, or head, whence arguments are brought to prove the queſtion in hand. Some of theſe are called *loci communes*, or common topics, as being common to all ſorts of arguments: thus, whether a thing be poſſible or impoſſible, more or leſs than ſomething elſe, &c.

Beſides theſe, three others are mentioned by rhetoricians, *perſons*, *acts*, and *circumſtances*; to which ſome add *circumdion*; but Voſſius will have this laſt to be comprehended under *acts*. See TOPIC.

LOCUS *geometricus* denotes a line, by which a local or indeterminate problem is ſolved. See LOCAL *problem*.

A *locus* is a line, any point of which may equally ſolve an indeterminate problem.

Thus, if a right line ſuffice for the conſtruction of the equation, is called *locus ad rectum*; if a circle, *locus ad circulum*; if a parabola, *locus ad parabolam*; if an ellipſis, *locus ad ellipſim*; and ſo of the reſt of the conic ſections.

The *loci* of ſuch equations as are right lines, or circles, the ancients called *plain loci*; and of thoſe that are parabolas, hyperbolas, &c. *ſolid loci*.

Wollius, and other moderns, divide the *loci* more commodiouſly into orders, according to the number of dimenſions to which the indeterminate quantities riſe. Thus it will be a *locus of the firſt order*, if the equation be $x=ay$; a *locus of the ſecond* or quadrate order, if $y^2=ax$, or $y^2=a^2-x^2$, &c. a *locus of the third* or cubic order, if $y^3=a^2x$, or $y^3=ax^2+x^3$, &c.

The better to conceive the nature of the *locus*, ſuppoſe two unknown and variable right lines AP, PM (*Vide Analyſis, fig.* 29, 30.) making any given angle APM with each other; the one whereof, as AP, we call x, having a fixed origin in the point A, and extending itſelf indefinitely along a right line given in poſition; the other PM, which we call y, continually changing its poſition, but always parallel to itſelf; and moreover an equation only containing theſe two unknown quantities x and y, mixed with known ones, which expreſſes the relation of every variable quantity AP (x) to its correſpondent variable quantity PM (y): the line paſſing through the extremities of all the values of y, i. e. through all the points M, is called a *geometrical locus*, in general, and *the locus* of that equation in particular.

All equations, whoſe *loci* are of the *firſt order*, may be reduced to ſome one of the four following formulæ:

1. $y=\frac{bx}{a}$, 2. $y=\frac{bx}{a}+c$. 3. $y=\frac{bx}{a}-c$. 4. $y=c-\frac{bx}{a}$,

where the unknown quantity y is ſuppoſed always to be freed from fractions, and the fraction that multiplies the other unknown quantity x, to be reduced to this expreſſion $\frac{b}{a}$, and all the known terms to this c.

The *loci* of the firſt formula being already determined; ſince it is evident, that it is a right line which cuts the axis in A, and which makes with it an angle, ſuch that the two unknown quantities x, y, may be always to one another in the proportion of a to b; to find that of the ſecond, $y=\frac{bx}{a}+c$; in the line AP (*fig.* 31.) take AB $=a$, and draw BE $=b$, AD $=c$, parallel to PM. On the ſame ſide AP, draw the line AE of an indefinite length towards E, and the indefinite ſtrait line DM parallel to AE. I ſay the line DM is the *locus* of the aforeſaid equation, or formula; for if the line MP be drawn from any point M thereof parallel to QA, the triangles ABE, APF, will be ſimilar; and therefore AB (a): BE (b) :: AP (x): PF $=\frac{bx}{a}$; and conſequently PM (y) $=$ PF $\left(\frac{bx}{a}\right)+$FM ($c$).

To find the *locus* of the third form, $y=\frac{bx}{a}-c$, proceed thus. Aſſume AB $=a$ (*fig.* 32.) and draw the right lines BE $=b$, AD $=c$, parallel to PM, the one on one ſide AP, and the other on the other ſide; and through the points A, E, draw the right line AE of an indefinite length towards E, and through the point D, the line DM parallel to AE; I ſay, the indefinite right line GM ſhall be the *locus* ſought; for we ſhall have always PM (y) $=$ PF $\left(\frac{bx}{a}\right)-$FM c.

Laſtly, to find the *locus* of the fourth formula, $y=c-\frac{bx}{a}$ *i. e.* $a:b::c:\frac{bx}{a}$ in AP (*fig.* 33.) take AB $=a$, and draw BE $=b$, AD $=$ C, parallel to PM, the one on one ſide AP, and the other on the other ſide; and through the points A, E, draw the line AE indefinitely towards E, and through the point D draw the line DM parallel to AE. I ſay DG ſhall be the *locus* ſought; for if the line MP be drawn from any point M thereof, parallel to AQ, then we ſhall have always PM (y) $=$ FM (c) $-$ PF $\left(\frac{bx}{a}\right)$.

Hence it appears, that all the *loci* of the firſt degree are ſtrait lines; which may be eaſily found, becauſe all their equations may be reduced to ſome one of the foregoing formulæ.

All *loci* of the *ſecond* degree are conic ſections, viz. either the parabola, the circle, ellipſis, or hyperbola: if an equation therefore be given, whoſe *locus* is of the ſecond degree, and it be required to draw the conic ſection, which is the *locus* thereof; firſt draw a parabola, ellipſis, and hyperbola; ſo, as that the equations expreſſing the natures thereof may be as compound as poſſible; in order to get general equations, or formulæ, by examining the peculiar properties whereof we may know which of theſe formulæ the given equation ought to have regard to; that is, which of the conic ſections will be the *locus* of the propoſed equation. This known, compare all the terms of the propoſed equation with the terms of the general formula of that conic ſection, which you have found will be the *locus* of the given equation; by which means you will find how to draw the ſection, which is the *locus* of the equation given.

For example: let AP (x), PM (y), be unknown, and variable ſtrait lines (*fig.* 34.) and let m, n, p, r, s, be given right lines: in the line AP take AB $=m$, and draw BE $=n$, AD $=r$, parallel to PM; and through the point A draw AE $=s$, and through the point D the indefinite right line DG parallel to AE. In DG take DC $=s$, and with CG, as a diameter, having its ordinates parallel to PM, and the line CH $=p$, as the parameter, deſcribe a parabola CM; and it will be the *locus* of the following general formula:

$$yy-\frac{2n}{m}xy+\frac{nn}{mm}xx-2ry+\frac{2nr}{m}x+rr=0.$$
$$-\frac{sp}{m}x+ps.$$

For if from *any* point M there be drawn the right line MP, making any angle APM with AP; the triangles ABE, APF, ſhall be ſimilar; therefore AB (m): AE (s) :: AP (x): AF or DG $=\frac{sx}{m}$; and AB (m): BE (n) :: AP (x): PF $=\frac{nx}{m}$. And conſequently GM or PM $-$PF$-$FG $=y-\frac{nx}{m}-r$, and CG or DG$-$DC $=\frac{sx}{m}-s$. But from the nature of the parabola GM^2 $=$ CG $\times$ CH; which equation will become that of the general formula, by putting the literal values of thoſe lines.

Again: if through the fixed point A you draw the indefinite right line AQ (*fig.* 35.) parallel to PM, and you take AB $=m$, and draw BE $=n$, parallel to AP, and through the determinate points A, E, the line AE $=s$; and if in AP you take AD $=r$, and draw the indefinite ſtrait line DG parallel to AE, and take DC $=s$; this being done, if with the diameter CG, whoſe ordinates are parallel to AP, and parameter the line CH $=p$, you deſcribe a parabola CM; this parabola ſhall be the *locus* of this ſecond equation, or formula:

$$xx-\frac{2n}{m}yx+\frac{nn}{mm}yy-2rx+\frac{2nr}{m}y+rr=0.$$
$$-\frac{sp}{m}y+ps.$$

For if the line MQ be drawn from any point M, therein, parallel to AP; then will AB (m): AE (s) :: AQ or PM (y): AF or DG $=\frac{sy}{m}$. And AB (m): BE (n) :: AQ (y): QF $=\frac{ny}{m}$. And therefore GM or QM $-$QF$-$FG $=x-\frac{ny}{m}-r$; and CG or DG$-$DC $=\frac{sy}{m}-s$. And ſo by the common property of the parabola, you will have the aforegoing ſecond equation, or formula. So likewiſe may be found general equations, or formulæ, to the other conic ſections.

Now if it be required to draw the parabola, which we find to be the *locus* of this propoſed equation $yy - 2ay - bx + cc = 0$; compare every term of the firſt formula with the terms of the equation, becauſe yy in both is without fractions; and then will $\frac{2n}{m} = 0$, becauſe the rectangle xy not being in the propoſed equation, the ſaid rectangle may be eſteemed as multiplied by 0; whence $n = 0$, and $m = 1$; becauſe the line AE falling in AB, that is, in AP in the conſtruction of the formula, the points B, E, do coincide. Therefore, deſtroying all the terms affected with $\frac{n}{m}$ in the formula, and ſubſtituting m for 1, we ſhall get $yy - 2ry - px + rr + pt = 0$. Again, by comparing the correſpondent terms $-2ry$, and $-2ay$, as alſo $-px$, and $-bx$, we have $r = a$, and $p = b$; and comparing the terms wherein are neither of the unknown quantities x, y, we get $rr + pt = cc$; and ſubſtituting a and b for r and p, then will $s = \frac{cc - aa}{b}$, which is a negative expreſſion, when a is greater than c, as is here ſuppoſed. There is no need of comparing the firſt terms yy and yy, becauſe they are the very ſame. Now the values of m, n, r, p, t, being thus found, the ſought *locus* may be conſtructed by means of the conſtruction of the formula, and after the following manner.

Becauſe BE $(n) = 0$ (*fig.* 36.) the points B, E, do coincide, and the line AE falls in AP; therefore through the fixed point A draw the line AD $r = a$ parallel to PM, and draw DG parallel to AP, in which take DC $(s) = \frac{aa - cc}{b}$; then with DC, as a diameter, whoſe ordinates are right lines parallel to PM, and parameter the line CH $(p) = b$, deſcribe a parabola: I ſay, this will be the *locus* of the given equation, as is eaſily proved. If in a given equation, whoſe *locus* is a parabola, xx be without a fraction; then the terms of the ſecond formula muſt be compared with thoſe of the given equation.

Thus much for the method of conſtructing the *loci* of equations which are conic ſections. If, now, an equation, whoſe *locus* is a conic ſection, be given; and the particular ſection whereof it is the *locus*, be required:

All the terms of the given equation being brought over to one ſide, ſo that the other be equal to 0, there will be two caſes.

Caſe 1. When the rectangle xy is not in the given equation. 1. If either yy or xx be in the ſame equation, the *locus* will be a parabola. 2. If both xx and yy are in the equation with the ſame ſigns, the *locus* will be an ellipſis, or a circle. 3. If xx and yy have different ſigns, the *locus* will be an hyperbola, or the oppoſite ſections regarding their diameters.

Caſe 2. When the rectangle xy is in the given equation. 1. If neither of the ſquares xx or yy, or only one of them, be in the ſame, the *locus* of it will be an hyperbola between the aſymptotes. 2. If yy and xx be therein, having different ſigns, the *locus* will be an hyperbola, regarding its diameters. 3. If both the ſquares xx and yy are in the equation, having the ſame ſigns, then, according as the co-efficient of x^2 is greater, equal or leſs than the ſquare of half the co-efficient of xy, the *locus* ſhall be an ellipſe, parabola, or hyperbola. And in any caſe the *locus* of the equation is ſome conic ſection.

This method of conſtructing geometrical *loci*, by reducing them to equations as compound as poſſible, we owe to Mr. Craig, who firſt publiſhed it in his Treatiſe of the Quadrature of Curves, in 1693. It is explained at large in the ſeventh and eighth books of the Conic Sections of the marquis de l'Hoſpital. See this ſubject particularly illuſtrated in Maclaurin's Algebra, part ii.

LOCUST, *locuſta*, a genus of inſects, comprehending the *locuſt*, ſimply ſo called, the ſeveral ſpecies of other *locuſts* and graſhoppers, with the crickets of the houſe and field. Linnæus has claſſed all theſe under the genus of GRYLLUS.

Willughby obſerves, that in theſe animals there are always more males than females, which is contrary to the order of nature in other inſects, where the females are much the moſt numerous; and Swammerdam obſerves, that it is only the males that make a noiſe, which he ſays they do by a ſwift vibration of their wings, either againſt one another, or againſt their legs. See *Tab. of Inſects*, N° 3. fig.

The nymphæ, or worm of the *locuſt*, ſcarce at all differs from the creature in its perfect ſtate. It moves and eats in the nymph ſtate; and all the viſible difference is, that the wings are not expanded as in the perfect *locuſt*, but are gathered up in a ſmall compaſs, and form four little buttons on the ſhoulders. Swammerdam obſerves, that the want of attention to this particular in former writers had been the occaſion of a very unneceſſary multiplication of names; as Aldrovand, Johnſon, Mouffet, and others, have deſcribed theſe *locuſts* in the nymph ſtate under the names of *bruchi*, *attelabi*, and *aſeli*, ſuppoſing them to be ſo many diſtinct ſpecies of animals. It is obſerved, that toward the end of ſummer the males are very tender of the females, three or four of them being frequently ſeen gathered about one of that ſex, and ſeeming to do her all the kind offices in their power, fluttering about with their wings, and rubbing her with their fore-legs. The males are always more briſk and nimble than the females; and among all the kinds of *locuſts*, there are a great many naturally imperfect; particularly many have only one hinder leg, yet theſe hop almoſt as well as the reſt. Swammerd. Bibl. Natur.

We have in England but very few inſects of this kind. The ſpecies mentioned by Mr. Ray are ſeven.

1. The common ſmall green graſhopper. This has articulated antennæ, very flexile, and nearly half an inch long; its belly is green; its outer wings brown, and its inner ones membranaceous, tranſparent, and reticulated; its back is divided into eight or nine rings, and is of a browniſh colour; the hinder legs are very long, and ſtrong. There is a great variety in the colour of this ſpecies; ſome have more, ſome leſs green, and ſome have a little yellow about them. 2. The larger grey-winged graſhopper. This is diſtinguiſhed by having grey wings ſpotted with black. 3. The ſmall brown graſhopper, with a long rhomboidal head; the antennæ in this ſpecies are very ſhort. 4. The great green graſhopper. This is accurately deſcribed by Joan. de Muralto in the German Ephemerides, and Mr. Ray has taken the whole into his hiſtory: the antennæ are long and ſlender, the eyes black and prominent, and the breaſt is remarkably high and narrow. 5. The great Spaniſh *locuſt*, of a browniſh grey, with ſpotted wings: this is about three inches long, and is the ſpecies lately found in England. 6. The great African *locuſt*, with ſtriated ſhoulders: this differs from the former only in theſe ſtreaks. 7. The great African *locuſt*: this is four inches long, and is of a green colour; under the ſhoulders there are only ſmall rudiments of wings, and it has two ſtrong yellow forceps under the tail, which terminate in black points. Theſe ſpecies of this genus, commonly called *crickets*, ſee under the article CRICKET. Ephem. Germ. anno 12. obſ. 16. Ray's Hiſt. Inſ. p. 64. See alſo CICADA and HARVEST *fly*.

The country of the Coſſacks or Ukrain is, in dry ſummers, much infeſted with ſwarms of *locuſts*, driven thither by an eaſt or ſouth-eaſt wind. The number of theſe inſects is ſo great, that they darken the air, and devour all the corn of the country. They lay their eggs in autumn, and then die. It is ſaid that each of theſe creatures lays two or three hundred eggs, which hatching the enſuing ſpring, produce ſuch a number of *locuſts*, that they do far more miſchief than before, unleſs the rains fall, which kill both the eggs and the inſects, or unleſs a ſtrong north, or north-weſt wind ariſes, which drives them all into the Euxine ſea. The hogs of the country are fond of theſe eggs, and devour great quantities of them. In the night, when theſe inſects reſt on the ground, they cover it to the height of three or four inches. If a wheel paſs over them, they emit an intolerable ſtench. Phil. Tranſ. N° 8. p. 137. where Monſieur Beauplan's Deſcription of Poland, and Thevenot's Voyages, part i. are referred to.

Graſhoppers ſometimes come in ſwarms to particular places in the ſame manner that *locuſts* do. They appeared ſome years ago in Languedoc, and ſome other places, in very formidable ſwarms, and eat up all the harveſt of ſeveral years. They took their flight like birds, and were about an inch long, and of a grey colour, in ſhape wholly like the common graſhoppers. They were found in many places covering the whole ſurface of the earth four or five inches deep, and uſed to lie quiet till toward noon; but when the ſun then ſhone warmly upon them, they uſed to riſe and take wing, and ſettling on the corn-fields, they would in a few hours eat up the whole produce, ears, leaves, and even the more tender parts of the ſtalks.

When they had deſtroyed one field in this manner, they uſed to take wing and fly to another. They uſually flew very high in the air, and directly againſt the wind; but as ſoon as they ſaw a new crop of corn, they dropped together in a ſwarm, and cleared it as they had done the firſt. This practice they continued the whole day, and toward evening they ſettled upon the ground, where they remained quiet, till the heat of the following day raiſed them again. When they had deſtroyed all the corn in the country, they ſeized upon the vines, garden herbs, and willows, and at laſt upon the hemp, whole fields of which

which they eat up, notwithſtanding its great bitterneſs. Towards autumn they left off feeding, and were found in copulation, and ſoon after this the females were every where ſeen laying their eggs, which they depoſited in the ground, making a hole with their tail large enough to receive a gooſe quill.

In theſe holes every female would lay forty or fifty eggs, each of the ſize of a millet ſeed; and when they had finiſhed the laying, they covered up the hole to keep out the water; after this they died apace, and the multitudes of their carcaſes ſtunk intolerably, poiſoning the air. The next year they hatched in April; and from this one ſwarm there were ſuch prodigious numbers hatched, that fifteen tuns of them were deſtroyed, while no bigger than flies, and nine tuns of their eggs before the hatching, and yet there remained enough of them to deſtroy, in a great meaſure, the ſucceeding harveſt. After this they gradually decreaſed for ſeveral years, till they were not more numerous there than elſewhere. This was attributed to the induſtry of the farmers in killing them; but it is more probable, that unfavourable ſeaſons deſtroyed them. Phil. Tranſ. N° 182. p. 146.

LOCUST, *water, lentiſa aquatica*, the name given by authors to a ſpecies of water-inſect, ſomewhat reſembling the *locuſt* kind in ſhape. It is about three inches long, its tail an inch and quarter, and its legs are of different lengths; the anterior part being the ſhorteſt of all; its body is ſlender, and its fore-legs are always carried ſtrait forward, ſo as to reach beyond the head in the form of antennæ; theſe, as well as the other legs, end each in two claws; the eyes are ſmall, and not very prominent, and the upper wings are cruſtaceous; the under ones membranaceous, thin, and tranſparent; the middle joint of the leg is ſuch, that the creature can only move them upwards, not downwards, and there runs an acute tongue or proboſcis under the belly, as is the caſe in the water-ſcorpion and notonecta.

LOCUST, in *Botany*. See CAROB. See alſo HONEY-*flower*.

LOCUST-*tree, hymenæa*, in *Botany*, a genus of the *decandria monogynia* claſs. Its characters are theſe: the outward involucrum of the flower is divided into two parts, the inner is of one leaf, indented in five parts; the flower has five equal petals, and ten ſhort declining ſtamina; in the center is ſituated an oblong germen, which becomes a large oblong pod, with a thick ligneous ſhell, divided tranſverſely into ſeveral partitions; in each of which is lodged one compreſſed large ſeed, ſurrounded with a farinaceous pulp. We know but one ſpecies of this tree, which is a large ſpreading tree in the Weſt Indies, the wood of which is eſteemed good timber; it yields a fine clear reſin, which is the GUM *anime* of the ſhops, and makes an excellent varniſh.

LOCUST-*tree, honey*. See HONEY *locuſt*.

LOCUSTA-*pulex*, a name given by Swammerdam to a genus of inſects, deſcribed ſince by Mr. Ray under the name CICADULA.

LOCUSTÆ, is uſed by botaniſts for the tender extremities of the branches of trees; ſuch as, it is ſuppoſed, John the Baptiſt fed on in the wilderneſs.

Some alſo uſed *locuſtæ* for the beards and pendulous ſeeds of oats, and of the gramina paniculata; to which the name is given on account of their figure, which ſomething reſembles that of a locuſt.

LOCUSTELLA, the *graſs-hopper lark*, in *Ornithology*, the name of a ſmall bird of the lark-kind, the *alauda trivialis* of Linnæus. It is ſmaller than the common wren, and of a browniſh-yellow colour, ſpotted with black; its tail is long and brown, and its belly and thighs are variegated with oblong ſtreaks of a blackiſh brown; its legs are very long, ſlender, and brown; it feeds on flies, and makes the ſame ſort of noiſe that the graſshopper does, only much louder; and uſually, as it ſings, ſits on the ſummit of ſome prickly ſhrub, and vibrates its wing about very briſkly; in the midſt of ſummer it chirps the whole night, and ceaſes about the latter end of July.

LOCUTIUS, in *Mythology*, the god of ſpeech among the Romans, called by Livy *Aius Locutius*.

LOCUTORIUM. The monks and other religious in monaſteries, after they had dined in their common hall, had a withdrawing-room, where they met and talked together among themſelves, which room, for that ſociable uſe and converſation, they called *locutorium, a loquendo*; as we call ſuch a place in our houſes parlour, from the French *parler*; and they had another room, which was called *locutorium foriſecum*, where they might talk with laymen.

LODESMAN, or LODMAN, a pilot eſtabliſhed for conducting veſſels in and out of harbours, or up and down navigable rivers. See PILOT.

LODGMENT, in *Military Affairs*, ſometimes denotes an encampment made by an army.

LODGMENT is more frequently uſed for a work caſt up by the beſiegers, during their approaches, in ſome dangerous poſt, which they have gained, and where it is abſolutely neceſſary to ſecure themſelves againſt the enemies fire; as in a covert-way, in a breach, the bottom of a moat, or any other poſt gained from the beſieged.

Lodgments are made by caſting up earth, or by gabions, or paliſades, woolpacks, faſcines, mantelets, or any thing capable of covering ſoldiers in the place they have gained, and are determined to keep.

LOEFLINGIA, in *Botany*, a genus of the *triandria monogynia* claſs. Its characters are theſe: the calyx is compoſed of five leaves; the flower has five very ſmall petals; and the fruit is a ſingle-celled capſule, with three valves. There is only one ſpecies.

LOESELIA, in *Botany*, the name of a genus of plants of the *didynamia angioſpermia* claſs, called alſo *rezenia* by Houſtun. The characters are theſe: the periantkium is one-leaved, and tubular; it is ſhort, and divided into four ſegments, and remains after the flower is fallen; the flower conſiſts of one irregular petal; it is formed into a tube at the length of the cup, and itsverge is divided into five equal ſegments, all bending toward one ſide, and of an oval figure; the ſtamina are four filaments, of the length of the flower; two of theſe are ſhorter than the others; the antheræ are ſimple, and the germen of the piſtil is oval; the ſtyle is ſimple, the ſtigma thick, the capſule is of an oval figure, divided into three cells, and containing a number of ſeeds of an angular figure.

LOG, in the *Jewiſh Antiquities*, a meaſure which held a quarter of a cab, and conſequently five-ſixths of a pint. There is mention of a *log*, 2 Kings vi. 25. under the name of a *fourth part of a cab*. But in Leviticus the word *log* is often met with, and ſignifies that meaſure of oil, which lepers were to offer at the temple after they were cured of their diſeaſe.

Dr. Arbuthnot ſays, that the *log* was a meaſure of liquids, the ſeventy-ſecond part of the bath or ephah, and twelfth part of the hin, according to all the accounts of the Jewiſh writers.

LOG, a ſea-term, ſignifying a ſmall piece of timber of a triangular, ſectoral, or quadrantal figure, on board a ſhip, generally about a quarter of an inch thick, and five or ſix inches from the angular point to the circumference. It is balanced by a thin plate of lead, nailed upon the arch, or circular ſide, ſo as to ſwim perpendicularly in the water, with about two-thirds immerſed under the ſurface.

LOG-*line*, a little cord, or line, about a hundred and fifty fathoms long, faſtened to the *log*, by means of two legs, one of which paſſes through a hole at the corner, and is knotted on the oppoſite ſide, while the other leg is attached to the arch by a pin fixed into another hole, ſo as to draw out occaſionally. By theſe legs the *log* is hung in equilibrio; and the line thus annexed to it is wound round a reel fixed for that purpoſe in the gallery of the ſhip.

This line, from the diſtance of about ten, twelve, or fifteen fathom off the *log*, has certain knots or diviſions, which ought to be at leaſt fifty feet from each other; though it was the common practice at ſea, not to have them above forty-two feet aſunder.

The length of each knot ought to be the ſame part of a ſea-mile as half a minute is of an hour; and admitting the meaſurement of Mr. Norwood, who makes a degree on a great circle of the earth to contain 367,200 Engliſh feet, or about 69½ Engliſh ſtatute miles, and, therefore, 1/8th of it, or a nautical mile, will be 6120 feet; 1/120th of 6120, or 51 feet, ſhould be the length of each knot. But becauſe it is ſafer to have the reckoning rather before the ſhip than after it, therefore fifty feet may be taken as the proper length of each knot. The knots are ſometimes made to conſiſt only of forty-two feet each, even in the preſent practice; and this method of dividing the *log-line* was founded on the ſuppoſition that ſixty miles, each of 5000 Engliſh feet, made a degree; for 1/10 of 5000 is 41⅔, or, in round numbers, 42 feet. Mariners, rather than quit the old way, though known to be erroneous, uſe glaſſes for half minute ones, that run but 24 or 25 ſeconds. They have alſo uſed a line of 25 feet to 30 ſeconds, or a glaſs of 28 ſeconds to 42 feet. When this is the caſe, the diſtance between the knots ſhould be corrected by the following proportion: as 30 is to 50, ſo is the number of ſeconds of the glaſs to the diſtance between the knots upon the line. The heat or moiſture of the weather has often a conſiderable effect upon the glaſs, ſo as to make it run ſlower or faſter; it ſhould, therefore, be frequently tried by the pendulum in the following manner. On a round nail hang a ſtring that has a muſket-ball fixed to one end, carefully meaſuring between the center of the ball and the ſtring's loop over the peg 39⅛ inches, being the length of a ſecond pendulum; then ſwing it, and count one for every time it paſſes under

the

the peg, beginning at the second time it passes, and the number of twings made during the time the glass is running out, shews the seconds it contains. The line also is liable to relax and shrink, and should, therefore, be occasionally measured.

The use of the *log* and *line* is, to keep account, and make an estimate of the ship's way, or distance run; which is done by observing the length of line unwound in half a minute's time, told by a half-minute glass; for so many knots as run out in that time, so many miles the ship sails in an hour. Thus, if there be four knots veered out in half a minute, the ship is computed to run four miles an hour.

The author of this device for measuring the ship's way is not known; and no mention of it occurs till the year 1607, in an East-India voyage, published by Purchas; but from that time its name occurs in other voyages among his collections; and henceforward it became famous, being taken notice of both by our own authors, and by foreigners; as by Gunter in 1623; Snellius, in 1624; Metius, in 1631; Oughtred, in 1633; Herigone, in 1634; Saliocthal, in 1636; Norwood, in 1637; Fournier, in 1643; and almost by all the succeeding writers on navigation of every country.

Log, *to heave the*, as they call it, they throw it into the water, on the lee-side, letting it run, till it comes without the eddy of the ship's wake; then one, holding a half-minute glass, turns it up just as the first knot, or the mark from which the knots begin to be reckoned, runs off the reel, or passes over the stern. As soon as the glass is out, the reel is stopped, and the knots run off are told, and their parts estimated.

It is usual to heave the *log* once every hour in ships of war and East India men; and in all other vessels, once in two hours: and if at any time of the watch the wind has increased or abated in the intervals, so as to affect the ship's velocity, the officer generally makes a suitable allowance for it at the close of the watch.

The *log* is a very precarious way of computing, and must always be corrected by experience, and good sense; there being a great deal of uncertainty in the yawing of the ship going with the wind aft, or upon the quarter, in the heaving of it, by its coming home, or being drawn after the ship, on account of the friction of the reel, and lightness of the *log*, in the course of the current, and in the strength of the wind, which seldom keeps the same tenor for two hours together; which is the interval between the times of using the *log*, in short voyages, though in longer ones they heave it every hour. Yet is this a much more exact way of computing than any other in use; much preferable certainly to that of the Spaniards and Portuguese, who guessed at the ship's way, by the running of the froth or water by the ship's side; or to that of the Dutch, who used to heave a chip over-board, and to number the paces they walk on the deck, while the chip swims between any two marks, or bulk-heads on the side.

The above mentioned errors, and particularly the *log*'s being subject to drive with the motion which the water may have at its surface, whereas the experiment requires it to be fixed in the place where it is when the mark commencing the knots goes off the reel, have been considered by writers, and many methods have been proposed to remove, or at least to lessen them. The late M. Bouguer proposed a method, which has been thought deserving of particular attention, in the Mem. Acad. Sc. 1747; afterwards in his Treatise on Navigation, published at Paris in 1753, and since reprinted in 1760, by the abbé de la Caille. For this purpose, take for the *log* a conical piece of wood, which fix to the *log-line* passed through or along its axis, at about forty, fifty, or sixty, or more feet, from one end; and to this end fit the diver, which is a body formed of two equal square pieces of tin, or of thin iron plate, fixed at right angles to one another along their diagonals; and its size to fitted to that of the cone, that the whole may float. A cone of three inches diameter in the base, and of six inches in the slant height, is proposed by M. Bouguer to suit a diver made of plates about 9½ inches square; the intersection of the diagonals is joined to the *log-line*, and the loop and peg fixed as in the common *log*. However, it has been found, that no kind of wood used in Britih dock-yards, when formed into a cone of the above dimensions, will float a diver made of stout tin plates, one side of the square being 9½ inches. Such a diver weighing 1½ lb. avoirdupoise, required to float it a cone of five inches diameter, and twelve inches on the slant side, to as the point of the cone, which was made of light fir, should just appear above the water. Now supposing one side of such a square tin diver to be about ten inches, and made of plates only two-thirds of the thickness of the former, such a diver would weigh, with its solder, about twenty ounces, and can be floated by a light fir cone of four inches diameter in the base, and ten inches in the slant height or length; and such a compound *log* might, perhaps, be found on trial to be affected by about as much again as that proposed by M. Bouguer, and consequently the difference between the numbers given by the common *log*, and compound *log*, must be augmented by two-thirds of itself for the necessary correction, as below. When the compound *log* of Bouguer, above described, is hove overboard, the diver will sink too deep to be much affected by the current, or motion of the water at the surface; and the *log* will thereby keep more steadily in the place where it first fell; and, consequently, the knots run off the reel, will shew more accurately the ship's rate of sailing. As the common *log* is affected by the whole motion of the current, so that compound *log* will feel only a part thereof, viz. such a part nearly as the resistance of the cone is of the resistance of the diver; then the resistances of the above cone and diver are about as 1 to 5; and consequently this *log* will drive but one-fifth part of what the common *log* would do; and so the ship's true run will be affected by one-fifth part only of the motion of the waters. To obtain the true rate of sailing, it will be proper to heave alternately hour and hour, the common *log*, and this compound *log*; then the difference of their knots run off, augmented by its one-fourth part, is the correction; which applied to the knots of the common *log*, will give the ship's true rate of sailing, at the middle time between the hours when these *logs* were hove. The correction is additive, when the compound *log*'s run is the greatest, otherwise it is subtractive. To find the course made good: increase the observed angle between the *log-lines* by one-fourth part; and this gives the correction to be applied to the apparent course, or the opposite of that shewn by the common *log*; the correction is to be applied to the $\left\{\begin{matrix}\text{right}\\\text{left}\end{matrix}\right\}$ of the apparent course, when the bearing of the common *log* is to the $\left\{\begin{matrix}\text{left}\\\text{right}\end{matrix}\right\}$ of the compound *log*. Or thus: the lengths run off both *logs*, together with their bearings being known; in a card or compass apply the knots run off taken from a scale of equal parts along their respective bearings, from the center; join the ends, and in this line produced, on the side next the compound *log*'s length, take one-fourth of the interval; then a line drawn from the end, thus produced, to the center of the card, will shew the true course and distance made good. When a current, such as a tide, runs to any depth, the velocity of that current may be much better ascertained by the compound *log* than by the common one, provided the diver does not descend lower than the run of the current; for as those ships which are deepest immerged, drive fastest with the tide; so the diver, by being acted on below, as well as the *log* on the surface, their joint motion will give the total effect of the current's motion better than what could be derived from the motion at the surface only. Also by such a compound *log*, the depth to which any current runs, may be easily tried. Robertson's Nav. book ix. § 1.

We have an account in the Voyage to the North Pole, p. 97. of two other *logs*, which were tried by captain Phipps: one invented by Mr. Russel, the other by Foxon; both constructed upon this principle, that a spiral, in proceeding in its own length in the direction of its axis through a resisting medium, makes one revolution round the axis; if, therefore, the revolutions of the spiral are registered, the number of times it has gone its own length through the water will be known. In both these the motion of the spiral in the water is communicated to the clock-work within-board, by means of a small line, fastened at one end to the spiral, which rows it after the ship, and at the other to a spindle, which sets the clock-work in motion. That invented by Mr. Russel has a half-spiral of two threads, made of copper, and a small dial with clock-work, to register the number of turns of the spiral. The other *log* has a whole spiral of wood with one thread, and a larger piece of clock-work, with three dials, two of them to mark the distance, and the other divided into knots and fathoms, to shew the rate by the half-minute glass for the convenience of comparing it with the *log*. This kind of *log* will have the advantage of every other in smooth water and moderate weather; and it will be useful in finding the time of a ship when alone, in surveying a coast in a single ship, or in measuring distances in a boat between head-lands and shoals; but it is subject to other inconveniences, which will not render it a proper substitute for the common *log*.

Log-*board* is a table divided into four or five columns, wherein are marked the reckonings of every day; from whence they are entered into the *log-book* or traverse-book; whence it may be transcribed into the journals, and how much the ship gains in her course be estimated daily.

In

in the firſt column of the *log-board* is entered the hour of the day, from the noon of one day to the noon of the next; in the ſecond and third, the number of knots and fathoms the ſhip is found to run per hour, ſet againſt the hours when the *log* was hove; in the fourth, the courſes which the ſhip ſteers; and in the fifth, or right hand column, the winds, the alteration of the ſails, the buſineſs doing aboard, obſervations made of the weather, variation of the compaſs, &c. See JOURNAL.

LOG-*book*, at ſea, a book ruled and columned like the *log-board*. It is uſed by ſome to enter the *log-board*'s account in, every day at noon, with the obſervations then made; and from hence it is corrected and entered into the JOURNALS. The intermediate diviſions or watches of the *log-book*, containing four hours each, are uſually ſigned by the commanding officer in ſhips of war, or Eaſt India men.

LOG-*wood*, in *Botany*, the wood of a tree, called by Ray *arbor ſiliquoſa floribus papilionaceis*. It is deſcribed by Breynius under the name of *triſtis pavonis coronillæ folio ſecundo*, and *erythroxylum indicum ſpiniſſimum coluteæ ſolitis, floribus luteis, ſiliquis maximis*. Linnæus calls it *hæmatoxylon*, and makes it a genus of the *decandria monogynia* claſs. Its characters are theſe: the flower hath a permanent empalement, cut into five oval ſegments, and has five oval petals, and ten awl-ſhaped ſtamina, which are longer than the petals; in the center is ſituated an oblong, oval germen, which becomes an obtuſe, compreſſed capſule, with one cell, opening with two valves, containing two or three oblong, flat, kidney-ſhaped ſeeds. We know but one ſpecies of this genus, which grows naturally in the bay of Campeachy, at Honduras, and other parts of the Spaniſh Weſt Indies. The wood of this tree is brought to Europe, where it is uſed for dying purples, and for the fineſt blacks; and therefore it is a very valuable commodity.

The uſe of *log-wood* in dying was eſtabliſhed in this country by 13 & 14 Car. II. cap. 11. before which time it was prohibited as a pernicious material. *Log-wood* is uſed in miniature painting, to make a purple waſh; which may be varied to a more red or blue colour by the addition or omiſſion of BRASIL-*wood*. The waſh may be prepared by boiling an ounce of ground *log-wood* in a pint of water, till one half of the fluid be waſted; ſtrain it then through flannel, while of a boiling heat; and add to it, when ſtrained, about ten grains of pearl-aſhes. To make it more red, add half an ounce of Braſil-wood, or in proportion as the colour wanted may require; uſing in this caſe the pearl-aſhes very ſparingly.

Beſides its uſe among dyers, it is found to be an excellent aſtringent, and is given, in doſes of from ten grains to a ſcruple and upwards, with ſucceſs, in form of extract, obtained by inſpiſſating the decoctions, in diarrhœas, dyſenteries, and other diſorders proceeding from the laxity of the ſolids. To promote the extraction, the wood ſhould be reduced into a fine powder, which is to be boiled in the water, in the proportion of a pound to a gallon, till half the liquor is waſted. Some digeſt the powdered wood in as much ſpirit as will cover it to the height of about four inches, and afterwards boil it in water; the matters taken up by the watery and ſpirituous menſtrua may be united into one extract, by inſpiſſating the watery decoction to the conſiſtence of honey, and then gradually ſtirring in the ſpirituous tincture.

LOGARITHMIC, *azimſpherical*, is a curve (*Tab. II. Aſtroſyſt. fig.* 56.) deſcribed in the following manner; let the point C repreſent the center of the earth, CA the earth's ſemidiameter, and AB any height above the ſurface; at A place a right line AD, of any finite length, at right angles with AC. In the right line AC, towards C, take A*β* ſuch, that CA may be to A*β* in the proportion of CB to BA. In a right line drawn through *β*, at right angles with AC, take *β*E, of ſuch length, as to be to AD in the proportion of the denſity of the air at B to the denſity at A, the earth's ſurface. The curve, which the point E always touches, is a *logarithmic*, of which AC is the aſymptote; and is called by Dr. Horſley the *azimſpherical logarithmic*.

Imagine this curve deſcribed, and take another height A*b*, and take $A\zeta = \frac{CA \times Ab}{CB}$, and draw *ζε* parallel to *β*E, meeting the curve in *ε*. Then *βζ* is the logarithm of the ratio of *β*E to *ζε*, or of the denſity at B to the denſity at *b*. But if the greater of the two heights, AB and A*b*, bear but a very ſmall proportion to the ſemidiameter of the earth, their difference B*b* will be very nearly equal to *βζ*.

For, becauſe CB : BA = CA : A*β* (by conſtruction)
Therefore, by converſion, CB : CA = CA : C*β*.
In like manner, and by inverſion, CA : C*b* = C*ζ* : CA.
by equi-diſtance perturbate, CB : C*b* = C*ζ* : C*β*.

and converting, CB : B*β* = C*ζ* : *βζ*
by permutation, B*b* : *βζ* = CB : C*β*.

But when AB is infinitely diminiſhed, CB = CA ultimately. Alſo A*b* being infinitely diminiſhed, C*ζ* = C*b* ultimately. Therefore CB = C*ζ* ultimately, and B*b* = *βζ* ultimately. Q. E. D.

Now AB and A*b* will always be ſo ſmall, with reſpect to CA, if B and *b* be ſuppoſed to repreſent any acceſſible places, that CB, C*ζ*, and B*b*, *βζ*, may always, in this caſe, be conſidered as in their ultimate proportion of equality.

It is ſtill therefore to be admitted, as a principle, in practice, that the difference of elevation of any two places, is as the difference of the tabular logarithms of the height of the quickſilver in the barometer at the ſame time, at both places; that is, it is the logarithm of the ratio of thoſe heights in *ſome* ſyſtem of logarithms. And the heights of the quickſilver being given, by obſervation, the difference of elevation will be known, if that particular ſyſtem can be determined; that is, if the *modulus* of the ſyſtem, or the length of the ſubtangent of the curve DE of that ſyſtem, can be aſcertained, in ſome known meaſure, as Engliſh fathoms, or Paris toiſes.

The eaſieſt method of doing this, that theory ſuggeſts, is to compare barometers at two ſtations, ſuppoſe B and *b*, each at a known elevation AB and A*b*, above the level of the ſea. For the logarithms of any given ratio, in different ſyſtems, are proportional to the ſubtangents; and the difference of elevation, B*b*, diminiſhed in the proportion of CB, (the diſtance of the higher ſtation from the earth's center) to C*ζ*, (a third propotional to C*b*, the diſtance of the lower ſtation from the earth's center, and CA, the earth's ſemidiameter) is the logarithm of the ratio of the denſity at B, to the denſity at *b* (that is, of the columns of quickſilver ſuſtained in the barometer at B and *b*) in the atmoſpherical ſyſtem. Therefore, as the difference of the tabular logarithms, of theſe columns, to the ſubtangent of the tabular ſyſtem, ſo ſhould B*β*, diminiſhed as hath been ſaid (that is, ſo ſhould *βζ*) be to the ſubtangent of the atmoſpherical *logarithmic*. The utmoſt height, to which we can aſcend, above the level of the ſea, is ſo ſmall, that the reduction of B*b* may, even in this inveſtigation, always be neglected. For, if AB were four Engliſh miles, which exceeds the greateſt acceſſible heights, even of the Peruvian mountains, and AC three, *βζ* would be ſcarce one part in 500 leſs than B*b*. So that, by comparing barometers at different elevations, within a mile above the level of the ſea, the ſubtangent of the atmoſpherical curve might be determined, as it ſhould ſeem, without ſenſible error, by taking ſimply the difference of elevation, without reduction, for the logarithm of the ratio of the obſerved heights of the quickſilver in the atmoſpherical ſyſtem.

This ſubtangent is different in length at different times; though M. de Luc has ſhewn, that it is conſtant in a given temperature; ſo that if the temperature of the air is +16½ of his ſcale, the difference of the tabular logarithms of the heights of the quickſilver in the barometer, gives the difference of elevation in 100ths of a Paris toiſe; whence the number, which is the *modulus* of Briggs's ſyſtem, expreſſes the length of the ſubtangent of the atmoſpherical curve, ſuch as it is in that temperature, in 100ths of a Paris toiſe. Phil. Tranſ. vol. lxiv. part 1. p. 231, &c.

LOGARITHMIC, or *logarithmical*, relating to logarithms.

Thus we ſay, *logarithmic* arithmetic, curve, line, ſcale, ſpiral. See ARITHMETIC, &c.

LOGARITHMS, formed from the Greek λογος, *ratio*, and αριθμος, *number*; q. d. *ratio of numbers*; the indices of the ratios of numbers one to another; or a ſeries of artificial numbers proceeding in arithmetical proportion, correſponding to as many others proceeding in geometrical proportion; contrived for the eaſing and expediting of calculation.

LOGARITHMS have been uſually defined *numerorum proportionalium æquidifferentes termines*; but this definition Dr. Halley and Stifelius think deficient, and more accurately define them, *the indices or exponents of the ratios of numbers*; ratio being conſidered as a quantity *ſui generis*, beginning from the ratio of equality, or 1 to 1 = 0; and being affirmative when the ratio is increaſing, and negative when it is decreaſing.

Thus, if unity be made the common conſequent of all ratios, or the common ſtandard, to which all other numbers are to be referred, then every *logarithm* will be the numeral exponent of the ratio of its natural number to unity. E. g. the ratio of 81 to 1 contains the four following ratios, viz. that of 81 to 27, 27 to 9, 9 to 3, and 3 to 1, or $\frac{81}{27} \times \frac{27}{9} \times \frac{9}{3} \times \frac{3}{1}$; but all theſe ratios are equal to one another, and $3^4 = 3 \times 3 \times 3 \times 3$: conſequently the *logarithm* of 81 is four times as great as

that of 3. In the same manner, the ratio of 24 to 1, or $\frac{24}{1} = \frac{8}{1} \times \frac{3}{1} \times \frac{1}{1}$; and, therefore the *logarithm* of 24 is equal to the sum of the *logarithms* of 2, 3, and 4. And, universally, the magnitude of the ratio of A to 1, is to the magnitude of the ratio of B to 1, as the *logarithm* of A to the *logarithm* of B. Hence we derive a method of measuring all ratios whatever, let their consequents be what they will: e. g. the ratio of A to B is the excess of the ratio of A to 1, above the ratio of B to 1; therefore the numeral exponent of the ratio of A to B, will be the excess of the numeral exponent of the ratio of A to 1, above the numeral exponent of the ratio of B to 1, that is, the excess of the *logarithm* of A above the *logarithm* of B: therefore the magnitude of the ratio of A to B is to the magnitude of the ratio of C to D as the excess of the *logarithm* of A above the *logarithm* of B, which is the measure of the former ratio, is to the excess of the *logarithm* of C above that of D, which is the measure of the latter ratio; and thus we see that *logarithms* are as true and proper measures of ratios, as circular arcs are of angles. See the sequel of this article.

The nature and genius of *logarithms* will be easily conceived, from what follows:—a series of quantities increasing or decreasing according to the same ratio is called a *geometrical progression*; e. g. 1. 2. 4. 8. 16. 32, &c. A series of quantities increasing or decreasing, according to the same difference, is called an *arithmetical progression*; e. gr. 3. 6. 9. 12. 15. 18. 21. Now, if underneath the numbers proceeding in a geometrical ratio, be added as many of those proceeding in the arithmetical one, these last are called the *logarithms* of the first.

Suppose, e. g. two progressions:

Geomet.	1.	2.	4.	8.	16.	32.	64.	128.	256. 512.
Arithmet.	0.	1.	2.	3.	4.	5.	6.	7.	8. 9.

Logarithms.

0 will be the *logarithm* of the first term 1; viz. 1; 5, of the 6th, 32; 7 the *logarithm* of the 8th, 128, &c.

These indices or *logarithms* may be adapted to any geometric series; and, therefore, there may be as many kinds of indices or *logarithms*, as there can be taken kinds of geometric series; but the *logarithms* most convenient for common use, are those adapted to a geometrical series increasing in a ten-fold progression, as in the sequel.

The doctrine and use of *logarithms* may be conceived from the following propositions.

1. *If the* logarithm *of unity be* 0, *the* logarithm *of the factors or product will be equal to the sum of the* logarithms *of the factors.*—For as unity is to one of the factors, so is the other factor to the product. So that the *logarithm* of the product, is a fourth equidifferent term to the *logarithm* of unity, and those of the factors; but the *logarithm* of unity being 0, the sum of the *logarithms* of the factors must be the *logarithm* of the factum, or product. Q. E. D. Hence, since the factors of a square are equal to each other, i. e. a square is the factum or product of its root multiplied into itself, the *logarithm* of the square will be double the *logarithm* of the root.

In the same manner it appears, that the *logarithm* of the cube is triple; of the biquadrate, quadruple; of the fifth power, quintuple; of the sixth, sextuple, &c. of the *logarithm* of the root.

Unity, therefore, is to the exponent of the power, as the *logarithm* of the root to the *logarithm* of the power.

So that the *logarithm* of the power is had, if the *logarithm* of the root be multiplied by its exponent; and the *logarithm* of the root is had, if the *logarithm* of the power be divided by its exponent.

And hence we derive one of the great uses of *logarithms*, which is to expedite and facilitate the business of multiplication, involution of powers, and extraction of roots; the former of which is here performed by mere addition, and the two latter by multiplication and division.—Thus 3, the sum of the *logarithms* 1 and 2, is the *logarithm* of 8, the product of 2 and 4. In like manner 7, the sum of the *logarithms* 2 and 5, is the *logarithm* of 128, the product of 4 and 32. Again, 6, the *logarithm* of 64, which is the third power of 4 or 4^1, is equal to 3×2. And 8, the *logarithm* of 256, which is the fourth power of 4 or 4^2, is equal to 4×2. Moreover, 3, the *logarithm* of the square root 8, is half the *logarithm* 6, of the square 64; and 2, the *logarithm* of the cube root 4, is subtriple the *logarithm* 6 of the cube 64.

2. *If the* logarithm *of unity be* 0, *the* logarithm *of the quotient will be equal to the difference of the* logarithms *of the divisor and dividend.*—For as the divisor is to the dividend, so is unity to the quotient; therefore the *logarithm* of the quotient is a fourth equidifferent number to the *logarithms* of the divisor, the dividend, and the *logarithm* of unity. The *logarithm* of unity, therefore, being 0, the difference of the *logarithm* of the divisor, and that of the dividend, is the *logarithm* of the quotient. Q. E. D.

Hence appears another great advantage of *logarithms*; viz. their expediting the business of division, and performing it by a bare subtraction. E. gr. 2, the difference between 7 and 5, is the *logarithm* of the quotient 4, obtained by dividing 128 by 32. In like manner, 5, the difference between 8 and 3, is the *logarithm* of the quotient 32, obtained by dividing 256 by 8.

An example or two will render the use of *logarithms* in multiplication, division, &c. obvious.

Num.	Log.	Num.	Log.
Multiply 68	1.832509	Divide 816	2.911690
by 12 + 1	1.079181	by 12 − 1	1.079181
816	2.911690	68	1.832509
9	0.954242	9	0.954242
9	0.954242	9	0.954242
Sq. 81	1.908484	9	0.954242

log. of sq. R. Cub. 729 3)2.862726(0.954242 *log.* of Cube R.

The properties of *logarithms* hitherto mentioned, and their various uses are taken notice of by Stifelius: but they come all far short of the use of *logarithms* in trigonometry, first discovered by John Napier, baron of Merchiston, in Scotland, and first published at Edinburgh in 1614, in his Mirifici Logarithmorum Canonis Descriptio. This work was translated by Mr. Edward Wright, and published by his son, with the assistance of Mr. Briggs, in the year 1616 or 1618. The method of constructing the table was reserved by the ingenious author, till the sense of the learned upon his invention should be known; nevertheless Kepler, in his Chilias Logarithmorum ad totidem Numeros rotundos, published at Marpurg in 1624; Speidell in his New *Logarithms*, published in 1619, and republished with considerable additions, in a fifth impression in 1624; Bonj. Urfinius, in his Table of *Logarithms*, printed at Cologne, in 1625, and others, at home and abroad, laboured at the computation of *logarithms*, and constructed small tables, conformable to the plan of lord Napier.

To find the logarithm *of any number, and to construct a canon of* logarithms *for natural numbers.*—1. Because, 1. 10. 100. 1000. 10000. &c. constitute a geometrical progression their *logarithms* may be taken at pleasure: to be able, then, to express the *logarithms* of the intermediate numbers by decimal fractions, take 0.00000000, 1.00000000, 2.00000000, 3.00000000, 4.00000000, &c. 2. It is manifest, that for those numbers which are not contained in the scale of geometrical progression, the just *logarithms* cannot be had: yet may they be had so near the truth, that, as to matters of use, they shall be altogether as good as if strictly just. To make this appear, suppose the *logarithm* of the number 9 were required: between 1.0000000 and 10.0000000, find a mean proportional, and between their *logarithms* 0.00000000, and 1.00000000 an equidifferent mean, which will be the *logarithm* thereof; that is, of a number exceeding three by $\frac{1}{1000000}$, and therefore far remote from nine. Between 3 and 10, therefore, find another mean proportional, which may come somewhat nearer 9; and between 10 and this mean another still; and so on between the numbers next above and next underneath 9, till at last you arrive at 9 $\frac{1}{1000000}$; which not being one millionth part from 9, its *logarithm* may, without any sensible error, be taken for that of 9 itself. Seeking then in each case for the *logarithms* of the mean proportionals, you will at last have 0.954251, which is exceedingly near the true *logarithm* of 9. 3. If in like manner you find mean proportionals between 1.0000000 and 3.1622777, and assign convenient *logarithms* to each, you will at length have the *logarithm* of the number 2, and so of the rest. 4. There needs not, however, be so much pains taken in investigating the *logarithms* of all numbers; since those that consist of aliquot parts being divided, and others mutually multiplying each other, their *logarithms* are easily found. Thus if the *logarithm* of the number 9 be bisected, we shall have the *logarithm* 0.477121125 of the number 3.

The indices, or characteristics of *logarithms*, correspond to the denominative part of the natural numbers, as the other member of the *logarithm* does to the numerative part of the number: i. e. the index shews the denomination, or place of the last (or left hand) figure of the number, and consequently of all the rest. Thus 0, affixed to a *logarithm*, denotes the last figure of the number, to which the *logarithm* answers, to be nothing distant from (i. e. in) the place of units. The index 1 shews the last figure of its number to be distant 1 place from the place of units, i. e. to be in the place of tens, and consequently the number itself to be either 10, or some number between that and 100, and so of the other indices. Hence all numbers, which have the same denominative, but not the same numerative part, as all numbers from 1 to 10, from 10 to 100, &c. will have *logarithms*, whose indices are the same, but the other members different. Again, all numbers which have the same numerative, but not

not denominative part, will have different indices; but the reſt of the *logarithms* the ſame. If a number be purely decimal, to its *logarithm* is affixed a negative index, ſhewing the diſtance of its firſt ſignificative figure, from the place of units. Thus the *logarithm* of the decimal .256 is 1.408240, of the decimal, 0256 is 2.408240, &c.

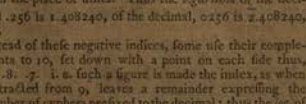
Inſtead of theſe negative indices, ſome uſe their complements to 10, ſet down with a point on each ſide thus, .9. 8. 7. i. e. ſuch a figure is made the index, as when ſubtracted from 9, leaves a remainder expreſſing the number of cyphers prefixed to the decimal: thus the *log.* of

.256 is .9.408240
of .0256, .8. 408240.

Logarithms are not only of great uſe for facilitating computations in arithmetic and trigonometry, but have been found of extenſive ſervice in the higher geometry, particularly in the method of fluxions. The nature and geneſis of *logarithms* are explained above, after the manner made uſe of in moſt elementary treatiſes; but it may be proper to add ſomething more on this ſubject from Mr. Maclaurin's Treatiſe of Fluxions, who has explained the nature and geneſis of *logarithms*, agreeably to the notion of their firſt inventor, Lord Napier, delivered in his Mirif. Logar. Canon. Deſcript.

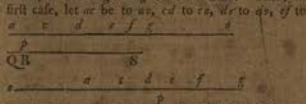
Logarithms, and the quantities to which they correſpond, may be ſuppoſed to be generated by the motion of a point. If this point moves over equal ſpaces in equal times, the line deſcribed by it increaſes equally.

Again, a line decreaſes proportionally, when the point that moves over it deſcribes ſuch parts in equal times as are always in the ſame conſtant ratio to the lines from which they are ſubducted, or to the diſtances of that point at the beginning of thoſe times, from a given term in the line. In like manner, a line may increaſe proportionally, if in equal times the moving point deſcribes ſpaces proportional to its diſtances from a certain term, at the beginning of each time. Thus, in the firſt caſe, let *ac* be to *ae*, *cd* to *eb*, *df* to *ec*, *ef* to



eo, *fg* to *fo*, always in the ſame ratio of QR to QS; and ſuppoſe that the point *p* ſets out from *a*, deſcribing *ac*, *cd*, *de*, *ef*, *fg*, in equal parts of the time; and let the ſpace deſcribed by *p*, in any given time, be always in the ſame ratio to the diſtance of *p* from *e*, at the beginning of that time, then will the right line *ae* decreaſe proportionally; and the lines *ae*, *ce*, *de*, *ee*, *fe*, &c. of the diſtances of the point *p* from *e*, at equal ſucceeding intervals of time, are in a continued geometrical progreſſion.

In like manner the line *ae* increaſes proportionally, if the point *p* in equal times deſcribes ſpaces *ac*, *cd*, *de*, *ef*, *fg*, &c. ſo that *ac* is to *ae*, *cd* to *ce*, *de* to *de*, &c. in a conſtant ratio.



If we now ſuppoſe a point P deſcribing the line AB with an uniform motion; equal to that with which *p* ſets out from *a*, in deſcribing the line *ae*, while the point *p* deſcribes a line increaſing or decreaſing proportionally, the line AP deſcribed by P with this uniform motion, in the ſame time that *ae*, by increaſing or decreaſing proportionally, becomes equal to *ep*, is the *logarithm* of *ep*. Thus AC, AD, AE, &c. are the *logarithms* of *ac*, *ad*, *ae*, &c. reſpectively; and *aa* is the quantity whoſe *logarithm* is ſuppoſed equal to nothing.

We have here abſtracted from numbers, that the doctrine may be the more general; but it is plain, that if AC, AD, AE, &c. be ſuppoſed 1, 2, 3, &c. in arithmetic progreſſion; *ac*, *ad*, *ae*, &c. will be in geometric progreſſion; and that the *logarithm* of *ae*, which may be taken for unity, is nothing.

Lord Napier, in his firſt ſcheme of *logarithms*, ſuppoſes, that while *ep* increaſes or decreaſes proportionally, the uniform motion of the point P, by which the *logarithm* of *ep* is generated, is equal to the velocity of *p* at *q*; that is, at the term of time when the *logarithms* begin to be generated. Hence *logarithms*, formed after this model, are called *Napier's logarithms*, and ſometimes *natural logarithms*.

When a ratio is given, the point *p* deſcribes the difference of the terms of the ratio in the ſame time. When a ratio is duplicate of another ratio, the point *p* deſcribes the difference of the terms in a double time. When a ratio is triplicate of another, it deſcribes the difference of the terms in a triple time; and ſo on. Alſo when a ratio is compounded of two or more ratios, the point *p* deſcribes the difference of the terms of that ratio, in a time equal to the ſum of the times in which it deſcribes the differences of the terms of the ſimple ratios of which it is compounded. And what is here ſaid of the times of the motion of *p*, when *ep* increaſes proportionally, is to be applied to the ſpaces deſcribed by P in thoſe times, with its uniform motion.

Hence the chief properties of *logarithms* are deduced. They are the meaſures of ratios. The exceſs of the *logarithm* of the antecedent above the *logarithm* of the conſequent meaſures the ratio of thoſe terms. The meaſure of the ratio of a greater quantity to a leſſer is poſitive, as this ratio compounded with any other ratio increaſes it. The ratio of equality, compounded with any other ratio, neither increaſes nor diminiſhes it; and its meaſure is nothing. The meaſure of the ratio of a leſſer quantity to a greater is negative, as this ratio compounded with any other ratio diminiſhes it. The ratio of any quantity A to unity, compounded with the ratio of unity to A, produces the ratio of A to A, or the ratio of equality; and the meaſures of thoſe two ratios deſtroy each other, when added together; ſo that when the one is conſidered as poſitive, the other is to be conſidered as negative.

When *ep* increaſes proportionally, the motion of *p* is perpetually accelerated; and, on the contrary, when *ep* decreaſes proportionally, the motion of *p* is perpetually retarded.

If the velocity of the point *p* be always as the diſtance *ep*, then will this line increaſe or decreaſe in the manner ſuppoſed by Lord Napier; and the velocity of the point *p* being the fluxion of the line *ep*, will always vary in the ſame ratio as this quantity itſelf. See Maclaurin's Flux. art. 161—166.

The fluxion of any quantity is to the fluxion of its *logarithm*, as the quantity itſelf is to unity.

Hence the FLUXION of the *logarithm* of x will be $\frac{\dot{x}}{x}$.

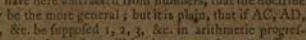
For $x : 1 :: \dot{x} : \frac{\dot{x}}{x}$ = the fluxion of the *logarithm* required.

When *ep* increaſes proportionally, the ſpaces generated in any equal times, are accurately in the ſame ratio as the velocities of *p*, or the fluxions of *ep*, at the beginning, end, or at any ſimilar terms of thoſe times.

When *ep* increaſes or decreaſes proportionally, the fluxions of this line, of all the higher orders, increaſe or decreaſe in the ſame proportion as the line itſelf increaſes or decreaſes; ſo that one rule ſerves for comparing together thoſe of any kind at different terms of time: and in this caſe we never arrive at any conſtant or invariable fluxion.

If the *logarithms* of two quantities be always to each other in any invariable ratio, the fluxions of thoſe quantities ſhall be in a ratio that is compounded of the ratio of the quantities themſelves, and of the invariable ratio of their *logarithms*.

Let *op* be greater than *oa*: *od*: *op* : *oa* : *op*; and let *ao*, *p q a d e f g h k p o*



aq, *de*, *ef*, *fg*, &c. be in continued proportion: then by adding together $\frac{1}{2}aq$, $\frac{1}{2}de$, $\frac{1}{2}ef$, $\frac{1}{2}fg$, &c. we approximate continually to the value of AP, the *logarithm* of *op*. And we approximate continually to the *logarithm* of *od*, by ſumming up the differences betwixt $\frac{1}{2}aq$ and $\frac{1}{2}de$, $\frac{1}{2}ef$ and $\frac{1}{2}fg$, $\frac{1}{2}gh$ and $\frac{1}{2}hk$, &c.

Theſe theorems are demonſtrated geometrically by Mr. Maclaurin, lib. cit. art. 171, 172. From what has been ſaid, it follows, that if *oa* : *od* :: *op* : *oe*, then the *logarithm* of *oe* will be equal to the ſum of the *logarithms* of *op* and *od*; that is, to the ſum of $\frac{1}{2}qd + \frac{1}{2}de + \frac{1}{2}ef + \frac{1}{2}fg + \frac{1}{2}gh + \frac{1}{2}hk$, &c. and $aq - \frac{1}{2}de + \frac{1}{2}ef - \frac{1}{2}fg + \frac{1}{2}gh - \frac{1}{2}hk$, &c. which ſum is $2aq + \frac{1}{3}ef + \frac{1}{5}gh$, &c.

Let $aq = ad$; then the *logarithm* of *oe* will meaſure the ratio of *od* to *oq*. But *ad* and *aq* have half their ſum equal to *ao*, and half their difference equal to *ad*, which are the two firſt terms of the geometric progreſſion *ao*, *ad*, *de*, *ef*, *fg*, *gh*, *hk*, &c. Hence, if $ao = 1$, and $ad = x$, de, ef, fg, &c. will be reſpectively, x^2, x^3, x^4, &c. and the ratio of $1 + x$ to $1 - x$ will be equal to that of *od* to *op*. But the *logarithm* of this ratio is $2ad + \frac{2}{3}ef + \frac{2}{5}gh +$, &c. therefore the *logarithm* of $\frac{1+x}{1-x} = 2 \times x + \frac{2}{3}x^3 + \frac{2}{5}x^5 + \frac{2}{7}x^7 +$, &c. agreeably to what has been ſhewn by Dr. Halley and others.

This ſeries is analytically deduced from the nature of *logarithms*, by Mr. Simſon in his Trigonometry, p. 40, &c.

The hyperbolic *logarithm* of any number is the index of that term of the logarithmic progreſſion, agreeing with the propoſed number, multiplied by the exceſs of the

common

common ratio above unity: thus if e be an indefinite small quantity, the hyperbolic *logarithm* of the natural number agreeing with any term $1+e^n$ of the logarithmic progreſſion 1, $1+e$, $1+e^2$, $1+e^3$ &c. will be expreſſed by ne. And ſince $1+e)^n=N$ or the number, we ſhall have $1+e=N^{\frac{1}{n}}=1+x)^m$, by putting $1+x=N$, and $m=\frac{1}{n}$. Therefore $\overline{1+x}^m$ being $=1+mx+m\times\frac{m-1}{2}\times x^2+m\times\frac{m-1}{2}\times\frac{m-2}{3}\times x^3$, &c. we have $e=mx+m\times\frac{m-1}{2}\times x^2$, &c. where m being rejected in the factors $m-1$, $m-2$, &c. as indefinitely ſmall in compariſon of 1, 2, &c. becauſe n is, from the nature of *logarithms*, indefinitely great, the equation will become $e=mx-\frac{mx^2}{2}+\frac{mx^3}{3}-\frac{mx^4}{4}$, &c. whence $\frac{e}{m}\,(=ne=\mathrm{L})=x-\frac{x^2}{2}+\frac{x^3}{3}-\frac{x^4}{4}$, &c. But this ſeries, though the moſt eaſy and natural, is of little uſe in determining the *logarithms* of large numbers, becauſe, in all ſuch caſes, it diverges, inſtead of converging.

In order to obtain a ſeries that will always converge, let the number, whoſe *logarithm* is wanted, be denoted by $\frac{1}{1-x}$, in which quantity will be always leſs than unity, and let $1+e^n$ as before be $=\frac{1}{1-x}$; then $1+e=\frac{1}{1-x})^{\frac{1}{n}}=\overline{1-x}^{-\frac{1}{n}}=\overline{1-x}^m$ (by making $m=-\frac{1}{n}$) $=1-mx+m\times\frac{m-1}{2}\times x^2-m\times\frac{m-1}{2}\times\frac{m-2}{3}\times x^3$, where m being rejected in the factors $m-1$, $m-2$, &c. as before, the equation will become $1+e=1-mx+\frac{mx^2}{2}-\frac{mx^3}{3}$, &c. whence $x+\frac{x^2}{2}+\frac{x^3}{3}$, &c. $=\frac{e}{-m}=ne=$ the hyperbolic *logarithm* of $\frac{1}{1-x}$; which ſeries will always converge, let the value of $\frac{1}{1-x}$ be ever ſo great, becauſe x will be always leſs than unity. But this ſeries being added to the former, expreſſing the *logarithm* of $1+x$, the ſeries $2x+\frac{2x^3}{3}+\frac{2x^5}{5}+\frac{2x^7}{7}$, &c. thence ariſing will be more ſimple than either of them, ſince one half of the terms will be entirely deſtroyed thereby: conſequently, as the ſum of the *logarithms* of any two numbers is equal to the *logarithm* of the product of thoſe numbers, the ſeries $2x+\frac{2x^3}{3}+\frac{2x^5}{5}$, &c. will truly expreſs the *logarithm* of $\frac{1+x}{1-x}$, or $\frac{1}{1-x}\times 1+x$. In order to find the value of x, let $\frac{1+x}{1-x}=N$, and x will be $=\frac{N-1}{N+1}$; but if the quantity propoſed be a fraction $=\frac{P}{Q}$, make $\frac{P}{Q}=\frac{1+x}{1-x}$, and x will be $=\frac{P-Q}{P+Q}$; either of which values ſubſtituted in the foregoing ſeries $2x+\frac{2x^3}{3}$, &c. will give the hyperbolic *logarithm* of the reſpective number.

To find, for example, the *logarithm* of 2, from this expreſſion of the *logarithm* of $\frac{1+x}{1-x}$. Then $\frac{1+x}{1-x}=2$, or $1+x=2-2x$, and $3x=1$, or $x=\frac{1}{3}$; that is in decimals:

x	$(=\frac{1}{3})$	$=0.333333333$, &c.
x^3	$(=\frac{1}{27})$	$=.037037037$, &c.
x^5	$(=\frac{1}{243})$	$=.004115226$, &c.
x^7	$(=\frac{1}{2187})$	$=.000457247$, &c.
x^9	$(=\frac{1}{19683})$	$=.000050805$, &c.
x^{11}	$(=\frac{1}{177147})$	$=.000005645$, &c.
x^{13}	$(=\frac{1}{1594323})$	$=.000000627$, &c.
x^{15}	$(=\frac{1}{14348907})$	$=.000000069$, &c.

Theſe values being reſpectively divided by the numbers 1, 3, 5, 7, 9, &c. and the ſeveral quotients added together, we ſhall have .346573590, &c. whoſe double, being .693147180, &c. is the hyperbolical or Napier's *logarithm* of the number 2. In the ſame manner the hyperbolic *logarithms* of any other numbers may be determined; but the moſt ready way of deriving *logarithms* from others already known is the following: let a, b, c, denote any three numbers in arithmetical progreſſion, whoſe common difference is unity; then, a being $=b-1$, and $c=b+1$, we ſhall have $ac=b^2-1$, and $\frac{b^2}{ac}=\frac{ac+1}{ac}$: whence, by the nature of *logarithms*, we ſhall have $2\ log.\ b-log.\ a-log.\ c=log.\ \frac{ac+1}{ac}$; but the *logarithm* of $\frac{ac+1}{ac}$ putting $\frac{1}{2ac+1}=x$, ſince $\frac{P}{Q}=\frac{ac+1}{ac}=\frac{1+x}{1-x}$, and $x=\frac{P-Q}{P+Q}=\frac{1}{2ac+1}$, will be $\frac{2x}{1}+\frac{2x^3}{3}+\frac{2x^5}{5}+\frac{2x^7}{7}$, &c. which being denoted by S, we ſhall have $\left\{\begin{array}{l} log.\ b=\frac{1}{2}\,log.\ a+\frac{1}{2}\,log.\ c+\frac{1}{2}\,S. \\ log.\ a=2\,log.\ b-log.\ c-S. \\ log.\ c=2\,log.\ b-log.\ a-S. \end{array}\right\}$

E. g. To find the hyperbolic *logarithm* of 3.

The *logarithm* of 2 being known, that of 4, which is the double of the former will alſo be known. Therefore, taking $a=2$, $b=3$, and $c=4$, we ſhall have $x\left(=\frac{1}{2ac+1}\right)=\frac{1}{17}$; and $x^2=\frac{1}{289}$. Whence,

$x\left(=\frac{1}{17}\right)=.058823529$, &c.

$x^3\left(=\frac{x}{289}\right)=.000203542$, &c.

$x^5\left(=\frac{x^3}{289}\right)=.000000704$, &c. Therefore, $\frac{1}{2}S\left(x+\frac{x^3}{3}+\frac{x^5}{5},\text{ &c.}\right)=.058891517$, &c. and conſequently the hyperbolic *log.* of $3\left(\frac{hyp.\ log.\ 2+hyp.\ log.\ 4}{2}+\frac{1}{2}S\right)=1.098612288$, &c.

If the hyperbolic *logarithm* of 10 were required; the *logarithms* of 8 and 9 being given from thoſe of 2 and 3 already found, a may be $=8$, $b=9$, and $c=10$; then $x\left(\frac{1}{2ac+1}\right.$ being $\left.=\frac{1}{161}\right)$, we ſhall have $\frac{1}{2}S\left(x+\frac{x^3}{3}+\frac{x^5}{5},\text{ &c.}\right)=.006211180$, &c. $+.000000079$, &c. &c. $=.006211259$, &c. and, therefore, the *logarithm* of 10 $(2\ log.\ 9-log.\ 8-S)=2.302585092$, &c.

Logarithms of any other kind may be derived from theſe by multiplying by the proper multiplicator or modulus. Thus to convert any of Napier's, or of the natural *logarithms* into Brigg's, or thoſe of the common form, where the *logarithm* of 10 is unity, ſince the *logarithms* of all forms preſerve the ſame proportion with reſpect to each other, ſay, as Napier's *logarithm* of 10 is to 1, ſo is any other of Napier's *logarithms* to Brigg's *logarithm* of the ſame number. Hence, Brigg's *logarithm* will be equal to Napier's divided by 2.302585092, &c. or, which comes to the ſame thing multiplied by its reciprocal $\frac{1}{2.302585092}$ or 0.434294481, &c. And *vice verſa*, Brigg's *logarithms* being given, to find Napier's correſponding, multiply Brigg's by 2.302585092, &c.

In general, to find Brigg's *logarithm* of any number n. Let $\frac{1+x}{1-x}=n$, and conſequently $x=\frac{n-1}{n+1}$. Multiply x by 0.868588096, &c. $(=2\times 0.434294481$, &c.) and then continually multiply this product by xx, and divide the reſulting products, reſpectively, by the terms of the progreſſion 1, 3, 5, 7, &c. The ſum of theſe quotients will be Brigg's *logarithm* required.

Thus, $2x+\frac{2x^3}{3}+\frac{2x^5}{5}$, &c. $\times\ 0.434294481$, &c. expreſſing the common *logarithm* of $\frac{1+x}{1-x}$, this ſeries, by making $R=.868588963$, &c. will be $Rx+\frac{Rx^3}{3}+\frac{Rx^5}{5}+\frac{Rx^7}{7}$, &c. Therefore, to find the *logarithm* of 7, thoſe of 8 and 9 being known, we ſhall have $log.\ 7=2\ log.\ 8-log.\ 9-S$; and $S=Rx+\frac{Rx^3}{3}+\frac{Rx^5}{5}$, &c. $=$ the common *logarithm* of $\frac{64}{63}$. $\frac{ac+1}{ac}$ being $=\frac{64}{63}$; and $x=\frac{64-63}{64+63}=\frac{1}{127}$; whence $\left(x^2\text{ being}=\frac{1}{16129}\right)$ we ſhall have,

$Rx\left(=\frac{868\text{ &c.}}{127}\right)=.006839283$, &c.

$Rx^3\left(=\frac{Rx}{16129}\right)=.000000424$, &c.

Rx^5

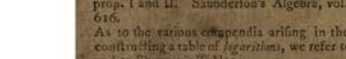
$R+\left(=\frac{R^3}{10.179}\right)=.0000000002$, &c. Consequently S $\left(R+\frac{R^3}{3}+\frac{R^5}{5}, \text{ &c.}\right)=.0006839474$, &c. and 2 *log.* 8 $-$ *log.* 9 $-$ S $=.8450980400$, &c. $=$ the common *logarithm* of 7 required. But this may be obtained by fewer terms of the series from the *logarithms* of the 3 firſt primes 2, 3, and 5; becauſe theſe of 48 and 50, compoſed of them, will alſo be known: therefore the *logarithm* of 7 $\left(=\frac{1}{4}\text{log. } 49=\frac{\text{log. } 48+\text{log. } 50+S}{4}\right)$ will be $=.8450980400$, &c. as before, true from the firſt term of the ſeries only, to 11 places of figures.

Thus alſo the *logarithm* of the next prime number 11 may be obtained: by making $a=10$. $b=11$, and $c=11$; or by making $a=98$, or $2\times7\times7$ $b=99$ or $3\times3\times11$, and $c=100$ or $2\times2\times5\times5$; and then, by the firſt term of the ſeries, the *logarithm* of 99 will be found true to 14 places; whence that of 11 (*log.* 99 $-$ *log.* 9) is alſo known. Simpſon ubi ſupra. Cotes's Harm. Menſ. prop. I and II. Saunderſon's Algebra, vol. ii. part 2. p. 616.

As to the various compendia ariſing in the practice of conſtructing a table of *logarithms*, we refer to Gardiner's, and to Sherwin's Tables.

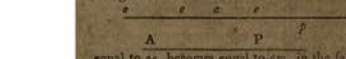
We have already obſerved, that Napier's, or the natural *logarithm* of any quantity, is found by ſuppoſing the uniform motion of the point P, by which the *logarithm* of op is generated, to be equal to the velocity of p, at the term of time when the *logarithms* begin to be generated.

But the uniform motion of P may be ſuppoſed equal to the motion of p at any other term, as when it comes to s; in which caſe, the conſtant velocity of P is to the velocity with which p ſets out from a, when the *logarithm* begins to be generated, as sv is to sa. Thus, we may have as many *logarithms* as we pleaſe; and the line se is what Mr. Cotes calls the *modulus of the ſyſtem*.



The meaſures of a given ratio in the different ſyſtems are in the ſame proportion as the lines se, e being always the term where the velocity of p becomes equal to the conſtant velocity of P. Hence, the *logarithm* of any quantity in Napier's firſt ſyſtem becomes equal to the *logarithm* of the ſame quantity in any other ſyſtem, whoſe modulus is se, by multiplying by the number which expreſſes the ratio of se to sa; and the modulus of any ſyſtem is to the modulus of any other ſyſtem, as the *logarithm* of any given quantity in the firſt is to its *logarithm* in the ſecond. Thus in Napier's firſt ſcheme, in the ſame time that op, from being equal to sa, becomes equal to ten times sa, the point P deſcribes a line, the ratio of which to sa is that of 2.30258509, &c. to unity. But it was found convenient, that the *logarithm* of 10 ſhould be 1; and the motion of P was ſuppoſed to be ſo far diminiſhed, that the ſpace deſcribed by it in that time might be equal only to sa; that is, its velocity, in this caſe, was ſuppoſed leſs than its velocity in the former, in the ſame ratio, as 1 is leſs than 2.30258, &c. If se be taken leſs than sa in the ſame ratio, the velocity of P ſhall be equal, in this caſe, to the velocity of p at e; and se will be the modulus of this ſyſtem, which will therefore be expreſſed by $\frac{1}{2.30258509, \text{ &c.}}=.43429448$, &c. $=\frac{1}{sa}$, sa being unity. Maclaurin, lib. cit. art. 174.

When a ratio is given, its meaſure is always as the modulus of the ſyſtem. It is therefore the ſame invariable ratio that is always meaſured by the modulus of the ſyſtem, which is called by Mr. Cotes *ratio modularis*. This ratio is that of sm to se, if op by increaſing proportionally, from being

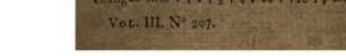


equal to se, becomes equal to sm, in the ſame time that P, by its uniform motion, deſcribes a line equal to the modulus se. Ibid. art. 175, 753.

This *ratio modularis* is found to be that of 2.71828182845, &c. to 1; or of 1 to 0.36787944117, &c. Cotes, Harm. Menſur. p. 7.

If a *logarithm* x be given, the number correſponding, if x be a natural *logarithm*, will be expreſſed by this ſeries, $1+x+\frac{1}{2}x^2+\frac{1}{6}x^3+\frac{1}{24}x^4+\frac{1}{120}x^5+\frac{1}{720}x^6+$, &c. or generally, if the modulus be M, by this, $1+\frac{x}{M}+\frac{x^2}{2M^2}+\frac{x^3}{6M^3}+$, &c. which when $x=M$ is changed into $1+1+\frac{1}{2}+\frac{1}{6}+\frac{1}{24}+\frac{1}{120}+$, &c. or $1+\frac{1}{1}+\frac{1}{1.2}+\frac{1}{1.2.3}+\frac{1}{1.2.3.4}+\frac{1}{1.2.3.4.5}+\frac{1}{1.2.3.4.5.6}+$, &c. $=2.7182818$, &c. the ratio of which to 1 is the ratio modularis. See Maclaurin, Flux. art. 753. Cotes, Harm. Menſ. p. 6, 7.

We have ſaid, that in Lord Napier's firſt ſyſtem, the conſtant velocity of P, by which the *logarithm* AP is generated, is equal to the velocity with which p ſets out from a. Therefore, if we ſuppoſe AP and ap to be diminiſhed continually,



AP being always the *logarithm* of op, their ratio ſhall continually approach to a ratio of equality as its LIMIT. And, an being ſuppoſed to repreſent unity, if op be very ſmall compared with an, it may be ſuppoſed in approximations to be the *logarithm* of on, in this ſyſtem; and any very ſmall fraction may be ſuppoſed to be the *logarithm* of the ſum of unity and that fraction added together. From this it follows, that if a ſeries of mean proportionals be interpoſed between sa and any given line ab, and the number of all the terms, excluſive of sa, be x; and sn being the ſecond term of the ſerics, an be to ab as unity is to the number q: then, by increaſing continually the number of mean proportionals betwixt sa and ab, the ratio of x to q ſhall approach continually to the ratio of AB (the *logarithm* of ob) to ab, as its limit. For the number x is to unity as AB is to AN (the *logarithm* of on); and unity is to q as an (which approaches continually to AN) is to ab. Therefore the ratio of x to q approaches continually to that of AB to ab. For inſtance, if ab be double of sa, the ratio of x to q approaches continually to the ratio of the natural *logarithm* of 2 to unity, which is nearly that of 7 to 10. Maclaurin lib. cit. art. 179. and De Moivre Doctr. of Chances, probl. 5.

The firſt canon of *logarithms* for natural numbers, from 1 to 20000, and from 90000 to 101000, was conſtructed by Hen. Briggs, with the approbation of the inventor, the lord Napier, and in purſuance of a hint ſuggeſted by him in 1616, who propoſed altering his firſt canon, by making 0 the *logarithm* of unity, and 10 that of the fine total, and the manner of conſtructing them ſhewn in his Arithmetica *Logarithmica*, publiſhed in 1624. Of this method Dr. Halley ſays, that to have his *logarithms* true to 14 places of figures, Mr. Briggs, by continual extraction, was obliged to find the root of more than the 140 million of millionth power. Briggs lived to complete a table of logarithmic fines and tangents, to the 100th part of every degree, and to 14 places of figures, beſides the index; to which he intended to have added a full deſcription and uſe: but, being prevented by death, this was done by Mr. Henry Gellibrand, in his Trigonometria Britannica, publiſhed at London, or as ſome ſay, at Gouda, in 1633. The chaſm between 20000 and 90000, was filled up by Adrian Ulacq, who publiſhed a ſecond edition of the Arithmetica *Logarithmica*, at Tergou, in 1628, in which was contained all the *logarithms* from 1 to 100000 to 10 places of figures, together with a table of artificial fines, tangents, and ſecants, to every minute of the quadrant. Some copies of Ulacq's tables were purchaſed by our bookſellers, and publiſhed at London, with an Engliſh explanation premiſed, dated 1631. Ulacq alſo publiſhed at the ſame place, in 1633, his Trigonometria Artificialis, with tables of logarithmic fines and tangents to every tenth ſecond of the quadrant. Ulacq's tables are in high eſteem for their exactneſs, as are alſo amongſt us Sherwin's firſt edition, in 1706, in which we have the *logarithms* of numbers from 1 to 101000, together with the differences and proportional parts, whereby the *logarithm* of any number under 10.000.000 may eaſily be found; and Gardiner's in 1742, containing the *logarithms* for all numbers from 1 to 102100, with the differences and proportional parts. M. de Fontenelle, in the Hiſtory of the Academy of Sciences, for 1717, commends an edition of Ulacq's ſmaller tables, made at Lyons, in 1670. and M. de la Lande, in his Aſtronomy, printed at Paris in 1764. tables publiſhed there in 1760.

In the common tables we have only a canon from 1 to 10000.—There are various other methods of conſtructing *logarithms*, by Dr. Halley, Mercator, Mr. Cotes, Dr. Brook Taylor, &c. which the reader may find in the Philoſophical Tranſactions, and other treatiſes on this ſubject.

As we have frequent occaſion for recurring to tables of *logarithms*, in the courſe of this work, we ſhall here, with a view of rendering the work more complete, annex thoſe in common uſe.

A Table of Logarithms, from 1 to 10000.

N°	Logar.	N°	Logar.	N°	Logar.	N°	Logar.	N°	Logar.	N°	Logar.	N°	Logar.	N°	Log.	N°	L. gar.
10	0.000000	12	1.079181	23	1.361728	34	1.531479	45	1.653213	56	1.748188	67	1.826075	78	1.892095	89	1.949390
11	0.041393	13	1.113943	24	1.380211	35	1.544068	46	1.662758	57	1.755875	68	1.832509	79	1.897627	90	1.954243
12	0.079181	14	1.146128	25	1.397940	36	1.556303	47	1.672098	58	1.763428	69	1.838849	80	1.903090	91	1.959041
13	0.113943	15	1.176091	26	1.414973	37	1.568202	48	1.681241	59	1.770852	70	1.845098	81	1.908485	92	1.963788
14	0.146128	16	1.204120	27	1.431364	38	1.579784	49	1.690196	60	1.778151	71	1.851258	82	1.913814	93	1.968483
15	0.176091	17	1.230449	28	1.447158	39	1.591065	50	1.698970	61	1.785330	72	1.857332	83	1.919078	94	1.973128
16	0.204120	18	1.255273	29	1.462398	40	1.602060	51	1.707570	62	1.792392	73	1.863323	84	1.924279	95	1.977724
17	0.230449	19	1.278754	30	1.477121	41	1.612784	52	1.716003	63	1.799340	74	1.869232	85	1.929419	96	1.982271
18	0.255273	20	1.301030	31	1.491362	42	1.623249	53	1.724276	64	1.806180	75	1.875061	86	1.934498	97	1.986772
19	0.278754	21	1.322219	32	1.505150	43	1.633468	54	1.732394	65	1.812913	76	1.880814	87	1.939519	98	1.991226
20	0.301030	22	1.342423	33	1.518514	44	1.643453	55	1.740363	66	1.819544	77	1.886491	88	1.944483	99	1.995635

N°	0	1	2	3	4	5	6	7	8	9	Dif.
100	2.000000	2.000434	2.000868	2.001301	2.001734	2.002166	2.002598	2.003030	2.003460	2.003891	432
101	2.004321	2.004751	2.005180	2.005609	2.006038	2.006466	2.006894	2.007321	2.007748	2.008174	428
102	2.008600	2.009026	2.009451	2.009876	2.010300	2.010724	2.011147	2.011570	2.011993	2.012415	424
103	2.012837	2.013259	2.013680	2.014100	2.014520	2.014940	2.015360	2.015779	2.016197	2.016616	419
104	2.017033	2.017451	2.017868	2.018284	2.018700	2.019116	2.019532	2.019947	2.020361	2.020775	415
105	2.021189	2.021603	2.022016	2.022428	2.022841	2.023252	2.023664	2.024075	2.024486	2.024896	412
106	2.025306	2.025715	2.026124	2.026533	2.026942	2.027350	2.027757	2.028164	2.028571	2.028978	408
107	2.029384	2.029789	2.030195	2.030600	2.031004	2.031408	2.031812	2.032216	2.032619	2.033021	404
108	2.033424	2.033826	2.034227	2.034628	2.035029	2.035430	2.035830	2.036229	2.036629	2.037028	400
109	2.037427	2.037825	2.038223	2.038620	2.039017	2.039414	2.039811	2.040207	2.040602	2.040998	396
110	2.041393	2.041787	2.042182	2.042575	2.042969	2.043362	2.043755	2.044148	2.044540	2.044931	393
111	2.045323	2.045714	2.046105	2.046495	2.046885	2.047275	2.047665	2.048054	2.048442	2.048830	389
112	2.049218	2.049606	2.049993	2.050380	2.050767	2.051152	2.051538	2.051923	2.052309	2.052694	386
113	2.053078	2.053463	2.053846	2.054230	2.054613	2.054996	2.055378	2.055760	2.056142	2.056524	382
114	2.056905	2.057286	2.057666	2.058046	2.058426	2.058805	2.059185	2.059563	2.059942	2.060320	379
115	2.060698	2.061075	2.061452	2.061829	2.062206	2.062582	2.062958	2.063333	2.063709	2.064083	376
116	2.064458	2.064832	2.065206	2.065580	2.065953	2.066326	2.066699	2.067071	2.067443	2.067814	372
117	2.068186	2.068557	2.068928	2.069298	2.069668	2.070038	2.070407	2.070776	2.071145	2.071514	369
118	2.071882	2.072250	2.072617	2.072985	2.073352	2.073718	2.074085	2.074451	2.074816	2.075182	366
119	2.075547	2.075912	2.076276	2.076640	2.077004	2.077368	2.077731	2.078094	2.078457	2.078819	363
120	2.079181	2.079543	2.079904	2.080266	2.080626	2.080987	2.081347	2.081707	2.082067	2.082426	360
121	2.082785	2.083144	2.083503	2.083861	2.084219	2.084576	2.084934	2.085291	2.085647	2.086004	357
122	2.086360	2.086716	2.087071	2.087426	2.087781	2.088136	2.088490	2.088845	2.089198	2.089552	355
123	2.089905	2.090258	2.090611	2.090963	2.091315	2.091667	2.092018	2.092370	2.092721	2.093071	351
124	2.093422	2.093772	2.094122	2.094471	2.094820	2.095169	2.095518	2.095866	2.096215	2.096562	349
125	2.096910	2.097257	2.097604	2.097951	2.098297	2.098644	2.098990	2.099335	2.099681	2.100026	346
126	2.100371	2.100715	2.101059	2.101403	2.101747	2.102090	2.102434	2.102777	2.103119	2.103462	343
127	2.103804	2.104145	2.104487	2.104828	2.105169	2.105510	2.105851	2.106191	2.106531	2.106870	340
128	2.107210	2.107549	2.107888	2.108227	2.108565	2.108903	2.109241	2.109578	2.109916	2.110253	338
129	2.110590	2.110926	2.111262	2.111598	2.111934	2.112270	2.112605	2.112940	2.113275	2.113609	335
130	2.113943	2.114277	2.114611	2.114944	2.115278	2.115610	2.115943	2.116276	2.116608	2.116940	333
131	2.117271	2.117603	2.117934	2.118265	2.118595	2.118926	2.119256	2.119586	2.119915	2.120245	330
132	2.120574	2.120903	2.121231	2.121560	2.121888	2.122216	2.122543	2.122871	2.123198	2.123525	328
133	2.123852	2.124178	2.124504	2.124830	2.125156	2.125481	2.125806	2.126131	2.126456	2.126781	325
134	2.127105	2.127429	2.127752	2.128076	2.128399	2.128722	2.129045	2.129368	2.129690	2.130012	323
135	2.130334	2.130655	2.130977	2.131298	2.131619	2.131939	2.132260	2.132580	2.132900	2.133220	321
136	2.133539	2.133858	2.134177	2.134496	2.134814	2.135133	2.135451	2.135768	2.136086	2.136403	318
137	2.136721	2.137037	2.137354	2.137670	2.137987	2.138303	2.138619	2.138934	2.139250	2.139565	316
138	2.139879	2.140194	2.140508	2.140822	2.141136	2.141450	2.141763	2.142076	2.142389	2.142702	314
139	2.143015	2.143327	2.143639	2.143951	2.144263	2.144574	2.144885	2.145197	2.145507	2.145818	311
140	2.146128	2.146438	2.146748	2.147058	2.147367	2.147676	2.147985	2.148294	2.148603	2.148911	309
141	2.149219	2.149527	2.149835	2.150142	2.150449	2.150756	2.151063	2.151370	2.151676	2.151982	307
142	2.152288	2.152594	2.152900	2.153205	2.153510	2.153815	2.154119	2.154424	2.154728	2.155032	305
143	2.155336	2.155640	2.155943	2.156246	2.156549	2.156852	2.157155	2.157457	2.157759	2.158061	303
144	2.158362	2.158664	2.158965	2.159266	2.159567	2.159868	2.160168	2.160468	2.160767	2.161068	301
145	2.161368	2.161667	2.161967	2.162266	2.162564	2.162863	2.163161	2.163459	2.163757	2.164055	299
146	2.164353	2.164650	2.164947	2.165244	2.165541	2.165838	2.166134	2.166431	2.166726	2.167022	297
147	2.167317	2.167613	2.167908	2.168203	2.168497	2.168792	2.169086	2.169380	2.169674	2.169968	295
148	2.170262	2.170555	2.170848	2.171141	2.171434	2.171726	2.172019	2.172311	2.172603	2.172895	293
149	2.173186	2.173478	2.173769	2.174060	2.174351	2.174641	2.174932	2.175222	2.175512	2.175802	291
150	2.176091	2.176381	2.176670	2.176959	2.177248	2.177536	2.177825	2.178113	2.178401	2.178689	289
151	2.178977	2.179264	2.179552	2.179839	2.180126	2.180413	2.180699	2.180986	2.181272	2.181558	287
152	2.181844	2.182129	2.182415	2.182700	2.182985	2.183270	2.183555	2.183839	2.184123	2.184407	285
153	2.184691	2.184975	2.185259	2.185542	2.185826	2.186108	2.186391	2.186674	2.186956	2.187239	283
154	2.187521	2.187803	2.188084	2.188366	2.188647	2.188928	2.189209	2.189490	2.189771	2.190051	281
155	2.190332	2.190612	2.190892	2.191171	2.191451	2.191730	2.192010	2.192288	2.192567	2.192846	279
156	2.193125	2.193403	2.193681	2.193959	2.194237	2.194514	2.194792	2.195069	2.195346	2.195623	278
157	2.195900	2.196176	2.196452	2.196729	2.197004	2.197280	2.197556	2.197832	2.198107	2.198382	276
158	2.198657	2.198932	2.199206	2.199481	2.199755	2.200029	2.200303	2.200577	2.200850	2.201124	274
159	2.201397	2.201670	2.201943	2.202216	2.202488	2.202761	2.203033	2.203305	2.203577	2.203848	272
160	2.204120	2.204391	2.204662	2.204933	2.205204	2.205475	2.205746	2.206016	2.206286	2.206556	271
161	2.206826	2.207095	2.207365	2.207634	2.207903	2.208172	2.208441	2.208710	2.208978	2.209247	269
162	2.209515	2.209783	2.210051	2.210318	2.210586	2.210853	2.211120	2.211388	2.211654	2.211921	267
163	2.212188	2.212454	2.212720	2.212986	2.213252	2.213518	2.213784	2.214050	2.214314	2.214580	266
164	2.214845	2.215109	2.215373	2.215638	2.215902	2.216166	2.216429	2.216693	2.216956	2.217219	264
165	2.217483	2.217744	2.218010	2.218272	2.218535	2.218798	2.219060	2.219322	2.219584	2.219846	262
166	2.220108	2.220370	2.220631	2.220892	2.221153	2.221414	2.221675	2.221936	2.222196	2.222456	261
167	2.222716	2.222976	2.223236	2.223496	2.223755	2.224015	2.224274	2.224533	2.224792	2.225051	259
168	2.225309	2.225568	2.225826	2.226084	2.226342	2.226600	2.226858	2.227116	2.227374	2.227631	258
169	2.227887	2.228143	2.228400	2.228657	2.228913	2.229170	2.229426	2.229683	2.229939	2.230195	256
170	2.230449	2.230704	2.230960	2.231215	2.231470	2.231724	2.231979	2.232233	2.232488	2.232742	254
171	2.232996	2.233250	2.233504	2.233757	2.234011	2.234264	2.234517	2.234770	2.235023	2.235276	253
172	2.235528	2.235781	2.236033	2.236285	2.236537	2.236789	2.237040	2.237292	2.237544	2.237795	252
173	2.238046	2.238297	2.238549	2.238799	2.239050	2.239302	2.239553	2.239803	2.240054	2.240304	250
174	2.240554	2.240804	2.241054	2.241303	2.241553	2.241802	2.242052	2.242301	2.242550	2.242799	249
175	2.243048	2.243297	2.243544	2.243793	2.244042	2.244290	2.244538	2.244786	2.245034	2.245282	248
176	2.245530	2.245778	2.246025	2.246273	2.246519	2.246767	2.247014	2.247261	2.247508	2.247754	247
177	2.248001	2.248247	2.248493	2.248739	2.248985	2.249231	2.249477	2.249723	2.249968	2.250214	246
178	2.250459	2.250704	2.250949	2.251193	2.251438	2.251683	2.251927	2.252172	2.252416	2.252660	245
179	2.252904	2.253148	2.253392	2.253636	2.253879	2.254123	2.254366	2.254610	2.254853	2.255096	243

N°	0	1	2	3	4	5	6	7	8	9	Diff.
180	2.255572	2.255814	2.256055	2.256296	2.256538	2.256779	2.257019	2.257260	2.257500	2.257739	241
181	2.257979	2.258219	2.258458	2.258698	2.258937	2.259176	2.259415	2.259655	2.259893	2.260132	239
182	2.260371	2.260610	2.260848	2.261086	2.261324	2.261562	2.261799	2.262037	2.262274	2.262511	238
183	2.262747	2.262984	2.263221	2.263457	2.263693	2.263930	2.264166	2.264402	2.264638	2.264874	237
184	2.265109	2.265345	2.265579	2.265815	2.266050	2.266285	2.266520	2.266756	2.266990	2.267225	235
185	2.267460	2.267694	2.267928	2.268162	2.268396	2.268629	2.268862	2.269096	2.269328	2.269562	234
186	2.269794	2.270026	2.270258	2.270490	2.270722	2.270954	2.271185	2.271417	2.271648	2.271879	232
187	2.272109	2.272340	2.272570	2.272801	2.273031	2.273261	2.273491	2.273721	2.273950	2.274180	230
188	2.274409	2.274638	2.274867	2.275096	2.275325	2.275554	2.275782	2.276011	2.276239	2.276468	229
189	2.276696	2.276924	2.277151	2.277380	2.277607	2.277835	2.278062	2.278289	2.278517	2.278743	227
190	2.278970	2.279197	2.279424	2.279650	2.279876	2.280103	2.280329	2.280555	2.280781	2.281006	226
191	2.281232	2.281458	2.281683	2.281909	2.282134	2.282359	2.282585	2.282810	2.283034	2.283259	225
192	2.283483	2.283708	2.283932	2.284156	2.284380	2.284604	2.284828	2.285052	2.285276	2.285499	224
193	2.285723	2.285946	2.286169	2.286392	2.286615	2.286838	2.287061	2.287284	2.287506	2.287728	223
194	2.287950	2.288172	2.288394	2.288617	2.288839	2.289060	2.289282	2.289504	2.289725	2.289946	222
195	2.290167	2.290389	2.290610	2.290831	2.291052	2.291273	2.291494	2.291715	2.291936	2.292156	221
196	2.292376	2.292597	2.292817	2.293037	2.293257	2.293477	2.293697	2.293917	2.294136	2.294356	220
197	2.294575	2.294795	2.295014	2.295233	2.295452	2.295671	2.295890	2.296108	2.296327	2.296545	219
198	2.296763	2.296982	2.297200	2.297418	2.297636	2.297854	2.298072	2.298289	2.298507	2.298724	218
199	2.298941	2.299159	2.299376	2.299593	2.299810	2.300027	2.300243	2.300460	2.300677	2.300893	217
200	2.301109	2.301325	2.301542	2.301758	2.301974	2.302190	2.302406	2.302622	2.302837	2.303053	216
201	2.303268	2.303484	2.303699	2.303914	2.304129	2.304344	2.304559	2.304774	2.304988	2.305203	215
202	2.305417	2.305631	2.305845	2.306059	2.306273	2.306487	2.306701	2.306914	2.307128	2.307341	214
203	2.307554	2.307768	2.307981	2.308194	2.308407	2.308620	2.308833	2.309046	2.309258	2.309471	213
204	2.309683	2.309896	2.310108	2.310320	2.310532	2.310744	2.310956	2.311167	2.311379	2.311590	212
205	2.311802	2.312013	2.312224	2.312435	2.312646	2.312857	2.313068	2.313279	2.313489	2.313700	211
206	2.313910	2.314120	2.314330	2.314540	2.314750	2.314960	2.315169	2.315379	2.315588	2.315798	210
207	2.316007	2.316216	2.316425	2.316634	2.316843	2.317052	2.317261	2.317469	2.317678	2.317886	209
208	2.318095	2.318302	2.318511	2.318718	2.318926	2.319133	2.319341	2.319548	2.319756	2.319963	208
209	2.320169	2.320376	2.320582	2.320789	2.320997	2.321203	2.321410	2.321616	2.321823	2.322029	207
210	2.322235	2.322440	2.322653	2.322859	2.323064	2.323270	2.323475	2.323680	2.323885	2.324089	206
211	2.324294	2.324498	2.324694	2.324906	2.325110	2.325314	2.325518	2.325721	2.325925	2.326128	205
212	2.326332	2.326534	2.326745	2.326950	2.327154	2.327355	2.327561	2.327764	2.327967	2.328170	204
213	2.328373	2.328576	2.328778	2.328981	2.329184	2.329386	2.329601	2.329804	2.330006	2.330208	203
214	2.330410	2.330611	2.330819	2.331020	2.331222	2.331423	2.331625	2.331826	2.332028	2.332230	202
215	2.332431	2.332632	2.332832	2.333034	2.333234	2.333434	2.333636	2.333836	2.334036	2.334235	200
216	2.334435	2.334635	2.334836	2.335036	2.335237	2.335437	2.335638	2.335838	2.336038	2.336237	200
217	2.336437	2.336636	2.336836	2.337036	2.337236	2.337439	2.337635	2.337835	2.338035	2.338234	200
218	2.338433	2.338632	2.338832	2.339032	2.339232	2.339431	2.339630	2.339830	2.340029	2.340228	199
219	2.340427	2.340626	2.340824	2.341023	2.341222	2.341421	2.341620	2.341819	2.342018	2.342216	199
220	2.342415	2.342612	2.342811	2.343010	2.343208	2.343406	2.343605	2.343802	2.344000	2.344198	197
221	2.344396	2.344593	2.344791	2.344988	2.345187	2.345374	2.345570	2.345768	2.345965	2.346162	197
222	2.346359	2.346554	2.346751	2.346949	2.347145	2.347342	2.347538	2.347736	2.347931	2.348128	197
223	2.348324	2.348520	2.348717	2.348913	2.349109	2.349305	2.349502	2.349698	2.349894	2.350090	196
224	2.350286	2.350482	2.350678	2.350874	2.351070	2.351266	2.351462	2.351658	2.351853	2.352049	196
225	2.352245	2.352440	2.352636	2.352831	2.353026	2.353222	2.353417	2.353613	2.353808	2.354003	195
226	2.354198	2.354393	2.354588	2.354783	2.354978	2.355173	2.355368	2.355563	2.355758	2.355953	195
227	2.356148	2.356342	2.356538	2.356732	2.356927	2.357122	2.357317	2.357512	2.357706	2.357901	195
228	2.358096	2.358291	2.358486	2.358680	2.358875	2.359069	2.359264	2.359458	2.359653	2.359847	194
229	2.360042	2.360236	2.360431	2.360625	2.360819	2.361014	2.361208	2.361402	2.361596	2.361791	194
230	2.361985	2.362179	2.362373	2.362567	2.362761	2.362955	2.363149	2.363343	2.363537	2.363731	194
231	2.363925	2.364119	2.364313	2.364507	2.364701	2.364895	2.365089	2.365283	2.365477	2.365671	194
232	2.365865	2.366059	2.366253	2.366447	2.366641	2.366835	2.367029	2.367223	2.367417	2.367611	194
233	2.367805	2.367999	2.368193	2.368387	2.368581	2.368775	2.368969	2.369163	2.369357	2.369551	194
234	2.369745	2.369939	2.370133	2.370327	2.370521	2.370715	2.370909	2.371103	2.371297	2.371491	194
235	2.371685	2.371879	2.372073	2.372267	2.372461	2.372655	2.372849	2.373043	2.373237	2.373431	194
236	2.373625	2.373819	2.374013	2.374207	2.374401	2.374595	2.374789	2.374983	2.375177	2.375371	194
237	2.375565	2.375759	2.375953	2.376147	2.376341	2.376535	2.376729	2.376923	2.377117	2.377311	194
238	2.377505	2.377699	2.377893	2.378087	2.378281	2.378475	2.378669	2.378863	2.379057	2.379251	194
239	2.379445	2.379639	2.379833	2.380027	2.380221	2.380415	2.380609	2.380803	2.380997	2.381191	194
240	2.381385	2.381579	2.381773	2.381967	2.382161	2.382355	2.382549	2.382743	2.382937	2.383131	194
241	2.383325	2.383519	2.383713	2.383907	2.384101	2.384295	2.384489	2.384683	2.384877	2.385071	194
242	2.385265	2.385459	2.385653	2.385847	2.386041	2.386235	2.386429	2.386623	2.386817	2.387011	194
243	2.387205	2.387399	2.387593	2.387787	2.387981	2.388175	2.388369	2.388563	2.388757	2.388951	194
244	2.389145	2.389339	2.389533	2.389727	2.389921	2.390115	2.390309	2.390503	2.390697	2.390891	194
245	2.391085	2.391279	2.391473	2.391667	2.391861	2.392055	2.392249	2.392443	2.392637	2.392831	194
246	2.393025	2.393219	2.393413	2.393607	2.393801	2.393995	2.394189	2.394383	2.394577	2.394771	194
247	2.394965	2.395159	2.395353	2.395547	2.395741	2.395935	2.396129	2.396323	2.396517	2.396711	194
248	2.396905	2.397099	2.397293	2.397487	2.397681	2.397875	2.398069	2.398263	2.398457	2.398651	194
249	2.398845	2.399039	2.399233	2.399427	2.399621	2.399815	2.400009	2.400203	2.400397	2.400591	194
250	2.400785	2.400979	2.401173	2.401367	2.401561	2.401755	2.401949	2.402143	2.402337	2.402531	194
251	2.402725	2.402919	2.403113	2.403307	2.403501	2.403695	2.403889	2.404083	2.404277	2.404471	194
252	2.404665	2.404859	2.405053	2.405247	2.405441	2.405635	2.405829	2.406023	2.406217	2.406411	194
253	2.406605	2.406799	2.406993	2.407187	2.407381	2.407575	2.407769	2.407963	2.408157	2.408351	194
254	2.408545	2.408739	2.408933	2.409127	2.409321	2.409515	2.409709	2.409903	2.410097	2.410291	194
255	2.410485	2.410679	2.410873	2.411067	2.411261	2.411455	2.411649	2.411843	2.412037	2.412231	194
256	2.412425	2.412619	2.412813	2.413007	2.413201	2.413395	2.413589	2.413783	2.413977	2.414171	194
257	2.414365	2.414559	2.414753	2.414947	2.415141	2.415335	2.415529	2.415723	2.415917	2.416111	194
258	2.416305	2.416499	2.416693	2.416887	2.417081	2.417275	2.417469	2.417663	2.417857	2.418051	194
259	2.418245	2.418439	2.418633	2.418827	2.419021	2.419215	2.419409	2.419603	2.419797	2.419991	194
260	2.420185	2.420379	2.420573	2.420767	2.420961	2.421155	2.421349	2.421543	2.421737	2.421931	194
261	2.422125	2.422319	2.422513	2.422707	2.422901	2.423095	2.423289	2.423483	2.423677	2.423871	194
262	2.424065	2.424259	2.424453	2.424647	2.424841	2.425035	2.425229	2.425423	2.425617	2.425811	194
263	2.426005	2.426199	2.426393	2.426587	2.426781	2.426975	2.427169	2.427363	2.427557	2.427751	194
264	2.427945	2.428139	2.428333	2.428527	2.428721	2.428915	2.429109	2.429303	2.429497	2.429691	194
265	2.429885	2.430079	2.430273	2.430467	2.430661	2.430855	2.431049	2.431243	2.431437	2.431631	194
266	2.431825	2.432019	2.432213	2.432407	2.432601	2.432795	2.432989	2.433183	2.433377	2.433571	194
267	2.433765	2.433959	2.434153	2.434347	2.434541	2.434735	2.434929	2.435123	2.435317	2.435511	194
268	2.435705	2.435899	2.436093	2.436287	2.436481	2.436675	2.436869	2.437063	2.437257	2.437451	194
269	2.437645	2.437839	2.438033	2.438227	2.438421	2.438615	2.438809	2.439003	2.439197	2.439391	194
270	2.439585	2.439779	2.439973	2.440167	2.440361	2.440555	2.440749	2.440943	2.441137	2.441331	194
271	2.441525	2.441719	2.441913	2.442107	2.442301	2.442495	2.442689	2.442883	2.443077	2.443271	194
272	2.443465	2.443659	2.443853	2.444047	2.444241	2.444435	2.444629	2.444823	2.445017	2.445211	194
273	2.445405	2.445599	2.445793	2.445987	2.446181	2.446375	2.446569	2.446763	2.446957	2.447151	194
274	2.447345	2.447539	2.447733	2.447927	2.448121	2.448315	2.448509	2.448703	2.448897	2.449091	194

N°	0	1	2	3	4	5	6	7	8	9	Diff.
370	2.568200	2.568349	2.568436	2.568554	2.568702	2.568788	2.568906	2.569054	2.569142	2.569290	117
371	2.569378	2.569497	2.569606	2.569725	2.569824	2.569959	2.570078	2.570195	2.570309	2.570426	117
372	2.570543	2.570660	2.570776	2.570893	2.571010	2.571126	2.571243	2.571359	2.571476	2.571592	117
373	2.571709	2.571825	2.571942	2.572058	2.572174	2.572291	2.572407	2.572523	2.572639	2.572755	116
374	2.572871	2.572988	2.573104	2.573220	2.573336	2.573452	2.573568	2.573684	2.573800	2.573915	116
375	2.574031	2.574147	2.574263	2.574379	2.574494	2.574610	2.574726	2.574841	2.574957	2.575072	116
376	2.575188	2.575303	2.575419	2.575534	2.575650	2.575765	2.575880	2.575996	2.576011	2.576226	115
377	2.576341	2.576456	2.576571	2.576687	2.576802	2.576917	2.577032	2.577147	2.577262	2.577377	115
378	2.577492	2.577607	2.577721	2.577836	2.577951	2.578066	2.578181	2.578295	2.578410	2.578525	115
379	2.578639	2.578754	2.578868	2.578983	2.579097	2.579211	2.579326	2.579441	2.579555	2.579669	114
380	2.579784	2.579898	2.580011	2.580126	2.580240	2.580355	2.580469	2.580583	2.580697	2.580811	114
381	2.580925	2.581039	2.581153	2.581267	2.581381	2.581495	2.581608	2.581722	2.581836	2.581950	114
382	2.582064	2.582177	2.582291	2.582404	2.582518	2.582631	2.582745	2.582858	2.582972	2.583085	113
383	2.583199	2.583312	2.583425	2.583539	2.583652	2.583765	2.583878	2.583992	2.584105	2.584218	113
384	2.584331	2.584444	2.584557	2.584670	2.584783	2.584896	2.585009	2.585122	2.585235	2.585348	113
385	2.585461	2.585573	2.585686	2.585799	2.585912	2.586024	2.586137	2.586250	2.586362	2.586475	113
386	2.586587	2.586700	2.586812	2.586925	2.587037	2.587149	2.587262	2.587374	2.587486	2.587599	112
387	2.587711	2.587823	2.587935	2.588047	2.588160	2.588272	2.588384	2.588496	2.588608	2.588720	112
388	2.588832	2.588944	2.589055	2.589167	2.589279	2.589390	2.589502	2.589614	2.589726	2.589838	112
389	2.589950	2.590061	2.590173	2.590284	2.590396	2.590507	2.590619	2.590730	2.590842	2.590953	111
390	2.591065	2.591176	2.591287	2.591398	2.591510	2.591621	2.591732	2.591843	2.591955	2.592066	111
391	2.592177	2.592288	2.592399	2.592510	2.592621	2.592732	2.592843	2.592954	2.593065	2.593175	111
392	2.593286	2.593397	2.593508	2.593618	2.593729	2.593840	2.593950	2.594061	2.594172	2.594282	111
393	2.594393	2.594503	2.594614	2.594724	2.594834	2.594945	2.595055	2.595165	2.595276	2.595386	110
394	2.595496	2.595606	2.595717	2.595827	2.595937	2.596047	2.596157	2.596267	2.596377	2.596487	110
395	2.596597	2.596707	2.596817	2.596927	2.597037	2.597146	2.597256	2.597366	2.597476	2.597585	110
396	2.597695	2.597805	2.597914	2.598024	2.598134	2.598243	2.598353	2.598462	2.598572	2.598681	110
397	2.598791	2.598900	2.599009	2.599119	2.599228	2.599337	2.599446	2.599556	2.599665	2.599774	109
398	2.599883	2.599992	2.600101	2.600210	2.600319	2.600428	2.600537	2.600646	2.600755	2.600864	109
399	2.600973	2.601082	2.601190	2.601299	2.601408	2.601517	2.601625	2.601734	2.601843	2.601951	109
400	2.602060	2.602168	2.602277	2.602386	2.602494	2.602603	2.602711	2.602819	2.602928	2.603036	108
401	2.603144	2.603253	2.603361	2.603469	2.603577	2.603685	2.603794	2.603900	2.604010	2.604118	108
402	2.604226	2.604334	2.604442	2.604550	2.604658	2.604766	2.604874	2.604982	2.605089	2.605197	108
403	2.605305	2.605413	2.605521	2.605628	2.605736	2.605843	2.605951	2.606059	2.606166	2.606274	108
404	2.606381	2.606489	2.606596	2.606704	2.606811	2.606918	2.607026	2.607133	2.607241	2.607348	107
405	2.607455	2.607562	2.607669	2.607777	2.607884	2.607991	2.608098	2.608205	2.608313	2.608419	107
406	2.608526	2.608633	2.608740	2.608847	2.608954	2.609060	2.609167	2.609274	2.609381	2.609488	107
407	2.609594	2.609701	2.609808	2.609914	2.610021	2.610128	2.610234	2.610341	2.610447	2.610554	107
408	2.610660	2.610767	2.610873	2.610979	2.611086	2.611192	2.611298	2.611405	2.611511	2.611617	106
409	2.611723	2.611829	2.611936	2.612042	2.612148	2.612254	2.612360	2.612466	2.612572	2.612678	106
410	2.612784	2.612890	2.612996	2.613102	2.613207	2.613313	2.613419	2.613525	2.613631	2.613736	106
411	2.613842	2.613947	2.614053	2.614159	2.614264	2.614370	2.614475	2.614581	2.614686	2.614792	105
412	2.614897	2.615003	2.615108	2.615213	2.615319	2.615424	2.615529	2.615634	2.615740	2.615845	105
413	2.615950	2.616055	2.616160	2.616266	2.616371	2.616476	2.616581	2.616686	2.616791	2.616896	105
414	2.617001	2.617105	2.617210	2.617315	2.617420	2.617525	2.617629	2.617734	2.617839	2.617943	105
415	2.618048	2.618153	2.618257	2.618362	2.618466	2.618571	2.618675	2.618780	2.618884	2.618988	104
416	2.619093	2.619196	2.619301	2.619406	2.619511	2.619615	2.619721	2.619823	2.619929	2.620032	103
417	2.620136	2.620241	2.620344	2.620448	2.620553	2.620656	2.620760	2.620864	2.620968	2.621072	104
418	2.621176	2.621280	2.621384	2.621488	2.621592	2.621695	2.621799	2.621903	2.622007	2.622110	104
419	2.622214	2.622318	2.622421	2.622525	2.622628	2.622732	2.622835	2.622939	2.623042	2.623146	104
420	2.623249	2.623353	2.623456	2.623559	2.623663	2.623766	2.623869	2.623973	2.624076	2.624179	104
421	2.624283	2.624385	2.624488	2.624591	2.624695	2.624798	2.624901	2.625004	2.625107	2.625209	103
422	2.625312	2.625415	2.625518	2.625621	2.625724	2.625827	2.625929	2.626032	2.626135	2.626238	103
423	2.626340	2.626443	2.626546	2.626648	2.626751	2.626853	2.626956	2.627058	2.627161	2.627263	103
424	2.627366	2.627468	2.627571	2.627673	2.627775	2.627878	2.627980	2.628082	2.628184	2.628287	102
425	2.628389	2.628491	2.628593	2.628695	2.628797	2.628901	2.629002	2.629104	2.629206	2.629308	102
426	2.629410	2.629511	2.629613	2.629715	2.629817	2.629918	2.630021	2.630122	2.630224	2.630326	102
427	2.630428	2.630529	2.630631	2.630733	2.630834	2.630936	2.631038	2.631139	2.631241	2.631342	102
428	2.631444	2.631545	2.631647	2.631748	2.631849	2.631951	2.632052	2.632153	2.632255	2.632356	101
429	2.632457	2.632558	2.632660	2.632761	2.632862	2.632963	2.633064	2.633165	2.633266	2.633367	101
430	2.633468	2.633569	2.633670	2.633771	2.633872	2.633973	2.634074	2.634175	2.634276	2.634376	100
431	2.634477	2.634578	2.634679	2.634779	2.634880	2.634981	2.635081	2.635182	2.635283	2.635383	100
432	2.635484	2.635585	2.635685	2.635785	2.635886	2.635986	2.636086	2.636187	2.636288	2.636388	100
433	2.636488	2.636588	2.636688	2.636788	2.636888	2.636988	2.637088	2.637188	2.637288	2.637388	100
434	2.637488	2.637588	2.637698	2.637788	2.637890	2.637990	2.638090	2.638190	2.638289	2.638389	99
435	2.638489	2.638588	2.638688	2.638788	2.638888	2.638988	2.639088	2.639188	2.639287	2.639387	99
436	2.639486	2.639586	2.639686	2.639785	2.639885	2.639984	2.640084	2.640183	2.640282	2.640382	99
437	2.640481	2.640580	2.640680	2.640779	2.640879	2.640978	2.641077	2.641177	2.641276	2.641375	99
438	2.641474	2.641573	2.641672	2.641772	2.641870	2.641970	2.642069	2.642168	2.642267	2.642366	99
439	2.642465	2.642563	2.642662	2.642761	2.642860	2.642959	2.643058	2.643156	2.643255	2.643354	99
440	2.643453	2.643552	2.643650	2.643749	2.643847	2.643946	2.644044	2.644143	2.644242	2.644340	98
441	2.644439	2.644537	2.644635	2.644734	2.644832	2.644931	2.645029	2.645127	2.645226	2.645324	98
442	2.645422	2.645520	2.645618	2.645717	2.645815	2.645913	2.646011	2.646109	2.646208	2.646306	98
443	2.646404	2.646502	2.646600	2.646698	2.646796	2.646894	2.646991	2.647089	2.647187	2.647285	98
444	2.647383	2.647481	2.647578	2.647676	2.647774	2.647872	2.647969	2.648067	2.648165	2.648262	98
445	2.648360	2.648458	2.648555	2.648653	2.648750	2.648848	2.648945	2.649043	2.649140	2.649237	97
446	2.649335	2.649432	2.649530	2.649627	2.649724	2.649821	2.649919	2.650016	2.650113	2.650210	97
447	2.650307	2.650404	2.650501	2.650599	2.650696	2.650793	2.650890	2.650987	2.651084	2.651181	97
448	2.651278	2.651375	2.651472	2.651569	2.651666	2.651762	2.651859	2.651956	2.652053	2.652150	97
449	2.652247	2.652343	2.652440	2.652536	2.652633	2.652730	2.652826	2.652923	2.653019	2.653116	97
450	2.653212	2.653309	2.653405	2.653502	2.653598	2.653695	2.653791	2.653888	2.653984	2.654080	96
451	2.654177	2.654273	2.654369	2.654465	2.654562	2.654658	2.654754	2.654850	2.654946	2.655042	96

N°	0	1	2	3	4	5	6	7	8	9	Diff.
452	2.655138	2.655234	2.655331	2.655427	2.655523	2.655619	2.655714	2.655810	2.655906	2.656002	96
453	2.656098	2.656194	2.656290	2.656386	2.656481	2.656577	2.656673	2.656769	2.656864	2.656960	96
454	2.657056	2.657152	2.657247	2.657343	2.657438	2.657534	2.657629	2.657725	2.657820	2.657916	96
455	2.658011	2.658107	2.658202	2.658298	2.658393	2.658488	2.658584	2.658679	2.658774	2.658870	95
456	2.658965	2.659060	2.659155	2.659250	2.659346	2.659441	2.659536	2.659631	2.659726	2.659821	95
457	2.659916	2.660011	2.660106	2.660201	2.660296	2.660391	2.660486	2.660581	2.660676	2.660771	95
458	2.660866	2.660961	2.661055	2.661150	2.661245	2.661339	2.661434	2.661529	2.661623	2.661718	95
459	2.661813	2.661907	2.662002	2.662096	2.662191	2.662285	2.662380	2.662474	2.662569	2.662663	95
460	2.662758	2.662852	2.662947	2.663041	2.663135	2.663230	2.663324	2.663418	2.663512	2.663607	94
461	2.663701	2.663795	2.663889	2.663983	2.664078	2.664172	2.664266	2.664360	2.664454	2.664548	94
462	2.664642	2.664736	2.664830	2.664924	2.665018	2.665112	2.665206	2.665299	2.665393	2.665487	94
463	2.665581	2.665675	2.665768	2.665862	2.665956	2.666050	2.666143	2.666237	2.666331	2.666424	94
464	2.666518	2.666611	2.666705	2.666799	2.666892	2.666986	2.667079	2.667173	2.667266	2.667359	94
465	2.667453	2.667546	2.667640	2.667733	2.667826	2.667920	2.668013	2.668106	2.668199	2.668293	93
466	2.668386	2.668479	2.668572	2.668665	2.668758	2.668852	2.668945	2.669038	2.669131	2.669224	93
467	2.669317	2.669410	2.669503	2.669596	2.669689	2.669782	2.669875	2.669967	2.670060	2.670153	93
468	2.670246	2.670339	2.670431	2.670524	2.670617	2.670710	2.670802	2.670895	2.670988	2.671080	93
469	2.671173	2.671265	2.671358	2.671451	2.671543	2.671636	2.671728	2.671821	2.671913	2.672005	93
470	2.672098	2.672190	2.672283	2.672375	2.672467	2.672560	2.672652	2.672744	2.672837	2.672929	92
471	2.673021	2.673113	2.673205	2.673297	2.673390	2.673482	2.673574	2.673666	2.673758	2.673850	92
472	2.673942	2.674034	2.674126	2.674218	2.674310	2.674402	2.674494	2.674586	2.674677	2.674769	92
473	2.674861	2.674953	2.675045	2.675136	2.675228	2.675320	2.675412	2.675503	2.675595	2.675687	92
474	2.675778	2.675870	2.675961	2.676053	2.676145	2.676236	2.676328	2.676419	2.676511	2.676602	92
475	2.676694	2.676785	2.676876	2.676968	2.677059	2.677151	2.677242	2.677333	2.677424	2.677516	91
476	2.677607	2.677698	2.677789	2.677881	2.677972	2.678063	2.678154	2.678245	2.678336	2.678427	91
477	2.678518	2.678609	2.678700	2.678791	2.678882	2.678973	2.679064	2.679155	2.679246	2.679337	91
478	2.679428	2.679519	2.679610	2.679700	2.679791	2.679882	2.679972	2.680063	2.680154	2.680245	91
479	2.680335	2.680426	2.680517	2.680607	2.680698	2.680789	2.680879	2.680970	2.681060	2.681151	91
480	2.681241	2.681332	2.681422	2.681513	2.681603	2.681693	2.681784	2.681874	2.681964	2.682055	90
481	2.682145	2.682235	2.682326	2.682416	2.682506	2.682596	2.682686	2.682777	2.682867	2.682957	90
482	2.683047	2.683137	2.683227	2.683317	2.683407	2.683497	2.683587	2.683677	2.683767	2.683857	90
483	2.683947	2.684037	2.684127	2.684217	2.684307	2.684396	2.684486	2.684576	2.684666	2.684756	90
484	2.684845	2.684935	2.685025	2.685114	2.685204	2.685294	2.685383	2.685473	2.685563	2.685652	90
485	2.685742	2.685831	2.685921	2.686010	2.686100	2.686189	2.686279	2.686368	2.686457	2.686547	89
486	2.686636	2.686726	2.686815	2.686904	2.686994	2.687083	2.687172	2.687261	2.687351	2.687440	89
487	2.687529	2.687618	2.687707	2.687796	2.687885	2.687975	2.688064	2.688153	2.688242	2.688331	89
488	2.688420	2.688509	2.688598	2.688687	2.688776	2.688865	2.688953	2.689042	2.689131	2.689220	89
489	2.689309	2.689398	2.689487	2.689575	2.689664	2.689753	2.689841	2.689930	2.690019	2.690107	89
490	2.690196	2.690285	2.690373	2.690462	2.690550	2.690639	2.690727	2.690816	2.690904	2.690993	88
491	2.691081	2.691170	2.691258	2.691347	2.691435	2.691523	2.691612	2.691700	2.691788	2.691877	88
492	2.691965	2.692053	2.692142	2.692230	2.692318	2.692406	2.692494	2.692583	2.692671	2.692759	88
493	2.692847	2.692935	2.693023	2.693111	2.693199	2.693287	2.693375	2.693463	2.693551	2.693639	88
494	2.693727	2.693815	2.693903	2.693991	2.694078	2.694166	2.694254	2.694342	2.694430	2.694517	88
495	2.694605	2.694693	2.694781	2.694868	2.694956	2.695044	2.695131	2.695219	2.695307	2.695394	88
496	2.695482	2.695569	2.695657	2.695744	2.695832	2.695919	2.696007	2.696094	2.696182	2.696269	87
497	2.696356	2.696444	2.696531	2.696618	2.696706	2.696793	2.696880	2.696968	2.697055	2.697142	87
498	2.697229	2.697316	2.697404	2.697491	2.697578	2.697665	2.697752	2.697839	2.697926	2.698013	87
499	2.698100	2.698188	2.698275	2.698362	2.698449	2.698535	2.698622	2.698709	2.698796	2.698883	87
500	2.698970	2.699057	2.699144	2.699231	2.699317	2.699404	2.699491	2.699578	2.699664	2.699751	87
501	2.699838	2.699924	2.700011	2.700098	2.700184	2.700271	2.700357	2.700444	2.700531	2.700617	87
502	2.700704	2.700790	2.700877	2.700963	2.701050	2.701136	2.701222	2.701309	2.701395	2.701482	86
503	2.701568	2.701654	2.701741	2.701827	2.701913	2.701999	2.702086	2.702172	2.702258	2.702344	86
504	2.702431	2.702517	2.702603	2.702689	2.702775	2.702861	2.702947	2.703033	2.703119	2.703205	86
505	2.703291	2.703377	2.703463	2.703549	2.703635	2.703721	2.703807	2.703893	2.703979	2.704065	86
506	2.704151	2.704236	2.704322	2.704408	2.704494	2.704579	2.704665	2.704751	2.704837	2.704922	86
507	2.705008	2.705094	2.705179	2.705265	2.705350	2.705436	2.705522	2.705607	2.705693	2.705778	86
508	2.705864	2.705949	2.706035	2.706120	2.706205	2.706291	2.706376	2.706462	2.706547	2.706632	85
509	2.706718	2.706803	2.706888	2.706974	2.707059	2.707144	2.707229	2.707315	2.707400	2.707485	85
510	2.707570	2.707655	2.707740	2.707826	2.707911	2.707996	2.708081	2.708166	2.708251	2.708336	85
511	2.708421	2.708506	2.708591	2.708676	2.708761	2.708846	2.708931	2.709016	2.709101	2.709185	85
512	2.709270	2.709355	2.709440	2.709524	2.709609	2.709694	2.709779	2.709863	2.709948	2.710033	85
513	2.710117	2.710202	2.710287	2.710371	2.710455	2.710541	2.710625	2.710710	2.710794	2.710879	85
514	2.710963	2.711048	2.711132	2.711216	2.711301	2.711385	2.711470	2.711554	2.711639	2.711723	84
515	2.711807	2.711891	2.711976	2.712060	2.712144	2.712229	2.712313	2.712397	2.712481	2.712565	84
516	2.712650	2.712734	2.712818	2.712902	2.712986	2.713070	2.713154	2.713238	2.713322	2.713406	84
517	2.713490	2.713574	2.713658	2.713742	2.713826	2.713910	2.713994	2.714078	2.714162	2.714246	84
518	2.714330	2.714414	2.714497	2.714581	2.714665	2.714749	2.714832	2.714916	2.715000	2.715084	84
519	2.715167	2.715251	2.715335	2.715418	2.715502	2.715586	2.715669	2.715753	2.715836	2.715920	84
520	2.716003	2.716087	2.716170	2.716254	2.716337	2.716421	2.716504	2.716588	2.716671	2.716754	83
521	2.716838	2.716921	2.717004	2.717088	2.717171	2.717254	2.717338	2.717421	2.717504	2.717587	83
522	2.717670	2.717754	2.717837	2.717920	2.718003	2.718086	2.718169	2.718253	2.718336	2.718419	83
523	2.718503	2.718585	2.718668	2.718751	2.718834	2.718917	2.719000	2.719083	2.719165	2.719248	83
524	2.719331	2.719414	2.719497	2.719580	2.719663	2.719745	2.719828	2.719911	2.719994	2.720077	83
525	2.720159	2.720242	2.720325	2.720407	2.720490	2.720573	2.720655	2.720738	2.720821	2.720903	83
526	2.720986	2.721068	2.721151	2.721233	2.721316	2.721398	2.721481	2.721563	2.721646	2.721728	82
527	2.721811	2.721893	2.721975	2.722058	2.722140	2.722222	2.722305	2.722387	2.722469	2.722552	82
528	2.722634	2.722716	2.722798	2.722881	2.722963	2.723045	2.723127	2.723209	2.723291	2.723374	82
529	2.723456	2.723538	2.723620	2.723702	2.723784	2.723866	2.723948	2.724030	2.724112	2.724194	82
530	2.724276	2.724358	2.724440	2.724522	2.724603	2.724685	2.724767	2.724849	2.724931	2.725013	82
531	2.725094	2.725176	2.725258	2.725340	2.725421	2.725503	2.725585	2.725667	2.725748	2.725830	82
532	2.725912	2.725993	2.726075	2.726156	2.726238	2.726320	2.726401	2.726483	2.726564	2.726646	82
533	2.726727	2.726809	2.726890	2.726972	2.727053	2.727134	2.727216	2.727297	2.727378	2.727460	81

N°	0	1	2	3	4	5	6	7	8	9	Diff.
534	2.727541	2.727623	2.727704	2.727786	2.727868	2.727948	2.728029	2.728110	2.728191	2.728273	81
535	2.728354	2.728435	2.728516	2.728597	2.728678	2.728759	2.728841	2.728922	2.729003	2.729085	81
536	2.729165	2.729246	2.729327	2.729408	2.729489	2.729570	2.729651	2.729732	2.729813	2.729893	81
537	2.729974	2.730055	2.730136	2.730217	2.730298	2.730378	2.730459	2.730540	2.730621	2.730702	81
538	2.730782	2.730863	2.730944	2.731024	2.731105	2.731186	2.731266	2.731347	2.731428	2.731508	81
539	2.731589	2.731669	2.731750	2.731830	2.731911	2.731991	2.732072	2.732152	2.732233	2.732313	81
540	2.732394	2.732474	2.732555	2.732635	2.732715	2.732796	2.732876	2.732956	2.733037	2.733117	80
541	2.733197	2.733277	2.733358	2.733438	2.733518	2.733598	2.733679	2.733759	2.733839	2.733919	80
542	2.733999	2.734079	2.734159	2.734240	2.734320	2.734400	2.734480	2.734560	2.734640	2.734720	80
543	2.734800	2.734880	2.734960	2.735040	2.735120	2.735200	2.735279	2.735359	2.735439	2.735519	80
544	2.735599	2.735679	2.735758	2.735838	2.735918	2.735998	2.736078	2.736157	2.736237	2.736317	80
545	2.736396	2.736476	2.736556	2.736635	2.736715	2.736795	2.736874	2.736954	2.737034	2.737113	80
546	2.737193	2.737272	2.737352	2.737431	2.737511	2.737590	2.737670	2.737749	2.737829	2.737908	79
547	2.737987	2.738067	2.738146	2.738225	2.738305	2.738384	2.738463	2.738543	2.738622	2.738701	79
548	2.738781	2.738860	2.738939	2.739018	2.739097	2.739177	2.739256	2.739335	2.739414	2.739493	79
549	2.739572	2.739651	2.739730	2.739810	2.739889	2.739968	2.740047	2.740126	2.740205	2.740284	79
550	2.740363	2.740442	2.740521	2.740599	2.740678	2.740757	2.740836	2.740915	2.740994	2.741073	79
551	2.741152	2.741230	2.741309	2.741388	2.741467	2.741546	2.741624	2.741703	2.741782	2.741860	79
552	2.741939	2.742018	2.742096	2.742175	2.742254	2.742332	2.742411	2.742489	2.742568	2.742647	79
553	2.742725	2.742804	2.742882	2.742961	2.743039	2.743118	2.743196	2.743275	2.743353	2.743431	78
554	2.743510	2.743588	2.743666	2.743745	2.743823	2.743901	2.743980	2.744058	2.744136	2.744215	78
555	2.744293	2.744371	2.744449	2.744528	2.744606	2.744684	2.744762	2.744840	2.744919	2.744997	78
556	2.745075	2.745153	2.745231	2.745309	2.745387	2.745465	2.745543	2.745621	2.745699	2.745777	78
557	2.745855	2.745933	2.746011	2.746089	2.746167	2.746245	2.746323	2.746401	2.746479	2.746556	78
558	2.746634	2.746712	2.746790	2.746868	2.746946	2.747024	2.747101	2.747179	2.747257	2.747334	78
559	2.747412	2.747489	2. 47567	2.747645	2.747722	2.747800	2.747878	2.747955	2.748033	2.748110	78
560	2.748188	2.748265	2.748343	2.748421	2.748498	2.748576	2.748653	2.748731	2.748808	2.748885	77
561	2.748963	2.749040	2.749118	2.749195	2.749272	2.749350	2.749427	2.749504	2.749582	2.749659	77
562	2.749736	2.749814	2.749891	2.749968	2.750045	2.750123	2.750200	2.750277	2.750354	2.750431	77
563	2.750508	2.750586	2.750663	2.750740	2.750817	2.750894	2.750971	2.751048	2.751125	2.751202	77
564	2.751279	2.751356	2.751433	2.751510	2.751587	2.751664	2.751741	2.751818	2.751895	2.751972	77
565	2.752048	2.752125	2.752202	2.752279	2.752356	2.752433	2.752509	2.752586	2.752663	2.752740	77
566	2.752816	2.752893	2.752970	2.753047	2.753124	2.753200	2.753277	2.753354	2.753430	2.753507	77
567	2.753583	2.753660	2.753736	2.753813	2.753889	2.753966	2.754042	2.754119	2.754195	2.754272	76
568	2.754348	2.754425	2.754501	2.754577	2.754654	2.754730	2.754807	2.754883	2.754960	2.755035	76
569	2.755112	2.755189	2.755265	2.755341	2.755417	2.755494	2.755571	2.755646	2.755722	2.755799	76
570	2.755875	2.755951	2.756027	2.756103	2.756180	2.756256	2.756332	2.756409	2.756484	2.756560	76
571	2.756636	2.756712	2.756788	2.756864	2.756940	2.757016	2.757092	2.757168	2.757244	2.757320	76
572	2.757396	2.757472	2.757548	2.757624	2.757700	2.757775	2.757851	2.757927	2.758003	2.758079	76
573	2.758155	2.758230	2.758306	2.758382	2.758458	2.758533	2.758609	2.758685	2.758761	2.758836	76
574	2.758912	2.758988	2.759065	2.759139	2.759214	2.759290	2.759366	2.759441	2.759517	2.759592	76
575	2.759668	2.759743	2.759819	2.759894	2.759970	2.760045	2.760121	2. 60196	2.760272	2.760347	75
576	2.760422	2.760498	2.760573	2.760649	2.760724	2.760799	2.760875	2.760950	2.761025	2.761101	75
577	2.761176	2.761251	2.761326	2.761402	2.761477	2.761552	2.761627	2.761702	2.761778	2.761853	75
578	2.761928	2.762003	2.762078	2.762153	2.762228	2.762303	2.762378	2.762453	2.762529	2.762604	75
579	2.762679	2.762754	2.762829	2.762904	2.762978	2.763053	2.763128	2.763203	2.763278	2.763353	75
580	2.763428	2.763503	2.763578	2.763653	2.763728	2.763802	2.763877	2.763952	2.764027	2.764101	75
581	2.764176	2.764251	2.764326	2.764400	2.764475	2.764550	2.764624	2.764699	2.764774	2.764848	75
582	2.764923	2.764998	2.765072	2.765147	2.765221	2.765296	2.765370	2.765445	2.765520	2.765594	75
583	2.765669	2.765743	2.765818	2.765892	2.765966	2.766041	2.766115	2.766190	2.766264	2.766338	74
584	2.766413	2.766487	2.766562	2.766636	2.766710	2.766784	2.766859	2.766933	2.767007	2.767082	74
585	2.767156	2.767230	2.767304	2.767379	2.767453	2.767527	2.767601	2.767675	2.767749	2.767823	74
586	2.767898	2.767972	2.768046	2.768120	2.768194	2.768268	2.768343	2.768416	2.768490	2.768564	74
587	2.768638	2.768711	2.768786	2.768860	2.768934	2.769008	2.769082	2.769156	2.769230	2.769303	74
588	2.769377	2.769451	2.769525	2.769599	2.769673	2.769746	2.769820	2.769894	2.769968	2.770042	74
589	2.770115	2.770189	2.770263	2.770336	2.770410	2.770484	2.770557	2.770631	2.770705	2.770778	74
590	2.770852	2.770926	2.770999	2.771073	2.771146	2.771220	2.771293	2.771367	2.771440	2.771514	74
591	2.771587	2.771661	2.771734	2.771808	2.771881	2.771955	2.772028	2.772102	2.772175	2.772248	73
592	2.772322	2.772395	2.772468	2.772542	2.772615	2.772688	2.772762	2.772835	2.772908	2.772981	73
593	2.773055	2.773128	2.773201	2.773274	2.773348	2.773421	2.773494	2.773567	2.773640	2.773713	73
594	2.773786	2.773860	2.773933	2.774006	2.774079	2.774152	2.774225	2.774298	2.774371	2.774444	73
595	2.774517	2.774590	2.774663	2.774736	2.774809	2.774882	2.774955	2.775028	2.775100	2.775173	73
596	2.775246	2.775319	2.775392	2.775465	2.775538	2.775611	2.775684	2.775756	2.775829	2.775902	73
597	2.775974	2.776047	2.776120	2.776193	2.776265	2.776338	2.776411	2.776483	2.776556	2.776629	73
598	2.776701	2.776774	2.776846	2.776919	2.776992	2.777064	2.777137	2.777209	2.777282	2.777354	73
599	2.777427	2.777499	2.777572	2.777644	2.777717	2.777789	2.777862	2.777934	2.778006	2.778079	72
600	2.778151	2.778224	2.778296	2.778368	2.778441	2.778513	2.778585	2.778658	2.778730	2.778802	72
601	2.778874	2.778946	2.779019	2.779091	2.779163	2.779235	2.779308	2.779380	2.779452	2.779524	72
602	2.779597	2.779669	2.779741	2.779813	2.779885	2.779957	2.780029	2.780101	2.780173	2.780245	72
603	2.780317	2.780389	2.780461	2.780533	2.780605	2.780677	2.780749	2.780821	2.780893	2.780965	72
604	2.781037	2.781109	2.781181	2.781253	2.781324	2.781396	2.781468	2.781540	2.781612	2.781684	72
605	2.781755	2.781827	2.781899	2.781971	2.782042	2.782114	2.782186	2.782258	2.782329	2.782401	72
606	2.782473	2.782544	2.782616	2.782688	2.782759	2.782831	2.782902	2.782974	2.783046	2.783117	72
607	2.783189	2.783260	2.783332	2.783403	2.783475	2.783546	2.783618	2.783689	2.783761	2.783832	71
608	2.783904	2.783975	2.784047	2.784118	2.784189	2.784261	2.784332	2.784403	2.784475	2.784546	71
609	2.784617	2.784689	2.784760	2.784831	2.784902	2.784974	2.785045	2.785116	2.785187	2.785259	71
610	2.785330	2.785401	2.785472	2.785543	2.785615	2.785685	2.785757	2.785828	2.785899	2.785970	71
611	2.786041	2.786112	2.786183	2.786254	2.786325	2.786396	2.786467	2.786538	2.786609	2.786680	71
612	2.786751	2.786822	2.786893	2.786964	2.787035	2.787106	2.787177	2.787248	2.787319	2.787390	71
613	2.787460	2.787531	2.787602	2.787673	2.787744	2.787815	2.787886	2.787956	2.788027	2.788098	71
614	2.788168	2.788239	2.788310	2.788381	2.788451	2.788522	2.788593	2.788663	2.788734	2.788804	71
615	2.788875	2.788945	2.789016	2.789086	2.789157	2.789228	2.789299	2.789369	2.789440	2.789510	71

N°	0	1	2	3	4	5	6	7	8	9	Diff.
618	2.789581	2.789651	2.789722	2.789792	2.789863	2.789933	2.790003	2.790074	2.790144	2.790215	70
617	2.790285	2.790356	2.790426	2.790496	2.790567	2.790637	2.790707	2.790778	2.790848	2.790918	70
616	2.790988	2.791059	2.791129	2.791199	2.791269	2.791340	2.791410	2.791480	2.791550	2.791620	70
615	2.791691	2.791761	2.791831	2.791901	2.791971	2.792041	2.792111	2.792181	2.792252	2.792322	70
614	2.792392	2.792462	2.792532	2.792602	2.792672	2.792742	2.792812	2.792882	2.792952	2.793022	70
613	2.793092	2.793162	2.793232	2.793301	2.793371	2.793441	2.793511	2.793581	2.793651	2.793721	70
612	2.793790	2.793860	2.793930	2.794000	2.794070	2.794139	2.794209	2.794279	2.794349	2.794418	70
611	2.794488	2.794558	2.794627	2.794697	2.794767	2.794836	2.794906	2.794976	2.795045	2.795115	70
610	2.795185	2.795254	2.795324	2.795393	2.795462	2.795532	2.795602	2.795671	2.795741	2.795810	70
609	2.795880	2.795949	2.796019	2.796088	2.796158	2.796227	2.796297	2.796366	2.796436	2.796505	69
608	2.796574	2.796643	2.796713	2.796782	2.796852	2.796921	2.796990	2.797060	2.797129	2.797198	69
607	2.797268	2.797337	2.797406	2.797475	2.797545	2.797614	2.797683	2.797752	2.797821	2.797890	69
606	2.797960	2.798029	2.798098	2.798167	2.798236	2.798305	2.798374	2.798443	2.798512	2.798581	69
605	2.798651	2.798720	2.798789	2.798858	2.798927	2.798996	2.799065	2.799134	2.799203	2.799272	69
604	2.799341	2.799409	2.799478	2.799547	2.799616	2.799685	2.799754	2.799823	2.799892	2.799961	69
603	2.800029	2.800098	2.800167	2.800236	2.800305	2.800373	2.800442	2.800511	2.800580	2.800648	69
602	2.800717	2.800786	2.800854	2.800923	2.800992	2.801060	2.801129	2.801198	2.801267	2.801335	69
601	2.801404	2.801472	2.801541	2.801609	2.801678	2.801747	2.801815	2.801884	2.801952	2.802021	68
600	2.802089	2.802158	2.802226	2.802295	2.802363	2.802431	2.802500	2.802568	2.802637	2.802705	68
599	2.802774	2.802842	2.802910	2.802979	2.803047	2.803116	2.803184	2.803252	2.803321	2.803389	68
598	2.803457	2.803525	2.803594	2.803662	2.803730	2.803798	2.803867	2.803935	2.804003	2.804071	68
597	2.804139	2.804208	2.804276	2.804344	2.804412	2.804480	2.804548	2.804616	2.804685	2.804753	68
596	2.804821	2.804889	2.804957	2.805025	2.805093	2.805161	2.805229	2.805297	2.805365	2.805433	68
595	2.805501	2.805569	2.805637	2.805705	2.805773	2.805840	2.805908	2.805976	2.806044	2.806112	68
594	2.806180	2.806248	2.806316	2.806384	2.806451	2.806519	2.806587	2.806655	2.806723	2.806790	68
593	2.806858	2.806926	2.806994	2.807061	2.807129	2.807197	2.807264	2.807332	2.807400	2.807467	68
592	2.807535	2.807603	2.807670	2.807738	2.807806	2.807873	2.807941	2.808008	2.808076	2.808143	68
591	2.808211	2.808279	2.808346	2.808414	2.808481	2.808549	2.808616	2.808683	2.808751	2.808818	68
590	2.808886	2.808953	2.809021	2.809088	2.809155	2.809223	2.809290	2.809357	2.809425	2.809492	67
589	2.809560	2.809627	2.809694	2.809762	2.809829	2.809896	2.809963	2.810031	2.810098	2.810165	67
588	2.810233	2.810300	2.810367	2.810434	2.810501	2.810568	2.810636	2.810703	2.810770	2.810837	67
587	2.810904	2.810971	2.811038	2.811105	2.811172	2.811239	2.811307	2.811374	2.811441	2.811508	67
586	2.811575	2.811642	2.811709	2.811776	2.811843	2.811910	2.811977	2.812044	2.812111	2.812178	67
585	2.812245	2.812312	2.812379	2.812446	2.812513	2.812580	2.812647	2.812714	2.812781	2.812848	67
584	2.812913	2.812980	2.813047	2.813114	2.813181	2.813247	2.813314	2.813381	2.813447	2.813514	67
583	2.813581	2.813648	2.813714	2.813781	2.813848	2.813914	2.813981	2.814048	2.814114	2.814181	67
582	2.814248	2.814314	2.814381	2.814447	2.814514	2.814581	2.814647	2.814714	2.814780	2.814847	66
581	2.814913	2.814980	2.815046	2.815113	2.815179	2.815246	2.815312	2.815378	2.815445	2.815511	66
580	2.815578	2.815644	2.815711	2.815777	2.815843	2.815910	2.815976	2.816043	2.816109	2.816175	66
579	2.816241	2.816308	2.816374	2.816440	2.816506	2.816573	2.816639	2.816705	2.816771	2.816838	66
578	2.816904	2.816970	2.817036	2.817102	2.817169	2.817235	2.817301	2.817367	2.817433	2.817499	66
577	2.817565	2.817631	2.817698	2.817764	2.817830	2.817896	2.817962	2.818028	2.818094	2.818160	66
576	2.818226	2.818292	2.818358	2.818424	2.818490	2.818556	2.818622	2.818688	2.818754	2.818819	66
575	2.818885	2.818951	2.819017	2.819083	2.819149	2.819215	2.819281	2.819346	2.819412	2.819478	66
574	2.819544	2.819610	2.819675	2.819741	2.819807	2.819873	2.819939	2.820004	2.820070	2.820136	66
573	2.820201	2.820267	2.820333	2.820398	2.820464	2.820530	2.820595	2.820661	2.820727	2.820792	66
572	2.820858	2.820924	2.820989	2.821055	2.821120	2.821186	2.821251	2.821317	2.821382	2.821448	65
571	2.821513	2.821579	2.821644	2.821710	2.821775	2.821841	2.821906	2.821972	2.822037	2.822103	65
570	2.822168	2.822233	2.822299	2.822364	2.822430	2.822495	2.822560	2.822626	2.822691	2.822756	65
569	2.822822	2.822887	2.822952	2.823017	2.823083	2.823148	2.823213	2.823279	2.823344	2.823409	65
568	2.823474	2.823539	2.823605	2.823670	2.823735	2.823800	2.823865	2.823930	2.823996	2.824061	65
567	2.824126	2.824191	2.824256	2.824321	2.824386	2.824451	2.824516	2.824581	2.824646	2.824711	65
566	2.824776	2.824841	2.824906	2.824971	2.825036	2.825101	2.825166	2.825231	2.825296	2.825361	65
565	2.825425	2.825491	2.825556	2.825620	2.825686	2.825751	2.825815	2.825880	2.825945	2.826010	65
564	2.826075	2.826140	2.826204	2.826269	2.826334	2.826399	2.826464	2.826528	2.826593	2.826658	65
563	2.826722	2.826787	2.826852	2.826917	2.826981	2.827046	2.827111	2.827174	2.827240	2.827305	65
562	2.827369	2.827434	2.827499	2.827563	2.827628	2.827692	2.827757	2.827821	2.827886	2.827950	64
561	2.828015	2.828080	2.828144	2.828209	2.828273	2.828338	2.828402	2.828466	2.828531	2.828595	64
560	2.828660	2.828724	2.828789	2.828853	2.828917	2.828982	2.829046	2.829111	2.829175	2.829239	64
559	2.829304	2.829368	2.829432	2.829497	2.829561	2.829625	2.829690	2.829754	2.829818	2.829882	64
558	2.829947	2.830011	2.830075	2.830139	2.830204	2.830268	2.830332	2.830396	2.830460	2.830524	64
557	2.830589	2.830653	2.830717	2.830781	2.830845	2.830909	2.830973	2.831037	2.831102	2.831166	64
556	2.831230	2.831294	2.831358	2.831422	2.831486	2.831550	2.831614	2.831678	2.831742	2.831806	64
555	2.831870	2.831934	2.831998	2.832062	2.832126	2.832189	2.832253	2.832317	2.832381	2.832445	64
554	2.832509	2.832573	2.832637	2.832700	2.832764	2.832828	2.832892	2.832956	2.833019	2.833083	64
553	2.833147	2.833211	2.833275	2.833338	2.833402	2.833466	2.833530	2.833593	2.833657	2.833721	64
552	2.833784	2.833848	2.833912	2.833975	2.834039	2.834103	2.834166	2.834230	2.834294	2.834357	64
551	2.834421	2.834484	2.834548	2.834611	2.834675	2.834738	2.834802	2.834866	2.834929	2.834993	64
550	2.835056	2.835120	2.835183	2.835246	2.835310	2.835373	2.835437	2.835500	2.835564	2.835627	63
549	2.835691	2.835754	2.835817	2.835881	2.835944	2.836007	2.836071	2.836134	2.836197	2.836261	63
548	2.836324	2.836387	2.836451	2.836514	2.836577	2.836641	2.836704	2.836767	2.836830	2.836893	63
547	2.836957	2.837020	2.837083	2.837146	2.837209	2.837272	2.837336	2.837399	2.837462	2.837525	63
546	2.837588	2.837651	2.837714	2.837778	2.837841	2.837904	2.837967	2.838030	2.838093	2.838156	63
545	2.838219	2.838282	2.838345	2.838408	2.838471	2.838534	2.838597	2.838660	2.838723	2.838786	63
544	2.838849	2.838912	2.838975	2.839038	2.839101	2.839164	2.839227	2.839289	2.839352	2.839415	63
543	2.839478	2.839541	2.839604	2.839667	2.839729	2.839792	2.839855	2.839918	2.839981	2.840043	63
542	2.840106	2.840169	2.840232	2.840294	2.840357	2.840420	2.840482	2.840545	2.840608	2.840671	63
541	2.840733	2.840796	2.840859	2.840921	2.840984	2.841046	2.841109	2.841172	2.841234	2.841296	63
540	2.841359	2.841422	2.841485	2.841547	2.841610	2.841672	2.841735	2.841797	2.841860	2.841922	63
539	2.841985	2.842047	2.842110	2.842172	2.842235	2.842297	2.842360	2.842422	2.842484	2.842547	63
538	2.842609	2.842672	2.842734	2.842796	2.842859	2.842921	2.842983	2.843046	2.843108	2.843170	63
537	2.843233	2.843295	2.843357	2.843420	2.843482	2.843544	2.843606	2.843668	2.843731	2.843793	63

N°	0	1	2	3	4	5	6	7	8	9	Diff.
698	2.8438555	2.8439188	2.8439820	2.8440452	2.8441083	2.8441716	2.8442347	2.8442979	2.8443553	2.8444115	632
699	2.8444477	2.8445109	2.8445741	2.8446373	2.8447004	2.8447636	2.8448268	2.8448901	2.8449534	2.8450166	632
700	2.8450798	2.8451430	2.8452062	2.8452694	2.8453326	2.8453958	2.8454589	2.8455221	2.8455854	2.8456486	632
701	2.8457118	2.8457750	2.8458383	2.8459015	2.8459647	2.8460280	2.8460912	2.8461543	2.8462175	2.8462807	632
702	2.8463439	2.8464071	2.8464703	2.8465335	2.8465967	2.8466600	2.8467232	2.8467864	2.8468496	2.8469128	632
703	2.8469760	2.8470392	2.8471024	2.8471656	2.8472288	2.8472920	2.8473552	2.8474184	2.8474816	2.8475448	632
704	2.8476080	2.8476712	2.8477344	2.8477976	2.8478608	2.8479240	2.8479872	2.8480504	2.8481136	2.8481768	632
705	2.8482400	2.8483032	2.8483664	2.8484296	2.8484928	2.8485560	2.8486192	2.8486824	2.8487456	2.8488088	632
706	2.8488720	2.8489352	2.8489984	2.8490616	2.8491248	2.8491880	2.8492512	2.8493144	2.8493776	2.8494408	632
707	2.8495040	2.8495672	2.8496304	2.8496936	2.8497568	2.8498200	2.8498832	2.8499464	2.8500096	2.8500728	632
708	2.8501360	2.8501992	2.8502624	2.8503256	2.8503888	2.8504520	2.8505152	2.8505784	2.8506416	2.8507048	632
709	2.8507680	2.8508312	2.8508944	2.8509576	2.8510208	2.8510840	2.8511472	2.8512104	2.8512736	2.8513368	632
710	2.8514000	2.8514632	2.8515264	2.8515896	2.8516528	2.8517160	2.8517792	2.8518424	2.8519056	2.8519688	632
711	2.8520320	2.8520952	2.8521584	2.8522216	2.8522848	2.8523480	2.8524112	2.8524744	2.8525376	2.8526008	632
712	2.8526640	2.8527272	2.8527904	2.8528536	2.8529168	2.8529800	2.8530432	2.8531064	2.8531696	2.8532328	632
713	2.8532960	2.8533592	2.8534224	2.8534856	2.8535488	2.8536120	2.8536752	2.8537384	2.8538016	2.8538648	632
714	2.8539280	2.8539912	2.8540544	2.8541176	2.8541808	2.8542440	2.8543072	2.8543704	2.8544336	2.8544968	632
715	2.8545600	2.8546232	2.8546864	2.8547496	2.8548128	2.8548760	2.8549392	2.8550024	2.8550656	2.8551288	632
716	2.8551920	2.8552552	2.8553184	2.8553816	2.8554448	2.8555080	2.8555712	2.8556344	2.8556976	2.8557608	632
717	2.8558240	2.8558872	2.8559504	2.8560136	2.8560768	2.8561400	2.8562032	2.8562664	2.8563296	2.8563928	632
718	2.8564560	2.8565192	2.8565824	2.8566456	2.8567088	2.8567720	2.8568352	2.8568984	2.8569616	2.8570248	632
719	2.8570880	2.8571512	2.8572144	2.8572776	2.8573408	2.8574040	2.8574672	2.8575304	2.8575936	2.8576568	632
720	2.8577200	2.8577832	2.8578464	2.8579096	2.8579728	2.8580360	2.8580992	2.8581624	2.8582256	2.8582888	632
721	2.8583520	2.8584152	2.8584784	2.8585416	2.8586048	2.8586680	2.8587312	2.8587944	2.8588576	2.8589208	632
722	2.8589840	2.8590472	2.8591104	2.8591736	2.8592368	2.8593000	2.8593632	2.8594264	2.8594896	2.8595528	632
723	2.8596160	2.8596792	2.8597424	2.8598056	2.8598688	2.8599320	2.8599952	2.8600584	2.8601216	2.8601848	632
724	2.8602480	2.8603112	2.8603744	2.8604376	2.8605008	2.8605640	2.8606272	2.8606904	2.8607536	2.8608168	632
725	2.8608800	2.8609432	2.8610064	2.8610696	2.8611328	2.8611960	2.8612592	2.8613224	2.8613856	2.8614488	632
726	2.8615120	2.8615752	2.8616384	2.8617016	2.8617648	2.8618280	2.8618912	2.8619544	2.8620176	2.8620808	632
727	2.8621440	2.8622072	2.8622704	2.8623336	2.8623968	2.8624600	2.8625232	2.8625864	2.8626496	2.8627128	632
728	2.8627760	2.8628392	2.8629024	2.8629656	2.8630288	2.8630920	2.8631552	2.8632184	2.8632816	2.8633448	632
729	2.8634080	2.8634712	2.8635344	2.8635976	2.8636608	2.8637240	2.8637872	2.8638504	2.8639136	2.8639768	632
730	2.8640400	2.8641032	2.8641664	2.8642296	2.8642928	2.8643560	2.8644192	2.8644824	2.8645456	2.8646088	632
731	2.8646720	2.8647352	2.8647984	2.8648616	2.8649248	2.8649880	2.8650512	2.8651144	2.8651776	2.8652408	632
732	2.8653040	2.8653672	2.8654304	2.8654936	2.8655568	2.8656200	2.8656832	2.8657464	2.8658096	2.8658728	632
733	2.8659360	2.8659992	2.8660624	2.8661256	2.8661888	2.8662520	2.8663152	2.8663784	2.8664416	2.8665048	632
734	2.8665680	2.8666312	2.8666944	2.8667576	2.8668208	2.8668840	2.8669472	2.8670104	2.8670736	2.8671368	632
735	2.8672000	2.8672632	2.8673264	2.8673896	2.8674528	2.8675160	2.8675792	2.8676424	2.8677056	2.8677688	632
736	2.8678320	2.8678952	2.8679584	2.8680216	2.8680848	2.8681480	2.8682112	2.8682744	2.8683376	2.8684008	632
737	2.8684640	2.8685272	2.8685904	2.8686536	2.8687168	2.8687800	2.8688432	2.8689064	2.8689696	2.8690328	632
738	2.8690960	2.8691592	2.8692224	2.8692856	2.8693488	2.8694120	2.8694752	2.8695384	2.8696016	2.8696648	632
739	2.8697280	2.8697912	2.8698544	2.8699176	2.8699808	2.8700440	2.8701072	2.8701704	2.8702336	2.8702968	632
740	2.8703600	2.8704232	2.8704864	2.8705496	2.8706128	2.8706760	2.8707392	2.8708024	2.8708656	2.8709288	632
741	2.8709920	2.8710552	2.8711184	2.8711816	2.8712448	2.8713080	2.8713712	2.8714344	2.8714976	2.8715608	632
742	2.8716240	2.8716872	2.8717504	2.8718136	2.8718768	2.8719400	2.8720032	2.8720664	2.8721296	2.8721928	632
743	2.8722560	2.8723192	2.8723824	2.8724456	2.8725088	2.8725720	2.8726352	2.8726984	2.8727616	2.8728248	632
744	2.8728880	2.8729512	2.8730144	2.8730776	2.8731408	2.8732040	2.8732672	2.8733304	2.8733936	2.8734568	632
745	2.8735200	2.8735832	2.8736464	2.8737096	2.8737728	2.8738360	2.8738992	2.8739624	2.8740256	2.8740888	632
746	2.8741520	2.8742152	2.8742784	2.8743416	2.8744048	2.8744680	2.8745312	2.8745944	2.8746576	2.8747208	632
747	2.8747840	2.8748472	2.8749104	2.8749736	2.8750368	2.8751000	2.8751632	2.8752264	2.8752896	2.8753528	632
748	2.8754160	2.8754792	2.8755424	2.8756056	2.8756688	2.8757320	2.8757952	2.8758584	2.8759216	2.8759848	632
749	2.8760480	2.8761112	2.8761744	2.8762376	2.8763008	2.8763640	2.8764272	2.8764904	2.8765536	2.8766168	632
750	2.8766800	2.8767432	2.8768064	2.8768696	2.8769328	2.8769960	2.8770592	2.8771224	2.8771856	2.8772488	632
751	2.8773120	2.8773752	2.8774384	2.8775016	2.8775648	2.8776280	2.8776912	2.8777544	2.8778176	2.8778808	632
752	2.8779440	2.8780072	2.8780704	2.8781336	2.8781968	2.8782600	2.8783232	2.8783864	2.8784496	2.8785128	632
753	2.8785760	2.8786392	2.8787024	2.8787656	2.8788288	2.8788920	2.8789552	2.8790184	2.8790816	2.8791448	632
754	2.8792080	2.8792712	2.8793344	2.8793976	2.8794608	2.8795240	2.8795872	2.8796504	2.8797136	2.8797768	632
755	2.8798400	2.8799032	2.8799664	2.8800296	2.8800928	2.8801560	2.8802192	2.8802824	2.8803456	2.8804088	632
756	2.8804720	2.8805352	2.8805984	2.8806616	2.8807248	2.8807880	2.8808512	2.8809144	2.8809776	2.8810408	632
757	2.8811040	2.8811672	2.8812304	2.8812936	2.8813568	2.8814200	2.8814832	2.8815464	2.8816096	2.8816728	632
758	2.8817360	2.8817992	2.8818624	2.8819256	2.8819888	2.8820520	2.8821152	2.8821784	2.8822416	2.8823048	632
759	2.8823680	2.8824312	2.8824944	2.8825576	2.8826208	2.8826840	2.8827472	2.8828104	2.8828736	2.8829368	632
760	2.8830000	2.8830632	2.8831264	2.8831896	2.8832528	2.8833160	2.8833792	2.8834424	2.8835056	2.8835688	632
761	2.8836320	2.8836952	2.8837584	2.8838216	2.8838848	2.8839480	2.8840112	2.8840744	2.8841376	2.8842008	632
762	2.8842640	2.8843272	2.8843904	2.8844536	2.8845168	2.8845800	2.8846432	2.8847064	2.8847696	2.8848328	632
763	2.8848960	2.8849592	2.8850224	2.8850856	2.8851488	2.8852120	2.8852752	2.8853384	2.8854016	2.8854648	632
764	2.8855280	2.8855912	2.8856544	2.8857176	2.8857808	2.8858440	2.8859072	2.8859704	2.8860336	2.8860968	632
765	2.8861600	2.8862232	2.8862864	2.8863496	2.8864128	2.8864760	2.8865392	2.8866024	2.8866656	2.8867288	632
766	2.8867920	2.8868552	2.8869184	2.8869816	2.8870448	2.8871080	2.8871712	2.8872344	2.8872976	2.8873608	632
767	2.8874240	2.8874872	2.8875504	2.8876136	2.8876768	2.8877400	2.8878032	2.8878664	2.8879296	2.8879928	632
768	2.8880560	2.8881192	2.8881824	2.8882456	2.8883088	2.8883720	2.8884352	2.8884984	2.8885616	2.8886248	632
769	2.8886880	2.8887512	2.8888144	2.8888776	2.8889408	2.8890040	2.8890672	2.8891304	2.8891936	2.8892568	632
770	2.8893200	2.8893832	2.8894464	2.8895096	2.8895728	2.8896360	2.8896992	2.8897624	2.8898256	2.8898888	632
771	2.8899520	2.8900152	2.8900784	2.8901416	2.8902048	2.8902680	2.8903312	2.8903944	2.8904576	2.8905208	632
772	2.8905840	2.8906472	2.8907104	2.8907736	2.8908368	2.8909000	2.8909632	2.8910264	2.8910896	2.8911528	632
773	2.8912160	2.8912792	2.8913424	2.8914056	2.8914688	2.8915320	2.8915952	2.8916584	2.8917216	2.8917848	632
774	2.8918480	2.8919112	2.8919744	2.8920376	2.8921008	2.8921640	2.8922272	2.8922904	2.8923536	2.8924168	632
775	2.8924800	2.8925432	2.8926064	2.8926696	2.8927328	2.8927960	2.8928592	2.8929224	2.8929856	2.8930488	632
776	2.8931120	2.8931752	2.8932384	2.8933016	2.8933648	2.8934280	2.8934912	2.8935544	2.8936176	2.8936808	632
777	2.8937440	2.8938072	2.8938704	2.8939336	2.8939968	2.8940600	2.8941232	2.8941864	2.8942496	2.8943128	632
778	2.8943760	2.8944392	2.8945024	2.8945656	2.8946288	2.8946920	2.8947552	2.8948184	2.8948816	2.8949448	632
779	2.8950080	2.8950712	2.8951344	2.8951976	2.8952608	2.8953240	2.8953872	2.8954504	2.8955136	2.8955768	632

N°	0	1	2	3	4	5	6	7	8	9	Diff.
780	2.892093	2.892150	2.892206	2.892262	2.892317	2.892373	2.892428	2.892484	2.892540	2.892595	56
781	2.892651	2.892707	2.892762	2.892818	2.892873	2.892929	2.892985	2.893040	2.893096	2.893151	56
782	2.893207	2.893262	2.893318	2.893373	2.893429	2.893484	2.893540	2.893595	2.893651	2.893706	56
783	2.893762	2.893817	2.893873	2.893928	2.893984	2.894039	2.894094	2.894150	2.894205	2.894261	55
784	2.894316	2.894371	2.894427	2.894482	2.894538	2.894593	2.894648	2.894704	2.894759	2.894814	55
785	2.894870	2.894925	2.894980	2.895036	2.895091	2.895146	2.895201	2.895257	2.895312	2.895367	55
786	2.895423	2.895478	2.895533	2.895588	2.895643	2.895699	2.895754	2.895809	2.895864	2.895919	55
787	2.895975	2.896030	2.896085	2.896140	2.896195	2.896251	2.896306	2.896361	2.896416	2.896471	55
788	2.896526	2.896581	2.896636	2.896691	2.896747	2.896802	2.896857	2.896912	2.896967	2.897022	55
789	2.897077	2.897132	2.897187	2.897242	2.897297	2.897352	2.897407	2.897462	2.897517	2.897572	55
790	2.897627	2.897682	2.897737	2.897792	2.897847	2.897902	2.897957	2.898012	2.898067	2.898122	55
791	2.898176	2.898231	2.898286	2.898341	2.898396	2.898451	2.898506	2.898561	2.898616	2.898670	55
792	2.898725	2.898780	2.898835	2.898890	2.898944	2.898999	2.899054	2.899109	2.899164	2.899218	55
793	2.899273	2.899328	2.899383	2.899437	2.899492	2.899547	2.899602	2.899656	2.899711	2.899766	55
794	2.899820	2.899875	2.899930	2.899984	2.900039	2.900094	2.900149	2.900203	2.900258	2.900313	55
795	2.900367	2.900422	2.900476	2.900531	2.900586	2.900640	2.900695	2.900749	2.900804	2.900858	55
796	2.900913	2.900968	2.901022	2.901077	2.901131	2.901186	2.901240	2.901295	2.901349	2.901404	54
797	2.901458	2.901513	2.901567	2.901622	2.901676	2.901731	2.901785	2.901840	2.901894	2.901948	54
798	2.902003	2.902057	2.902112	2.902166	2.902220	2.902275	2.902329	2.902383	2.902438	2.902492	54
799	2.902547	2.902601	2.902655	2.902710	2.902764	2.902818	2.902873	2.902927	2.902981	2.903036	54
800	2.903090	2.903144	2.903198	2.903253	2.903307	2.903361	2.903416	2.903470	2.903524	2.903578	54
801	2.903632	2.903686	2.903741	2.903795	2.903849	2.903903	2.903958	2.904012	2.904066	2.904120	54
802	2.904174	2.904228	2.904283	2.904337	2.904391	2.904445	2.904499	2.904553	2.904607	2.904661	54
803	2.904715	2.904770	2.904824	2.904878	2.904932	2.904986	2.905040	2.905094	2.905148	2.905202	54
804	2.905256	2.905310	2.905364	2.905418	2.905472	2.905526	2.905580	2.905634	2.905688	2.905742	54
805	2.905796	2.905850	2.905904	2.905958	2.906012	2.906065	2.906119	2.906173	2.906227	2.906281	54
806	2.906335	2.906389	2.906443	2.906497	2.906550	2.906604	2.906658	2.906712	2.906766	2.906820	54
807	2.906873	2.906927	2.906981	2.907035	2.907089	2.907142	2.907196	2.907250	2.907304	2.907358	54
808	2.907411	2.907465	2.907519	2.907573	2.907626	2.907680	2.907734	2.907787	2.907841	2.907895	54
809	2.907948	2.908002	2.908056	2.908109	2.908163	2.908217	2.908270	2.908324	2.908378	2.908431	54
810	2.908485	2.908539	2.908592	2.908646	2.908699	2.908753	2.908807	2.908860	2.908914	2.908967	54
811	2.909021	2.909074	2.909128	2.909181	2.909235	2.909289	2.909342	2.909396	2.909449	2.909503	54
812	2.909556	2.909610	2.909663	2.909717	2.909770	2.909823	2.909877	2.909930	2.909984	2.910037	53
813	2.910090	2.910144	2.910197	2.910251	2.910304	2.910358	2.910411	2.910464	2.910518	2.910571	53
814	2.910624	2.910678	2.910731	2.910784	2.910838	2.910891	2.910944	2.910998	2.911051	2.911104	53
815	2.911158	2.911211	2.911264	2.911317	2.911371	2.911424	2.911477	2.911530	2.911584	2.911637	53
816	2.911690	2.911743	2.911797	2.911850	2.911903	2.911956	2.912009	2.912063	2.912116	2.912169	53
817	2.912222	2.912275	2.912328	2.912381	2.912435	2.912488	2.912541	2.912594	2.912647	2.912700	53
818	2.912753	2.912806	2.912859	2.912912	2.912966	2.913019	2.913072	2.913125	2.913178	2.913231	53
819	2.913284	2.913337	2.913390	2.913443	2.913496	2.913549	2.913602	2.913655	2.913708	2.913761	53
820	2.913814	2.913867	2.913920	2.913973	2.914026	2.914079	2.914131	2.914184	2.914237	2.914290	53
821	2.914343	2.914396	2.914449	2.914502	2.914555	2.914608	2.914660	2.914713	2.914766	2.914819	53
822	2.914872	2.914925	2.914977	2.915030	2.915083	2.915136	2.915189	2.915241	2.915294	2.915347	53
823	2.915400	2.915453	2.915506	2.915558	2.915611	2.915664	2.915716	2.915769	2.915822	2.915874	53
824	2.915927	2.915980	2.916033	2.916085	2.916138	2.916191	2.916243	2.916296	2.916349	2.916401	53
825	2.916454	2.916507	2.916559	2.916612	2.916664	2.916717	2.916770	2.916822	2.916875	2.916927	53
826	2.916980	2.917033	2.917085	2.917138	2.917190	2.917243	2.917295	2.917348	2.917400	2.917453	52
827	2.917505	2.917558	2.917610	2.917663	2.917715	2.917768	2.917820	2.917873	2.917925	2.917978	52
828	2.918030	2.918083	2.918135	2.918188	2.918240	2.918293	2.918345	2.918397	2.918450	2.918502	52
829	2.918554	2.918607	2.918659	2.918712	2.918764	2.918816	2.918869	2.918921	2.918973	2.919026	52
830	2.919078	2.919130	2.919183	2.919235	2.919287	2.919340	2.919392	2.919444	2.919496	2.919549	52
831	2.919601	2.919653	2.919706	2.919758	2.919810	2.919862	2.919914	2.919967	2.920019	2.920071	52
832	2.920123	2.920175	2.920228	2.920280	2.920332	2.920384	2.920436	2.920489	2.920541	2.920593	52
833	2.920645	2.920697	2.920749	2.920801	2.920853	2.920906	2.920958	2.921010	2.921062	2.921114	52
834	2.921166	2.921218	2.921270	2.921322	2.921374	2.921426	2.921478	2.921530	2.921582	2.921634	52
835	2.921686	2.921738	2.921790	2.921842	2.921894	2.921946	2.921998	2.922050	2.922102	2.922154	52
836	2.922206	2.922259	2.922311	2.922362	2.922414	2.922466	2.922518	2.922570	2.922622	2.922674	52
837	2.922725	2.922777	2.922829	2.922881	2.922933	2.922985	2.923037	2.923088	2.923140	2.923192	52
838	2.923244	2.923296	2.923348	2.923399	2.923451	2.923503	2.923555	2.923606	2.923658	2.923710	52
839	2.923762	2.923814	2.923865	2.923917	2.923969	2.924021	2.924072	2.924124	2.924176	2.924228	52
840	2.924279	2.924331	2.924383	2.924434	2.924486	2.924538	2.924589	2.924641	2.924693	2.924744	52
841	2.924796	2.924848	2.924899	2.924951	2.925002	2.925054	2.925106	2.925157	2.925209	2.925260	52
842	2.925312	2.925364	2.925415	2.925467	2.925518	2.925570	2.925621	2.925673	2.925724	2.925776	52
843	2.925828	2.925879	2.925931	2.925982	2.926034	2.926085	2.926137	2.926188	2.926240	2.926291	51
844	2.926342	2.926394	2.926445	2.926497	2.926548	2.926600	2.926651	2.926703	2.926754	2.926805	51
845	2.926857	2.926908	2.926959	2.927011	2.927062	2.927114	2.927165	2.927216	2.927268	2.927319	51
846	2.927370	2.927422	2.927473	2.927524	2.927576	2.927627	2.927678	2.927730	2.927781	2.927832	51
847	2.927883	2.927935	2.927986	2.928037	2.928088	2.928140	2.928191	2.928242	2.928293	2.928345	51
848	2.928396	2.928447	2.928498	2.928549	2.928601	2.928652	2.928703	2.928754	2.928805	2.928856	51
849	2.928908	2.928959	2.929010	2.929061	2.929112	2.929163	2.929214	2.929266	2.929317	2.929368	51
850	2.929419	2.929470	2.929521	2.929572	2.929623	2.929674	2.929725	2.929776	2.929827	2.929878	51
851	2.929929	2.929980	2.930031	2.930082	2.930133	2.930185	2.930236	2.930287	2.930338	2.930389	51
852	2.930440	2.930491	2.930542	2.930592	2.930643	2.930694	2.930745	2.930796	2.930847	2.930898	51
853	2.930949	2.931000	2.931051	2.931102	2.931153	2.931204	2.931255	2.931306	2.931356	2.931407	51
854	2.931458	2.931509	2.931560	2.931610	2.931661	2.931712	2.931763	2.931814	2.931864	2.931915	51
855	2.931966	2.932017	2.932068	2.932118	2.932169	2.932220	2.932271	2.932321	2.932372	2.932423	51
856	2.932474	2.932524	2.932575	2.932626	2.932677	2.932727	2.932778	2.932829	2.932879	2.932930	51
857	2.932981	2.933032	2.933082	2.933133	2.933183	2.933234	2.933285	2.933335	2.933386	2.933437	51
858	2.933487	2.933538	2.933589	2.933639	2.933690	2.933740	2.933791	2.933841	2.933892	2.933943	51
859	2.933993	2.934044	2.934094	2.934145	2.934195	2.934246	2.934296	2.934347	2.934397	2.934448	50
860	2.934498	2.934549	2.934599	2.934650	2.934700	2.934751	2.934801	2.934852	2.934902	2.934953	50
861	2.935003	2.935054	2.935104	2.935154	2.935205	2.935255	2.935306	2.935356	2.935406	2.935457	50

N°	0	1	2	3	4	5	6	7	8	9	Dif.
862	2.935507	2.935551	2.935608	2.935651	2.935700	2.935750	2.935809	2.935860	2.935910	2.935960	50
863	2.936011	2.936061	2.936111	2.936161	2.936212	2.936262	2.936312	2.936363	2.936413	2.936463	50
864	2.936514	2.936564	2.936614	2.936664	2.936715	2.936765	2.936815	2.936865	2.936916	2.936966	50
865	2.937017	2.937068	2.937118	2.937168	2.937217	2.937267	2.937317	2.937368	2.937418	2.937468	50
866	2.937518	2.937568	2.937618	2.937668	2.937718	2.937768	2.937818	2.937869	2.937919	2.937969	50
867	2.938019	2.938069	2.938119	2.938169	2.938219	2.938269	2.938319	2.938370	2.938420	2.938470	50
868	2.938520	2.938570	2.938620	2.938670	2.938720	2.938770	2.938820	2.938870	2.938920	2.938970	50
869	2.939020	2.939070	2.939120	2.939170	2.939220	2.939270	2.939320	2.939369	2.939419	2.939469	50
870	2.939519	2.939569	2.939619	2.939669	2.939719	2.939769	2.939819	2.939868	2.939918	2.939968	50
871	2.940018	2.940068	2.940118	2.940168	2.940218	2.940267	2.940317	2.940367	2.940417	2.940467	50
872	2.940516	2.940566	2.940616	2.940666	2.940716	2.940765	2.940815	2.940865	2.940915	2.940964	50
873	2.941014	2.941064	2.941114	2.941163	2.941213	2.941263	2.941313	2.941362	2.941412	2.941462	50
874	2.941511	2.941561	2.941611	2.941660	2.941710	2.941760	2.941809	2.941859	2.941909	2.941958	50
875	2.942008	2.942058	2.942107	2.942157	2.942206	2.942256	2.942305	2.942355	2.942404	2.942454	50
876	2.942503	2.942553	2.942602	2.942652	2.942702	2.942751	2.942801	2.942851	2.942900	2.942950	50
877	2.943000	2.943049	2.943099	2.943148	2.943198	2.943247	2.943297	2.943346	2.943397	2.943445	49
878	2.943494	2.943544	2.943593	2.943643	2.943692	2.943742	2.943791	2.943841	2.943890	2.943939	49
879	2.943989	2.944038	2.944088	2.944137	2.944186	2.944236	2.944285	2.944335	2.944384	2.944433	49
880	2.944483	2.944532	2.944581	2.944631	2.944680	2.944729	2.944779	2.944828	2.944877	2.944927	49
881	2.944976	2.945025	2.945074	2.945124	2.945173	2.945222	2.945272	2.945321	2.945370	2.945419	49
882	2.945469	2.945518	2.945567	2.945616	2.945666	2.945715	2.945764	2.945813	2.945863	2.945911	49
883	2.945961	2.946010	2.946059	2.946108	2.946157	2.946207	2.946256	2.946305	2.946354	2.946404	49
884	2.946452	2.946501	2.946550	2.946600	2.946649	2.946698	2.946747	2.946796	2.946845	2.946894	49
885	2.946943	2.946992	2.947041	2.947090	2.947139	2.947188	2.947237	2.947286	2.947336	2.947385	49
886	2.947434	2.947483	2.947532	2.947581	2.947630	2.947679	2.947728	2.947777	2.947826	2.947875	49
887	2.947924	2.947973	2.948021	2.948070	2.948119	2.948168	2.948217	2.948266	2.948315	2.948364	49
888	2.948413	2.948462	2.948511	2.948560	2.948608	2.948657	2.948706	2.948755	2.948804	2.948853	49
889	2.948902	2.948951	2.948999	2.949048	2.949097	2.949146	2.949195	2.949244	2.949292	2.949341	49
890	2.949390	2.949439	2.949488	2.949535	2.949585	2.949633	2.949682	2.949731	2.949780	2.949828	49
891	2.949878	2.949926	2.949975	2.950023	2.950072	2.950121	2.950170	2.950219	2.950267	2.950316	49
892	2.950365	2.950413	2.950462	2.950511	2.950560	2.950608	2.950657	2.950705	2.950754	2.950803	49
893	2.950850	2.950900	2.950949	2.950997	2.951045	2.951095	2.951143	2.951192	2.951240	2.951289	49
894	2.951337	2.951386	2.951435	2.951485	2.951533	2.951580	2.951630	2.951677	2.951726	2.951774	49
895	2.951823	2.951872	2.951920	2.951969	2.952016	2.952065	2.952113	2.952162	2.952210	2.952259	48
896	2.952307	2.952356	2.952405	2.952453	2.952502	2.952550	2.952599	2.952647	2.952696	2.952744	48
897	2.952792	2.952841	2.952888	2.952938	2.952986	2.953034	2.953083	2.953131	2.953180	2.953228	48
898	2.953276	2.953325	2.953373	2.953421	2.953470	2.953518	2.953566	2.953615	2.953663	2.953711	48
899	2.953760	2.953808	2.953856	2.953905	2.953953	2.954001	2.954049	2.954098	2.954146	2.954194	48
900	2.954242	2.954291	2.954339	2.954387	2.954435	2.954484	2.954532	2.954580	2.954628	2.954677	48
901	2.954725	2.954773	2.954821	2.954869	2.954918	2.954966	2.955014	2.955062	2.955110	2.955158	48
902	2.955206	2.955255	2.955303	2.955351	2.955399	2.955447	2.955495	2.955543	2.955591	2.955640	48
903	2.955688	2.955736	2.955784	2.955832	2.955880	2.955928	2.955976	2.956024	2.956072	2.956120	48
904	2.956168	2.956216	2.956264	2.956312	2.956360	2.956408	2.956457	2.956505	2.956553	2.956601	48
905	2.956649	2.956697	2.956744	2.956792	2.956840	2.956888	2.956936	2.956984	2.957032	2.957080	48
906	2.957128	2.957176	2.957224	2.957272	2.957320	2.957368	2.957416	2.957464	2.957511	2.957559	48
907	2.957607	2.957655	2.957703	2.957751	2.957799	2.957847	2.957894	2.957942	2.957990	2.958038	48
908	2.958086	2.958134	2.958181	2.958229	2.958277	2.958325	2.958373	2.958421	2.958468	2.958516	48
909	2.958564	2.958611	2.958659	2.958707	2.958755	2.958802	2.958850	2.958898	2.958946	2.958994	48
910	2.959041	2.959089	2.959137	2.959184	2.959232	2.959280	2.959328	2.959375	2.959423	2.959471	48
911	2.959518	2.959566	2.959614	2.959661	2.959709	2.959757	2.959804	2.959852	2.959900	2.959947	48
912	2.959995	2.960042	2.960090	2.960138	2.960185	2.960233	2.960280	2.960328	2.960376	2.960423	48
913	2.960471	2.960518	2.960566	2.960613	2.960661	2.960708	2.960756	2.960804	2.960851	2.960899	48
914	2.960946	2.960994	2.961041	2.961089	2.961136	2.961184	2.961231	2.961279	2.961326	2.961374	47
915	2.961421	2.961468	2.961516	2.961563	2.961611	2.961658	2.961706	2.961753	2.961801	2.961848	47
916	2.961895	2.961943	2.961990	2.962038	2.962085	2.962132	2.962180	2.962227	2.962275	2.962322	47
917	2.962369	2.962417	2.962464	2.962511	2.962559	2.962606	2.962653	2.962701	2.962748	2.962795	47
918	2.962843	2.962890	2.962937	2.962985	2.963032	2.963079	2.963126	2.963174	2.963221	2.963268	47
919	2.963316	2.963363	2.963410	2.963457	2.963504	2.963552	2.963599	2.963646	2.963693	2.963741	47
920	2.963788	2.963835	2.963882	2.963930	2.963977	2.964024	2.964071	2.964118	2.964165	2.964212	47
921	2.964260	2.964307	2.964354	2.964401	2.964448	2.964495	2.964542	2.964590	2.964637	2.964684	47
922	2.964731	2.964778	2.964825	2.964872	2.964919	2.964966	2.965013	2.965060	2.965108	2.965155	47
923	2.965202	2.965249	2.965296	2.965343	2.965390	2.965437	2.965484	2.965531	2.965578	2.965625	47
924	2.965672	2.965719	2.965766	2.965813	2.965860	2.965907	2.965954	2.966001	2.966048	2.966095	47
925	2.966142	2.966189	2.966236	2.966283	2.966329	2.966376	2.966423	2.966470	2.966517	2.966564	47
926	2.966611	2.966658	2.966705	2.966752	2.966798	2.966845	2.966892	2.966939	2.966986	2.967033	47
927	2.967080	2.967127	2.967173	2.967220	2.967267	2.967314	2.967361	2.967408	2.967454	2.967501	47
928	2.967548	2.967595	2.967642	2.967688	2.967735	2.967782	2.967829	2.967875	2.967922	2.967969	47
929	2.968016	2.968062	2.968109	2.968156	2.968203	2.968249	2.968296	2.968343	2.968389	2.968436	47
930	2.968483	2.968530	2.968576	2.968623	2.968670	2.968716	2.968763	2.968810	2.968856	2.968903	47
931	2.968950	2.968996	2.969043	2.969090	2.969136	2.969183	2.969229	2.969276	2.969323	2.969369	47
932	2.969416	2.969462	2.969509	2.969556	2.969602	2.969649	2.969695	2.969742	2.969788	2.969835	47
933	2.969882	2.969928	2.969975	2.970021	2.970068	2.970114	2.970161	2.970207	2.970254	2.970300	47
934	2.970347	2.970393	2.970440	2.970486	2.970533	2.970579	2.970626	2.970672	2.970719	2.970765	46
935	2.970812	2.970858	2.970904	2.970951	2.970997	2.971044	2.971090	2.971137	2.971183	2.971229	46
936	2.971276	2.971322	2.971369	2.971415	2.971461	2.971508	2.971554	2.971600	2.971647	2.971693	46
937	2.971740	2.971786	2.971832	2.971879	2.971925	2.971971	2.972018	2.972064	2.972111	2.972157	46
938	2.972203	2.972249	2.972295	2.972342	2.972388	2.972434	2.972480	2.972527	2.972573	2.972619	46
939	2.972666	2.972712	2.972758	2.972804	2.972851	2.972897	2.972943	2.972989	2.973035	2.973082	46
940	2.973128	2.973174	2.973220	2.973266	2.973313	2.973359	2.973405	2.973451	2.973497	2.973543	46
941	2.973590	2.973636	2.973682	2.973728	2.973774	2.973820	2.973866	2.973913	2.973959	2.974005	46
942	2.974051	2.974097	2.974143	2.974189	2.974235	2.974281	2.974327	2.974374	2.974420	2.974466	46
943	2.974512	2.974558	2.974604	2.974650	2.974696	2.974742	2.974788	2.974834	2.974880	2.974926	46

N°	0	1	2	3	4	5	6	7	8	9	Diff.
914	2.974972	2.975018	2.975064	2.975110	2.975156	2.975202	2.975248	2.975294	2.975340	2.975386	46
915	2.975432	2.975478	2.975524	2.975570	2.975616	2.975661	2.975707	2.975753	2.975799	2.975845	46
916	2.975891	2.975937	2.975983	2.976029	2.976075	2.976121	2.976167	2.976212	2.976258	2.976304	46
917	2.976350	2.976396	2.976442	2.976488	2.976533	2.976579	2.976625	2.976671	2.976717	2.976763	46
918	2.976808	2.976854	2.976900	2.976946	2.976992	2.977037	2.977083	2.977129	2.977175	2.977220	46
919	2.977266	2.977312	2.977358	2.977404	2.977449	2.977495	2.977541	2.977586	2.977632	2.977678	46
920	2.977724	2.977769	2.977815	2.977861	2.977906	2.977952	2.977998	2.978043	2.978089	2.978135	46
921	2.978180	2.978226	2.978272	2.978317	2.978363	2.978409	2.978454	2.978500	2.978546	2.978591	46
922	2.978637	2.978683	2.978728	2.978774	2.978819	2.978865	2.978911	2.978956	2.979002	2.979047	46
923	2.979093	2.979138	2.979184	2.979230	2.979275	2.979321	2.979366	2.979412	2.979457	2.979503	46
924	2.979548	2.979594	2.979639	2.979685	2.979730	2.979776	2.979821	2.979867	2.979912	2.979958	46
925	2.980003	2.980049	2.980094	2.980140	2.980185	2.980231	2.980276	2.980322	2.980367	2.980412	45
926	2.980458	2.980503	2.980549	2.980594	2.980640	2.980685	2.980730	2.980776	2.980821	2.980867	45
927	2.980912	2.980957	2.981003	2.981048	2.981093	2.981139	2.981184	2.981229	2.981275	2.981320	45
928	2.981365	2.981411	2.981456	2.981501	2.981547	2.981592	2.981637	2.981683	2.981728	2.981773	45
929	2.981819	2.981864	2.981909	2.981954	2.982000	2.982045	2.982090	2.982135	2.982181	2.982226	45
930	2.982271	2.982317	2.982362	2.982407	2.982452	2.982497	2.982543	2.982588	2.982633	2.982678	45
931	2.982723	2.982769	2.982814	2.982859	2.982904	2.982949	2.982994	2.983040	2.983085	2.983130	45
932	2.983175	2.983220	2.983266	2.983311	2.983356	2.983401	2.983446	2.983491	2.983536	2.983581	45
933	2.983626	2.983671	2.983716	2.983762	2.983807	2.983852	2.983897	2.983942	2.983987	2.984032	45
934	2.984077	2.984122	2.984167	2.984212	2.984257	2.984302	2.984347	2.984392	2.984437	2.984482	45
935	2.984527	2.984572	2.984617	2.984662	2.984707	2.984752	2.984797	2.984842	2.984887	2.984932	45
936	2.984977	2.985021	2.985067	2.985112	2.985157	2.985202	2.985247	2.985292	2.985337	2.985382	45
937	2.985426	2.985471	2.985516	2.985561	2.985606	2.985651	2.985696	2.985741	2.985786	2.985830	45
938	2.985875	2.985920	2.985965	2.986010	2.986055	2.986100	2.986144	2.986189	2.986234	2.986279	45
939	2.986324	2.986369	2.986413	2.986458	2.986503	2.986548	2.986593	2.986637	2.986682	2.986727	45
940	2.986772	2.986817	2.986861	2.986906	2.986951	2.986995	2.987040	2.987085	2.987130	2.987174	45
941	2.987219	2.987264	2.987309	2.987353	2.987398	2.987443	2.987487	2.987532	2.987577	2.987622	45
942	2.987666	2.987711	2.987756	2.987800	2.987845	2.987890	2.987934	2.987979	2.988024	2.988068	45
943	2.988113	2.988157	2.988202	2.988247	2.988291	2.988336	2.988381	2.988425	2.988470	2.988514	45
944	2.988559	2.988603	2.988648	2.988693	2.988737	2.988782	2.988826	2.988871	2.988915	2.988960	44
945	2.989004	2.989049	2.989093	2.989138	2.989182	2.989227	2.989271	2.989316	2.989360	2.989405	44
946	2.989449	2.989494	2.989539	2.989583	2.989628	2.989672	2.989717	2.989761	2.989806	2.989850	44
947	2.989895	2.989939	2.989983	2.990028	2.990072	2.990117	2.990161	2.990206	2.990250	2.990294	44
948	2.990339	2.990383	2.990428	2.990472	2.990516	2.990561	2.990605	2.990650	2.990694	2.990738	44
949	2.990783	2.990827	2.990872	2.990916	2.990960	2.991004	2.991049	2.991093	2.991137	2.991182	44
950	2.991226	2.991270	2.991315	2.991359	2.991403	2.991448	2.991492	2.991536	2.991581	2.991625	44
951	2.991669	2.991713	2.991757	2.991802	2.991846	2.991890	2.991935	2.991979	2.992023	2.992067	44
952	2.992111	2.992156	2.992200	2.992244	2.992288	2.992333	2.992377	2.992421	2.992465	2.992509	44
953	2.992553	2.992598	2.992642	2.992686	2.992730	2.992774	2.992818	2.992863	2.992907	2.992951	44
954	2.992995	2.993039	2.993083	2.993127	2.993172	2.993216	2.993260	2.993304	2.993348	2.993392	44
955	2.993436	2.993480	2.993524	2.993568	2.993613	2.993657	2.993701	2.993745	2.993789	2.993833	44
956	2.993877	2.993921	2.993965	2.994009	2.994053	2.994097	2.994141	2.994185	2.994229	2.994273	44
957	2.994317	2.994361	2.994405	2.994449	2.994493	2.994537	2.994581	2.994625	2.994669	2.994713	44
958	2.994757	2.994801	2.994845	2.994889	2.994933	2.994977	2.995021	2.995064	2.995108	2.995152	44
959	2.995196	2.995240	2.995284	2.995328	2.995372	2.995416	2.995460	2.995504	2.995547	2.995591	44
960	2.995635	2.995679	2.995723	2.995767	2.995811	2.995854	2.995898	2.995942	2.995986	2.996030	44
961	2.996074	2.996117	2.996161	2.996205	2.996249	2.996293	2.996336	2.996380	2.996424	2.996468	44
962	2.996512	2.996555	2.996599	2.996643	2.996687	2.996731	2.996774	2.996818	2.996862	2.996905	44
963	2.996949	2.996993	2.997037	2.997080	2.997124	2.997168	2.997212	2.997255	2.997299	2.997343	44
964	2.997386	2.997430	2.997474	2.997517	2.997561	2.997605	2.997648	2.997692	2.997736	2.997779	44
965	2.997823	2.997867	2.997910	2.997954	2.997998	2.998041	2.998085	2.998128	2.998172	2.998216	44
966	2.998259	2.998303	2.998346	2.998390	2.998434	2.998477	2.998521	2.998564	2.998608	2.998652	44
967	2.998695	2.998739	2.998782	2.998826	2.998869	2.998913	2.998956	2.999000	2.999043	2.999087	44
968	2.999130	2.999174	2.999218	2.999261	2.999305	2.999348	2.999392	2.999435	2.999479	2.999522	44
969	2.999566	2.999609	2.999653	2.999696	2.999740	2.999783	2.999827	2.999870	2.999913	2.999957	43

Use of the preceding table.

To find the logarithm *of any number within the compass of the table.*—If the number be under 100, it is eafily found in the firſt diviſion at the head of the firſt page; if it be betwixt 100 and 1000, over againſt the number in the firſt column of the following pages, in the next column under 0 will be found the *logarithm* required. If the number be betwixt 1000 and 10000, the firſt three figures of the number are to be found in the column marked N° and the fourth figure at the top, and in the column under it, lineally againſt the firſt three figures, will be found the *logarithm* required, changing the index 2 into 3. The column, marked Diff. and ſhewing the common difference by which each of thoſe columns increaſes, ſerves to find the *logarithms* of numbers beyond 10000. Thus,

To find the logarithm *for a number greater than any in the common canon, but leſs than* 100000.—Cut off four figures on the left of the given number, and ſeek the *logarithm* in the table; add as many units to the index, as there are figures remaining on the right; ſubtract the *logarithm* found from the next following it, in the table; then, as the difference of numbers in the canon is to the tabular diſtance of the *logarithms* anſwering to them, ſo are the remaining figures of the given number to the logarithmic difference; which, if it be added to the *logarithm* before found, the ſum will be the *logarithm* required. Suppoſe v. g. the *logarithm* of the number 93275 required. Cut off the four figures 9327, and to the characteriſtic of the *logarithm* correſponding to them, add an unit; then,

From the *logarith.* of the numb. 9328	=3.965578
Subtract *logarith.* numb. 9327	=3.965531
Remains tabular difference	47

Then 100 : 47 :: 5 : 23

Now to the *logarithm*	4.965531
Add the difference found	23
The ſum is the *logarithm* required	4.965554

Or more briefly; find the *logarithm* of the firſt four figures as before; then multiply the common difference which ſtands againſt it by the remaining figures of the given number; from the product, cut off as many figures at the right hand as you multiplied by, and add the remainder to the *logarithm* before found, fitting it with a proper index. Thus $47 \times 5 = 235$; cut off 5 and add 23.

To find the logarithm *of a fraction.*—Subtract the *logarithm* of the numerator from that of the denominator, and to the remainder prefix the ſign of negation. Thus ſuppoſe it required to find the *logarithm* of the fraction $\frac{3}{7}$,

Logarithm of 7 =	0.845098
Logarithm of 3 =	0.477121
Logarithm of $\frac{3}{7}$ =	0.367977

The reaſon of the rule is, that a fraction being the quotient of the numerator divided by the denominator, its *logarithm* muſt be the difference of the *logarithms* of thoſe two; ſo that the numerator being ſubtracted from the denominator, the difference becomes negative. Obſerve, that the *logarithms* of a proper fraction muſt always be negative, if that of unity be 0; which is evident, a fraction being leſs than one.

Or, the *logarithm* of the denominator, though greater than that of the numerator, as in the caſe of a proper fraction, may be ſubtracted from it, regard being had to the ſign of the index, which alone in that caſe is negative. Thus,

Log. of 3 =	0.477121
Log. of 7 =	0.845098
Log. of $\frac{3}{7}$ =	1.632023 which produces the

ſame

same effect in any operation, as that before found, viz. —0.387077, this being to be subtracted, and the other to be added.

Or again, the fraction may be reduced to a decimal, and its *logarithm* found; which differs from that of a whole number only in the index, which is to be negative.

For an improper fraction v. gr. $\frac{7}{5}$, its numerator being greater than its denominator, its *logarithm* is had, by subtracting the *logarithm* of the latter from that of the former.

The *logarithm* of 7 = 0.8450980
Logarithm of 5 = 0.6989700
Logarithm $\frac{7}{5}$ = 0.1561280

In the same manner may a *logarithm* of a mixt number, as $7\frac{3}{5}$, be found, it being first reduced into an improper fraction $\frac{38}{5}$.

Or, this improper fraction may be reduced to a mixed number, whose *logarithm* must be found as if it were wholly integral, and its index taken according to the integral part. We shall here observe, that the *logarithms* of whole numbers are added, subtracted, &c. according to the rules of those operations in decimal arithmetic; but with regard to the management of *logarithms* with negative indices, the same rules are to be observed as those given in Algebra for like and unlike signs.

In addition, all the figures, except the index, are reckoned positive, and, therefore the figure to be carried to the index from the other part of the *logarithm*, takes away so much from the negative index. Thus 1.8823526 + 3.699972 = 1.582238. In subtraction, if either one or both of the *logarithms* have negative indices, you muſt change the ſign of the index of the ſubtrahend, after you have carried to it what may ariſe from the decimal part, and then add the indices: thus 1.582208 − 1.883326 = 3.699972. In multiplication, what is carried from the product of the other parts of the *logarithms* muſt be ſubtracted from the product of the indices: thus 2.477121 × 5 = 8.385605. In diviſion, if the diviſor will exactly meaſure the index, proceed as in common arithmetic: e. g. 3.924384 ÷ 2 = 2.462192. But if the diviſor will not exactly meaſure the index, add units to the index, till you can exactly divide it, and carry thoſe units to the next number: e. g. 8.385605 ÷ 5 = 2.477121.

To find the number corresponding to any given logarithm. If the *logarithm* be within the limits of the table, i. e. if its index does not exceed 3, then, neglecting the index, look down in the column of *logarithms* under 0, for the two or three firſt figures of your given *logarithm*, and if you exactly find all the figures of the given *logarithm* in that column, you have the number corresponding at the left hand. But if you do not find your *logarithm* exactly in the column under 0, you muſt run through the other columns, till you find it exactly, or till you obtain the next leaſt *logarithm*; and in the column of numbers baſically againſt it, you have the firſt 3 figures of the number ſought, to which join the figure over the column, where your *logarithm* or its next leaſt was found, and you have the correſponding number. E. g. The number anſwering to the *logarithm* 3.544812 is 3560.

If the index of this *logarithm* had been 1, then the two laſt figures of the number would have been decimal; with the index 0, its correſponding number would have been 3.560; with 2, 356.0; with 3, 3560, &c.

If the *logarithm* cannot be found exactly, take the next leaſt, and make the difference between the given *logarithm* and the next leaſt the numerator of a fraction, whoſe denominator ſhall be the common difference, and add the fraction to the number found in the table.

To find the number corresponding to a logarithm *greater than any in the table.*—Firſt, from the given *logarithm*, ſubtract the *logarithm* of 10, or 100, or 1000, or 10000, till you have a *logarithm* that will come within the compaſs of the table; find the number correſponding to this, and multiply it by 10, or 100, or 1000, or 10000, the product is the number required.

Suppoſe, for inſtance, the number correſponding to the *logarithm* 7.758981 be required: ſubtract the *logarithm* of the number 10000, which is 4.0000000, from 7.758981; the remainder is 3.758981; the number correſponding to which is 5741.11: this multiplied by 10000, the product is 57411100, the number required.

Otherwiſe look the decimal number of the *logarithm* in the table, and if you can find it exactly, you have the four firſt figures of the number in the table, to which affix as many cyphers as the given index exceeds 3, and it is the number required. But if you cannot find the *logarithm* exactly, take the next leaſt, and find the four firſt figures of the correſponding number; then take the difference between the given *logarithm* and the next leaſt, and annex to it as many cyphers as the index exceeds 3; then divide by the common difference, and affix the quotient to the 4 firſt figures, and you have the number required.

To find the number corresponding to a negative logarithm.—To the given negative *logarithm*, add the laſt *logarithm* of the table, or that of the number 10000; i. e. ſubtract the firſt from the ſecond, and find the number correſponding to the remainder: this will be the numerator of the fraction, whoſe denominator will be 10000; v. gr. ſuppoſe it to be required to find the fraction correſponding to the negative *logarithm* ——————0.367977, ſubtract this from
4.0000000

The remainder is ——— 3.632023, the number correſponding to which is 4285/10000, the fraction ſought therefore is $\frac{4285}{10000}$.—The reaſon of the rule is, that as a fraction is the quotient, ariſing on the diviſion of the numerator by the denominator, unity will be in the fraction, as the denominator to the numerator; but as unity is to the fraction correſponding to the given negative *logarithm*, ſo is 10000 to the number correſponding to the remainder: therefore, if 10000 be taken for the denominator, the number will be the numerator of the fraction required.

The negative *logarithm* —0.367977 is equal to the *logarithm* 1.632023, and the number anſwering to it, found in the manner already directed, will be .4285/10000.

To find a fourth proportional to three given numbers.—Add the *logarithm* of the ſecond to that of the third, and from the ſum ſubtract the *logarithm* of the firſt; the remainder is the *logarithm* of the fourth required. E. gr. let the given numbers be 4, 68, and 3.

Logarithm 68 = 1.832509
Logarithm 3 = 0.477121
Sum = 2.309630
Logarithm 4 = 0.602060
Logarithm required 1.707570

The number to the tables correſponding to which is 51.—Otherwiſe, againſt the firſt term, write the ARITHMETICAL *complement* of its *logarithm*, and againſt the ſecond and third terms write their *logarithms*; and the ſum of theſe three *logarithms*, abating 10 in the index, will be the *logarithm* of the fourth term. Thus

4 — 9.397940
68 — 1.832509
3 — 0.477121
51 — 1.707570 as before.

This problem is of the utmoſt uſe in trigonometry. See TRIANGLE and TRIGONOMETRY.

For the method of performing multiplication, diviſion, involution, and extraction of roots by *logarithms*, ſee the beginning of this article.

In the common tables of *logarithms* we find the *logarithm* correſponding to any given number within the limits of the table by inſpection; but it is of uſe alſo to have a table wherein the *logarithms* are placed in their natural order from 0 to 100000 for inſtance, and with the correſponding natural numbers; ſo that a *logarithm* being given, we may find the correſponding number by inſpection only, which can ſeldom be done by the common tables; nor can the correſponding number to a *logarithm* not in the table be found without ſome trouble.

A table of this ſort is called by Dr. Wallis an *anti-logarithmic canon*; and by this canon a *logarithm* being given, its number may be found with the ſame facility that a *logarithm* of a given number may be found by the common canon.

Dr. Wallis tells us, that a canon of this kind was formed many years ago. It was begun, perhaps, by Harriot, and it was diſtributed at leaſt, and prepared for the preſs, if not begun by Warner. This canon ſeems to have been loſt; but the loſs has been ſupplied by Mr. Dodſon. See the *Anti-logarithmic canon* by James Dodſon, Lond. 1742. fol. where the author alſo ſhews the conſtruction and uſe of his table at large; and in which he has computed the numbers correſponding to every *logarithm* from 1 to 100000, to 11 places of figures.

LOGARITHMIC, *hyperbola*, are the ſame as natural *logarithms*, or thoſe of Napier's firſt ſcheme.

The reaſon of the appellation is the analogy *hyperbolic* ſpaces have to *logarithms*. Thus,

It is known, that if on the aſymptote OS of an hyperbola LMN, Tab. II. *Analyſis*, fig. 49. the abſciſſæ OA, OP, OG, OR, &c. be taken in geometric progreſſion, the correſponding ſectors LOM, LON, LOQ, &c. or the ſegments LAPM, LAGN, LARQ, &c. will be in arithmetical progreſſion. Hence, the ſegments or ſectors will be the *logarithms* of their correſponding abſciſſæ, OP, OG, OR, &c. And the ſector LOM, or the ſegment LAPM meaſures the ratio OP to OA. The modulus of this ſyſtem of *logarithms* is the parallelogram OALB, which being ſuppoſed unity, theſe *logarithms* coincide with Napier's.

Hyperbolic ſectors meaſure ratios as circular ſectors or arches meaſure angles. See Maclaurin, l. c. Art. 177. L'Hoſpital Sect. Conic. art. 221.

By means of the hyperbola having the *hyperbolic logarithms*

of $1=0$, it is eafy to find the hyperbolic *logarithm* of 10. Let EZ and ET (*Tab.* III. *Analyfis*, *fig.* 66.) be the aſymptotes of the rectangular hyperbola YAI, whoſe parameter is $AP=PE=1$. Then, the area of the ſpace PABC will be the *hyperbolic logarithm* of $\frac{EC}{EP}$, that is, of EC; the area of the ſpace PA*bc* will be the *hyperbolic logarithm* of $\frac{EP}{Ec}$, that is of $\frac{1}{Ec}$; and the area of the ſpace *cb* BC will be the *hyperbolic logarithm* of $\frac{EC}{Ec}$; the right lines or ordinates CB and *cb* being ſuppoſed parallel to the aſymptote EZ. Now, to find theſe areas.

1. Put $Pc=x$, and $cb=y$; then, by the known property of the curve, $y=\frac{1}{1-x}$; which, drawn into $\dot{x}$, is $y\dot{x}=\frac{\dot{x}}{1-x}$ = the fluxion of Pb= (by throwing $\frac{\dot{x}}{1-x}$ into a ſeries,) $\dot{x}+x\dot{x}+x^2\dot{x}+x^3\dot{x}+x^4\dot{x}+x^5\dot{x}+x^6\dot{x}+x^7\dot{x}+x^8\dot{x}+x^9\dot{x}+x^{10}\dot{x}+x^{11}\dot{x}$, &c. therefore the fluent of this ſeries, *viz.* $x+\frac{1}{2}x^2+\frac{1}{3}x^3+\frac{1}{4}x^4+\frac{1}{5}x^5+\frac{1}{6}x^6+\frac{1}{7}x^7+\frac{1}{8}x^8+\frac{1}{9}x^9+\frac{1}{10}x^{10}+\frac{1}{11}x^{11}+\frac{1}{12}x^{12}$, &c. is=Pb.

2. Put $Pc=x$, and $CB=y$; then $y=\frac{1}{1+x}$, and $y\dot{x}=\frac{\dot{x}}{1+x}$ = the fluxion of PB= (by throwing $\frac{\dot{x}}{1+x}$ into a ſeries,) $\dot{x}-x\dot{x}+x^2\dot{x}-x^3\dot{x}+x^4\dot{x}-x^5\dot{x}+x^6\dot{x}-x^7\dot{x}+x^8\dot{x}-x^9\dot{x}+x^{10}\dot{x}-x^{11}\dot{x}$ &c. therefore the fluent of this ſeries, *viz.* $x-\frac{1}{2}x^2+\frac{1}{3}x^3-\frac{1}{4}x^4+\frac{1}{5}x^5-\frac{1}{6}x^6+\frac{1}{7}x^7-\frac{1}{8}x^8+\frac{1}{9}x^9-\frac{1}{10}x^{10}+\frac{1}{11}x^{11}-\frac{1}{12}x^{12}$ &c. is=PB.

Hence if $Pc=PC$, the area *cb*BC, *viz.* the ſum of Pb and PB, will be $=2x+\frac{1}{3}x^3+\frac{1}{5}x^5+\frac{1}{7}x^7+\frac{1}{9}x^9+\frac{1}{11}x^{11}+$ &c. And Pb—PB will be $=x^2+\frac{1}{2}x^4+\frac{1}{3}x^6+\frac{1}{4}x^8+\frac{1}{5}x^{10}+\frac{1}{6}x^{12}+$, &c. That is, if $Ec=.9$, and $cP=PC=.1$; then, by ſubſtituting .1 for x, we ſhall have *cb*B=.2006706954, &c. and Pb—PB=.0100503358, &c. half of which added to half *cb*B is .1053605156, &c. $=Pb=$ the *hyperbolic logarithm* of $\frac{1}{.9}$. And, if $Ec=.8$, and $cP=PC=v=.2$; then, by writing .2 for x, we have *cb*B=.4054651081, &c. = the *hyperbolic logarithm* of $\frac{1.2}{.8}$; and Pb—PB=.0408213945, &c. half of which ſubtracted from half *cb*B is .1823215567, &c. = PB = the *hyperbolic logarithm* of $\frac{1.2}{1}$ or 1.2; and this ſubtracted from *cb*B leaves .2231435513, &c. = Pb = the *hyperbolic logarithm* of $\frac{1}{.8}$. Therefore, by the nature of *logarithms*, the *hyperbolic logarithm* of $\frac{1}{.9}\times\frac{1.2}{.8}\times 1.2$, *viz.* of 2, is =.1053605156, &c. +.4054651081, &c. +.1823215567, &c. =.6931471806, &c. and, the *hyperbolic logarithm* of 2^3, *viz.* of 8, is $=3\times.6931471805$, &c. $=2.0794415416$, &c. and, the *hyperbolic logarithm* of $8\times\frac{1}{.8}$, *viz.* of 10, is $=2.0794415416$, &c. +.2231435513, &c. $=2.3025850929$, &c. Q. E. I. Rowe's Fluxions, p. 204, &c.

LOGARITHM, *imaginary*, is uſed for the *logarithm* of negative and imaginary quantities, ſuch as $a-\sqrt{-a}$, &c. Thus alſo the fluents of certain imaginary fluxionary expreſſions, ſuch as $\frac{\dot{x}}{x\sqrt{-1}}$, $\frac{a\dot{x}}{z\,b\,x\sqrt{-1}}$, &c. are *imaginary logarithms*. Euler Analyſ. infin. vol. i. p. 72, 74.

The expreſſion $\frac{\dot{x}}{x}$ repreſents the fluxion of the *logarithm* of x, and the fluent therefore of $\frac{\dot{x}}{x}$ is the *logarithm* of x; but no *logarithm* can repreſent the fluent of $\frac{\dot{x}}{x\sqrt{-1}}$, which is therefore called an *imaginary logarithm*.

However, when theſe *imaginary logarithms* occur in the ſolutions of problems, they may be tranſformed into circular arcs or ſectors; that is, the *imaginary logarithm*, or imaginary hyperbolic ſector becomes a real circular ſector. See Bernoulli, Oper. tom. i. p. 400, and p. 512. Mac Laurin's Fluxions, art. 762, ſeq. Walmeſley, Anal. des Mef. p. 63.

LOGARITHMIC *curve*. See CURVE.

LOGGERHEAT, in the *Sea Language*, denotes a large round ball of iron, with a long handle, for heating pitch.

LOGIC, the art of thinking juſtly; or of making a right uſe of our rational faculties, in defining, dividing, and reaſoning: or, as it is defined by an excellent writer on this ſubject, *logic* is the art of uſing reaſon well in our enquiries after truth, and the communication of it to others. Watts.

The word is Greek, λογικη, derived from λογος, *ſermo*, *diſcourſe*; in regard, thinking is only an inward, mental diſcourſe, wherein the mind converſes with itſelf.

Logic is alſo ſometimes called *dialectica*; and ſometimes the *canonical art*, as being a canon, or rule, for directing us in our reaſonings.

As, in order to think aright, it is neceſſary, that we apprehend, judge, diſcourſe, and diſpoſe, or methodize, rightly: hence perception or apprehenſion, judgment, diſcourſe or reaſoning, and diſpoſition, whence reſults method, become the four fundamental articles of this art; and it is from our reflections on theſe operations of the mind, that *logic* is, or ought to be, wholly drawn.

Lord Bacon divides *logic* into four branches, according to the ends propoſed in each: for a man reaſons, either to find what he ſeeks, or to judge of what he finds, or to retain what he judges, or to teach what he retains; whence ariſe ſo many arts of reaſoning; viz. the art of *inquiſition*, or invention; the art of *examining*, or judgment; the art of *preſerving*, or of memory; and the art of *elocution*, or delivery.

Logic, having been extremely abuſed, is now in ſome diſrepute. The ſchools have ſo clogged it with barbarous terms and phraſes, and have run it out ſo much into dry uſeleſs ſubtleties, that it ſeems rather intended to exerciſe the mind in wrangling and diſputation, than to aſſiſt it in thinking juſtly. It is true, in its original, it was rather intended as the art of cavilling, than of reaſoning; the Greeks, among whom it had its riſe, being a people who piqued themſelves mightily upon their being able to talk *ex tempore*; and to argue, by turns, on either ſide of the queſtion.—Hence their dialectici, to be always furniſhed with arms for ſuch rencounters, invented a ſet of words and terms, rather than rules and reaſons, fitted for the uſe of contention and diſpute.

Logic, then, was only an art of words, which frequently had no meaning, but ſerved well enough to hide ignorance inſtead of improving knowledge; to baffle reaſon inſtead of aſſiſting it, and to confound the truth inſtead of clearing it.—Much of that heap of words, and rules, which we have borrowed from the old *logic*, is of little uſe in life; and is ſo far out of the common uſage, that the mind does not attend to them without trouble; and finding nothing in them to reward its attention, it ſoon diſcharges itſelf, and loſes all ideas it had conceived of of them.

But *logic*, diſengaged from the jargon of the ſchools, and reduced into a clear and intelligible method, is the art of conducting the underſtanding in the knowledge of things, and the diſcovery of truth.

From its proper uſe we gain ſeveral very conſiderable advantages: for, 1. The conſideration of rules incites the mind to a cloſer attention and application in thinking; ſo that we hereby become aſſured, that we make the beſt uſe of our faculties. 2. We hereby more eaſily and accurately diſcover and point out the errors and defects in our reaſoning; for the common light of reaſon, unaſſiſted by *logic*, frequently obſerves an argumentation to be faulty, without being able to determine wherein the preciſe failure conſiſts. 3. By theſe reflections on the order and manner of the operations of the mind, we are brought to a more juſt and complete knowledge of the nature of our own underſtanding. See SOUL and UNDERSTANDING.

LOGICAL *concrete*. See CONCRETE.

LOGICAL *part*. See PART.

LOGISTA, the title of an officer at Athens, whoſe buſineſs was to receive and paſs the accounts of magiſtrates, when they came out of their office.

The *logiſtæ* were in number ten; they were elected by *lot*, and had ten euthyni, or auditors of accounts, under them.

LOGISTIC, or *logarithmic line*, a curve ſo called, from its properties and uſes, in conſtructing and explaining the nature of logarithms.

If the right line AX (*Tab. Analyſis*, *fig.* 37.) be divided into any number of equal parts, and to the points of thoſe diviſions, A, P, *p*, &c. be drawn lines continually proportional, the points, N, M, *m*, &c. form the *logiſtic* or *logarithmic*, *line*, or *curve*.

Here the abſciſſes AP, A*p*, &c. are the logarithms of the ſemiordinates PM, *pm*, &c.

Hence, if $AP=x$, $Ap=z$, $PM=y$, $pm=v$, and the logarithms of y and $x=ly$ and $v=lx$; conſequently $x:v=ly:lx$; that is, the denominators of the ratios AN: PM, and AN: *pm*, are to one another as the abſciſſes AP and A*p*.

Hence it follows, that there may be infinite other *logiſtic* lines invented: provided $x^m:v^n::ly:lx$, that any of the roots, or powers, may be the logarithms of the ſemiordinates. The *logiſtic* will never concur with the axis, except at an infinite diſtance; ſo that AX is its aſymptote. See *Logarithmic* CURVE.

LOGISTIC, *quadrature of the*. See QUADRATURE.

LOGISTIC, *or logarithmic spiral*, a line, whose construction is as follows.—Divide the quadrant of a circle into any number of equal parts, in the points N, *n*, *n*, &c. (*Tab. Analysis. fig.* 22.) and from the radii CN, C*n*, C*n*, &c. cut off C M, C*m*, C*m*, &c. continually proportional, the points M, *m*, *m*, &c. form the *logistic spiral*.

The arches, therefore, AN, A*n*, A*n*, &c. are the logarithms of the ordinates CM, C*m*, &c. whence also it follows, that there may be infinite *logistic spirals*.

LOGISTICA, or LOGISTICAL *arithmetic*, a denomination sometimes given to the arithmetic of sexagesimal fractions, used by astronomers in their calculations.

It was so called from a Greek treatise of one Barlaamus Monachus, who wrote about sexagesimal multiplication very accurately; and intitled his book Λογιστικη. This author Vossius places about the year 1350, but he mistakes the work for a treatise of algebra.

Shakerly, in his Tabulæ Britannicæ, has a table of logarithms adapted to the sexagesimal fractions; which, therefore, he calls, *logistical logarithms*; and the expeditious arithmetic of them, which is by this means obtained, and by which all the trouble of multiplication, and division, is saved, he calls *logistical arithmetic*.

LOGOGRAPHI, Λογοσγραφοι, among the *Ancients*, were the secretaries of the LOGISTÆ, and kept an account of the public revenues.

LOGOGRIPHUS, from the Greek λογος, *discourse*, and γριφος, or γρυπος, *net*, a kind of fymbol, or riddle, propofed to ftudents for their folution, in order to exercife and improve the mind.

The *logogriphus* ufually conſiſts in ſome equivocal alluſion, or mutilation of words; which, literally taken, ſignify ſomething different from the thing intended by it; ſo that it is a kind of medium between a REBUS and proper ENIGMA.

According to Kircher, *logogriphi* are a kind of canting arms: thus a perſon called Leonard, who bore in his arms a lion and nard, or ſpikenard, according to that father, made a *logogriphus*. Œdip. Ægypt.

In another place, the ſame author defines *logogriphus* to be an enigma; which, under one name, or word, will bear various meanings, by adding or retrenching ſome part of it.—This kind of enigmas is well known to the Arabs; among whom are authors who treat expreſly of it.

LOGOTHETA, an officer under the emperors of the Eaſt, who kept an account of the various branches of public and private expence.

There were ſeveral kinds of them diſtinguiſhed by the particular branch they ſuperintended, as the *logotheta τη δρομε*, or *poſt-maſter general*; *logotheta των οικιακων*, or *maſter of the houſehold*, &c.

LOHOCH. See LOCH.

LOINS, *lumbi*, in *Anatomy*, that part of the body about the reins, properly the lower part of the ſpine of the back, compoſed of five vertebræ, larger than thoſe of the back, and ſerving them as a baſe; having their articulations pretty looſe, that the motion of the *loins* may be more free. See *Tab. Anat. (Oſteol.) fig.* 3. *n.* 12. *fig.* 7. *n.* 16. *fig.* 9. * *fig.* 11. See alſo SPINE, and VERTEBRA.

LOKE, in *Mythology*, the name of one of the deities of the northern nations, anſwering to the Arimanes among the Perſians, whom they repreſent as at enmity both with Gods and men, and the author of all the evils which deſolate the univerſe. *Loke* is deſcribed in the EDDA as producing the great ſerpent which encircles the world; which ſeems to have been intended as an emblem of corruption or ſin: he alſo gives birth to Hela or death, the queen of the infernal regions; and alſo to the wolf Fenris, that monſter, who is to encounter the Gods and deſtroy the world. North. Ant. vol. ii. p. 85, &c.

LOLIUM, in *Botany*, *darnel*, or *rye-graſs*, a genus of the *triandria digynia* claſs, with a ſingle-leaved, fixed, many-flowered empalement.

The ancients uſed the word *lolium*, as the name of a diſeaſed ſtate of corn of any kind, and have given accounts of ſeveral ſorts of diſeaſed appearances, to all of which they indifferently gave this name. See GRASS.

LOLLARDS, in *Eccleſiaſtical Hiſtory*, a religious ſect, differing in many religious points from the church of Rome, which aroſe in Germany about the beginning of the fourteenth century; ſo called, as many writers have erroneouſly imagined, from Walter Lollard, who began to dogmatize in 1315, and was burnt at Cologn: but it is evident that Lollard was no ſurname, but merely a term of reproach applied to all heretics who concealed the poiſon of error under the appearance of piety.

The monk of Canterbury derives the origin of the word *Lollard*, among us, from *lolium*, *a tare*; as if the *Lollards* were the tares ſown in Chriſt's vineyard.—Abelly ſays, that the word *Lollard* ſignifies *praiſing God*, from the German *loben*, *to praiſe*, and *herr*, *Lord*; becauſe the *Lollards* employed themſelves in travelling about from place to place, ſinging pſalms and hymns.

Others, much to the ſame purpoſe, derive *lollhard*, *lullhard*, or *lollert lullert*, as it was written by the ancient Germans, from the old German word *lullen*, *lollen*, or *lullen*, and the termination *hard*, with which many of the High Dutch words end. *Lollen* ſignifies to ſing with a low voice, and, therefore, *Lollhard* is a ſinger, or one who frequently ſings; and in the vulgar tongue of the Germans, it denotes a perſon who is continually praiſing God with a ſong, or ſinging hymns to his honour. The Alexians or CELLITES were called *Lollards*, becauſe they were public ſingers, who made it their buſineſs to inter the bodies of thoſe who died of the plague, and ſang a dirge over them in a mournful and indiſtinct tone as they carried them to the grave. The name was afterwards aſſumed by perſons that diſhonoured it; for we find, among thoſe *Lollards* who made extraordinary pretences to piety and religion, and ſpent the greateſt part of their time in meditation, prayer, and ſuch acts of piety, there were many abominable hypocrites, who entertained the moſt ridiculous opinions and concealed the moſt enormous vices under the ſpecious mark of this extraordinary profeſſion. And many injurious aſperſions were propagated againſt thoſe who aſſumed this name, by the prieſts and monks; ſo that by degrees, any perſon who covered hereſies or crimes under the appearance of piety, was called a *Lollard*. Thus the name was not uſed to denote any one particular ſect, but was formerly common to all perſons and all ſects, who were ſuppoſed to be guilty of impiety towards God or the church, under an external profeſſion of extraordinary piety. However, many ſocieties, conſiſting both of men and women, under the name of *Lollards*, were formed in moſt parts of Germany, and Flanders, and were ſupported partly by their manual labours, and partly by the charitable donations of pious perſons. The magiſtrates and inhabitants of the towns, where theſe brethren and ſiſters reſided, gave them particular marks of favour and protection, on account of their great uſefulneſs to the ſick and needy. They were thus ſupported againſt their malignant rivals, and obtained many papal conſtitutions, by which their inſtitute was confirmed, their perſons exempted from the cognizance of the inquiſitors, and ſubjected entirely to the juriſdiction of the biſhops; but as theſe meaſures were inſufficient to ſecure them from moleſtation, Charles, duke of Burgundy, in the year 1472, obtained a ſolemn bull from pope Sixtus IV. ordering that the CELLITES, or *Lollards*, ſhould be ranked among the religious orders, and delivered from the juriſdiction of the biſhops; and pope Julius II. granted them yet greater privileges in the year 1506. Moſheim informs us, that many ſocieties of this kind are ſtill ſubſiſting at Cologn, and in the cities of Flanders, though they have evidently departed from their ancient rules. Eccl. Hiſt. vol. iii. p. 188. 8vo.

Lollard and his followers rejected the ſacrifice of the maſs, extreme unction, and penances for ſin; arguing, that Chriſt's ſufferings were ſufficient. He is likewiſe ſaid to have ſet aſide baptiſm, as a thing of no effect; and repentance, as not abſolutely neceſſary, &c.—In England, the followers of Wickliffe were called, by way of reproach, *Lollards*, from ſome affinity there was between ſome of their tenets; though others are of opinion, that the Engliſh *Lollards* came from Germany.

They were ſolemnly condemned by the archbiſhop of Canterbury, and the council of Oxford.

LOMBAIRE *externe*, in *Anatomy*, a name given by Winſlow, and ſome other of the French writers, to a muſcle, called by the earlier authors the *primus dorſi*, and now generally known by the name *quadratus lumborum*. The French call this the external lumbal muſcle, in diſtinction from the *pſoas magnus*, which they call the *lombaire interne*.

LOMBAIRE *interne*, in *Anatomy*, a name given by Winſlow, and ſome other French writers, to the muſcle generally called *pſoas magnus*.

LOMENTUM, a word uſed by the old writers on medicine, to expreſs a meal made of beans, or bread made of this meal, and uſed as a waſh. See DETERSORIUM.

Others have applied it to the French chalk, or morochthus, uſed by the ſcowerers of cloaths, which is brought over in large cakes, reſembling loaves or cakes of bread.

LOMMIA, in *Ornithology*, the name of a web-footed water-fowl common on the Engliſh ſhores, and called in different places the *guillem*, *guillemot*, *ſea-hen*, *kiddow*, and *ſcout*: the laſt name, however, is ſomewhat equivocal as the Scotch call the common *razor-bill* by this name.

The *lommia*, or kiddaw, or COLYMBUS *troile* of Linnæus, is much like the razor-bill, but it is larger, being of the full

full size of a common duck; its head, neck, wings, back, and tail, as also the upper part of its throat, are of a mixed colour, between brown, black, and grey; its breast, belly, and lower part of its throat are white, and its wings are variegated with a mixture of white; its bill is straight, black and sharp, and is three fingers breadth long, and rounded; its legs are placed far behind, and it has no hinder toes. It is very plentiful on the high cliffs on several of our coasts, and builds on the naked rocks there. It is a very simple bird, for when it is shot at and sees some of its companions killed by it, it will not quit the rock. Ray's Ornithol. p. 244.

There is a better variety of this bird, which frequents the Welsh coasts in winter; and which haunt the frith of Forth in pursuit of sprats, where they are called *marrots*; but they all retire before spring.

LONCHITIS, in *Botany*. See SPLEENWORT.

LONCHOTON, a word used by some chemical writers to express the best and purest kinds of native vitriol, of the green or bluish green kinds.

LONDON *pride*, in *Botany*. See SAXIFRAGE.

LONG *accent*, in *Grammar*. See ACCENT.

LONG *hand*. See *Long* HAND.

LONG *measure*. See MEASURE.

LONG *muscles*, in *Anatomy*. See LONGUS.

LONG-*jointed*, in the *Manege*. A horse is said to be *long-jointed*, whose pastern is slender and pliant. *Long-jointed* horses are wont to have wind-galls.

LONG-*legs*, in *Natural History*. See TIPULA.

LONGA, *long*, in the *Italian Music*, is a character marked thus 𝅜, containing four semi-breves, in common time, and consequently eight minims, unless tied to a breve; for in that case, in such case, see LIGATURE.

LONGANON, a name given by some authors to the intestinum rectum.

LONGEVITY, length of life. See LIFE and AGE.

From the different *longevities* of men in the beginning of the world, after the flood, and in these ages, Mr. Derham draws a good argument for the interposition of a Divine Providence.

Immediately after the creation, when the world was to be peopled by one man and woman, the ordinary age was 900 years and upwards,—Immediately after the flood, when there were three persons to stock the world, their age was cut shorter; and none of those patriarchs, but Shem, arrived at 500. In the second century we find none that reached 240; in the third, none, but Terah, that came to 200 years; the world, at least a part of it, by that time being so well peopled, that they had built cities, and were cantoned out into distant nations. By degrees, as the number of people increased, their *longevity* decreased, till it came down, at length, to 70 or 80 years; and there it stood, and has continued to stand, ever since the time of Moses. This is found a good medium, and, by means hereof, the world is neither overstocked, nor kept too thin; but life and death keep a pretty equal pace.

That the common duration of man's life has been the same in all ages since the world was peopled, is plain, both from sacred and profane history. To pass by others, Plato lived to 81, and was accounted an old man: and the instances of *longevity* produced by Pliny, lib. vii. cap. 48. as very extraordinary, may most of them be paralleled in modern histories, particularly in Dr. Plott's Nat. Hist. of Ox. and Staff.—Among others, he tells of twelve tenants to the same person, who made up 1000 years; to say nothing of old Parr, who lived 152 years 9 months; nor of H. Jenkins, of Yorkshire, who lived 169 years; or of the countess of Desmond, or Mr. Eckleston, both of Ireland, who each exceeded 140 years.

LONGIMETRY, the art of measuring lengths, both accessible as roads, &c. and inaccessible, as arms of the sea, &c.

Longimetry is a part of trigonometry, and a dependent on geometry, in the same manner as altimetry, planimetry, stereometry, &c.

The art of *longimetry* see under the names of the instruments used in it, particularly THEODOLITE, CHAIN, DISTANCE, &c.

LONGISSIMUS *dorsi*. See DORSI.

In conjunction with some others, this helps to keep the body erect.

LONGISSIMUS *Oculi*. See OBLIQUUS *superior*.

LONGITUDE *of the earth*, is sometimes used to denote its extent from west to east, according to the *direction* of the equator.

By which it stands contradistinguished from the *latitude of the earth*, which denotes its extent from one pole to the other.

LONGITUDE *of a star*, in *Astronomy*, is an arch of the ecliptic, counted from the beginning of Aries, to the place where a star's circle of *longitude* cuts the ecliptic.

The *longitude* of a star, as *S* (Tab. *Astronomy*, fig. 14. n. 2.) is an arch of the ecliptic ♈L, comprehended between the beginning of Aries, and the circle of *longitude* TM, drawn through the centre of the star *S*.

Longitude stands in the same relation to the ecliptic, that *right ascension* does to the equator.

In which sense, the longitude of a star amounts to much the same, as the star's place in the ecliptic, reckoned from the beginning of Aries; which to find, see PLACE *of the sun, or star*.

LONGITUDE *of the sun*, or a *star*, from the next equinoctial point, is the number of degrees, and minutes they are from the beginning of Aries, or Libra, either before or after them; which can never be more than 180 degrees.

LONGITUDE, *geocentric, of a planet*. See GEOCENTRIC.

LONGITUDE *of a place*, in *Geography*, is its distance from some first meridian; or an arch of the equator, intercepted between the meridian of the place, and the *first* MERIDIAN. See a table exhibiting the quantity of each degree of *longitude* in each parallel of latitude, under DEGREE.

LONGITUDES, in *Navigation*, is the distance of a ship, or place, east or west, from another, counted in degrees of the equator. If this distance be counted in leagues, or miles, or in degrees of the meridian, and not in those proper to the parallel of latitude, it is usually called DEPARTURE.

To discover an exact method of finding the *longitude* at sea, is a problem that has extremely perplexed the mathematicians of these two last ages; and for the solution whereof, great rewards have been publicly offered by the English, French, Dutch, and other nations; this being the only thing wanting to render navigation perfect.

In the year 1598, Philip the third, king of Spain, offered a reward of 1000 crowns for the solution of this problem; this noble example was followed by the States General, who offered 10,000 florins; and in 1635, John Morin, professor of mathematics at Paris, proposed a method of resolving it to cardinal Richlieu; though the commissioners, who were appointed to examine this method, judged it insufficient, on account of the imperfection of the lunar tables. cardinal Nazarin, in 1645, procured for him a pension of 2000 livres. In 1714, an act was passed in the British parliament, appointing and empowering certain commissioners to make out a bill for a sum not exceeding 20000*l.* towards making necessary experiments; and also granting a reward to the person who should discover the *longitude* at sea, proportioned to the degree of accuracy that might be attained by such method; viz. a reward of 10,000*l.* if it determines the said *longitude* to one degree of a great circle, or sixty geographical miles; 15,000*l.* if it determines the same to two-thirds of that distance; and 20,000*l.* if it determines it to half that distance. It is added, that one moiety or half part of such rewards or sum, shall be due and paid when the said commissioners, or the major part of them, do agree, that any such method extends to the security of ships, within eighty geographical miles from the shores, which are places of the greatest danger; and the other moiety or half part, when a ship, by the appointment of the said commissioners, or the major part of them, shall thereby actually sail over the ocean, from Great Britain to any such port in the West Indies, as those commissioners or the major part of them shall chuse, or nominate for the experiment, without losing her *longitude* beyond the limits above mentioned. 12 Ann. cap. 15. See also stat. 14 Geo. II. cap. 30. 26 Geo. II. cap. 25. By stat. 14 Geo. III. all former acts concerning the *longitude* at sea are repealed, except so much of them as relates to the appointment and authority of the commissioners thereby constituted, and also such clauses as relate to the contracting, printing, publishing, &c. of nautical almanacs, and other useful tables; and it is enacted, that any person, who shall discover any method for finding the *longitude* by means of a time-keeper, the principles of which have not hitherto been made public, shall be intitled to the reward of 5000*l.* if, after certain trials prescribed by the commissioners, such method shall enable a ship to keep her *longitude*, during a voyage of six months, within sixty geographical miles, or a degree of a great circle; to 7500*l.* if it serves to keep her *longitude* for the same time, within forty geographical miles, or two-thirds of a degree of a great circle; or to a reward of 10,000*l.* if, for that time, it enables her to keep her *longitude* within thirty geographical miles, or half a degree of a great circle. If the method proposed shall be by means of improved lunar tables, the author of such tables shall be intitled to a reward of 5000*l.* when they shew the distance of the moon from the sun and stars within 15″ of a degree, answering to about 2′ of *longitude*, after making an allowance of half a degree for the errors of observation, and under certain restrictions, and after comparison with astronomical observa-

tions for a period of 18½ years, which is deemed the period of the irregularities of the lunar motions. In case any other method shall be proposed for finding the *longitude* at sea, beside those already mentioned, the author shall be intitled to 5000*l.* if it shall determine the faid *longitude* within one degree of a great circle, or fixty geographical miles; to 7500*l.* if it fhall determine the fame to two-thirds of that diftance; and to 10,00*l.* if it fhall determine the fame to one half of that diftance. The commiffioners are impowered by this act to make out bills upon the treafurer of the navy for any fums of money, which they fhall think neceffary for making experiments with relation to any probable difcovery or improvement. It is obfervable, that there is an ambiguity in the limits preferibed by this and other acts, relating to the *longitude*, which may poffibly be the occafion of difputes; for fixty geographical miles or one degree of a great circle may make either one or one hundred and eighty degrees of *longitude*; and, therefore, the determination ought to have been expreffed in minutes of the equator.

Various are the attempts that authors have made for this purpofe, and various the methods they have propofed, which have been attended with different degrees of fuccefs. What moft of them aim at is, a method of determining the difference of time between any two points on the earth; for the *longitude* of any place is an arc of the equator intercepted between the faid meridian and the meridian of that place, and this arc is proportional to the quantity of time which the fun requires to move from the one meridian to the other; and every fifteen degrees of the equator anfwering to an hour, i. e. one degree to 4 minutes of time, and one minute of a degree to 15 feconds of time; the difference of time being known, and turned into degrees, will give the *longitude*, and *vice verfa*. This fome have attempted to effect by clocks, watches, and other automata: for, if a clock or watch was fo contrived, as in all feafons and in all places to go uniformly; fuch a watch being regulated to London or Greenwich time, would always fhew the time of the day at London or Greenwich, then the time of the day under any other meridian being found, the difference between that time and the London or Greenwich time correfponding, would give the difference of *longitude*.

Gemma Frifius, in a tract intitled De Principiis Aftronomiæ et Geographiæ, printed at Antwerp in 1530, feems to have been the firft who fuggefted the method of finding the *longitude* at fea by means of watches, or time-keepers; which machines were then, as he fays, but lately invented. After him, Metius, about 1631, and fome others attempted it; but the ftate of watch-making was then too imperfect for this purpofe. Dr. Hooke and M. Huygens, about the fame time, *viz.* about the year 1664, applied the invention of the pendulum-fpring to watches; and employed it for the purpofe of difcovering the *longitude* at fea. Some difputes, however, between the former of thofe gentlemen and the Engliſh miniſtry, prevented any experiments being made with watches conſtructed by him; but many experiments were made with watches conſtructed by M. Huygens. Major Holmes, in a voyage from the coaſt of Guinea in 1665, predicted with one of his watches, the *longitude* of the iſland of Fuego to a very great degree of accuracy: this ſucceſs encouraged Huygens to improve the ſtructure of his watches, (ſee Phil. Tranſ. N° 47, for May, 1669), but experience ſoon convinced him, that unleſs methods could be diſcovered for preſerving the regular motion of ſuch machines, and preventing the effects of heat and cold, and other diſturbing cauſes, they could never anſwer the intention of diſcovering the *longitude*; and on this account his attempts failed. The firſt perſon who turned his thoughts this way, after the public encouragement held out by the act of 1714, was Henry Sully, an Engliſhman; who in 1714, printed at Vienna, a ſmall tract on the ſubject of watch-making, and afterwards removing to Paris, employed himſelf in improving time-keepers for the diſcovery of the *longitude*. He is ſaid to have greatly diminiſhed the friction, and to have rendered that which remained uniform. The greater part of what is yet known of watch-making in France, is principally to be attributed to him; for the famous Julien le Roy was his pupil, and owed moſt of his inventions to him, which he afterwards perfected and executed; and this gentleman, his ſon, and M. Berthoud are the only perſons in France, who have turned their thoughts this way ſince the time of Sully. Several watches, made by the two latter artiſts, have been tried at ſea, at the expence of the king of France, and voluminous accounts have been publiſhed of theſe trials; but it does not appear that they afford any conſiderable advantage with regard to the main object. In the year 1726, our own countryman, Mr. John Harriſon, produced a time-keeper of his own conſtruction, which was found to keep time ſo exactly with the heavens, as not to err above one ſecond in a month, for ten years together; and in the year 1736, this machine was tried, on board one of his majeſty's ſhips, in a voyage to and from Liſbon; and by its exact meaſure of time, in the ſhip's return from Liſbon, corrected an error of almoſt a degree and a half, in the computation of the ſhip's reckoning. Mr. Harriſon, in conſequence of this ſucceſs, received public encouragement to proceed; and he made three other time-keepers, every one of which was more accurate, and better adapted to the purpoſe of meaſuring time truly at ſea, than the former. The ſecond of his machines was finiſhed in 1739; the third in 1758; and the fourth in 1761: this laſt proved ſo much to Mr. Harriſon's ſatisfaction, that he applied to the commiſſioners of the board of *longitude* for orders to make a trial of this inſtrument in a voyage to ſome port in the Weſt Indies, according to the directions of the ſtatute of 12th of Anne above cited. Accordingly, Mr. William Harriſon, ſon of the inventor, embarked on board his majeſty's ſhip Deptford, in November, 1761, with this fourth time-keeper, on a voyage for Jamaica; and the *longitude* of the iſland, as ſhewn by the time-keeper, on his arrival there, differed but one minute and a quarter of the equator from the true *longitude*, deduced from aſtronomical obſervations. The time-keeper alſo pointed out the *longitudes* of the ſeveral places, which they law in the courſe of the voyage, in a very exact manner. Mr. Harriſon, junior, returned to England, with the time-keeper, in the latter end of March, 1762; and found that it had erred, in the whole, from its ſetting out to its return to England, no more than 1′ 54″ in time, or 28′ minutes of *longitude*; whereas the act requires no greater exactneſs than 30 minutes, in a voyage to the Weſt Indies. Mr. Harriſon now claimed the whole reward of 20,000*l.* offered by the ſaid act; but ſome doubts ariſing in the minds of the commiſſioners concerning the true ſituation of the iſland of Jamaica and the manner in which the time at that place had been found, as well as at Portſmouth; and it being farther ſuggeſted by ſome, that although the time-keeper had proved to be right at Jamaica and after its return to England, it was by no means a proof that it had been always ſo in the intermediate times, another trial was propoſed in a voyage to the iſland of Barbadoes, in which precautions were taken to obviate as many of theſe objections as poſſible. Accordingly, the commiſſioners previouſly ſent out proper perſons to make aſtronomical obſervations at that iſland, which, when compared with other correſponding ones made in England, would determine, beyond a doubt, its true ſituation. Mr. William Harriſon again ſet out with his father's time-keeper, in March 1764, the watch having been compared with equal altitudes, before he ſet out, at Portſmouth, and arrived at Barbadoes about the middle of May; where, on comparing it again with equal altitudes of the ſun, it was found to ſhew the difference of *longitude* between Portſmouth and Barbadoes, 3ʰ 55′ 3″; the true difference of *longitude* between theſe places, reſulting from aſtronomical obſervations, being 3ʰ 54′ 20″, ſo that the error of the watch was 43″, or 10′ 45″ of *longitude*. The watch gained at the rate of 2″,58 a day, on mean time, from February 29th to March 21ſt, at Portſmouth, and loſt at the rate of 2″,8 a day, from May 14th to May 17th, at Barbadoes: and from its departure from Surry-ſtreet, in the Strand, where it had been compared with Mr. Short's regulator, till its arrival there again, after one hundred and fifty-ſix days, it had gained fifty-four ſeconds. In conſequence of this and the former trials, Mr. Harriſon received a moiety of the reward offered by the 12th of Queen Anne, on his explaining the principles by which his time-keeper was conſtructed, and delivering this as well as the former three, to the commiſſioners of the *longitude*, for the uſe of the public. He was alſo promiſed the other moiety of the reward, when other time-keepers were made, on the ſame principles, either by himſelf or others, which performed equally well with that which he had laſt made. This laſt time-keeper was alſo ſent down to the royal obſervatory at Greenwich, to be tried there, under the direction of the Rev. Mr. Maſkelyne, his majeſty's aſtronomer royal. It did not appear, however, that during the time of this trial, the watch went with the regularity that was expected, which gave reaſons for apprehending that the performance even of the ſame watch, was not at all times equal; and conſequently that little certainty could be expected in the performance of different ones. Moreover, the watch was now found to go faſter than it did during its voyage to and from Barbadoes, by about eighteen or nineteen ſeconds in twenty-four hours; but this circumſtance was accounted for by Mr. Harriſon; who informs us, that he had altered the rate of its going by trying ſome experiments, which he had not time to finiſh before he was ordered to deliver up the watch to

the board. Soon after this trial, the commissioners of *longitude* agreed with Mr. Kendall, one of the watch-makers appointed by them to receive Mr. Harrison's discoveries, to make another watch on the same construction with this, in order to determine whether other watch-makers could make them from the account which Mr. Harrison had given, as well as himself. The event proved the affirmative; for the watch produced by Mr. Kendall, in consequence of this agreement, went considerably better than that which had been made by Mr. Harrison himself. This watch was sent out with Capt. Cooke in his second voyage towards the South Pole and round the world, in 1772, 1773, 1774, and 1775, to be tried under the care of Mr. Wales, employed by the board of *longitude* for that purpose. The only defect which appears to have been in this watch is, that its rate of going was continually accelerated; but in the 38 years, during this trial, it never amounted to 14′ 2 a day. In consequence of the going of this watch, the house of commons were pleased, in 1774, to order the other moiety of the reward, offered by the act of the 12th of queen Anne, to be given to Mr. Harrison, and to pass the act above recited. Mr. Arnold has lately constructed a watch, which seems to be more accurate than any of the former; though it has not yet been tried at sea. During thirteen months of trial from February 1779, to February 1780, the greatest difference between the rates at which the watch went on any two days, was 6″,69: the greatest difference between its rates of going on any day and the next to it, was 4″,13; so that the greatest error it would have committed in the difference of *longitude*, on any one day, would have been very little more than one minute; which, as Mr. Arnold observes, in determining the *longitude* daily, to as great precision as the latitude can, in general, be determined. If the mean rate at which it went during the month of February 1779, be taken as a standard rate with which we may compare its going for the following twelve months, the greatest error which it would have committed in the *longitude* shewn by it, would have been 2′, 33″, 2, or 38′ 18″ in *longitude*: the parts of this machine, which are to counteract the effects of heat and cold, seem to be most exactly adjusted; and the balance is so adjusted likewise, that it is capable of going alike in the different positions into which the watch may be placed. Account kept during thirteen Months in the Royal Observatory at Greenwich, of the going of a Pocket chronometer, made on a new Construction, by John Arnold, &c. 4to. 1780. See TIME-*keeper* and PENDULUM.

Others have proposed various astronomical methods for finding the *longitude* in the heavens; for, if the exact times of any celestial appearance be known for two places, the difference of those times gives that of the *longitude* of those places. These methods chiefly depend on having an ephemeris or almanac, suited to the meridian of some place, suppose Greenwich, for which the *Nautical* ALMANAC is fitted, which ephemeris shall contain for every day of the year the sun's place, right ascension, declination, the times of the planets passing the meridian, as also their rising and setting, the times of the eclipses of the sun and moon, together with those of Jupiter's satellites, the distance of the moon from the sun, and some zodiacal stars at certain times; and, in general, the times when any other remarkable celestial appearances may be seen at the place for which the ephemeris is calculated: therefore, if the hour and minute be known, wherein any of the same phenomena are observed in any unknown place, the difference between the hour and minute of that place, and that other to which the tables are calculated, and consequently, the difference of their meridians, and their *longitude*, from each other, are known also.

Now the difficulty here does not consist in the exact finding of the time, which is easily had, from the sun's altitude, or azimuth, but the defect lies in the paucity of proper appearances, capable of being thus observed; for all slow motions (v. gr. that of Saturn) are at once excluded, as shewing but little difference in a considerable space of time; and it being here required, that the phenomenon be sensibly varied in two minutes time, an error of two minutes in time produces another of thirty miles in *longitude*.—Now there are no phenomena in the heavens that have these requisites, excepting the several stages of an eclipse of the moon: her *longitude*, or place in the zodiac; her distance from the fixed stars, or appulse to them; her ingress into the ecliptic; or the points of her orbit, where that cuts the ecliptic, and the conjunction, distances, and eclipses of Jupiter's satellites.—Of each of which in their order.

1. The method, by the eclipses of the moon, is very easy, and sufficiently accurate, if there were but eclipses every night.—At the moment wherein we see the beginning, or middle, or end of a lunar eclipse by a telescope, we have nothing to do but take the altitude, or azimuth, of some fixed star, from which the hour and minute are easily found; or without the altitude, if the star be in the meridian.—This hour and minute, therefore, thus found, and compared with that expressed in the tables, gives the *longitude*.

But as the beginning or end of an eclipse of the moon cannot be generally observed nearer than one minute, and sometimes two or three minutes of time, the *longitudes* of places cannot be certainly determined by this method from a single observation of the beginning or end, nearer than a degree. However, if both the beginning and end of the eclipse be observed, a considerably greater degree of exactness will be attained.

2. The moon's place in the zodiac is a phenomenon more frequent than that of her eclipses; but then the observation thereof is difficult, and the calculus intricate and perplexed, by reason of two parallaxes; so that it is scarce practicable, to any tolerable degree of accuracy. Indeed, by waiting till the moon comes into the meridian of the place, and then taking the altitude of some remarkable star (the altitude being supposed to be first known), from this altitude, and the latitude, we shall be able to find the time pretty accurately; though it will be better to do it by some star in the meridian. Now the time being found, it will be easy to find what point of the ecliptic is then in the meridian, or mid-heaven. Thus we shall have the moon's place in the zodiac, corresponding to the time of our place. Then in the ephemeris we find what hour it is in the meridian of the ephemeris, when the moon is in that part of the zodiac: thus we shall have the hour and minute of the two places for the same time; the difference of which will give the difference of *longitude*.

3. In regard there are many times when the moon cannot be observed in the meridian, there is, therefore, another still more frequent phenomenon, from which the *longitude* is sought; viz. the moon's appulse, and recess from the fixed stars; for from thence the moon's true place may be investigated for the given time of observation.

The first person who recommended the investigation of the *longitude* from observing the distance between the moon and some star, is said to have been John Werner, of Nuremberg, who printed his annotations on the first book of Ptolemy's Geography, in 1514: Peter Apian, professor of mathematics at Ingolstadt, in 1524; Orontius Finè, of Briançon, about 1530; Gemma Frisius, at Antwerp, in 1530; Nonius or Pedro Nunez, in 1560; and Kepler, in 1620, all suggest and recommend the same method. In 1665, king Charles II. erected the observatory at Greenwich, and appointed Mr. Flamsteed his astronomical observer, with this express command, that he should apply himself with the utmost care and diligence to the rectifying the table of the motions of the heavens, and the places of the fixed stars, in order to find out the so much desired *longitude* at sea, for perfecting the art of navigation. To the fidelity and industry with which Mr. Flamsteed executed his commission, we are in a great measure indebted for that curious theory of the moon, which was afterwards formed by the immortal Newton. This incomparable philosopher made the best use which human sagacity could make of the observations with which he was furnished; but, as these were interrupted and imperfect, the difference of Sir Isaac's theory from the heavens would sometimes amount at least to five minutes. Dr. Halley employed much time on this subject; and a starry zodiac was published under his direction, containing all the stars to which the moon's appulse can be observed: but for want of proper instruments and correct tables, he could not proceed in making the necessary observations: in a paper on this subject he expresses his hope, that the instrument just invented by Mr Hadley, might be applied to taking angles at sea with the desired accuracy. See Phil. Trans. N° 421. This great astronomer, and after him the abbé de la Caille, and others, have reckoned the best astronomical method for finding the *longitude* at sea, to be that wherein the distance of the moon from the sun, or from a star is used; for the moon's daily mean motion being about thirteen degrees, her hourly mean motion is about half a degree, or one minute of a degree in two minutes of time; and so an error of one minute of a degree in position will produce an error of two minutes in time, or half a degree in *longitude*: and if by observation it is determined what part of her daily motion the moon has run through during the interval between a certain point of time under a known meridian, and the instant of time when the observations are made on her, under an unknown meridian, then her daily motion at that time will have, to the part thereof determined by observation, the same ratio, which twenty-four hours has to the interval of time taken to definite that arc. From the very considerable improvements made by Sir Isaac Newton in the theory of the moon, and more lately by Mr. Euler, and others on his

principles, M. Tobias Mayer, professor, of Gottingen, was enabled to calculate lunar tables more correct than any that were before published, and he has succeeded so far as to give the moon's place within one minute of the truth. This has been proved by a comparison of the tables with the observations made at the Greenwich observatory by the late Dr. Bradley, and by the present astronomer royal. These tables, for which the widow of Mr. Mayer was rewarded by the British parliament, were published in 1770, by Mr. Maskelyne, by order of the commissioners of *longitude*. Mr. Maskelyne, in his voyage to St. Helena, in 1761, made use of these tables, and found them to answer for the discovery of the *longitude*, within a degree; and in order to facilitate the general use of them, he proposed a nautical ephemeris, the scheme of which was adopted by the commissioners of *longitude*, and first executed in the year 1767: and the publication has been regularly continued ever since. But as the rules that were given in the appendix to one of those publications, for correcting the effects of refraction and parallax were deemed too difficult for general use, they were reduced to tables: so that by the help of the ephemeris, these tables, and others that are provided, the calculations relating to the *longitude*, which could not be performed by the most expert mathematician in less than four hours, may now be completed with great ease and accuracy in half an hour. Mr. Maskelyne observes, that the error of Mr. Mayer's last lunar tables seldom exceeds 1′ at the most, and seldom amounts to 20″; and, therefore, the uncertainty hence arising in the determination of the *longitude*, can scarcely exceed half a degree, and generally will not exceed ten miles. As this method of determining the *longitude* depends on the use of the tables, annually published for this purpose, we shall refer those who wish for farther information, to the instructions that accompany them, and particularly to those that are annexed to the tables requisite to be used with the astronomical and nautical Ephemeris, 1769, p. 241, &c.

4. To find the *longitude* by the moon's ingress into the eclipse, observe the moment of that ingress: then, in the ephemeris, see what hour it is in the meridian of the ephemeris, when that ingress happens. The difference between these times gives the difference of *longitude*. See MOON.

5. The phænomena of Jupiter's satellites have been generally preferred to those of the moon, for finding the *longitude*; because the former are less liable to parallaxes; and do, farther, afford a very commodious observation, in every situation of that planet above the horizon. Their motion is very swift, and must be calculated for every hour; and, for that reason, they are not found in the common ephemerides, but are had elsewhere; particularly in the Nautical Ephemeris. These satellites of Jupiter were no sooner discovered by Galileo, in his Sydereus Nuncius, first printed at Venice, in 1610, than the frequency of their eclipses recommended them for this purpose; and among those who attempted this subject, none were more successful than Cassini. This great astronomer, in 1688, published at Bologna, tables for calculating the appearances of their eclipses, with directions for finding thence the *longitudes* of places; and being invited to France by Lewis XIV. he there published corrected tables in 1693. But the mutual attractions of the satellites rendering their motions very irregular, the tables soon became useless; insomuch that they require to be renewed from time to time, which has been performed by ingenious persons, as Dr. James Pound, Dr. James Bradley, M. Cassini the son, and M. Peter Wargentin. Wargentin's tables are much esteemed; they were first published at Stockholm, in the Acta Societatis Regiæ Scientiarum Upsaliensis, for the year 1743; and since more correctly from a new copy of the author's at Paris, in 1755, by M. de la Lande. They are also published in the Nautical Almanac for 1771 and 1779, &c.

Now, to find the *longitude* by these satellites, with a good telescope observe a conjunction of two of them, or of one of them with Jupiter, or any other the like appearance; and, at the same time, find the hour and minute from the meridian altitude of some star, or by means of a clock or watch, previously regulated for the place of observation; then, consulting tables of the satellites, observe the hour and minute wherein such appearance happens in the meridian of the place to which the tables are calculated. The difference of time, as before, will give the *longitude*.

The eclipses of the first and second of Jupiter's satellites are the most proper for this purpose: and the best telescopes for observing them are common refracting telescopes, from fifteen to twenty feet, reflecting telescopes of eighteen inches or two feet, and telescopes of Mr. Dollond's construction, with two object glasses, from five to ten feet; or, which are still more convenient, those of three feet and a half, constructed with three object glasses, which are as manageable as reflecting telescopes, and perform as much as those of ten feet, with two object glasses. As these eclipses happen almost daily, they afford the most ready means of determining the *longitude* of places at land, and have very much contributed to the modern improvements in geography. If it were possible to observe them with sufficient accuracy in a ship under sail, they would be of great service in ascertaining its *longitude* from time to time. In order to remedy the inconvenience to which these observations are liable from the agitation of the ship, Mr. Christopher Irwin invented what he calls a marine chair. This chair was tried by Mr. Maskelyne, in his voyage to Barbadoes, who found it totally impracticable to derive any advantage from the use of it: and indeed, considering the great power requisite in a telescope for making these observations well, and the violence, as well as irregularities of the motion of a ship, there is reason to fear that the complete management of a telescope on ship board will always remain among the desiderata in this part of nautical science. Since all methods which depend on the phenomena of the heavens have also this other defect, that they cannot be observed at all times; the improvement of time-keepers is an object of very great importance.

Mr. Whiston and Mr. Ditton have proposed a method of determining the *longitude*, by the flash and report of great guns. Sounds, it is known, move pretty equably in all their stages, whatever the sonorous body be that occasions them, or whatever the medium that conveys them. If, then, a mortar, or great gun, be exploded, at a place whose *longitude* is known, the difference between the time wherein the flash (which moves, as it were instantaneously) is seen, and the sound, which moves at the rate of a mile in four seconds, is heard, will give the distance of those places from each other: whence if their latitudes be known, the difference of *longitude* will be likewise known.

Again, if the hour and minute of the explosion be known (for the place where it is made), by observing the hour and minute from the sun or stars, at the place whose *longitude* is required; the difference between those times will give the *difference of longitude*.

Again, if the said mortar be loaded with an iron shell, full of combustible matter, and pointed perpendicularly, it will carry the same a mile high, which will be seen near a hundred miles: if therefore, neither the sound shall be heard, nor the flash seen, the distance of any remote place from the place of the mortar, may be determined from the altitude of the shell above the horizon of the place unknown: and the distance and latitudes known, the *longitude* is easily found. According to this scheme, it was proposed to have such mortars fixed at proper distances, and at known stations, on all the frequented coasts, islands, capes, &c and to be exploded at certain hours, for the observation of mariners.

This method, though good in the theory, yet is found useless in the practice; as being extremely troublesome, and yet precarious. It supposes that sounds may be heard forty, fifty, or sixty miles; of which, it is true, we have instances, but they are very rare; and, ordinarily, the report of a cannon is not heard above half so far, and sometimes much less. It supposes, again, sound to move always with equal velocity; whereas, in fact, its velocity is increased or diminished as it moves with or against the wind. It supposes, again, the strength of powder uniform; and that the same quantity carries the same range; the contrary whereof is known to every gunner. We say nothing of thick cloudy nights, when no lights can be seen; nor of stormy nights, when no sound can be heard; even at inconsiderable distances.

We have another method of finding the *longitude*, proposed by the same Mr. Whiston, *viz.* by the inclinatory, or DIPPING-*needle*.

LONGITUDE, *angle of*. See ANGLE.

LONGITUDE, *argument of*. See ARGUMENT.

LONGITUDE, *circles of*. See CIRCLE.

LONGITUDE, *degrees of*. See DEGREE.

LONGITUDE, *parallax of*. See PARALLAX.

LONGITUDE *refraction of*. See REFRACTION.

LONGITUDE *of motion*, is used by Dr. Wallis for the measure of motion, estimated according to the line of direction; on which principle, *longitude* of motion is the distance, or length, which the centre of any moving body runs through, as it moves on in a right line.

The same author calls the measure of any motion, estimated according to the line of direction of the vis motrix, the *altitude* of it.

Bellini also uses the terms *longitude* and *altitude* in the same sense, in many places of his writings, which an ordinary reader finds hard to understand, for want of this interpretation.

interpretation." By *altitudo* alſo in his nineteenth propoſition *de fabrikâ*, he means the thickneſs of the viſcid matter in the blood-veſſels; or the greateſt length a viſcid particle is extended into, from the ſide of a canal to its axis.

LONGITUDINAL, in *Anatomy*, is uſed to ſignify ſome part, or member, extended in length, or poſited lengthwiſe.

The membranes which compoſe the veſſels, are woven out of two kinds of fibres, the one *longitudinal*, the other *circular*, cutting the *longitudinal* at right angles.

The *longitudinal* fibres are tendinous and elaſtic; the *circular*, muſculous, and motrices, like ſphincters.

LONGUS, LONG, an epithet given by *Anatomiſts*, to a great number of muſcles, hereby contradiſtinguiſhed from BREVIS.

The ſecond extenſor of the carpus is called *longus*, in compariſon of the third extenſor, which is called *brevis*, *ſhort*. The *longus* has its origin in the bottom of the humerus, and, lying along the radius, paſſes underneath the ligamentum annulare, and is inſerted into the carpus.

The ſecond of the flexors of the neck is alſo called the *longus* or *longus colli*, and ſometimes *rectus*. It has its origin in the lateral part of the body of the four upper vertebræ of the back; and is inſerted into the body of the four vertebræ of the neck, and ſometimes into the occiput: this, in conjunction with the ſcalenum, bends the neck.

The third of the ſix muſcles of the elbow, or arm, which is the firſt of its extenſors, is alſo called *longus*, as being the longeſt of the extenſors. It has its origin on the upper ſide of the omoplate, near the neck, and deſcending by the hind part of the arm, is inſerted into the olecranum by a ſtrong aponeuroſis, which is common to it, and the ſecond and third extenſor of the arm.

The ſecond muſcle of the thumb, which is the firſt of its extenſors, is alſo called *longus*, as being longer than another extenſor of the ſame thumb, called *brevis*. The *longus* proceeds from the upper and external part of the bone of the elbow; and, riſing over the radius, is inſerted, by a forked tendon, into the ſecond bone of the thumb, which it extends. One of the four muſcles of the radius is alſo called the *longus*: this is the firſt of the two ſupinators, and has its origin three or four fingers breadth above the outer apophyſis of the humerus, whence running along the radius, it is inſerted into the inner parts of its lower apophyſis. It is called *longus* with regard to the other ſupinator, which is called *brevis*. Theſe two muſcles ſerve to turn the radius, ſo that the palm of the hand looks upward; which makes the ſupination.

The firſt of the abductors of the leg is alſo called the *longus*, or *longus tibiæ*; and bears this title more juſtly than any of the others, as being the longeſt muſcle in the whole body. It is alſo denominated *fascialis*, on account of its bearing ſome reſemblance to a *faſcia*, ſwathe; and *ſartorius*, or taylor's muſcle, becauſe it ſerves to bend the legs inward, as the taylors uſe to have them when at work. See *Tab. Anat. Muſcl.* fig. 1 n. 40. fig. 2 n. 38.

LONGUS *colli*, is a muſcle, which, with others, extends the cubitus. It ariſes from the inferior coſta of the ſcapula nigh its neck; and, paſſing between the two round muſcles, deſcends on the back ſide of the humerus; where it joins with the brevis, and brachiæus externus.

LONICERA. *See Upright* HONEYSUCKLE.

LOOF, or, as it is uſually pronounced, LUFF, a term uſed in conding of a ſhip. Thus,

LOOF *up*, is to bid the ſteerſman keep nearer to the wind.

LOOF *into a harbour*, is to ſail into it cloſe by the wind.

LOOF, *in ſpring-tides*, or *luff*, is when a ſhip that was going large before the wind, is brought cloſe by the wind.

When a ſhip ſails on a wind, that is, on a quarter-wind, they ſay to the ſteerſman, *keep your luff! veer as more! keep her to! touch the wind! have a care of the lee-latch!* All which words ſignify much the ſame thing, and bid the man at the helm to keep the ſhip near the wind.

LOOF *of a ſhip*, denotes the after-part of a ſhip's bow; or that part of her ſide forward where the planks begin to be incurvated into an arch, as they approach the ſtem. Hence, the guns which lie here are called *loof-pieces*.

LOOF-*lock*, in a ſhip, a tackle with two hooks to it, one of which is to hitch into the crengle of the main and fore-ſail, and the other is to hitch into a certain ſtrap, which is ſpliced into the cheſs-tree, and ſo down the ſail. Its uſe is to ſuccour the tackles in a large ſail, that all the ſtreſs may not bear upon the tack. Sometimes alſo it is uſed when the tack is to be ſeized the furer.

LOOF-*tackle*, or LUFF-*tackle*, in a *Ship*, a large *tackle*, larger than the jigger-tackle, but ſmaller than thoſe which hoiſt the heavier materials into and out of the veſſel, ſuch as the main and fore-tackles, the ſtay and quarter-tackles, &c. ſerving to lift all the ſmall weights in or out of the ſhip, and otherwiſe variouſly employed as occaſion requires.

LOOK-OUT, in *Sea Language*, denotes a watchful attention to ſome important object, or event, which is expected to ariſe from the preſent ſituation of a ſhip, &c. It is principally uſed when there is a probability of danger from the real or ſuppoſed proximity of land, rocks, enemies, &c. There is always a *look-out* kept on a ſhip's forecaſtle at ſea, to watch for any dangerous objects lying near her track; the mate of the watch accordingly calls often from the quarter-deck, *look-out afore there!* to the perſons appointed to this ſervice. Falconer.

LOOKING-*glaſs*, a plain glaſs ſpeculum, or mirror, which, being impervious to the light, reflects its rays, and ſo exhibits the images of objects placed before it.

The theory of *looking-glaſſes*, and the laws whereby they give the appearance of bodies, ſee under MIRROR.

LOOKING-*glaſſes, the manner of grinding and preparing*, is as follows:—A plate of glaſs is fixed to a horizontal table, and to another leſſer table is fixed another plate, over the hind part of which is added a box loaded with ſtones, and other weights. Over the firſt plate is ſprinkled fine ſand and water, in a ſufficient quantity for the grinding, and the ſecond or leſs plate is laid on it, and thus worked this way and that way, till each has planed the other's ſurface. As they begin to grow ſmoother, finer ſand is uſed, and at laſt powder of emalt. Being thus fitted for poliſhing, a wooden parallelopiped, lined with Tripoli earth, or burnt tin, tempered with water, is laid on the plate, and worked to and again, till the glaſs hath got a perfect politure.

It is found extremely difficult to bring a glaſs to an exact planeneſs. Hevelius judges more art required to bring glaſs to a perfect plane than to a ſphere. For poliſhing large plates of glaſs, they have a machine for the purpoſe. See GLASS.

The plates being poliſhed, a thin blotting paper is ſpread on a table or marble ſlab, and ſprinkled with fine powdered chalk; and this done, over the paper is laid a thin lamina or leaf of tin, on which is poured mercury, which is to be equally diſtributed over the leaf, with a hare's foot or cotton. Over the leaf is laid a very thin ſmooth paper, of which the kind called ſan-paper is beſt, and over that the glaſs-plate. With the left hand the glaſs-plate is preſſed down, and with the right the paper is gently drawn out; which done, the plate is covered with a thicker paper, and loaden with a greater weight, that the ſuperfluous mercury may be driven out, and the tin adhere more cloſely to the glaſs. When it is dried, the weight is removed, and the *looking-glaſs* is complete.

Some uſe an ounce of mercury with half an ounce of marcaſite or biſmuth, melted by the fire; and left the mercury evaporate in ſmoke, pour it into cold water; and when cold, ſqueeze it through a cloth or leather. Some alſo add a quarter of an ounce of lead and tin to the marcaſite, that the glaſs may dry the ſooner. See FOLIATING.

LOOKING-*glaſs*, *Venus's*, in *Botany*. See CAMPANULA.

LOOL, in *Metallurgy*, a veſſel made to receive the waſhings of ores of metals. The heavier or more metalline part of the ores remain in the trough in which they are waſhed; the lighter, and more earthy, run off with the water, but ſettle in the *lool*.

LOOM, the weaver's frame; a machine whereby ſeveral diſtinct threads are woven into one piece.

Looms are of various ſtructures, accommodated to the various kinds of materials to be woven, and the various manner of weaving them; viz. for woollens, ſilks, linens, cottons, cloths of gold; and other works, as tapeſtry, ribbands, ſtockings, &c. divers of which will be found under their proper heads. See WEAVING.

The weaver's *loom*-engine, otherwiſe called the Dutch *loom*-engine, was brought into uſe from Holland to London, in or about the year 1676.

LOOM, *heir*, in *Law*. See HEIR-*Loom*.

LOOM, at *Sea*. If a ſhip appear big, when ſeen at a diſtance, they ſay the *loom*, or appears a great ſail: the term is alſo uſed to denote the indiſtinct appearance of any other diſtant objects.

LOOM-*gale*, at *Sea*, a gentle, eaſy gale of wind, in which a ſhip can carry her top-ſails *a-trip*.

LOON, in *Ornithology*, a name given to the *columbus major*, or great diver; and alſo to the *columbus minor*. See *Tropic*-CREEK and DOB-CHICK.

LOOP, in the *Iron Works*, is a part of a ſow or block of caſt iron broken or melted off from the reſt, and prepared for the forge or hammer. The uſual method is, to break off the *loop* of about three quarters of a hundred weight. This *loop* they take up with their ſhingling-tongs, and beat it with iron hedges upon an iron-plate near the fire, that ſo it may not fall to pieces, but be in a condition to be carried under the hammer. It is then placed under the hammer, and a little water being drawn to make the hammer move but ſoftly, it is beat very gently, and by

this means the dross and foulness are forced off, and after this they draw more and more water by degrees, and beat it more and more till they bring it to a four-square mass, of about two feet long, which they call a bloom.

LOOP-*Holes*, in the *Sea-language*, are holes made in the coamings of the hatches of a ship, to fire muskets through in a close fight.

LOOPING, in *Metallurgy*, a word used by the miners of some counties of England, to express the running together of the matter of an ore into a mass, in the roasting, or first burning, intended only to calcine it so far as to make it fit for powdering. This accident, which gives the miners some trouble, is generally owing to the continuing the fire too long in this process.

To LOOSE, in *Sea-language*, is to unfurl or call *loose* any sail, in order to be set or dried, after rainy weather.

LOOSE-*strife*, *Lysimachia*, in *Botany*, a genus of the *pentandria monogynia* class, the characters of which are these: the empalement of the flower is permanent, and cut into five acute segments that are erect; the flower is of one petal, cut into five oblong oval segments to the bottom, which spread open flat; it hath five awl-shaped stamina about half the length of the petal, terminated by acute-pointed summits; in the center is situated a roundish germen, supporting a slender style of the length of the stamina, crowned by an obtuse stigma; the germen afterwards turns to a globular capsule, with one cell opening with ten valves, and filled with small angular seeds. Miller enumerates ten, and Linnæus eleven species. See MONEY-*wort*.

Pliaded LOOSE-*strife*, in *Botany*. See WILLOW-*herb*.

Purple and *spiked* LOOSE-*strife*, *hyssopus*, in *Botany*, a genus of the *dodecandria monogynia* class, the characters are, that the flower hath a cylindrical striated empalement of one leaf, indented at the brim in twelve parts, which are alternately smaller; it has six oblong blunt petals, inserted in the indentures of the empalement, and ten slender stamina of the length of the empalement, the upper being shorter than the lower, terminated by single rising summits; in the center is situated an oblong germen, which turns to an oblong acute capsule, with two cells filled with small seeds. Miller reckons ten and Linnæus nine species.

Virginian LOOSE-*strife*. See GAURA.

LOOSE *Style*. See STYLE.

LOOSENED. See HOOF-*loosened*.

LOPHIA, in *Anatomy*, a term for the upper part of the *cervix*, or back part of the human neck.

LOPHIUS, in *Ichthyology*, a genus of the *amphibia nantes* in the Linnæan system; having solitary spiracles near the branchiæ; many small teeth, pectoral fins, incident in the branchiæ; and only three branchiæ. The species are the GUACUCIA and RANA *piscatrix*.

LOPPA, a word used by the chemical writers, to express the metallic mass, which results from a crementatory calcination, either with or without regulus.

LOPPING, among *Gardeners*, the cutting in a proper and artful manner the branches of trees, so as to make them grow more beautiful or more durable.

It is observable, that most old trees are hollow within, and this is in general owing to their wrong management, the tops being suffered to grow too large before they are lopped. This is a very common error in regard to the ash, elm, hornbeam, &c. and is owing to peoples persuading themselves, that by this means they shall have more great woods; but they do not consider, that the cutting off large tops destroys or decays the tree, so that it decays more in the body than it grows in the head. And though the hornbeams and elm will bear large tops when the outside is little more than a shell, yet this is not at all the case with the ash, which should therefore always be cut down as soon as it begins to decay. See HOLLOWNESS *of Trees*.

The *lopping* of young trees, that is of such as are ten or twelve years old, will preserve them much longer, and will occasion the shoots to grow more into the wood in one year, than they do in old tops in two or three. The taking off of large boughs in a careless manner destroys many a tree; they should therefore always be lopped close and smooth, and not parallel to the horizon, and the wound covered with some loam to keep it from rotting, and preventing the wet from entering and getting into the body of the tree.

All sorts of resinous trees, or such as abound with a milky juice, should be lopped but very sparingly, for they are very subject to decay when cut. The best season for the *lopping* these is the end of August, when they will not bleed very much, and the wounds will heal before the hard weather. Miller.

Whatever shape a tree is intended to be of, it must be thrown into it by *lopping* while young, for the branches being then small, full of juice, heal easily and never endanger the tree. When a tree is intended for timber it must be left to grow to its own height, and its top is never to be cut off on any account. Those trees which have large pithy, as the ash, elm, willow, poplar, and the like, must never have their heads cut off, if intended to stand long, for the wet gets into the soft part of the tree, and begins to hollow, and rot it where cut off, and soon spreads to the very root, so that the whole is but a shell or case of a tree. If a tree grow top heavy, and be in danger of breaking down, then some think it necessary to take off the top to preserve it; but this may be much better done only by thinning the top, that is cutting off the small branches that grow from the main boughs of the head, and leaving them bare, so as to let the wind have a free passage through them. This is a very good practice for young trees, which are intended to be spreading ones; and if they are intended to be tall and slender ones, the best method to be taken with them, while young, is rubbing off the buds as fast as they appear in the spring, and taking off the side-shoots as they grow, leaving only here and there one; when any new shoots break out, some of them may be saved, and the others cut off in their place, always observing to cut off the largest, and leave the youngest; the whole intent being to leave some check there for the sap, to prevent its all running up to the head, which would endanger the breaking of the body in some weak place. When the trunk learns strong and robust, the shoots of these roots need be left in the great care. In this case, it is to be employed about the head. The leading shaft or branch, must be carried on all the way straight and single, and not suffered to fork or split till it come to the head, and the quantity of boughs left there must be such as will not leave the whole top-heavy. When the tree is grown to its proper height, the head is to be suffered to break out in its natural way, and the side branches are to be kept cut off as they shoot, or at any proper distances of time.

If the side-boughs are found still breaking out, and the top is able to sustain itself, the boughs that put out in spring should be lopped very close in summer, a little after Midsummer; this will cause the bark to shoot over them, and they will not be liable to grow again. This is the only method of making a tree grow with a fine straight and handsome body.

The generality of the world are against pruning timber-trees at all, and where they naturally grow straight and regular, it is much better let alone. But all the common faults in shape may be regulated by this *lopping* them while young, and it can be attended with no ill consequence to the timber; for the cut not lying near the timber pith, cannot affect it when grown up, and squared in the working for beams or other uses, or to be quartered; for all the defects, occasioned by such wounds, are in the superficial parts, and all the four quarters are perfectly sound within.

As to the large forest-trees they should not be lopped at all, except in cases of great necessity, and then the large boughs must not be cut, but only the side-branches, and even these must be cut off close, that the bark may soon cover the wound, and yet a little slanting, that the water may run off, and not lodge upon the cut part.

If there is a necessity of cutting off a large bough, as by its being broken or cankered, let it be cut off slanting at about four feet distance from the body of the tree, and that if possible near some place where there is a young shoot from it, which may receive the sap and grow up in its place. No stump must be left standing out farther than this, because they are wounded parts which never can heal, and which will always be letting in the water, and will serve as pipes to convey that water to the heart of the body of the tree, and by degrees will utterly spoil it. All that grow upright, whether they be large or small branches, must in cutting be taken off slanting, never evenly for the same reason; those boughs that bear from the head are to be cut with the slope on the lower side, and on any occasion that great wounds are given to a tree, they should be covered with a mixture of clay and horse-dung, which will make them heal much sooner than they otherwise would do. Mortimer. See SUMMER-*Trees*.

LORANTHUS, in *Botany*, a genus of the *decandria monogynia* class. Its characters are these: the flower is tubulous, and cut into six narrow segments, almost to the bottom, which are reflexed; the germen is situated below the empalement, and becomes a berry containing one seed. Linnæus enumerates nine species.

LORARII, among *the Romans*, officers whose business it was, with whips and scourges, to compel the gladiators to engage. The *lorarii* also punished slaves who disobeyed their masters.

LORD, a title of honour attributed to those who are no-

ble, either by birth, or creation; and vested with the dignity of a baron.

The word is of Saxon origin, and primarily denotes a bread-giver, alluding to the hospitality of our ancient nobles: it is formed, according to Camden, from *hlaford*, afterwards written *lisford*, a compound of *hlaf*, *bread*, and *ford*, *to supply, afford*.

In this sense, *lord* amounts to the same with *peer* of the realm, *lord* of parliament.

LORD is also applied to those so called by the courtesy of England; as all sons of a duke or marquis, and the eldest son of an earl.

LORD is also an appellation given to divers persons honourable by office; as *lord* chief justice, *lord* chancellor, *lord* of the treasury, admiralty, *&c.*

LORD is also a title sometimes given to an inferior person who has a fee, and consequently the homage of tenants within his manor.

The by his tenants he is called *lord*, and in some places, for distinction-sake, *landlord*.

It is in this last signification that the word *lord* is principally used in our law-books; where it is divided into *lord paramount*, and *lord mesne*.

LORD *mesne*, is he that is owner of a manor, and by virtue thereof hath tenants holding of him in fee, and by copy of court-roll; and yet holds himself of a superior *lord* called *lord paramount*.

We also read of *every lord*, and *every tenant*.

LORD *in gross*, he who is *lord*, not by reason of any manor, as the king in respect of his crown, *&c.*

Very LORD, is he who is immediate *lord* to his tenant; and *very tenant*, he who holds immediately of that *lord*.

So that where there is *lord* paramount, *lord* mesne, and tenant; the *lord* paramount is not very *lord* to the tenant.

LORD *high-admiral* of England, is one of the great officers of the crown, whose trust and honour is so great, that it was formerly seldom given, except to some of the king's youngest sons, or near kinsmen.

To him is, by the king, intrusted the management of all maritime affairs, as well in respect to jurisdiction as protection; with the government of the British navy; and a power to decide all controversies and causes maritime, as well civil as criminal; such as happen either on our coasts, or beyond sea, among his majesty's subjects.

To him also belong such wrecks and prizes, as are called LAGON, JETSON, and FLOTSON; that is, goods lying in the sea floating, or cast on shore, excepting in such royalties as are granted to other *lords* of manors, *&c.* with all great fishes, called *royal* FISH, except whales and sturgeon; a share of prizes in time of war, and the goods of pirates and felons condemned.

The *lord high admiral* has under him many officers of high and low condition, some at sea, others at land; some of a military, others of a civil capacity; some judicial, others ministerial. See ADMIRAL.

This great office is now usually executed by seven commissioners, who are styled *lords of the admiralty*: one is called the first *lord*, with a salary of 3000*l.* a year, the others have 1000*l.* a year each. Under these there are a secretary and deputy-secretary and several inferior clerks.

In this court, called the *court of admiralty*, all proceeds issue in his name, not the king's, as they do in all other courts; to that the dominion and jurisdiction of the sea may justly be styled another commonwealth, or kingdom apart, and the *lord high admiral*, the viceroy of the maritime kingdom.

He hath under him a lieutenant, or deputy, who is judge of the admiralty, commonly a doctor of the civil law. See COURT *of Admiralty*.

LORD *privy-seal*, has his office by patent: before the fifteenth of Henry VIII. he was generally, an ecclesiastic; since which, the office has been usually conferred on temporal peers, above the degree of barons.

The *lord privy-seal*, receiving a warrant from the signet-office, issues the privy-seal, which is an authority to the lord chancellor to pass the great seal, where the nature of the grant requires the SEAL.—But privy-seals for money begin in the treasury, from whence the first warrant issues, countersigned by the lord treasurer.—On the *lord privy-seal* are attendant four clerks, who have two deputies to act for them.

LORD *steward of the king's household*, is the principal officer for the civil government of the king's servants below-stairs; over the officers of which he has jurisdiction. See HOUSEHOLD.

He is constituted by the delivery of the white staff, which is esteemed his commission.—By virtue of his office, without any other commission, he judges of all offences committed within the court, or the verge thereof; and gives judgment according to their several deserts.

At the death of the sovereign he breaks his staff over the grave in which the royal corpse is deposited, and thereby discharges all the officers under his power.

LORD *advocate*. See ADVOCATE.

LORD *high-treasurer*. See TREASURER.

LORD *chamberlain of the household*. } See CHAMBERLAIN.
LORD *great-chamberlain of England*. }

LORD *high-chancellor of England*. See CHANCELLOR.

LORDS *of the bed-chamber* are fourteen in number under the *Lord* Chamberlain. See BED-CHAMBER.

LORDS *of session*. See SESSION.

LORDS, *house of*. See PEER.

LORDS *of the treasury*. See TREASURY.

LORDS *lieutenants of counties*, are officers of great distinction, appointed by the king for the managing the standing militia of the county, and all military matters therein. They are supposed to have been introduced about the reign of king Henry VIII. for they are mentioned as known officers in the statute 4 and 5 Ph. and M. c. 3. though they had not been then long in use; for Camden speaks of them, in the time of queen Elizabeth, as extraordinary magistrates constituted only in times of difficulty and danger.

They are generally of the principal nobility, and of the best interest in the county: they are to form the militia in case of a rebellion, *&c.* and march at the head of them, as the king shall direct.

They have the power of commissioning colonels, majors, captains, and subaltern officers; also to present the king with the names of deputy-lieutenants, who are to be selected from the best gentry, in the county, and act in the absence of the *lords-lieutenants*.

Subservient to the *lords-lieutenants*, and deputy-lieutenants, are the justices of peace; who, according to the order they receive from them, are to issue out warrants to the high and petty-constables, *&c.* for military service, *&c.*

LORD'S *Day*. See SUNDAY.

LORDOSIS, of ὁρδὸς, *bent inwards*, in the *Medical Writings*, a name given to a distempered state of the spine, in which it is bent inwards, or toward the anterior parts. It is used in opposition to gibbous, or hump-backed.

LORICATION, or CRATING, in *Chemistry*, is the covering a glass or earthen vessel with a coat or crust of a matter able to resist the fire, to prevent its breaking in the performing an operation that requires great violence of fire.

When vessels are exposed to a fire too strong for their structure, or to the corrosive quality contained in them, or on the throwing on of fresh cold fuel into the fire where they stand, it frequently happens that they crack and burst; for the preventing of which, the operator has recourse to this method of *coating* or *lorication* his vessels. It is performed in the following manner: take a quantity of washed clay, with an admixture of pure sand, powder of calcined flints, or broken crucibles; and instead of pure water moisten it with fresh blood that has not yet been coagulated, diluted with twice or three times its quantity of water; make the clay with this into a thin paste, and work into it some cow's hair, or other hair not too long nor too fine, and a little powdered and sifted glass, if you have it at hand; smear over the vessel intended to be used with this paste, by means of a pencil, and let it to dry; when dry, besmear it again, and repeat the operation till the vessel have a crust of a third, or a quarter of an inch, at least, thick of this matter, and let it be thoroughly dry before it is used.

To keep blood in a proper state for this use, it must, when just let out from the animal, be well stirred about with a stick for some time, at least till it is quite cold; and being thus prepared, it will keep for some days without coagulating, and fit for use.

This composition, with an admixture of hole, worked into a paste with the whites of eggs, diluted with water, makes also the proper LUTE for closing the junctures of other chemical vessels, in the distilling strong spirits.

LORIMERS, one of the COMPANIES of London, that make bits for bridles, spurs, and such like small iron ware. They are mentioned Stat. 1 Rich. II. cap. 12.

The word seems derived from the Latin, *lorum*, a thong.

LORIPES, in *Zoology*, the name used by some authors for the HIMANTOPUS, a bird of the water-kind, remarkable for the length and weakness of its legs.

LORIS, in *Zoology*, a species of LEMUR in the Linnæan system, being the *lemur tardigradus* of Buffon, described by Buffon. Nat. Hist. vol. xxii. p. 277. *Tab.* III. *Quadrupeds*, N° 29. See MALACCO.

LORUS, a name by which some of the chemical writers have called mercury.

LOT

LOT in a legal ſenſe. See SCOT.

LOT, or LOTH, in *Mining*, is the thirteenth diſh, meaſure, or part of the miner's ore, which the bar-maſter takes up for the king, or the farmer.

LOTA, in *Zoology*, the name of a ſpecies of the *muſtela fluviatilis*, or RIVER-*ſtoat*, differing from the ordinary kind, in that it has no hairs or excreſcences on the upper jaw; the tail is flat, and like the point of a broad ſword, whereas that of the common kind is more rounded; and that it is covered with eaſily diſtinguiſhable ſcales.

LOTE-*tree*, in *Botany*. See NETTLE *tree*.

LOTION, LOTIO, popularly called *waſh*, denotes a form of medicine, made up of liquid matters, chiefly uſed for beautifying the ſkin, and cleanſing it from thoſe deformities which a diſtempered blood ſometimes throws on it, or rather, which are occaſioned by a preternatural ſecretion. For, generally ſpeaking, thoſe diſtempers of the ſkin, which are accounted ſigns of a foul blood, proceed from the natural ſalts thrown off by the cutaneous glands, which ought to be waſhed away through the kidneys; ſo that inſtead of ſweeteners, which are uſually preſcribed on thoſe occaſions, Dr. Quincy thinks the urinary diſcharge ſhould be promoted, or that of the ſkin reſtored by proper *lotions*, or ointments and frictions.

LOTION alſo denotes a remedy, conſiſting a medium between a fomentation and a bath.

There are refreſhing and ſomniferous *lotions* for feverith perſons, made of leaves, flowers, and roots boiled, wherewith the feet and hands of the patient are waſhed; and after waſhing, wrapped up in linen, ſteeped in the ſame decoction, till dry.

There are *lotions* alſo for the head and hair, made of the aſhes of vine-twigs.

LOTION *of the philoſophers*, in *Chemiſtry*, is a coboabation which nature makes of what is raiſed up, and afterwards falls back again to the bottom of the veſſel.

LOTION, in *Pharmacy*, denotes a preparation of medicines, by waſhing them in ſome liquid, either made very light, ſo as to take away only the dregs; or ſharp, ſo as to penetrate them, in order to clear them of ſome fait, or corroſive ſpirit, as is done to antimony, precipitates, magiſteries, &c. or intended to take away ſome foulneſs, or ill quality, or to communicate ſome good one.

LOTIO *ſaponacea*, the *ſapunaceous lotion*, the name of a form of medicine preſcribed in the late London Pharmacopœia, being properly ſoap in a liquid form. It is ordered to be made thus: take damaſk roſe-water, three quarters of a pint; oil of olives, a quarter of a pint; ley of tartar, half an ounce in meaſure: rub the ley and oil together till they are mixed, and then gradually add the water.

LOTOMETRA, in *Botany*, a name given by many of the antients to the *nymphæa Indica*, or *Ægyptiaca*, called alſo the *faba Ægyptiaca*, and originally the *nilufar*, an abbreviation of *nilufar*; *nufar* ſignifying a water lily, and the prefix *nil* expreſſing its growing particularly in the river Nile.

Neophytus tells us, that this *lotometra* has leaves of a middle form between thoſe of the common *nymphæa*, which are roundiſh, and thoſe of the *arum*, which are oblong and pointed, and are cordated at the baſe; and this is the very figure of the leaves of the *faba Ægyptiaca*, as we ſee it in all paintings, &c.

LOTTERY, a kind of game at hazard, wherein ſeveral lots of merchandize, or ſums of money, are depoſited as prizes, for the benefit of the fortunate.

The deſign of *lotteries*, and the manner of drawing them, are too well known among us to need a deſcription: they are very frequent in England and Holland, where they cannot be ſet on foot without the permiſſion of the magiſtrate.—In France too, there have been ſeveral *lotteries* in favour of their hoſpitals.

M. le Clerc has compoſed a treatiſe of *lotteries*, wherein is ſhewn what is laudable, and what blameable in them.—Gregorio Leti has alſo a book on the ſubject of *lotteries*. Father Meneſtrier has a treatiſe on the ſame, publiſhed in 1700, where he ſhews their origin, and uſe among the Romans. He diſtinguiſhes ſeveral kinds of *lotteries*, and takes occaſion to ſpeak of chances, and reſolves ſeveral caſes of conſcience relating thereto.

The firſt *lottery* in England of which we have any account, was drawn at the weſt door of St. Paul's cathedral, in the year 1569, and conſiſted of 40,000 lots, at ten ſhillings each lot; the prizes were plate; and the profits were to be applied towards repairing the havens of this kingdom. At this time there were only three *lottery* offices in London.

In 1612, king James, for the plantation of Engliſh colonies in Virginia, appointed a *lottery*, to be held at the weſt end of St. Paul's: the chief prize of which was 4000 crowns, in fair plate. But by 10 and 11 W. c. 17. all *lotteries* are declared to be public nuiſances, and all grants, patents and licences, for ſuch *lotteries*, to be againſt law. They are farther prohibited under penalties by 9 Ann. c. 6.

By the 8 Geo. I. c. 2. for ſuppreſſion of private *lotteries*, no perſon ſhall ſet up or keep any office, or ſales of houſes or lands, plate, goods, &c. for improvement of ſmall ſums of money, or expoſe to ſale any houſes or goods by way of *lottery*, lots, tickets, or numbers, or publiſh propoſals relating to the ſame, &c. on pain of forfeiting 500l. And adventurers in ſuch ſales ſhall forfeit double the ſum contributed. See 9 Geo. I. No perſon ſhall ſell the chance of any ticket in a public *lottery* for leſs than the whole time of drawing; nor any ſhares therein, or receive money on conſideration of repayment, if tickets prove unfortunate, on forfeiture of treble the ſum received: to be recovered in the courts of Weſtminſter, &c. Stat. 6 Geo. II.

See other ſtatutes relating to *lotteries* under the article GAMING. The act paſſed in 1778, for regulating the conduct of the *lottery* reſtrains any perſon from keeping an office for the ſale of tickets, ſhares, or chances, or for buying, ſelling, inſuring or regiſtering, without a licence; for which licence each office-keeper muſt pay 50l. to continue in force for one year, and the produce to be applied towards defraying the expences of the *lottery*. And no perſon is allowed to ſell any ſhare or chance leſs than a ſixteenth, on the penalty of 50l. All tickets divided into ſhares or chances are to be depoſited in an office, to be eſtabliſhed in London by the commiſſioners of the Treaſury, who are to appoint a perſon to conduct the buſineſs thereof; and all ſhares are to be ſtamped by the ſaid officer, who is to give a receipt, for every ticket depoſited with him. The numbers of all tickets ſo depoſited are to be entered in a book, with the names of the owners, and the number of ſhares into which they are divided; and two pence for each ſhare is to be paid to the officer on depoſiting ſuch tickets, who is therewith to pay all expences incident to the office. All tickets depoſited in the office are to remain there three days after the drawing. And any perſon keeping an office, or ſelling ſhares, or who ſhall publiſh any ſcheme for receiving moneys in conſideration of any intereſt to be granted in any ticket in the ſaid *lottery*, &c. without being in poſſeſſion of ſuch ticket, ſhall forfeit 500l. and ſuffer three months impriſonment. And no buſineſs is to be tranſacted at any of the offices after eight in the evening, except on the evening of the Saturday preceding the drawing. No perſon is to keep any office for the ſale of tickets, &c. in Oxford or Cambridge, on penalty of 20l. Before this regulating ſtatute took place, there were upwards of 400 *lottery* offices in and about London only; but the whole number afterwards, for all England, as appeared by the liſt publiſhed by authority, amounted to no more than 51.

The various calculations, relating to *lotteries*, depend on an acquaintance with the doctrine of chances, a ſummary of which the reader will find under the article of GAMING. Thus by Prob. II. under that article, it is eaſy to find how many tickets one muſt take in a *lottery* where of the number of blanks to the number of prizes as 39 to 1, in order to make it an equal chance for one or more prizes. Multiply 39 by 0.7, and the product 27.3 ſhews that the number of tickets for this purpoſe will be 27 or 28 at moſt. In a *lottery* likewiſe, whereof the number of blanks is to the number of prizes as 5 to 1, multiply 5 by 0.7, and the product 3.5 ſhews, that there is more than an equality of chance in four tickets for one or more prizes, but leſs than an equality in three. But if, in a *lottery* having the blanks to the prizes as 39 to 1, the whole number of tickets were only 40, the above proportion would be altered; for 20 tickets would be a ſufficient number for the juſt expectation of the ſingle prize; becauſe it is evident, that the prize may be as well among the tickets which are taken, as among thoſe that are left behind. Moreover, if the number of tickets were 80, and the ſame proportion of blanks to prizes preſerved, the proportion would ſtill be altered; for by the doctrine of combination it appears, that the probability of taking one prize, or both in 20 tickets would be but $\frac{1}{2}\frac{9}{0}$, and the probability of taking none would be $\frac{1}{2}\frac{7}{0}$, wherefore the odds againſt taking any prize would be as 177 to 130, or nearly as 9 to 7. By the ſame doctrine of combination it alſo appears, that 23 tickets would not be quite ſufficient for the expectation of a prize in this *lottery*; but that 24 would rather be too many: ſo that one might with advantage lay an even wager of taking a prize in 24 tickets.

If the proportion of 39 to 1 be oftener repeated, the number of tickets requiſite for the equal chance of a prize, will ſtill increaſe with that repetition; yet let the

proportion of 39 to 1 be repeated ever ſo many times, nay, an infinite number of times, the number of tickets requiſite for the equal chance of a prize would never exceed $\frac{1}{39}$ of 39, that is about 27 or 28. Wherefore, if the proportion of the blanks to the prizes be often repeated, as it uſually is in *lotteries*, the number of tickets requiſite for a prize will always be found by taking $\frac{1}{39}$ of the proportion of the blanks to the prizes.

Again, by Prob. IV. under GAMING, it may be found how many tickets muſt be taken, in a *lottery* whoſe number of blanks is to that of the prizes, as 39 to 1, in order to make it as probable that 2 or more benefits will be taken as not: multiply 39 by 1.678, and the product 65.4 will ſhew, that no leſs than 65 tickets will be requiſite to that effect.

Farther, by Prob. IX. under GAMING, we may find, in a *lottery* conſiſting of 40000 tickets, among which are three particular benefits, what is the probability that taking 8000 of them, one or more of the particular benefits ſhall be among them. Subſtitute 8000, 40000, 32000, 3, and 1 reſpectively for c, n, a, e, and p, in that problem; and the probability of taking preciſely one of the three particular benefits will appear to be $\frac{8000 \times 32000 \times 31999 \times 3}{40000 \times 39999 \times 39998} = \frac{48}{125}$ nearly. If $p=2$, the probability of taking preciſely 2 of the particular benefits will be $\frac{8000 \times 7999 \times 32000 \times 3}{40000 \times 39999 \times 39998} = \frac{12}{125}$ nearly. If $p=3$, the probability of taking all the 3 particular benefits, will be $\frac{8000 \times 7999 \times 7998}{40000 \times 39999 \times 39998} = \frac{1}{125}$. And the probability of taking one or more of the three particular benefits will be $\frac{48+12+1}{125} = \frac{61}{125}$ very nearly. Theſe three operations might have been contracted into one by inquiring the probability of not taking any of the three particular benefits, which will be found to be $\frac{32000 \times 31999 \times 31998}{40000 \times 39999 \times 39998} = \frac{64}{125}$ nearly, which being ſubtracted from unity, gives a remainder, $1 - \frac{64}{125} = \frac{61}{125}$, ſhewing the probability required; and therefore the odds againſt taking any of three particular benefits will be 64 to 61 nearly.

2. To find by the ſame problem how many tickets ought to be taken in a *lottery* conſiſting of 40000, among which are three particular benefits, to make it as probable that one or more of theſe three may be taken as not. Let the number of tickets requiſite to be taken be $= x$, and the probability of not taking any of the particular benefits will be $\frac{n-x}{n} \times \frac{n-x-1}{n-1} \times \frac{n-x-2}{n-2}$ but this probability is equal to $\frac{1}{2}$, ſince by hypotheſis, the probability of taking one or more of them is equal to $\frac{1}{2}$; whence we ſhall have the equation $\frac{n-x}{n} \times \frac{n-x-1}{n-1} \times \frac{n-x-2}{n-2} = \frac{1}{2}$, from the ſolution of which x will be found nearly equal to 8252. The terms of this equation, Mr. De Moivre obſerves, may be conſidered as being in geometric progreſſion; ſince the factors both of the numerator and denominator are few and in arithmetic progreſſion, and their difference very ſmall in reſpect of n: and, therefore, the cube of the middle term may be ſuppoſed equal to the product of the multiplication of theſe terms; whence will ariſe the equation, $\left(\frac{n-x-1}{n-1}\right)^3 = \frac{1}{2}$, or, neglecting unit both in the numerator and *denominator*, $\left(\frac{n-x}{n}\right)^3 = \frac{1}{2}$ and x, conſequently, $= n \times 1 - \sqrt[3]{\frac{1}{2}}$, or $n \times 1 - \frac{1}{2}\sqrt[3]{4}$: but $n = 40000$, and $1 - \frac{1}{2}\sqrt[3]{4} = 0.20634$; therefore $x = 8252$.

3. To determine accurately, in a *lottery* of 100000 tickets, whereof 90000 are blanks, and 10000 are benefits, what the odds are of taking or not taking a benefit, in any number of tickets aſſigned. Let the number be 6; and it will appear, by the above cited problem, that the number of chances for taking no prize in 6 tickets, making $a=100000$, $b=90000$, $c=b$, $p=6$, $n=100000$, will be $\frac{90000}{1} \times \frac{89999}{2} \times \frac{89998}{3} \times \frac{89997}{4} \times \frac{89996}{5} \times \frac{89995}{6}$ and that the whole number of chances will be $\frac{100000}{1} \times \frac{99999}{2} \times \frac{99998}{3} \times \frac{99997}{4} \times \frac{99996}{5} \times \frac{99995}{6}$ then dividing the firſt number of chances by the ſecond, by means of LOGARITHMS, the quotient will be 0.53143, the probability required: this decimal fraction being ſubtracted from unity, the remainder 0.46857 ſhews the probability of taking one prize or more in 6 tickets; wherefore the odds againſt taking any prize in 6 tickets will be 53143 to 46857. If the number of tickets be 7, then carrying each number of chances above written one ſtep farther, we ſhall find that the probability of taking no prize in 7 tickets is 0.47828, which ſubtracted from unit leaves a remainder 0.52172, which ſhews the odds of taking one prize or more in 7 tickets to be 52172 to 47828.

4. By the ſame problem, to find the value of the chance of a prize, ſuppoſing each ticket to be 10*l.* and that after the *lottery* is drawn, 7*l.* 10*s.* be returned to the blanks. There being 90000 blanks, to each of which is returned 7*l.* 10*s.* the total value of the blanks is 675000*l.* and conſequently, the total value of the benefits is 325000*l.* which being divided by 10000, the number of benefits, gives a quotient 32*l.* 10*s.* and, therefore, one might for the ſum of 32*l.* 10*s.* be intitled to have a benefit certain, taken at random out of the whole number of benefits: the purchaſer of a chance has, therefore, one chance in ten for the ſum of 3*l.* 10*s.* and nine chances in ten for loſing his money, from whence it follows, that the value of his chance is the 10th part of 32*l.* 10*s.* *i. e.* 3*l.* 5*s.* And conſequently the purchaſer of a chance, by giving the ſeller 3*l.* 5*s.* is intitled to the chance of a benefit, and ought not to return any thing to the ſeller, although he ſhould have a prize; for the ſeller having 3*l.* 5*s.* ſure, and nine chances in ten for 7*l.* 10*s.* the value of which chance is 6*l.* 15*s.* it follows that he has his 10*l.* 5*s.*

In the ſame kind of *lottery*, let A engage to furniſh B with a chance, on condition that whenever the ticket on which the chance depends, ſhall happen to be drawn, whether it proves a blank or prize, A ſhall furniſh B with a new chance, and ſo on, as often as there is occaſion, till the whole *lottery* is drawn; it is propoſed to find what conſideration B ought to give A before the *lottery* begins to be drawn, for the chance or chances of one or more prizes, admitting that the *lottery* will be 40 days in drawing.

Let the abſolute value of a chance, or 3*l.* 5*s.* be called s. Firſt A who is the ſeller ought to conſider, that on the firſt day he furniſhes neceſſarily a chance whoſe value is s.

2dly, That on the ſecond day, he does not neceſſarily furniſh a chance, but conditionally, *viz.* if it ſo happen that the ticket on which the chance depends, ſhould be drawn on the firſt day; but the probability of its being drawn on the firſt day is $\frac{1}{40}$, and therefore, he ought to take $\frac{1}{40}s$ for the conſideration of the ſecond day.

3dly, That in the ſame manner he does not neceſſarily furniſh a change on the third day, but conditionally, in caſe the only ticket depending (for there can be but one) ſhould happen to be drawn on the ſecond day; of which the probability being $\frac{1}{39}$, by reaſon of the remaining 39 days from the ſecond incluſive to the laſt, it follows, that the value of that chance is $\frac{1}{39}s$.

4thly, And for the ſame reaſon the value of the next is $\frac{1}{38}s$, &c. the purchaſer ought, therefore, to give the ſeller $1 + \frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \frac{1}{5} + \&c. + \frac{1}{39} + \frac{1}{40} \times s$, or $1 + \frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \frac{1}{5} + \&c. + \frac{1}{38} \times s$. The ſum of theſe 40 terms, being 4.2785 nearly, multiplied by s or 3*l.* 5*s.* will give a product 13*l.* 9*s.* ſhewing that the purchaſer ought to give the ſeller about 13*l.* 18*s.*

From what has been ſaid it appears, that the value of the chance 1 for one ſingle day that ſhall be fixed upon is the value of that chance divided by the number of days intercepted between that day inclusive and the number of days remaining to the end of the *lottery*: which, however, muſt be underſtood with this reſtriction, that the day fixed upon muſt be choſen before the *lottery* begins; or if it be done on any other day, the ſtate of the *lottery* muſt be known, and a new calculation made accordingly for the value of s. De Moivre's Doctrine of Chances, 1756.

LOTTERY is alſo the name of a well known game at cards.

LOTUS, in *Botany*; ſee *Bird's Foot* TREFOIL.

LOTUS *Africana*. See *Indian date* PLUM.

Bladder LOTUS, a name ſometimes given to a ſpecies of *colutea*, or *anthyllis*. See LADY's *Finger*.

LOTUS, *coryalamus*, a name given by the ancient Greeks to an Egyptian plant according to ſome, and according to others, to a rare plant, found only in few places, and only met with by accident, by the people who made long and uncommon voyages. The whole account given of it, by the earlieſt writers, is no more than

that it was of a very sweet and pleasant taste. Mysepsus uses the term frequently, and his interpreters understand him to mean the *cassia fistula* by it. But we have accounts from Homer, that the followers of Ulysses were detained by eating the *lotus glycycalamus*; and it is not at all probable, that the *cassia fistula* could be the thing meant by the word in this place; neither will the words of the author allow it to be any thing of this kind. The *cassia fistula* is the fruit of a tree; but this *glycycalamus* we find in Homer himself was an herbaceous plant. Quintilian calls it expressly a kind of grass, *gramen*; and from the other accounts of its growing in form of reeds, and in wet places; it seems very probable, that it was the sugar-cane that they called by this name. See *Indian Date* PLUM.

LOVAGE, *ligusticum*, in *Botany*, a genus of the *pentandria digynia* class. Its characters are these: it has an umbellated flower, the general umbel composed of several smaller; this umbel has an involucrum of seven unequal leaves; the perianthium of the flower is indented in five parts, and the flower has five equal petals, which are inflexed at their points, and five hairy stamina; the germen, which is situated under the flower, turns to an oblong fruit, divided into two parts; it is angular and channelled, containing two oblong smooth seeds. Miller reckons five and Linnæus six species.

The root, leaves, and seeds of the common *lovage* with many leaves, whose lobes are cut toward the tops, are of the aromatic kind: they warm and comfort the stomach, expel wind, and provoke urine. They have been supposed particularly useful in female disorders.

LOVE, in *Ethics*, is one of the primitive passions; and may be generally defined to be the gravitation or tendency of the soul towards good. If this affection be conceived separate from any alteration in the body, it is called intellectual or rational *love*; if it be attended with an agitation of blood and spirits, it is called sensitive or passionate *love*. It is observed by moral writers, that those passions in which *love* predominates are more agreeable to the original intention of nature than those which are ranged under hatred; because they are found to have a more friendly influence upon the body, and tend, within proper bounds, to the preservation and happiness of life, which the others do not. See Cumberland de Leg. Nat. c. 2. § 18. *Love* regarding its object as absent, begets desire; as present, either immediately or in prospect, joy and hope. *Love* of desire, abstractedly considered, is a simple tendency towards good; when considered as wishing the good desired to some being or other, it is called BENEVOLENCE, and SELF-*love*. See PLEASURE, and PAIN.

LOVE, *family of*. See FAMILY.

LOVE, *Platonic*. See PLATONIC.

LOVE-*apple* is the English name for the fruit of the LYCOPERSICON, a plant cultivated in gardens with us, for the singularity of its appearance. The Portuguese call it *tomato*, and eat the fruit, either raw or stewed; as do also the Jew families in England.

LOVE-*grass*; see GRASS.

LOVE *in a mist*; see PASSION *Flower*.

LOVE *lies a bleeding*. See AMARANTH.

Tree of LOVE. See JUDAS *Tree*.

LOUIS, LEWIS, LOUIS D'OR, or LEWIDORE, a French coin, first struck in 1641, under the reign of Louis XIII. and which has now a considerable currency.

Louis d'ors, at first, were valued at ten livres, afterwards at eleven, and at length at twelve and fourteen. In the latter end of the reign of Louis XIV. they were risen to twenty, and in the beginning of that of Louis XV. to thirty and thirty-six, nay, forty and upwards; with this difference, however, that in the last coinings the weight was augmented in some proportion to the price, which, in the former reign, was never regarded.

On one side of the coin is the king's head seen, with his name; and on the other, a cross composed of eight L's cantoned with crowns. The legend is, *Christus regnat, vincit, imperat*.—The reverse has been frequently changed; at present, it bears a hand of justice crossed in a saltier, with a sceptre.

There are also *white* LOUISES, or LOUIS *d'argent*, some of 120, others of 60 sols a-piece, called also *ecus*; and among us, *French crowns, half-crowns*, &c.

On the one side of these is the king's head, and on the other the French arms, with this legend, *Sit nomen Domini benedictum*.

Knights of S. LOUIS, is the name of a military order, instituted by Louis XIV. in 1693.

Their collar is of a flame-colour, and passes from left to right. The king is their grand-master. There are in it eight great crosses, and twenty-four commanders. The number of knights is not limited. At the time of their institution, the king charged his revenue with a fund of three hundred thousand livres, for the pensions of the commanders and knights.

LOUS, AOS, in *Chronology*, the Macedonian name for the Athenian month HECATOMBÆON, which was the first of their year, and answered to the latter part of our June and the beginning of July.

LOUSE, *pediculus*, in *Zoology*, a genus of insects of the *aptera* order, the body of which is lobated at the sides; the abdomen depressed; the legs are six, serving only for walking; the eyes are two, and are simple; the mouth is capable of putting out a small sting; and the antennæ are of the length of the thorax.

Most animals are infested with *lice*, or insects, which feed upon them; thus sheep have one species, oxen another, &c. and mankind are not free from them. For beside the common kind, whose natural habitation is in the heads of children, there is another kind called the *crab-louse*, whose residence is about the pubes. Linnæus enumerates no less than forty different species, distinguishing them by the several animals to which they belong.

The *louse* affords to the microscopic observer of the works of the creation, a very delicate and beautiful structure of parts. See *Tab. of Microscopical Objects, class* 1.

This creature has so transparent a shell, or skin, that we are able to discover more of what passes within its body, than in most other living creatures. It has naturally three divisions, the head, the breast, and the tail part. In the head appear two fine black eyes, with a horn that has five joints, and is surrounded with hairs standing before each eye; and from the end of the nose, or snout, there is a pointed projecting part, which serves as a sheath or case to a piercer, or sucker, which the creature thrusts into the skin, to draw out the blood and humours, which are its destined food, for it has no mouth that opens in the common way. This piercer, or sucker, is judged to be seven hundred times smaller than a hair, and is contained in another case within the first, and can be thrust out or drawn in at pleasure. Baker's Microscope, p. 177.

The breast is very beautifully marked in the middle, the skin is transparent, and full of little pits, and from the under part of it proceed six legs, each having five joints, and their skin all the way resembling shagreen, except at the ends, where it is smoother. Each leg is terminated by two claws, which are hooked, and are of an unequal length and size; these it uses as we would a thumb and a middle finger, and there are hairs between these claws as well as all over the legs. Lewenhoeck's Arcan. Nat. tom. ii. p. 74.

On the back of the tail part there may be discovered some ring-like divisions, abundance of hairs, and a sort of marks, which look like the strokes of a rod on a child that has been whipped; the skin of the belly seems like shagreen, and toward the lower end is very clear, and full of pits: at the extremity of the tail there are two semi-circular parts, covered all over with hairs, which serve to conceal the anus.

When the *louse* moves its legs, the motion of the muscles, which all unite in an oblong dark spot in the middle of the breast, may be distinguished perfectly, and so may the motion of the muscles of the head when it moves its horns. We may likewise see the various ramifications of the veins and arteries, which are white, with the pulse regularly beating in the arteries. But the most surprising of all the sights is the perillaltic motion of the guts, which is continued from the stomach down to the anus. Philos. Trans. N° 102.

If one of these creatures, when hungry, be placed on the back of the hand, it will thrust its sucker into the skin, and the blood it sucks may be seen passing in a fine stream to the fore-part of the head, where falling into a roundish cavity, it passes again in a fine stream to another circular receptacle in the middle of the head; from thence it runs through a smaller vessel to the breast, and then to a gut which reaches to the hinder part of the body, where in a curve it turns again a little upward. In the breast and the gut the blood is moved without intermission with a great force, especially in the gut; and that with so strong a propulsion downward, and such a contraction of the gut as is very surprising. Power's Mic. Obs. 9.

In the upper part of the crooked ascending gut before mentioned the propelled blood stands still, and seems to undergo a separation; some of it becoming clear and watery, while other little black particles pass downward to the anus.

If a *louse* be placed on its back, two bloody darkish spots appear; the larger in the middle of the body, the lesser toward the tail. In the larger spot, a white film or bladder contracts and dilates upwards and downwards from the head toward the tail, the motions of which are followed by a pulsation of the dark bloody spot, in or over which

the white bladder seems to lie. This motion of the syſtole and diaſtole is beſt ſeen when the creature begins to grow weak; and on picking the white bladder, which ſeems to be the heart, the creature always inſtantly dies. The lower dark ſpot is ſuppoſed to be the excrements in the guts.

Lice have been ſuppoſed to be hermaphrodites, but this is erroneous; for Mr. Lewenhoeck diſcovered that the males have ſtings in their tails, which the females have not. And he ſuppoſes the ſmarting pain theſe creatures ſometimes give to be owing to their ſtinging with theſe ſtings, when made uneaſy by preſſure or otherwiſe. And this accurate obſerver ſays, that he felt little or no pain from their ſuckers, though ſix of them were feeding on his hand at once.

The ſame accurate obſerver determining to know their true hiſtory and manner of breeding, put two females into a black ſtocking, which he wore night and day. He found, on examination, that in ſix days one of them had laid above fifty eggs; and upon diſſecting it, he found as many yet remaining in the ovary; whence he concludes, that in twelve days it would have laid a hundred eggs. Theſe eggs naturally hatch in ſix days, and would then probably have produced fifty males and as many females; and theſe females coming to their full growth in eighteen days, might each of them be ſuppoſed after twelve days more to lay a hundred eggs; which eggs, in ſix days more, might produce a young brood of five thouſand; ſo that in eight weeks one *louſe* may ſee five thouſand of its own deſcendents. A *louſe* may be eaſily diſſected in a ſmall drop of water upon a ſlip of glaſs; and thus placed before the microſcope, it is common to find five or ſix eggs of a ſize ready to be laid, and ſixty or ſeventy others of different bigneſs. In the male the penis is very remarkably diſtinct, as are alſo the teſtes, of which he ſeems to have a double pair, as is alſo the ſting, the ſtructure of which merits a peculiar attention. Lewenhoeck's Arcan. Natur. tom. ii. p. 78.

Many animals, both of the quadruped and flying kinds, are ſubject to *lice*: but theſe are of peculiar ſpecies on each animal, and are not at all like thoſe which infeſt the human body. Nay, even inſects are infeſted with vermin, which feed on them and torment them. Several kinds of beetles are very ſubject to *lice*, but particularly that kind called thence the *louſy beetle*. The *lice* on this are very numerous, but will not be ſhook off. The earwig is often infeſted with *lice* juſt at the ſetting on of its head; theſe are white, and ſhining like mites, but they are much ſmaller; they are round-backed, flat-bellied, and have long legs, particularly the foremoſt pair. Snails of all kinds, but eſpecially the large naked kinds, are very ſubject to *lice*, which are continually ſeen running about them, and devouring them. Numbers of little red *lice*, with a very ſmall head, and in ſhape reſembling a tortoiſe, are often ſeen about the legs of ſpiders, and they never leave the ſpider while he lives, but if he be killed, they almoſt inſtantly forſake him. A ſort of whitiſh *lice* are very common on humble-bees; they are alſo found on ants; and many ſorts of fiſhes are not leſs ſubject to them than the land animals. Kircher ſays, that he has found *lice* alſo on flies. Baker's Microſcope, p. 182.

Signior Redi, who has more accurately examined theſe creatures than any other author, has engraved ſeveral ſpecies found on different animals. He calls thoſe found on beaſts *lice*, and thoſe found on birds fleas. He is of opinion, that every ſpecies of birds has its peculiar ſort of flea, different from thoſe of other birds; and has obſerved that they are hatched white, but that they gradually acquire a colour, like that of the feathers they live among; yet they uſually remain tranſparent enough for a good microſcope to diſcover the motion of their inteſtines. The kinds he has obſerved are theſe: on the hawk three different ſorts; on the large pigeon, the turtle-dove, the hen, the ſtarling, the crane, the magpye, the heron, the leſſer heron, the ſwan, the turkey, the duck, the ſea-mew, the ſmall ſwan, the teal, the caſſtrel, the peacock, the capon, and the crow, on each one ſort; on the moorhen three ſorts; on the wild gooſe two ſorts; and on the crane, beſide the common one, a white ſort, marked, as it were, with Arabic characters. Men, he obſerves, are ſubject to two kinds, the common *louſe*, and that called the *crab-louſe*. He alſo found peculiar ſorts on the goat, the camel, thoſe, the African ram, the ſtag, which has like many of the birds, two kinds, and on the lion and the tyger. The ſame author has obſerved, that the ſize of theſe creatures is not at all proportioned to that of the animal they are to inhabit, for the ſtarling has them as large as the ſwan. Redi, Gen. Inſ. p. 312.

It is obſervable, that ſome ſort of conſtitutions are more apt to breed *lice* than others; and that in certain places of different degrees of heat, they are very certain to be deſtroyed upon people, who in other climates are overrun with them. It is an obſervation of Oviedo, that the Spaniſh ſailors, who are generally much afflicted with *lice*, always loſe them in a certain degree in their voyage to the Indies, and have them again on their coming to the ſame degree at their return: this is not only true of the Spaniards, but of all other people who make the ſame voyage; for though they ſet out ever ſo *louſy*, they have not one of theſe creatures to be found after they come to the tropic. And in the Indies there is no ſuch thing as a *louſe* about the body, though the people be ever ſo naſty. The ſailors continue free from theſe creatures till their return; but in going back they uſually begin to be *louſy*, after they come to about the latitude of Madeira. The extreme ſweats, which the working people naturally fall into between this latitude and the Indies, drown and deſtroy the *lice*, and are of the ſame effect as the rubbing over the *louſy* heads of children with butter and oil. The ſweat in and about the Indies is not rank as in Europe, and therefore it is not apt to breed *lice*; but when the people return into latitudes where they ſweat rank again, their naſtineſs ſubjects them to the ſame viſitations of theſe vermin which it uſed to have.

The people in general, in the Indies, are very ſubject to *lice* in their heads, though free from them in their bodies. The reaſon of this is, that their heads ſweat leſs than their body, and they take no care to comb and clean them. The Spaniſh negroes waſh their heads thoroughly once every week with ſoap, to prevent their being *louſy*. This makes them eſcape much better than the other negroes who are ſlaves there, for the *lice* grow ſo numerous in their heads, that they often eat large holes in this part. Mr. de la Hire has given a curious account of the creature which he found on the common fly. Having occaſion to view a living fly by the microſcope, he obſerved on its head, back, and ſhoulders, a great number of ſmall animals, crawling very nimbly about, and often climbing up the hairs, which grow at the origin of the fly's legs. He, with a fine needle, took up one of theſe, and placed it before the microſcope, uſed to view the animalcules in fluids. It had eight legs, four on each ſide; they were not placed very diſtant from one another, but the four toward the head were ſeparated by a ſmall ſpace from the four toward the tail. The feet were of a particular ſtructure, being compoſed of ſeveral fingers, as it were, and fitted for taking faſt hold of any thing; the two neareſt the head were alſo more remarkable in this particular than thoſe near the tail; the extremities of the legs, for a little way above the feet, were dry and void of fleſh, like the legs of birds, but above this part they appeared plump and fleſhy. It had two ſmall horns upon its head, formed of ſeveral hairs arranged cloſely together; and there were ſome other cluſters of hairs by the ſide of theſe horns, but they had not the ſame figure; and toward the origin of the hinder legs there were two other ſuch cluſters of hairs, which took their origin at the middle of the back. The whole creature was of a bright yellowiſh red; and the legs, and all the body, except a large ſpot in the centre, were perfectly tranſparent. In ſize, the author believes it was about a tenth part of the bigneſs of the head of the fly; he obſerves, that it is rarely that flies are found infeſted with them. Mem. Acad. Par. 1693.

LOUSE, *tree*. See APHIS.

LOUSE, *wood*. See MILLEPEDES.

LOUSE-*wort*, *pedicularis*, in *Botany*, the name of a genus of plants, of the *didynamia angioſpermia* claſs; the characters of which are theſe: the flower conſiſts of one leaf, and is of perſonated or maſked form, and divided into two lips, the upper one hooded, the lower one divided into three ſegments; the piſtil ariſes from the cup, and is fixed in manner of a nail to the hinder part of the flower; this afterwards ripens into a capſule, divided into two cells, and containing oblong, flatted, and marginated ſeeds. Linnæus enumerates fifteen ſpecies of this plant. The common ſpecies are very troubleſome weeds in paſtures.

LOUSE-*wort*, *yellow*, *rhinanthus*, in *Botany*, a genus of the *didynamia angioſpermia* claſs; the characters are, that the flower hath a permanent empalement of one leaf, which is roundiſh, compreſſed, and blown up; it hath one ringent petal, with a cylindrical tube of the length of the empalement, compreſſed at the baſe, but opening at the top; the upper lip is hooded, compreſſed, and indented at the point; the lower lip is plain, ſpreading, and cut into three obtuſe parts at the point; it has four ſtamina ſhut up in the upper lip, and an oval compreſſed germen, which becomes a capſule of the ſame form, with two cells, opening on the ſide and filled with compreſſed ſeeds. Miller enumerates three and Linnæus ſeven ſpecies.

The Dutch carry on a trade with the ſeeds and feed-veſſels of a ſpecies of this plant, reſembling the common yellow-meadow *louſe-wort*, to Germany, and call it *ſemen ſorodillæ*; they uſe it for deſtroying bugs: for this purpoſe, they boil a quantity of the ſeeds and capſules in common water, with which they waſh their wainſcots, bed-

bedſteads, &c. where theſe inſects are lodged, and thus they are effectually deſtroyed. Miller.

LOUVRE, in *Muſic*, a well known dance-tune.

LOUVRE is alſo the name of the royal palace at Paris.

LOUVRE, *bowers of the*. See HONOURS.

LOW *air*, in *Horſemanſhip*. See AIRS.

Low *ſhank, hemiſphere, maſs, ſtyle*. See the ſubſtantives.

Low-*bell*, in *Bird-ing*, a name given to a *bell*, by means of which they take birds in the night in open champaign countries, and among ſtubble in October. The method is to go out about nine o'clock in a ſtill evening, when the air is mild and the moon does not ſhine.

The *low-bell* is to be of a deep and hollow ſound, and of ſuch a ſize, that a man may conveniently carry it in one hand. The perſon who carries it is to make it toll all the way he goes, as nearly as may be, in that manner in which the *bell* on the neck of a ſheep tolls, at it goes on while it feeds. There muſt alſo be a box made like a large lanthorn, about a foot ſquare, and lined with tin, but with one ſide open. Two or three great lights are to be ſet in this, and the box is to be fixed to the perſon's breaſt, with the open ſide forwards, ſo that the light may be caſt forward to a great diſtance; it will ſpread as it goes out of the box, and will diſtinctly ſhew the perſon who carries it whatever there is in the large ſpace of ground which it extends over, and conſequently all the birds that rooſt upon the ground. Two perſons muſt follow him who carries the box and *bell*, one on each ſide, ſo as not to be within the reach of the light to ſhew themſelves. Each of theſe is to have a hand-net of about three or four feet ſquare, faſtened to a long ſtick or pole; and on which ever ſide any bird is ſeen at rooſt, the perſon who is neareſt is to lay his net over it, and take it with as little noiſe as poſſible. When the net is over the bird, the perſon who laid it, is not to be in a hurry to take the bird, but muſt ſtay till he who carries the light is got beyond it, that the motions may not be diſcovered. The blaze of the light, and the noiſe of the *bell*, terrify and amaze the birds, in ſuch a manner, that they remain ſtill to be taken; but the people who are about the work muſt keep the ſtricteſt quiet and ſtillneſs that may be.

Some people are fond of going on this ſcheme alone. The perſon then fixes the light-box to his breaſt, and carries the *bell* in one hand and the net in the other; the net, in this caſe, may be ſomewhat ſmaller, and the handle ſhorter. When more than one are out at a time, it is always proper to carry a gun. It is no uncommon thing to ſpy a hare when on this expedition; and, in that caſe, it is better to ſhoot her, than to truſt to the taking her in the net, for ſhe will very eaſily eſcape from that. Some tie the *bell* to their girdle, and carry the light in their left hand and the net in the right; the light is not to be ſo large in this caſe, and the other way is therefore rather the better.

Low-*bellers*, in our *Statute-Books*, are perſons who go in the night-time with a light and a bell; by the ſight and noiſe whereof, birds ſitting on the ground become ſtupefied, and ſo are covered with a net, and taken.

LOW, in the *Manege*—To *carry* LOW. See CARRYING.

Low-*water*. See WATER.

Low-*wines*. See *Low*-WINES.

To LOWER, in *Sea-Language*, is to eaſe down gradually, expreſſed of ſome weighty body, which is ſuſpended by tackles or other ropes, which, being ſlackened, ſuffer the body to deſcend as ſlowly or expeditiouſly as the occaſion requires. Hence *lower handſomely*, and *lower cheerly*, are oppoſed to one another; the former being the order to *lower* gradually, and the latter to *lower* expeditiouſly.

LOWERING, in the *Diſtillery*, a term uſed to expreſs the debaſing the ſtrength of any ſpirituous liquor by mixing water with it. The ſtandard and marketable price of theſe liquors are fixed, in regard to a certain ſtrength in them called PROOF; this is that ſtrength, which makes them, when ſhook in a phial, or poured from on high into a glaſs, retain a froth or crown of bubbles for ſome time. In this ſtate ſpirits conſiſt of about half pure, or totally inflammable ſpirit and half water; and if any foreign or home ſpirit is to be expoſed to ſale, and is found to have that proof wanting, ſcarce any one will buy it, till it has been diſtilled again and brought to that ſtrength; and if it is above that ſtrength the proprietor uſually adds water to it to bring it down to that ſtandard. This addition of water, to debaſe the ſtrength, is what is called *lowering* it. People well acquainted with the goods, will indeed buy ſpirits at any ſtrength, only *lowering* a ſample to the proof ſtrength, and by that judging of the ſtrength of the whole; but the generality of buyers will not enter into this, but muſt have it all *lowered* for them.

There is another kind of *lowering* in practice among the retailers of ſpirituous liquors to the vulgar, this is the reducing it under the ſtandard of proof. They buy it proof, and afterwards increaſe their profit upon it, by *lowering* it with water one eighth part. The quantity of ſpirit is what they generally allow themſelves for the addition of water; and whoever has the art of doing this, without deſtroying the bubble proof, as this is eaſily done by means of ſome addition, that gives a greater tenacity to the parts of the ſpirit, will deceive all that judge by this proof alone; that is, very nearly all who are concerned in the ſpirit trade. Such an additional quantity of water as one eighth, makes the ſpirit taſte ſofter and cooler, and will make many prefer it to the ſtronger ſpirit, which is hotter and more fiery; but unleſs the ſpirit, thus *lowered*, were tolerably clean, or the proof be ſome other way preſerved, the addition of the water lets looſe ſome of the coarſe oil, which makes the liquor milky, and leaves a very nauſeous taſte in the mouth. Shaw's Eſſay on Diſtillery.

The way to judge of ſpirits not being thus *lowered*, or debaſed in ſtrength, is to examine them by the eye and tongue; and in buying a quantity of proof goods, ſuch ſhould always be choſen as are clean, thin, and light, and have a good crown of froth which goes off in large bubbles, ſuch as taſte ſoft and uniform, and are not high flavoured, of an alcaline guſt, nor acrid and fiery, but ſoon quit the tongue.

LOWERING *the flag*. See FLAG.

LOWEST *region*. See REGION.

LOXIA, in *Ornithology*. See CROSS-*bill*. See alſo BULL-*finch*, COCCOTHRAUSTES, GREEN-*finch*, &c.

LOXODROMIC *table*. See TABLE.

LOXODROMICS, the art, or method, of oblique SAILING, by the loxodromy, or RHUMB.

LOXODROMY, LOXODROMIA, formed of λοξὸς, *oblique*, and δρόμος, *courſe*, the line which a ſhip deſcribes in ſailing on the ſame collateral RHUMB.

The *loxodromy*, called alſo the *loxodromic line*, cuts all the meridians in the ſame angle, called the *loxodromic angle*. This line is a ſpecies of the logarithmic SPIRAL, deſcribed on the ſurface of the ſphere, having the meridians for its radii.

LOYAL, in the *Manege*. A horſe is ſaid to be *loyal*, that freely bends all his force in obeying and performing any manege he is put to; and does not defend himſelf, or reſiſt, notwithſtanding his being ill treated.

A *loyal* mouth is an excellent mouth, of the nature of ſuch as we call mouths with a full reſt upon the hands.

LOZENGE, or LOZANGE, in *Geometry*, a kind of parallelogram, or quadrilateral figure, conſiſting of four equal and parallel lines, or ſides, whoſe angles are not right, but whereof two oppoſite ones are acute, and the other two obtuſe; the diſtance between the two obtuſe ones being always equal to the length of one ſide.

Scaliger derives the word *lozange* from *lauragia*; this figure reſembling, in ſome reſpects, that of a laurel-leaf. In geometry, it is ordinarily called RHOMBUS; and, when the ſides are unequal, RHOMBOIDES.

LOZENGE, in *Heraldry*, is a rhombus, or figure of equal ſides, but unequal angles; reſembling a quarry of glaſs in our old windows; placed erect, point-ways. See *Tab. II. Heraldry, fig.* 71. It is in this figure that all unmarried gentlewomen and widows bear their coats of arms becauſe, as ſome ſay, it was the figure of the Amazonian ſhield; or, as others, becauſe it is the ancient figure of the ſpindle.

The *lozenge* differs from the *fuſil*, in that the latter is narrower in the middle, and not ſo ſharp at the ends.

LOZENGES, among *Jewellers*, are common to brilliant and roſe-diamonds. In the former they are formed by the meeting of the ſtill and flat-facets on the bezil; in the latter, by the meeting of the FACETS in the horizontal ribs of the crown.

LOZENGE, is alſo a form of medicine, made into ſmall pieces, to be held or chewed in the mouth till they are melted there: the ſame with what are otherwiſe called *troches*, *troches*.

LUA, in *Mythology*, a Roman divinity mentioned by Livy, lib. viii. and invoked in war. The name is ſuppoſed to be derived from *luere, to expiate*.

LUBI, in *Botany*, a name by which many authors have called the *cocoznite-tree*, or *palma muſciferа medica* of other writers.

LUCAR, among the Romans, an appellation given to the money expended upon plays and public ſhews.

LUCARIA, an ancient feaſt celebrated by the Romans. Sext. Pompeius obſerves, that the *Lucaria* were ſolemnized in the woods, where the Romans, defeated and purſued by the Gauls, retired, and concealed themſelves. The word, according to Feſtus, and Sext. Pompeius, comes from *lucus*, a *grove*, or *wood*. Varro derives it from *lux*, the ablative of the word *lux, light* and *liberty*. But the former etymology ſeems the more natural.

It was held in the month of July, in memory of the aſylum they found in the wood, which was between the Tyber and the road called Via Salaria.

LUCE,

LUCE, *cæcitie*. See EAU *de luce*.

LUCERIUS, in *Mythology*, a name given to Jupiter, as *Lucetia* was given to Juno, as the deities which gave light to the world.

LUCERNA, in *Zoology*, the name of a fish caught in the Mediterranean and some other seas, of the oculus kind, and very nearly approaching to the shape and figure of the HIRUNDO. Its tail is but slightly forked, and what distinguishes it principally from the hirundo, is, that its side-lines near the tail divide into two, whereas in that fish they continue single; its scales are very small, and it has a furrow on the back, edged by twenty-five spines on each side; the gill-fins are of a remarkable size, and look like wings: it feeds on shrimps and other small animals. See *Tab.* II. *of Fishes*, N° 20.

LUCERNE, *medica*, in *Botany*. The flower, which hath a bell-shaped empalement of one leaf, cut into five equal acute points, is of the butterfly kind; the standard oval and entire; the border reflexed; the two wings are oblong, oval, and fixed by an appendix to the keel, which is oblong, bifid, and reflexed toward the standard; it has ten stamina, nine of which are joined almost to their tops, the other is single, terminated by small summits; it has an oblong compressed germen, which is incurved, sitting on a short style: this and the stamina are involved by the keel and standard; the germen afterward turns to a compressed moon-shaped pod, inclosing several kidney-shaped seeds. Miller enumerates eight species. Linnæus joins this genus to the medicago or *Snail* TREFOIL.

Lucerne, which is the greater upright *medica*, with purplish flowers, called also Burgundy hay, is frequently cultivated by our farmers in the manner of clover. It is the same plant which the ancients were so fond of under the name of *medica*, so called because it came originally from Media, and on the culture of which they bestowed such great care and pains.

Its leaves grow three at a joint, like those of the clover; its flowers, which appear in June, are purple, and its pods of a screw-like shape, containing seeds, which ripen in September, like those of the broad-clover, but larger and more kidney-shaped.

The stalks grow erect, and after mowing, they immediately grow up again from the parts where they were cut off. The roots are longer than those of the saint-foin, and are not single, but sometimes they run perpendicular in three or four places from the crown. Miller reckons four varieties of this species, the best of which is that with the purple flower.

This is the only plant in the world, whose hay is preferable to the saint-foin for the fattening of cattle; but its virtues, in that respect, are so great, that they are not to be credited by any that have not tried the plant. It is the sweetest grass in the world, but must be given to cattle with caution, and in small quantities, otherwise they will swell and incur diseases from it.

The ancients were at the greatest pains to plant this properly: they chose the fattest and best land they had for it, and this they dunged and laid out in beds as we do for the choicest garden-plants. They sowed it in the end of April, first carefully preparing the ground by breaking the clods, they then raked the earth over the seeds to cover them lightly, and when it was come up they carefully kept the beds clear of weeds. They sowed it very thick, and let the first crop of it stand till the seed was in part shattered out, that they might be sure of more plants in the beds; after this, they cut it as young as they pleased, and it usually yielded them four or five crops or more in a year. A land well planted with it, would, with proper management, last ten years, and produce largely all the time. It is computed that English gardeners make forty pounds of an acre of asparagus, or many other garden plants, with half the labour and expence that was bestowed upon an acre of the Roman *medica*. This was a piece of husbandry only practised while that great empire was in its glory; at present they have very little *medica* or *lucerne* in Italy, and what they have is manured in a less troublesome manner.

In the south of France there is annually a great quantity of it raised. They sow it alone in March, or in the end of September, choosing for this purpose dry and sandy lands, but such as lie low.

They prepare these by ploughing and harrowing them very fine, and the spring and autumn being rainy, they have no occasion to water the plants, while young, as the Romans did. The summers in that part of the world are much drier than in Italy, and by that means the grass is burnt up, and other weeds much destroyed, so that the crop does not want that vast expence in weeding that the Roman *medica* did: by this means the expence also is greatly abated.

On the banks of the Rhine *lucerne* is produced in great abundance, and may be mowed five or six times in a year.

In Switzerland also this plant is cultivated with great advantage: but it has not found so good a reception in England as it justly deserves; though there is reason to believe that it will succeed as well in this country as in France or Switzerland, since it is extremely hardy, and capable of resisting the severest cold of our climate. The culture of *lucerne* was attempted in this country about the year 1650, and afterwards discontinued, through failure of success, for many years: but since the discovery and practice of the new method of husbandry, it has been revived with considerable advantage. However writers on agriculture are not agreed as to the best method of cultivating this plant. Mr. Tull observes, that though all our land seems to be either too rich, too poor, or too cold, for raising this valuable plant in the way of the common husbandry, yet he is convinced that in the new method many thousand acres of English land are capable of producing fine crops of it, even for an age together.

The greater degree of moisture, and less heat of this climate, are all of the utmost advantage to this plant when horse-hoed, as that sufficiently prevents the growth of the turf which would destroy it.

In the drier summers in Italy and the south of France, the *lucerne* yields only four or five crops instead of six or seven; but in the driest summers in England, it would succeed the best of all, and give the most numerous crops. The horse-hoeing prevents the turf, and makes the land imbibe the dews, and retain them for the nourishment of the plants; and *lucerne*, in sheltering places, will grow by this means, even in our winter, plants of it having been seen at Christmas of fourteen inches high. Our winters need not be feared in regard to the *lucerne*, for at Neufchatel it is found to stand all the winters very well; yet there the rosemary-plants all die if left out in the winter. This is a proof that the winters are more severe than our's, for it is not one winter in forty that hurts this shrub with us.

In the year 1708, the *lucerne* in Languedoc suffered by the severity of the winter, but this was so sharp, that the olive-trees, and even the walnut-trees, were also killed by it: as no such frosts come among us as to kill our walnut-trees, we need not fear a crop of this plant, for much of it survived even there when those trees perished. In Languedoc the *lucerne* never arrives at any great height, except where it has the advantage of the plough; and in Wiltshire there have been lands sown with it, where it grew but poorly and low; but after the same grounds had been ploughed, and after corn laid down with saint-foin, the *lucerne* plants that were left grew up to a vast height, and were very vigorous, which shews the advantage of the plough; and all this advantage will be regularly given by horse-hoeing, without the destruction of any of the plants. Though the common method of husbandry will not raise *lucerne* to advantage, yet the horse-hoeing husbandry will raise it annually, increasing in value to the owner, and make one of the most profitable articles of it.

The soil to plant it on must be either a hot gravel, or a very rich dry sand, or some other rich warm land that has not an under stratum of clay, and is not too near springs of water. The natural poorness of gravel may be made up by dung and the benefit of the hoe, and the natural richness of the other lands being increased by hoeing and cleansing them from grass, the *lucerne* will thrive with less heat; for what it wanted in one of these qualities must be made up in the other. The best season for planting it in England according to Mr. Tull, is about the middle of April, after the danger of frost is past; for a small frost will destroy the whole crop, when the plants first appear, and too much wet, with cold weather, will rot the seeds in the ground.

The number of *lucerne* plants should be less than those of of saint-foin to an acre, because they grow much larger in this way of management, and each occupies a great space of ground, and produces a larger quantity of hay. The quick growth of this plant requires that it should have large supplies of nourishment, and good room to grow in, and it is better in all things of this kind to err in setting the plants too far distant than in setting them too near.

The most fatal disease incident to *lucerne* is starving; for this reason good culture is necessary to it, and the often turning the earth with the hoe all about it. By this means, a plant, that in the common way of sowing, would not have been more than four or five inches high, will be three feet, and will spread every way, so as to produce a quantity of hay, more like the cutting of a shrub than a plant. The plants should stand at five inches distance in single rows, and the intervals between these rows must be left wide enough for the use of the hoe-plough.

The rows of *lucerne* plants must not be thinned till they are grown up to some height; for while young they are subject to be eaten by the fly, like turnips; and if this destroyer should seize them, after they are reduced to only a competent number, the crop would be rendered much too thin. The hoe-plough is the only instrument that can

bring

bring this plant to perfection, and it must be frequently had in proportion to the number of crops it produces; but then it must be ſtill ſome years, leſt the ploughed ground injure the hay that is made upon it; and when it is come to a turf, and the *lucerne* wants renewing, the four-coulterred plough is the only inſtrument that can prepare the turf to be killed, and cure the *lucerne*. This plough muſt be uſed in the following manner: turn its furrows toward one row, and from the next; that is, plough round one row, and that will finiſh two intervals; and ſo of the reſt. The next ploughing muſt be towards thoſe rows from which they were turned the firſt time, and care muſt be taken that the firſt furrows do not lie long enough on the rows to kill the plants, which will be much longer in winter than in ſummer.

Lucerne can never be expected to ſucceed well any where, let the ſoil be ever ſo good, unleſs it be kept clean from natural graſs. Tull's Horſe-Hoeing Huſbandry, chap. 13.

Mr. Miller, in his directions for the culture of *lucerne*, recommends a light, dry, looſe, ſandy land; which ſhould be well ploughed and dreſſed, and cleared of weeds. The beſt time for ſowing the ſeed, which ſhould not be mixed with oats or barley, as is ſometimes the practice, is in the middle of April, and in a dry ſeaſon. After having well ploughed and harrowed the land very fine, he adviſes to make a drill quite acroſs the ground, almoſt half an inch deep, into which the ſeeds ſhould be ſcattered very thin, and to cover them over with earth ſomewhat more than a quarter of an inch thick. Another drill ſhould then be made about a foot and a half from the former, ſowing the ſeeds in the ſame manner as before, and thus proceeding through the whole ground. In this way, an acre of land will require about ſix pounds of ſeeds. If this crop be well cultivated, it will continue many years, and be as good as when firſt ſown. By ſowing the ſeed in rows, the plants will have room to grow, and the ſoil between them may be ſtirred more eaſily with a hoe, in order to deſtroy the weeds and encourage the growth of the plants. This hoeing ſhould be repeated in dry weather two or three times, while the plants are young, for more effectually deſtroying the weeds. In the beginning of Auguſt the plants will have grown to the height of two feet or more, and the flowers will begin to appear: they ſhould then be cut in a dry ſeaſon; and when they are made into hay, often turned, that they may ſoon dry and be carried off the ground; for if they be long upon the roots, they will prevent their ſhooting. Mr. Tull recommends to cut the *lucerne* before it begins to flower: the richeſt *lucerne* hay, he ſays, is cut while the ſtalks are ſingle, without any collateral branches, and in this caſe there is not uſually ſo much as the bud of a flower to be ſeen on the plants. After the crop is taken off, the ground ſhould be ſtirred between the rows with a hoe, to kill the weeds and looſen the ſurface; and thus in the beginning of September, there will be ſhoots four or five inches high, which may be fed down with ſheep until November. In the beginning of February, the ground between the rows ſhould again be ſtirred with the hoe, without injuring the crown of the roots. By this management, in a warm ſoil, the ſhoots will be five or ſix inches high in the middle of March; and they may be fed down, if fodder be wanted, till a week in April; after which it ſhould be left to grow for a crop, which will be fit to cut in the beginning of June; and when the ground is cleared, let it be ſtirred again with a Dutch hoe, and thus there will be another crop fit to cut in the middle or latter end of July: after which it ſhould be fed down again in autumn with larger cattle, obſerving not to let them remain after the roots have done ſhooting, leſt they eat down the crown of the roots below the buds, which would conſiderably damage, if not deſtroy them. In this way you may continue conſtantly to have two crops to cut, and two feedings upon this plant, and in good ſeaſons there may be three crops cut and two feedings; which will be a great improvement, eſpecially as this plant will grow upon dry barren ſoils, and be of great uſe in dry ſummers, when graſs is often burnt up. And as it is an early plant in the ſpring, it will be of great ſervice when fodder is ſcarce, becauſe it will be fit to feed at leaſt a month before graſs or clover. The beſt ſeed is procured from Switzerland and the northern parts of France; but the ſeed may be ſowed in England, by ſuffering ſome of the plants to grow uncut till the ſeeds are ripe, and then cutting them and laying them to dry in an open barn, expoſed to the air, but defended from the wet. When they are quite dry, the ſeed may be threſhed out, cleanſed from the huſk, and preſerved in a dry place. This ſeed, ſays Mr. Miller, is preferable to any brought from abroad. This writer ſays great things of *lucerne* being ſown by itſelf, unmixed with any other ſeed. When the *lucerne* is made into hay, it muſt be often turned, and expoſed a fortnight before it can be houſed; and it ſhould then be kept in cloſe barns, where it will remain good for three years. One acre of this fodder has been reckoned ſufficient to keep three horſes for a whole year; and three acres of it have fed ten cart-horſes, from the end of April to the beginning of October, without any other food, though they have been conſtantly worked. *Lucerne* is beſt uſed green, and will ſerve the purpoſe both of hay and corn. Miller's Gard. Dict.

Mr. Rocque, a late writer on the culture of *lucerne*, advances a different opinion from that of moſt others on this ſubject. He recommends the ſtrongeſt land, which ſhould be prepared in the ſame manner as for barley, being ploughed, harrowed, and cleaned from weeds: he adviſes before the laſt ploughing, to manure the land with freſh ſtable-dung, which ſhould be laid on in a ſtate of full fermentation, and ploughed in as ſoon as poſſible: after which the land muſt be harrowed, and the *lucerne*-ſeed ſown broad caſt, not in drills, in fine weather, after the rate of about fourteen pounds to an acre; afterwards it ſhould be harrowed again with a light or buſh-harrow, and, laſtly, rolled to ſettle the ground and break the clods. The quantity of tillage and time of ſowing muſt be regulated by the nature of the ſoil. Heavy ſtrong land will require more ploughings and harrowings, and to be later ſown, than light land: and, for the firſt time, a trench-ploughing would be of great advantage. *Lucerne*, he ſays, may be ſown from the beginning of March to the end of May, but April, in dry weather, is the beſt time. Barley or oats may be ſown with the *lucerne*, in the proportion of a buſhel of either of the former, which ſhould be ſown firſt on an acre, to fourteen pounds of the *lucerne*. When the plants are one year old, Mr. Rocque adviſes, to go over the land, early in the ſpring and in dry weather, with a large harrow, as often as is ſufficient to root up annual weeds and graſs; to add a dreſſing of rotten dung: and in the ſecond ſpring after ſowing, to plough the ground with a drill-plough, having a round ſhare, without a fin or feather, and without a coulter, which ploughing ſhould be annually repeated: after lying for a few days to dry and mellow, it ſhould be harrowed down. This writer ſays that he has ſeen *lucerne* mowed five times in a ſeaſon, yielding, at the five mowings, neatly eight loads of hay per acre. Mr. Rocque is of opinion, that it is by no means adviſeable to ſow the ſeed in England, ſince it may be imported ſo cheap, that the ſeedſman can afford to retail it at one pound.

Others have recommended the method of ſowing the *lucerne* ſeed in a nurſery, and afterwards removing the young plants, with their ſtalks and tap-roots cut off, and tranſplanting them in the field where the crop is to be produced. The plants in this way of management are tranſplanted into holes filled with water, in rows three feet four inches diſtant from each other, and about a foot from each other in the rows. An acre of tranſplanted *lucerne*, it is ſaid, will bring in 3*l.* a year, clear of all expences, for a conſiderable time. M. de Chateauvieux has made many experiments on the method of cultivating *lucerne* on beds or ridges, which are to be a little more than three feet broad, and tranſplanting his plants in a ſingle row upon each ridge, at the diſtance of about ſix inches. In this way he obtained above five tons of *lucerne* hay per Engliſh acre, reckoning his crops at an average of four years; and it is obſervable, that his crops were improving, though they had no manure, and were only hoed with his cultivation. This method of planting on ridges ſeems to be the beſt method, with regard to produce, of any that has been yet practiſed: but it might be moſt adviſeable to ſet the plants at nine inches diſtance in the rows, and to make the ridges four one-half or five inches broad, for the convenience of hoeing them. Good crops of green *lucerne* may be reckoned from twenty to forty tons, and the average about twenty-five tons per acre, when drilled on the level; but conſiderably more if upon ridges and horſe-hoed. Farmer's Diction. art. *Lucerne*.

LUCERNE, in *Ichthyology*, a name given by the Venetians to the fiſh commonly called the DRAKOSCORE. It is a ſpecies of trachinus, with many beards on the lower jaw.

LUCIANISTS, or LUCANISTS, a religious ſect, ſo called from Lucianus, or Lucanus, a heretic of the ſecond century, being a diſciple of Marcion, whoſe errors he followed, adding ſome new ones to them.

Epiphanius ſays, he abandoned Marcion; teaching, that people ought not to marry, for fear of miſtaking the Creator: and yet other authors mention, that he held this error in common with Marcion, and other Gnoſtics. He denied the immortality of the ſoul; aſſerting it to be material.

There was another ſect of *Lucianiſts*, who appeared ſome

time after the Arians. They taught, that the Father had been a Father always, and that he had the name even before he begot the Son; as having in him the power, or faculty, of generation: and in this manner they accounted for the eternity of the Son.

LUCID *intervals*, the fits of lunatics, or maniacs, wherein the phrenzy leaves them in poſſeſſion of their reaſon.

It is ſaid, lunatics are capable of making a will in their *lucid intervals*.

LUCIDA *corona*, a fixed ſtar of the ſecond magnitude, in the northern crown. See CORONA *borealis*.

LUCIDA *hydræ*, in *Aſtronomy*. See COR *hydræ*.

LUCIDA *lyræ*, a bright ſtar of the firſt magnitude, in the conſtellation LYRA.

LUCIDUM *ſeptum*. See SEPTUM.

LUCIFER, in *Aſtronomy* and *Mythology*, a name given to the planet Venus, when ſhe appears in the morning before ſun-riſe.

LUCIFERA, in *Mythology*, a ſurname given to Diana, under which title ſhe was invoked by the Greeks in childbed. She was repreſented as covered with a large veil, interſperſed with ſtars, bearing a creſcent on her head, and holding in her hand a lifted flambeau.

LUCIFERIANS, a religious ſect, who adhered to the ſchiſm of Lucifer, biſhop of Cagliari, in the fourth century, who was baniſhed by the emperor Conſtantius, for having defended the Nicene doctrine concerning the three perſons in the godhead.

St. Auguſtine ſeems to intimate, that they believed the ſoul, which they conſidered as of a carnal nature, to be tranſmitted to the children from their fathers. Theodoret ſays, that Lucifer was the author of a new error. The *Luciferians* increaſed mightily in Gaul, Spain, Egypt, &c. The occaſion of the ſchiſm was, that *Lucifer* would not allow any acts he had done to be aboliſhed. There were but two *Luciferian* biſhops, but a great number of prieſts and deacons. The *Luciferians* bore a peculiar averſion to the Arians.

LUCINA, of *lux*, *light*, in *Mythology*, a deity who preſided over the labour of women and the birth of children. This title is ſometimes given to Diana, but moſt commonly to Juno.

LUCIOLA, in *Botany*, a name uſed by ſome authors for the ophioglоſſum, or adder's tongue.

LUCIOPERCA, the *pike-perch*, a fiſh caught in the Danube and other large rivers, and in the lakes of Germany, and eſteemed a very good one for the table. Others have called it by the names *ſchidus* and *zingumachus*. It is a fiſh that grows to a very conſiderable ſize, being frequently caught from two feet to three or four in length; it is of a longer ſhape than the river-perch, and grows narrower toward the tail; its ſnout is alſo more pointed and longer, and its back much leſs prominent than that of the common perarch; its figure, upon the whole, more approaches to that of the pike than of the perarch; its belly is however broad and flat; and on the anterior part of the back, toward the head, there is a furrow in the middle. The ſcales are ranged very cloſely together, and are imbricated round their edges; the breaſt has no ſcales; the ſides are of the ſame colour with thoſe of the common perarch, a yelloweſh brown, and its belly and fins are red, but leſs ſo than in the common perarch.

LUCIUS, in *Ichthyology*. See PIKE.

LUCIUS *marinus*, the *ſea-pike*, a name given by ſome authors to the fiſh more uſually called the MERLUCIUS, and in Engliſh the HAKE.

LUCIUS *marinus*, is alſo uſed by many authors for the SUDIS, called alſo by ſome *ſphyræna*.

LUCIUS *terreſtris*, the *land-pike*, in *Zoology*, the name of a very ſingular ſpecies of American lizard, which has the ſhape, ſcales, &c. of the pike-fiſh; in the place of the fins of that fiſh it has four legs, but theſe are ſo weak and ſlender that it makes no uſe of them in walking, but crawls along upon the ground in the manner of a ſnake, and draws its legs after it; it grows to about fifteen inches long, with a proportionable thickneſs; it is all over covered with ſmall, ſtrong, and gloſſy ſcales, of a ſilvery grey. In the night they retire into holes and caverns, and make a very diſagreeable and loud noiſe, much louder than the croaking of frogs. They ſeldom ſtir out of their holes, unleſs in the dusk of the evening; and if they are ever met with in the day-time, their ſtrange motion ſurpriſes all who ſee them.

LUCULLEUM *marmor*, in the *Natural Hiſtory of the Ancients*, the name of a hard ſtony kind of marble, of a good fine black, and capable of an elegant poliſh, but little regarded from its want of variegations. When freſh broken, it is ſeen to be full of ſmall, but very bright ſhining particles, appearing like ſo many ſmall ſpangles of tale. It had its name from the Roman conſul Lucullus, who firſt brought it into uſe in that city. It is common in Italy, Germany, and France. We have much of it imported, and our artificers call it the *Namur* marble, the Spaniards call it marble of *Buega*. Hiſt. of Foſſ. p. 466.

LUCULLIAN *games*, in *Antiquity*, were annual games decreed by the proviace of Aſia, about the year 70 before Chriſt, in honour of the exploits of Lucullus.

LUDI *Circenſes*. See CIRCENSES.

LUDI *florales*. See FLORALES.

LUDI *juvenibi*. See DECEMBER.

LUDICROUS *games*. See GAMES.

LUDUS *Helmontii*, ſo called from Van Helmont who extolled its medicinal virtues, in *Natural Hiſtory*, an opake foſſil of an irregular ſhape, but of a very regular and ſingular internal ſtructure. It is of an earthy hue, and always divided into ſeparate maſſes, by a number of veins of a different colour, and purer matter than the reſt. Theſe maſſes, into which it is divided, are ſometimes ſmall and pretty regularly figured; in which caſe, they are called *tali* or *tali*, *dives*; but they are more frequently of no regular ſhape at all. There are others of them craſſitated, or compoſed of many coats, diſpoſed one over another about a central nucleus. In theſe the *ſepta*, or dividing veins, are very thin and fine, in the others thicker.

It is only theſe *ſepta* that are uſed in medicine, being given in nephritic complaints with ſucceſs. The doſe is from a ſcruple to a drachm.

LUDWIGIA, in *Botany*, a genus of the *tetrandria monogynia* claſs. Its characters are theſe: the flower whoſe empalement is compoſed of one leaf, cut into ſegments at the top, conſiſts of four ſpear-ſhaped petals, which are equal and ſpread open; in the center of the flower is ſituated the four-cornered peral, attended with four ſtamina; the germen which ſits under the flower, becomes a four-cornered fruit, crowned with the empalement, and has four cells, which are filled with ſmall ſeeds. Miller mentions only one ſpecies of this plant, which grows naturally in South America; Linnæus reckons three ſpecies.

LUES, in a general ſenſe, is uſed for a diſeaſe of any kind.

LUES, in a more particular ſenſe, is reſtrained to contagious and peſtilential diſeaſes.

LUES, in the common and modern uſe of the word, eſpecially when joined with *Gallica*, or *venerea*, is reſtrained only to the French pox. See VENEREAL *diſeaſe*.

LUFF, a ſea-term, the ſame with LOOF.

LUFFA, *Egyptian cucumber*, in *Botany*, is a ſpecies of the *momordica* in the Linnæan ſyſtem. See *Mala* BALSAM *apple*.

LUG-*ſail*, a name uſed in ſome parts of England for a ſmall fiſh of the turbot kind, or rather a middle kind between that and the plaiſe. It is the ſame with the *ſaggio*.

It is the *rhomboides* of Rondeletius, and the *rhombus non aculeatus ſquamoſus* of Willughby.

We have it on our own ſhores; and the Corniſh people, who frequently catch it, call it the *lug-a-leaf*. It has no rough fines at the roots of its fins. Its eyes are large, and ſet at a conſiderable diſtance, and it is covered with extremely minute ſcales. It is very flat and thin, and of an aſh-colour.

It is a very ſingular ſpecies of fiſh, differing, in ſome particulars, from both thoſe genera in which it ſeems allied. It differs from the plaiſe kind, in that it has the eyes, fins, &c. of the turbot, or rhombus; and from that fiſh, in that it is ſcaly as the plaiſe, and the other fiſh of that genus.

LUG-*ſail*, in *Sea-language*, is a ſquare ſail, hoiſted occaſionally on the maſt of a boat or ſmall veſſel, upon a yard which hangs nearly at a right-angle with the maſt. Theſe are chiefly uſed in the *barca longa*, navigated by the Spaniards in the Mediterranean.

LUGGS, the Engliſh name for a peculiar ſpecies of inſect, found in great plenty on the ſhores of Cornwal. It is of the nature of the *ſcolopendra*, and is called by Mr. Ray *vermis ſcolopendroides*. It grows to twelve inches long, and has inſtead of legs nineteen pair of ſtiff briſtles, all which ſtand toward the head part of the creature. The tail is at leaſt five inches long when full grown, and has no mark of them. Its body is rounded, and much reſembles the body of the common earth worm, and is of a fleſh-colour, or pale red. It has no forceps.

LUGMON, in natural hiſtory, a name given by the people of the Philippine Iſlands to a ſpecies of turtle, the female of which has a tuft of red feathers, of a pale blood-colour, on her breaſt, which have greatly the appearance of a wound, ſo much that any body would really be deceived.

LUJULA, *wood-ſorrel*, in *Medicine*. See SORREL.

LUKE, or *Goſpel of St. Luke*, a canonical book of the New Teſtament, written by *Luke* the Evangeliſt, who was

probably, an early Jewish believer, soon after the ascension of Christ; if not a hearer of Christ and one of the seventy disciples. *Luke* was by profession a physician; and is supposed to have died a natural death in the eighticth or eighty-fourth year of his age, about the year of Christ 70.

Some think it was properly St. Paul's gospel, and that when that apostle speaks of his gospel, he means what is called *St. Luke's*. Irenæus says, that *St. Luke* digested into writing what St. Paul preached to the Gentiles; and Gregory Nazianzen tells us, that *St. Luke* wrote with the assistance of St. Paul. This Gospel, as well as the Acts of the Apostles, written by this evangelist, are supposed to have been two parts of the same volume, and to have been published in the year of Christ 63 or 64, as some say, at Alexandria, but according to others, in Greece.

St. Luke, says a modern writer, is pure, copious, and flowing in his language, and has a wonderful and entertaining variety of select circumstances in his narration of our Saviour's divine actions. He acquaints us with numerous passages of the evangelical history, not related by any other evangelist: both in this gospel and Apostolical Acts, he is accurate and neat, clear and flowing with a natural and easy grace: his style is admirably accommodated to the design of history; it had a very considerable resemblance to that of his great master St. Paul; and, like him, he had a learned and liberal education, and appears to have been very conversant with the best classics; for many of his words and expressions are exactly parallel to their's. Blackwall's Sacred Classics.

St. LUKE's *day* is a festival observed on the 18th of October.

St. LUKE's *hospital*. See HOSPITAL.

LULANIS, in *Botany*, a name given by some of the ancient Greeks to a plant, used very frequently for a yellow colour in dying, and by the ladies for tinging their hair yellow, the favourite colour of those times. Neuphytus explaining this word, says, that it signified the same with isatis, glastum, or woad; and several others have been of that opinion, though very absurdly, since the glastum or woad dies a blue colour, not a yellow; and by no means answers the description of the *lulanis*, which is the same with the LUTUM, or *lutea herba* of the Romans, and with the *genistella tinctoria*, or DYERS-*weed* of these times.

LULLY's *art*. See ART.

LUMBAGO, pains about the loins, and the small of the back; such as precede ague-fits, and fevers.

They rise commonly from fulness, and acrimony; in common with a disposition to yawning, shuddering, and erratic pains in other parts, and go off with evacuation, generally by sweat and other critical discharges of fevers. This disorder is a kind of RHEUMATISM in the loins.

LUMBAL *glands*. See GLAND.

LUMBAL *nerves*. See NERVE.

LUMBARIS, an epithet given to those branches of the aorta which carry the blood to the muscles of the loins.

LUMBARIS is also applied to certain veins which bring back the blood from the loins into the trunk of the vena cava.

There is also a muscle of the thigh which bears this name. See PSOAS.

LUMBRICAL, LUMBRICALIS, an appellation given to four muscles of the hand, and as many of the foot, which act as adducents of the fingers and toes.

The word is formed from *lumbricus*, *worm*, on account of their figure, and smallness, which give them a resemblance to worms: on which account they are called *vermiculares*.

LUMBRICALES *manus* are muscles of the hands, commonly supposed to be nothing but branches of the tendons of the perforans, which go to the inside of the first bone on each finger, and are supposed to contribute to the variety of motions with the fingers, by giving a diversion to the direct actions of the other muscles; but, simply, they only serve to draw the fingers towards the thumb. Though Mr. Cowper observes that some of them have distinct origins, and suspects, that the rest may have so too, and therefore makes them distinct muscles.

LUMBRICALES *pedes* are muscles of the foot, which arise, as in the hand, one from each tendon of the perforans, or profundus; and go to the inside of each of the lesser toes.

LUMBRICUS, in *Zoology*. See EARTH *worm*.

LUMELLA, in the *glass-trade*, the round hole in the floor of the tower of the leer, which is directly over the working furnace, and by which the flame is let into the tower.

LUMINOSA *simia*. See SEMIA.

LUMINOUS *column*, and *fire*. See the substantives.

LUMINOUS, *sensations*, have been observed from human bodies, as also from those of brutes. The light arising from currying a horse, or from rubbing a cat's back, are known to most. Instances of a like kind have been known on combing a woman's head. Bartholin gives us an account, which he intitles *mulier splendens*, of a lady in Italy, whose body would shine, whenever slightly touched with a piece of linen. These effluvia of animal bodies have many properties in common with those produced from glass; such as their being lucid; their snapping, and their not being excited without some degree of friction; and are undoubtedly electrical, as a cat's back has been found strongly electrical when stroaked. See ELECTRICITY, and LIGHT.

Human bodies not only appear *luminous*, but even the exhalations from them adhering to their cloathing will cause it to shine likewise.

LUMINOUSNESS *of the sea*. See SEA and FIRE.

LUMME, in *Ornithology*, the name of a water-fowl of the colymbus kind, called by authors *colymbus in rictus*, common about Iceland and some parts of Norway, and scarce known in other parts of the world.

It is a beautiful bird of the size of a duck; it has a black and sharp beak of two inches long, and its head and neck are covered with grey feathers, running each way to a sharp edge, and making the appearance of a hood, or friar's cowl. Its back and wings are black, variegated with square specks of white, and just under the neck there is a large black square spot. This runs down the back also to five inches in length, and is about two inches broad, and beautifully variegated with black, white, and grey. Its belly is white, its legs are short, and its feet webbed. The people, where it is common, hold it as sacred in some measure, and are afraid of killing it in some places; but the Icelanders make it their principal food, and are very dextrous at catching it with snares. Ray.

LUMP-*fish*, the *cyclopterus lumpus* in the Linnæan system, in *Ichthyology*, a thick and short sea-fish, called the *sucker*, also the *sea-mouse*, and by the Scotch, the *cock-paddle*.

It is a thick and very ill-shaped fish. Its belly is broad and flat, and its back rises to a ridge; its colour is a mixture of blackish and red; its belly is red; it has no scales, but is covered with a rough skin, which is full of sharp tubercles; and on each side it has three rows of prickles or crooked thorns; it has two fins on the back, the first thick, cartilaginous, or rather fleshy, and having no rays or nerves, and another below it supported by nine rays; its mouth is large, and its jaws are furnished with vast numbers of small teeth; beneath the pectoral fins is the part by which it adheres to the rocks, &c. consisting of an oval aperture, surrounded with a fleshy, muscular and obtuse soft substance, edged with smaller threaded appendages, which concur in so many clusters.

It is caught in many parts of the English seas, and is common in the fishmongers shops in London, but it is not much esteemed, being both flabby and insipid. On the coast of Sutherland it abounds in spring, and is devoured by the seals, which may be known by the smoothness of the water above the spot; the oil serving to still the agitation of the waves. The roe of this fish is remarkably large, and is boiled to a pulp, and eaten by the Greenlanders. See *Tab.* II. *of Fish.* N° 21.

LUMP *of flesh*, in the *Manege*. See BOUILLON.

LUMPEN, in *Ichthyology*, the name of a long-bodied fish of the mustela kind, common in the markets at Antwerp.

It is of a long and round body, growing gradually slenderer to the tail. Its colour is a greenish yellow, with black broad lines on the back, placed transversely; and it has a little redness at the end of its tail.

The *lumpen* is the *galea pisces*, or *mustela altera* of Gesner, and others. It is a species of the *blennus*, distinguished by Artedi by the name of the *blennus*, with fins like cirri under its neck, and transverse streaks on the back. The cirri are bifid.

LUNA, in *Astronomy*. See MOON.

LUNA, in the jargon of the *Chemists*, signifies SILVER; so called from the supposed influence of the moon thereupon.

The medicinal virtues of this metal, Dr. Quincy says, are none at all, until it has undergone very elaborate preparations.

LUNA *cornea*, in *Chemistry*, is the combination of marine acid with silver. To make this combination, the silver is first dissolved in nitrous acid; to this solution marine acid, or more usually common salt dissolved in water, is added. The mixture soon becomes turbid, and a copious precipitate is formed in it, which has always the appearance

pearance of curd. The solution of salt is added, till no more precipitate is formed. The precipitate, when separated from the liquor that swims over it, is called *luna cornea*; because if this matter be exposed alone to fire, the acid carries off with it a portion of the silver, and the remaining matter melts, assuming the form of a horny substance.

The best method of reducing *luna cornea*, or of separating silver from marine acid, according to Margraaf, is to dissolve half an ounce of fine silver in aqua fortis, to precipitate it by a sea salt, and edulcorate the precipitate, which will then weigh five drams fifteen grains. For the reduction of this precipitate, mix it with an ounce and a half of dry volatile sal ammoniac, triturate them well together with a little water during a quarter of an hour; then add three ounces of mercury obtained from cinnabar by means of quick-lime, and continue to triturate during some hours with a little more water. Thus an amalgam will be formed, which being washed from a white powder and dried, will weigh three ounces and half a dram. By distillation of this amalgam, a residuum of silver, four grains less than the original half ounce, will be obtained. By subliming the white powder, which weighs five drams, three grains of silver will be obtained; but if the amalgam and white powder be distilled together, the operation will fail, and the *luna cornea* be recomposed. Berlin Mem. 1749. M. Beaume says, that *luna cornea* may be reduced without loss by fusion with four times its weight of fixed alkali.

Luna cornea mixed with sea salt and tartar rubbed on brass gives a silver like appearance; and is the substance employed for the silvering of the dial-plates for clocks. A more substantial silvering may be given by the above mixture, if the piece of brass to be silvered be previously heated considerably, and cleaned with a scratch brush, and if the operation be repeated, till the silver seems to be sufficiently thick. The brass having a stronger disposition to unite with the marine acid than the silver has, separates this acid from the silver, which is then precipitated upon the surface of the brass plate. The *luna cornea* will also serve, in the examination of mineral waters or of any other liquor, to dissolve if they contain marine acid in whatever base it be engaged, except metallic bases; for if these waters contain the smallest quantity of marine acid, a *luna cornea* will be precipitated by them from a solution of silver in nitrous acid, and this *luna cornea* is known by its acid-like appearance. Dict. Chem. Eng. edit.

LUNA *Crystals of*, See CRYSTAL.

LUNA, *Vitriol of* See VITRIOL.

LUNA *marina*, in *Ichthyology*, a name by which Gesner has called a peculiar species of *flat-fish*, called also the *sea-sun*. See SOLEIL *de mer*.

LUNA *piscis*, in *Ichthyology*, a name by which some have called the mola, which we usually call in English the SUN-*fish*.

LUNÆ, *Lac*. See the article LAC *lunæ*.

LUNÆTRIA, a term inscribed by some affected writers on medicine for a fever, which they say is curable in one period of the moon.

LUNALE *bezoardicum*. See BEZOARDICUM.

LUNAR, something relating to the MOON.

LUNAR *cycle*. See CYCLE.

LUNAR *month*. See MONTH.

LUNAR *year*, consists of three hundred and sixty-four days, or twelve synodical months. See YEAR.

In the first ages, the year used by all nations was *lunar*; the variety of course being more frequent in this planet, and, of consequence more conspicuous, and better known to men, than those of any other. The Romans regulated their year, in part, by the moon, even till the time of Julius Cæsar: the Jews too had their *lunar* months. Some rabbins pretend, that the *lunar* month did not commence till the moment the moon began to appear; and that there was a law, which obliged the person who discovered her first, to go and inform the sanhedrin thereof. Upon which the president solemnly pronounced the month begun, and notice was given of it to the people by fires lighted on the tops of mountains. But this appears somewhat chimerical.

LUNAR *dial*, *eclipse*, *horoscope*, and *rainbow*. See the several substantives.

LUNARE *os*, in *Anatomy*, is the second bone in the first row of the carpus. It has its name from the Latin, *luna*, the moon, because one of its sides is in form of a crescent.

The articular sides in this bone are four in number. One convex, for the basis of the radius; one semi-lunar, for the os scaphoides; one almost triangular, for the os cuneiforme; and one hollow, which, with the hollow side of the os scaphoides, forms a cotyloide cavity for the head of the os magnum. The convex side, together with that of the os scaphoides, forms an oblong convexity, answering to the oblong concavity in the basis of the radius. The outer and inner surfaces are small and rough. This bone would somewhat more properly be named *os semi-lunare*, than *lunare*, &c. See Winslow.

LUNARIA, in *Botany*. See HONESTY.

LUNARIA, in *Natural History*, is also cited by some authors for the SELENITES.

LUNARIS *cochlea*, in *Natural History*, the name of a genus of shells of the snail-kind, the distinguishing character of which is their having a perfectly round mouth. These are univalve, umbilicated shells, with a depressed clavicle, and a surface sometimes smooth, but more frequently striated, furrowed, laciniated, or covered with tubercles. See COCHLEA.

It is said, that Archimedes took the invention of the screw, so famous ever since his time, and still called after his name, from the form of this shell; and it is generally allowed, that architects have taken the hint of their winding flights of stairs from it.

The small species of crab, called *bernard the hermit*, often lodges itself in a shell of one of these animals, after the creature to whom it belonged is dead. One species of this genus is called the *rotunda*, from its round shape. This is so large as to contain two quarts of water; and from an old practice of using this species by way of an oil-jar in families, it obtained the name of *aduria*. There is a peculiar species, called the *dauphin-shell*, which is elegantly furnished with rows of points of a jagged form on all its spires; and the shell, called the *sperm*, is another species of this genus, the volume of which are in the same manner furnished with points; but in this species they are smoother and sharper than in the dauphin-shell. Kondeletius has given the name *echinosphera* to one, which is all over covered with rough tubercles. And there is one species of this shell brought from America, which is very large, and of a fine pearly coat within. The workmen in toys take much of what they use from it; and what we imagine the inside of the nacre, or mother of pearl, is often no other than the inner coat of this shell. Of this genus there are enumerated twenty-one different species. Hist. Nat. Eclar. par ii. p. 251.

LUNATIC, LUNATICUS, a person affected, or governed, by the moon. Hence, epileptics were anciently called *lunatici*, because the paroxysms of that disease seem to be regulated by the changes of the moon. Thus Galen, De Diebus criticis, lib. iii. says, the moon governs the periods of epileptic cases; and others referred the disease entirely to this planet. Areteus de Dunamis Morbis lib. i. cap. 4. See Mead's Treatise concerning the influence of the Sun and Moon upon the human Bodies, p. 38. 40, &c.

Mad people are still called *lunatics*, from an ancient but now almost exploded opinion, that they are much influenced by that planet. A much sounder philosophy hath taught us, that if there be any thing in it, it must be accounted for, not in the manner the ancients imagined, nor otherwise than what the moon has in common with other heavenly bodies, occasioning various alterations in the gravity of our atmosphere, and thereby affecting human bodies. However, there is considerable reason to doubt the fact; and it is certain that the moon has no perceivable influence on our most accurate barometers.

The stat. 17 Ed. II. cap. 10. ordains that the king is to provide that the lands of *lunatics* be safely kept, and they and their families maintained by the profits; and the residue shall be kept for their use, and be delivered to them when they come to their right mind; the king taking nothing to his own use; and if the parties die in such state, the residue shall go to their executors or administrators. A warrant is now issued by the king, under his royal sign manual, to the chancellor or keeper of his seal, to perform this office for him.

Lunatics are not legally accountable for any crimes they commit in this state. And also, if a man in his sound memory commits a capital offence, and before arraignment for it, he becomes mad, he ought not to be arraigned for it: and if, after he has pleaded, the prisoner becomes mad, he shall not be tried: if after he be tried and found guilty, he loses his senses before judgment, judgment shall not be pronounced: and, if after judgment, he becomes of non-sane memory, execution shall be stayed.

For the marriage of *lunatics*, See MARRIAGE.

LUNATION, the period, or space of time, between one new moon and another; also called *synodical month*. See CYCLE and EPACT.

LUNDA, in *Zoology*, a name by which Wormius, Hyler, and some others, have called the bird commonly known by the name of *anas arctica Clusii*. See DUCK.

LUNDRESS, or *Old Hundress*, a sterling silver penny; which had its name from being coined only in London, and not at the country mints.

LUNE, LUNULA, in *Geometry*, a plane in form of a crescent, or half-moon, terminated by the circumference of two circles, that intersect each other within it.

Though the quadrature of the entire circle was never yet effected, yet geometricians have found out the squares of many of its parts. The first partial quadrature was that of the lunula given by Hippocrates of Scio, or Chios; who, from being a shipwrecked merchant, commenced geometrician. See CIRCLE and QUADRATURE.

Let AEB (*Tab. III. Geometry, fig. 39.*) be a semicircle, and $G \cdot = \frac{1}{2} GB$; with the radius BC describe a quadrant AFB, then will AEBFA be Hippocrates's *lune*.

And since $BC^2 = 2GB^2$, the quadrant AFBC will be equal to the semicircle AEB: taking away, therefore, from each the common segment AFBGA; AEBFA = to the triangle ACB = GB².

The quadrature of the *lunula* is generally ascribed to Hippocrates of Chios; but Proclus tells us expressly, that it was found by Œnopides of Chios. See Mr. Hermus in Mem. de l'Acad. de Berlin, tom. iii. p. 410. who has given us a narration about this Œnopides.

LUNE, in *Fortification*. See DEMI-lune.

LUNETTE, among, in the *Natural History of the Ancients*, the name of that species of white marble, now known among us by the name of the *Carrara marble*, and distinguished from the statuary kind by its greater hardness and less coherence. It was ever greatly esteemed in building and ornamental works, and is full full. It is of a very fine and fine texture, of a very pure white, and much more transparent than any other of the white marbles. It has always been found in great quantities in Italy, and is so to this day.

LUNES, or LOWRES, in *Falconry*, feathers or longfeathers in the tail or hawks.

LUNETTE, in *Fortification*, an inveloped counterguard, or elevation of earth, made beyond the second ditch, opposite to the places of arms; differing from the ravelins only in their situation.

Lunettes are usually made in ditches full of water, and serve to the same purpose as fausbrayes, to dispute the passage of the ditch.

Lunettes are placed on both sides of the ravelin, as D, D, *Tab. VIII. Fortification fig. 47.* to increase the strength of a place: they are constructed by bisecting the faces of the ravelin with the perpendicular LN, on which are let off 30 toises from the counterscarp of the ditch, for one of its faces; the other face PN is found by making the semigorge TP of 25 toises; the ditch before the *lunettes* is 12 toises, the parapet 3 and the rampart 8.

There is sometimes another work made to cover the salient angle of the ravelin, such as A, called BONNET, whose faces are parallel to those of the ravelin, and whose prolonged sides of the *lunettes* of the ditch before it being 10 toises.

There are likewise found *lunettes*, whose faces are drawn perpendicular to those of the ravelin, within a third part from the salient angle; and their semigorges are only 20 toises. Mr. Muller recommends the face PN to be perpendicular to that of the bastion, which would then defend it in a direct manner; and if the semigorges of the lunettes A were only 7 or 8 toises, it would be less expensive, and its ditch and the covert-way before it would be better defended by the *lunettes*. Elem. of Fortif. p. 36.

LUNETTE, in the *Manege*, is a half horse-shoe, or such a shoe as wants the ipunges, i. e. that part of the branch which runs towards the quarters of the foot.

LUNETTES is also the name of two small pieces of felt, made round and hollow, to clap upon the eyes of a vicious horse that is apt to bite, and strike with his fore feet, or run will not suffer his rider to mount him.

LUNGS, in *Anatomy*, a part of the human body, composed of vessels, and membranous vesicles, serving for respiration. See BREATH.

The lungs are connected, above to the fauces, by means of the trachea; and below, to the vertebræ of the thorax, and to the sternum and diaphragm, by means of the pleuræ. They are divided into two great lobes of a reddish colour in children, grayish in adults, and livid in old age, by the mediastinum and heart, and those again into others less; the right sometimes into three, by means of some fissures running from the fore to the back edge. At the lower edge of the left lung, there is an indented notch or fissure opposite to the apex of the heart, which is therefore never covered by that lung even in the deepest expirations, and consequently the apex of the heart and pericardium may always strike against the ribs. The great lobes, when inflated, resemble each of them a horse's hoof in figure, but together they are more like an ox's inverted, convex next the ribs, concave next the diaphragm, and irregularly depressed near the mediastinum and heart. See *Tab. Anat. Physiolog. fig. 12. lit. t. t. fig. 14.*

The substance of the *lungs* is membranous; consisting chiefly of innumerable cells, or vesicles, which seem to be nothing but expansions of the membranes of the BRONCHIA, to which they hang like grapes in clusters: for that by blowing into one of the branches of the bronchia, those cells, or vesicles, belonging to it, are blown up; the rest, which do not, remaining still flaccid and unstirred.

These clusters of vesicles, or cells, are called the *internal lobules*; by which name they are distinguished from the lesser lobes spoken of. They are separated from one another by interstices, which receive the vessels, and are filled up with membranes propagated from the lobules, and lying parallel, some angular. These lobules discover and display themselves very exactly, if the larger trunks of the bronchia be laid open, and the latter blown into by which means, every lobule belonging to that branch will be inflated, and rise very distinctly, and show its extent.

The whole substance of the *lungs* is covered with a common membrane, continued from each pleura, which is divisible into two coats; the outer thin, smooth, and nervous; the inner somewhat thicker and rougher, consisting mostly of the extremities of vessels and vesicles, through the impression of which it is pitted, and resembles, in some measure, a honeycomb. Some affirm, that in this coat are abundance of perforations, or pores, so disposed, that they resemble those any humidity from the cavity of the thorax, but suffer nothing to escape into it: but this seems little more than a fancy.

The vessels of the *lungs* are, the bronchia, the pulmonary and bronchial arteries and veins, nerves, and lymphatics. Of these vessels, some are proper, and some common, in respect of the service they are of to the rest of the body. The common are, the bronchia, the pulmonary artery and vein, the nerves and lymphatics; the proper are, the bronchial artery and vein.

Dr. Willis, contrary to the common opinion, ascribes to the *lungs* a great number of nerves, which come from the trunk of the par vagum; and which being distributed through the substance of the *lungs*, enhance the serious and sanguiferous vessels. He also asserts, that the vesicles have musculous fibres, to enable them to exert a greater contractive force in expiration; though others deny any such fibres. Diemerbroeck observes, that the vesicles admit not only of air, but also of other grosser matter; and instances two asthmatic persons which he opened; the one a shoemaker, the vesicles of whose *lungs* were so filled with dust, that, in cutting, his knife seemed as if through a heap of dusty; and the other a feather-dresser, in whom the vesicles were full of the fine dust, or down, of feathers. See ASTHMA.

From the experiments made on living animals by Dr. Hamilton, Dr. Hendley, and Mr. Brunsoil, the *lungs* seem to all independent of the thorax, continuing to be distant and contracted after they are exposed to the air. Phil. Trans. N° 441. sect. 4. Lectures on Respiration. Mem. de l'Acad. des Sciences, 1733.

An artificial inflation of the *lungs* of a dead or dying animal will put the heart in motion, and continue it so for some time. And we have an instance of the successful application of this experiment to the restoring the life of a person suffocated by the steam of a coal-pit. See Medic. Eff. Edinb. vol. v. And Phil. Trans. N° 475. sect. 11.

In the medical Tables Edinb. we read of an ulcer in the *lungs* piercing through the diaphragm into the liver. See *vol. I. art. 26.*

Dropsy of the LUNGS. See DROPSY.

Purpose of the LUNGS. See PURPOSE.

LUNGS *wounded*. There is always reason to apprehend that the *lungs* are wounded, when the patient voids a great quantity of frothy blood by the mouth, accompanied with a cough after receiving a wound in the thorax, especially when the blood that is voided at the wound is very florid, and the patient makes a particular noise when he draws his breath. The office of the surgeon, in this case, is to clear the cavity of the thorax from extravasated blood, and to heal the external wound, when that may be done with safety; but as no application can be made to the internal wound, that must be left to nature. Wherever the divided vessels contract themselves, and the blood stops of itself, the patient will recover. The persons who have recovered from these wounds, are afterwards subject to consumptions, and ulcers of the *lungs*. Sometimes, in cases of this kind, the wounded part of the *lungs* pushes itself

itſelf forward, and ſticks pretty firmly in the orifice of the external wound. In this caſe, if it is forced back again, it will diſcharge a great quantity of blood into the cavity of the thorax; therefore it is better to let it remain in the ſituation nature has thrown it into; for by this means it will admit of the immediate application of proper dreſſings, and you may ſafely encourage it to adhere to the lips of the external wound: but if a wounded portion of the *lungs* ſhould be puſhed out of the thorax, beyond the limits of the external wound, a fine piece of linen is to be wrapped round this part, and a ligature muſt be then made above the linen, and all that is below the ligature taken off with a fine knife, and the ſound part of the *lungs* muſt then be returned into the body, keeping one end of the ligature conſtantly hanging out at the external wound; the wound is then to be kept open with a tent, and the ligature at length may be ſafely drawn out. The wound is then to be healed in the ordinary way. And during the courſe of the cure the patient muſt take internally vulnerary decoctions, and Lucatellus's balſam. By this treatment, wounds of this dangerous kind are ſometimes cured; but when they are not, it is a ſatisfaction to know that all has been done, that could be done in ſo deſperate a caſe. *Heiſter's Surgery*, p. 73.

LUNGS, *Inflammation of the.* See PERIPNEUMONY.

LUNGS *of inſects.* In the fly claſs the ſtigmata are extremely numerous, and the trachęæ which they terminate are branched and divaricated all over the body in an amazing manner, as if every part and particle of the bodies of theſe little animals had occaſion for its particular air-veſſels; beſides theſe, however, flies are provided with proper *lungs*. They have two, and theſe ſo very large, that they frequently take up half, and ſometimes two thirds of the body of the animal.

Theſe are two bladders placed ſideways one by the other, alike in ſhape and ſize, and having their origin at the junction of the corcelet and body; and in many flies, whole bodies are compoſed of five rings, extending to the third, and ſometimes reaching the fourth. The ſize and figure of each of *theſe* bladders are ſuch, as is neceſſary to fill almoſt entirely that cavity of the body in which it is lodged. They each of them touch the ſides of this cavity; the part when they join one another is flat, and this commiſſure forms a fine running ſtraight down the body; they are, however, in this part, though ſo cloſely in contact, yet not at all joined to one another: this commiſſure, however, does not reach quite up to the back, or quite down to the belly, there is a ſmall *cavity* left between each, which was very neceſſary in both places; the one to give paſſage to the great *artery*, the other to the excrements. Reaumur's Hiſt. Inſ. vol. iv. p. 267. &c.

LUNGS, *Sea*, in *Zoology*. See MEDUSA.

LUNGS, *Stiefs*. See VENTILATOR.

LUNG-*wort, pulmonaria*, in *Botany*, a genus of the *pentandria monogynia* claſs. Its characters are theſe: the flower has a cylindrical, five-cornered, permanent empalement, cut into five parts at the top; the flower is of one petal, having a cylindrical tube, of the length of the empalement, cut at the top into five parts, which ſpread open, but the chaps are pervious; it has five ſhort ſtamina, terminated by erect ſummits, which cloſe together; and four germina ſupporting a ſhort ſtyle, crowned by an obtuſe indented ſtigma; the germina turn to four roundiſh ſeeds ſitting in the bottom of the empalement. There are ſix ſpecies.

The figure of the flower-cup is what principally diſtinguiſhes the *pulmonaria* from the bugloſs, *&c.* and the plants of it may be uſually known when not in flower, by their long, rough, and not divided leaves, which in almoſt all the ſpecies are ſpotted, ſo as to reſemble the tabid *lungs* of an animal, whence it had its name. Tourn. Inſt. p. 137.

The leaves of the common ſpotted *pulmonaria*, or, as we vulgarly call it, *ſage of Jeruſalem*, or Jeruſalem cowſlip, which grows wild in many parts of Europe, and flowers in our gardens in April and May, have been eſteemed an excellent medicine in many of the diſorders of the *lungs*; and have been ſaid to do great ſervice in ſpitting of blood, though Dr. Lewis ſays, that they appear to have little medicinal virtue; and they ſtand greatly recommended, externally uſed, as a conſolidator and healer of old ulcers as well as freſh wounds.

LUNG-*wort, cow's.* See MULLEIN.

LUNG-*wort, golden.* See HAREWEED.

LUNISOLAR, in *Aſtronomy and Chronology*, denotes ſomething compoſed of the revolution of the ſun, and of that of the moon.

LUNISOLAR *year* is a period of years made by multiplying the cycle of the moon, which is nineteen, by that of the ſun, which is twenty-eight; the product of which is five hundred and thirty-two; in which ſpace of time theſe two luminaries return to the ſame points.

LUNULA, in *Geometry*. See LUNE.

LUNULA, the *half moon*, among the Romans, an ornament the patricians wore on their ſhoes.

LUNULA was alſo an ornament in form of a moon, worn by the ladies.

LUNULAR *angles*. See ANGLE.

LUNULARIA, in *Botany*, a name given by Micheli to certain ſpecies of the marchantia, a kind of LICHEN. Theſe have the male cup divided into four ſegments, and thoſe tarning their edges over the flower; whereas the marchantia, as he calls them, have eight or ten ſegments, and thoſe plain.

LUNULATED *leaf*, among *Botaniſts*. See LEAF.

LUPERCALIA, feaſts inſtituted, in ancient Rome, in honour of the god Pan.

The word comes from *Lupercal*, the name of a place under the Palatine mountain, where the ſacrifices were performed.

The *Lupercalia* were celebrated on the fifteenth of the calends of March, that is on the fifteenth of February; or, as Ovid obſerves, on the third day after the ides. They are ſuppoſed to have been eſtabliſhed by Evander.

On the morning of the feaſt, the LUPERCI, or prieſts of Pan, ran naked through the ſtreets of Rome, ſtriking the married women they met on the hands and body, with a thong, or ſtrap of goat's leather; which was held an omen promiſing them fecundity and happy deliveries.

The reaſon of this indecent cuſtom, in celebrating the *Lupercalia*, took its riſe from Romulus and Remus: for while they were aſſiſting at this feaſt, a body of robbers taking hold of the occaſion, plundered them of their flocks. Upon this, the two brothers, and all the youth that were with them, throwing off their clothes, to be the more expeditc, purſued the thieves and recovered their prey. This ſucceeded ſo well, that henceforward this ceremony became a part of the *Lupercalia*.

This feaſt was abolihed in the time of Auguſtus; but it was afterwards reſtored, and continued to the time of the emperor Anaſtaſius. Baronius ſays, it was abolihed by pope Geleſius, in 496.

LUPERCI, a name given to the prieſts of the god Pan.

The *Luperci* were the moſt ancient order of prieſts in Rome: they were divided into two colleges, or companies; the one called *Fabii*, and the other *Quintilii*: to theſe Ceſar added a third, which he called *Julii*.

Suetonius mentions the inſtitution of this new college of *Luperci* as a thing that rendered Ceſar more odious than he was: however, it appears, from the ſame paſſage of Suetonius, that this new company was not inſtituted by Ceſar, nor in honour of Pan, but by ſome friends of Ceſar, and in honour of himſelf.

LUPI *crepitus*. See CREPITUS.

LUPIA, in *Surgery*, a name given by ſome authors to that ſort of ſwelling, called by others *talpa* and *aglado*. This is an encyſted tumor, more diſtinguiſhed by its ſituation than by its nature, ſince of whatever kind it be, whether inflammatous, or atheromatous, *&c.* if ſituated under the ſcalp, it is called by theſe names. Heiſter's Surgery, p. 51.

LUPINASTER, in *Botany*, the name given by Buxbaum to a new genus of plants, from their near approach to the characters of the lupine; the flowers are like thoſe of the other papilionaceous plants; the leaves are digitated as in the lupines; the flowers are collected into a head, ſuſtained on a long peticle, ariſing from the ale of the leaves: the pods are flat, and the ſeeds kidney-ſhaped; the ſtalks are ſix or eight inches high; the leaves long, or a bluiſh green, ſharply ſerrated, and elegantly ſtriated; they grow, ſix, ſeven, or eight on a peticle, which comes out of a yellowiſh membrane ſurrounding the ſtalk; the flowers are of a bluiſh purple, and ariſe out of cups, divided into ſeveral ſegments; the pods are long and depreſſed, and the ſeeds black and kidney-ſhaped. It grows in great plenty about the banks of the Volga. Act. Petrop. vol. ii. p. 340.

LUPINE, *lupinus*, in *Botany*, a genus of the *diadelphia decandria* claſs. Its characters are theſe: the empalement is biſid and of one leaf; the flower is of the butterfly kind; the ſtandard roundiſh, heart ſhaped, indented at the top, and the ſides reflexed and compreſſed; the wings are nearly oval, and cloſe at their baſe, the keel narrow, falcated, and ending in a point; it has ten ſtamina joined at their baſe in two bodies, but diſtinct above; in the center is ſituated a hairy compreſſed germen, which becomes an oblong, large, thick ſhelled pod with one cell, ending with an acute point, including ſeveral roundiſh compreſſed ſeeds. There are ſix ſpecies of this plant, propagated in gardens, where they make a very

very agreeable appearance. But the kind moſt frequent with us is the leſſer purple or blue-flowered kind. This is propagated by ſowing the ſeeds in a common flower border, where they require no care, but will come up and thrive of themſelves; they ſhould be ſown in April, in the places where they are to remain, for it gives leſs trouble, and they are plants which but very badly bear tranſplanting. This firſt flowers in June and July, and the ſeeds ripen in autumn. The common yellow *lupine* is cultivated for the ſweetneſs of its flowers, though they are of ſhort duration, eſpecially in warm weather. The ſeeds ſhould therefore be ſown at different times, viz. in April, May, and June, that there may be a ſucceſſion of flowers through the ſeaſon. If ſome of theſe ſeeds are ſown in autumn on a warm border, the plants will often live through the winter, and flower early in the ſpring. The ſeeds of the manured *lupine*, with a white flower, being of a bitter taſte, are ſometimes uſed in medicine, to open, digeſt, diſſolve and cleanſe. The flower of the ſeed has been occaſionally mixed with the juice of lemon, and a little *ſpermaceti* barbatum, and made up in the form of ſoft ointment, to make the face ſmooth Miller.

LUPULUS, *hop*, in *Botany*. See HOP.

LUPUS, *Wolf*, in *Aſtronomy*, a ſouthern conſtellation, joined to the CENTAUR, whoſe ſtars in Ptolemy's Catalogue are nineteen; in the Britannic Catalogue with Sharp's Appendix, twenty-four: the order, names, longitudes, latitudes, magnitudes, &c. are as follow:

	Magnitudes.	Longit.		Latitude		
		°	′	°	′	″
Southern in the fore foot		20	21	0	12	58	21	S.
Northern		20	36	22	11	28	12	S. 6
Preced. of the two in the noſe	5	18	10	3	14	25	44	S. 6
Second	2	18	7	2	14	34	8	S. 6
		18	29	40	13	7	48	S.
5.								
In the foot at the hand of the Centaur	3	21	12	23	24	59	20	S.
In the ham	4	19	41	33	29	37	42	S.
Northern of the two ſouthern		19	31	28	32	4	46	S.
Southern		19	22	26	33	21	50	S.
Contiguous to the firſt of the wolf		20	1	0	25	49	40	S.
10.								
Preced. of two in the ſhoulder		24	50	10	21	21	5	S.
Subſequent		17	18	43	21	11	17	S.
In the middle of the body		16	18	5	25	11	12	S.
In the belly		23	54	38	26	27	47	S.
In the thigh		23	51	58	28	20	23	S.
15.								
Northern in thigh		26	34	21	28	26	38	S.
Southern		25	42	18	29	25	59	S.
In the loins		20	53	19	31	25	6	S.
South. in the extrem. of tail		15	0	30	30	8	55	S.
Northern		15	30	11	28	56	18	S.
20.								
Before the neck		13	41	8	17	6	43	S.
Subſequent		14	6	40	17	27	47	S.
Southern of two in the throat	3	7	23	50	17	21	6	S.
Northern	4	8	44	50	15	39	0	S.

LUPUS, in *Botany*, a name ſaid to be given by Pliny to the common hop: this is however, an *error*, for though the word ſtands in moſt of the copies of that author *lupus*, the true meaning is doubtleſs *lupulus*: *the hop*. Pliny has coupled it with a word that expreſſes its climbing upon *willows*, calling it *lupus ſalictarius*. We find in all the old writers the *upulus*, which is the proper name of the hop before the initial *l* was added, joined with the word *ſalictarius*, but no where mention of *lupus ſalictarius*, unleſs in Pliny.

LUPUS, in *Ornithology*, a name given by ſome authors to the *manedula* or JACKDAW, from his voracious appetite and habit of ſtealing.

LUPUS, in *Zoology*. See WOLF.

LUPUS *aureus*, the *gilt colowred wolf*, in *Zoology*, the name by which Latin authors call the creature known in Engliſh by the name of the JACKALL.

LUPUS *cervarius*, in *Zoology*, a name by which many authors have called the LYNX, from its feeding on deer.

LUPUS *marinus*, the *ſea-wolf*, the *anarhicas lupus*, of Linnæus, in *Ichthyology*, a fierce and voracious ſea-fiſh, confined to the northern ſeas of our globe. It is found in thoſe of Greenland, Iceland, and Norway, on the coaſts of Scotland, and of Yorkſhire, and in that part of the German ocean, which waſhes the ſhores of Holland. Its head is larger in proportion to its ſize than that of the ſhark, and rounder, a little flatted on the top; the noſe blunt; the noſtrils very ſmall; the eyes ſmall, and placed near the end of the noſe; the body is long, and a little compreſſed ſideways; the back, ſides, and fins, are all of a livid lead colour; the two firſt marked downwards with irregular, obſcure duſky lines, which in different fiſh have different appearances. The youngeſt of a greateſt caſt; the belly is white; the ſkin is rough and ſoft, but his teeth ſo remarkable hard and ſtrong, that if he bites againſt an anchor of a ſhip, or other ſuch ſubſtance, he makes a loud noiſe, and leaves his marks in the iron; the fore-teeth are ſtrong, conical, diverging a little from each other, ſtand ſix out of the jaws, and are commonly ſix above and ſix below, though ſometimes there are only five in each jaw: theſe are ſupported within ſide by a row of leſſer teeth, which make the number in the upper jaw ſeventeen or eighteen, and in the lower eleven or twelve. The ſides of the lower jaw are convex inwards, and the grinding teeth of this jaw are higher on the outer than the inner edges, and join to the canine teeth, but in the upper are ſeparated from them; in the centre are two rows of flat ſtrong teeth, fixed on an oblong baſis upon the bones of the palate and noſe: theſe and the other grinding teeth are often found foſſil, and called BUFONITES, or toad-ſtones. The two bones that form the under jaw are united before by a looſe cartilage, ſerving by a free motion to the purpoſe of breaking, grinding, and comminuting its teſtaceous and cruſtaceous food, as crabs, lobſters, prawns, muſcles, &c. At the entrance of the gullet, above and below, are two very ſmall echinated bones. It has two fins like wings, ſituated juſt under the gills; and one long ſtarſ fin running from the head to the tail, and another reaching from the anus to the tail; the tail is round at its end, and conſiſts of thirteen rays. This fiſh grows to a large ſize, being ſometimes found on the Yorkſhire coaſt of the length of four feet, and near Shetland more than ſeven feet. Pennant. *See Tab.* III. *Fiſh*, N° 22.

To LURCH, in *Fencing*, is to make an opening in order to invite your adverſary to thruſt at you, when you, being ready, may find a favourable repoſt at him.

LURCHER, among *Sportſmen*, a kind of hunting DOG, like a mongrel greyhound, with pricked ears, a thaggy coat, and generally of a yellowiſh-white colour.

LURE, in *Falconry*, a piece of red leather cut in form of a bird, with two wings, ſtuck with feathers; and ſometimes baited with a piece of fleſh: wherewith to reclaim, or call back a hawk.

The word comes from the French *leurre*, which ſignifies the ſame; formed, according to Skinner, from the Anglo-Saxon, *luren*, *irritare*; or, according to Triſanet, from *leura*, *craftineſs*. *See* FALCON and HAWKING.

LUSCINIA, the *nightingale*. See NIGHTINGALE.

LUSHBURGHS, or LUXENBURGHS, in our *Old Writers*, a baſe ſort of foreign coin, made of the likeneſs of Engliſh money, and brought into England in the time of Edw. III. to deceive the king and his people: on account of which it was made treaſon, for any one willingly to bring any ſuch money into the realm, as knowing it to be falſe. Stat. 25 Edw. III. 3 Inſt. 14.

LUSITANICA *rubra bolus*, is an impure earth, of a florid red colour, compact texture, and heavy: it colours the hands, and is very friable, readily diſſoluble in water, and raiſes with it a ſtrong ebullition: it melts readily in the mouth, has a ſtrong aſtringent taſte, is gritty, and adheres firmly to the tongue. It acquires hardneſs and a brighter colour by burning; it is of an alkaline quality: it is dug in the kingdoms of Portugal and Spain; it is alſo found near the Havannah and La Vera Cruz in New Spain. It is eſteemed a very valuable aſtringent, and an effectual remedy for fluxes and other diſtempers of that kind. It is alſo accounted alexipharmic by the Spaniards and Portugueſe. They make an earthen ware of this *bole*, which they call *bucaros*: the ware is of a fine red colour, ſmooth and poliſhed, though it is merely dried and not glazed. They uſe it to filtre, cleanſe, and cool the water. Veſſels of the ſame kind are alſo brought from the Havannah and Vera Cruz.

LUST, at *Sea*. If a ſhip *heel* either to ſtar-board or port, the ſeamen ſay ſhe hath a *luſt* that way; and they ſay ſo though it be occaſioned only by the ſhooting of her ballaſt, or by the unequal flowing of things in her hold; though it is more properly ſaid of a ſhip, when ſhe is inclined to heel any way upon account of her mold or make.

LUST-*gyrt*, in *Botany*. See STRAMONIUM.

LUSTER, or LUSTRE, gloſs, or brightneſs appearing on any thing; particularly on manufactures of ſilk, wool, or fluff.

LUSTRE is alſo uſed for a certain compoſition, or manner of giving that gloſs or brilliance.

The *luſtre* of ſilks, in which their chief beauty conſiſts, is given them by waſhing in ſoap, then clear water, and dipping them in alum-water cold.

The *luſtre* of black taffety is given by double-brewed beer, boiled with orange or lemon-juice; that of colored taffeties

taffeties with water of gourds, diſtilled in an alembic. Curriers give a *luſtre*, or gloſs to the leather ſeveral ways, according to the colour it is to be illuſtrated. For blacks, the firſt *luſtre* is with juice of barberries; the ſecond with gum arabic, alc. vinegar, and Flanders glue boiled together; for coloured leathers, they uſe the white of an egg beaten in water: Morocens have their *luſtre* from juice of lemon, and lemon or orange.

For teſts, *the aqua fortis* frequently given with common water; ſometimes a little black dye is added. The ſame *luſtre* ſerves ſkinners, except that as whites furs they never uſe any black dye. For very black furs, the Mooremans prepare a *luſtre* of galls, copperas, Roman alum, ſublimate, and other ingredients.

The *luſtre* given to clocks and mohairs, by PASSING them under the CALENDER.

LUSTRE, an appellation given to a branched candleſtick, when made of glaſs. See BRANCH and JESSE.

LUSTRAL, an epithet given by the ancients, to the water uſed in their ceremonies, to ſprinkle and purify the people. From them the Romaniſts have borrowed the holy water uſed in their churches.

LUSTRALIA, *dies* LUSTRALES, that wherein the luſtrations were performed for a child, and its name given; which was uſually the ninth day from the birth of a boy, and the eighth from that of a girl. Though others performed the ceremony on the laſt day of that week wherein the child was born, and others on the fifth day from its birth.

Over this feaſt-day the goddeſs Nundina was ſuppoſed to preſide; the midwives, nurſes, and domeſtics, handed the child backwards and forwards, around a fire burning on the altars of the gods, after which they ſprinkled it with water; hence this feaſt had the name of AMPHIDROMIA. The old women mixed ſalt and daſt with the water. The whole ended with a ſumptuous entertainment. The parents received gifts from their friends on this occaſion. If this child was a male, their door was decked with an olive-garland; if a female, with wool, denoting the work about which women were to be employed. Potter.

LUSTRATION, *expiation*, in antiquity, ſacrifices, or ceremonies, by which the Romans purified their cities, fields, armies, or people defiled by any crime, or impurity.

Some of the *luſtrations* were public, others private.

There were three ſpecies or manners of performing *luſtrations*; viz. by fire and ſulphur; by water; and by air: which laſt was done by fanning and agitating the air round the thing to be purified.

There was alſo a peculiar kind of *luſtration* for young children.

Lampridius has a volume expreſs on the *luſtrations* of the auctions; viz. Lampridii Cantianenſis Epimenedes, ſive de veterum gentilium *Luſtrationibus*; firſt printed at Utrecht in 1661, and ſince, with additions, in 1702, 4to.

All perſons, ſaints only excepted, he ſhews, were miniſters of ſome ſort of *luſtration*. When any one died, the houſe was to be ſwept after a particular manner, by way of purification; the prieſt threw water on new married people, with the like intention. To purify themſelves, people would even ſometimes run naked through the ſtreets; ſuch was their extravagance. And, as if ſuperſtition enough in inventing modes of *luſtration*, they even uſed enchantments to raiſe the dead, in order to receive inſtructions what they muſt do to purge themſelves of their crime. Add, that they frequently raiſed the opinion of the efficacy of their expiations by fictitious miracles.

It was common, on theſe occaſions to ſhed human blood: the prieſts of Cybele, Bellona, and Baal, made cruel inciſions on themſelves. Euetheus, king of Attica, ſacrificed his daughter to Proſerpina. Several had their throats cut at Rome, to obtain the emperor's health from the gods. Thoſe who commanded armies, offered one of their ſoldiers to appeaſe the anger of the gods; that he alone might ſuffer all the wrath the army deſerved.

All ſorts of perfumes, and odoriferous herbs, had place in *luſtrations*. The egg was much uſed among them, as being the ſymbol of the four elements: its ſhell, they ſay, repreſents the earth; the yolk, a globe of fire; the white, reſembles the water; and beſides it has a ſpirit, they ſay, which repreſents the air. For this reaſon it is, that the Romans, or Indian prieſts, believe to this day that the world came out of an egg. There is ſcarce any perſon, public, true, or mythic, which they did not offer to, in their lu ſ ſ rations: nor did they forget milk, honey, wine, or honey: what is more, they made uſe of the very ſpittle, and urine.

The pagan prieſts believed that the gods purified themſelves; and when they wanted to purify their ſtatues. They made a *luſtration* for children, the eighth day after their birth. When a man who had been falſely reputed dead, returned home, he was not to enter his houſe by the door. It was a ſettled cuſtom to offer no expiation for thoſe who were hanged by order of juſtice; or that were killed by thunder. Neither did they offer any for thoſe who were drowned in the ſea: it being the common opinion, that their ſouls periſhed with their bodies. And hence it was, that perſons in danger of ſhipwreck, ſometimes thruſt their wounds through their bodies, that they might not die in the ſea; where they thought their ſoul, which they ſuppoſed to be a ſtame, would be totally extinguiſhed.

The moſt celebrated expiatory ſacrifice was the hecatomb, when they offered a hundred beaſts; though they commonly did not offer ſo many, but contented themſelves with killing twenty-five; but thoſe being quadrupeds, their feet alone were hundred.

The manner of the Macedonians purifying their army by *luſtration* was thus: at the time of their feſtival Xanthica, they divided a bitch into two halves, one of which, together with the entrails, was placed upon the right hand, the other upon the left; between theſe the army marched in this order: after the arms of the Macedonian kings, came the firſt line of the army, conſiſting of horſe; theſe were followed by the king, and his children, after whom went the life guards; then followed the reſt of the army: this done, the army was divided into two parts, one of which being fet in array againſt the other, there followed a ſham encounter, in imitation of a fight. Potter, Archæol. Græc. lib. ii. c. 20. tom. i. p. 417.

Luſtrations, and luſtrare ſacrifices, were not only performed for men, but alſo for temples, altars, theatres, trees, fountains, rivers, ſheep, fields, and villages. When the Arval brothers offered a victim for the fields, their ſacrifice was called *ambarvalia*.

Cities were all to be purified, from time to time: ſome made the victim walk round their walls, and then ſlew him. The Athenians ſacrificed two men, one for the men of their city, and the other for the women. The Corinthians ſacrificed the children of Medea to; though the poets ſay, Medea killed them herſelf. The Romans performed the ceremony of purifying their city every lifth year; whence the name of *luſtrum* was given to the ſpace of five years.

Divers of the explations were auſtere: ſome faſtful; others abſtained from all ſenſual pleaſures; ſome, as the prieſts of Cybele, caſtrated themſelves; others, that they might live chaſte, cut off, or lay under the branches of a tree called AGNUS CASTUS.

They caſt into the river, or at leaſt out of the city, the animals or other things that had ſerved for a *luſtration*, or ſacrifice of amendment; and thought themſelves threatened with ſome great misfortune, when by chance they trod upon them. At Marſeilles, they took care to feed a poor man for ſome time; after which, they charged him with all the ſins of the country, and drove him away: thoſe of Leucadia faſtened a number of birds to a man charged with their ſins, and in that condition caſt him headlong from a high tower; and if the birds hindered his being killed, they drove him out of the country.

Some of theſe ceremonies were abolithed by the emperor Conſtantine, and his ſucceſſors; the reſt fulfilled till the Gothic kings were maſters of Rome, under whom they expired; except that ſeveral of them were adopted by the popes, and brought into the church, where they make a figure to this day: witneſs the numerous conſecrations, benedictions, exorciſms, ablutions, ſprinklings, proceſſions, feaſts, &c. ſtill in uſe in the Romiſh church.

LUSTRINGS. A company was incorporated for making, dreſſing, and luſtring alamodes and *luſtrings* in England, who were to have the ſole benefit thereof, by ſtat. 4 and 5 W. and M. And no foreign ſilks known by the name of *luſtrings* or alamodes are to be imported, but at the Port of London, &c. Stat. 9 and 10 W. III. c. 43. See SILK.

LUSTRUM, a term uſed by the Romans, to ſignify a ſpace of five years.

Varro derives the word from *lus*, *to waſh*, becauſe at the beginning of every fifth year, they paid the cenſus, or tribute impoſed by the cenſors; whoſe authority, at their firſt inſtitution, was confined them for five years; though afterwards it was abridged to one. Others rather derive the word from *luſtrare*, *to make a review*; becauſe once in five years the cenſors reviewed the army.

LUSTRUM was alſo a ceremony, or ſacrifice uſed by the Romans, after numbering their people, once in five years. See LUSTRATION.

The *lustrum* was accompanied always by a *luſtration* of the people, by the word *luſtrum*, has conſtantly been taken by the ancients and moderns for a term of five years: yet, if we enquire into the real ſtate of the caſe, we ſhall find no good ground for fixing to preciſe a ſignification

to it; but, on the contrary, that the CENSUS and *lustrum* were, for the moſt part, held irregularly and uncertainly, at very different and various intervals of time, as the particular exigencies of the ſtate required. Middlet. of Rom. Sen. p. 167.

LUTATION, in *Chemiſtry*, is uſed for the cementing of chemical veſſels cloſe together.

LUTE, LUTUM, in *Chemiſtry*, a compoſition of certain tenacious ſubſtances, wherewith to cloſe the apertures and junctures of veſſels in diſtillation, &c.

Under *lute* is comprehended any ſort of cement, or plaſter, uſed either in the conſtruction of furnaces, or in fitting to them veſſels of glaſs or earth, that are to reſiſt a very violent fire. Some *lutes* are made of flour and water; others, of quick-lime and whites of eggs; others, of iron-filings, brick-duſt, and linſeed oil; others, of potters earth, river-ſand, horſe-dung, powder of broken pots, caput mortuum of vitriol, droſs of iron, beaten glaſs, flocks of wool mixed with ſalt water or bullock's blood. The *lute* uſed by Lemery was only two parts of ſand, and one of clay, tempered together in water; which does very well for joining the noſes of retorts and their receivers in diſtilling of volatile ſpirits, &c.

Others have recommended for covering the inſide of FURNACES, a maſs of clay mixed with ſand, and moiſtened with three or four times as much ox blood diluted with water. The beſt lute, and eaſieſt to be had at London, is a ſort of clay called Windſor loam, which muſt be mixt pretty ſtiff, and preſſed into the inſide of the furnace, firſt wetted with water; and when the clay begins to dry, it muſt be beat down cloſe to the ſides with a wooden mallet; then the unevenneſs and cracks filled up with freſh clay ſomewhat moiſter, ſo as to be made ſmooth and even with a trowel, and then left to dry gently; and if any cracks happen, they muſt again be filled up.

Dr. Shaw recommends the following mixture: take a buſhel of Windſor loam, four quarts of brick-duſt, two quarts of powdered green glaſs, two quarts of iron filings, four handfuls of cow-hair, and eight handfuls of horſe-dung; beat theſe all together, and add a ſufficient quantity of bullock's blood to make a ſtiff and uniform paſte. In diſtilling by the alembic, or veſica, or copper body, with its head or ſerpentine, a wet bladder ſerves very well to *lute* the junctures of the veſſels; ſlips of paper or linen, covered with flour paſte, will alſo anſwer this purpoſe: which more penetrating and diſſolving vapours are contained in the veſſels, it will be neceſſary to uſe a *lute* formed of quick-lime ſlaked in the air, and beat into a liquid paſte, with whites of eggs, which ſhould be ſpread upon ſlips of linen, and applied exactly to the juncture of the veſſels: but for the diſtillation of corroſive ſpirits, as alſo to ſtop the cracks of glaſſes, &c. the following compoſition is recommended; viz. ſtarch boiled, or iſinglaſs diſſolved in ſpirit of wine, with flour of ſulphur, maſtic, and lime ſlaked with milk.

For this purpoſe recourſe muſt be had to what is called the fat *lute*; made by forming into a paſte ſome dried clay finely powdered, ſifted through a ſilken ſcarce, and moiſtened with water, and then by beating this paſte in a mortar, with boiled linſeed oil, that is oil which has been rendered drying by litharge diſſolved in it, and fit for the uſe of painters. This *lute* may be made up in a cylindric form, and ſhould be applied by flattening it to the joinings of the veſſels, previouſly well dried, and the whole covered with ſlips of linen, ſpread with *lute* of lime and whites of eggs: theſe ſlips muſt be faſtened with packthread. See CEMENT and MORTAR.

LUTE, a muſical inſtrument of the ſtring kind; which had anciently but five rows of ſtrings; though in courſe of time, four, five, or ſix more have been added.

Some derive the word from the German *laute*, which ſignifies the ſame; or from *lauten*, *ſonare*. Scaliger and Bochart derive it from the Arabic, *alland*.

The *lute* conſiſts of four principal parts: the table, the body or belly, which has nine or ten ſides; the neck, which has nine or ten ſtops or diviſions, marked with ſtrings; and the head or croſs, wherein are ſcrews, for raiſing or lowering the ſtrings to the proper tone. In the middle of the table is a roſe, or paſſage for the ſound. There is alſo a bridge that the ſtrings are faſtened to, and a piece of ivory between the head and the neck, to which the other extremity of the ſtrings is fitted. In playing, the ſtrings are ſtruck with the right hand, and with the left the ſtops are preſſed.

The *lutes* of Bologna are eſteemed the beſt; on account of the wood, which is ſaid to have an uncommon diſpoſition for producing a ſweet ſound. The theorbo is an improvement on the common *lute*.

LUTE, *temperament of the*, denotes the alteration requiſite to be made in the intervals, both with regard to concords, and diſcords, in order to render them more juſt on that inſtrument.

LUTE, *archi*. See ARCHLUTE.

LUTE, *theorbo*. See THEORBO.

LUTEA, in *Natural Hiſtory*, the name of a ſpecies of fly found frequently near waters after rain; it is of a dunniſh yellow colour, the wings are long, and the eyes large and prominent; the tail is thick, and has two hairy of a conſiderable length, growing at the head, ſo that it is of the briſtle kind.

LUTEA is alſo a name by which ſome authors have called the YELLOW *hammer*.

LUTEOLA, in *Botany*. See DYER'S *weed*.

LUTIOLA, in *Zoology*, a name given by many to a ſmall bird, called by others *viſtor*, and by others *regulus non criſtatus*; but this laſt is a name that has occaſioned ſome confuſion, as many have erroneouſly called our common wren the *regulus*, and as it has no creſt, imagined it to be the bird meant by this name.

It is, excepting the creſted wren, the ſmalleſt of all European birds, and it very little exceeds that in ſize; its head, neck, and back are of a greeniſh brown; the rump is greener than the reſt; it has a yellow line on each ſide, extended from the noſtrils, beyond the eyes, to the hinder part of the head; the breaſt, throat, and belly, are yellow, with a very faint caſt of green; the wings and tail are brown, and all their feathers are tipped with green at their ends; the under part of the wings has much of a very fine green; the beak is extremely ſlender and half an inch long; the mouth is yellow within; it makes a loud noiſe, like that of a graſshopper, and is principally found among willows; it is continually creeping and ſinging among the branches of trees; it builds with ſtraw and feathers, and lays five eggs, which are white, and ſpotted with red: there is a conſiderable variation in the colours of theſe birds; ſome of them being much greener on the back, and much whiter on the belly, than others.

LUTHERANISM, in *Eccleſiaſtical Hiſtory*, the ſentiments of Dr. Martin Luther, and his followers, with regard to religion.

Lutheraniſm had its riſe in the 16th century: its author was born at Iſleben in Thuringia, in 1483. After his ſtudies he entered himſelf among the Auguſtines, and having found a copy of the Bible, which lay neglected in the library of his monaſtery, he devoted himſelf with ſurpriſing aſſiduity to the ſtudy of the ſcriptures; and in 1512, took the cap of a doctor in theology, in the univerſity of Wittemberg. In 1516, he attacked the ſchool divinity in ſeveral theſes. In 1517, Leo X. ordered indulgences to be diſpenſed to thoſe who ſhould contribute towards the building of St. Peter's church at Rome, comprehending all ſins paſt, preſent, and future. Albert, archbiſhop of Mentz and Magdeburgh, appointed John Tetzel, a monk of the Dominican order, notorious for his profligacy, barbarity, and extortion, to preach and proclaim theſe indulgences in Germany. The inſolence and indecency with which Tetzel executed his commiſſion, rouſed the indignation of Luther, who, in ninety-five propoſitions, maintained publicly at Wittenberg, on the 30th of September, 1517, cenſured the extravagant extortion of theſe queſtors, and plainly pointed out the Roman pontiff as a partaker of their guilt; ſince he ſuffered the people to be ſeduced by ſuch deluſions from placing their principal confidence in Chriſt, the only proper object of their truſt.

He alſo wrote to Albert, warmly remonſtrating againſt the falſe opinions and wicked lives of the preachers of indulgences; and in order to gain the ſuffrage of men of learning, he publiſhed his ninety-five theſes; appointing a day, on which the learned were invited to impugn them either in perſon, or by writing, and ſubjoining to the whole, ſolemn proteſtations of his high reſpect for the apoſtolic ſee, and of his implicit ſubmiſſion to its authority. No opponent appeared at the time appointed; the theſes ſpread over Germany with aſtoniſhing rapidity; they were much read and approved: at the ſame time the boldneſs and novelty of his opinions, drew great attention from his hearers, and being recommended by the authority of Luther's perſonal character, and by a popular and perſuaſive eloquence, made a deep impreſſion. Luther was alſo an Auguſtinian, and Tetzel a Dominican; and, therefore, he was more encouraged than oppoſed by the friars of his own order, who hoped to ſee the Dominicans expoſed to the hatred and ſcorn of the people. He was alſo ſecretly ſupported by his ſovereign, the elector of Saxony, who, without to ſee the exactions of the court of Rome reſtrained. This was the commencement and foundation of that memorable rupture and revolution in the church, which humbled the grandeur of the ſordid pontiffs, and eclipſed ſo great a part of their glory. See REFORMATION.

It has been ſaid indeed by F. Paul, in his Hiſtory of the Council of Trent, p. 5. and after him by Mr. Hume, in his Hiſtory of England, vol. i. p. 119. as well as by others, that the Auſtin friars had been uſually employed in preaching

preaching indulgences in Saxony; but that Arcemboldo, a Genoese merchant, who was employed by Magdalen, the sister of Leo, to whom he had granted the profits arising from the sale of indulgences in Saxony, to collect the money that should be raised, and his deputies, hoping to gain more by committing this trust to the Dominicans, had bargained with Tetzel; and that Luther was prompted at first to oppose Tetzel and his associates, and to deny indulgences, by a desire of taking revenge for this injury offered to his order. Mr. Chambers, in the former edition of this work, followed the Diction. de Trevoux, as that Dictionary seems to have adopted the representation of Bossuet; and, more lately, the editors of the Encyclopedie have stated the first rise of *Lutheranism* in a manner that favours the opinion just mentioned: it is proper, therefore, to observe, that the profits arising from indulgences in Saxony and the adjacent countries, were granted, not to Magdalen the sister of Leo, but to Albert, archbishop of Mentz, who had the sole right of nominating those who published them: moreover, Arcemboldo never had any concern in the publication of indulgences in Saxony; because his district was Flanders and the Upper and Lower Rhine. Besides, the publication of indulgences in Germany was not usually committed to the Augustinians: from the year 1220, that lucrative commission was principally intrusted with the Dominicans; and they had been employed in the same office a short time before the present period: the promulgation of them, at three different periods under Julius II. was granted to the Franciscans, and the guardian of the Franciscans was joined in the trust with Albert on this occasion, though he refused to accept it: and it is remarkable, that for half a century before Luther, viz. from 1450 to 1517, the name of an Austin friar employed in this service, occurs but once. To these facts it may be added, that it is far from being probable, that Luther would have been solicitous about obtaining for himself or his order, a commission of this kind, at a time when the preaching of indulgences was become very unpopular; insomuch that all the princes of Europe, and many bishops, as well as other learned men, abhorred the traffic; and even the Franciscans and Dominicans, towards the conclusion of the fifteenth century, opposed it publicly, both in their discourses and writings: nor was this commission given to the Dominicans in general, but solely to Tetzel. Finally, Luther was never accused of opposing the publication of indulgences from resentment or envy, either in the edicts of the pontifs of his time, or in the reproaches of his contemporary writers, who defended the cause of Rome, from the year 1517 to 1546, and who were far from being sparing of their invectives and calumnies. The reader may find this matter fully stated by Dr. Maclean, the translator of Mosheim's Ecclesiastical History, in vol. iii. p. 304. note (p) 8vo. ed. and by Dr. Robertson in his Hist. of Ch. V. vol. ii. p. 125. note * 8vo edit.

But to return from a digression, which, it is hoped, will not be unacceptable to the readers of a work of this kind: the sentiments of Luther were received with applause by the greatest part of Germany; and the alarm of controversy being sounded, Tetzel published counter-theses in opposition to those of Luther, and was supported by Prierio, Eckius and others. Leo, however, treated the dispute at first with indifference and contempt; till being roused by Luther's adversaries, he summoned him to appear at Rome: but partly by Luther's own application to the pontif, and partly by the interference of Frederick the Wise, elector of Saxony, cardinal Cajetan, a Dominican, the pope's legate in Germany, was appointed to hear and determine the cause. The cardinal in an arrogant and overbearing manner insisted on Luther's renouncing his opinions, and submitting respectfully to the judgment of the Roman pontif. The intrepid reformer was not to be awed into compliance; and leaving Augsburgh, the place of conference, returned into his own country. But before his departure, he prepared a solemn appeal from the pope, ill-informed at that time concerning his cause, to the pope, when he should receive more full information concerning it. Leo, enraged at the obstinacy of Luther, published an edict in 1518, commanding his spiritual subjects to acknowledge his power of delivering from all the punishments due to sin and transgression of every kind: upon this measure, Luther appealed from the pontif to a general council. The pope, repenting of his precipitance, and desirous of bringing the dispute to an amicable conclusion, employed Miltitz, a Saxon knight, to negociate with Luther: but, though there seemed at first to be some hopes of a reconciliation, the violence of the enemies of Luther blasted these agreeable expectations, and kindled anew the flames of discord. At length Leo X. issued out a bull against Luther, dated the 15th of June, 1520, condemning forty-one heretical propositions selected from his writings, ordering his works to be burnt, and prohibiting their being read; and summoning Luther himself, on pain of excommunication, to acknowledge and retract his errors. In consequence of this rash and furious sentence, Luther withdrew himself in the most public manner from the communion of the church of Rome; committing to the flames at Wittemberg, before a vast multitude of spectators, the pope's bull of excommunication, and all the decretals and canons relating to the pope's supreme jurisdiction. Soon after this a second bull was issued against him on the 6th of January, 1521, by which he was expelled from the communion of the church, for having insulted the majesty and disowned the supremacy of the Roman pontif. These violent measures led this bold reformer to form the project of founding a church, upon principles entirely opposite to those of Rome, and to establish in it a system of doctrine and ecclesiastical discipline, agreeable to the spirit and precepts of the gospel of truth: in this noble undertaking he was encouraged by many learned and pious men in various parts of Europe, and especially by the celebrated Melancthon. In 1521, Charles V. summoned Luther to appear before the diet at Worms, where he behaved with great decency and equal firmness; he acknowledged an excess of vehemence and acrimony in his controversial writings, but refused to retract his opinions, unless he were convinced of their falsehood, or to consent to their being tried by any other rule than the word of God. However, after his departure, when it was found that neither intreaties nor threats could be of any avail, he was condemned by the unanimous suffrages both of the emperor and the princes, and declared an enemy to the whole Roman empire. Frederic, the elector of Saxony, contrived to preserve him from the violence of his enemies, by seizing him on his return, and carrying him to the castle of Wartburgh, as a place of safety: in this retreat, which he called his Patmos, Luther was concealed for the space of ten months, where he employed himself in preparing several useful compositions. During his confinement his opinions gained ground; and the Augustinians of Wittemberg, with the approbation of the university and the connivance of the elector, abolished the celebration of private masses, and gave the cup as well as the bread to the laity, in the administration of the Lord's supper. Nevertheless, at this time, his opinions were solemnly condemned by a decree of the university of Paris, and in a Treatise on the seven Sacraments, published by Henry VIII. of England. Luther soon published his animadversions both on the decree of the university and the work of the English monarch. In the month of March, 1522, he quitted his retreat, and returned to Wittemberg, in order to check the furious zeal of Carolostadt and his fanatical followers, who had begun to excite tumults in Saxony; and his appearance alone suppressed that spirit of extravagance which began to seize his party. Whilst Luther was in confinement, he had begun to translate the Bible into the German tongue, and in 1524, by his own diligent application, and the assistance of Melancthon and several other of his disciples, he finished part of the New Testament; and the publication of it proved more fatal to the church of Rome than that of all his own works. The advocates for reformation in the other countries of Europe, were thus encouraged to publish versions of the scriptures in their own languages: and several cities and princes of Germany embraced the reformed religion, and patronized Luther's opinions: and though the succeeding popes Adrian VI. and Clement VII. exerted their utmost efforts to prevent their spread, they proved altogether ineffectual. In a word the character of the man, the strength of his arguments, and the weakness of his adversaries cause, procured him an increasing number of followers. And thus it was that *Lutheranism* was formed; the adherents whereto were called *Lutherans*, from *Luther*, a name which has a Greek turn, and which he assumed in lieu of his family name, *Lother*, or *Lauther*; it being the custom of those days, for men of learning to give themselves Greek names; witness Erasmus, Melancthon, Bucer, &c.

In 1523, Luther quitted the habit of a religious, and in 1526, married Catharine a Boria, a nun of a noble family, who, having thrown off the veil, had fled from the cloister; and after having been an happy instrument of reforming a great part of Germany, under the protection of Frederick and John, electors of Saxony, he died at his native place, in 1546.

For a full and accurate account of the rise and progress of *Lutheranism*, the reader may consult Mosheim and Robertson, ubi supra. See PROTESTANTS and REFORMATION.

Lutheranism has undergone some alterations since the time of its founder. Luther rejected the epistle of St. James, as inconsistent with the doctrine of St. Paul, in relation to justification; he also set aside the Apocalypse; both

both which are now received as canonical in the Lutheran church.

Luther reduced the number of sacraments to two, viz. baptism, and the eucharist; but he believed the impanation, or CONSUBSTANTIATION: that is, that the matter of the bread and wine remain with the body and blood of Christ; and it is in this article, that the main difference between the Lutheran and English churches consists.

Luther maintained the mass to be no sacrifice; he exploded the adoration of the host, auricular confession, meritorious works, indulgences, purgatory, the worship of images, &c. which had been introduced in the corrupt times of the Romish church. He also opposed the doctrine of free-will; maintained predestination; asserted that we are necessitated in all we do; that all our actions done in a state of sin, and even the virtues themselves of heathens, are crimes; that we are only justified by the imputation of the merits and satisfaction of Christ. He also opposed the failings in the Romish church, monastical vows, the celibacy of the clergy, &c.

Some authors reckon thirty-nine different sects, which at different times have sprung up among the Lutherans.

LUTHERANS, a sect of Protestants who profess Lutheranism, or adhere to the doctrine and tenets of Luther.

The *Lutherans*, of all Protestants, are those who differ least from the Romish church; as they affirm, that the body and blood of Christ are materially present in the sacrament of the Lord's Supper, though in an incomprehensible manner; and likewise represent some religious rites and institutions, as the use of images in churches, the distinguishing vestments of the clergy, the private confession of sins, the use of wafers in the administration of the Lord's Supper, the form of exorcism in the celebration of baptism, and other ceremonies of the like nature, as tolerable, and some of them as useful. The *Lutherans* maintain, with regard to the divine decrees, that they respect the salvation or misery of men, in consequence of a previous knowledge of their sentiments and characters, and not as free and unconditional, and as founded on the mere will of God. Towards the close of the last century, the *Lutherans* began to entertain a greater liberality of sentiment than they had before adopted; though in many places they persevered longer in severe and despotic principles, than other protestant churches.

Their public teachers now enjoy an unbounded liberty of dissenting from the decisions of those symbols or creeds, which were once deemed almost infallible rules of faith and practice, and of declaring their dissent in the manner they judge the most expedient. Mosheim attributes this change in their sentiments to the maxim, which they generally adopted, that Christians were accountable to God alone for their religious opinions; and that no individual could be justly punished by the magistrate for his erroneous opinions, while he conducted himself like a virtuous and obedient subject, and made no attempts to disturb the peace and order of civil society. Eccl. Hist. vol. iv. p. 440. Brog. ed. 8vo.

LUTHERN, from the French *lucarne*, of the Latin *lucerna*, *light*, or *lucerna*, a kind of window over the cornice, in the roof of a building; standing perpendicularly over the naked of the wall; and serving to illuminate the upper story.

The French architects distinguish these into various kinds, according to their various forms; as *fouare*, *fenestre-vulat*, *bulle eye*, *flat arches*, *Flemish lutherns*, &c.

LUTRA, in *Zoology*. See OTTER.

LUTUM, in *Botany*, a name given by the ancient Roman authors to a plant since called *lutcola*, or DYER's *weed*, and by authors of later date *carduus*, and *cnicus*. It is used at this time to dye things yellow, and was so by the ancient Greeks, who expressly mention the dying woollen cloth with it. The Roman courtezans had also a way of dying their hair yellow with it.

LUTUM *sapientiæ* is the hermetical seal; made by melting the end of a glass vessel by a lamp, and twisting it up with a pair of pincers.

LUXATION, LUXATIO, formed from *luxare*, to *loose*, in *Medicine* and *Surgery*, the slipping of the head of a bone from its proper receptacle into another place, whereby the natural motion of the joint is destroyed.

Luxation is the same with what is otherwise called DISLOCATION; being the displacing of a bone, or rather the disjoining of two bones, articulated together for the motion of the part.

Luxations are either violent, proceeding from some external cause; as falls, strains, blows, leaps, extensions, &c. Or *lento*, arising from internal causes; as a natural laxity of the ligaments, a fluxion of humours, or gradual collection thereof between the joints, &c.

Luxation, properly, has place only amongst bones whose figure determines them to a manifest motion: such are all those united by DIARTHROSIS: those articulated by SYNARTHROSIS, where there is no manifest motion, are indeed subject to fracture, caries, exostosis, &c. but not to *luxation*.

Luxations, again, are either *perfect*, or *imperfect*.

LUXATION, *perfect*, or *complete*, *ἀπαρθρημα*, is that where the head of a bone is actually started out of the cavity of another. This is known by a tumor or protuberance, formed by the head of the separate bone, which raises up the skin and muscular flesh above its natural level in the part not destined to receive it; and an hollowness or sinking in the place from whence it is started, perceivable by the touch. It is also attended with great pain, a total abolition of motion, and a shortening of the limb.

LUXATION, *imperfect*, or *partial*, *παραρθρημα*, called also *subluxation*, is where the motion is only much impaired, the joint weakened, and a deformity perceivable in it, when compared with the opposite part, which is found. This is otherwise called a *strain*, when it proceeds from an external cause; or, simply, a *relaxation*, when from an internal one.

A *luxation* is said to be *simple*, when it has no other accident or injury accompanying it—*complicated*, when it is attended with a wound, inflammation, fracture, or the like.

The cure of a *luxation* is by a speedy reduction of the dislocated member to its natural place. To this are necessary:

1. *Extension*, which a luxated as well as fractured member requires; as well on account of the contraction of the tendons, as that the head of the bone may more directly be intruded into its seat. This extension is made either by the hands alone, which is called *manus postatrices*, because, among wrestlers, dislocated members used to be reduced after this manner; or by ligatures or towels; or by instruments, or great machines, when the *luxation* is difficult and inveterate.

2. After extension follows the intruding of the joint into the natural cavity; which, likewise, may either be effected by the hands only, or by the heel (as when the head of the os humeri is fallen into the arm-pit), or by means of ladders, doors, pestles, or Hippocrates's instruments, called *ambe*. This way is termed *methodical*, by way of distinction from the third, which is called *organical*, because performed by large instruments, and machines, but now altogether out of use. Gourmelinus to these adds *ἀπόθεσιν*, the very act of reducing the member into its own place, which is to be known by the sound usually heard, and from the use and motion of the reduced joint. Lastly, because, on account of the laxity of the tendons, &c. the reduced bone cannot remain in its natural position, it is necessary yet farther to apply compresses and bandage; by whose means the articulation is preserved safe till the ligaments may acquire their usual strength of elasticity and attraction.

A recent *luxation* or dislocation may generally be reduced by extention alone, which must always be greater or less, according to the strength of the muscles which move the joint, the use, robustness, and other circumstances of the patient. When the bone has been out of its place for any considerable time, and a swelling or inflammation has come on, it will be necessary to bleed the patient, and, after fomenting the part, to apply soft poultices with vinegar to it for some time before the reduction be attempted. After the reduction, it is only necessary to apply cloths dipped in vinegar, or camphorated spirits of wine to the part, and to keep it perfectly easy.

LUXATION *of the ancle, clavicle, os coxendix, cubitus, fibula, fingers, hand, humerus, jaw, knee, neck, nose, os calcis, rib, thigh, and vertebræ*. See ANCLE, CLAVICLE, *&c.*

LUXURY, denotes an addictedness to sensual pleasure. Excess of diet, which is one species of *luxury*, is prohibited by an Edw. III. stat. 3. which ordains that no man shall be served at dinner or supper with more than two courses; except upon some great holidays there specified, in which he may be served with three.

LUZZO *marino*, in *Ichthyology*, a name given by the Italians to the fish called by the ancient Greek writers, and many of the modern Latin authors, SPHYRÆNA; and by Pliny, Varro, and some other of the old Roman authors, SUDIS. Gaza has called it the *malleolus*, and the French, at this time, call it *bet*. It seems to belong to the genus of the *scombri*. Salviau has given the figure of it, but it is an imperfect one; for he has omitted the first fin of the back.

LYCÆA, Λυκαια, in *Antiquity*, an Arcadian festival resembling the Roman LUPERCALIA, in which the conqueror was rewarded with a suit of brazen armour.

LYCANTHROPY, Λυκανθρωπια, formed of Λυκος, *wolf*, and ἀνθρωπος, *man*, q. d. *man-wolf*, a species of madness, wherein those affected run, in the night-time, howling about the fields like wolves; and sometimes bite and hunt like dogs: whence the disease is also called by the ancients *cynanthropy*.

Lycanthropy is also used by some to express an imaginary metamorphosis of a man into a wolf, by magic power; wherein the persons affected seem not only to themselves in the form of wolves, but to others. See MADNESS.

LYCEUM, *Λύκειον*, in *Antiquity*, the name of a celebrated school, or academy, at Athens, where Aristotle explained his philosophy.

The place was composed of porticoes, and trees planted in the quincunx form, where the philosophers disputed walking. Hence *philosophy of the Lyceum* is used to signify the philosophy of Aristotle, or the Peripatetic philosophy. Suidas observes, that the *Lyceum* took its name from its having been originally a temple of Apollo *Lyceus*; or rather, a portico or gallery built by Lyceus, son of Apollo: but others mention it to have been built by Pisistratus, or Pericles.

LYCHNIDEA, in *Botany*. See PHLOX.

LYCHNIS, in *Botany*. See CAMPION.

LYCHNITES *macrior*. See MARBLE.

LYCIUM, in the *Materia Medica*, the name of a fruit called by the French *baye d'Avignon*, the AVIGNON *berry*, and by many authors the *grossularia*. The shrub which produces it is the *lycium sive pyracantha* of Gerard. See *Rhamnus* THORN. The fruit is about the size of a grain of wheat, and is not round, but of an angular form when dried, sometimes of three, sometimes of four angles, and sometimes dented in at one end like a heart. It is of a yellowish green colour, and of a bitter and astringent taste. It should be chosen fresh dried, and large. There was formerly a rob, or inspissated juice made from these berries, much in use in medicine; but this was generally adulterated with a rob made of the berries of the woodbine, privet, sloe, or other shrub, and is now quite out of use. The dyers in France and Holland use it for a yellow; and the Dutch have another use for it, which is, that they boil it in alum-water, and mixing it in whiting, form it into twisted sticks, which they sell to the painters in water-colours, under the name of *fil de grain*.

LYCOCTONON. See ACONITE.

LYCODONTES. See BUPONITE.

LYCOGALA, in *Botany*, a name by which Micheli has called several of the species of MUCOR.

LYCOIDES, a term used by medical writers to express the disorders which arise in the human body by a long retention of the seed. These are sometimes mischievous, and very often dangerous quinsies and swellings, and inflammations about the neck and throat. If we consider the natural tendency of the disorders of this kind to affect the neck, and the remarkable swelling of the necks of bucks, and some other animals at rutting time, it may give some rational hints towards understanding the alteration of the voice in boys who arrive at puberty.

Blancard derives the word *lycoides* from *λυκος lupus*, and *ειδος forma*, from a supposition that wolves are subject to this disorder.

LYCOPERDON, in *Botany*. See PUFF-*ball*.

LYCOPERSICON, in *Botany*; *love-apple*, *wolf's peach*, or *tomato*. Its characters are these: the flower, which has a permanent empalement of one leaf cut into five acute segments at the top, has one wheel-shaped petal, with a very short tube, and a large five-cornered brim, which spreads open and is plaited: it has five small awl-shaped stamina which close together: it has a roundish germen, which becomes a roundish fleshy fruit or berry, divided into several cells, including many flat seeds. There are seven species, one of which is the common POTATOE, Miller.

Linnæus has joined this genus and the melongena of Tournefort to the solanum, or NIGHTSHADE.

That species called tomatas is cultivated in many of our gardens, and its fruit eaten by the Spaniards and Italians, and by the Jew families in England, as we do cucumbers, with oil and vinegar, or else stewed in soups.

The plants are propagated by sowing their seeds in March on a moderate hot-bed. When they are come up two inches high they are to be transplanted into another bed of about the same temperature, where they are to be set at four inches distance. In this place they must be watered and shaded, and must have as much fresh air as may be; and in May they are to be transplanted into pots, or borders, and the branches, when they grow long, must be supported with sticks, otherwise the fruit which is grown large, will break them. They require frequent watering, and in August ripen their fruit, which grows to a large size, and makes a very pretty figure. But they should not be planted near habitations, for the leaves and stalks, when rubbed by the clothes in people's passing by, yield a very strong and very offensive smell.

LYCOPHTHALMUS, *the wolf's eye stone*, a name given by some authors to such pieces of agate or any other semipellucid stone, as chance to have circular spots in them, resembling in colour the eye of that animal.

LYCOPODIOIDES, in *Botany*, the name of a genus of mosses, the characters of which are these: it produces its seeds in spikes, in the manner of the *lycopodium*, or wolf's claw moss, but that in two ways; for some of the capsules include a powder, which seems only a farina; others seem to contain true seeds: these always stand to the number of three in each capsule. It differs from the *lycopodium* also in its general appearance and manner of growth, the leaves being all placed in the same plane, and expanded in the manner of fins, with an intermediate series of small leaves, which cover the upper side of the middle rib, or stalk. Of these mosses there are two orders: the first comprehends such as are creeping, or procumbent.

The second order of the *lycopodioides* comprehends those which are erect, or have some erect, and some procumbent or creeping branches, with erect shoots rising from them. Dillen. Hist. Muse. p. 405, &c. See *Tab. of Mosses*, N° 15.

LYCOPODIUM, in *Botany*, the name of a genus of mosses, the characters of which are these: it produces capsules in the axe of certain leaves, which are very unlike the capsules of the other mosses, having neither calyptra, operculum, nor pedicle: these do not stand as those of the *foliaceæ*, in all the axe of the leaves, but are collected together into a sort of spike of a scaly structure, and one capsule stands under every scale, or leaf: these capsules are of the shape of a kidney, and when ripe they separate longitudinally into two parts, and throw out a powder, consisting of round globules. It has been supposed by many, that this powder is the farina of the flower; but as there are no seeds found in any other part of the plant for it to impregnate, it seems much more probable opinion, that this powder, as well as that of the capsules of all the other mosses, is the true and genuine seed of the plant. In most of the species of this plant, the spikes are composed of leaves of a different figure from those of the rest of the plant, and are therefore called scales; but in some they are made of leaves of the same figure with those of the other parts of the moss. See *Tab. X. of Botany*, N° 14.

The first order of the *lycopodia*, according to Dillenius, consists of those which have their spikes supported on pedicles; and of these the first series are distinguished by the appellation of *juliformes*, from their spikes resembling the *jula*, or catkins of some trees, and being not of the same leaves with the rest of the plant.

The second series of the *lycopodia*, comprehends those whose spikes consist of leaves, the same with those of the other part of the plant.

The second order of the *lycopodia* comprehends those which have spikes not placed on pedicles. Linnæus enumerates twenty-four species of this genus, the characters of which are, that it has a bivalve sessile anthera and no calyptra.

LYCOPSIS, in *Botany*, the name of a genus of plants, the characters of which are these: the cup is a perianthium, divided into five broad, oblong, acute, and open segments, and remaining after the flower is fallen: the flower consists of a single petal, in form of a cylindric and crooked tube, the rim of which is slightly divided into five segments, and is obtuse: the opening is covered with five covex and prominent scales, converging one towards another: the stamina are five extremely small filaments, placed at the bending of the tube of the flower: the antheræ are small and covered: the pistil has four germina: the style is slender, and of the length of the stamina; and the stigma is obtuse and bifid: the cup is very large, and contains four oblong seeds.

LYCOPUS, in *Botany*. See *Water* HOREHOUND.

LYCOSTAPHYLA, *wolf's grapes*, in *Botany*, a name given by some of the Greek writers to the *solanum somniferum*, a kind of efculent nightshade, which we have much more properly called *lycopersicon*, the *wolf's peach*, its fruit being as large as a peach, and in nothing resembling a grape. Some of the Latin authors we find have called this *morelle*; and some, who have not understood this synonymous use of the word, have mistaken the writers to have meant the mushroom we call morel, when they prescribe this plant in fevers. The seeds of this plant are, however, what are usually prescribed in this case, and there is no danger therefore of these substituting the morel mushroom for it, if they will stick to the letter of the text; the seeds of that morella being too small to be gathered in such quantities as are prescribed.

Æmilius Macer tells us, that the nightshades, in general, were called by the name *morella* in his time: his words are, *herbam quam Græci strychnon dixere, Latini nos-*

rellum Arvum. The name *morello* seems to be formed upon the word *morion*, a name given both by the Greeks and Latins to one of the sleepy nightshades, and to the male mandrake of Dioscorides, which the shepherds were fond of eating; but which brought on sleepy disorders, if taken too largely.

LYCOSTOMUS, in *Ichthyology*, the name of a fish caught in the Baltic, but not very frequently, and approaching somewhat to the nature of the herring or pilchard. It is usually of five or six inches long, and so fat and fleshy, that its body is not flat, as all the herring kind have their's, but rounded; its *scales* are very small and loose, easily falling off on rubbing.

The name *lycostomus* is given by Ælian, and many other of the Greek authors to the ANCHOVY, called by others the *encrasicolus* and *encrasicholus*, and by the late writers *encrasicetus*. Artedi proves it to be only a species of the herring or clupea, and distinguishes it from the rest by the name of the *clupea* with the upper jaw longest.

LYCURGIA, λυκουργια, in *Antiquity*, a festival celebrated by the Spartans in memory of Lycurgus, whom they honoured with a temple, and an anniversary sacrifice.

LYDIAN, in *Ancient Music*, the second species of the diagason.

LYDIAN *mode*. See MODE.

LYDIUM *marmor*. See MARBLE.

LYDIUS *lapis*, in the *Natural History of the Ancients*, the name of the stone used by way of touch-stone for the trial of gold and silver, and called also by some *heraclius lapis*, both which names are also applied by the ancients to the load-stone, and hence have arisen no small misunderstandings of their works.

The true *lapis lydius*, or touch-stone, was anciently found only in the river Tmolus, but afterwards it was discovered in many other places, and is now very common in many of the rivers of Germany. The ancients give us very remarkable and circumstantial accounts of the uses they made of it, and it is plain they were able to discern the alloys in gold, by means of it with very great exactness. We at present use several different stones under this name, and for the same purpose; in Italy a green marble, called *verdello*, is what is most frequently used, and with us, very frequently, small pieces of the BASALTES, the same with that vast mass of black marble called the GIANT'S *causeway* in Ireland.

LYEMMER. See LEVINER.

LYGDINUM *marmor*. See MARBLE.

LYGEUM, *hooded matweed*, in *Botany*, a genus of the *triandria monogynia* class: the characters of which are, that it has a single-leaved spatha, two corollæ over the same germen, and that the fruit is a bilocular nut; there is only one species.

LYGDUS *lapis*, in *Natural History*, a name given by some of the ancients to the species of alabaster, which others of them called *marmor hyalinum*, by which name it was most usually known. See MARBLE.

LYGMOS. See HICCUP.

LYGON and LYGUS, in *Botany*, are used for AGNUS *castus*.

LYING-*in-woman*. The disorders that attend *lying-in-women* are principally these: the suppression, or immoderate flux of the lochia; the manner of curing which, see under LOCHIA. Inflammatory fevers are too common in these cases, and usually arise either from a retention of part of the secundines, a suppression of the lochia, or taking cold; or finally, from violent passions of the mind, such as anger, fear, joy, or the like. These fevers very often prove fatal, if not carefully treated. The best method in them, is to give the saline medicines joined to the absorbents, partly saturated with acids, and the usual attemperating powders of nitre, and the like. The discussion of the cause is at the same time to be attempted by the mild alexipharmics, among which the cortex eluteriæ holds a principal place, and with the use of these, the patient is to be kept in a gentle breathing sweat, during the course of the cure; the bowels must also be kept gently open, by means of mild suppositories, emollient clysters, or the gentle laxative medicines in small doses. The miliary fever often also attends *lying-in-women*, the method of cure in which see under *Puerperal* FEVER, and not unfrequently they fall into the *febris populatoria*, distinguished from the other by the broadness of the spots. This usually goes off by the use of attemperating and absorbent medicines, and a gentle diaphoretic regimen; and finally, after about fourteen days, it is proper to carry off the remaining sordes by some gentle doses of rhubarb.

A bilious diarrhœa is often also a complaint at these times. This is easily brought on by violent passions, or by drinking cold liquors, or such as are rancient and fermenting; and sometimes it succeeds a natural suppression of a flux of blood. This often proves a very terrible and fatal symptom, being attended with violent pains, and all inflammation of the intestines, accompanied with an inflammatory fever, especially when it continues longer than three or four days. In case of this symptom the method is to give absorbent powders, such as mother of pearl and the like; and after the matter has been corrected by this, and the other testaceous powders, as coral and crabs-eyes, the bitter extracts of gentian, &c. are to be given to strengthen the parts, and in the intermediate days small doses of rhubarb, and if it be necessary of opiates, or other anodynes carefully corrected. Astringents and an improper use of opium are very dangerous, and it is always proper to drink a large quantity of warm diluting liquors; if it be found necessary to give nitre, it must be mixed in small quantities with these liquors. See *Puerperal* FEVER.

Hysterics are also very common to women in child-bed, from improper discharges of the *lochia*: these are cured by giving internally the common absorbents with cats of antimony, oil of sweet almonds, inflated spirit of sal ammoniac, essence of orange peel; and, in people of hot habits, nitrous medicines, and the *spiritus mindereri*, with carminative broths, with a small quantity of saffron boiled in them.

After-pains are the greatest of all the complaints of *lying-in-women*, and withal the most common; these sometimes arise from difficult labour, sometimes from some part of the secundines being left, or from blood coagulated in the uterus; they also frequently arise from the improper evacuation of the lochia, whether they be too much, or too little in the quantity; also from colds from neglecting the proper binding or ligature of the abdomen after delivery; and finally, from the infant's sucking too violently while the mother is weak.

These pains are greatly mitigated by the carminative, aromatic and nervous medicines; such is the tincture of orange peel, scolozy, angelica-root, and camomile-flowers. Castor is to be particularly avoided in this case. Candied nutmegs are a very good medicine in it, and carminative broths, with the distilled waters of penny-royal, balm, cinnamon, and the like. External fomentations may be used at the same time, made of decoctions of rosemary, mint, elder-flowers, and bay-berries; and the common carminative clysters are often of the utmost service; and finally, the carminative oils, as that of carraway, and the like, may be rubbed on the pit of the stomach.

These pains seldom happen to women in their first *lying-in*; but they are not wholly exempt from them, for singular instances happen of their violence in those cases.

Swelling of the belly. This is another very common complaint with women after their *lying-in*; and usually is owing to the neglecting the proper ligatures about the abdomen after delivery. The cure for this is to be found in carminatives and resolvents, which first of all cleanse the womb from all its foulnesses, and afterwards restore it to its due tone. Bryony and hellebore roots in various forms, as also the leaves of botony, origanum and chervil serve to this purpose; and Stahl's or Becker's pills are of the most singular service, but all these things are to be used for some time.

Swelling of the pudenda. This is a symptom that usually takes its rise from difficult delivery; and besides the pain and other inconveniencies attending it, usually brings on a dysury. The proper remedies are ointments of elder and marshmallows, with the camphorated white ointment, commonly called by the good women simply unguentum. Bags of camomile flowers, with fennel, and a little camphor, boiled in milk, and then lightly squeezed, are also of great service. When the dysury continues after the swelling is taken down, it is then to be treated in the common way. When there is any actual wound in the parts, the liquor of myrrh, or oil of eggs, and other balsams are to be used, but all fatty substances are to be carefully avoided, as they usually occasion tumors.

Proper treatment of lying-in-women. As soon as ever they are delivered, they are to be put immediately into a warm bed, and the belly wound round with a broad swathe or roller; they are then to be kept with the utmost care from external cold; for the sweats, on the one hand, and the lochia on the other, make them extremely susceptible of mischief that way; and the consequence is a suppression of the lochia with fevers of a very dangerous kind, tumors of the abdomen, and many other terrible complaints. They are then to be kept extremely quiet, and if they are not in danger of fainting, they are to be suffered to sleep as soon as possible, but if there be any suspicion of fainting, they must be kept awake three or four hours after delivery. Their strength is then to be restored by broths of tender meats, as chicken, or the like, and by caudles. And the use of jellies, as of harti-

horn, and the like, is to be freely indulged. After the fourth day, when the painful buſineſs of the MILK is over, they may be indulged with good wine, drank alone, in moderate quantities. The heat of the room is to be all the time preſerved as equally as may be; and they are to be allowed to drink as much warm liquors as they pleaſe, but they muſt not touch any cold ones. The ſeveral excretions are carefully to be regarded, eſpecially the lochia. Great care muſt be taken that this diſcharge is not rendered too great by means of hot medicines, or a too hot regimen, nor ſuppreſſed by a cold regimen, or by the cold air. A gentle ſweating is to be encouraged, and promoted during the whole time; and even, if this become very conſiderable, in people of corpulent habits, it is not to be checked. Coſtiveneſs, during the two or three firſt days, is not to be regarded, for the vital principle is at that time ſo much engaged in the ſecretions of the lochia and milk, that it is no wonder if the bowels are leſs ſtimulated. No means are to be uſed to irritate the bowels in this time, nor ſhould the ſtomach be loaded with ſolid foods. After theſe firſt days are over, if the coſtiveneſs remains, it is proper to give glyſters at times, to make the patient take lubricating broths, and now and then ſwallow a little oil of ſweet almonds.

All paſſions of the mind are to be avoided in the moſt careful manner, and all occaſions of them kept from the patient. Fear is often known to ſtop the lochia, and anger to bring on hæmorrhages of a dangerous kind, and ſometimes fevers and bilious diarrhœas, and both often throw the patient into faintings. The light is to be kept out of the room in a great meaſure; for it often happens that the ſight is much impaired, and the eyes weakened in render perſons; and ſometimes noiſes and ringing in the ears, ſometimes deafneſs is brought on.

Talking much is very improper in theſe caſes, as it eaſily throws the blood into commotions; and it is to be carefully obſerved, that when the exceſſive flux of the lochia has rendered the patients very weak, and often ſubject to faintings; they are by no means to be indulged in that ſleepineſs which uſually grows upon them; for they ſometimes die in ſuch ſleeps. Bags of carminative ingredients are very properly applied to the abdomen, during the firſt days of *lying-in*, for they greatly prevent flatulencies; and it is a very good cuſtom, of ſome people, to apply cloths wetted in wine to the pudenda, when ſwelled, or otherwiſe injured in delivery. In young people, eſpecially thoſe of plethoric habits, all hot things are to be avoided, and wine is to be uſed with great caution and circumſpection. If the blood is on any occaſion thrown into commotion, abſorbents and nitrous medicines are proper; when the perſon is of a weak conſtitution, ſhe is not to be ſuffered to get out of bed until the firſt nine days are over, and not to leave her room until a month, or until five or ſix weeks are over, and then it is proper to give a doſe or two of ſome gentle purge. See DELIVERY, LOCHIA, MILK, and MOLA.

LYING *under the ſea*, in *Sea-language*, is when, in a ſtorm, the ſhip is a-hull, and the helm ſo faſtened a-lee, that the ſea breaks upon her bow, or broadſide.

LYING *along* denotes the ſtate of a ſhip, when preſſed down ſideways by a weight of ſail in a freſh wind that croſſes the ſhip's courſe either directly or obliquely.

LYING-*to*, or LYING-*by*, denotes the ſituation of a ſhip when ſhe is retarded in her courſe, by arranging the ſails in ſuch a manner as to counteract each other with nearly an equal effort, and render the ſhip almoſt immoveable, with reſpect to her progreſſive motion, or head-way. A ſhip is uſually *hringd-to* by the main or fore-top-ſails, one of which is laid a-back, whilſt the other is full; ſo that the latter puſhes the ſhip forward, whilſt the former reſiſts this impulſe, by forcing her a-ſtern. This is particularly practiſed in a general engagement, when the hoſtile fleets are drawn up in two lines of battle oppoſite to each other; it is alſo uſed to wait for ſome other ſhip, either approaching or expected; or to avoid purſuing a dangerous courſe, eſpecially in dark or foggy weather, &c. Falconer.

LYING-*to in a ſtorm*. See TAVING.

LYLAC, in *Botany*. See LILAC.

LYMPHÆA, among the *Romans*, a kind of grottoes, or artificial caves, ſo called from *lympha*, *water*; becauſe they were furniſhed with a great many tubes, canals, and ſecret paſſages, through which the water ſuddenly guſhed upon the ſpectators, while buſy in admiring the great variety and beautiful arrangement of ſhells, with which the grotto was adorned.

LYMPH, LYMPHA, in *Anatomy*, a thin tranſparent humour, ſomething like water, ſecreted from the ſerum of the blood in all parts of the body, and returned to the blood again, by proper ducts of its own, called *lymphatics*, and ſuppoſed, by ſome, to be the immediate matter of nutrition.

If the *lymph* be chemically examined, it will be found to contain a great deal of volatile, but no fixed ſalt, ſome phlegm, ſome ſulphur, and a little earth.

The uſe of the *lymph* may be gathered from the conſideration of the parts into which it diſcharges itſelf. That which comes from the head, neck and arms, is thrown into the jugular and ſubclavian veins. All the lymphatics, which the parts in the cavity of the thorax ſend out, empty themſelves into the thoracic duct; and the *lymphæ*, from all the reſt of the body, flows to the common receptacle: ſo that there can be no doubt, but that its chief uſe is to dilute and perfect the chyle, before it mixes with the blood.

The late ingenious Mr. Hewſon uſes the term *lymph* to denote that part of the blood which jellies, or becomes ſolid ſpontaneouſly, when blood is received into a baſon, and, therefore, this coagulable *lymph*, which ſome have called the fibrous part of the blood or the gluten, and which, by becoming ſolid, gives firmneſs to the CRASSAMENTUM, ought not to be confounded with the SERUM of the blood, which alſo contains a ſubſtance that coagulates, when expoſed to heat, or when mixed with ardent ſpirits, or ſome other chemical ſubſtances; though it remains fluid when merely expoſed to the air. That the coagulable *lymph* gives firmneſs to the craſſamentum, whilſt the red particles of which it conſiſts give the red colour to the blood, is proved by agitating freſh blood with a ſtick, ſo as to collect this *lymph* on the ſtick, in which caſe the reſt of the blood remains fluid: and theſe two parts may be ſeparated by waſhing the craſſamentum in water, the red particles diſſolving in the water, whilſt the coagulable *lymph* remains ſolid. Mr. Hewſon, in the courſe of his experiments on this ſubject, has found, that neutral ſalts mixed with the blood, when juſt received from the vein, prevent its coagulation, or keep it fluid; but upon adding water to the mixture, it then jellies or coagulates; and on ſhaking the jelly, the coagulum will be broken, and the part ſo coagulated can be now ſeparated as it falls to the bottom, and proves to be the *lymph*. Moreover the blood, thus kept fluid by neutral ſalts, ſtill retains its property of being coagulable by heat, and by other ſubſtances as before, air excepted.

The coagulable *lymph* from various cauſes becomes ſolid in the body, and occaſions various obſtructions and inflammations: it appears therefore, to be a deſideratum of conſiderable importance, to aſcertain the cauſe of that coagulation which it always, and generally very ſoon undergoes, when it is out of the body. With this view Mr. Hewſon conſiders the particular circumſtances, in which blood, received into a baſon and there coagulating, differs from that flowing in the veſſels of a living animal. The moſt obvious and material differences are, that, in the firſt caſe, it is expoſed to the action of the air, and to that of cold, and that it is at reſt. In the laſt caſe, all theſe circumſtances are wanting. From the whole of his experiments, it appears, that the blood, when out of the body, coagulates as ſoon, when agitated and kept warm, as it does when ſuffered to reſt and to cool; and, from a compariſon of the whole, there is reaſon to conclude, that the air is a ſtrong coagulant of the blood; and that the change which this fluid ſoon undergoes in its conſiſtency, when taken from the veins, is chiefly owing to the action of that element, and not to cold, or want of motion. His experiments likewiſe tend to prove, that the inflammatory cruſt, SIZE, or BUFF, which often appears on the blood in inflammatory diſorders, is not forced from the ſerum, but from the fixation of the coagulable *lymph*, after the red particles have ſubſided. It appears alſo from his experiments and obſervations, that fizy blood coagulates much more ſlowly than other blood; that inflammation actually leſſens the diſpoſition of that fluid to coagulate; and, that in inflammatory diſorders, where this whitiſh cruſt or fize appears, the blood, or at leaſt the coagulable *lymph*, which conſtitutes this inflammatory fize is nearly attenuated. It appears farther, that the common opinion, that cold coagulates blood, is ſo far from being true, that the *lymph*, on being cooled, is deprived of its power of coagulation, when expoſed to the air. He alſo concludes, that bleeding alters the nature of the blood, not by removing the vitiated part, and giving room for new blood to be formed, as has been ſuppoſed, but probably by changing that ſtate of the blood-veſſels, on which the thinneſs of the *lymph*, and the leſſening of its tendency to coagulate, depend. And although bleeding does in general weaken the action of the veſſels, increaſe the diſpoſition of the blood to coagulate and even thicken the *lymph*, yet it may happen, that the taking away blood in the ordinary quantity, may produce none of theſe effects. Phil. Trans. vol. lx. art. 32, 33, 34. See BLOOD, HÆMORRHAGE, HEAT, INFLAMMATION, and LYMPHATICS.

LYMPHATI or LYMPHATICI, in *Antiquity*, a name given by the Latins to poſſeſſed or mad perſons, becauſe they were thought to be gifted with divination. Plin. Nat. Hiſt. lib. xxv. cap. 5 p. 386. edit. Hard.

Theſe anſwer to the νυμφόληπτοι of the Greeks: the ancient Greeks called water *νυμφα*, which the Latins changed into *lympha*. The term *nympha*, ſays Mr. Bryant, is of great antiquity, and denotes an oracular influence by which people obtained an inſight into the ſecrets of futurity: it was written *nympha* or *amphi*, and ſignified the oracle of Ham, who, according to the Egyptian theology, was the ſame as the ſun, or Oſiris: and as fountains were deemed ſacred, theſe were ſtyled by the Amonians *Ain Ompha*, or the fountains of the oracle, from the divine influence with which they were ſuppoſed to abound, which terms were afterwards contracted by the Greeks into *νυμφη*, *a nymph*, who ſuppoſed ſuch a perſon to be an inferior goddeſs who preſided over waters. In the ſame manner from *ai omphoi* was derived *lympha*, which differed from aqua or common water, becauſe it was of a ſacred or prophetic nature. Analyſis of Ant. Myth. vol. i. p. 280.

LYMPHATICS, or LYMPHEDUCTS, a ſort of fine, ſmall, tranſparent veſſels, generally ariſing from the glands, and conveying back to the blood a tranſparent liquor, called *lymph* or *lympha*.

Theſe, though not ſo viſible as the other veſſels, becauſe of their minuteneſs and tranſparency, are, however, exiſtent in all parts of the body; but the difficulty of finding them has prevented their being deſcribed in many parts. The *lymphatics* are contracted at ſmall and unequal diſtances by two oppoſite ſemilunar valves, which permit the lymph to paſs through them towards the heart; but ſhut, like flood-gates upon its returning.

They ariſe in all parts of the body, but after what manner, needs no great diſpute; for, without doubt, all the liquors in the body, excepting the chyle, are ſeparated from the blood in the fine capillary veſſels, by a different pipe from the common channel, in which the reſt of the blood moves: but whether this pipe be long or ſhort, whether it be viſible or inviſible, it is ſtill a gland, whilſt it ſuffers ſome part of the blood to paſs through it; denying a paſſage to the reſt.

Now, the glands which ſeparate the lymph muſt be of the ſmalleſt kind, for they are inviſible to the fineſt microſcope; but their excretory ducts, the *lymphatic* veſſels, unite with one another, and grow larger, as they approach the heart: yet they do not open in one common channel, as the veins do; for ſometimes we find two, or three, or more *lymphatics*, running by one another; which only communicate by ſhort intermediate ducts, and which unite and immediately divide again. In their progreſs, they always touch at one or two conglobate or veſicular glands, into which they diſcharge themſelves of their *lympha*. Sometimes the whole *lymphatic* opens at ſeveral places, into the gland; and ſometimes it ſends in only two or three branches, whilſt the main trunk paſſes over and joins the *lymphatics* which ariſe from the oppoſite ſides of the gland, exporting again their lympha to their common receptacle.

The glands of the abdomen, which receive the *lymphatics* from all its parts, as likewiſe from the lower extremities, are the glandulæ inguinales, ſacræ, iliacæ, lumbares, meſentericæ, and hepaticæ; all which ſend out new *lymphatics*, which pour their contents into the receptaculum chyli; as thoſe of the cheſt, head, and arms, do into the ductus thoracicus, jugular, and ſubclavian veins.

Theſe glands are round and ſmooth bodies, about the bigneſs of a hazle-nut, bigger or leſſer, according to the number of *lymphatics* they receive. Their ſubſtance is membranous, and their whole bulk divided into little cells, which receive the lymph from the *lymphatics*; and are therefore improperly called *glands*, becauſe they ſeparate no liquor from the blood. It is true, that their exporting *lymphatics*, communicating with their arteries, do receive a lymph from them; but this is done without the help of conglobeate glands; as the lacteal veins do with the capillary arteries of the guts: the chief uſe of theſe veſicular bodies ſeems to be, that the ſlow-moving lympha may receive a greater velocity from the elaſtic contraction of their membranous cells, as well as from the new lymph immediately derived from the arteries. See GLAND.

Dr. Akenſide, in his account of the origin and uſe of the *lymphatic* veſſels of animals, concludes, that they have their origin, in general, among the little cavities of the cellular ſubſtance of the muſcles, among the mucous folliculi of the tendons, or the membranous receptacles and ducts of the larger glands; that their extremities or roots do, from theſe cavities, imbibe the moiſture exhaled there from the ultimate arterial tubes, juſt as the lacteals (the *lymphatics* of the meſentery) do on the concave ſurface of the inteſtines: and that the minute imbibing veſſels, by gradually opening into one another, form at length a *lymphatic* trunk, furniſhed with valves to prevent the return of its fluid, and tending uniformly, from the extremities, and from the viſcera to reconvey to the blood that lymph with which they are kept in perpetual moiſture; which is indiſpenſibly neceſſary to life and motion; while, at the ſame time, the continual reabſorptions of that moiſture by the *lymphatics* is no leſs neceſſary, in order to preſerve the blood properly fluid, and to prevent the putrefaction, which would inevitably follow, if this animal vapour be ſuffered to ſtagnate in the cavities where it is diſcharged. Phil. Tranſ. vol. L. p. 328.

Mr. Hewſon's doctrine on this ſubject is, that the *lymphatic* ſyſtem and its appendages, in which he includes the *lymphatic* veſſels, the *lymphatic* glands, the THYMUS, and the SPLEEN, are the elaboratory which nature uſes, or the organs which ſhe employs in fabricating the particles of the BLOOD, which he deſcribes as round, flat, red veſicles containing ſmall and ſolid particles in their centres. He ſhews, that the *lymphatic* glands ſecrete a fluid, in which may be ſeen, by means of the microſcope, numberleſs ſmall ſolid particles, exactly reſembling, in ſize and ſhape, the central particles contained in the middle of the veſicles. He obſerves farther that, after a *lymphatic* veſſel has emerged from a *lymphatic* gland, central particles are found to have acquired their veſicular portions, and that they are now become real particles of red blood completely formed. He conjectures, that this newly acquired veſicle may either be a ſecretion from the internal coat of the *lymphatic* veſſel; or, that this veſſel has a plaſtic power over its contained fluid, ſo as not only to form a veſicle round the central particle, but alſo to give its red colour; for, till the red veſicle is formed, the central particle is evidently white. See Experimental Inquiries, part the 3d, &c. &c. being the remaining part of the Obſervations and Experiments of the late Mr. W. Hewſon, F. R. S. By Magnus Falconer, 1777.

The *lymphatic* ſyſtem is not confined to the human ſpecies: Mr. Hewſon diſcovered it in birds, fiſh, and amphibious animals. See LACTEALS.

LYNCHET, among *Farmers*, a line of green ſward, ſerving as a boundary to ſeparate ploughed land, in common fields. See BALK.

LYNCIS *lapis*, in *Natural Hiſtory*, the name given by moſt of the writers of the middle age to the BELEMNITES.

LYNCURIUS *lapis*, in the *Natural Hiſtory of the Ancients*, the name of a ſtone about which there have been various diſputes among the later writers. Theophraſtus has left us this account of it; that it was hard, and uſed for engraving ſeals on, and was of a very ſolid texture like the gems; that it had an attractive power like amber, and was pellucid, and of a flame colour.

Dr. Woodward believed this ſtone to be a ſpecies of the BELEMNITES, to which it is objected, that this is neither pellucid nor fit for engraving ſeals upon, neither can it by any management be made to attract ſtraws and other light bodies.

M. Geoffroy conſiders it as AMBER; but this ſubſtance, though it has the attractive power mentioned by Theophraſtus, has not the firm texture requiſite to have ſeals engraved upon it, neither is it ſo very hard, as is expreſſly ſaid by this author concerning the *lyncurium*, as to require great labour in poliſhing it.

All that the ancients have ſaid about it, determines that it was really one of the gems, and that it was of a flame colour; and this deſcription agrees perfectly, ſays Dr. Hill, with the gem we call the HYACINTH, and this doubtleſs was the ſtone they knew by that name; ſince it is plain by the antique heads we ſee cut in it, that it was in common uſe among them; and it is plain from all their writings, that they did not know it by any other name: what they called the hyacinth being a very different ſtone, and one to which that name much more properly belonged, being a blue amethyſt than the common kind, and ſomewhat reſembling the colour of the hyacinth flower. The ancients have ſpoken of three or four kinds of it, that is, three or four varieties in degree of colour; and we alſo, at this time, are acquainted with the very ſame varieties. What they called the male and female *lyncurium*, were plainly our deeper and paler hyacinth; and the fine *lyncurium*, deſcribed by Pliny, our hyacintha la bella. Hill's Theophraſt, p. 75.

Dr. Watſon, in his obſervations relating to the *lyncurium* of the ancients makes it extremely probable, that the *lyncurium* of Theophraſtus is the TOURMALIN, which agrees with his deſcription in all its ſenſible qualities; viz. that it is a very hard pellucid ſtone, of a deep red colour; that it is very proper to engrave ſeals upon; that it attracts like amber, not only ſtraws and light pieces of wood,

wood, but filings of iron and brass. Phil. Transf. vol. li. art. 37. p. 394.

LYNX, in *Zoology*, the name of a very fierce beast of prey, called in English the *ounce*, and by many Latin authors the *lupus cervarius*, or deer-wolf, from its loving to feed on deer. This animal, in the Linnæan system, is a species of *felis* or cat, with a short tail, black at the end, and ears tufted with black long hairs. See *Tab.* III. *of Quadrupeds*, N° 30.

Pliny seems to distinguish the *lynx* from the *lupus cervarius*, but there seems not the least reason for it. The principal colours of this creature are a whitish and a purplish yellow, variegated with numerous very beautiful round spots like eyes, in the manner of the *leopard*; these are usually black. Sometimes it is seen also of a plain fox-colour on the back, and full of black spots, and grey on the belly, and inner part of the legs, with the like spots as on the back and sides, but larger, of a somewhat paler colour, and fewer in number.

The hairs of this creature, as well such as appeared reddish, as those which were grey, when nicely examined, are all found to be truly of three colours in each single hair; the middle part being of a reddish tawney, the bottom grey, and the top white; but those which compose the black spots are only of two colours, there being no white at their ends.

This creature's eyes are extremely bright and vivid, and shew plainly that it has a very piercing sight. Its ears are like those of a cat, but have this peculiarity, which distinguishes the creature from all the animals of the same class, that they have a fine pencil of black hairs growing out at their extremities, very smooth, and of a deep black like velvet, and two fingers long. Its tongue is rough like that of the lion. The *lynx* is found wild in Italy and Germany, but the greater number are in Asia, and these are much finer coloured than the European. They all differ considerably from one another, at times, in the number and disposition of their spots. The greater number is found in the north of Europe, Asia, and America, whence the furs, which are valuable for their softness and warmth, are annually imported.

There are several varieties differing in size and colour. Pennant mentions a distinct species, under the name of the *bay lynx*, inhabiting the inner parts of the province of New York; and the Prussian *lynx*, for which see SIGAHGUASH. Ray and Pennant.

LYNX, in *Mythology*, was a fabulous animal consecrated to Bacchus.

LYNX, in *Astronomy*, is a constellation of the northern hemisphere, made by Hevelius out of unformed stars: the number of stars in Hevelius's catalogue is nineteen, and in the Britannic is forty-four, their names, places, longitudes and latitudes, and magnitudes are as follow:

Situation of stars.	Signs.	Longit.	Latitude N.	Magnitudes.
		° ′ ″	° ′ ″	
In the right knee at the eye.	♊	28 24 42	58 4 35	6
1. In the noſtrils		28 47 55	35 34 20	4
		29 3 18	38 20 53	6
2. In the noſtrils		29 10 22	35 57 34	6
5.		29 58 24	35 2 35	6-7
	♋	0 37 45	34 50 38	6-7
		1 25 54	33 3 6	6-7
		1 24 30	38 12 36	6-7
10.		1 37 18	33 6 10	6
		1 31 20	38 12 1	6-7
		2 50 38	33 34 51	6
		2 56 58	30 13 23	7
		3 36 57	34 0 20	6
Lower in the neck		4 2 5	36 21 26	5
Upper in the neck		4 49 56	35 24 30	5
15.				
At the left ſhoulder		6 37 22	22 9 14	6
		6 25 27	37 57 36	7
At the left ear		7 35 2	30 57 17	6
In the neck		9 36 55	32 48 15	5
		10 25 2	17 44 14	6
20.				
In the ſide		11 23 13	26 53 58	5
		11 22 9	17 26 35	6
		12 3 40	35 1 27	7
Above the nape of the neck		13 1 48	30 41 6	5
		16 49 43	25 58 55	6
25.				
		16 49 39	28 10 41	5
In the back		18 18 4	30 31 26	5
		20 25 58	22 30 3	7
30.		17 14 0	38 38 56	5
		18 15 52	36 59 50	6
In the belly		23 13 38	23 4 21	5
		27 19 49	17 5 25	7
At the left knee		27 25 20	17 6 24	6
1. In the root of the tail		25 53 52	26 29 5	6
2. In ditto		28 37 29	25 1 55	6
35.				
	♌	2 58 25	23 49 36	5-6
		1 1 15	33 43 11	6
In the middle of the tail		6 13 10	20 4 20	4
		2 4 45	31 10 16	6
Laſt in the tail		7 32 10	27 56 0	4
40.				
		4 51 59	28 58 40	6
		8 52 0	24 35 41	6
		9 45 50	24 24 35	5-6
		21 22 7	40 39 39	5-6

LYRA, in *Astronomy*, a constellation in the northern hemisphere.

The number of its stars, in Ptolemy's catalogue is ten, in Tycho's eleven; in Hevelius's seventeen; and in the Britannic catalogue twenty-one; the names, places, longitudes, latitudes, and magnitudes whereof are as follow:

Stars in the conſtellation *Lyra*, or *Vultur Cadens*.

Names and ſituation of the ſtars.	Signs.	Longit.	Latitude N.	Magnitudes.
		° ′ ″	° ′ ″	
South. in the preced. wing of the Vult.	♑	3 35 30	59 24 42	5
North. of the ſame	♒	5 55 10	62 46 56	6
Lucida in the ſhell called *lyra*		10 59 18	61 45 31	1
Bright ſtar the moſt nor. of the adjacent		14 17 42	62 26 05	5
Another contiguous		14 17 17	62 22 31	6
5				
South of theſe	♐	15 46 55	60 23 33	5
Contiguous alſo to this		13 47 20	60 22 10	5
Sou. of the preced. in the jugum of the lyre		14 19 42	55 29 48	6
		14 17 58	55 13 58	6
North. of the preced. in the jugum		14 35 30	56 1 48	3
10				
Preced. in the root of either horn	♑	17 3 51	59 36 39	4-5
Subſeq. of the ſame		17 21 39	59 21 54	4
	♒	20 54 46	66 23 0	5
Nor. of theſe that fol. in the jugum		17 33 00	55 3 28	5
South of the ſame		17 50 36	54 28 15	6
15				
		21 19 46	60 2 21	6
		20 35 18	54 33 2	6
In the middle of the body	♏	21 54 8	58 3 44	5
		24 33 11	61 0 23	6
In the eaſtern part of the ſhell		25 36 19	67 42 51	6
South. of the ſame		26 14 11	59 36 20	6

LYRA, in *Ichthyology*, the name of a fiſh of the *trigla* kind, of which there are two varieties, reckoned by Artedi and Linnæus two different ſpecies. The one the *piper* or TIBIGEN. The other the *lyra cornuta*, or horned harp-fiſh. This laſt is a fiſh of an octagonal form, covered all over with bony ſcales: theſe are of a rhomboidal figure, and each has in its middle a ſharp and ſtrong prickle bending backwards; it is of a red colour, and its head is very large; its ſnout divides towards the extremity into two long horns, on which are placed two perpendicular ſpines, and a third above makes an acute angle with theſe; it has one very long fin on the back, and another anſwering to it behind the anus: alſo two large ones at the gills, and two ſmaller on the belly; it has only two filaments, called fingers, behind its gill-fins; its mouth is large, but has no teeth, and there are ſeveral beards on its under-jaw; two of which are longer than the reſt, and are branched; it is caught in the Mediterranean, and brought to market at Rome; it is a ſcarce fiſh in other places, and at Montpelier was one ſhewed to Mr. Ray for the *remora*. See *Tab.* III. *of Fiſh*, N° 33.

LYRA is alſo the name of a beautiful ſea-ſhell of the genus of the *concha globoſa*, or dolium. There are three ſpecies of the *lyra*, or harp-ſhell. 1. The common *lyra*, which has thirteen roſe-coloured ribs running along its body. 2. The eleven-ribbed *lyra*; and 3. the noble harp, or *lyra nobilis*. This is a moſt elegantly variegated ſhell; its ground colour is a deep brown, and its variegations very elegant and black.

LYRA *luteſcens*. See LUCIDA.

LYRATUM *folium*, among *Botaniſts*. See LEAF.

LYRE, Lyra, a ſtringed inſtrument much uſed among the ancients; ſaid to be invented by Mercury, about the year of the world 2000, on occaſion of his finding a dead ſhell-fiſh, called by the Greeks, *chelone*, and Latins, *teſtudo*, left on an inundation of the Nile; of the ſhell whereof he formed his *lyre*; mounting it with ſeven ſtrings, according to Lucian, and adding a kind of jugum to it, to ſtretch or looſen the ſtrings.

Boetius relates the opinion of ſome, who ſay, that Mercury's *lyra* had but four ſtrings, in imitation of the mundane muſic of the four elements. Diodorus Siculus ſays it had but three ſtrings, in imitation of the three ſeaſons of the year; which were all the Greeks counted, viz. ſpring, ſummer, and winter. Nicomachus, Horace, Lucian, and others, make it have ſeven ſtrings, in imitation of the ſeven planets.

This three, four, or ſeven-ſtringed inſtrument, they ſay, Mercury gave to Orpheus; who being torn to pieces by the Bacchantes, the *lyre* was hung up by the Leſbians in Apollo's temple. Others ſay, Pythagoras found it in ſome temple in Egypt, and added an eighth ſtring. Nicomachus ſays, that when Orpheus was killed, this *lyre* was caſt into the ſea, and thrown up at Antiſſa, a city of Leſbos; where the fiſhermen finding it, gave it to Terpander, who carried it into Egypt, and called himſelf the inventor. The ſeven ſtrings were diatonically diſpoſed, by tones and ſemitones; and Pythagoras's eighth ſtring made up the octave.

Mr. Barnes, in the prolegomena to his edition of Anacreon, has an inquiry into the antiquity and ſtructure of the *lyre*; of which he makes Jubal the firſt inventor. For the ſeveral changes this inſtrument underwent, by the addition of new ſtrings, he obſerves, that, according to Diodorus, it had originally only three; whence it was called τριγωνος. Afterwards it had ſeven ſtrings; as appears from Homer, Pindar, Horace, Virgil, &c. Feſtus Avienus gives the *lyre* of Orpheus nine ſtrings. David mentions an inſtrument of that ſort ſtrung with ten, *in pſalterio decachordo*. Timotheus of Miletus added four to the old ſeven, which made eleven. Joſephus, in his Jewiſh Antiquities, makes mention of one with twelve ſtrings; to which were afterwards added ſix others, which made eighteen in all. Anacreon himſelf ſays, p. 253. of Mr. Barnes's edition, *cantu viginti tetis chordis*. As for the modern *lyre*, or Welch HARP, it is ſufficiently known. From the *lyre*, which all agree to be the firſt inſtrument of the ſtringed kind in Greece, there aroſe an infinite number of others, different in ſhape, and number of ſtrings; as the pſalterium, trigon, ſambucus, pectis, magadis, barbiton, teſtudo (the two laſt uſed promiſcuouſly, by Horace, with the *lyre* and *cithara*), epigonium, ſimmicum, and pandura; which were all ſtruck with the hand, or a plectrum. See PSALTERY, SAMBUCA, MAGADIS, BARBITON, and CITHARA.

LYRE, among painters, ſtatuaries, &c. is an ATTRIBUTE of Apollo and the Muſes.

LYRIC, ſomething ſung or played, on the LYRE or HARP.

LYRIC is more particularly applied to the ancient odes, and ſtanzas; which anſwer to our *airs*, or *ſongs*, and may be played on inſtruments.

The ancients were great admirers of *lyric verſes*; which name, Mr. Barnes obſerves, they gave to ſuch verſes as were ſung to the lyre.

This ſpecies of poetry was originally employed in celebrating the praiſes of gods and heroes; though it was afterwards introduced into feaſts, and public diverſions: it is a miſtake to imagine Anacreon, as the Greeks do, the author of it; ſince it appears from Scripture to have been in uſe above a thouſand years before that poet. Mr. Barnes ſhews how unjuſt it is to exclude heroic ſubjects and actions from this ſort of verſe, *lyric poetry* being capable of all the elevation and ſublimity ſuch ſubjects require; which he confirms by the example of Alcæus, Steſichorus, Anacreon, and Horace, and by his own eſſay, A triumphal Ode inſcribed to the Duke of Marlborough, at the head of this edition: he concludes with the hiſtory of *lyric poetry*, and of thoſe ancients who excelled in it.

The characteriſtic of *lyric* poetry, which diſtinguiſhes it from all others, is *dignity* and *ſweetneſs*. As *gravity* rules in heroic verſe; *ſimplicity*, in paſtoral; *tenderneſs* and *ſoftneſs*, in elegy; *ſharpneſs* and *poignancy*, in ſatire; *mirth*, in comedy; the *pathetic*, in tragedy; and the *point*, in epigram; ſo in the *lyric*, the poet applies himſelf wholly to ſooth the minds of men, by the ſweetneſs and variety of the verſe, and the delicacy and elevation of the words and thoughts; the agreeableneſs of the numbers, and the deſcription of things moſt pleaſing in their own nature.

LYRODI, among the *Ancients*, a kind of muſicians who played on the LYRE, and ſung at the ſame time.

LYRODI was alſo an appellation given to ſuch as made it their employment to ſing lyric poems, compoſed by others.

LYSANDRIA, Λυσανδρια, in *Antiquity*, a Samian feſtival celebrated with ſacrifices and games, in honour of Lyſander the Lacedæmonian admiral. It was anciently called *hereo*, which name was aboliſhed by a decree of the Samians.

LYSIARCHA, an ancient kind of magiſtrate, being the pontiff of Lycia, or ſuperintendent of the ſacred games of that province.

Strabo obſerves, that the *lyſiarcha* was created in a council conſiſting of the deputies of twenty-three cities; that is, of all the cities in the province; ſome of which cities had three voices, others two, and others but one.

Cardinal Norris ſays, that the *lyſiarcha* preſided in matters of religion; in effect, the *lyſiarcha* was nearly the ſame with the *aſiarcha*, and *friarcha*; who though they were all the heads of the councils, or ſtates of thoſe provinces, yet were they eſtabliſhed principally to take care of the games and feaſts celebrated in honour of the gods, whoſe prieſts they were inaugurated, at the ſame time that they were created *lyſiarchæ*, *friarchæ*, or *aſiarchæ*.

LYSIMACHIA. See *Loose-ſtrife*.

LYSIMACHIA-*worm*, in *Natural Hiſtory*, a name given to an inſect found very frequently feeding on the leaves of the *lyſimachia*, or willow-herb. It has uſually been eſteemed a caterpillar, but is properly one of the PAUSSE *rhenilli*, having a rounded head, and twenty-two legs; this creature changes its ſkin ſeveral times, and finally changes its colour with it; it is at firſt of a bluiſh grey, but on its laſt change in the worm-ſtate it becomes of a yellowiſh green; when it has lived a week or thereabout, after this laſt change, it becomes a chryſalis, from which there afterwards comes out a four-winged fly.

LYSSA, λυσσα, a word uſed by medical authors to expreſs that ſpecies of madneſs which is peculiar to dogs and wolves, but is communicated by their bite to man and other animals. Hence perſons labouring under the diſmal effects of ſuch a bite, are called alſo *lyſſodecti*.

LYTHRUM, in *Botany*, a name by which Linnæus calls a genus of plants, named by Tournefort, and other authors, *ſalicaria*. See *Purple* LOOSE-*ſtrife*.

M.

M. A liquid conſonant, and the twelfth letter in the alphabet.

It has one invariable ſound, and is pronounced by ſtriking the upper lip againſt the lower; in which the pronunciation of this letter agrees with that of *b*; the only difference between the two conſiſting in a little motion made in the noſe in pronouncing *M*, and not in *b*: whence it happens, that thoſe who have taken cold, for *M* ordinarily pronounce *b*; the noſe, in that caſe, being diſabled from making the neceſſary motion.

All conſonants are formed with the aid of vowels; in each the vowel precedes, in *br* it follows: and *M* is never mute.

Quinctilian obſerves, that the *M* ſometimes ends Latin words, but never Greek ones; the Greeks always changing it in that caſe into *n*, for the ſake of the better ſound.

M is alſo a numeral letter, and among the ancients was uſed for a thouſand; according to the verſe,

M cupit eſſe meum, quem ſcimus mille tenere.

When a dath is added at the top of it, as $\overline{M}$; it ſignifies a thouſand times a thouſand.

M as an abbreviature ſtands for Manlius, Marcus, Martius, and Mucius: *M. A.* ſignifies *magiſter artium*, or maſter of arts; *MS.* manuſcript, and *MSS.* manuſcripts.

M. in *Aſtronomical Tables*, and other things of that kind, is uſed for *Meridionali* or ſouthern; and ſometimes for *Meridies*, or mid-day.

M. in *Medicinal Preſcription*, is frequently uſed to ſignify a maniple, or handful: and it is ſometimes alſo put at the end of a recipe, for *miſce*, *mingle*; or for *mixtura*, *a mixture*. Thus, ex. *ſ. julapium*, ſignifies *mix*, and *make a julap*.

M. in *Law*, the brand or ſtigma of a perſon convicted of man-ſlaughter, and admitted to the benefit of his clergy. It is to be burnt on the brawn of his left thumb.

MABBY, a kind of wine made from potatoes. It is ſaid to be uſed in Barbadoes.

MABOUJAS, the *deciduous*, in *Zoology*, a ſpecies of American lizard, ſo called from its uglineſs and diſagreeable aſpect. It grows to ſix or ſeven inches long, and to the thickneſs of a thumb, and is found in the trunks of rotten trees, and in marſhy places, where the ſun-beams ſeldom reach; it is all over of a gloſſy black colour, and looks as if ſmeared over with oil.

MAC, an Iriſh word ſignifying *ſon*; frequently preſixed to ſurnames: as *Macdonald* for Donald's ſon, *Maclaurin* for Laurence's ſon, &c.

MACAM, *Indian apple*, in *Natural Hiſtory*, the name of a common Eaſt Indian fruit; it is of a round ſhape, and about the ſize of our common wild crabs which grow in the hedges; inſtead of the ſeveral ſmall ſeeds, which our crabs and apples contain, this fruit has only one hard kernel; it is of an acid taſte, and of a raw and not very agreeable ſmell; the tree which produces this fruit, does not grow to any great height; it reſembles the quince-tree in its leaves, except that they have a yelloviſh caſt. Mem. Acad. Par. 1699.

MACAO, in *Zoology*. See MACAW.

MACAQUO, in *Zoology*, the name of a large ſpecies of monkey, called by Mr. Ray *cercopithecus Angolenſis major*, the great Angola monkey. Its hair is ſometimes of the colour of that of a wolf, but that of others is brown, tinged with yellow or olive; its noſtrils are elate, and divided like thoſe of a hare; its head like a bear's; its eyes ſmall; its buttocks are bald; on theſe he frequently ſits upright: he always carries his tail bent into a ſort of arch; his length, from the head to the inſertion of the tail, is more than a foot; his tail is rather ſhorter than his body; his legs are conſiderably long, and his body remarkably fat and bulky; his teeth are extremely white; and his penis very much reſembles that of a man: it is an extremely lively animal, and continually plays a number of antic tricks; its voice is ſhrill, and its only noiſe hah! hah! See CERCOPITHECUS.

They have another ſpecies of this kind alſo about Angola, which may be called the black *macaque*. Its only colour is black; but on many parts of the back and ſides, there is a greyiſh caſt among it: this has a tail of remarkable length, being more than two foot long.

MACARIANS, in *Eccleſiaſtical Hiſtory*, the followers of Macarius, an Egyptian monk, who was eſtabliſhed towards the cloſe of the fourth century for his ſanctity and virtue. In his writings there are ſome ſuperſtitious tenets, and alſo certain opinions that ſeem tainted with Origeniſm. The name has been alſo applied to thoſe who adopted the ſentiments of Macarius, a native of Ireland, who, about the cloſe of the ninth century, propagated in France the error afterwards maintained by Averrhoes, that one individual intelligence or ſoul performed the ſpiritual and rational functions in all the human race.

MACARON, the name of a ſort of vermicelli, a paſte made of flour and water, and formed in the ſhape of the barrel of a large quill, or the guts of ſmall fowls.

MACARONIC, or MACARONIAN, a kind of burleſque poetry; conſiſting of a jumble of words of different languages, with words of the vulgar tongue latiniſed, and Latin words modernized.

Macaronic, among the Italians, as has been obſerved by Caelius Rhodiginus, ſignifies a coarſe clowniſh man: and becauſe this kind of poetry, being patched out of ſeveral languages, and full of extravagant words, is not ſo polite and ſmooth as thoſe of Virgil, &c. the Italians, among whom it had its riſe, gave it the name of *Macaronian* or *Macaronic* poetry. Others chooſe to derive it *a Macaronibus*, from *Macaroons*, a kind of confection made of meal not boulted, ſweet-almonds, ſugar, and the whites of eggs: accounted a great dainty among the country people in Italy; which from their being compoſed of various ingredients occaſioned this kind of poetry, which conſiſts of Latin, Italian, Spaniſh, French, Engliſh, &c. to be called by their name.

Theoph. Folingius, a Benedictine monk of Mantua, was the firſt who invented, or at leaſt cultivated, this kind of verſe: for though we have *Macaronea Aſtinianenſis* in a very old letter, beginning, "Eſt author Typhis Leonicus atque Patanſus;" yet it ſeems to have been the work of Guarinus Capellus Sarſinas, who, in the year 1526, printed ſix books of *Macaronic* poetry, in Cabrinum Gagamonæ Regem: but as both theſe came out after the firſt edition of Folingius, which was publiſhed under the name of Merlinus Cocca jus in 1520, ſo they were likewiſe much inferior to his both in the ſtyle, invention, and epiſodes, wherewith he haſteuriched the hiſtory of Baldus; which make the ſubject of his poem. The famous Rabelais firſt transferred the *Macaronic* ſtyle out of the Italian verſe into French proſe, and on the model thereof formed ſome of the beſt things in his Pantagruel.

We have ſcarce any thing in Engliſh in the *Macaronian* way, except ſome little looſe pieces collected in Camden's remains; which is no diſcredit to our authors: for one may ſay of ſuch pieces in general,

Turpe eſt difficiles habere nugas,
Et ſtultus labor eſt ineptiarum.

But the Germans and Netherlanders have had their *Macaronic* poets; witneſs the Certamen catholicum cum Calviniſtis, of one Martinius Hamconius Friſius, which contains about twelve hundred verſes, all the words whereof begin with the letter C.

MACAROON. See MACARONIC.

MACASSAR *poison*, in *Natural History*, called *upas*, in the Macassar and Malayan tongue, is the gum of a certain tree, shining, brittle, black, and every way like stone-pitch, growing in the island Celebes, in the South Seas; with which all the natives arm themselves in travel, having a long hollow trunk of a hard red-wood like brasil, accurately bored, and at one end is fixed a large lance-blade of iron. Then they make a small arrow, very strait, and somewhat bigger than a large wheaten straw: at one end they fix it into a round piece of white, light, soft wood, like cork, about the length of the little finger, just fit for the bore of the trunk, to pass clear by the force of one's breath, and to fill it so exactly, that the air may not pass by, but against it, in order to carry it with the greater force. At the other end they fix it either in a small fish-tooth for that purpose, or make a blade of wood of the bigness of the point of a lancet, about three-quarters of an inch long, and making a little notch in the end of the arrow, they strike it firm therein, which they anoint with poison. The poisonous gum, when gathered, is put into hollow bamboos or canes, stopped up very close, and thus brought to *Macassar*. When they fit it for use, they take a piece of smooth turtle-shell, and a stick cut flat and smooth at the end; then they take green galangal root, grate it, and with the addition of a little fair water, press the juice into a clean china dish; then with a knife, scraping a little of the poison upon the shell, dip the end of the stick in the forementioned liquor, and with that dissolve the poison, to the consistence of a syrup: when this is done, they anoint the fish-tooth of wooden-blade with the same stick and lay them in the sun, so that it may be baked hard. The pointed arrows thus prepared are put in hollow bamboos, close shut, and in this state they retain their virtue for a month. Loch's Hist. of the Royal Society, vol. ii. p. 440.

MACAW, MACCAW, or MACAO, in *Ornithology*, the name of a large species of *parrot*, distinguished also by the length of its tail. There are three different species of this bird brought over into Europe, which not only differ in size and other particulars, but also in colour. The first is the largest, and is finely variegated with blue and yellow; the second is somewhat smaller than that, and is principally red and yellow; and the third is red and blue. It is not uncommon also to see the *macaws* perfectly white, and it is to that particular colour we give the name of *cockatoos*; though with some it is made the synonymous name of all the *macaw* tribe.

MACAW-*tree*. See PALM-*tree*.

MACCABEES, two apocryphal books of scripture, containing the history of Judas and his brothers, and their wars against the Syrian kings in defence of their religion and liberties, so called from Judas Maccabæus, surnamed *Maccabæus*, as some say from the word מכבי, formed of the initials of מי כמכה באלם יהוה, q. d. *Who is like unto thee, O Lord, among the Gods*; which was the motto of his standard; whence those who fought under his standard were called *Maccabees*, and the name was generally applied to all who suffered in the cause of the true religion, under the Egyptian or Syrian kings. The first book of the *Maccabees* is an excellent history, and comes nearest to the style and manner of the sacred historians of any extant. It was written originally in the Chaldee language, of the Jerusalem dialect, and was extant in this language in the time of Jerom. From the Chaldee it was translated into Greek, from the Greek into Latin. It is supposed to have been written by John Hyrcanus, the son of Simon, who was prince and high priest of the Jews near thirty years, and began his government at the time where this history ends. It contains the history of forty years, from the reign of Antiochus Epiphanes to the death of Simon the high priest; that is, from the year of the world 3829 to the year 3869; 131 years before Christ. The second book of the *Maccabees* begins with two epistles sent from the Jews of Jerusalem to the Jews of Egypt and Alexandria; to exhort them to observe the feast of the dedication of the new altar erected by Judas, on his purifying the temple. The first was written in the 169th year of the æra of the Seleucidæ, i. e. before Christ 144; and the second in the 188th year of the same æra, or 125 before Christ; and both appear to be spurious. After these epistles follows the preface of the author to his history, which is an abridgment of a larger work, composed by one Jason, a Jew of Cyrene, who wrote in Greek the history of Judas *Maccabæus*, and his brethren, and the wars against Antiochus Epiphanes, and Eupator his son. This second book does not, by any means, equal the accuracy and excellency of the first. It contains a history of about fifteen years, from the execution of Heliodorus's commission, who was sent by Seleucus to fetch away the treasures of the temple, to the victory obtained by Judas *Maccabæus* over Nicanor; that is from the year of the world 3828 to the year 3843, 147 years before Christ.

There are in the Polyglot Bibles, both of Paris and London, Syriac versions of both these books; but they, as well as the English versions which we have among the apocryphal writers in our Bibles, are derived from the Greek. There is also a third book of the *Maccabees*, containing the history of the persecution of Ptolemy Philopator against the Jews in Egypt, and their sufferings under it; and seems to have been written by some Alexandrian Jew in the Greek language, not long after the time of Siracides. It is in most of the ancient manuscript copies of the Greek Septuagint, particularly in the Alexandrian and Vatican, but was never inserted into the vulgar Latin version of the Bible, nor consequently into any of our English copies. Moreover, Josephus's history of the martyrs that suffered under Antiochus Epiphanes, is found in some manuscript Greek Bibles, under the name of the fourth book of the *Maccabees*.

MACE, *macis*, is a pretty thick, tough, unctuous membrane, reticulat or variously chapt, of a lively reddish yellow colour, approaching to that of saffron, enveloping the shell of the fruit, whose kernel is the NUTMEG. The *mace*, when fresh, is of a blood-red colour, and acquires its yellow hue in drying. It is dried in the sun upon hurdles fixed above one another, and then, as it is said, sprinkled with sea-water, to prevent its crumbling in carriage.

Mace has a pleasant aromatic smell, and a warm, bitterish, moderately pungent taste; it is a thin and flat membranaceous substance, of an oleaginous nature, and of a yellowish colour. We meet with it in flakes of an inch or more in length, which are divided into a multitude of irregular ramifications; it is of an extremely smooth surface, and of a tolerably close texture, yet friable, and very easily cut to pieces. It is of an extremely fragrant, aromatic, and agreeable smell, and of a pleasant, but acrid and oleaginous taste; it is to be chosen new, not *dry*, and of a fragrant smell, tough, oleaginous, and of a good yellow. The people who collect the nutmegs first cut it open, and throw away the pulpy substance, or external coat; they then see the *mace* covering the nutmegs, wrapping itself every way round its outer woody shell. The *mace* is at this time of a red colour; they take it carefully off from the nutmeg, and lay it in the sun for the whole day. In this little its colour, from a strong blood-red, becomes dusky; it is after this carried to another place, where the sun has less power, and there exposed again to its rays, the few hours they reach thither. By this means it dries gently, and remains tough, and retains its fragrancy and colour in a great degree; if it were dried more hastily, it would be whitish, brittle, and would lose much of its smell; after this it is slightly sprinkled over with sea-water, and then put up into bales, in which it is pressed down firm and close, by way of preserving its fragrance and consistence.

It is of an astringent and drying nature, and is used as a corrector in cordiac and cathartic compositions. In its general qualities it is nearly similar to the nutmeg; the principal difference consists in the *mace* being much warmer, more bitterish, less unctuous, and fitting easier on weak stomachs: in its yielding by expression a more fluid oil, and in distillation with water a more subtile volatile one. Lewis's Mat. Med.

MACE, *oil of*, is a kind of sebaceous matter, said to be expressed from the nutmeg, and appearing to be a mixture of the gross sebaceous matter of the nutmeg, with a little of the essential or aromatic oil; both which may be perfectly separated from one another by maceration or digestion in rectified spirit, or by distillation with water. The best sort of this oil is brought from the East Indies in stone jars, and is somewhat soft, of a yellow colour, and of a strong agreeable smell, much resembling that of the nutmeg itself. There is another sort brought from Holland in solid masses, generally flat, and of a square figure, of a paler colour, and much weaker smell. Lewis.

MACE, *reed*, in *Botany*. See TYPHA.

MACEDONIAN *kingdom*, in *Ancient History*, one of the four kingdoms into which the EMPIRE of Alexander was divided after his death. This kingdom, under Perseus, who was overcome and taken by Æmilius, and carried in triumph to Rome, where he died in prison, was reduced to the form of a Roman province. The other three, viz. the Asiatic, Syrian, and Egyptian kingdoms, flourished for a considerable time under their own kings, but were at last compelled to receive the Roman yoke.

MACEDONIAN *year*. See YEAR.

MACEDONIANS, in *Ecclesiastical History*, the followers of Macedonius, bishop of Constantinople, who, through the influence of the Eunomians, was deposed by the council of Constantinople in 360, and sent into exile. He considered the Holy Ghost as a divine energy diffused throughout the universe, and not as a person distinct from the Father and the Son. The sect of *Macedonians* was crushed before it had arrived at its full maturity, by the

the council assembled by Theodosius in 381, at Constantinople. See SEMI-ARIANS.

MACER. The Grecian *macer* is brought from Barbary; and the part in use is the thick yellow bark, which has a very astringent taste, and is said by Dioscorides to be good for spitting of blood, the dysentery, and fluxes. See SIMAROUBA.

MACERATION, in *Pharmacy*, the operation of dissolving a solid body by means of water, or some other liquor.

In this sense, the word amounts to much the same with LIQUEFACTION, or liquation.

MACERATION is also used for the infusing a body in any menstruous fluid, in order to a solution of its principles, whether with or without fire.

In which sense, *maceration* amounts to much the same with DIGESTION.

Others restrain *maceration* to that particular kind of digestion, which is performed in thick substances, as when, having mixed roses with fat to make *unguent. rosatum*, the mixture is exposed for some days to the sun, that the virtue of the roses may be the better communicated to the fat.

MACERONE, in *Botany*, a name given by some authors to the great *hipposelinum*, or herb alexanders, or ALEXANDERS.

MACHA *nuces*, a kind of African CALABASH. It is the fruit of a very large tree which grows in Africa, and the American islands. When this fruit is ripe, the pulp has a flourish taste, with a little astringency: it is delicious in hot countries; and they prepare a liquor of it, which they use instead of lemonade, to cool and refresh themselves, and give it to sick persons under a looseness. The pulp, dried, tastes as well as the spiced bread of Rheims. The slaves make a kind of thick gruel with this pulp and water; it is of an absorbent quality. The African women use the pulp instead of rennet, for curdling their milk.

The seeds of this fruit are as big as small pine-apple kernels, kidney-shaped, of a chestnut-colour, and inclosing an almond far more delicious than our sweet almonds.

MACHÆRION, a word used by chirurgical writers as the name of an instrument of the nature of the incision knife. It is also sometimes used to express an incision; and by the auspices of old it was applied to some peculiar part of the liver of animals, from which they presaged events.

MACHERA *lapis*, in *Natural History*, the name of a stone of a ferrugineous colour, frequent on mount Berecynthus in Phrygia. Plutarch, and many other grave writers, relate, that if any person found this stone, and took it up at the time of the celebration of the feasts of Cybele, he instantly was seized with madness.

MACHIAVELISM, in *Literary History*, is a species of detestable politics, which may be defined in few words, the art of reigning tyrannically, the principles of which are inculcated in the works of Machiavel, a native of Florence, and particularly in his treatise, entitled the Prince. M. de Wicquefort observes, concerning the character of this writer: Machiavel says almost every where what princes do, and not what they ought to do. To the same purpose the chancellor Bacon remarks: *Est quod gratiæ agamus Machiavello et hujus modi scriptoribus qui aperte et indissimulanter proferunt quid homines facere soleant non quid debeant.* Machiavel was secretary, and afterwards hiftoriographer to the republic of Florence. He was put to the rack upon the suspicion of being concerned in a confederacy against the house of Medicis; but he endured the torments of it, without making any confession. He was so much an enemy to religion as to found politics; and is said to have died, in the year 1530, uttering profane jests and blasphemies. Bayle.

MACHINE, *machina*, in general, signifies any thing that serves to augment, or to regulate moving powers: or it is any body destined to produce motion, so as to save either time or force.

The word comes from the Greek μηχανη, *machina, invention, art.* And hence, in ſtrictneſs, a *machine* is something that conſiſts more in art and invention, than in the ſtrength and ſolidity of the materials; and for this reaſon it is that the inventors of *machines* are called *inventors.*

MACHINES, *ſimple*, are thoſe otherwiſe called MECHANICAL *powers.* There are ſix ſimple *machines*, to which all others may be reduced; viz. the BALANCE, LEVER, WHEEL, PULLEY, WEDGE, and SCREW.

The ſimple *machines*, or mechanical powers, according to their different ſtructure, ſerve for different purpoſes; and it is the buſineſs of the ſkilful mechaniſt to chooſe them, or combine them, in the manner that may be beſt adapted to produce the effect required, by the power which he is poſſeſſed of, and at the leaſt expence. The lever can be employed to raiſe weights a little way only, unleſs the engine itſelf be moved; as, for inſtance, to raiſe ſtones out of their beds in quarries. But the axis and wheel may ſerve for raiſing weights from the greateſt depths. Pullies being eaſily carried, are therefore much employed in ſhips. The wedge is excellent for ſeparating the parts of bodies; and the ſcrew for compreſſing or ſqueezing them together; and its great friction is even ſometimes of uſe, to preſerve the effect already produced by it. The ſtrength of the *machine*, and of its parts, muſt be proportioned to the effects which are to be produced by it. Thus, when the center of motion is placed between the power and the weight, it muſt ſuſtain the ſum of their efforts; a ſmall balance, therefore, ought not to be employed for weighing great weights; for theſe diſorder its ſtructure, and render it unfit for ſerving that purpoſe with accuracy. Neither are great *machines* proper for producing ſmall effects. It were to be wiſhed, that we had a detail of all theſe things drawn up by ſome ſkilful and experienced mechaniſt.

From theſe ſimple *machines*, compounded ones are formed by various combinations, and ſerve for different purpoſes; in all which the ſame general laws take place; and particularly this, that the power and weight ſuſtain each other, when they are in the inverſe proportion of the velocities which they would have in the directions wherein they act, if they were put in motion.

But in practice the friction of *machines* is to be conſidered, without allowing for which we ſhall often find ourſelves at a loſs. See FRICTION.

Accurate deſcriptions and draughts of *machines* would be a very curious and uſeful work. But to make a collection of this kind as advantageous as poſſible, it ſhould, beſides the deſcriptions of *machines*, contain an analyſis of them; pointing out their advantages and diſadvantages; the reaſons of the conſtructions; and the general problems, implied in theſe conſtructions, with their ſolutions, ſhould be extracted. None of theſe things have as yet been done, in a complete and ſatisfactory manner, in any treatiſe of this kind. However, many curious particulars may be gathered from Strada, Beſſon, Beroaldus, Auguſtinus de Ramellis, Boeckler, Leupold, Beyer, Limpergh, Van Zyl, Perault, and others; a ſhort account of whoſe works we find in Wolfii Commentatio de præcipuis ſcriptis Mathematicis. Elem. Matheſ. Univ. tom. v. p. 84. ſeq. To theſe muſt be added, monſieur Belidor's Architecture Hydraulique, and Dr. Deſaguliers's Courſe of Experimental Philoſophy. The Royal Academy of Sciences at Paris have alſo given us a collection of *machines* and inventions approved of by them. This work, publiſhed by monſieur Gallon, conſiſts of ſix volumes in quarto, containing engraved draughts of the *machines*, with their deſcriptions annexed. But a complete inſtitution of practical mechanics is ſtill wanting.

MACHINE, *compound*, is that which is compoſed of ſeveral ſimple ones combined together.

The number of compound *machines* is now almoſt infinite; and yet the ancients ſeem to have outdone the moderns in this reſpect; their *machines* of war, architecture, &c. being deſcribed as vaſtly ſuperior to our's.

MACHINE, *architectonical*, is an aſſemblage of pieces of wood ſo diſpoſed, as that, by means of ropes and pulleys, a ſmall number of men may raiſe vaſt loads, and lay them in their places. Such are cranes, &c.

It is hard to conceive what ſort of *machines* the ancients muſt have uſed to raiſe thoſe immenſe ſtones found in ſome of the antique buildings.

MACHINES, *blowing*. See BELLOWS.

MACHINE, *electrical*. See ELECTRICAL *machine*.

MACHINE, *wind*. See ANEMOMETER, and WIND-*machine*.

MACHINE, *water*, or *hydraulic*, is either uſed to ſignify a ſimple *machine*, ſerving to conduct or raiſe water; as a ſluice, pump, &c. or ſeveral of theſe acting together, to produce ſome extraordinary effect; as the

MACHINE *of Marli*. See MARLI. See alſo FIRE-*engine*, and STEAM-*engine*, and WATER-*works*.

MACHINES, *military*, among the *Ancients*, were of three kinds: the firſt ſerving to launch arrows, as the ſcorpion; or javelins, as the catapulta; or ſtones, as the balliſta; or fiery darts, as the pyrabolus: the ſecond ſerving to beat down walls, as the battering ram and terebra; and the third to ſhelter thoſe who approach the enemy's wall; as the tortoiſe or teſtudo, the vinea, and the towers of wood. See SCORPION, ARIES, &c.

The *machines of war* now in uſe, conſiſt in artillery, bombs, petards, &c.

MACHINE, in *Dramatic Poetry*, is when the poet brings ſome divinity or ſupernatural being upon the ſtage, to perform ſome exploit, or ſolve ſome difficulty, out of the reach of human power.

The *machines* of the drama are gods, angels, ghoſts, &c. They are ſo called from the *machines* or contrivances by which they are repreſented upon the ſtage, and afterwards removed again.

Hence the uſe of the word *machine* has alſo paſſed into

epic poem; though the reason of its name be there wanting. It denotes, in both cases, the intervention or ministry of some divinity: but as the occasion of *machines* in the one and the other is somewhat different, the rules and laws of managing them are different likewise.

The ancient dramatic poets never brought any *machine* on the stage, but where there was an absolute necessity for the presence of a god; and they were generally laughed at for suffering themselves to be reduced to such a necessity. Accordingly, Ariſtotle lays it down as an expreſs law, that the unravelling of the piece ſhould ariſe from the fable itſelf, and not from any foreign *machine*, as in the Medea. Horace is ſomething leſs ſevere, and contents himſelf with ſaying, that the gods ſhould never appear, unleſs where the *nodus*, or knot, is worthy of their preſence; *Nec deus intersit, niſi dignus vindice nodus — inciderit.* But it is quite otherwiſe with the epopea; in that there muſt be *machines* every where, and in every part. Homer and Virgil do nothing without them. Petronius, with his uſual fire, maintains, that the poet ſhould deal more with the gods than with men; that he ſhould every-where leave marks of his prophetic raptures, and of the divine fury that poſſeſſes him; that his thoughts ſhould be all full of fables, that is of allegories and figures: in fine, he will have a poem diſtinguiſhed from a hiſtory in all its parts; not ſo much by the verſes, as by that poetical fury, which expreſſes itſelf wholly by allegories; and does nothing but by *machines*, or the miniſtry of the gods. A poet, therefore, muſt leave it to the hiſtorian to ſay, that a fleet was diſperſed by a ſtorm, and driven to foreign theres; and muſt himſelf ſay, with Virgil, that Juno went to ſeek Æolus; and that this god, at her requeſt, turned the winds looſe againſt the Trojans: he muſt leave the hiſtorian to write, that a young prince behaved himſelf with a great deal of prudence and diſcretion on all occaſions; and muſt ſay, with Homer, that Minerva led him by the hand in all his enterprizes: let an hiſtorian ſay, that Agamemnon, quarelling with Achilles, hath a mind to throw him, though miſtakenly, that he can take Troy without his aſſiſtance; the poet muſt ſay, that Thetis, piqued at the affront her ſon had received, flies up to heaven, there to demand vengeance of Jupiter: and that this god, to ſatisfy her, ſends the god Somnus, or Sleep, to Agamemnon, to deceive him, and make him believe that he ſhall take Troy that day.

It is thus that the epic poets uſed *machines* in all parts of their works; in the Iliad, Odyſſey, and Æneid, the propoſition mentions them; the invocation is addreſſed to them; and the narration is full of them: they are the cauſes of actions; they make the knots; and at laſt they unravel them. This laſt circumſtance is what Ariſtotle forbids in the drama; but it is what Homer and Virgil have both practiſed in the epopea. Thus Minerva flights for Ulyſſes againſt Penelope's lovers; helps him to deſtroy them; and, the next day, herſelf makes the peace between Ulyſſes and the Ithacans; which cloſes the Odyſſey. The uſe of *machines*, in the epic poem is, on ſome accounts, entirely oppoſite to what Horace preſcribes for the theatre. In tragedy, that critic will never have them uſed without an abſolute neceſſity, whereas, in the epopea, they ſhould never be uſed, but where they may be to well let alone; and where the action appears as if it did not neceſſarily require them. How many gods and *machines* does Virgil implore to raiſe the ſtorm that drives Æneas into Carthage; which yet might eaſily have happened in the ordinary courſe of nature.

In Milton's Paradiſe Loſt, moſt of the actors are ſupernatural perſonages; and in Voltaire's Henriade, the poet has made excellent uſe of St. Louis.

Machines, in the epic poem, therefore, are not contrivances of the poet, to recover himſelf after he has made a falſe ſtep, nor to ſolve any difficulty peculiar to ſome part of the poem; but it is the preſence of a divinity, and ſome ſupernatural and extraordinary action, which the poet inſerts in moſt of the incidents of his work, to render it more majeſtic and admirable, and to train up his readers to piety and virtue. This mixture ſhould always be ſo managed, as that the *machine* may be retrenched, without retrenching any thing from the action. As to the manner in which the *machines* are to act; it may be obſerved, that in the old mythology, there are gods both good, bad, and indifferent; and that our paſſions may be converted into ſo many allegorial divinities: ſo that every thing, both good and bad in a poem, may be attributed to theſe *machines*, and may be tranſacted by them. They do not, however, always act in the ſame manner; ſometimes they act without appearing, and by ſimple inſpirations, which have nothing in them extraordinary or miraculous; as when we ſay, the devil ſuggeſted ſuch a thought, &c. The ſecond manner of acting is entirely miraculous; as when a divinity preſents itſelf viſible before men, ſo as to be known by them; or when they diſguiſe themſelves under ſome human form without diſcovering themſelves. The third manner partakes of each of the two, and conſiſts in oracles, dreams, and extraordinary inſpirations: all which Boſſu calls *demi-machines*.

All theſe manners ought to be ſo managed, as to carry a verſimilitude: and though verſimilitude be of a vaſt extent in *machines*, as being founded on the divine power, yet it has its bounds.

MACHUI, an inſtrument of muſic among the Hebrews: Kircher apprehends that the name was given to two kinds of inſtruments, one of the ſtringed and the other of the pulſatile kind. That of the former ſort had ſix chords, and is repreſented *Tom. Muſurg. fig.* 4. Though there is great reaſon to doubt whether an inſtrument requiring the aid of the hair-bow, and ſo much reſembling the viol, be ſo ancient. The ſecond kind was of a circular form, (ſee *fig.* 5.) made of metal, and either hung round with little bells, or furniſhed with iron rings, ſuſpended on a rod or bar that paſſed acroſs the circle. Kircher ſuppoſes that it was moved to and fro by a handle fixed to it, and thus emitted a melancholy kind of murmur.

MACHUS, in *Natural Hiſtory*, a name uſed by Pliny and ſome of the old authors, for the ELK, and alſo for the REIN-DEER.

MACKREL, *ſcomber*, in *Ichthyology*, a well known ſea-fiſh of the ſcomber kind: the noſe is taper and ſharp-pointed; the eyes large; the jaws of an equal length; and the teeth ſmall, but numerous; the body is a little compreſſed on the ſides; towards the tail it grows very ſlender, and a little angular; the firſt dorſal fin is placed a little behind the pectoral fin, is triangular, and conſiſts of nine or ten ſtiff rays; the ſecond lies at a diſtance from the other, and has twelve ſoft rays; the pectoral, twenty; the ventral, ſix; and at the baſe of the anal fin is a ſtrong ſpine; between the laſt dorſal fin and the tail are five ſmall fins, and the ſame number between the anal fin and the tail; the tail is broad and ſemilunar; the colour of the back and ſides above the lateral line is a fine green, varied with blue, marked with black lines, pointing downwards; beneath the line, the ſides and belly are of a ſilvery colour. In the ſpring, the eyes of the *mackrel* are almoſt covered with a white film, which grows in winter, during which period they are half blind, and is caſt in the beginning of ſummer. This fiſh was in high eſteem among the Romans, becauſe it furniſhed the precious GARUM. The beſt time of taking *mackrel* is during a freſh gale of wind, which it thence called the *mackrel* gale. See *Mackrel* FISHERY. Pennant.

MACKREL, *horſe*, *ſcomber trachurus*, of Linnæus, in *Ichthyology*, a name given by us to a peculiar ſpecies of *mackrel*, called alſo in Cornwall a ſcad. It is the *trachurus* of authors in general. Bellonius calls it the *lacertus*, and the old Greek writers, as Ariſtotle and the reſt, the *ſaurus*. Artedi diſtinguiſhes it by the name of the *ſcomber*, or *mackrel*, with the lateral lines acuſtuated, and with thirty rays in the pinnæ ani. This fiſh is firm and well taſted, and has the flavour of *mackrel*.

MACROCEPHALUS, *Macrocephalus*, compounded of μακρος, *great*, and κεφαλη, *head*, denotes a perſon with a head larger or longer than the common ſize.

Macrocephali, or *long heads*, is a name given to a certain people, who, according to the accounts of authors, were famous for the unſeemly length of their heads: yet cuſtom ſo far habituated them to it, that inſtead of looking on it as a deformity, they eſteemed it a beauty, and as ſoon as the child was born, moulded and faſhioned its head in their hands to as great a length as poſſible, and afterwards uſed all ſuch rollers and bandages as might ſeem moſt likely to determine its growing long.

MACROCERCI, the name eſtabliſhed by Dr. Hill for a large genus of animalcules, diſtinguiſhed from all others by having tails longer than their bodies. See ANIMALCULE.

MACRONEMUM, in *Botany*, a genus of the *pentandria monogynia* claſs: the characters are, that the flower is bell-ſhaped, the fruit is a double-celled capſule, and the ſeed imbricated. There is only one ſpecies.

MACROCOLUM, or MACROCOLLUM, formed of μακρος, *large*, and κολλα, *glue*, among the Romans, the largeſt kind of paper then in uſe. It meaſured ſixteen inches, and frequently two feet.

MACROCOSM, *Macrocoſmus*, compounded of μακρος, *long*, *large*; and κοσμος, *world*, denotes the great world, that is, the univerſe.

In which ſenſe it ſtands contradiſtinguiſhed from MICROCOSM, a term uſed to expreſs man.

MACROLOGY, *Macrologia*, formed of μακρος, *long*, and and λογος, *diſcourſe*, in *Rhetoric*, a redundant, or too copious ſtyle; an example of which we have in Livy. lib. viii. *Legati non impetrato pace, retro domum, unde venerant abierunt.*

The too copious is equally subject to obscurity with the too concise style, and consequently ought to be avoided. See BRACHYLOGY, DICTION, and STYLE.

MACROPEDIUM, the *long-legs*, a name given by some writers in natural history, to the common TIPULA.

MACROPIPER, a name given by authors to the *piper longum*, or long pepper.

MACROPNUS, formed of μακρος, *long*, and πνευ, *breath*, a word used by Hippocrates, and other old writers in medicine, to signify a person who fetches his breath at long intervals. It is used in opposition to *brachypnus*, or short-breathed.

MACROPTERA, derived from μακρος, *long*, and πτερον, *wing*. The hawks of this genus have their wings so long, that when closed they reach to the end of the tail, or nearly so. Of this genus are the bald-buzzard, the kite, the hen-harrier, the honey-buzzard, and the common buzzard, the facre, the jer-falcon, &c.

MACRORYNCHÆ, *long-beaked*, derived from μακρος, *long*, and ρυγχος, *a beak*, in *Zoology*, the character of a large order of the bird kind.

The birds of this order have all of them beaks many times longer than their heads, with oblong noſtrils, and a furrow running from them towards the apex of the beak.

MACROTELOSTYLA, in *Natural Hiſtory*, the name of a genus of cryſtals, which are compoſed of two pyramids joined to the end of a column; both the pyramids, as alſo the column, being hexangular, and the whole body conſequently compoſed of eighteen planes.

The word is derived from the Greek μακρος, *long*, τελειος, *perfect*, and στυλος, a *column*; expreſſing a perfect cryſtal with a long column. See *Tab. of Foſſils, claſs* 3.

There are only three known ſpecies of this genus. Either of the ſorts found with us, are called by the common name of *Corniſh diamonds*. Hill's Hiſt. of Foſſ.

MACROULE, in *Ornithology*, the name given by many to the largeſt ſpecies of coot. It is of a deeper black than the common kind, and has a large bald ſpot on it's head. It is alſo called by ſome *diable de mer*. It is found in Lancaſhire and Scotland. See COOT.

MACUCAQUA, in *Ornithology*, the name of a Braſilian bird of the gallinaceous kind, called alſo by ſome the *gallina ſylveſtris*, or wild hen. It has no tail; but is a very well taſted fowl, and has twice as much fleſh as the European hen; its eggs are ſomewhat larger than the common hen eggs, and of a bluiſh-green colour; it feeds on fruits that fall off the trees, &c. and runs well, but cannot fly high or far, and never is ſeen in the trees. Marcgrave.

MACULÆ, in *Aſtronomy*, dark ſpots appearing on the luminary faces of the ſun, moon, and even ſome of the planets.

In which ſenſe *macula* ſtand contradiſtinguiſhed from FACULÆ.

MACULÆ, *ſolar*, are dark ſpots of an irregular, changeable, figure, obſerved in the face of the ſun, firſt taken notice of by Galileo, 1610, ſoon after he had finiſhed his teleſcope, and afterwards accurately obſerved by Scheiner, Hevelius, Mr. Flamſteed, Caſſini, Kirch, &c. Phil. Tranſ. vol. i. p. 274. vol. liii. p. i. p. 104.

Many of theſe *maculæ* appear to conſiſt of heterogeneous parts; whereof the darker and more denſe are called by Hevelius, nuclei, and are encompaſſed, as it were, with atmoſpheres, ſomewhat raſer, and leſs obſcure; but the figure both of the nuclei, and entire *maculæ*, is variable. In 1643, Hevelius obſerved a ſmall thin *macula*, which, in two days time, grew to ten times its bulk; appearing withal much darker, and with a larger nucleus; and ſuch ſudden mutations are frequent. The nucleus, he obſerved, began to fall ſenſibly before the ſpot diſappeared; and that, before it quite vaniſhed, it broke into four, which, in two days, again reunited. Some *maculæ* have laſted two, three, ten, fifteen, twenty, thirty, but ſeldom forty days; though Kirchius obſerved one in 1681, which remained from April 26th to the 17th of July. The ſpots move over the ſun's diſk with a motion ſomewhat ſlacker near the limb than the centre: that obſerved by Kirchius was twelve days viſible on the ſun's diſk; for fifteen days more it lay behind it, it being the uſual rule to return to the limb whence they departed in twenty-ſeven, ſometimes in twenty-eight days.

Laſtly, it muſt be obſerved, that the *maculæ* contract themſelves nearer the limb, and in the middle of the diſk appear much larger; thoſe often running into one in the diſk, which, in the limb, were ſeparate: that many of them ariſe in the middle of the diſk, and many diſappear in the ſame: and that none of them are obſerved to deviate from their path near the horizon; whereas Hevelius, obſerving Mercury in the ſun near the horizon, found him too low, being thruſt twenty-ſeven ſecounds beneath his former path.

From theſe phenomena we collect, 1. That ſince Mercury's depreſſion below his path ariſes from his parallax, the *maculæ*, having no parallax from the ſun, are nearer him than that planet.

2. That, ſince they ariſe and diſappear in the middle of the ſun's diſk, and undergo various alterations with regard both to bulk, figure, and denſity, they muſt be formed *de novo*, and again diſſolved about the ſun; and hence ſome have inferred, that they are a kind of ſolar clouds, formed out of its exhalations.

3. If they are of this nature, as they riſe over his body, and are ſuſpended at a certain height from it, it appears, from the laws of hydroſtatics, that the ſun muſt be encompaſſed with ſome fluid to drive thoſe exhalations upwards; which fluid muſt be denſer as it is lower, and rarer as higher, like our atmoſphere: and, ſince the *maculæ* diſſolve and diſappear in the very middle of the ſun's diſk, the matter thereof, ſuppoſing them to be ſolar exhalations, muſt fall back again to the ſun; whence there muſt ariſe changes in the ſun's atmoſphere; and, conſequently, in the ſun itſelf.

4. Since the revolution of the *maculæ* round the ſun is very regular, and ſince their diſtance from the ſun is very ſmall, it is not properly the *maculæ* that move round the ſun, but it is himſelf, together with his atmoſphere, wherein the *maculæ* ſwim, that in the ſpace of twenty-ſeven days, twelve hours, twenty minutes, moves round his own axis; and to the ſame fixed ſtar, in twenty-five days, fifteen hours, ſixteen minutes (ſee SUN); and hence it is, that the *maculæ*, being viewed obliquely near the limb, appear narrow and oblong.

5. Since the ſun appears with a circular diſk in every ſituation, his figure, as to ſenſe, muſt be ſpherical.

The magnitude of the ſurface of a ſpot may be eſtimated by the time of its tranſit over a hair in a fixed teleſcope. Galileo reckons ſome ſpots to be larger than all Aſia and Africa put together: but if he had known the ſun's parallax and diſtance, as exactly as we do, he would have found them much larger than the whole ſurface of the earth. For, in 1612, he obſerved a ſpot ſo large as to be plainly viſible to the naked eye; it, therefore, ſubtended an angle at the eye of about a minute. The diameter of the earth, if removed to the ſun, would ſubtend an angle of but about ſeventeen ſecounds. Therefore the diameter of the ſpot was to the diameter of the earth, as ſixty to ſeventeen, or three one-half to one nearly; and conſequently, the ſurface of the ſpot, if circular, to a great circle of the earth, as twelve one-fourth to one, and to the whole ſurface of the earth, as twelve one-fourth to four, or nearly three to one. Gaſſendus obſerved a ſpot whoſe diameter was $\frac{1}{30}$ of the ſun's, and, therefore, ſubtended an angle at the eye of above a minute and a half. Its ſurface was, therefore, above ſix times larger than the whole ſurface of the earth. He tells us, that he ſaw above forty ſpots at once, but did not perceive that the light of the ſun was ſenſibly diminiſhed: nevertheleſs, the paſſages of the ſun mentioned by hiſtorians, after the death of Julius Cæſar, might have been cauſed in this manner, if we admit the fact.

The opinions that have been formed concerning the nature, origin, and ſituation of the ſolar ſpots, have been various: Dr. Wilſon, profeſſor of practical aſtronomy in the univerſity of Glaſgow, by attending particularly to the different phaſes preſented by the umbra, or ſhady zone, of a ſpot of an extraordinary ſize that appeared upon the ſun, in the month of November, 1769, during its progreſs over the ſolar diſc, was led to form a new and ſingular conjecture concerning the nature of theſe appearances; which he ſeems to have afterwards confirmed by repeated obſervations. The reſults of theſe obſervations are, that the ſolar *maculæ* are cavities in the body of the ſun; that the nucleus, as the middle or dark part has been uſually called, is the bottom of the excavation; and that the umbra, or ſhady zone uſually ſurrounding it, is the ſhelving ſides of the cavity. Dr. Wilſon appears not only to have very ſatisfactorily aſcertained the reality of theſe immenſe excavations in the ſun's body, but has pointed out a method of meaſuring the depth of them. He eſtimates, in particular, that the nucleus, or bottom of the large ſpot above mentioned, was not leſs than a ſemidiameter of the earth, or about four thouſand miles, below the level of the ſun's ſurface; while its other dimenſions were of a much larger extent. He obſerved, that when a ſpot, in the middle of the ſun's diſc, where it is ſurrounded equally on all ſides with its umbra, comes near the weſtern limb of the ſun; that part of the umbra, which is next to the ſun's centre gradually diminiſhes in breadth, and at length, when the ſpot reaches within about a minute of the limb, totally diſappears; while the umbra, on the other ſide of it, continues nearly of its former dimenſions. If, after the period of half a revolution, the ſpot appears again, on the oppoſite ſide of the diſc, that part of the umbra, which had before diſappeared, and which is now on the left hand ſide of the nucleus, is now

plainly

plainly to be seen; but the umbra on the other side of the spot, or that which is next to the sun's centre, seems to have vanished in its turn; being hid from the view by the upper edge of the excavation, or by the oblique position of its sloping sides with respect to the eye. As the spot, however, advances on the sun's surface, this umbra, or side of the cavity, comes in sight; at first appearing narrow, but afterwards gradually increasing in breadth, in proportion as the spot moves toward the middle of the disc. These appearances, in particular the gradual diminution and disappearance, as well as the re-appearance and gradual enlargement of the umbra, on the one side or the other of a spot, according as it advances near the western limb, or proceeds onwards from the eastern edge of the sun, are naturally accounted for by Dr. Wilson's supposition, that the umbræ are the sloping sides of a cavity, which will appear under different angles, or of different breadths, or totally disappear, according to their position with respect to the eye of the spectator. These appearances, at least, perfectly resemble the phases that would be exhibited by an excavation in a spherical body, made to revolve on its axis; the bottom of the cavity being painted black, and the sides lightly shaded. From these and other observations it may be inferred, that the body of the sun, at the depth of the nucleus, either emits no light, or emits so little as to appear dark, when seen at the same time, and compared, with that resplendent, and probably, in some degree, fluid substance that covers his surface. This manner of considering these phenomena naturally gives rise to many curious speculations and inquiries. It is natural, for instance, to inquire by what great commotion this refulgent matter is thrown up on all sides, so as to expose to our view the darker part of the sun's body, which was before covered by it? What is the nature of this shining matter? and why, when an excavation is formed in it, is the lustre of this shining substance, which forms the slucking sides of the cavity, so far diminished, as to give the whole the appearance of a shady zone, or darkish atmosphere, surrounding the denuded part of the sun's body? On these and many other subjects, Dr. Wilson has advanced some ingenious conjectures; for which we must refer the curious to the Phil. Transf. vol. lxiv. part i. art. 1. See also some remarks on Dr. Wilson's Theory, by Mr. Woolaston, in the Phil. Transf. vol. lxiv. part. ii. art. 3. p. 332, &c.

MACULÆ, in the *Writers of Medicine*, is used to express all kinds of spots and efflorescences on the skin, with different epithets. Thus, *maculæ pestilentiales*, are the spots or efflorescences, which appear upon the skin in pestilential diseases. *Maculæ hepaticæ* are spots of a brownish red colour, appearing on the skin in many places, from an *obstruction* of the blood, attended with a sort of coagulation. *Maculæ solaticæ*, or vanishing spots, are very common to children, appearing in several parts of their bodies, and very soon disappearing again. *Maculæ maternæ* are the spots or blemishes on children, called *nævi*, and marks from the mother's longing; and *maculæ albæ* are white spots which appear in the cornea of the eye, called by other names, albugo, leucoma, nebula, and nubecula.

MACULA *solis*, a word used by many authors to signify a cataract or suffusion.

MAD-*dog*. See MADNESS.

MAD-*apple*, or, as called by some, the EGG *plant*, *melongena*, in *Botany*. Its characters are these: the flower, which has a permanent empalement of one leaf, deeply cut into five acute segments, has but one petal, which is cut into five parts, and reflexed; it has five awl-shaped stamina; and in the center is situated an oblong germen, which becomes an oval or oblong fruit, with one cell, with a fleshy pulp, filled with compressed roundish seeds. There are four species. Miller.

Linnæus has joined this species, and the LYCOPERSICON of Tournefort, to the *solanum*, or NIGHTSHADE, making them only species of that genus.

This plant is propagated in the gardens of the curious with us; and in Spain, Italy, and Barbary, common in the kitchen-gardens, the fruit of them being frequently eaten there boiled with fat flesh, putting thereto some scraped cheese, and preserving it through the winter with vinegar, honey, or salt pickle. This they esteem of great efficacy to provoke venery. In summer also, when the fruit is just ripe, they eat it fresh dressed, with spices, and other ingredients.

The manner of propagating them with us, is to sow the seeds in March, upon a moderate hot-bed; and when the plants are come up, they are to be thinned by planting them in another hot-bed at about four inches asunder, watering and shading them till they have taken root. They must afterwards have as much air as the season will allow; and in May they must be transplanted into a warm border, setting them at two feet distance every way. About the middle of July the fruit will appear; and if the weather be dry at this time, they must be often watered, which will make the fruit grow large. The fruit ripens in the end of August. Miller.

The apples being much like those of the mandrake, have induced some moderns to suspect this plant to be the male mandrake of Theophrastus; and supposing them to be deadly, to call them *mad-apples*; whereas in reality they excite no symptoms of madness, but are used by the Italians and Spaniards in their sauces and sweetmeats. They have the taste of the citron.

MAD-*water*, among *Miners*, is water that has been drawn from a shaft, or any part of a mine, and returns back again to the same place from whence it was drawn.

MAD-*wort*, *alyssum*, in *Botany*, a genus of the *tetradynamia siliculosa* class. Its characters are these: the flower, which has an oblong four-leaved empalement, that falls away, has four petals in form of a cross, and six stamina, two of which are shorter than the other four, crowned with broad summits; in the center of the flower is situated the oval germen, which becomes a globular, or compressed seed-vessel, containing several compressed seeds. Miller enumerates eight, and Linnæus seventeen species. This plant is said to be aperitive, and good against the bite of a mad dog; being of a very penetrating and diaphoretic nature, and agreeing in other respects with the scurvy-grass.

MAD-*wort*, *German*. See ASPERUGO.

MADDER, *rubia*, in *Botany*, a genus of the *tetrandria monogynia* class. Its characters are these; the empalement of the flower is small, cut into four segments, and sits upon the germen; the flower has one bell-shaped petal, having no tube, but is divided into four parts; it has four awl-shaped stamina, which are shorter than the petals, terminated by single summits, and a twin germen under the flower, supporting a slender style, divided into two parts upward, and crowned by two-headed stigmas; the germen afterward becomes two smooth berries, joined together, each having one roundish seed, with a navel. There are three species.

The culture of that species of *madder*, which is used by the dyers and callico printers, and which grows naturally in the Levant, is an article of considerable advantage to the Dutch, insomuch that at an average of several years past they have received from us more than 180,000*l.* per annum, and might be profecuted here with equal success. The method of cultivating it in Holland is this: in autumn they new plough the land, where the *madder* is to be planted, if it is strong and heavy, laying it up in high ridges, that it may be mellowed by the winter's frosts. In March they plough it again, working it very deep, and laying it in ridges at eighteen inches asunder, and about a foot deep. Then, in the beginning of April, when the *madder* begins to shoot out of the ground, they open the earth about the old roots, and take off all the side shoots, which extend themselves horizontally just under the surface of the ground, preserving as much of the root as may be with them. These they plant immediately on the tops of the new ridges, at about a foot distance from each other; and this they usually do in showery weather, when the plants immediately take root, and require no more water. In these ridges they let the plants remain two seasons, keeping them clear of weeds; and at Michaelmas time, when the leaves are fallen off, they take up the roots, and dry them for the market.

The best land for the culture of *madder* in England is a soft sandy loam, which has been for some years in tillage, with a depth of two and a half or three feet of good earth, free from all weeds. The ground should be ploughed deep before winter, and laid in ridges to mellow; and if it be not too strong, there will be no necessity for ploughing it again, till just before the time of planting the *madder*, when it should be ploughed as deep as possible; and there should be men following the plough in the furrows, who should dig a full spit below the bottom of the furrow, and turn it up on the top. The best time for planting the *madder* in the ground, thus prepared and made level, is about the middle or latter end of April; the young shoots being about two inches above the ground. The shoots should be taken up carefully, so that the roots may be large and unbroken; and if they are in any degree withered by lying out of the ground, they should be set upright in water for a few hours before they are planted. In planting of *madder*, if the roots have been left three years in the ground, the best distance of the rows is three feet; but if they are taken up in two years, they may be two feet asunder; and the distance of the plants in the rows should be one foot, if they are to stand two years, or a foot and a half, if they are to stand three years. Where there is no danger of too much wet in winter, the plants may be set upon the level ground; otherwise they should be planted in ridges, that the wet may drain off. The method of planting is

as follows: when the ground is made smooth, a line is drawn across, to mark out the rows; then, with an iron-shod dibble, holes are made at the proper distances; the depth of these holes should be equal to the length of the roots; and when the plants are put into the holes, the earth should be pressed close to them, in order to secure them from being destroyed by birds. It is most advisable in planting *madder*, never to sow or plant any thing between the rows, but to keep the *madder* quite clean from weeds, or any other kind of vegetable. Some showers of rain in a day or two after the planting will be of considerable service. During the first summer, the only culture which the *madder* requires is that of keeping it clean, by scuffling it over with a Dutch hoe, as soon as the weeds appear; and when the shoots or haulm of the plants decay in autumn, they should be raked off the ground; and the intervals between the rows should be either dug with a spade, or ploughed with a hoeing plough, laying up the earth over the heads of the plants in a roundish ridge. Some have covered the haulm of their *madder* with the earth, to keep the frost out of the ground, in the manner of the Dutch; but this practice is not absolutely necessary in England. In the following spring, before the *madder* begins to shoot, the ground should be raked very smooth, and the weeds destroyed; and in the ensuing summer, care must be taken to keep it clear from weeds; and if it is performed by the hoe-plough, the earth of the intervals should be thrown up against one side of the ridges, which will earth up the roots, and greatly increase their strength; but before the ground of one interval is to be hoed, the haulm of the plants should be turned over to the next adjoining interval, and suffered to lie in this manner for two or three weeks; and then turned back again on those intervals which were hoed, observing first to scuffle the ground; then the alternate intervals should be ploughed in like manner, turning the earth up against the opposite sides of the roots. By this method the intervals will be alternately ploughed, and the plants earthed up, whereby the ground will be kept clean and mellow, which will greatly promote the growth of the roots; and thus the superficial shoots will be subdued, and the principal roots greatly strengthened. In the following autumn the ground should be cleared of the haulm and weeds, and the earth raised in ridges over the roots, as in the preceding year. In the third spring the roots will furnish a great supply of young plants; but, before they appear, the ground should be cleaned and raked smooth; and when the young plants are fit to take off, this should be carefully done, always taking off those which are produced at the greatest distance from the crown of the mother plants. The culture of the *madder* in the third summer must be the same as in the second; but as the roots will be then much stronger, the earth should be hoed up a little higher to them at the times when the ground is cleaned and ploughed; and it will be of service to hoe or plough off the distant superficial roots, when come up in the intervals, in order to strengthen the larger downright roots; and as the haulm will be now very strong and thick, the frequent turning it over from one interval to another will prevent its rotting, and the sun is alternately admitted to each side of the roots, which will much contribute to the growth of the *madder*. As soon as the haulm of the *madder* begins to decay in autumn, the roots may be taken up for use, because the roots have then done growing for that season, and will be less liable to shrink, than if they are dug up when the plants are growing. When the season for digging up the *madder* roots is come, it should be done in the following manner: a deep trench should be dug at one side of the ground next to the first row of *madder*, in order to make a sufficient opening to receive the earth, which must be laid therein in digging up the row of roots; so that it should be at least two feet broad, and two spits and two shovellings deep, and as close as possible to the roots, so that they are not cut or broke; then the rows of roots must be carefully dug up, turning the earth into the fore-mentioned trench. After the principal roots are taken up, there will be many of the long fibres remaining below; and, therefore, in order to get the roots as clean as possible, the whole spot of ground should be dug to the same depth as the first trench; and those who are employed in picking up the roots must follow the diggers, to get them all out to the bottom. This digging will be an excellent preparation of the ground for any succeeding crop. After the roots are taken up, the sooner they are carried to the place of drying, the finer will be their colour; and therefore no more roots should be taken up than can be carried under shelter in the same day; for by lying in heaps, they will heat, and much wet will likewise tend to discolour them. The first place, where the roots should be laid to dry, must be open to admit the air, but covered on the top to keep out the wet: a building like that in which tanners dry their skins, will be very proper for this purpose. They may remain in this situation for three or four days, but the roots should be turned over once or twice, that every part may dry equally; and that the earth which adhered to them may be rubbed off. They should then be carried to the kilns to be further dried; and as there are in most parts of England, kilns already erected for drying of malt and hops, they may be used for drying of *madder*; but if there were VENTILATORS fixed to these kilns, for blowing a sufficient quantity of air through the room, where the *madder* roots are drying, in the manner directed by Dr. Hales, for drying of malt and hops, it would be found a much better method than that which is practised by the Dutch, and save a great expence of fuel. When the outside of the roots has been sufficiently dried in this cold stove or kiln, they should be removed to the threshing floor, which may be the same as in a common barn where corn is thrashed. On this floor, made as clean as possible, the roots should be threshed, in order to beat off their skins or outside covering: this skin, called *mull*, is the worst sort of *madder*, and sold at a very low price: when it is separated from the roots, it is pounded by itself, and afterwards packed up in separate casks, and sold under the name of *mull*. This, however, may be sometimes sold at a price, which will defray the whole expence of drying the crop. After the *mull* is separated from the roots, they must then be removed to the kiln again, and there carefully dried in a greater heat than before: and that the heat may not be too great, the roots should be frequently turned in this stove, the fires properly regulated, and a sufficient quantity of fresh air thrown through the kiln, which will serve to drive out the foul air occasioned by the perspiration of the roots, and thus be useful in preserving their colour. It will be always better to have the heat rather less than too violent; for though the roots may require a longer time to dry with a slow heat, yet the colour will be better. When the roots are properly dried in this stove, they must be carried to the pounding-house, where they must be reduced to powder. Any common bulting will serve for this purpose, provided there be room in it for fixing the requisite apparatus: the back for this purpose should be like those used in Holland, and also the hampers, which are bound round at bottom with thick iron bands, framed like the points of a star; for if the surface of the hampers be smooth and even, the *madder* will adhere to them so closely as to render it impossible to pulverise the roots properly. The hampers may be so contrived as to be worked by water, where there is convenience, or perhaps by wind; but in Holland it is done by horses. Miller.

It appears from the calculations of another writer, that, supposing the land to be worth 40*s.* per acre, and excluding the original price of the plants, the whole expence of cultivating it with *madder*, is 16*l.* 18*s.* 2*d.* and that the produce of it is 52*l.* 12*s.* 2*d.* so that the clear profit is 36*l.* 14*s.*

Persons stealing or destroying *madder* roots are liable to satisfaction for damages, at the discretion of the justice, for the first offence, or commitment to the house of correction for one month, or whipping; and for the second offence, commitment to the house of correction for three months: provided that the prosecution be commenced within thirty days. 31 Geo. II. c. 35.

The root of the common *madder* cultivated for the use of the dyers, is an excellent aperient and diuretic. When taken internally it tinges the urine red. It is prescribed with great success in obstructions of the liver and spleen, in suppressions of the menses and urine, and in dropsies, jaundices, and cachexies. It is also recommended as a vulnerary, and said to be peculiarly excellent in the dissolving coagulated blood. The college of Edinburgh makes it an ingredient in the ictetic decoction, which is prepared by boiling an ounce of *madder*, the same quantity of turmeric, and the same quantity of the roots and leaves of celandine, in three pints of water to a quart, to which, when strained and cooled, the juice of two hundred millepedes is added: a quarter of a pint of this liquor is taken twice a day, or oftener. The dyers prepare a red colour with it, and use it also as a first tint for several others.

It impregnates water with a dull red colour, and spirit of wine with a deep bright red. Wool, previously boiled in a solution of alum and tartar, receives from a hot decoction of *madder* and tartar, a very durable, but not a very beautiful red colour. M. Margraaf (Berlin Mem. 1774) shews how a very durable lake, of a fine red colour, fit for the purposes of painting, may be obtained from *madder*. The process is as follows: take two ounces of the purest Roman alum, and dissolve it in three (French) quarts of distilled water that has boiled, and in a clean glazed pot. Set the pot on the fire, and when the water begins to boil, withdraw it, and add to it

two ounces of the beſt Dutch *madder*. Boil the mixture once or twice; then remove it from the fire, and filtrate it through a double filtre of paper not coloured. Let the filtrated liquor ſtand for a night to ſettle; and pour off the clear liquor into the glazed pot, well cleaned. Make the liquor hot, and add to it gradually a clear ſolution of ſalt of tartar in water, till all the *madder* is precipitated; filtrate the miſture, and upon the red precipitate which remains upon the filtre, pour boiling diſtilled water, till the water no longer acquires a ſaline taſte; the red lake is then to be gently dried. The colour of this precipitate is deep; but if two parts of *madder* be uſed to one part of alum, the colour will be ſtill deeper: one part of *madder* and four parts of alum produce a beautiful roſe-colour. Mr. John Belchier ſhewed to the Royal Society the bones of hogs which were become red, by their feeding on bran that had been boiled with printed calicoes, which had been ſtained with preparations of iron, alum, ſugar of lead, and that had an infuſion of *madder-root*, to fix the colours. By feeding a cock fifteen days on fig-duſt, with a little *madder-root*, all his bones became alſo red. Phil. Tranſ. N° 457.

Mr. Hamel du Monceau verified Mr. Belchier's experiments, and obſerved, that except the villous coat of the ſtomach and inteſtines, the capſula of the cryſtalline and vitreous humours of the eyes, and ſome very hard bony tendons, and the bones; no other part had any tincture of the *madder*. The moſt ſolid bones were moſt tinged, and all the red ones were larger, more ſpungy, and eaſily broken; nor did they unite ſo well, when broken, as white bones. Some young animals had their bones tinged in three days. The red colour went gradually off, when the creatures forbore to take the *madder* for food, which proved unhealthy, for they began to languiſh ſoon, and died with it. Vegetables did not take the red colour when they were planted in *madder*; and none of the other dyes, with which he fed animals, had any ſuch effect of tinging their bones, as the *madder* had. Mr. du Hamel, having mixed *madder* with the food of a pig for ſome time, and then kept away the *madder* an equal time, found, upon ſawing the bones through, that their interior lamin æ were red, while the exterior were white: and having fed another pig ſix weeks with *madder*, then kept it out of its food as long, and then mixed it other ſix weeks; upon ſawing the bones, they were compoſed of three layers, whereof the external and internal were red, the middle one was white. Mem. de L'Acad. des Scienc. 1739. & Phil. Tranſ. N° 457. § 4. Med. Eſſ. Edinb. Abr. vol. ii. p. 477.

MADDER, *little field*, *Sherardia*, in *Botany*, a genus of the *tetrandria monogynia* claſs. Its characters are theſe: the flower has a ſmall permanent empalement ſitting upon the germen; it has one long tubulous petal, cut into four plain acute parts at the brim; it has four ſtamina, ſituated on the top of the tube; terminated by ſingle ſummits, and an oblong twin germen below the flower, ſupporting a ſlender biſid ſtyle, crowned by two-headed ſtigmas; the germen afterwards becomes an oblong fruit, containing two oblong ſeeds; which are ſeparated. Miller reckons two, and Linnæus three ſpecies.

MADDER, *petty*, in *Botany*. See CRUCIANELLA.

MADERAM-*pulli*, in *Botany*, a name uſed by ſome authors for the tree whoſe fruit is the tamarind of the ſhops.

MADIC, a word uſed by ſome medical writers for buttermilk.

MADISTERIUM, *Madiſterium*, a name given by the Greeks to an inſtrument intended to keep the ſkin ſmooth, by eradicating the hairs.

MAD-HOUSE. By 14 Geo. III. c. 49. enacted to be in force for five years, and by 19 Geo. III. c. 15. which continues it for ſeven years farther, no perſon, on pain of 500*l.* ſhall entertain or confine, in any houſe kept for the reception of LUNATICS, more than one lunatic at a time, without a licence to be granted yearly by five commiſſioners, annually elected by the colleges of phyſicians, within London and Weſtminſter, and ſeven miles thereof, and within the county of Middleſex, and elſewhere by the juſtices in ſeſſions. The licences are to be ſtamped with a 5*l.* ſtamp: every one who keeps a number of lunatics, not exceeding ten, ſhall pay the ſum of 10*l.* and above ten the ſum of 15*l.* and 6*s.* 8*d.* on every licence, as a fee to the ſecretary of the commiſſioners. No licence can authoriſe any perſon to keep more than one houſe. The commiſſioners are required annually to viſit licenced houſes, and inſpect their ſtate: on application to the commiſſioners for information concerning any confined perſon, the ſecretary is to ſearch his books, and acquaint the perſons applying with the name of the keepers in whoſe houſe the lunatic is confined. The keeper is required to give notice to the ſecretary, within three days after receiving a patient, who is to file ſuch notice; and every keeper admitting a perſon as lunatic, without an order under the hand of ſome phyſician or ſurgeon, that ſuch perſon is proper to be received, ſhall pay the ſum of 100*l.*

MADNESS, *mania*, in *Medicine*. See MANIA.

MADNESS, *from the bite of enraged animals*, *rabies canina*. The bites of enraged animals, though they were not *mad* at the time they inflicted them, are uſually attended with very grievous conſequences. If the wound is ſlight, the diſcharge of blood from the part is to be encouraged by preſſing it with the fingers, ſucking it in the mouth, or by the application of cupping-glaſſes, or enlarging it with a lancet. It is afterwards to be waſhed with warm ſpirit of wine, and boſſters dipped in the ſame liquor are to be applied to it, repeating the application every three or four hours, till all danger of inflammation is gone off. If the wound be conſiderably deep, it is always neceſſary to enlarge it with the knife, unleſs it have already a very large opening; and, after applying ſpirit of wine for the firſt days, to prevent the bad ſymptoms, it may be eaſily healed with honey or ſome digeſtive ointment, and afterwards with a vulnerary baſſam, as uſed in other wounds. To know whether a dog which has bitten a perſon be or be not *mad*, it is neceſſary to know the marks by which a dog, in that condition, is to be diſtinguiſhed from others. See HYDROPHOBIA.

Perſons bit by a *mad* dog are uſually afflicted with very violent diſorders, ſometimes ſooner, ſometimes later, according to the malignity of the poiſon imbibed by the wound, and other accidents. Many means have been recommended by different perſons, as preſervatives or as remedies in theſe diſorders; the principal of which we ſhall recount in the ſequel of this article.

Dr. de Sauli argues for the *rabies canina*, depending on ſmall worms, of which, he ſays, there is a great number found in the heads of thoſe who die of this diſeaſe. From the analogy of this terrible diſeaſe with others; ſuch as the itch, lues venerea, &c. which, in his opinion, are alſo contagious, by worms communicating from one perſon to another, he was led to think that the cure of the *rabies* was only to be performed by mercury, and the ſucceſs confirmed his theory; for of four men who had all been bit at the ſame time by the ſame wolf, two were treated by the common ſpecifics of plunging in the ſea, &c. and died ſome days after of the *rabies*. The other two, having all the ſigns of an approaching *rabies*, were cured by Dr. de Sauli's method, which is this: if he is conſulted immediately after the perſon is bit, he orders him to be bathed in the ſea, that the common confidence in this method may calm his mind. As ſoon as the patient returns, he puts him on the uſe of Palmarius's powder, compoſed of equal parts of the leaves of rue, vervain, ſage, plantain, polypody, common wormwood, mint, mugwort, baſtard baum, betony, St. John's wort, and leſſer centaury, dried and powdered, with ſome coralline. A dram of this powder is to be taken every morning, in a glaſs of white wine or warm water. This he gives for twenty or thirty days, as there is more or leſs preſumption of the poiſon having entered the blood. From the firſt day of taking the powder, he rubs a dram or two of ung. Neapolit. upon the wound, and ſkin round it, every other day. After doing this thrice, he applies the ointment every third day; and afterwards every fourth day, till he has made uſe of two or three ounces of the ointment. If the patient has delayed ſeveral days to take his advice, he uſes the mercurial friction three or four times a day, for four days, and increaſes the doſe of Palmarius's powder; then forbears the unction two days, leſt a ſalivation ſhould be brought on. Our author likewiſe recommends muſic as of uſe to calm the mind, and divert the fear which people, in danger of this diſeaſe, generally have. Med. Eſſ. Edinb. vol. vi. p. 475. Boerhaave, in order to prevent the effects of a bite inflicted by a *mad* dog, recommends deep ſcarifications in the parts immediately affected and thoſe adjacent to it; the application of large cupping-glaſſes or actual cauteries; and an uninterrupted fomentation, with a brine or pickle made of ſea-ſalt and vinegar; and this treatment is to be continued for ſix months. The patient is alſo to be occaſionally thrown headlong into water, with the moſt terrifying circumſtances; becauſe he apprehends that the advantage of bathing riſes from the terror. He adviſes likewiſe frequent purges with rhubarb, agaric, and the juice of elder-bark; and gentle ſweats every morning by taking a mixture of aromatic vinegar, ſea-ſalt, and warm water. The patient ſhould foment his head, hands, and feet in a bath of water, and drink cold water till he throws it up, by vomit: his diet ſhould be light and laxative. When ſigns of approaching *madneſs* are diſcovered, a large quantity of blood ſhould be taken away, till the patient faints; and the following clyſters mixed with a little vinegar ſhould be injected: viz. ten ounces of barley water, two drams of nitre, and elder vinegar and honey of roſes, of each an ounce: or, ten ounces of rue,

rue, two drams of sea-salt, six drams of vinegar impregnated with marigold-flowers, and an ounce of honey. These should be often repeated, and the patient be often thrown into cold water or washed with it. See HYDROPHOBIA.

Dr. James relates the cure he made of dogs that were *mad*, and how he preserved others from the *rabies*, who had been bit by *mad* dogs, by giving doses of turbith mineral every day, or every other day. The other dogs of the pack that had been bit, died, notwithstanding the famous *powder* medicine, dipping in the sea, and the other common specifics. The Doctor likewise mentions three people who were bit by *mad* dogs, and escaped the *rabies* by the use of the turbith. Phil. Trans. N° 441. § 8.

He directs to rub into the part where the wound was received, a dram or more of mercurial ointment, formed of equal parts of hog's lard and crude quicksilver, as soon as possible after the bite: this should be repeated every day for a week; and in the evening, the patient should take from three to eight grains of turbith mineral, according to his strength and the degree of infection, with an equal quantity of camphor, made into a bolus with any conserve. The dose should be repeated every other evening; but salivation must be avoided. About two or three days after the last dose, the patient should bathe his head in cold water every day, till, as he says, the day before the next full or new moon; and then repeat the dose of turbith mineral three times, as before; and after the third dose, bathe again: and let this method be repeated for the three or four succeeding periods of the moon. He absolutely forbids all nervous and heating medicines. James on Canine Madness.

Mr. Fuller relates the good effects of the PULVIS *antihydrus*, composed of lichen. ciner. terrest. and piper. inge. in preventing the *rabies*. Phil. Tran. N° 448. § 5.

This is much recommended as a preventive medicine by Dr. Mead, who says, that in the space of thirty years, he used it a thousand times and never knew it fail.

A person who had been bit by a *mad* dog, and began to have symptoms of the *rabies*, was saved by having one hundred and twenty ounces of blood taken in a week, and being bathed in cold water. Phil. Trans. ibid. § 6.

Mr. Nourse relates the history of a lad bit in the thumb by a *mad* dog; he took morning and evening a dram of the *pulvis antihydrus* forty days, and bathed in the sea ten days; he was cut for the bone soon after, and recovered very well: nineteen months after which he died, with all the symptoms of the hydrophobia. Phil. Trans. N° 445.

The Tonquinese pretend to an infallible remedy for the bite of the *mad* dog. Their method is to take about fifteen grains of the bell musk; of the purest native cinnabar, and finest vermilion, each about twenty-four grains; and having reduced them separately to impalpable powders, they mix and administer them in about a gill of arrack. This, in two or three hours, generally throws the patient into a found sleep, and perspiration: if not, they repeat the dose, and think the cure certain. See Phil. Trans. N° 474. p. 225. Where Mr. Reid, to whom we are obliged for this receipt, observes, as in the vermilion, that though it be a preparation of cinnabar, yet as the Tonquinese seem to think its virtue different, if it were to be wished, that we knew their method of preparing it, to which they certainly owed

This compolition of musk and cinnabar has been applied with success to other distempers, as an antispasmodic; but as Tonquin vermilion is not easy to be had, Mr. Reid substituted an equal quantity of factitious cinnabar in its stead, and sometimes administered it in rum or brandy instead of arrack. See Musk.

The Tonquinese medicine is sometimes called Cobb's powder, because it was brought over from Tonquin by a Mr. Cobb, formerly in the service of the East India Company.

A good antispasmodic medicine may be prepared by mixing half a dram of Virginian snake-root in powder, with twelve grains of gum asafœtida, and seven grains of gum camphor, into a bolus, with syrup of saffron. Or, one dram of camphor, half an ounce of purified nitre, two drams of powdered Virginian snake-root may be rubbed together in a mortar, and the whole divided into ten doses. Mercury is also a medicine of considerable efficacy, in the prevention and cure of this kind of *madness*. When used as a preventive, it will be sufficient to rub daily a dram of the ointment into the parts about the wound. Vinegar taken freely in the patient's drink and food, is of considerable service. But these or any other medicines must be used for a sufficient length of time.

The following receipt was taken from the church of Caythorp in Lincolnshire, where almost the whole parish were bit by a *mad* dog, and thole was used it recovered, but they who did not, died: take the leaves of rue picked from the stalks and bruised, six ounces; garlick picked from the stalks and bruised, Venice treacle, and mithridate, and the scrapings of pewter, of each four ounces; boil all these over a slow fire in two quarts of strong ale, till one pint be consumed; then keep it in a bottle close stopped, and give nine spoonfuls of it warm to a man or woman, for seven mornings together fasting; and six spoonfuls to a dog. It is confidently said, that this will not fail, if it be used within nine days after the biting of the dog. Some of the ingredients from which the liquor was strained, should be applied to the wounded part. Dr. Parsons advises to rub into the wound, as soon as a person receives the bite, a spoonful or two of common salt, moistened with water, and to repeat it three or four times a day, for a week or ten days; and then to lay on a compress with the same saline preparation. If the wound is very small, it ought to be dilated, that enough of the salt may be the sooner introduced. The inhabitants of Connecticut in New England have long practised this method with success, as an antidote against the bites of *mad* dogs and venomous animals in general.

The most proper thing the surgeon can do on this occasion, is to enlarge the wound with the knife, and promote the flowing out of the blood; then to wash it with salt-water, or with Venice treacle dissolved in vinegar; and when the texture of the part will permit, that is, when only the common integuments, or fleshy parts are wounded, to apply the actual cautery to the wound, and afterwards dress it as other burns. Another method much practised, is to make a tight ligature above the wound, to prevent, as much as may be, the return of the blood by the veins from that part; then to enlarge the wound with a knife, and wash it as before directed; then cauterize it, if the part will admit that operation, if not, cleanse the wound, if deep, by means of a syringe, and apply over it a plaster of the mercurial kind; and if the person be plethoric, to open a vein. After the Venice treacle has been used for a day or two in these cases, the wound is to be dressed with honey, or with the common digestive ointment, mixed with the Ægyptian ointment, or with red precipitate, and be kept open by means of these dressings for some weeks; for wounds of this kind must never be healed too soon, especially when they have not been cauterized. Heister's Surg. p. 99.

The patient should also begin to use either Dr. Mead's PULVIS *antihydrus*, or some of the others already mentioned. He must also rub into the parts about the wound, daily, one dram of the mercurial ointment; which may be continued for ten or twelve days. Afterwards he may take a purge or two; and then begin to use the cold or rather a warm bath; which he may persist in every morning for five or six weeks. In the mean time he may take either one of the bolules of snake-root, asafœtida and camphor, or one of the powders of nitre, camphor, and snake-root, twice a day. He should carefully abstain from flesh, and all salted and high seasoned provisions. He must also avoid strong liquors and turbulent passions, and live modestly on a light and spare diet, and be kept as easy and chearful as possible. Dr. Buchan observes, that he has never seen this course of Medicine, with proper regions, fail in preventing the HYDROPHOBIA. Dom. Med. p. 625. ed. 1770.

Dr. Tissot says, that this *disease* may be cured in the following manner: let the patient lose a considerable quantity of blood; and let bleeding be repeated twice, thrice, or even a fourth time, if circumstances require it: the patient should be put, if possible, into a warm bath, twice a day; and every day twice or three emollient clysters: the wound and adjacent parts should be rubbed with the mercurial ointment twice a day; and the whole limb, in which the wound lies, be rubbed with oil, and wrapped up in an oily flannel. A dose of Cobb's powder should be taken every three hours in a cup of the infusion of lime-tree and elder-flowers: and a bolus, made by mixing one dram of powdered Virginia snake-root, one grain of opium, and of camphor and asafœtida ten grains each, with a sufficient quantity of conserve or rob of elder, should be given every night, and repeated in the morning, if the patient is not easy: washing it down with the above mentioned infusion. When there is a great nausea at the stomach, and a bitterness in the mouth, thirty-five or forty grains of ipecacuanha, in powder, may be taken for a vomit. The patient's food must be light, as panada, soups made of mealy vegetables, &c. and if he should long continue weak and subject to retchings, he may take half a dram of the Peruvian bark thrice a day. Tissot's Advice, &c. p. 263. ed. 1766.

In a case, with respect to which Dr. Fothergill and Dr. Watson held a consultation, they agreed on the following method

method of treatment, though unattended with success. They ordered the patient to be blooded standing, according as his strength would bear; that he should be conveyed to the warm bath, and remain in it as long as it was agreeable: at his return from the bath a clyster of milk and water was injected with a dram of Dover's powder, and half an ounce of mercurial unction was rubbed on his legs and thighs; one scruple of theebaic extract was ordered to be made into twenty pills, three of which were to be taken when he came out of the bath, and two every hour till he seemed disposed to sleep. The Ormskirk remedy, which has been extolled as an infallible preservative in this disorder, had been previously tried without any beneficial effect.

The method of bathing in fresh or salt water, with the terrifying circumstances that attend it, founded indeed on the authority of Celsus, lib. v. cap. 27. and generally recurred to in this disorder, has also been found ineffectual. Mercurials, however commonly recommended, are no sufficient preservatives; nor can we rely on the *pulvis antilyssus* extolled by Mead, nor on the Tonquin medicine. The only method that promised much security, and that is recommended by long and extensive experience is that, advised also by Celsus, of burning the wounded part, and promoting a discharge from the wound as long and as copiously as possible. A sufficient opening for this purpose may be made either by the knife or by actual cautery. In the Highlands it is common, when a person is bit by a mad dog, to cut out the flesh of the wounded part with a razor, to suck the blood in plenty, and to cover the wound with a handful of cobwebs; and in some parts of Europe, they fill the wound with gun-powder as speedily as possible and set fire to it; or if there be no considerable wound, make an incision near it quickly, put gun-powder into it, and then set it on fire; and thus, the explosion both enlarges the wound and prevents its speedy healing. Lond. Med. Obs. vol. v. art. 19, and art. 26.

MADNING-*Money*, old Roman coins, found about Dunstable, are so called by the country people; and have their name from *magnitum*, used by the emperor Antoninus in his itinerary, for Dunstable.

MADON, in *Botany*, a name by which Pliny, and some other authors, have called the white bryony.

MADOR, a word used by some authors to express the sweat which arises under syncope or fainting, whether it be cold or hot, or in larger or smaller quantities.

MADREPORA, in *Natural History*, the name of a genus of fubmarine fubftances, the characters of which are, that they are almoft of a ftony hardneſs, reſembling the coral, and are uſually divided into branches, and pervious by many holes or cavities, which are frequently of a ſtellar figure.

In the Linnæan ſyſtem, this is a genus of LITHOPHYTA: The animal that inhabits it is the molufca: it comprehends thirty-nine ſpecies. According to Donati, the *madrepora* is like the coral in cross hardneſs, which is equal to bone or marble; the colour is white when poliſhed; its ſurface is highly wrinkled, and the wrinkles run lengthwiſe of the branches; in the center there is a ſort of cylinder, which is often pierced through its whole length by two or three holes. From this cylinder are detached about ſeventeen lamina, which run to the circumference in ſtreight lines; and are tranſverſely interſected by other lamina, forming many irregular cavities; the cellules, which are compoſed of theſe lamina ranged into circles, are the habitations of little polypes, which are extremely tender animals, generally tranſparent, and variegated with beautiful colours. M. de Peyſſonel obſerves, that thoſe writers who only conſidered the figures of ſubmarine ſubſtances, denominated that claſs of them, which ſeemed pierced with holes, *pora*; and thoſe, the holes of which were large, they called *madrepora*. He deſires them to be all thoſe marine bodies, which are of a ſtony ſubſtance, without either bark or cruſt, and which have but one apparent opening at each extremity, furniſhed with rays that proceed from the center to the circumference. He obſerves that the body of the animal of the *madrepora*, whoſe fleſh is ſo ſoft, that it divides upon the gentleſt touch, fills the centre; the head is placed in the middle, and ſurrounded by ſeveral feet or claws, which fill the intervals of the partitions obſerved in this ſubſtance, and are at pleaſure brought to its head, and are furniſhed with yellow papillæ. He diſcovered, that its head or centre was lifted up occaſionally above the ſurface, and often contracted and dilated itſelf like the pupil of the eye: he ſaw all its claws moved, as well as its head or centre. When the animals of the *madrepora* are deſtroyed, its extremities become white. In the *madrepora*, he ſays, the animal occupies the extremity; and the ſubſtance is of a ſtony, but more looſe texture than the coral. This is formed, like other ſubſtances of the ſame nature, of a liquor which the animal diſcharges; and he further adds, that there are ſome ſpecies of the polype of the *madrepora*, which are produced ſingly, and others in cluſters. Phil. Tranſ. vol. xlvii. p. 103. 461, &c. See CORAL.

MADRIER, in the *Military Art*, a thick plank, ſometimes armed with iron plates, having a cavity ſufficient to receive the mouth of a petard when charged; with which it is applied againſt a gate, or other body deſigned to be broken down. See PETARD.

MADRIER alſo denotes a long and broad plank, uſed for ſupporting the earth in mining, carrying on ſaps, making caponiers, galleries, and the like.

There are alſo *madriers* lined with tin, and covered with earth, ſerving as defences againſt artificial fires, in lodgments, &c. where there is need of being covered over head.

MADRIGAL, in the modern Italian, Spaniſh, and French poetry, denotes a little amorous piece, containing a certain number of free unequal verſes, not tied either to the ſcrupulous regularity of a ſonnet, or the ſubtlety of an epigram, but conſiſting of ſome tender and delicate, yet ſimple thought, ſuitably expreſſed.

Menage derives the word from *mandra*, which, in Latin and Greek, ſignifies a sheepfold; imagining it to have been originally a kind of paſtoral, or ſhepherd's ſong; whence the Italians formed their *madrigale*, and we *madrigal*. Others rather chooſe to derive the word from *mandegar*; which, in the Spaniſh, ſignifies, to riſe in the morning; the *madrigals* being formerly ſung early in the morning, by thoſe who had a mind to ſerenade their miſtreſſes.

Huet ſuppoſes it to be a corruption of *martegaux*, a name given to the inhabitants of a diſtrict of Provence, who either invented or excelled in this ſpecies of compoſition. If the origin is deduced from the Spaniards, it may have taken its name from a town in Spain, called *Madrigal*.

The *madrigal*, according to M. le Brun, is an epigram without any thing very brisk and ſprightly in its fall, or cloſe: ſomething very tender and gallant is uſually the ſubject of it: and a certain beautiful, noble, yet chaſte ſimplicity forms its character.

The *madrigal* is uſually looked on as the ſhorteſt of all the leſſer kinds of poems, except the epigram: it may conſiſt of fewer verſes than either the ſonnet, or roundelay. There is no other rule regarded in mingling the rhymes and verſes of different kinds, but the fancy and convenience of the author. This poem, however, really allows of leſs licence than many others; whether we regard the rhyme, the meaſures, or the purity of expreſſion.

The term is alſo applied to a muſical compoſition of three or more parts for different voices, adapted to the words of ſuch poems.

MAEL, *Corean*, in the *Language of the Ceylonſe*, the flowering cinnamon-tree. This is a name given to a peculiar ſpecies of the cinnamon-tree, which is all the year round found full of flowers. The flowers are not eaſily to be diſtinguiſhed from the very ſmall cinnamon-flowers, but they produce no fruit, which the flowers of the fine cinnamon always do. The bark is much like that of the beſt cinnamon, in external appearance; but it has very little taſte or ſmell. The tree grows very large, and the inhabitants ſometimes tap it, by boring a hole into the trunk, at which it bleeds a thin watery juice, in the manner of our birch-tree.

MÆMACTERION, *Μαιμακτηριων*, in *Chronology*, the fourth month of the Athenian year. It contained twenty-nine days, and anſwered to the latter part of our September and beginning of October. The Boeotians called it *alcomenius*.

It took its name from the feſtival *Memacteria*, ſacred to Jupiter, kept at this time.

MÆMACYLON, in the *Materia Medica*, a name given by Dioſcorides, and the ancients in general, to the fruit of the *arbutus*, or ſtrawberry-tree.

MÆNA, in *Zoology*, the name of a ſmall fiſh, caught in vaſt abundance about the ſhores of the Mediterranean, and common in the markets of Italy, where they are accounted but a poor ſort of fiſh, and ſold at a very cheap rate. It is ſomewhat of the figure of the pearch, but broader and thinner, and is ſeldom above four or five inches in length.

MÆNA *cornuta*, in *Ichthyology*, a name given by many authors to the ſmaris. It is not very improper, for they are both of the ſame genus of the SPARUS, and are very nearly allied to one another; the principal difference conſiſting in the tail and belly fins of the ſmaris being red.

MAESTOSO, or MAESTOSOO, in the *Italian Muſic*, ſignifies to play with grandeur, and conſequently ſlow, but yet with ſtrength and fortitude.

MAJOR-

MAFORTIUM, among the *Romans*, a veil, or head-dress, worn by the married women.

MAGADA, in *Mythology*, a title under which Venus was known and worshipped in Lower Saxony; where this goddess had a famous temple, which was treated with respect even by the Huns and Vandals, when they ravaged the country. It is said to have been destroyed by Charlemagne.

MAGAS, Μαγαδις, from μαγαδιζω, *to sing or play in unison* or *octave*, the name of a musical instrument, in use among the ancients.

There were two kinds of *magades*, the one a string instrument, formed of twenty chords, arranged in pairs, and tuned to unison or octave, so that they yielded ten sounds; the invention whereof is ascribed, by some to Sappho; by others, to the Lydians; and, by some, to Timotheus of Miletus.

The other was a kind of flute, which, at the same time, yielded very high and very low notes. The former kind was, at least, much improved by Timotheus of Miletus, who is said to have been impeached of a crime; because by increasing the number of chords, he spoiled and discredited the ancient music.

MAGAS, in the *Ancient Music*, is also used to denote the bridge of any instrument.

MAGAURI, in *Ornithology*, the name of a Brasilian bird, a species of STORK: it is of the size of the common white stork; its neck is a foot long, and its beak strait and pointed, and nine fingers breadth in length; its legs long and naked; its tail is short; its head, neck and body, are covered with snow-white feathers; on the throat these are very long, very white and valuable; its wings and tail have their long feathers black; its legs are red; and its flesh eatable.

MAGAZINE, in the *Military Art*, a place in fortified towns, where all sorts of stores are kept; and where carpenters, wheelwrights, smiths, &c. are employed in making things needful to furnish out the train of artillery.

MAGAZINE, *powder*, is a building constructed for keeping large quantities of powder. These *magazines* were formerly towers erected in the town walls; but many inconveniences attending this situation of them they are now placed in different parts of the town. They were at first constructed with Gothic arches; but M. Vauban, finding these too weak, constructed them in a semicircular form of the following dimensions, viz. fifty feet long within, and twenty-five broad; the foundations eight or nine feet thick; and eight feet high from the foundation to the spring of the arch; the floor about two feet from the ground to prevent damp; and consequently six feet for the height of the story.

The thinnest part or haunches of the arch is three feet thick, and the arch made of four lesser ones, one over the other, and the outside of the whole terminated in a slope to form the roof; from the highest part of the arch to the ridges is eight feet, which makes the angle somewhat greater than ninety degrees; the two wings, or gable ends, are four feet thick, raised somewhat higher than the roof, as is customary in other buildings; as to their foundations they are five feet thick, and as deep as the nature of the ground required.

The piers or long sides are supported by four counterforts, each of six feet broad, and four feet long, and their interval twelve feet; between the intervals of the counterforts, are air-holes, in order to keep the *magazine* dry and free from dampness; the dices of these air-holes are commonly a foot and a half every way, and the vacant space round them three inches, made so, as the in and outside be in the same direction. The dices serve to prevent an enemy from throwing fire in, to burn the *magazine*, and for a farther precaution, it is necessary to stop these holes with several iron plates, that have small holes in them like a skimmer, otherwise fire might be fled to the tail of some small animal, and so drive it in that way; this would be no hard matter to do, since where this precaution has been neglected, egg-shells have been found within, that have been carried there by weasles.

To keep the floor from dampness, beams are laid long ways, and to prevent these beams from being soon rotten, large stones are laid under them; these beams are eight or nine inches square, or rather ten high and eight broad, which is better, and eighteen inches distant from each other; their interval is filled with dry sea coals, or chips of dry stones, then over these beams are others laid cross-ways, of four inches broad, and five high, which are covered with two inch planks.

Mr. Belidor would have brick walls made under the floor, instead of beams, and a double floor laid on the cross-beams; which does not appear to be so well as the manner proposed here; the reader is, however, at liberty to choose the method he likes best.

To give light to the *magazine*, a window is made in each wing, which are shut up by two shutters of two or three inches thick, one within and the other without; that which is on the outside is covered with an iron plate, and is fastened with bolts, as well as that on the inside. These windows are made very high, for fear of accidents, and are opened by means of a ladder, to give air to the *magazine* in fine dry weather.

There is likewise a double door made of strong planks, the one opens on the outside, and the other within; the outside one is also covered with an iron plate, and both are locked by a strong double lock; the store-keeper has the key of the outside, and the governor that of the inside: the door ought to face the south nearly, if possible; in order to render the *magazine* as light as can be, and that the wind blowing in may be dry and warm. Sometimes a wall of ten feet high is built round the *magazine* about twelve distant from it, to prevent any thing from approaching it without being seen. Mr. Muller has proposed some alterations, by way of improvement, in M. Vauban's construction, for which see his Practical Fortification, p. 219, *&c.*

If large *magazines* are required, the piers or side walls which support the arch, should be ten feet thick, seventy-two feet long, and twenty-five feet high; the middle wall, which supports the two small arches of the ground floor, eight feet high and eighteen inches thick, and likewise the arches: the thickness of the great arch should be three feet six inches, and the counterforts, as well as the air-holes, the same as before. *Magazines* of this kind should not be erected in fortified towns, but in some inland part of the country near the capital, where no enemy is expected. It has been observed, that after the centres of semicircular arches are struck, they settle at the crown and rise up at the haunches; now as this shrinking of the arches must be attended with ill consequences, by breaking the texture of the cement after it has been partly dried, and also by opening the joints of the voussoirs at one end, Mr. Hutton, in his Treatise on Bridges, has proposed to remedy this inconvenience, with regard to bridges, by the arch of equilibration: and as the ill effect is much greater in powder *magazines*, he has also proposed to find an arch of equilibration for them also; and to construct it when the span is twenty feet, the pitch or height ten, which are the same dimensions as those of the semicircle, the inclined exterior walls, at top, forming an angle of 113°, and the height of their angular point above the top of the arch equal to seven feet: this curious question was answered in 1775, by the Rev. Mr. Wildbore, and the solution of it may be found in Mr. Hutton's Miscellanea Mathematica.

MAGAZINE, *artillery*, or the *magazine* to a field battery, is usually made about fifty or sixty yards behind the platform. This is a cavity dug in the ground about four feet deep, and the earth thrown between the pit and the platform; the sides of the pit are sometimes planked round to keep it dry and to prevent the earth from crumbling in: and the powder-barrels placed here are covered with hurdles and earth, or tanned hides, to preserve the powder from wet or fire. The communication to the *magazine* is by a sloping trench beginning to descend about five or six yards behind the platform; and the earth is thrown on that side where it will most conveniently cover the persons who remove the barrels of powder from the great *magazine* to the *battery* or small *magazine*. When there are many cannons in the battery, and the service is quick, it is customary to have, for every two pieces, a small *magazine* to hold twenty or thirty barrels of powder; this is placed about fifteen or twenty yards behind the platform, and against the merlon between the cannon; and as these barrels are used, they are replaced by others from the great *magazine*. At each *magazine* a centinel is placed to prevent accidents; and in order to prevent persons from coming into the battery and *magazines* who have no business there, a trench is sometimes dug behind the *magazine* and carried into the trenches which communicate between the *magazine* and battery.

MAGAZINE, or POWDER-ROOM, in a ship, a close room or store-house built in the fore, or afterpart of a ship's hold, to contain the gunpowder used in battle, &c. This apartment is strongly secured against fire, and no person is suffered to enter it with a lamp or candle; it is therefore lighted, as occasion requires, by means of the candles or lamps which are fixed in the LIGHT-room contiguous to it.

MAGBOTE, or MEGBOTE, formed of the Saxon *mag*, i. e. *vegnator*, and *bote*, *compositio*, in our *Old Writers*, a compensation for the slaying or murder of one's kinsman, in ancient times, when corporal punishments for murder, &c. were sometimes commuted into pecuniary fines, if the friends and relations of the party were so satisfied.

MAGDALEN, *Religious of St.* MAGDALEN, is a denomination given to divers communities of nuns, consisting, generally, of penitent courtezans; sometimes also called *Magdalanettes*.

Such are those at Metz, established in 1452; those at Paris, in 1492; those at Naples first established in 1324, and endowed by queen Sancha, to serve as a retreat for public courtezans, who should betake themselves to repentance; and those of Rouen and Bourdeaux, which had their original among those of Paris in 1618.

In each of these monasteries there are three kinds of persons and congregations; the first consist of those who are admitted to make vows, and these bear the name of *St. Magdalen*; the congregation of St Martha is the second, and is composed of those whom it is not judged proper to admit to vows; finally, the congregation of St. Lazarus is composed of such as are detained there by force.

The religious of *St. Magdalen* at Rome were established by pope Leo X. Clement VIII. settled a revenue on them, and further appointed, that the effects of all public prostitutes, dying intestate, should fall to them; and that the testaments of the rest should be invalid, unless they bequeathed a portion of their effects, which was to be at least a fifth part, to them.

MAGDALEN *hospital*. See HOSPITAL.

MAGDALEO, a word used by dispensatory writers, to express any thing made up into a cylindric form. The common rolls of plasters which the apothecaries make up, to be ready for spreading upon occasion, are thus called, as also the rolls of sulphur or common brimstone.

MAGDALEON, or MAGDALIDES, the same as Magdaleons, rolls of sulphur, plaister, &c.

MAGELLANIC *clouds*, whitish appearances like clouds, seen in the heavens towards the south pole, and having the same apparent motion as the stars.

They are three in number, two of them near each other. The largest lies far from the south pole; but the other two are not many degrees more remote from it than the nearest conspicuous star, that is, about eleven degrees. Mr. Boyle conjectures, that if these clouds were seen through a good telescope, they would appear to be multitudes of small stars, like the milky way. Boyle's Works abr. vol i. p. 295.

MAGELLANIC *goose, anser magellanicus*, in *Ornithology*. See GOOSE.

MAGGOT, the common name of the fly-worm, bred in flesh, from the egg of the great blue flesh-fly. Notwithstanding the distaste for this animal, its figure and structure of parts are greatly worth attending to, and may serve as a general history of the class of worms produced from the eggs of flies.

This animal is white and fleshy; its body is composed of a number of rings, like the bodies of caterpillars, and other the like insects, and is capable at the pleasure of the animal, of assuming different figures, being, at times, more or less extended in length, and consequently more or less thick.

Notwithstanding that this creature has no legs, it is able to move itself very swiftly, and, in its first attempt to move its body, is extended to its greatest length, and assumes something of the figure of a pointed cone. The pointed part of this cone is the head of the animal, and is not separated from the next ring by any deeper furrow than the rest of the rings are from one another. In some states of the animal one may see two short horns thrust out from the head; but what are more constantly observable are two brown fealy hooks; these are, however, sometimes hid, and have each of them a sheath, or case, into which the animal can retract them at pleasure. These hooks are bent into an arch, the concavity of which is toward the plane on which the creature is placed, and they are thickest at their insertion in the head, and thence diminish gradually, till they terminate in a fine sharp point.

These two hooks are placed in a parallel direction, and can never come together, and therefore cannot serve in the place of teeth to grind the food between, but merely to pull and sever it to pieces, that it may be of a proper size for the mouth of the creature.

The creature has besides these two hooks a kind of dart, which is of about a third part of their length, and is placed at an equal distance between them. This also is brown like them, and scaly; it is quite strait, and terminates in a fine point. The hooks have, as it were, two scaly thorns at their points, and this dart seems intended, by reiterated strokes, to divide and break the pieces of flesh these have separated from the rest, into smaller parts.

Immediately below the aperture for the egress of the hooks, is placed the mouth of the animal; the creature does not shew this little opening unless pressed; but if the pressure be properly managed, it will sufficiently open it, and there may be discovered within it a small protuberance, which may very naturally be supposed either the tongue, or the sucker of the animal.

The hooks in this creature not only supply the place of teeth, but also of legs; since it is by fastening these hooks into the substance it is placed on, and then drawing up its body to it, that it pulls itself along.

The back of the creature lowers itself by degrees as it approaches the extremity of the belly, and near the place where the back begins to lower itself, are placed the creature's two principal organs of respiration. One may perceive there two small roundish brown spots; these are very easily distinguishable by the naked eye, because the rest of the body of the creature is white; but if we take in the assistance of glasses, each of these spots appears to be a brown circular eminence raised a little above the rest of the body. On each of these spots one may also discover three oblong oval cavities, something in the shape of button-holes; these are situated in a parallel direction to one another, and their length nearly in a perpendicular direction to that of the body of the animal.

These apertures are so many stigmata or air-holes, openings destined to admit the air necessary to the life of the animal. The creature has six of these stigmata, three in each side of its body.

The great transparence of the body of this insect, gives us an opportunity also to distinguish that it has on each side a large white vessel running the whole length of the body. It is easy to follow the course of these vessels through their whole length, but they are most distinct of all toward its hinder part, and they are always seen to terminate each in the brown spot before described; this leaves us no room to doubt but that they are the two principal tracheæ.

These posterior tracheæ have been well known to the later naturalists; but there are two others besides these which they seem not to have distinguished. These are situated in the anterior part of the animal, and are easily discovered by following the course of the tracheæ on each side; for though these all the way diminish in their diameters as they approach the head of the animal, yet it may be easily enough seen where they terminate, which is (taking the head for one ring) in the junction of the second and third ring. In this place the naked eye easily discovers a small spot at the extremity of each, which viewed with a good microscope appears to be a plain stigma, of the figure of a funnel with half of it cut off, and very elegantly indented, and as it were fringed at the edges.

These stigmata in the anterior part of the body, are as constant in this creature, as the posterior ones, but it seems to have none of those which the caterpillar class are furnished with along their sides; though it seems from the structure of the fly it afterwards transforms itself into, that it ought to have them, since that has stigmata in their places.

The ramifications of the two great tracheæ are very beautifully seen in this creature, especially on its belly; and it is remarkable that no vessel analogous to the great artery in the caterpillar class can be discovered in these; though, if there were any such, their great transparence must needs make them very easily distinguishable; nor could its dilarations and contractions, if so considerable as in that class of animals, be less so. See CATERPILLAR.

Malpighi imagined that artery, in the caterpillar-class, a series of hearts; in its place, however, there may be seen in these animals a true heart. It is easy to observe in these creatures, about the fourth ring of the body, a small fleshy part, which has alternate contractions and dilatations, and is not only discoverable in the body by means of the creature's transparence, but on making a proper section of them in the second, third, and fourth rings, will be thrown out of the body of the creature, and will afterwards continue its beats for some minutes. Reaumer's Hist. Insect. vol iv. p. 165, &c.

MAGI, or MAGIANS, a title which the ancient Persians gave to their wise men, or philosophers.

The learned are in great perplexity about the original of the word *magus, magi*. Plato, Xenophon, Herodotus, Strabo, &c. derive it from the Persian language, in which it signified a *priest*, or person appointed to officiate in holy things; as *Druid*, among the Gauls; *Gymnosophist*, among the Indians; and *Levite*, among the Hebrews. Others derive it from the Greek μεγας, *great*; which they say, being borrowed of the Greeks, by the Persians, was returned in the form of μαγος; but Vossius, with more probability, brings it from the Hebrew הגה *hagu, to meditate*; whence מהגים, *magim*, in Latin *meditabundi*, q. d. people addicted to meditation. See the sequel of this article.

Magi, among the Persians, answers to σοφοι, or σοφισται, among the Greeks; *sapientes*, among the Latins; *Druids*, among the Gauls; *Gymnosophists*, among the Indians; and *prophets*, or *priests*, among the Egyptians.

The ancient *Magi*, according to Aristotle and Laertius,

were the ſole authors and conſervators of the Perſian philoſophy; and the philoſophy principally cultivated among them, was theology, and politics; they being always eſteemed as the interpreters of all law, both divine and human; on which account they were wonderfully revered by the people. Hence, Cicero obſerves, that none were admitted to the crown of Perſia, but ſuch as were well inſtructed in the diſcipline of the *magi*; who taught *ta diaitêsai*, and ſhewed princes how to govern.

Plato, Apuleius, Laertius, and others, agree, that the philoſophy of the *magi* related principally to the worſhip of the gods: they were the perſons who were to offer prayers, ſupplications, and ſacrifices, as if the gods would be heard by them alone.

But, according to Lucian, Suidas, &c. this theology, or worſhip of the gods, as it is called, about which the *Magi* were employed, was little more than the diabolical art of divination; ſo that *mageia*, ſtrictly taken, was the art of divination. Theſe people were held in ſuch veneration among the Perſians, that Darius, the ſon of Hyſtaſpes, among other things, had it engraven on his monument, that he was the maſter of the *Magi*.

Philo Judæus deſcribes the *Magi* to be diligent inquirers into nature, out of the love they bear to truth; and who, ſetting themſelves apart from other things, contemplate the divine virtues the more clearly, and initiate others in the ſame myſteries.

The *Magi*, or *Magians*, formed one of the two grand ſects into which the idolatry of the world was divided between five and ſix hundred years before Chriſt. Theſe abominated all thoſe images which were worſhipped by the other ſect, denominated Sabians, and paid their worſhip to the Deity under the emblem of fire. Their chief doctrine was, that there were two principles, one of which was the cauſe of all good, and the other the cauſe of all evil. The former was repreſented by light, and the latter by darkneſs, as their trueſt ſymbols; and of the compoſition of theſe two they ſuppoſed that all things in the world were made. The good god they called Yazdan, denominated by the Greeks Oroſmades: and the evil god Abraman, whom the Greeks called Arimanius. Concerning theſe two Gods, there was this difference of opinion among them; that whereas ſome held both of them to have been from all eternity, there were others who contended, that the good God only was eternal, and that the other was created. But they both agreed in this, that there will be a continual oppoſition between theſe two, till the end of the world; when the former ſhall overcome the latter; and that from thenceforth each of them ſhall have his world to himſelf; that is, the good God ſhall have his world, with all good men with him, and the evil god his world with all evil men with him. The good God they always worſhipped before fire, as being the cauſe of light, and eſpecially before the ſun, as being, in their opinion, the moſt perfect fire, and cauſing the moſt perfect light: and, for this reaſon they had, in all their temples, fire continually burning on altars, erected in them for that purpoſe. Before theſe ſacred fires they performed all their publications of devotion, as they likewiſe practiſed their private devotions before their private fires in their own houſes. Such were the tenets of this ſect, when Smerdis, who was the principal leader of it, having uſurped the crown after the death of Cambyſes, was ſlain by ſeven princes of Perſia; and many of the *Magians* who adhered to him ſhared likewiſe the ſame fate. In conſequence of this event thoſe who adopted the ſentiments of this ſect were called, by way of derſion, *Magians*, from *mist-guſt*, which ſignifies, in the language of the country then in uſe, *one that has his ears cropped*. The whole ſect of the *Magians* would ſoon have ſunk into utter extinction, if it had not in a few years after this period, been revived and reformed by Zoroaſter. This celebrated philoſopher, called by the Perſians Zerduſht or Zaratuſh, began about the thirty-ſixth year of the reign of Darius, to reſtore and reform the *Magian* ſyſtem of religion. He was not only excellently ſkilled in all the learning of the Eaſt, that prevailed in his time; but likewiſe thoroughly verſed in the Jewiſh religion, and in all the ſacred writings of the Old Teſtament that were then extant, whence ſome have inferred that he was a native Jew both by birth and profeſſion; and that he had been ſervant to one of the prophets, probably to Ezekiel or Daniel. He made his firſt appearance in Media, in the city of Xiz, now called Aderbijan, as ſome ſay; or according to others, in Echatana, now called Tauris. Inſtead of admitting the exiſtence of two firſt cauſes, with the *Magians*, he introduced a principle ſuperior to them both, one ſupreme God, who created both theſe, and out of theſe two produced, according to his ſovereign pleaſure, every thing elſe. See Iſaiah v. 5, 6, 7.

In order to avoid making God the author of all evil, he taught, that God originally created only light or good, and that darkneſs or evil followed it by conſequence, as the ſhadow doth the perſon. According to his doctrine there was one ſupreme Being independently, and ſelf-exiſting from all eternity: under him there were two angels, one the angel of light, the author and director of all good; and the other the angel of darkneſs, who is the author and director of all evil: theſe two, out of the mixture of light and darkneſs made all things that are; and they are in a ſtate of perpetual conflict; ſo that where the angel of light prevails, there the moſt is good, and where the angel of darkneſs prevails, there the moſt is evil: this ſtruggle ſhall continue to the end of the world; and then there ſhall be a general reſurrection, and a day of judgment; after which the angel of darkneſs and his diſciples ſhall go into a world of their own, where they ſhall ſuffer in everlaſting darkneſs the puniſhment of their evil deeds; and the angel of light and his diſciples ſhall go into a world of their own, where they ſhall receive, in everlaſting light, the reward due unto their good deeds: and henceforward they ſhall for ever remain ſeparate. Thoſe who remain of this ſect in Perſia and India, in the preſent day, retain the ſame doctrines. Zoroaſter alſo cauſed fire-temples to be erected wherever he came: for having feigned, that he was taken up into heaven, and there inſtructed in the doctrines he taught by God himſelf, out of the midſt of a great and moſt bright flame of fire, he taught his followers, that fire was the trueſt ſhechinah of the divine preſence; that the ſun being the moſt perfect fire, God had there the throne of his glory, and the reſidence of his divine preſence in a peculiar manner; and next to this in our elementary fire: and, therefore, he ordered them to direct all their worſhip to God, firſt towards the ſun, which they called Mithra, and next towards their ſacred fires: and when they came before theſe fires to worſhip, they always approached them on the weſt ſide, that having their faces towards them, and alſo towards the riſing ſun at the ſame time, they might direct their worſhip towards both. And in this poſture they always performed every act of their worſhip. Zoroaſter alſo pretended, that he brought ſome of the heavenly fire with him on his return, and placed it on the altar of the firſt fire-temple, which he erected at Xiz, in Media, whence it was propagated to all the reſt. And on this account, their prieſts carefully watch it, and never ſuffer it to be extinguiſhed.

Zoroaſter, having aſſumed the character of a divine prophet and reformer of religion, retired into a cave, devoting himſelf to prayer and meditation, where he compoſed the book called the Zend, in which his pretended revelations were contained. From Media he removed into Bactria; and he went alſo into India among the Brachmans, and having acquired all their knowledge in mathematics, philoſophy, and aſtronomy, returned and communicated the knowledge he had acquired to his *Magians*: and thus they became famous for their ſkill in theſe ſciences; ſo that a learned man and a *Magian* were equivalent terms. The vulgar conceived of them as perſons actuated and inſpired by ſupernatural powers; and hence thoſe who pretended to wicked and diabolical acts aſſumed the name of *Magians*; and the term magician acquired its evil meaning. However this diſtinguiſhed knowledge was confined to thoſe who were by way of eminence, the *Magi*, or the prieſts; who, like thoſe of the Jews, being of the ſame tribe, appropriated their learning to their own families. Theſe prieſts were diſtributed into three orders, viz. the inferior clergy, the ſuperintendants who governed them, and the archimagus, or high-prieſt: and their churches or temples were alſo of three ſorts, parochial or oratories; fire-temples, in which fire was kept continually burning on a ſacred altar; and the fire-temple in which the archimagus reſided. Zoroaſter at length carried his religious ſyſtem to the royal court of Suſa, and made Darius a proſelyte, together with moſt of the great men of the kingdom. Darius was ſo attached to the *Magian* ſyſtem, that he became an archimagus, and ordered, that among other titles, it ſhould be engraven on his monument, that he was *maſter of the Magians*. Hence the kings of Perſia were conſidered as pertaining to the ſacerdotal tribe, and were always initiated in the ſacred order of the *Magians*, before they took on them the crown, or were inaugurated into the kingdom.

Zoroaſter, after this ſucceſs, returned to Balch, in Bactria, where, according to his own inſtitution, he was obliged to reſide, as archimagus or head of the ſect, and there he reigned in ſpirituals, with the ſame authority, over the whole empire, as the king did in temporals: and from hence probably aroſe the miſtake of making him king of Bactria. Zoroaſter, at length, fell a ſacrifice to his zeal; for having concerted an enterprize againſt Argaſp, king of

of the oriental Scythians, who was a zealous Sabian, to draw him over to his religion; the Scythian prince invaded Bactria with an army, and slew Zoroaster, with all the priests of this patriarchal church, to the number of eighty persons, and demolished all the fire-temples in that province. This is said to have happened in the 258th year of Darius. Pythagoras derived a great part of his knowledge from Zoroaster, and his disciples the *Magians*. Prideaux's Conn. vol. i.

Their descendents, the modern *Magi*, or fire-worshippers, are divided into three classes; whereof the first, and most learned, neither eat nor kill animals; but adhere to the old institution of abstaining from living creatures. The *Magi* of the second class refrain only from tame animals; nor do the last kill all indifferently, it being the first and distinguishing settled notion of them all, *viz. μετεμψυχωσις εστιν, that there is a transmigration of souls.* See METEMPSYCHOSIS and GABRES.

MAGIC, MAGIA, Μαγεια, in its ancient sense, the science, or discipline and doctrine, of the *Magi*, or wise-men of Persia. See the preceding article.

MAGIC, in a more modern sense, is a science which teaches to perform wonderful and surprising effects.

The word *magic* originally carried with it a very innocent, nay, a very laudable, meaning; being used purely to signify the study of wisdom, and the more sublime parts of knowledge; but, in regard the ancient *Magi* engaged themselves in astrology, divination, sorcery, &c. the term *Magic*, in time, became odious, and was only used to signify an unlawful and diabolical kind of science, depending, as it was pretended, on the assistance of the devil, and departed souls.

If any wonder how so vain and deceitful a science should gain so much credit and authority over men's minds, Pliny gives the reason of it. It is, says he, because it has possessed itself of three sciences of the most esteem among men, taking from each all that is great and marvellous in it. Nobody doubts but it had its origin in medicine, and that it insinuated itself into the minds of people, under pretence of affording extraordinary remedies. To these fine promises is added every thing in religion that is pompous and splendid, and that appears calculated to blind and captivate mankind. And, lastly, it mingled judiciary astrology with the rest, persuading people, curious of futurity, that it saw every thing to come in the heavens. Agrippa divides *magic* into three kinds, *natural, celestial,* and *ceremonial*, or *superstitious*.

MAGIC *natural* is no more than the application of natural active causes to passive things or subjects; by means whereof many surprising, but yet natural effects are produced.

MAGIC *celestial* borders nearly on judiciary astrology; it attributes to spirits a kind of rule, or dominion, over the planets; and to the planets a dominion over men; and on these principles, builds a ridiculous kind of system.

MAGIC *superstitious*, or *goetic*, consists in the invocation of devils: its effects are usually evil and wicked, though very strange, and seemingly surpassing the powers of nature; they are supposed to be produced by virtue of some compact, either tacit or express, with evil spirits; but the truth is, these supposed compacts have not the power that is usually imagined; nor do they produce half those effects ordinarily ascribed to them.

MAGIC *lantern*, an optic machine contrived by Kircher: (See his Ars Magna Lucis et Umbræ, p. 768, 769), by means whereof little painted images are represented on an opposite wall of a dark room, magnified to any bigness at pleasure.

MAGIC *lantern, construction of the.* Suppose A B C D (*Tab. Optics, fig.* 10.) a common tin lantern, to which is added a tube to draw out F G. In H is fixed a metallic concave speculum, of a foot diameter at most, or four inches at least; or, in lieu thereof, near the extremity of the tube, there must be placed a convex lens, consisting of a segment of a small sphere, its diameter not exceeding a few inches. The use of this lens is to throw a strong light upon the image; and sometimes a concave speculum is used with the lens, in order to make the image still more vivid. In the focus of the concave speculum, or lens, is placed a lamp L; within the tube, where it is soldered to the side of the lantern, is placed a small lens, convex on both sides, being a portion of a small sphere, having its focus about the distance of three inches. The extreme part of the tube F M, is square, and has an aperture quite through, so as to receive an oblong frame N O, passed into it; in this frame are round holes, an inch or two in diameter. According to the bigness of these holes are drawn circles on a plain thin glass; and in these circles are painted any figures or images, at pleasure, with transparent water-colours. These images fitted into the frame, and placed inverted, at a little distance from the focus of the lens I, will be projected on an opposite white wall of a dark room, prodigiously magnified in all their colours, and in erect situation. By having the instrument so contrived, as that the lens I may move in a slide, the focus may be made and consequently the image appear distinct, at almost any distances.

Or thus:—Every thing being managed as in the former, into the sliding tube F G, insert another convex lens K, the segment of a sphere somewhat larger than I. Now, if the picture be brought nearer to I than the distance of the focus, diverging rays will be propagated, as if they proceeded from the object; wherefore, if the lens K be so placed, as that the object is very near its focus, the image will be exhibited on the wall, exceedingly magnified.

MAGIC *lantern, theory of the.* The lamp being placed in the focus of the concave speculum, or any convex glass, the rays will be propagated parallel to each other, and the image will be strongly illumined, and will therefore emit a great number of rays upon the lens I. But, being supposed to be placed near the lens I, the inverted image of the picture inverted must be formed on the opposite wall, exceedingly magnified, after its refraction through the lens; and it will be still the more magnified, as the lens is a segment of a less sphere, and as the picture is placed nearer the focus of the lens: in a dark place, therefore, the picture will be represented prodigiously large and extremely vivid.

To heighten the light, specula are preferred to lenses; the focus of a speculum being nearer than that of a lens. De Chales orders the diameter of the lens I to be two, four, or five digits, and in a subduple proportion to the other K; *i. e.* if I be five digits, K must be ten; and the diameter of the speculum, according to the same, is to be two digits. Zahnius chooses to have the diameter of I $\frac{1}{10}$ of a foot; and that of K one foot and $\frac{1}{2}$, &c.

Little animals being included in the *magic lantern*, in the manner observed in speaking of the microscope, or any little transparent objects fastened to a slice of talc or glass, and substituted instead of images, the *magic lantern* will become a microscope.

A view of the instrument itself may be seen in *fig.* 10, N° 2, in which *b h e* is the lens that throws the light of the candle or lamp *a* on the object *d e*, and *k l* is the lens that magnifies the image *f g* on the white wall F H in a dark room. It is plain, that if the tube *k u l m* be contracted, and the glass *d e* be brought nearer the object *d e*, the image *f g* will be enlarged; and hence this *lantern* has been called the *lanterna magiographica*. On the contrary, if the tube be protracted, the image of the object will be diminished.

M. Euler proposed a scheme to introduce vision by reflected light into the *magic lantern*, as well as the *solar* MICROSCOPE, by which many inconveniences to which those instruments are subject, might be avoided. For this purpose, he says, that nothing is necessary but a large concave mirror, perforated as for a telescope, and that the light be so situated, that none of it may pass directly through the perforation, so as to fall on the images of the objects upon the screen. He proposes to have four different machines for objects of different sizes; the first for those of six feet long, the second for those of one foot, the third for those of two inches, and the fourth for those of two lines. An idea of this contrivance is given in *Tab. III. Optics fig.* 42, in which O D represents the concave mirror, E the object, *l, l*, the lights, and A the lens, through which the rays are transmitted to the screen. Nov. Com. Petrop. vol iii. p. 303.

MAGIC *square*, a square figure, formed of a series of numbers, in mathematical proportion; so disposed in parallel and equal ranks, as that the sums of each row, taken either perpendicularly, horizontally, or diagonally, are equal.

The several numbers which compose any square number (for instance, 1, 2, 3, 4, 5, &c. to 25 inclusive, which compose the square number 25) being disposed after each other, in a square figure of 25 cells, each in its cell; if then you change the order of these numbers, and dispose them in the cells in such manner, as that the five numbers which fill an horizontal rank of cells, being added together, shall make the same sum with the five numbers in any other rank of cells, whether horizontal, or vertical, and even the same number with the five in each of the two diagonal ranks; this disposition of numbers is called a *magic square*; in opposition to the former disposition, which is called a *natural square*. See the figures following:

Natural square.

1	2	3	4	5
6	7	8	9	10
11	12	13	14	15
16	17	18	19	20
21	22	23	24	25

Magic square.

16	24	8	2	25
3	22	20	11	9
15	6	4	23	17
24	18	2	10	1
7	5	21	19	13

One

One would imagine, that these *magic squares* had that name given them, in regard this property of all their ranks, which, taken any way, make always the same sum, appeared extremely surprising, especially in certain ignorant ages, when mathematics passed for *magic*; but there is a great deal of reason to suspect, that these squares merited their name still farther, by the superstitious operations they were employed in, as the construction of talismans, &c. for, according to the childish philosophy of those days, which attributed virtues to numbers, what virtues might not be expected from numbers so wonderful?

However, what was at first the vain practice of makers of talismans and conjurers, has since become the subject of a serious research among mathematicians; not that they imagine it will lead them to any thing of solid use or advantage. *Magic squares* favour too much of their original to be of much use; but only as it is a kind of play, where the difficulty makes the merit, and it may chance to produce some new views of numbers, which mathematicians will not lose the occasion of.

Eman. Moschopulus, a Greek author of no great antiquity, is the first that appears to have spoken of *magic squares*: and, by the age wherein he lived, there is reason to imagine he did not look on them merely as a mathematician. However, he has left us some rules for their construction. In the treatise of Cor. Agrippa, to much accused of *magic*, we find the squares of seven, numbers, viz. from three to nine inclusive, disposed *magically*; and it must not be supposed, that those seven numbers were preferred to all the other without some very good reason: in effect, it is because their squares, according to the system of Agrippa, and his followers, are planetary. The square of 3, for instance, belongs to Saturn; that of 4 to Jupiter; that of 5 to Mars; that of 6, to the sun; that of 7 to Venus; that of 8, to Mercury; and that of 9, to the moon. M. Bachet applied himself to the study of *magic squares*, on the hint he had taken from the planetary squares of Agrippa, as being unacquainted with the work of Moschopulus, which is only in manuscript in the French king's library; and, without the assistance of any author, he found out a new method for those squares whose root is uneven; for instance, 25, 49, &c. but he could not make any thing of those whose root is even.

After him came M. Frenicle, who took the same subject in hand. A certain great algebraist was of opinion, that whereas the sixteen numbers which compose the square, might be disposed 20922789888000 different ways in a natural square (as from the rules of combination it is certain they may) they could not be disposed in a *magic figure* above sixteen different ways; but M. Frenicle showed, that they might be thus disposed 878 different ways: whence it appears how much his method exceeds the former, which only yielded the 55th part of *magic squares* of that of Mr. Frenicle.

To this inquiry he thought fit to add a difficulty, that had not yet been considered: the *magic squares*, of 7, for instance, being constructed, and its 49 cells filled, if the two horizontal ranks of cells, and, at the same time, the two vertical ones, the most remote from the middle, be retrenched, that is, if the whole border or circumference of the square be taken away, there will remain a square, whose root will be 5, and which will only consist of twenty-five cells. Now, it is not at all surprising, that the square should be no longer *magical*, because the ranks of the large ones were not intended to make the same sum, excepting when taken entire with all the seven numbers that fill their seven cells; so that being mutilated each of two cells, and having lost two of their numbers, it may be well expected, that their remainders will not any longer make the same sum. But M. Frenicle would not be satisfied, unless when the circumference or border of the *magic square* was taken away, and even any circumference at pleasure, or, in fine, several circumferences at once, the remaining square were still *magical*: which last condition, no doubt, made these *squares* vastly more magical than ever.

Again, he inverted that condition, and required that any circumference taken at pleasure, or even several circumferences, should be inseparable from the square; that is, that it should cease to be *magical* when they were removed, and yet continue *magical* after the removal of any of the rest. M. Frenicle, however, gives no general demonstration of his methods, and frequently seems to have no other guide but chance. It is true, his book was not published by himself, nor did it appear till after his death, viz. in 1693.

In 1703, M. Poignard, canon of Bruffels, published a treatise of sublime *magic squares*. Before him there had been no *magic squares* made but for feriefes of natural numbers that formed a square; but M. Poignard made two very considerable improvements. 1°, Instead of taking all the numbers that fill a square, for instance, the thirty-six fucceffive numbers, which would fill all the cells of a natural square, whofe fide is 6, he only takes as many fucceffive numbers as there are units in the fide of the fquare, which, in this cafe, are 6; and thefe fix numbers alone he difpofes in fuch manner, in the thirty-fix cells, that none of them are repeated twice in the fame rank, whether it be horizontal, vertical, or diagonal; whence it follows, that all the ranks, taken all the ways poffible, muft always make the fame fum, which M. Poignard calls repeated progreffion. 2°, Inftead of being confined to take thefe numbers according to the feries and fucceffion of the natural numbers, that is, in an arithmetical progreffion, he takes them likewife in a geometrical progreffion, and even in an harmonical progreffion. But with thefe two laft progreffions the *magic* muft neceffarily be different to what it was: in the fquares, filled with numbers in geometrical progreffion, it conſiſts in this, that the products of all the ranks are equal; and, in the harmonical progreffion, the numbers of all the ranks continually follow that progreffion: he makes fquares of each of thefe three progreffions repeated.

This book of M. Poignard gave occafion to M. De la Hire to return his thoughts the fame way, which he did with fuch fuccefs, that he feems to have well-nigh completed the theory of *magic fquares*. He firft conſiders uneven *fquares*: all his predeceffors on the fubject having found the conſtruction of even ones by much the moſt difficult; for which reafon M. De la Hire reſerves thofe for the laſt. This exceſs of difficulty may arife partly from hence, that the numbers are taken in arithmetical progreffion. Now in that progreffion, if the number of terms be uneven, that in the middle has fome properties, which may be of ſervice; for inſtance, being multiplied by the number of terms in the progreffion, the product is equal to the ſum of all the terms.

M. De la Hire propoſes a general method for uneven fquares, which has fome affinitude with the theory of compound motions, ſo uſeful and fertile in mechanics. As that conſiſts in decompounding motions, and reſolving them into others more ſimple; ſo does M. De la Hire's method conſiſt in reſolving the fquare that is to be conſtructed into two ſimple and primitive fquares. It muſt be owned, however, it is not quite ſo eaſy to conceive thoſe two ſimple and primitive fquares in the compound or perfect fquare, as in an oblique motion to imagine a parallel and perpendicular one.

Suppoſe a fquare of cells, whoſe root is uneven, for inſtance 7; and that its forty-nine cells are to be filled magically with numbers, for inſtance, the firſt 7. M. De la Hire, on the one ſide, takes the firſt ſeven numbers, beginning with unity, and ending with the root 7; and on the other 7, and all its multiples to 49, exclufively; and as thefe only make ſix numbers, he adds 0, which makes this an arithmetical progreſſion of ſeven terms, as well as the other; 0. 7. 14. 21. 28. 35. 42. This done, with as the firſt progreſſion repeated, he fills the ſquare of the root 7 magically: in order to this, he writes in the firſt ſeven cells of the firſt horizontal rank, the ſeven numbers propoſed, in what order he pleaſes, for that is abſolutely indifferent; and it is proper to obſerve here, that thoſe ſeven numbers may be ranged in 5040 different manners in the ſame rank. The order in which they are placed in the firſt horizontal rank, be it what it will, is that which determines their order in all the reſt. For the ſecond horizontal rank, he places in its firſt cell, either the third, the fourth, the fifth, or the ſixth number, from the firſt number of the firſt rank; and after that writes the ſix others in order as they follow. For the third horizontal rank, he obſerves the ſame method with regard to the ſecond, that he obſerved in the ſecond with regard to the firſt, and ſo of the reſt. For inſtance, ſuppoſe the firſt horizontal rank filled with the ſeven numbers in their natural order, 1, 2, 3, 4, 5, 6, 7; the ſecond horizontal rank may either commence with 3, with 4, with 5, or with 6: but in this inſtance it commences with 3; the third rank therefore muſt commence with 5; the fourth with 7, the fifth with 2, the ſixth with 4, and the ſeventh with 6. The commencement of the ranks which follow the firſt being thus determined, the other numbers as we have already obſerved, muſt be written down in the order wherein they ſtand in the firſt, going on to 5, 6, and 7 and returning to 1, 2, &c. All every number in the firſt rank be found in every rank underneath, according to the order arbitrarily pitched upon at firſt. By this means it is evident, that no number whatever can be repeated twice in the ſame rank; and by conſequence, that the

1	3	5	4	2	6	7
3	4	5	6	7	1	2
5	6	7	1	2	3	4
7	1	2	3	4	5	6
2	3	4	5	6	7	1
4	5	6	7	1	2	3
6	7	1	2	3	4	5

seven numbers 1, 2, 3, 4, 5, 6, 7, being in each rank, muſt of neceſſity make the ſame ſum.

It appears, from this example, that the arrangement of the numbers in the firſt rank being choſen at pleaſure, the other ranks may be continued in four different manners: and ſince the firſt rank may have 5040 different arrangements, there are no leſs than 20160 different manners of conſtructing the *magic ſquare* of ſeven numbers repeated.

1	2	3	4	5	6	7
2	3	4	5	6	7	1
3	4	5	6	7	1	2
4	5	6	7	1	2	3
5	6	7	1	2	3	4
6	7	1	2	3	4	5
7	1	2	3	4	5	6

1	2	3	4	5	6	7
7	1	2	3	4	5	6
6	7	1	2	3	4	5
5	6	7	1	2	3	4
4	5	6	7	1	2	3
3	4	5	6	7	1	2
2	3	4	5	6	7	1

The order of the numbers in the firſt rank being determined; if in beginning with the ſecond rank, the ſecond number 2, or the laſt number 7, ſhould be pitched upon, in one of thoſe caſes and repeated; and, in the other caſe, the other diagonal would be falſe, unleſs the number repeated ſeven times ſhould happen to be 4; for four times ſeven is equal to the ſum of 1, 2, 3, 4, 5, 6, 7: and, in general, in every ſquare conſiſting of an unequal number of terms, in arithmetical progreſſion, one of the diagonals would be falſe according to thoſe two conſtructions, unleſs the term always repeated in that diagonal, were the middle term of the progreſſion.

It is not, however, at all neceſſary to take the terms in an arithmetical progreſſion; for, according to this method, one may conſtruct a *magic ſquare* of any numbers at pleaſure, whether they be according to any certain progreſſion, or not. If they be in an arithmetical progreſſion, it will be proper, out of the general method, to except thoſe two conſtructions, which produce a continual repetition of the ſame term, in one of the two diagonals; and only to take in the caſe, wherein that repetition would prevent the diagonal from being juſt: which caſe being abſolutely diſcarded, when we computed, that the ſquare of 7 might have 20160 different conſtructions; it is evident, that by taking that caſe in, it muſt have vaſtly more.

To begin the ſecond rank with any other number beſides the ſecond and the laſt, muſt not, however, be looked on as an univerſal rule: it holds good for the ſquare of 7; but if the ſquare of 9, for inſtance, were to be conſtructed, and the fourth figure of the firſt horizontal rank were pitched on for the firſt of the ſecond, the conſequence would be, that the fifth and eighth horizontal ranks would likewiſe commence with the ſame number, which would therefore be repeated three times in the ſame vertical rank, and occaſion other repetitions in all the reſt. The general rule, therefore, muſt be conceived thus: let the number in the firſt rank pitched on, for the commencement of the ſecond, have ſuch an exponent of its quota, that is, let the order of its place be ſuch, as that if an unit be taken from it, the remainder will not be any juſt quota part of the root of the ſquare; that is cannot divide it equally. If for example, in the ſquare of 7, the third number of the firſt horizontal rank be pitched on for the firſt of the ſecond, ſuch conſtruction will be juſt; becauſe the exponent of the place of that number, viz. 3, ſubtracting 1, that is, 2 cannot divide 7. Thus alſo reckon the fourth number of the ſame firſt rank be choſen, becauſe 4—1, viz. 3, cannot divide 7; and, for the ſame reaſon, the fifth or ſixth number might be taken: but in the ſquare of 9, the fourth number of the firſt rank muſt not be taken, becauſe 4—1, viz. 3, does divide 9. The reaſon of this rule will appear very evidently, by conſidering in what manner the returns of the ſame numbers do or do not happen, taking them always in the ſame manner in any given ſeries. And hence it follows, that the fewer diviſions the root of any ſquare to be conſtructed has, the more different manners of conſtructing it there are; and that the prime numbers, i. e. thoſe which have no diviſions, as 3, 5, 7, 11, 13, &c. are thoſe whoſe ſquares will admit of the moſt variations in proportion to their quantities.

The ſquares conſtructed, according to this method, have ſome particular properties not required in the problem; for the numbers that compoſe any rank parallel to one of the two diagonals, are ranged in the ſame order with the numbers that compoſe the diagonal, to which they are parallel. And as any rank parallel to a diagonal, muſt neceſſarily be ſhorter, and have fewer cells, than the diagonal itſelf, by adding to it the correſpondent parallel, which has the number of cells by which the other falls ſhort of the diagonal, the numbers of thoſe two parallels, placed, as it were, end to end, muſt follow the ſame order with thoſe of the diagonal: beſides, that their ſums are likewiſe equal; ſo that they are magical on another account.

Inſtead of the ſquares, which we have hitherto formed by horizontal ranks, one might alſo form them by vertical ones: the caſe is the ſame in both.

All we have hitherto ſaid regards only the firſt primitive ſquare, whoſe numbers, in the propoſed example, were 1, 2, 3, 4, 5, 6, 7: here ſtill remains the ſecond primitive, whoſe numbers are 0, 7,

Firſt Primitive.

1	2	3	4	5	6	7
3	4	5	6	7	1	2
5	6	7	1	2	3	4
7	1	2	3	4	5	6
2	3	4	5	6	7	1
4	5	6	7	1	2	3
6	7	1	2	3	4	5

14, 21, 28, 35, 42. M. de la Hire proceeds in the ſame manner here as in the former; and this may likewiſe be conſtructed in 20160 different manners, as containing the ſame number of terms with the firſt. Its conſtruction being made, and of conſequence all its ranks making the ſame ſum, it is evident, that if we bring the two into one, by adding together the numbers of the two correſponding cells of the two ſquares, that is, the two numbers of the firſt of each, the two numbers of the ſecond, of the third, &c. and diſpoſe them in the forty-nine correſponding cells of a third ſquare; it will likewiſe be *magical*, in regard to its rank, formed by the addition of equal ſums to equal ſums, which muſt of neceſſity be equal among themſelves. All that remains in doubt is, whether or no, by the addition of the correſponding cells of the two firſt ſquares, all the cells of the third will be filled in ſuch manner, as that each not only contains one of the numbers of the progreſſion from 1 to 49, but alſo that this number be different from any of the reſt, which is the end and deſign of the whole operation.

Second Primitive.

0	7	14	21	28	35	42
21	28	35	42	0	7	14
42	0	7	14	21	28	35
14	21	28	35	42	0	7
35	42	0	7	14	21	28
7	14	21	28	35	42	0
28	35	42	0	7	14	21

As to this it muſt be obſerved, that if in the conſtruction of the ſecond *primitive ſquare*, care has been taken in the commencement of the ſecond horizontal rank, to obſerve an order with regard to the firſt, different from what was obſerved in the conſtruction of the firſt ſquare; for inſtance, if the ſecond rank of the firſt ſquare began with the third term of the firſt rank, and the ſecond rank of the ſecond ſquare commence with the fourth of the firſt rank, as in the example it actually does; each number of the firſt ſquare may be combined once, and only once, by addition with all the numbers of the ſecond. And as the numbers of the firſt are here 1, 2, 3, 4, 5, 6, 7, and thoſe of the ſecond 0, 7, 14, 21, 28, 35, 42, by combining them in this manner, we have all the numbers in the progreſſion from 1 to 49, without having any of them repeated, which is the *perfect magic ſquare* propoſed.

Perfect Square.

1	9	17	25	33	41	42
22	30	38	46	5	13	21
43	2	10	18	26	34	35
14	23	31	39	47	6	7
36	44	3	11	19	27	28
8	16	24	32	40	48	29
49	27	35	36	45	4	12

The neceſſity of conſtructing the two *primitive ſquares* in a different manner, does not at all hinder but that each of the 20160 conſtructions of the one may be combined with all the 20160 conſtructions of the other: of conſequence, therefore 20160 multiplied by itſelf, which makes 406425600, is the number of different conſtructions that may be made of the *perfect ſquare*, which here conſiſts of the 49 numbers of the natural progreſſion. But as we have already obſerved, that a *primitive ſquare* of ſeven numbers repeated may have above 20160 ſeveral conſtructions, the number 406425600 will come vaſtly ſhort of expreſſing all the poſſible conſtructions of a perfect *magic ſquare* of the 49 firſt numbers.

As to the *even ſquares*, he conſtructs them like the uneven ones, by two *primitive ſquares*; but the conſtruction of *primitives* is different in general, and may be ſo a great number of ways: and thoſe general differences admit of a great number of particular variations, which give as many different conſtructions of the ſame even ſquare. It ſcarce ſeems poſſible to determine exactly, either how many general differences there may be between the conſtruction of the primitive ſquares of an even ſquare, and an uneven one; nor how many particular variations each general difference may admit of: and, of conſequence, we are ſtill *fat* from being able to determine the number of different conſtructions of all thoſe that may be made by the primitive ſquares.

See the Memoirs of the Royal Academy of Sciences, for 1705 and 1710, where this ſubject is almoſt exhauſted by M. de la Hire and M. Sauveur. See alſo Saunderſon's Algebra, vol. 2. p. 354, &c.

The ingenious Dr. Franklin ſeems to have carried this

curious speculation farther than any of his predeceſſors in the ſame way. He has conſtructed not only a *magic* ſquare of ſquares, but likewiſe a *magic* circle of circles, of which we ſhall give ſome account for the amuſement of our readers. The *magic* ſquare of ſquares is formed by dividing the great ſquare, as *Tab.* III. *Analyſis, fig.* 64. The great ſquare is divided into 256 ſmall ſquares, in which all the numbers from 1 to 256 are placed, in 16 columns, which may be taken either horizontally or vertically. The properties are as follow:

1. The ſum of the ſixteen numbers in each column, vertical and horizontal, is 2056.

2. Every half column, vertical and horizontal, makes 1028, or half of 2056.

3. Half a diagonal aſcending, added to half a diagonal deſcending, makes 2056; taking theſe half diagonals from the ends of any ſide of the ſquare to the middle thereof; and ſo reckoning them either upward, or downward; or ſidewiſe from left to right hand, or from right to left.

4. The ſame with all the parallels to the half diagonals, as many as can be drawn in the great ſquare: for any two of them being directed upward and downward, from the place where they begin to that where they end, their ſums will make 2056. The ſame downward and upward in like manner: or all the ſame if taken ſideways to the middle, and back to the ſame ſide again.

N. B. One ſet of theſe half diagonals and their parallels, is drawn in the ſame ſquare upward and downward. Another ſuch ſet may be drawn from any of the other three ſides.

5. The four corner numbers in the great ſquare added to the four central numbers therein, make 1028; equal to the half ſum of any vertical or horizontal column, which contains 16 numbers; and equal to half a diagonal or its parallel.

6. If a ſquare hole (equal in breadth to four of the little ſquares) be cut in a paper, through which any of the ſixteen little ſquares in the great ſquare may be ſeen, and the paper be laid on the great ſquare; the ſum of all the 16 numbers, ſeen through the hole, is equal to the ſum of the ſixteen numbers in any horizontal or vertical column, viz. to 2056.

The *magic* circle of circles, *fig.* 65. is compoſed of a ſeries of numbers, from 1 to 75 inclufive, divided into eight concentric circular ſpaces, and ranged in eight radii of numbers, with the number 12 in the center; which number, like the center, is common to all theſe circular ſpaces, and to all the radii.

The numbers are ſo placed, that the ſum of all thoſe in either of the concentric circular ſpaces above mentioned, together with the central number 12, make 360; equal to the number of degrees in a circle.

The numbers in each radius alſo, together with the central number 12, make juſt 360.

The numbers in half of any of the above circular ſpaces, taken either above or below the double horizontal line, with half the central number 12, make 180; equal to the number of degrees in a ſemicircle.

If any four adjoining numbers be taken, as if in a ſquare, in the radial diviſions of theſe circular ſpaces; the ſum of theſe, with half the central number, make 180.

There are, moreover, included four ſets of other circular ſpaces, bounded by circles which are excentric with reſpect to the common center; each of theſe ſets containing five ſpaces. The centers of the circles which bound them are at A, B, C, and D. The ſet whoſe center is at A is bounded by dotted lines; the ſet whoſe center is at C is bounded by lines of ſhort unconnected ſtrokes, and the ſet round D is bounded by lines of unconnected longer ſtrokes, to diſtinguiſh them from one another. In drawing this figure by hand, the ſet of concentric circles ſhould be drawn with black ink; and the four different ſets of excentric circles with four kinds of ink of different colours; as blue, red, yellow, and green, for diſtinguiſhing them readily from one another.

Theſe ſets of excentric circular ſpaces interſect thoſe of the concentric, and each other: and yet, the numbers contained in each of the excentric ſpaces, taken all around through any of the 20, which are excentric, make the ſame ſum as thoſe in the concentric; namely 360, when the central number 12 is added. Their halves alſo, taken above or below the double horizontal line, with half the central number, make 180.

Obſerve, that there is not one of the numbers but what belongs at leaſt to two of the circular ſpaces; ſome to three, ſome to four, ſome to five: and yet they are all ſo placed, as never to break the required number 360, in any of the 28 circular ſpaces within the primitive circle.

To bring theſe matters in view, all the numbers as above mentioned are taken out: and placed in ſeparate columns, as they ſtand around both the concentric and excentric circular ſpaces, always beginning with the outermoſt and ending with the innermoſt of each ſet; and alſo the numbers as they ſtand in the eight radii, from the circumference to the center: the common central number 12 being placed the loweſt in each column.

1. In the eight concentric circular ſpaces.

14	72	23	65	21	67	12	74
25	63	16	70	18	68	27	61
30	56	39	49	37	51	28	58
41	47	32	54	34	52	43	45
40	40	55	33	53	35	44	42
57	31	48	38	50	36	59	29
62	24	71	17	69	19	60	26
73	15	64	22	66	20	75	13
12	12	12	12	12	12	12	12
360	360	360	360	360	360	360	360

2. In the eight radii.

14	25	30	41	40	57	62	73
72	63	56	47	40	31	24	15
23	16	39	32	55	48	71	64
65	70	49	54	33	38	17	22
31	18	37	34	53	50	69	66
67	68	51	52	35	36	19	20
12	27	28	43	44	59	60	75
74	61	58	45	42	29	26	13
12	12	12	12	12	12	12	12
360	360	360	360	360	360	360	360

3. In the five excentric circular ſpaces whoſe center is at A.

14	72	23	65	21	
63	16	70	18	68	
39	49	37	51	28	
54	34	52	43	45	
33	53	35	44	42	
26	38	50	36	59	
24	71	17	69	19	
73	15	64	22	66	
12	12	12	12	12	
360	360	360	360	360	

4. In the five excentric circular ſpaces whoſe center is at B.

30	56	39	49	37	
47	32	54	34	52	
55	33	53	35	44	
38	50	36	59	29	
17	69	19	60	26	
64	22	66	20	75	
72	23	65	21	67	
25	63	16	70	18	
12	12	12	12	12	
360	360	360	360	360	

5. In the five excentric circular ſpaces whoſe center is at C.

40	40	55	33	53	
31	48	38	50	36	
71	17	69	19	60	
22	66	20	75	13	
65	21	67	12	74	
16	70	18	68	27	
56	39	49	37	51	
41	47	32	54	34	
12	12	12	12	12	
360	360	360	360	360	

6. In the five excentric circular ſpaces whoſe center is at D.

62	24	71	17	69	
15	64	22	66	20	
23	65	21	67	12	
70	18	68	27	61	
49	37	51	28	58	
32	54	34	52	43	
40	55	33	53	35	
57	31	48	38	50	
12	12	12	12	12	
360	360	360	360	360	

If now, we take any four numbers, as in a ſquare form, either from N° 1. N° 2. (as ſuppoſe from N° 1.) as in the margin; and add half the central number 12 to them, the ſum will be 180; equal to half the numbers in any circular ſpace, taken above or below the double horizontal line; and equal to the number of degrees in a ſemicircle. Thus, 14, 72, 25, 63, and 6, make 180. See Franklin's Eſſays and Obſ. p. 350, &c. edit. 4to. 1769; or Ferguſon's Tables and Tracts, 1771, p. 318, &c.

14	72
25	63
	6

MAGICAL *picture*, in *Electricity*, was firſt contrived by Mr. Kinnerſley, and is thus made: having a large metzotinto with a frame and glaſs, e. gr. of the king, take out the print, and cut a pannel out of it, near two inches diſtant from the frame all round; with thin paſte or gum-water, fix the border that is cut off on the inſide of the glaſs, preſſing it ſmooth and cloſe: then fill up the vacancy by gilding the glaſs well with leaf gold, or braſs. Gild likewiſe the inner edge of the back of the frame all round,

round, except the top part, and form a communication between that gilding and the gilding behind the glass; then put in the board, and that side is finished. Turn up the glass, and gild the foreside exactly over the back gilding, and when it is dry, cover it, by passing on the pannel of the picture that hath been cut out, observing to bring the correspondent parts of the border and picture together, by which means the picture will appear of a piece, as at first, only part behind the glass and part before. Hold the picture horizontally by the top, and place a little moveable gilt crown on the king's head. If now the picture be moderately electrified, and another person takes hold of the frame with one hand, so that his fingers touch its inside gilding, and with the other hand endeavour to take off the crown, he will receive a terrible blow, and fail in the attempt. If the picture were highly charged, the consequence might be as fatal as that of high treason. The operator, who holds the picture by the upper end, where the inside of the frame is not gilt, to prevent its falling, feels nothing of the shock, and may touch the face of the picture without danger. If a ring of persons take the shock among them, the experiment is called the conspirators. Franklin's Exp. and Obf. p. 30.

MAGICIAN, is one who practifes the art of MAGIC. See DIVINATION and SORCERY.

The ancient *magicians* pretended to extraordinary powers of interpreting dreams, foretelling future events, and accomplifhing many wonderful things, by their fuperior knowledge of the fecret powers of nature, of the virtues of plants and minerals, and of the motions and influences of the ftars. And as the art of magic among the pagan nations was founded in this fyftem of theology, and the *magi* who firft exercifed it were the priefts of the gods, they pretended to derive thefe extraordinary powers from the affiftance of the gods; which affiftance they fought by a great variety of rites and facrifices, adapted to their refpective natures, by the ufe of charms and fuperftitious words, and alfo by ceremonies and fupplications: they pretended likewife, in the proper ufe of their art, to a power of compelling the gods to execute their defires and commands. A late excellent writer has fhewn, that the fcripture brands all thefe powers as a fhameleſs impofture, and reproaches thofe who aſſumed them with an utter inability of difcovering or accomplifhing any thing fupernatural. See Ifaiah xlvii. 11, 12, 13. chap. viii. 18, 19. chap. xii. 23, 24. chap. xliv. 25. Jerom. x. 2, 3, 8, 14. chap. xiv. 14. chap. xxvii. 9, 10. chap. l. 36. Pf. xxi. 6. Jonah ii. 8. Nevertheleſs many of the Chriſtian fathers, as well as fome of the heathen philofophers, aſcribed the efficacy of *magic* to evil DEMONS: and it was a very prevailing opinion in the primitive church, that *magicians* and necromancers, both among the Gentiles and heretical Chriſtians, had each their particular demons, perpetually attending on their perſons, and obſequious to their commands, by whofe help they could call up the ſouls of the dead, foretel future events, and perform miracles. In ſupport of this opinion, it has been alledged, that the names by which the ſeveral ſorts of diviners are deſcribed in ſcripture, imply a communication with ſpiritual beings; that the laws of Moſes (Exod. xxii. 18. Lev. xix. 26, 31. chap. xx. 27. Deut. xviii. 10, 11.) againſt divination and witchcraft, prove the efficacy of theſe arts, though in reality they prove nothing more than their execrable wickedneſs and impiety; and that pretenſions to divination could not have ſupported their credit in all the heathen nations and through all ages, if ſome inſtances of true divination had not occurred. But the ſtrongeſt argument is derived from the ſcripture hiſtory of the *Egyptian magicians* who oppoſed Moſes. With regard to the works performed by theſe *magicians*, ſome have ſuppoſed that God himſelf empowered them to perform true miracles, and gave them an unexpected ſucceſs; but the hiſtory expreſsly aſcribes the effects they produced, not to God, but to their own inchantments. Others imagine, that the devil aſſiſted the *magicians* not in performing true miracles, but in deceiving the ſenſes of the ſpectators, or in preſenting before them deluſive appearances of true miracles: againſt which opinion it has been urged that it tends to diſparage the credit of the works of Moſes. The moſt common opinion ſince the time of St. Auſtin, has been, that they were not only performed by the power of the devil, but were genuine miracles, and real imitations of thoſe of Moſes. In a late elaborate inquiry into the true ſenſe and deſign of this part of ſcripture hiſtory, it has been ſhewn, that the names given to the *magicians*, ſeem to expreſs their profeſſion, their affectation of ſuperior knowlege, and their pretences both to explain and effect ſigns and wonders, by obſerving the rules of their art; and therefore, that they are the perſons, whoſe ability of diſcovering or effecting any thing ſupernatural the ſcripture expreſly denies. The learned author farther inveſtigates the deſign, for which Pharaoh employed them on this occaſion; which, he apprehends, was to learn from them, whether the ſign given by Moſes was truly ſupernatural, or only ſuch as their art was able to accompliſh. Accordingly it is obſerved, that they did not undertake to outdo Moſes, or to control him, by ſuperior or oppoſite arts of power, but merely to imitate him, or to do the ſame works with his, with a view of invalidating the argument which he drew from his miracles, in ſupport of the ſole divinity of Jehovah, and of his own miſſion. The queſtion on this occaſion was not, are the gods of Egypt ſuperior to the God of Iſrael, or can any evil ſpirits perform greater miracles than thoſe which Moſes performed by the aſſiſtance of Jehovah? but the queſtion was, are the works of Moſes proper proofs, that the God of Iſrael is Jehovah, the only ſovereign of nature, and conſequently that Moſes acts by his commiſſion; or, are they merely the wonders of nature, and the effects of magic? In this light Philo, de Vita Moſis, lib. i. p. 616, and Joſephus, Antiq. Jud. lib. ii. cap. 13. place the ſubject. Moreover, it appears from the principles and conduct of Moſes, that he could not allow the *magicians* to have performed real miracles: becauſe the ſcripture repreſents the whole body of *magicians* as impoſtors; the ſacred writers, Moſes in particular, deſcribe all the heathen deities, in the belief of whoſe exiſtence and influence the magic art was founded, as unſupported by any inviſible ſpirits, and merely impotent and fenſeleſs: the religion of Moſes was built on the unity and ſole dominion of God, and the ſole divinity of Jehovah was the point which Moſes was now about to eſtabliſh, in direct oppoſition to the principles of idolatry; ſo that if he had allowed that the heathen idols, or any evil ſpirits ſupporting their cauſe, enabled the *magicians* to turn rods into ſerpents, and water into blood, and to create frogs, he would have contradicted the great deſign of his miſſion, and overthrown the whole fabric of his religion: beſides, Moſes appropriates all miracles to God, and urges his own, both in general and ſeparately, as an abſolute and authentic proof, both of the ſole divinity of Jehovah, and of his own miſſion; which he could not juſtly have done, if his oppoſers performed miracles, and even the ſame with his. On the other hand, it has been urged, that Moſes deſcribes the works of the *magicians* in the very ſame language he does his own. Exod. vii. 11, 12. chap. v. 22. chap. viii. 7. and hence it is concluded, that they were equally miraculous. To this objection it is replied, that it is common to ſpeak of profeſſed jugglers, as doing what they pretend and appear to do; but that Moſes does not affirm, that there was a perfect conformity between his works and thoſe of the *magicians*, but they did *ſo*, or in like manner, uſing a word which expreſſes merely a general ſimilitude; and he expreſſly refers all they did, or attempted in imitation of himſelf, not to the invocation or power of demons, or of any ſuperior beings, but to human artifice and impoſture. The original words tranſlated *inchantments*, Exod. vii. 11. 22. and chap. viii. 7, 18. import deception and concealment, and ought to have been rendered, *ſecret ſlights* or *jugglings*. Our learned writer farther ſhews, that the works performed by the *magicians* did not exceed the cauſe, or human artifice, to which they are aſcribed. Farmer's Diſſ. on Miracles, 1771, chap. 3. ſ. 3. chap. 4. ſ. 1.

MAGISTER, MASTER, a title frequently found in old writings; noting the perſon who bore it to have attained ſome degree of eminence *in ſcientia aliqua, præſertim in literaria*.

In old times, thoſe we now call *doctors*, were called *magiſtri*, or *maſters*.

MAGISTERY, MAGISTERIUM, in *Chemiſtry*, is a name given to almoſt all precipitates; ſo that *magiſtery* and precipitate are almoſt ſynonymous: but the term has been lately applied to ſome particular precipitates, which are uſed in medicine and the arts. Such are the *magiſteries* of biſmuth, coral, crabs-eyes, ſulphur, &c.

MAGISTERY *of biſmuth*, is a fine powder, made by diſſolving biſmuth in ſpirit of nitre, and pouring on it a large quantity of clear water, which precipitates the *magiſtery* to the bottom.

This is chiefly uſed in the compoſition of white paint for the ladies: it is preferred to all other whites on account of its ſuperior beauty, luſtre, and almoſt inſenſible tint of carnation, which renders it more ſimilar to the fineſt and whiteſt ſkin; but the ſkin will be conſiderably injured by a continued uſe of it. See BISMUTH.

MAGISTERY *of coral*, &c. Coral, crabs-eyes, pearl, ſhells, chalk, and other ſubſtances of that kind, are all abſorbent and calcareous earths, eaſily ſoluble in nitrous acid. If the ſolutions of theſe matters are precipitated by a fixed alkali, and afterwards well waſhed, they acquire the name of *magiſtery*, together with that of the ſubſtance which has been diſſolved and precipitated.

MAGISTERY *of lead*. See LEAD.

MAGISTERY is alſo uſed in ſpeaking of reſins, or the reſi-

nous

roots extracts of scammony, jalap, turbith, &c. which are made by drawing a tincture from the matter in spirit of wine, and precipitating it with water.

Mr. Boyle takes the proper notion of a *magistery* to consist in a preparation of a body, whereby it is wholly, or in part, reduced into a finer consistence, by means of some extraneous *adjutament*, converted into a body of a different kind: as when iron or copper is turned into crystals of Mars and Venus.

MAGISTRATE, is the name of any public officer or ruler, to whom the executive power of the law is committed, either wholly or in part. Of *magistrates*, some are supreme, in whom the sovereign power of the state resides; others are subordinate, deriving all their authority from the supreme *magistrate*, accountable to him for their conduct, and acting in an inferior secondary sphere. See KING, SHERIFF, JUSTICE, &c.

MAGMA, *Marc*, among *Chymists*, &c. the dregs or recrement of a composition, remaining after all the more fluid parts are expressed.

It is a word used by medical writers on many occasions, sometimes in a very lax, and sometimes in a more appropriated sense. Some writers use it to express a mass of any thing; others for a thick ointment made up with very little fluid matter to prevent its running; and others for the remains of an ointment after expression from its ingredients. Galen restrains the word *magma* to express only the feces of mitobalans.

MAGNA *arteria*. See AORTA.

MAGNA *assisa elisenda*, a writ directed to the sheriff to summon four lawful knights before the justices of assise, there, upon their oaths, to choose twelve knights of the vicinage, &c. to pass upon the *great assise* between A. B. plaintiff, and C. D. defendant, &c. See ASSISE.

MAGNA *Charta*, the *great charter* of liberties of England, granted in the ninth year of Henry the Third, and confirmed by Edward the First.

The reason of it's being termed *Magna*, or *great*, is either because of the excellency of the laws and liberties therein contained; or because there was another charter, called *Charta de Foresta*, established with it, which was the less of the two; or else because it contained more than any other charters; or in regard of the wars and troubles in the obtaining of it; or of a great and remarkable solemnity in the denouncing excommunications against the infringers of it.

Magna Charta may be said to derive its origin from king Edward the Confessor, who granted divers liberties and privileges, both civil and ecclesiastical, by charter: the same, with some others, were also granted and confirmed by king Henry I. by a celebrated great charter, now lost. His successors king Stephen, king Henry II. and king John, confirmed or re-enacted the same; but the last prince violating his charter, the barons took up arms, and his reign ended in blood. Henry III. who succeeded him, after having procured an inquisition to be made by twelve men in each county, what the liberties of England were in the time of Henry I. confirmed, with some alterations, the charter, obtained sword in hand from king John, in 1215, being the present *Magna Charta*; which he several times confirmed, and as often broke again; till, in the thirty-seventh year of his reign, he came to Westminster-hall; where, in the presence of the nobility and bishops, with lighted candles in their hands, *Magna Charta* was read, the king all the while laying his hand on his breast, and at last solemnly swearing faithfully and inviolably to observe all the things therein contained, as he was a man, a Christian, a soldier, and a king. Then the bishops extinguished their candles, throwing them on the ground, crying, Thus let him be extinguished and blak in hell who violates this charter.

Nevertheless, king Henry in the next year invaded the rights of his people, till the barons levied war against him; and, after various success, he confirmed this charter and the charter of the forest, in the parliament of Marlebridge, and in the fifty-second year of his reign. Afterwards, by the statute 25 Edw. I. called *confirmatio cartarum*, whereby the great charter is directed to be allowed as the common law, all judgments contrary to it are declared void; copies of it are ordered to be sent to all cathedral churches, and read twice a year to the people; and sentence of excommunication is directed to be as constantly denounced against all those that, by word, deed, or counsel, act contrary thereto, or in any degree infringe it. Sir Edward Coke observes, that it was confirmed no less than thirty-two times, from the fifth Edward to Henry IV. Then, after a long interval, by the *petition of* RIGHT, by many salutary laws, particularly the HABEAS *corpus act* of Charles II. by the *bill of* RIGHTS, and lastly by the *act of* SETTLEMENT.

The *Magna Charta* is the basis of the English laws and liberties: besides those provisions, which redressed many grievances incident to feodal tenures, care was also taken therein to protect the subject against other oppressions, frequently arising from unreasonable amercements, from illegal distresses or other process for debts or services due to the crown, and from the tyrannical abuse of the prerogative of purveyance, and pre-emption. It fixed the forfeiture of lands for felony in the same manner as it still remains; prohibited for the future the grants of exclusive fisheries, and the erections of new bridges so as to oppress the neighbourhood. With respect to private rights, it established the testamentary power of the subject over part of his personal estate, the rest being distributed among his wife and children: it laid down the law of dower, as it hath continued ever since; and prohibited the appeals of women, unless for the death of their husbands. In matters of public police and national concern: it enjoined an uniformity of weights and measures; gave new encouragement to commerce, by the protection of merchant-strangers; and forbad the alienation of lands in mortmain. With regard to the administration of justice: besides prohibiting all denials or delays of it, it fixed the court of Common Pleas at Westminster, that the suitors might no longer be harassed with following the king's person in all his progresses; and at the same time brought the trials of issues home to the very doors of the freeholders, by directing assizes to be taken in the proper counties, and establishing annual circuits; it also corrected some abuses then incident to the trials by wager of law and of battle; directed the regular awarding of inquests for life or member; prohibited the king's inferior ministers from holding pleas of the crown, or trying any criminal charge, whereby many forfeitures might otherwise have unjustly accrued to the Exchequer; and regulated the time and place of holding the inferior tribunals of justice, the county-court, sheriff's turn and court-leet. It confirmed and established the liberties of the city of London, and all other cities, boroughs, towns, and ports of the kingdom. And, lastly, (which alone would have merited the title that it bears of the *Great Charter*) it protected every individual of the nation in the free enjoyment of his life, his liberty, and his property, unless declared to be forfeited by the judgment of his peers or the law of the land. Blackst. Com. vol. iv. p. 417.

MAGNANINE, in *Ornithology*, the name of a small bird described by Aldrovand, Gesner, and some other authors, and seeming to be the same with our *hedge-sparrow*, commonly known among authors by the name *curruca*.

MAGNES *carneus*, in *Natural History*, a name given by Cardan, and some other authors, to a white earth dug in Italy and some other places, and called also by many CALAMITA *alba*. It is an indurated earthy substance of the hardness of otter-stone, and is of a white colour variegated with black lines. It adheres very firmly to the tongue, and is hence said to attract flesh in the same manner as the magnet does iron. It is even pretended, that if an iron stylus be rubbed over with this stony earth, and then plunged into the flesh, the virtue of the earth will heal the wound as soon as made, and when the weapon is taken forth, there will remain no appearance of hurt. Cardan affirms that he saw this tried with success, but suspects witchcraft in the case!

MAGNESIA *alba*, in *Chymistry* and *Medicine*, a fine white earth, which has not hitherto been found naturally pure or in a separate state. At Rome it bore the name of the Count of Palma, though many are of opinion, that the preparation was carried from Germany into Italy. It was, however, for several years, a celebrated secret, in possession of some particular persons, till the method of preparing it was made public by Lancisi, in the year 1717, and afterwards by Hoffman in 1722. It was then extracted from the mother-ley, or the liquor which remains after the crystallization of rough nitre; either by precipitation with a solution of fixed alcaline salts; or by evaporating the liquor, and calcining the dry residuum, so as to dissipate the acids by which the earth had been made soluble. The *magnesia*, in this mother-ley, proceeds from the vegetable ashes contained in it; but as quick-lime is commonly much employed in most of the German, French, and other European nitre-works, the substance obtained from the mother-leys of those works, is rather a calcareous earth than *magnesia*, and appears to be such by its burning into quick-lime, and forming a selenites with the vitriolic acid. *Magnesia* is called the *nitrum vitriolatum*, because from two pellucid liquors a coagulum is formed, which contains this substance.

From the experiments of Dr. Black, related in the Edinburgh Phys. & Lit. Ess. vol. ii. art. 8. we learn, that *magnesia* is soluble, with effervescence, in vitriolic, nitrous, marine, and acetous acids; forming with the vitriolic acid crystals, similar to those of the Epsom salt; and with the nitrous acids, crystals which deliquiated in a moist air: with marine acid it formed no crystals; but the saline matter being evaporated to dryness, soon deliquiated

liquiated by expoſure to air: with diſtilled vinegar it formed no cryſtals by evaporation, but a ſaline maſs, viſcid when warm, reſembling glue in colour and conſiſtence, and brittle when cold. *Magneſia* was found to loſe, by calcination, ſeven-twelfths of its weight, and was thus deprived of the power of effervefcing with acids; whence the ſubſtance loſt by calcination was GAS, or *fixable* AIR: nevertheleſs this gas, and almoſt the whole weight loſt by calcination, were reſtored to it by ſolution in vitriolic acid, and precipitation from them by a mild fixed alkali, the gas of which it abſorbed: in this laſt reſpect it ſeemed analogous to the calcareous earths, but differed from them in other properties; particularly in theſe, that when calcined, it was not ſoluble in water, nor communicated any ſenſible impregnation to it, and that it did not, like them, when calcined, become cauſtic or acrid.

Dr. Black alſo found, that *magneſia* was precipitated from acids by volatile alkali; that, when uncalcined, it precipitated calcareous earth from acids; but when calcined, or in any other way deprived of its gas, it did not precipitate theſe earths: when uncalcined, or united with gas, it precipitated lime from lime-water: which ſhews that the calcareous earth had a ſtronger power to combine with the gas, than the *magneſia* had, ſince the former earth took this gas from the latter; by which means the former was rendered ſolid and inſoluble in water, and therefore was precipitated. This property ſuggeſted to Dr. Alſton a method of procuring ſweet water at ſea, by adding *magneſia* to water, the putrefaction of which has been prevented by the previous addition of quick-lime. M. Monnet obſerves, that *magneſia* combined with ſulphur, generally inveſops ſtrata of coal: M. Margraaf has diſcovered that the ſerpentine earths in Saxony, contain *magneſia*: and M. Monnet adds, that the marly and alſo the alum earths contain it. Mr. Henry, aningenious apothecary at Mancheſter, has communicated the following proceſs for making the *magneſia*. Diſſolve any quantity of ſal cathartici amari in its own weight of water; filter and add to it by degrees a filtered ſolution of pearl or pot-aſhes, in an equal quantity of water, ſtirring them gently, until the mixed liquors have acquired the appearance of a complete coagulum; then deſiſt from adding any more of the alkaline lixivium, and immediately throw the mixture into a large veſſel of boiling water; keep it boiling for a quarter of an hour, then take it out, and put it into glazed earthen veſſels; as ſoon as the powder hath ſubſided, and before the water is quite cold, pour it off, and add a freſh quantity of boiling water; repeat theſe ablutions with hot water ſeveral times, till the liquor hath entirely loſt its ſaline taſte: then let it be ſo agitated as to ſuſpend the finer parts of the powder, in which ſtate decant it into other veſſels, and having ſeparated the water from the *magneſia*, by inclination, put it on large chalk-ſtones, till a conſiderable part of the humidity is abſorbed; then wrap it up in ſheets of white-paper, and dry it before the fire. Pour hot water upon the remaining powder, ſtir and decant it in its turbid ſtate, and ſeparate the *magneſia* from the water as before; thus the whole, or moſt of it, will be reduced to an equal degree of fineneſs. The larger the quantity of water into which the precipitated powder is caſt, the more ſpeedily and perfectly will the vitriolated tartar, which is formed by the union of the alkali with the acid of the ſal cath. be waſhed off. The neutral ſalt ſhould be waſhed off as quick as poſſible; otherwiſe, by allowing the mixture to ſtand for ſome time, the powder concretes into minute grains, which, when viewed with a microſcope, appear to be aſſemblages of needles diverging from a point. Theſe concretions cannot be re-diſſolved by any waſhing, however long continued. Dr. Black orders four times the quantity of water to that of the ſolution for throwing the coagulum into, but Mr. Henry obſerves, that this quantity is much too little. The water ſhould be pure, and diſtilled water is the beſt, provided it be kept till its empyreuma is gone off. Hard or impure water makes *magneſia* coarſe and diſagreeable. The chalk-ſtones on which the *magneſia* is dried ſhould be expoſed to a moderate heat, that the moiſture may evaporate quickly: and cleanlineſs ſhould be particularly attended to through the whole proceſs.

The *magneſia* is recommended by Hoffman, as an uſeful antacid, a ſafe and inoffenſive laxative in doſes of a dram or two, and a diaphoretic and diuretic, when given in ſmaller doſes of fifteen or twenty grains. It is now much in uſe, particularly in heart-burns, for correcting acidities in the prime viæ, and for preventing or removing the many diſorders to which children are ſubject on this account. It is preferred to all common abſorbents, on account of its laxative quality, which it manifeſts when it meets with an acid in the ſtomach and bowels. If it is mixed with rhubarb, it prevents the rhubarb from leaving a coſtiveneſs behind. If the *magneſia* is neither accompanied, nor met with by an acid, it is not purgative, but ſimply abſorbent.

Objection has been made to the uſe of *magneſia* by Hoffman and others, that it frequently produced flatulencies, gripings and other uneaſy ſenſations, particularly in weak bowels. It is now well known, that theſe ſymptoms muſt have been produced by the great quantity of fixed air contained in it, and diſcharged from it in conſequence of its meeting and effervefcing with an acid in the ſtomach or inteſtines. Dr. Percival, therefore, ſuggeſted to Mr. Henry the idea of depriving it of its air, with a view of obviating theſe troubleſome ſymptoms occaſionally attending the uſe of it. For this purpoſe the *magneſia* ſhould be calcined by putting it in a common crucible, placing it in a glowing fire and keeping it red-hot for the ſpace of two hours. The *magneſia* thus treated was found to be equally purgative, when given in half an former doſe, and is deprived, by this proceſs, of the diſagreeable qualities above mentioned, and acquires likewiſe new properties, which render it likely to anſwer ſome other important practical purpoſe. By calcination it is not only rendered incapable of generating air in the ſtomach and bowels, but it is qualified to abſorb, or render fixed, that which it finds there, and which is produced, ſometimes in too great quantities, in the proceſs of digeſtion; and it is conſequently adapted to relieve thoſe colics or other diſorders, which are commonly called flatulent. In this reſpect it promiſes, as Mr. Henry obſerves, to be much more efficacious than the whole tribe of carminatives, from which it eſſentially differs with regard to its mode of operation and effects. It appears likewiſe to be the moſt proper cathartic for patients afflicted with the ſtone, who are under a courſe of the ſoap-ley; as it cannot, like the vegetable purgatives, counteract the lixivium, by throwing air into it; but, on the contrary, muſt abſorb a part of that air, which is already in the *primæ viæ*, and which would otherwiſe be attracted by the cauſtic alkali and render it leſs capable of acting on the calculus. In order to produce theſe effects, it is of great importance, that the *magneſia* intended for calcination, ſhould be perfectly free from any admixture of calcareous earth; as in that proceſs, this laſt mentioned ſubſtance muſt neceſſarily be deprived of its air, or rendered cauſtic; and the *magneſia* which contains it will accordingly impregnate the water in which it is infuſed with the taſte and qualities of lime-water. Mr. Glaſe's *magneſia*, which has been ſo highly extolled, appears by Mr. Henry's experiments, to contain no inconſiderable portion of calcareous earth. Lond. Med. Tranſ. vol. ii. art. 16. Henry's Exp. and Obſ. 1773.

MAGNESIA *nigra*, or MANGANESE, is a native mineral found in iron mines, and in the lead mines of Mendip-hills, in Somerſetſhire, commonly conſidered as an ore of iron, though the experiments of Mr. Pott and Mr. Cronſtedt ſhew, that it contains little or no iron; and therefore, the latter author has made a diſtinct order of this earth, which he calls *terræ magnæ*. From ſome experiments of the former writer, it may be preſumed that this mineral conſiſts in great part of an earth, analogous to that of alum, which, in combination with acids, makes one of the ſtrongeſt ſyptics.

It is a denſe ponderous ſubſtance, in its fineſt and pureſt pieces, approaching greatly to the texture of the *lapis hæmatites*, being compoſed of regular parallel ſtriæ, diverging from a center to the circumference. This kind, however, is rare; beſide which there is another ſomewhat leſs pure kind, of an iron grey colour, and irregularly ſtreaked like the ſteel-grained lead-ores. But the common *manganeſe* is of a perfectly irregular ſtructure. It is very heavy, moderately hard, and of a deep duſky grey, approaching to black, though ſometimes of a ferruginous brown. It is found in large maſſes of no determinate ſhape, and of a rude, rugged, and unequal ſurface. *Manganeſe* gives fire but difficultly with ſteel, and makes no effervefcence with acids; though they diſſolve ſome part of it, eſpecially when it is calcined. Spirit of vitriol acquires from it a roſe colour; and aqua regia, alſo acquires colour, eſpecially from the black kind. From theſe ſolutions, fixed alkali precipitate a white earth. It is remarkable for communicating to a large proportion of glaſs in fuſion, a purpliſh or red tinge, which diſappears on a continuance of the fire; at the ſame time deſtroying the effects of many other colouring matters, and rendering foul or coloured glaſs clear. When fuſed with nitre or with fixed alkali, it gives to warm water various colours, green, purple, red, or blue, which change by agitating the water. Cronſtedt ſays, that he has ſometimes extracted a ſmall portion of tin from *magneſia*; and that the colours given by it to glaſs, are eaſily deſtroyed by calxes of arſenic or of tin.

Dr. Prieſtley, on putting an ounce of this ſubſtance finely powdered into a ſmall retort with a very long narrow neck, and expoſing it to a red hot heat, found,

that forty ounce measures of air were expelled from it in different portions. Part of this air in every portion, was fixed air, and at firſt almoſt wholly ſo; but four-fifths of the laſt produce was the pureſt dephlogiſticated air. Imagining that the nitrous acid, or at leaſt the influence of the atmoſphere, was neceſſary to the production of this latter kind of air, he was ſurpriſed at this reſult, from examining a ſubſtance, without the uſe of any nitrous acid, which, till it was dug out of the bowels of the earth, had not been expoſed to the influence of the external air; unleſs, as an ingenious writer ſuggeſts, we recur to ſome unknown and very diſtant æra, in which it may poſſibly have had a communication with the atmoſphere, and have acquired its dephlogiſticated air, in a manner ſimilar to that in which the precipitate per ſe, and red lead, at preſent acquire their pure air, during the act of calcination, in our laboratories. According to this idea, we may ſay that *manganeſe*, whoſe nature is little known, may probably be a metallic calx, which has undergone a calcination in volcanos, long ſince extinct; but which may formerly have had a communication with the atmoſphere. Prieſtley's Exp. and Obſ. relating to various Branches of Natural Philoſophy, 1779, p. 203, &c.

From ſome experiments of M. Sage, related in his Elemens de Mineralogie Docimaſtique, &c. Paris, 1777, he is led to infer, that *manganeſe* is compoſed of zinc and cobalt mineraliſed by the marine acid; and he obſerves, that the lead, copper, or iron, which are ſometimes found in it, are accidental additions. He accounts for the quality which this ſubſtance poſſeſſes of deſtroying the bluiſh or green tinge which glaſs may have received, and rendering it colourleſs, by obſerving, that the depuration of the glaſs is probably produced by the calx of the zinc contained in the *manganeſe*: this calx, he ſuppoſes, lays hold of the phlogiſton to which the glaſs owed its green colour. The zinc is thereby reduced, and diſſipated in the atmoſphere, while the ſmall portion of cobalt contained in the *manganeſe* gives the glaſs a ſlight bluiſh tinge, which contributes to its tranſparency.

This ſubſtance is of vaſt uſe in the glaſs-trade, but neither the induſtrious Neri, nor any others who have written of the art, can ever deliver the true proportions in which it is to be mixed with the glaſs-metal on the ſeveral occaſions. The ſame thing is alſo to be obſerved in regard to *zaffer*, another ſubſtance in continual uſe with them. And the reaſon of this is, that there is vaſt difference in the quality of theſe bodies, ſome of which are ſold being very pure and rich, others good for almoſt nothing, and much of middle degrees of purity between theſe. For this reaſon there is no determining how much of each is to be added to the glaſs, but the conciliator adds them at ſeveral times and in ſmall quantities, and takes frequent proofs by his eye, till he knows they are properly proportioned. See GLASS.

It is alſo uſed to give a GLAZING to pottery, and recommended medicinally, when calcined by a ſtrong fire, as an aſtringent.

MAGNESIA, *ſpatina*, *ſpatin*, or ruby coloured *magneſia* of antimony, is made, according to the directions of Lemery, of equal parts of antimony, nitre, and decrepitated ſea-ſalt. It is a much weaker emetic than the liver of *antimony*.

MAGNET, MAGNES, the *loadſtone*; a ſort of ferruginous ſtone, in weight and colour reſembling iron ore, and very hard and heavy; endued with divers extraordinary properties, attractive, directive, inclinatory, &c.

The *magnet* is alſo called *lapis Heraclaeus*, from Heraclea, a city of Magneſia, a port of the ancient Lydia, where it is ſaid to have been firſt found, and from which it is uſually ſuppoſed to have taken its name. Though others derive the word from a ſhepherd named *Magnes*, who firſt diſcovered it with the iron of his crook on mount Ida. It is alſo called *lapis nauticus*, by reaſon of its uſe in navigation; and *ferrites*, from its attracting iron, which the Greeks called σιδηρος.

The *magnet* is indeed a true iron ore, from which a conſiderable portion of iron may be extracted, and is uſually found in iron mines, and ſometimes in very large pieces, half *magnet*, half common ore. Its colour is different, white, blue, red, black, but moſtly ferruginous, according to the different countries it is brought from. Norman obſerves, that the beſt are thoſe brought from China and Bengal, which are of an iron or ſanguine colour; thoſe of Arabia are reddiſh; thoſe of Macedonia blackiſh; and thoſe of Hungary, Germany, England, &c. of the colour of unwrought iron. Neither its figure nor bulk are determined, but it is found of all forms and ſizes.

The ancients reckoned five kinds of *magnets*, different in colour and virtue; the Ethiopic, Magneſian, Bœotic, Alexandrian, and Natolian. They alſo took it to be of two kinds, male and female; but the chief uſe they made of it was in medicine; eſpecially for the cure of burns and defluxions on the eyes. The moderns, more happy, take it to conduct them in their voyages.

The moſt diſtinguiſhing properties of the *magnet* are, that it attracts iron, thus ſerving the purpoſes of the chemiſt in diſcovering or ſeparating ſmall particles of iron, mixed with other matters, and that it points to the poles of the world; and, in other circumſtances, alſo dips or inclines to a point beneath the horizon, directly under the pole; and that it communicates theſe properties, by touch, to iron. On which foundation are formed the mariners needles; both the horizontal, and the inclinatory, or dipping needles. See NEEDLE, DIPPING, &c.

MAGNET, *the attractive power of the*, was known to the ancients, and is mentioned even by Plato and Euripides, who call it the *Herculean ſtone*; becauſe it commands iron, which ſubdues every thing elſe. This property is finely deſcribed by Pliny: *Quid lapidis rigore pugnius? Ecce ſenſus manu ſpe tributi illi natura. Quid ferro durius pugnacius? Sed audit & potitur mores: trahitur namque a magnete lapide, domiteque illa rerum omnium materia ad inane ſeſe quid curret, atque ut proprius venit, aſſiſtit tenaturque, & complexu hæret.* lib. xxxvi. cap. 16.

The ancients ſeem alſo to have been acquainted with the communicative virtue of the *magnet*. Plato has deſcribed a chain of iron rings ſuſpended by one another, the firſt of which is ſuſtained by the load-ſtone: Lucretius, Philo, Pliny, Galen, and Nemeſius have likewiſe deſcribed the ſame phenomenon: but the knowledge of its directive power, whereby it diſpoſes its poles along the meridian of every place, and occaſions needles, pieces of iron, &c. touched with it, to point nearly north and ſouth, is of a much later date; though the exact time of its diſcovery, and the diſcoverer himſelf, are yet in the dark. The firſt tidings we hear of it, are in 1260, when Marco Polo, the Venetian is ſaid, by ſome, to have introduced the mariner's compaſs; though not as an invention of his own; but as derived from the Chineſe, who are ſaid to have had the uſe of it long before: though ſome imagine, that the Chineſe before that had borrowed it from the Europeans.

Flavio de Gioia, a Neopolitan, and a citizen of Amalfi, is the perſon uſually ſuppoſed to have the beſt title to the diſcovery, about the year 1302: and yet Sir G Wheeler mentions, that he had ſeen a book of aſtronomy much older, which ſpoke of the uſe of the needle; though not as applied to the uſes of navigation, but of aſtronomy. And in Guyot de Provins, an old French poet, who wrote about the year 1180, there is expreſs mention made of the *loadſtone*, and the compaſs; and their uſe in navigation is obliquely hinted at.

MAGNET, *the variation of the*, or its declination from the pole, was firſt diſcovered by Seb. Cabot, a Venetian, in 1500, who firſt ſerved our king Henry VII. then the king of Spain, and laſtly returning to England, was conſtituted grand pilot by king Edw. VI. with an annual ſalary of above 166*l.* though Ferdinand, the ſon of Columbus, aſſerts, that his father obſerved it on the 14th of September, 1492: and the variation of that variation by Mr. Gellibrand, an Engliſhman, who publiſhed his diſcovery in a ſmall quarto pamphlet, intitled A Diſcourſe Mathematical on the Variation of the Magnetic Needle, printed in 1635.

Laſtly, the dip or inclination of the needle, when at liberty to play vertically, to a point beneath the horizon, was firſt diſcovered by another of our countrymen, Mr. R. Norman, who in 1581, publiſhed the diſcovery he had long before made, in a ſmall pamphlet, called the *New Attractive*, where he ſhews how to determine its quantity. See DIPPING-*needle*.

MAGNET, *phenomena of the*. 1. In every *magnet* there are two poles, one whereof points northward, the other ſouthward; one of theſe is called the north pole, and the other the ſouth; and that is generally, and moſt properly be called the ſouth pole, which, if the *magnet* was put into a little boat of wood, or other materials, large enough to ſupport it, and ſet aſloat in water, would turn itſelf towards the north; and that is more properly called the north pole, which would turn towards the ſouth. The reaſon of calling them thus is, that the pole of the *magnet* which turns towards the ſouth, is of the ſame kind with the northern magnetic pole or poles of the earth, and contrarywiſe. The north pole of one *magnet* always attracts the ſouth pole, and repels the north pole of another, and *vice verſâ*. It is obſerved that the poles of *magnets* are not at their extremities but at a little diſtance from thence: and if the *magnet* be divided into ever ſo many pieces, the two poles will be found in each piece: we may add, that in ſome natural *magnets* there are more than two poles, inſtances having occurred of ſome in which there are eight, nine, and even ten. M. Muſchenbroeck ſays, that he has ſeen a cube, each ſide of which

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was polar. The axis of a *magnet* is a right line which paſſes from one pole to another, and the equator is formed by a plane biſecting it in a direction perpendicular to the axis. By the following method, the ſituation of the poles, and the direction of the *magnetic* effluvia in paſſing out of the ſtone, may be exhibited to the ſight: let AB, CD, *Tab. Magnetiſm, fig.* 1. be the poles of the ſtone; about every ſide gently ſtrew ſome fleel-filings on a ſheet of white paper; theſe ſmall particles will be affected by the effluvia of the ſtone, and ſo diſpoſed as to ſhew the courſe and direction of the *magnetic* particles in every part. Thus in the middle of each pole between AB, and DC, it appears to go nearly ſtrait on; towards the ſides it proceeds in lines more and more curved, till at laſt the curve lines from both poles exactly meeting and coinciding form numberleſs curves on each ſide, nearly of a circular figure, as repreſented in the diagram. This ſeems to ſhew, that the *magnetic* virtue emitted from one pole circulates to and enters the other. The ſituation of the poles may be alſo determined by placing over the *magnet* a very fine needle, which will ſtand perpendicular over each pole, being more ſtrongly attracted by it, and no where elſe. 2. Theſe poles, in different parts of the globe, are differently inclined towards a point under the horizon. 3. Theſe poles, though contrary to one another, do help mutually towards the *magnet*'s attraction and ſuſpenſion of iron. 4. If two *magnets* be ſpherical, one will turn or conform itſelf to the other, ſo as either of them would do to the earth; and after they have ſo conformed or turned themſelves, they will endeavour to approach or join each other; but if placed in a contrary poſition, they will avoid each other. This property may be illuſtrated by placing two *magnets* on ſmall pieces of wood, formed in the ſhape of boats, and ſwimming freely on ſtagnated water, undiſturbed by wind, and at ſuch a diſtance as to be within the ſphere of each other's activity: both the boats will ſwim towards each other with an accelerated motion, and meet exactly in the middle of the diſtance between them, provided that the boats and magnets were exactly of the ſame weight and bulk: but if either boat be turned, ſo that its *magnet* may preſent a contrary end to that by which it was attracted by the other *magnet*, they will both recede from each other with an equal velocity. The ſame phenomenon may likewiſe be exhibited by ſuſpending a *magnet* C, from the end B of a balance, *Tab. Magnetiſm, fig.* 2. and forming an equilibrium with a weight in the ſcale A; place another *magnet* D under C, and C will be found to ruſh towards D, and to lift the weight in the ſcale A: but if the oppoſite end of D be preſented to C, C will be repelled by it, aſcend, and the ſcale A will deſcend: if D be placed above C, as in E, the effects will be juſt the contrary.

M. Muſchenbroeck has found by a variety of experiments, that two *magnets* attract one another with different forces at different diſtances; that they act moſt ſtrongly in mutual contact, in which caſe their force has been equal to the weight of three hundred and forty grains, but at the diſtance of twelve inches, equal only to twenty-three grains: nevertheleſs they obſerve no regular proportion in their decreaſe, but their ratio is leſs than the inverſe of their diſtances; and different in different *magnets* and at different times. There are ſome whoſe ſphere of activity reaches even to fourteen feet, and others in which it is not ſenſible at the diſtance of eight or nine inches. He has alſo found, that the ſphere of repulſion varies in different *magnets*, and at different diſtances; and that the repulſive force is much leſs than that of attraction; the latter in contact being equal to three hundred and forty grains, whereas the former is equal only to forty-four grains. It appears alſo from another experiment of the ſame author, that the repelling forces of both poles of the ſame *magnet*, are very conſiderable at the diſtance of twelve lines, being equal to thirty grains, that they increaſe to the diſtance only of ſeven lines, where they are equal to thirty-ſix, but that in immediate contact they are equal only to thirteen grains. Mr. Michell, however, differs much in his concluſions from thoſe above mentioned: he maintains, that each pole acts, attracts, or repels exactly equally, at equal diſtances, in every direction: and that the magnetical attraction and repulſion are exactly equal to each other. He adds, that the miſtake of thoſe who think otherwiſe, ariſe from their not attending to the different degrees of ſtrength, which *magnets* have in different circumſtances: for two *magnets* that are placed with their attracting poles towards each other, will have their power, by that means, increaſed: and, on the contrary, if their repelling poles be placed towards each other, their power will thereby be diminiſhed: and this increaſe or diminution of power will be in a greater or leſs degree, according as the *magnets* are nearer to, or farther from each other: whence in all the experiments made on this ſubject, the attraction and repulſion come perpetually nearer to an equality, the greater the diſtance of the two *magnets* is, with which the experiments are made, and *vice verſa*. And ſo great is the effect of *magnets* on each other, that, when the repellent poles of a large *magnet* and a ſmall one are brought into contact, the ſmall one ſhall ſometimes have its repellency changed into attraction. Mr. Michell alſo infers from other experiments, that the attraction and repulſion of *magnets* decreaſe, as the ſquares of the diſtances from the reſpective poles increaſe. The differences of opinion in this reſpect are aſcribed by him, to the want of making proper allowances for that property of *magnets*, in conſequence of which they attract or repel equally at equal diſtances, together with the increaſe and diminution of power in the *magnets* with which the experiments were tried. See *Laws of* MAGNETISM.

5. If a *magnet* be cut through the axis, the parts or ſegments of the ſtone, which before were joined, will now avoid and fly each other. 6. If the *magnet* be cut by a ſection perpendicular to its axis, the two points, which before were conjoined, will become contrary poles; one in one, the other in the other ſegment. 7. Iron is not only attracted by a *magnet*, even more than another *magnet*, and equally attracts it, but alſo receives virtue from the *magnet* by application to it, or barely from an approach near it, though it do not touch it; and the iron receives this virtue variouſly, according to the parts of the ſtone it is made to touch, or even but to approach to. In order to communicate the magnetic virtue more effectually, the following methods are made uſe of: viz. it has been diſcovered, that iron rubbed upon one of the poles of the *magnet* acquires much greater virtue than from any other part of it, and this is more conſiderable from an armed *magnet*, than from a naked one. Farther, the more gently the iron is preſſed, and the more it is preſſed againſt the pole, the more magnetical it becomes. Again, it is more convenient to impregnate iron on one pole, than on both poles ſucceſſively; becauſe the iron receives magnetic virtue from each pole, in contrary directions, which deſtroy each other's effects. Moreover, the iron is much better impregnated by preſſing it uniformly and in the ſame direction, according to its length, than by rubbing it by the middle; and the extremity which touches the pole laſt, retains the greateſt virtue: it is alſo of importance, that the length of the iron be conſiderable. Beſides, a piece of poliſhed ſteel, or of pointed iron, receives more virtue than mere iron, or iron of the ſame figure: and, *cæteris paribus*, a piece of iron that is long, ſmall and pointed, is more ſtrongly impregnated than that of any other form. 8. If an oblong piece of iron be any way applied to the ſtone, it receives virtue from it, only as to its length. 9. The *magnet* loſes none of its own virtue by communicating any to the iron; though this is doubted by Mr. Savery; and this virtue it can communicate to the iron very ſpeedily; though the longer the iron touches or joins the ſtone, the longer will its communicated virtue remain in it; and a better *magnet* will communicate more of it, and ſooner, than one not ſo good. The late Dr. Gowin Knight practiſed a method, which he never publiſhed, of communicating to iron a very conſiderable magnetic virtue, and alſo of increaſing that of feeble *magnets*. From a report delivered to the Royal Society, in 1744, it appears that he had prepared a ſmall eight-cornered bar of ſteel, three inches, and almoſt ½ long, and about half an ounce Troy in weight, which liſted by one of its ends about eleven of the ſame ounces: that another plain bar of ſteel of a parallelopiped form, 5⅛ inches long, 1/10 inch broad, and 1/20 inch thick, weighing two ounces 8¾ penny-weights, liſted, in like manner, by one of its ends, twenty Troy ounces: that a ſteel bar, almoſt of the ſame form as the laſt, but only four inches in length, capped or armed with iron at each end, cramped with ſilver, and weighing all together, one ounce fourteen penny-weights, liſted by the feet of the armour full four pounds Troy; and that a ſingle block of ſteel, of a parallelopiped form, almoſt four inches long, 1 2/10 high, and 4/10 inch thick, armed with iron, cramped with braſs, and ſuſpended by a ring of the ſame, and weighing all together fourteen ounces one penny-weight, liſted by the feet of the armour, fourteen pounds 2¼ ounces, Troy weight. He alſo exhibited a compound artificial *magnet*, conſiſting of twelve bars of ſteel armed, which liſted by the feet of the armour as the laſt, twenty three Troy pounds 2½ ounces. At the ſame time he preſented before the ſociety, a ſmall armed loadſtone, which, with its armour, weighed ſeven penny-weights fourteen grains, and which could ſcarce lift two ounces; but improved by his method, it ſuſtained ſix ounces eighteen penny-weights and three grains. See *Armed* MAGNET, and *Artificial* MAGNET.

10. Iron will receive magneſiſm more eaſily than ſteel; the ſoft ſteel receives it much more eaſily than the ſpring-tempered, and the ſpring-tempered much more eaſily than

the hard: but a piece of ſpring-tempered ſteel will not return near ſo much magnetiſm, and is therefore incapable of being excited to the ſame degree as hard ſteel; ſoft ſteel will retain it ſtill leſs; and iron, which is the ſofteſt of all, ſcarce retains any. Mr. Michell has evinced the truth of theſe obſervations both by reaſoning and experiment. There are other bodies, beſides iron and ſteel, which are ſuſceptible of magnetiſm; theſe are probably no other than iron in ſome ſhape or other, or bodies that have a mixture of them: ſuch are all ſorts of iron ore after ignition, and ſome before. It is obſervable, that ſeveral of the hard ores of iron, which are not affected in the leaſt by the *magnet* in their natural ſtate, are vigorouſly attracted by it, when moderately roaſted; that the calces of iron, by ſlight roaſting with inflammable additions, are made to obey the *loadſtone*, and revived into their metallic form, each particle appearing now to be perfect iron; whilſt the calces of other metals are in no degree revived, without being brought into fuſion. There are alſo ſeveral ſorts of *heavy*, ſhining, opake, black, or dark chocolate-coloured ſand, moſt of which, if not all, are iron ores, which are ſuſceptible of magnetiſm. Of this kind is the dark-*brown* ſand or EMERY: we may alſo refer to this claſs moſt braſs, and ſeveral other metals; and bricks that have been much burnt in the fire. The magnetiſm of theſe is probably owing to a ſmall quantity of iron mixed with them. What is in the braſs, Mr. Michell conjectures, may come from the lapis calaminaris, which is ſaid to have often a ſmall mixture of iron in it: but Mr. Anderſon, who has ſucceeded in giving magnetiſm and polarity to braſs, has doubts as to the mixture of iron with braſs; particularly, becauſe braſs fuzes with a much leſs degree of heat than iron, and iron naturally ſwims in fluid braſs. Phil. Tranſ. vol. l. p. 774.

11. A needle touched by a *magnet* will turn its ends the ſame way towards the poles of the world, as the *magnet* itſelf does. 12. Neither *loadſtone* nor needles touched by it do conform their poles exactly to thoſe of the world, but have uſually ſome variation from them: and this VARIATION is different in divers places, and at divers times in the ſame place. 13. A *loadſtone* will take up much more iron when armed or capped, than it can when naked. And though an iron ring or key be ſuſpended by the *loadſtone*, yet the *magnetical* particles do not hinder that ring or key from turning round any way, either to the right or left. See ARMS and *Armed* MAGNET.

14. The force of a *loadſtone* may be variouſly increaſed or leſſened by the various application of iron, or another *loadſtone*, to it. 15. A ſtrong *magnet*, at the leaſt diſtance from a leſſer, or a weaker, cannot draw to it a piece of iron adhering actually to ſuch leſſer or weaker ſtone; but if it come to touch it, it can draw it from the other: but a weaker *magnet*, or even a little piece of iron, can draw away or ſeparate a piece of iron contiguous to a greater or ſtronger *loadſtone*. 16. In theſe northern parts of the world, the ſouth pole of a *loadſtone* will raiſe up more iron than the north pole. 17. A plate of iron only, but no other body interpoſed, can impede the operation of the *loadſtone*, either as to its attractive or directive quality. Mr. Boyle found this true in glaſſes ſealed hermetically; and glaſs is a body as impervious, as moſt are, to any effluvia. The magnetic virtue is ſenſibly continued through the ſubſtance of ſeveral contiguous bodies or pieces of iron, as keys, &c. it pervades the pores of the hardeſt bodies; and equally attracts the iron in vacuo, as in open air. 18. The power or virtue of a *loadſtone*, and of iron or ſteel impregnated with the magnetic virtue, may be impaired by long lying in a wrong poſition, by an electrical ſtroke as alſo by ruſt, wet, &c. and it may be quite deſtroyed by fire, and by LIGHTNING. 19. A piece of iron wire, well touched, will, upon being bent round in a ring, or coiled round on a ſtick, &c. generally, quite loſe its directive virtue: but it will always have it much diminiſhed: and yet if the whole length of the wire were not entirely bent, ſo that the ends of it, though but for the length of one-tenth of an inch, were laſt ſtrait, the virtue will not be deſtroyed in thoſe parts; though it will in all the reſt. This was firſt obſerved by Meſſ. Grimaldi, and de la Hire; and is confirmed by the experiments of Dr. Derham; who adds further, that though coiling or bending the wire as above, would always deſtroy its virtue by day, yet it would not do it in the evening. 20. The ſphere of the activity of *magnets* is greater and leſs at different times: in particular that referred to in the repoſitory of the Royal Society will keep a key or other body ſuſpended to another, ſometimes at the height of eight or ten feet; and at others, not above four feet. See 4. above. To which we may add, that the variation of the *magnetical* needle from the meridian varies at various times of the day; as appears from ſome experiments of Mr. Graham. See VARIATION.

21. By twiſting a piece of wire touched with a *magnet*, its virtue is exceedingly diminiſhed, and ſometimes ſo diſordered and confuſed, that in ſome parts it will attract, and in others repel; and even in ſome places, one ſide of the wire ſeems to be attracted, and the other ſide repelled, by one and the ſame pole of the ſtone. 22. A piece of wire that has been touched, being ſplit or cleft in two, the poles are ſometimes changed; as in a cleft *magnet*; the north becoming the ſouth, and the ſouth the north: and yet ſometimes one half of the wire will retain its former poles, and the other half will have them changed. To which it may be added, that laying one or other ſide of the half uppermoſt, cauſes a great alteration in its tendency or averſion to the poles of the *magnet*. 23. A wire being touched from end to end with the ſame pole of the *magnet*, the end wherein you begin will always turn contrary to the pole which touched it: if it be again touched the ſame way with the other pole of the *magnet*, it will then be turned the contrary way. 24. If a piece of wire be touched in the middle with only one pole of the *magnet*, without moving it backwards or forwards; in that place will be the pole of the wire, and the two ends will be the other pole. 25. If a *magnet* be heated red-hot, and again cooled either with its ſouth pole towards the north in a horizontal poſition, or with its ſouth pole downwards in a perpendicular poſition, its poles will be changed. 26. Mr. Boyle (to whom we are indebted for the following *magnetical* phænomena) found he could preſently change the poles of a ſmall fragment of a *loadſtone*, by applying them to the oppoſite extremes ones of a large *magnet*. Dr. Knight diſcovered a method of changing the direction of the poles in natural *magnets*, multiplying and variouſly placing them at pleaſure. In the firſt inſtance, recorded in the Philoſophical Tranſactions, he inverted the poles of a *magnet* by a proceſs, which required only a minute's time; ſo that the ſame end, which before attracted the ſouth end of the needle, now attracted the north and repelled the ſouth, and *vice verſâ*: in the ſame time he again turned the direction of the polarity of the ſtone at right angles, to its former direction; and afterwards inverted this laſt direction of the poles. In the ſecond ſeries of experiments, he cut a piece of natural *loadſtone* into the ſhape of a parallelopiped, $1\frac{1}{2}$ inch long, $\frac{7}{10}$ inch broad, and $\frac{3}{4}$ in thickneſs: its weight was three drams and ten grains. In this ſtone he placed the magnetical virtue in ſuch a manner, that the two oppoſite ends became, both of them, ſouth poles, and the middle was quite round a north pole. The two oppoſite ends of another ſtone were made both north poles, and the two oppoſite ſides ſouth poles. At one end of another ſtone, he placed a north pole ſurrounded by a ſouth; and at the other end a ſouth ſurrounded by a north pole; ſo that the edges of each ſurface had a pole of a different denomination from that which occupied the middle. On another occaſion, he inverted the poles at the ends of a piece of *magnet*, and then tranſferred them to the ſides of the ſtone. All theſe changes of the poles are eaſily produced by ſteel bars A B, C D, *Tab. Magneti/m*, *fig.* 3. impregnated with a ſtrong magnetic virtue, by which the piece of *magnet* EF, placed between them is ſo affected, that the poles may be changed at pleaſure, and excited in places that are touched by the ends of the bars. Mr. Michell has ſhewn the method of doing this both in ſmall and large *magnets*. If a ſmall and ſhort *magnet* is to have its poles changed, lay the ſupporters deſcribed under *Armed* MAGNET; ſo, that the centre of their force ſhall, at each end, lie at the end of the line deſigned to be the axis of the *magnet*, and touch it double in the manner explained under *Artificial* MAGNET, as near as may be in that direction. If the poles are to be converted, and the *magnet* be long enough, touch it double according to the directions for converting the poles of an artificial *magnet*; then ſupport it, and touch it over again with freſh touches: or if the *magnet* is ſhort, apply bars as ſupporters only, and change them two or three times: or elſe make uſe of the following method, applicable to large *magnets*. If the poles of ſuch are to be changed, the middle of the end of the piece of iron placed at each end of the *magnet*, (ſee *Armed* MAGNET) is to be placed againſt the end of the line deſigned to be the axis. If the poles are to be converted, it ſhould be done firſt by touching double, if a ſufficient force of magnetical bars can be applied for this purpoſe: but if by touching double, the poles will not be converted, place the *magnet* between two pieces of iron, then keeping them ſteady at their diſtance, remove the *magnet*, and connecting the pieces of iron by wedges of iron, that may not ſtand in the way of it, when it is to be put in its place again, apply the ſupporters as before, and putting the *magnet* in its place, take off the iron wedges. This may be done two or three times, if it be found neceſſary, retouching the ſupporters every time. See *Artificial* MAGNET. It is well known, that LIGHTNING not only deſtroys, but reverſes in ſome caſes, the poles of

magnetic needles. 27. Hard iron tools well tempered, when heated by a brisk attrition, as filing, turning, &c. will, while warm, attract thin filings or chips of iron, steel, &c. though not when cold; though there are not wanting some instances of their retaining the virtue when quite cold. 28. The iron bars of windows, &c. which have a long time stood in an erect position, grow permanently *magnetical*; the lower end of such bars being the north pole, and the upper end the southern. 29. A bar of iron that has not stood long in an erect posture, if it be only held perpendicular, will become *magnetical*, and its lower end the north pole; as appears from its attracting the south pole of a needle: but then this virtue is transient, and, by inverting the bar, the poles will shift their places. In order therefore to render the quality permanent in an iron bar, it muſt continue a long time in a proper position. But the fire will produce the effect in a ſhort time: for as it will immediately deprive a *loadſtone* of its attractive virtue, ſo it ſoon gives a verticity to a bar of iron, if, being heated red-hot, it be cooled in an erect poſture, or directly north and ſouth. Nay, tongs and pokers, by being often heated and ſet to cool again in a poſture nearly erect, have frequently gained this *magnetical* property. The *magnetic* virtue may be excited in iron and ſteel by electricity and lightning. 30. Mr. Boyle found, that by heating a piece of Engliſh oker red-hot, and placing it to cool in a proper poſture, it manifeſtly acquired a *magnetic* virtue. And an excellent *magnet* of the ſame ingenious gentleman's having lain near a year in an inconvenient poſture, had its virtue ſurpriſingly impaired; as if it had been injured by fire. 31. A needle well touched, it is well known, will point north and ſouth: if it have one contrary touch of the ſame ſtone, it will be deprived of its faculty; and by another ſuch touch it will have its poles quite changed. 32. If a bar of iron have gained a verticity by being heated red-hot, and cooled again, north and ſouth, and then hammered at the two ends; its virtue will be deſtroyed by two or three ſmart blows on the middle. Mr. Martin ſays, that by a ſmart ſtroke of a hammer on the untouched end of the dipping-needle, he has often cauſed the whole *magnetic* virtue to come to that end from the other, ſo as to make it dip on that ſide as much as it did on the other before: on the contrary, by ſuch a ſtroke he has ſometimes made it dip much more on the touched end than before. Sometimes, by ſtriking it, the needle, which dipped before, will be reſtored to its equilibrium, as if the virtue had made its eſcape, or were uniformly diffuſed all over the needle. 33. By drawing the back of a knife, or long piece of ſteel wire, &c. leiſurely over the pole of a *loadſtone*, carrying the motion from the middle of the ſtone to the pole; the knife or wire will accordingly attract one end of a needle: but if the knife or wire be paſſed from the ſaid pole to the middle of the ſtone, it will repel that end of the needle which in the other caſe it attracts. 34. Either a *magnet* or a piece of iron being laid on a piece of cork, ſo as to ſwim freely in water; it will be found, that whichſoever of the two is held in the hand, the other will be drawn to it: ſo that iron attracts the *magnet* as much as it is attracted by it; action and reaction being always equal. In this experiment, if the *magnet* be ſet aſloat, it will direct its two poles to the poles of the world. 35. A knife, &c. touched with a *magnet*, acquires a greater or leſs degree of virtue, according to the part it is touched on. It receives the ſtrongeſt touch, when it is drawn leiſurely from the handle towards the point over one of the poles: and if the ſame knife thus touched, and thus in poſſeſſion of a ſtrong attractive power, be retouched in a contrary direction, viz. by drawing it from the point towards the handle over the ſame pole, it immediately loſes all its virtue. Laſtly, It is obſerved by ſome writers, that the power or force of *magnets* is generally greater in ſmall than in large ones, in proportion to their bulk. It is very rare that very large ones will take up more than three or four times their own weight, but a ſmall one, that is only tolerably good, will take up eight, ten, or twelve times its weight. Mr. Martin mentions one, whoſe weight with the armature is only forty three grains, that will take up twenty-four times its own weight, or one thouſand and thirty-two grains; and another wore in a ring, weighing ſcarce three grains, that will take up ſeven hundred and forty-ſix grains, or two hundred and fifty times its own weight.

MAGNET, in *Medicine*. Some writers of the middle ages have, from a miſtaken tranſlation of Theophraſtus, been induced to account the *loadſtone* poiſonous, which the ancients were ſo far from doing, that they gave it inwardly. Galen aſcribes a purgative quality to it, and recommends it in droppes; and Dioſcorides preſcribes it as a good medicine to evacuate groſs melancholic humours. It is doubtleſs poſſeſſed of the ſame virtues with the other ores of iron, though of late never uſed inwardly, being only made an ingredient in ſome plaſters.

It has been ſaid, that the application of the artificial *magnet*, or of a *magnetical-bar* to the teeth, will effectually cure the tooth-ache.

MAGNET, in *Metallurgy* and *Chemiſtry*. Iron ores may generally be diſcovered to be ſuch by the *magnet*; for almoſt all of them will be attracted by it either before or after ignition. A ſtrong *artificial* MAGNET, well hung, and uſed as a needle, will beſt ſerve for this purpoſe. It will alſo readily find, and ſeparate any little bits of iron or ſteel from other things, and particularly iron or ſteel from thoſe of other metals. It will likewiſe diſcover whether tools, &c. are made of ſteel, or whether they are iron caſe-hardened; for the ſteel will receive a ſtrong touch, when the other will hardly receive any. For the uſe of the *magnetic* needle, in *Mining*, ſee NEEDLE. According to Neumann, the *magnet* is almoſt totally ſoluble in ſpirit of nitre, and partially in the vitriolic and marine acids.

MAGNET, *armed*, denotes one that is capped, caſed, or ſet in iron or ſteel, in order to make it take up a greater weight, and alſo more readily to diſtinguiſh its poles. For the method of arming the natural *magnet*, ſee ARM. Mr. Michell directs to increaſe the power of a natural *magnet*, if it be ſmall and ſhort, by laying a great number of iron bars at its ends, after the manner of ſupporters, care being taken to apply the proper poles; if it be pretty long, ſo as to allow room for it, by touching it alſo double with ſeveral bars, according to its bulk, applying them to all ſides at once. To increaſe the power of a large *magnet*, inſtead of placing ſupporters, he adviſes to put a large piece of iron, of the thickneſs and breadth of the *magnet* at each end of it. This piece of iron ſhould be either three or four times as long as it is thick, or elſe ſhort, and three or four times as large at the end not touching the *magnet*, as at the other: in the former of theſe ways, there are to be placed on one ſide, in the other caſe at the broad end, as many ſupporters as can conveniently ſtand there. This, if the *magnet* be very ſhort, may be ſufficient; if it be long, it ſhould be ſides be touched double. If the *magnets* to be thus improved be very ſuſceptible of magnetiſm, they ſhould have much thicker armour than is generally uſed, becauſe they will thus retain more magnetiſm; and the armour ſhould be ſo faſtened, that the hoops, &c. uſed for that purpoſe may not ſtand in the way of applying any thing to the ends, or the ſides; for it is much the beſt way to make any ſhort *magnets* magnetical in their armour, becauſe they will retain more power by this means. But Mr. Michell apprehends, that the beſt way of managing very large *magnets*, would be to fit them, in a direction parallel to the axis, into ſeveral long bars of the length of the ſtone, and having made them magnetical ſingly, to put them into their armour, in the manner directed for compound artificial *magnets*. The ſteel bars uſed for artificial magnets, may be armed and made magnetical, like the natural *magnets*. Armed compound artificial *magnets* may be made of ſeveral bars exactly of a length, with armour nicely fitted to them. The bars ſhould have the ſame proportions as thoſe of ſingle unarmed *magnets*; they ſhould be touched ſingly, and put into their armour, as they are touched, with the poles of the ſame denomination the ſame way. The armour ſhould be pretty thick, and ſhould have a wedge of iron applied to it, whilſt the bars are putting in, and till the whole is bound together and finiſhed; for which reaſon the caſe, that keeps the armour together at bottom, ſhould be put on before any of the bars are put in. The iron wedge ſhould always continue applied to the *magnet*, but when it is uſed; for this will be a great preſervation to it; though with all this precaution, it will loſe a great deal of its firſt ſtrength, in a very little time. Mr. Michell directs an occaſional *magnet* of this kind to be made in the following manner: let there be a ſmall box, about an inch deep, ſix inches long, and three or four wide; in the bottom of this box fix two bars of iron, at each end one, about $\frac{1}{2}$ inch ſquare, reaching quite acroſs the ends and through holes in one ſide, and projecting a little way beyond; theſe projecting ends ſerve as feet to lift with like thoſe of the common armed natural *magnet*: the faces of theſe feet ſhould lie in the ſame plane with each other, and they may be reduced, by taking off the edges, to about half the breadth of the bar, in the flat way of the box. When the *magnet* is wanted, apply a wedge of iron to the two feet, that come through the ſide of the box; and having made any number of the ſix-inch bars as magnetical as may be, place them one by one with their edges againſt the two iron bars in the box, and with their poles of the ſame denomination the ſame way, puſhing them cloſe againſt the ſide of the box, which will keep them from turning over and lying flat-ways. Having placed as

many of the six-inch bars as are required, in this manner, lay two or three doubles of flannel, or something else that is soft and spungy, over them, and press them against the two iron bars with the lid of the box, and fasten it down. Such a *magnet* as this may be easily taken to pieces and retouched, and set together again, as occasion shall serve. A *magnet* of this kind, consisting of three dozen of six inch bars, will lift fifty pound avoirdupois.

MAGNET, *arsenical*, in *Chemistry*, MAGNES *arsenicalis*, denotes a mixture of equal parts of arsenic, sulphur, and antimony, melted together over the fire, and condensed in manner of a stone.

It is a very gentle caustic, and was first invented by Angelus Sala. It succeeds very well in taking down fungous flesh in wounds. It has its name *magnet*, because, being worn during malignant diseases, it is supposed to preserve the wearer from infection, by a *magnetical* power.

MAGNET, *artificial*, is a steel or iron bar, impregnated with the magnetic virtue, so as to possess all the properties, and be used instead of the natural *loadstone*. The method of making *magnets* of this kind, by means of a natural *magnet*, and even without the assistance of any *magnet*, was suggested many years ago by Mr. Servington Savery, and particularly described in the Phil. Transf. N° 414. See also Abridgement, vol. vi. part ii. p. 260, &c. But as his method was tedious and operose, though capable of communicating a very considerable virtue, it was little practised. Dr. Gowin Knight was the first who brought this kind of *magnets* to their present state of perfection, so as to be of much greater efficacy than the natural ones. The result of his method, though the process itself was kept secret, was first published in the Phil. Transf. for 1744, vol xliii. art. 8. and Phil. Transf. for 1745, art. 3. See also vol. xliv. for 1747. art. 2. Mr. Wilson has lately communicated to the public Dr. Knight's method; who informs us, that having provided himself with a large quantity of clean filings of iron, he put them into a large tub, that was more than one-third filled with clean water: he then, with great labour, worked the tub to and fro for many hours together, that the friction between the grains of iron by this treatment, might break off such smaller parts as would remain suspended in the water for some time. The obtaining of these very small particles in sufficient quantity, seemed to him, to be one of the principal desiderata in the experiment. The water being thus rendered very muddy, he poured the same into a clean earthen vessel, leaving the filings behind; and when the water had stood long enough to become clear, he poured it out carefully, without disturbing such of the iron sediment as still remained, which now appeared reduced almost to impalpable powder. This powder was afterwards removed, into another vessel, in order to dry it: and this process was several times repeated. When a sufficient quantity of this fine powder was procured, he made a paste of it with linseed oil; preferring this vehicle, because it contained a considerable quantity of the phlogistic principle. With these two ingredients he made a stiff paste, which he well kneaded, before he formed it into convenient shapes, and then put upon wood, and sometimes on tiles, in order to bake or dry it before a moderate fire, at about a foot distance from it. In about five or six hours it generally attained a sufficient degree of hardness. When these baked pieces were become cold, he gave them their magnetic virtue in any direction he pleased, by placing them between the extreme ends of his large magazine of artificial *magnets* for a few seconds or more, as he saw occasion. By this method, the virtue they acquired was such, that when any one of those pieces was held between two of his bett ten-guinea bars, with its poles purposely inverted, it immediately of itself turned about to recover its natural direction, which the force of those very powerful bars was not sufficient to counteract. Phil. Transf. vol. lxix. part. i. for 1779. art. 5. However, the method of making artificial *magnets* was discovered and published by Mr. John Michell, in a Treatise of Artificial *Magnets*, printed in 1750, and by Mr. John Canton, in the Phil. Transf. for 1751, vol. xlvii. art. 6. p. 31. The process for this purpose was also found out by others, particularly by Marsil Ultgeleeze Natuurkund. Verhandl. tom. ii. p. 261. and Du Hamel, Hist. Acad. Roy. 1745 and 1750.

Mr. Michell's method of making *magnets* is as follows: prepare a dozen bars of steel, of about 1¼ ounce weight each, six inches long, and half an inch broad: let these be hardened with a full, but not too great heat: let one end be nicked all round with a chissel, to distinguish it from the other; and the ends of the bars should be cleaned after hardening, either upon a smooth stone, or razor-grinder's wheel: the size and shape of the bars may be varied at pleasure, provided that the length be proportioned to the thickness. The best sort of steel is that which has no veins of iron in it, and Mr. Michell has found the common blistered steel at least equal to any other. When any *magnet* does not answer expectation, it will be proper to harden it over again, with a greater or less degree of heat, till it proves better. In order to preserve these bars, contrive a box, that shall have two pieces of iron, about an inch long each, fixed upright in the middle of each end, over against each other, at the distance of six inches from outside to outside. These pieces of iron may be about ¾ inch square, and should be filed pretty smooth on the sides. Against these are to be placed, with their edges towards them, the twelve magnetical bars, six on one side, with their south, or north poles one way, and six on the other side with the same poles the contrary way. It is necessary to observe that these bars must neither be taken out, nor put in, all, or too many on a side at once; for if two only be left, with their poles of the same denomination the same way, without one or more on the other side to counterbalance their effects, they will damage each other: and if two of the same side be taken out together, or laid with their poles of the same denomination together, after they are taken out, they will also damage one another: and if this be the case, it will be proper to restore them, before they are used, after the manner prescribed for making of *magnets*. In order to make the marked ends of these bars south poles, and the other ends north poles, place six of them in a line north and south, bringing the unmarked end of one, to touch the marked end of the next throughout; the marked ends lying towards the north, which will be some advantage to them. Then take an armed *magnet*, and placing it with both poles upon one of the bars, the north pole towards the marked end, which is to be a south pole, and the south pole towards the unmarked end, which is to be a north pole, slide it backwards and forwards, from end to end of the whole line of bars three or four times, taking care that they all touch. Then taking it off, remove the two endmost bars into the middle, and pass over them again three or four times. Having thus touched the bars, it will not be improper to turn them with the other side uppermost, and to touch them over again on that side as before, omitting the endmost bars, till they are removed into the middle, where they also are to be touched.

If an unarmed *magnet*, either natural or artificial be used, lay the bars in a line as before; place the south pole of the *magnet* upon the marked end of the endmost bar, and slide it over the whole line to the end; then taking that pole off, place the north pole upon the same bar in its room, not at the extremity of the bar, but towards the middle, and slide it back again; then, change the poles again, observing to set the *magnet* on at the middle of the bar, and slide it to the other end, as at first. Having done this four or five times, remove the two endmost bars into the middle, and placing the south pole of the *magnet* upon the marked end of them, slide it to the unmarked end; and then, placing the north pole upon the unmarked end, slide it to the marked end. Let this be repeated three or four times; and turning the bars with the other side upwards, repeat the same process again. When the *magnets* are weak, it may be necessary to touch the bars, according to the preceding directions, before they are hardened, when they will receive the magnetic virtue more easily; then, making the whole dozen magnetical, in the manner hereafter prescribed, till they are as strongly so as they will be in their soft state, harden one half; and having made these again magnetical with the remaining half that are soft, harden those also, and proceed. But if the *magnets* are too weak to perform properly, even in this case, recourse must be had to smaller bars of steel, which should also be soft; and if these fail, bars of iron must be used. Having communicated a small degree of magnetism to six of the bars, let the other six, which are unmagnetical, be laid in a line, in the same manner as the former: and let AB *Tab. Magnetism, fig.* 4. represent this line, consisting of six bars, though three only are delineated. The line drawn across at the end of each bar, represents the mark distinguishing that end which is to be made the south pole, from the other. Let CD, EF represent the six bars already made magnetical: these lean against each other at the top, and are separated by a piece of wood, or other matter except iron, about a tenth of an inch at the bottom. The three *magnets* in CD, have all their south poles downwards, and are placed towards the unmarked ends of the bars in the line, which are to be north poles; and the three *magnets* in EF, have all their north poles downward, and are placed towards the marked ends of the bars, which are to be south poles. Slide these six magnetical bars, thus placed, backward and forward three or four times, over the whole length of the line. Then taking them off, having first brought them to touch at the

bottom, remove the two endmoſt bars of the line into the middle, and replacing the magnetical bars upon them, as before, paſs over thoſe again. Then taking them off, and turning the bars in the line with the other ſide upward, go over them again in the ſame manner, excepting the endmoſt bars; which, when thoſe in the middle are touched, are to be removed thither, to be touched in their turn. Thus the bars in the line will give a ſtronger power to that of the other ſix, by which they were touched: and, therefore, theſe latter may now be laid down in a line, and retouched, after the ſame manner, with the latter; when this is done, lay thoſe down again, and retouch them with the others: repeat this operation a few times, firſt touching one ſet, and then the other, till they have acquired as much magneticiſm as they will retain; or till they will receive no additional force, by any farther repetition. The ſix-inch bars, made magnetical after this manner, when properly hardened, will ſingly lift by one pole, a piece of iron, weighing a pound or better, if it be of a proper form; and ſix ſuch bars will touch a line of freſh bars of the ſame ſize, to their full perfection, by three or four times ſliding over them; except the endmoſt which muſt always be removed into the middle. As ſeveral *magnets* laid together with their poles of the ſame denomination the ſame way, will greatly injure one another, unleſs they have ſomething to counteract them, it is abſolutely neceſſary, not to place two of them, of a ſide, on together; but ſingly, one on one ſide, and one on the other, making them to lean together, that they may reſt againſt one another at the top: at the bottom they are preſerved from injuring one another, by being placed upon the bar which is to be made magnetical. In like manner, they muſt not be taken off two of a ſide together, but ſingly, firſt on one ſide, and then on the other. But the readieſt way of taking them off is firſt to bring them to touch one another at the bottom, in the ſame manner as they do at the top, and then they may be removed at once, and upon occaſion ſet on again; only obſerving not to ſeparate them again at the bottom, till they are placed upon the bar, which they are to touch. The reaſon of removing the two bars at the ends of the line, in order to their receiving a greater virtue, ſeems to be, that the ſix *magnets*, employed in touching, are endeavouring to make that part of the bar which is not included between them magnetical, in a contrary direction from that which is included between them. As this laſt is the direction of magneticiſm deſigned, the former endeavour would be injurious; and it is prevented by two cauſes: one of which is the power, whereby the ſteel reſiſts in a degree every endeavour, either to make it magnetical, or to deſtroy its magneticiſm; and the other is the power of the bars already in ſome meaſure magnetical, which lie at both ends of the bar that is touched. Now this laſt power is wanting at one extremity of thoſe bars, that are placed at the ends; and conſequently not having a ſufficient force fully to reſiſt the contrary endeavour of the *magnets* employed in touching them, they become leſs magnetical than the others, which have a ſufficient force. Though in the line of bars, when making magnetical, each bar has only one at each end to ſupport it (thoſe *magnets* that are placed at the ends of the others to preſerve them being called *ſupporters*) againſt the contrary endeavour of the ſix, made uſe of to touch it; and this does very well: yet ſome will receive an additional force by being ſupported with larger *magnets*; or inſtead of theſe, two or three of their own ſize, at each end: thoſe at the marked end all with their north poles touching it, and thoſe at the unmarked end all with their ſouth poles touching it. And becauſe there will be two or three north poles, and as many ſouth poles together amongſt the ſupporters, at the other end from the bar to be touched, that have nothing to counteract them, it will be proper to place the ſouth pole of another *magnet* amongſt the north poles, and the north pole of another amongſt the ſouth poles, that they may not hurt one another, which they otherwiſe will do.

The manner above deſcribed is called the *double touch*: and Mr. Michell obſerves, that two *magnets* will give more ſtrength to a bar of their own ſize, when uſed after this manner, than a ſingle *magnet* equal to five of the former in ſtrength, when applied after the manner of the ſingle touch. This ingenious writer has deſcribed a frame, contrived for holding ſeveral of the ſix-inch bars, when they are uſed in touching large bars, and when they cannot be conveniently held in the hand; for an account of which we muſt refer to his excellent pamphlet, already cited, p. 45, &c. ed. 2.

He obſerves, that the form of *magnets* is of very little conſequence, with regard to their receiving the magnetic virtue, provided that they have a ſufficient length in proportion to their bulk. The ſtrait bars may be made ſquare, round, or flat; though the flat are moſt convenient for touching, and probably ſomewhat ſtronger. Theſe may alſo be pointed at the ends, as in *fig.* 5. in order to render them lighter and to increaſe their power of lifting; though pointed bars are not ſo proper for touching. The *magnet* may be made in the form of a horſe-ſhoe, as in *fig.* 6. where a wedge of iron is ſuppoſed to be applied to the poles of it; and it will thus lie in a mariner's compaſs, a wedge of iron may be applied to its two poles, and it will lift by both poles at once. The *magnet* may be alſo made annular, which is a plain flat bar, bent flatways inſtead of edgeways; and a ſemicircular *magnet* may be bent flatways like the annular, or edgeways like the horſe-ſhoe; and two *magnets* of this kind may be conveniently placed together, in order to preſerve each other.

The poles of a *magnet* may be converted by placing the bars which are to retouch it, with their north poles towards its north pole, and the ſouth poles towards its ſouth pole. In doing this, they ſhould be placed on at the middle, and ſlid once or twice backwards and forwards, before it is ſupported; and then, that which was the north pole muſt be ſupported as a ſouth pole, by north poles; and that, which was the ſouth pole, as a north pole, by ſouth poles. In order to make a bar magnetical, ſo that it ſhall have ſeveral poles, ſupport it at the places where the poles are deſigned to be, with poles of a contrary denomination from thoſe deſigned; and if any place is ſupported with ſouth poles, the next places on either ſide muſt be ſupported with north poles, and *vice verſa*. Having done this, conſider each piece included between any two ſets of ſupporters, as a ſeparate bar, to be made magnetical, with its ſouth pole towards the north ſet of ſupporters, and its north pole towards the ſouth ſet, and touch it accordingly. *Magnets* of this ſort will not do well, unleſs they are very long; and at beſt they are always weak, and will very ſoon be injured; ſo that they ſhould only be made occaſionally.

Mr. Michell has alſo publiſhed a method of obtaining magneticiſm by means of three iron bars, without the aſſiſtance of a natural loadſtone, for which we ſhall refer to his pamphlet, p. 60, &c. and proceed to deſcribe the method deſcribed by the ingenious Mr. Canton, the remembrance of whoſe knowlege and communicative diſpoſition has led the editor often to lament his death in the courſe of this work; and whoſe friendſhip demands this tribute of reſpect. This gentleman has ſucceeded ſo well in his attempts to convey a conſiderable magnetic virtue to bars of hardened ſteel, as to be able to impregnate ſuch bars with this virtue to as high a degree, at leaſt, as any bars of the ſame weight and dimenſions, which he had ſeen or heard of; and to as high a degree, as he apprehends, the ſame bars, in their preſent ſtate, are capable of being impregnated. Mr. Canton was able, in about half an hour's time, to communicate to ſix bars of hardened ſteel, at firſt entirely deſtitute of any magnetic virtue, the utmoſt virtue they were capable of receiving; and that without the mediation or aſſiſtance of any natural *loadſtone*, or of any artificial *magnet*. Mr. Canton has publiſhed the deſcription of his proceſs with ſuch directions, that any perſon may readily perform the ſame. For this purpoſe procure a dozen bars; ſix of ſoft ſteel, each three inches long, $\frac{1}{4}$ inch broad, and $\frac{1}{8}$ inch thick, with two pieces of iron, each half the length of one of the bars, but of the ſame breadth and thickneſs; and ſix of hard ſteel, each $5\frac{1}{2}$ inches long, half an inch broad, and $\frac{1}{8}$ of an inch thick, with two pieces of iron of half the length, but the whole breadth and thickneſs of one of the hard bars: and let all the bars be marked with a line quite round them at one end. Then take an iron poker and tongs, (or two bars of iron) *Tab. Magnetiſm. fig.* 7. the larger they are, and the longer they have been uſed, the better: and fixing the poker upright between the knees, hold to it near the top one of the ſoft bars, having its marked end downward, by a piece of ſewing ſilk, which muſt be pulled tight with the left hand, that the bar may not ſlide; then graſping the tongs with the right hand a little below the middle, and holding them nearly in a vertical poſition, let the bar be ſtroked by the lower end, from the bottom to the top, about ten times on each ſide, which will give it a magnetic power ſufficient to lift a ſmall key at the marked end; which end, if the bar was ſuſpended on a point, would turn towards the north, and is, therefore, called the north pole, and the unmarked end is, for the ſame reaſon, called the ſouth pole of the bar. Four of the ſoft bars being impregnated after this manner, lay the other two, *fig.* 8. parallel to each other, at the diſtance of about one-fourth of an inch, between the two pieces of iron belonging to them, with a north and a ſouth pole againſt each piece of iron; then take two of the four bars already made magnetical, and place them together, ſo as to make a double bar in thickneſs, the north pole of one being

being even with the south pole of the other; and the remaining two being put to these, one on each side, so as to have two north and two south poles together, separate the north from the south poles at one end by a large pin, and place them perpendicularly with that end downward, on the middle of one of the parallel bars, the two north poles towards its south, and the two south poles towards its north end: slide them backward and forward three or four times over the whole length of the bar, and removing them from the middle of this, place them on the middle of the other bar as before directed, and go over that in the same manner: then turn both the bars with the other side upward, and repeat the former operation: this being done, take the two from between the pieces of iron, and placing the two outermost of the touching bars in their room, let the other two be the outermost of the four to touch those with; and this process being repeated till each pair of bars has been touched three or four times over, which will give them a considerable magnetic power, put the half dozen together after the manner of the four, *fig.* 9. and touch with them two pair of the hard bars, placed between the irons at the distance of about half an inch from each other; then lay the soft bars aside; and with the four hard ones set the other two be impregnated, *fig.* 10. holding the touching bars apart at the lower end near two tenths of an inch, to which distance let them be separated after they are set on the parallel bar, and brought together again after they are taken off; this being observed, proceed according to the method already described, till each pair has been touched two or three times over. But as this vertical way of touching a bar will not give it quite so much of the magnetic virtue as it will receive, let each pair be now touched once or twice over, in their parallel position between the irons, *fig.* 11. with two of the bars held horizontally, or nearly so, by drawing at the same time the north of one from the middle over the south end, and the south of the other from the middle over the north end of a parallel bar: then bringing them to the middle again without touching the parallel bar, give three or four of these horizontal strokes to each side. The horizontal touch, after the vertical, will make the bars as strong as they can possibly be made; as appears by their not receiving any additional strength, when the vertical touch is given by a greater number of bars, and the horizontal by those of a superior magnetic power. This whole process may be gone through in about half an hour, and each of the larger bars, if well hardened, may be made to lift twenty-eight Troy ounces, and sometimes more. And when these bars are thus impregnated, they will give to a hard bar of the same size its full virtue in less than two minutes; and will, therefore, answer all the purposes of magnetism in navigation and experimental philosophy, much better than the *loadstone*, which is well known not to have sufficient power to impregnate hard bars. The half dozen being put into a case, *fig.* 12. in such a manner as that two poles of the same denomination may not be together, and their irons with them as one bar, they will retain the virtue they have received; but if their power should, by making experiments, be ever so far impaired, it may be restored without any foreign assistance in a few minutes. And if, out of curiosity, a much larger set of bars should be required, these will communicate to them a sufficient power to proceed with, and they may in a short time, by the same method, be brought to their full strength. Mr. Canton, by the same process, communicated magnetic virtue to two larger bars, each half an inch square, 10¼ inches in length, and weighing nearly ten ounces and twelve penny-weights, to such a degree, that one of them lifted, by one of its ends, seventy-nine ounces and nine penny-weights; and a flat semicircular steel *magnet*, weighing an ounce and thirteen penny-weights, was made to lift, by applying its two ends together to an iron wedge, ninety Troy ounces. The same ingenious gentleman could also readily deprive his bars of their virtue; and charge the poles of a natural loadstone, by placing it in an inverted direction, between the contrary poles of his larger bars, laid down at some distance from each other, in the same strait line continued at the distance of about a quarter of an inch from either of the poles, without touching the stone with either of the bars.

The method in which the steel be made use of was hardened is as follows: having cut a sufficient quantity of the leather of old shoes into very small pieces, an iron-pan is provided, which a little exceeds the length of a bar, is wide enough to admit of two bars side by side without touching each other on the pan, and at least an inch deep. This pan is nearly half-filled with the bits of leather, upon which are laid the two bars, having fastened to the end of each a small wire for taking them out: the pan is then quite filled with the leather, and placed on a gentle flat fire, being covered and surrounded with charcoal. The pan being brought to somewhat more than a red heat, is kept for about half an hour, and the bars are suddenly quenched in a large quantity of cold water. Mr. Horne, in his Essays on Iron and Steel, p. 147. claims the merit of directing this process for hardening Mr. Canton's bars. Artificial *magnets* are preferable to the natural ones in a variety of respects. Mr. Michell mentions particularly, that they may be had at much less expence and trouble, and in greater plenty; that they are much superior to natural *magnets* in strength, and better able to communicate the magnetic virtue in proportion to their strength; that they are more easily restored to their former strength when they are at any time damaged; that they furnish several poles; and that they may be had in every form.

MAGNETICAL *amplitude* and *azimuth*. See AMPLITUDE and AZIMUTH.

MAGNETICAL *line*, is that line in which a needle would place itself, if left at entire liberty to turn itself as well vertically, as horizontally.

MAGNETICAL *meridian*, in *Navigation*. See MERIDIAN.

MAGNETICAL *needle*, in *Navigation*, &c. See NEEDLE.

MAGNETIS *lapis*, in the *Natural History of the Ancients*, the name given in different ages to two very different substances. The earliest Greek authors expressed by it the loadstone, which became afterwards called *Heraclius lapis*; and then the word *magnes* was applied to a very different stone brought from the same place, the neighbourhood of Magnesia in Lydia.

This was a fine beautiful and bright substance, of a pure white, and so very bright and glossy, as to bear a resemblance to polished silver. It was dug in large masses, and was of a texture capable of being wrought into any figure. Accordingly it was in great esteem among the ancients, who had it wrought into vessels for the use of the table.

It seems to be wholly unknown at present among the nations we have commerce with. Hill's Theophrast. p. 79.

MAGNETISM, MAGNETISMUS, that quality or constitution of a body, and its pores, whereby it is rendered *magnetical*, or a *magnet*.

Magnetism is found to be a transient power, capable of being produced and destroyed again.

MAGNETISM, *the laws of*, are laid down by Mr. Whiston in the following propositions.—1. The *loadstone* has both an attractive and a directive power united together: whereas iron touched by it has only the former; i. e. the *magnet* not only attracts needles, or filings of steel, but directs them to certain different angles, with respect to its own surface and axis: whereas iron, touched with it, does little or nothing more than attract them; still suffering them to lie along or stand perpendicular to its surface and edges in all places; without any such special direction.

2. Neither the strongest nor the largest *magnets* give a better directive touch to needles, than those of a less size or virtue: to which it may be added, that whereas there are two qualities in all *magnets*, an attractive and a directive one; neither of them depend one or are any argument of the strength of the other.

3. The attractive power of *magnets*, and of iron, will greatly increase or diminish the weight of needles on the balance; nay, it will overcome that weight, and sustain other additional weights too: while the directive power has a much smaller effect. Gassendus, indeed, as well as Mersennus and Dr. Gilbert, maintain, it has none at all: but by mistake; for Mr. Whiston found, from repeated trials on large needles, that after the touch they weighed less than before. One of 4584 grains, lost 24 grains by the touch; and another of 63776 grains weight, no less than 74 grains.

4. It is probable, that iron consists almost wholly of the attractive particles; and the *magnet* of the attractive and directive together; mixed, probably, with other heterogeneous matter; as having never been purged by the fire, which iron has: and hence may arise the reason why iron, after it has been touched, will lift up much greater weights than the *loadstone* that touched it.

5. The quantity and direction of *magnetic* powers, communicated to needles, is not properly, after such communication, owing to the *magnet* which gave the touch; but to the goodness of the steel that receives it, and to the strength and position of the terrestrial *loadstone*, whose influence alone those needles are afterwards subject to, and directed by: so that all such needles, if good, move with the same strength, and point to the same angle; what *loadstone* soever (provided it be good) they have been excited by. Nor does the touch seem to do much more in *magnetical*, than attrition does in electrical cases; i. e. it serves to rub off some obstructing particles, that adhere to the surface of the steel, and open the pores of the body touched, and so make way for the entrance and exit of such effluvia as occasion or assist the powers we are

speaking of. Hence Mr. Whiston takes occasion to observe, that the directive power of the *loadstone* seems to be mechanical; and to be derived from *magnetic* effluvia, circulating continually round it.

6. The absolute attractive power of different armed *loadstones* is, *cæteris paribus*, according to the quantity, not of their diameters or solidities, but of the surfaces of the *loadstones*; or in a duplicate proportion of their diameters.

7. The power of good *magnets* unarmed, not sensibly different in strength, similar in figure and position, but unequal in magnitude, is sometimes a little greater, sometimes a little less, than in the proportion of their similar diameters.

8. The *loadstone* attracts needles that have been touched, and others that have not been touched, with equal force, at distances unequal; viz. where the distances are to one another as 5 to 2.

9. Both poles of a *loadstone* equally attract needles, till they be, though roughly, touched; then it is, and then only, that one pole begins to attract one end, and repel the other: though the repelling pole will still attract upon contact, nay, at very small distances, notwithstanding.

10. The attractive power of *loadstones*, in their similar position to, but different distances from, *magnetic* needles, is in the sesquiduplicate proportion of the distances of their surfaces from their needles reciprocally; or as the mean proportionals between the squares and the cubes of those distances reciprocally; or as the square roots of the fifth powers of those distances reciprocally. Thus the *magnetic* power of attraction, at twice the distance from the surface of the *loadstone*, is between a fifth and sixth part of that power at the first distance; at thrice the distance, the power is between the fifteenth and fifteenth part; at four times the distance, the power is thirty-two times as small; and at six times the distance, eighty-eight times as small. Where it is to be noted, that the distances are not taken, as in the laws of gravity, from the centre; but from the surface: all experience assuring us, that the *magnetic* power resides chiefly, if not wholly, in the surfaces of the *loadstones* and iron; without any particular relation to any centre at all. The proportion here laid down was determined by Mr. Whiston, from a great number of experiments of Mr. Hawksbee, Dr. Brook Taylor, and himself. The force they measured by the chords of those arcs, by which the *magnet*, at several distances, draws the needle out of its natural direction, to which chords (as he has demonstrated) it is ever proportional. The numbers in some of their most accurate trials he gives us in the following table; setting down half the chords, or the sines of half those arcs of declination, as the true measures of the power of *magnetism*.

Distances in inches.	*Degrees of inclination.*	*Sines of ½ arcs.*	*Rat. sesquidupl.*
20	2	175	466
14½	4	349	216
13¾	6	523	170
12⅛	8	697	138
11½	10	871	105
10¼	12	1045	87
9½	14	1219	70

Sir Isaac Newton supposes magnetic attraction to decrease nearly in the triplicate ratio of the distance: Mr. Martin observes, that the power of his loadstone decreases in the sesquiplicate ratio of the distances inversely. Dr. Hellham found it to be as the squares of the distances inversely, which ratio agrees with that of the ingenious Mr. Michell: others as Dr. Brook Taylor, and Mr. Musschenbrock are of opinion, that this power follows no certain ratio at all, but that it is much quicker at greater distances than at small ones, and that it is different in different stones. See *Phenomena of the* MAGNET, N° 4.

11. An inclinatory, or dipping-needle, of six inches radius, and of a prismatic or cylindric figure, when it oscillates along the *magnetic* meridian, performs there every mean vibration in about 6′ or 360″; and every small oscillation in about 54″, or 330″; and the same kind of needle, four feet long, makes every mean oscillation in about 24′, and every small one in about 22″.

12. The entire power of *magnetism* in this country, as it affects needles a foot long, is to that of gravity nearly as 1 to 300; and as it affects needles four feet long, as 1 to 600.

13. The quantity of *magnetic* power accelerating the same dipping needle, as it oscillates in different vertical planes, is ever as the cosines of the angles made by those planes, and the *magnetic* meridian, taken on the horizon.

Thus if we would estimate the quantity of forces in the horizontal and vertical situations of needles at London; we shall find, that the latter, in needles a foot long, is, to the entire force along the *magnetic* meridian, as 96 to 1005; and in needles four feet long, as 9667 to 10000: whereas in the former, the entire force in needles a foot long, is as 28 to 1005; and in those four feet long, as 2569 to 10000.

Whence it follows, that the power by which horizontal needles are governed in these parts of the world, is but one quarter of the power by which the dipping needle is moved.

Hence, also, since the horizontal needle is moved only by a part of the power which moves the dipping-needle; and that it only points to a certain place in the horizon, because that place is the nearest its original tendency of any its situation will allow it to tend to; whenever the dipping-needle stands exactly perpendicular to the horizon, the horizontal needle will not respect one point of the compass more than another, but will wheel about every way unerringly.

14. The time of oscillation and vibration, both in dipping and horizontal needles equally good, is as their length directly; and the actual velocity of their points along their arcs is always equal.

Hence *magnetic* needles are, *cæteris paribus*, still better, the longer they are; and that in the same proportion with their length.

15. The earth on which we live, includes within it a vast spherical *magnet*, concentrical thereto, having its own poles, meridians, equator, and parallels; and all much of the same general nature with those of small *terrellæ*, or spherical *loadstones*, in the possession of the curious among us.

16. The power of a good *terrella*, or a spherical *loadstone*, as it affects a needle a foot long, is equal to the *magnetic* power of that internal *loadstone* about two and a half, or three diameters of such *loadstone*. From which consideration, the quantity of *magnetic* attraction, at all distances from the internal *loadstone*, for needles a foot long, may be determined; and from the same consideration it appears, that the diameter of this internal *loadstone* is about eleven hundred and fifty miles. To which we add, that, in regard Sir Isaac Newton has demonstrated, that the power of gravity diminishes within the earth, and is less there than at its surface, nearly in the proportion of its greater nearness to the centre, the *magnetic* power, at two thousand nine hundred miles distance from us, and nearly one thousand and sixty from the earth's centre, which is ⅛ of the power of gravity here, will be somewhat greater than the power of gravity there: which limit is worthy our attention, gravity being stronger than *magnetism* on the one side of it, and weaker on the other; we mean, as it affects needles of one foot diameter. At that limit, therefore, at least near the *magnetic* poles, iron a foot long will be twice as heavy, and fall twice as fast, as any other natural body, viz. by the union of those two equal powers, gravity and *magnetism*; and of consequence, above that limit, such an iron will be less than twice as heavy, below it more than twice as heavy, as any other natural body.

17. The earth's internal *loadstone* is not fixed to our upper parts, but is moveable with respect to them, and actually revolves on the earth's axis, from east to west, in a certain long period of time; as appears, beyond contradiction, from the constant variation of the horizontal needle westward, as well as the regular increase of inclination of the dipping needle.

The only way to render this motion, i. e. the variation, possible and intelligible (to use Dr. Halley's words), is to suppose it to turn about the centre of a globe, having its centre of gravity fixed and immoveable in the same common centre of the earth. This moveable internal surface must likewise be loose, and detached from the external parts of the globe, which may be reckoned the shell, and the other the nucleus, or inner globe, included within it, with a fluid medium between. Now, from the variation's moving westward, it is plain, that the forefaid nucleus has not precisely attained the same degree of velocity with the exterior parts in their diurnal revolution: but so nearly equals it, that in three hundred and sixty-five revolutions, the difference is scarce sensible; and must probably have arisen from hence, that the impulse, whereby the diurnal motion was impressed on the earth, was given to the external parts, and thence communicated to the internal.

18. This internal *magnet* has one central pole northward, in the nature of the poles of our common *loadstones*; but its southern pole appears not to be central, but rather circular, and that at a great distance from the southern pole of the earth.

19. The northern *magnetic* pole is now situate, says Mr. Whiston, about the latitude of 76 degrees ½; i. e. thirteen degrees ½ from the north pole of the earth, and about 30 degrees eastward from the meridian of London.

20. The southern *magnetic* circular pole has its centre, or central pole, nearly in the parallel of 60 degrees: and, in a meridian passing along the east coast of Borneo, about 117 degrees eastward of London. Its radius is also an arc of a great circle of about 44 degrees.

21. The respective motion of the internal *magnet*, or the velocity v.s. of its north pole, appears to be 27 deg. 0 min. 21. 144 years, *i. e.* upwards of one degree in five years; so that it makes an entire revolution in 1920 years.

Hence, as the number of degrees in the upper earth's diurnal revolution is to the number of days in the revolution of the internal *magnet*, *i. e.* as 1 is to 360000, so is the respective motion of this *magnet* from east to west, to the real motion of the upper earth from west to east; or, to speak strictly, so is the difference of their motions from west to east to the entire motion of the upper earth the same way. This external fixed earth has therefore communicated almost all its motion already to the internal *magnet*; and can communicate no more than this difference of their motion, and that only in an infinite term of years; or, in other words, this real internal motion can never be the seven hundred thousandth part swifter than it is apprehended. This internal motion, therefore, began with the commencement of the diurnal motion of the upper earth; and has gone on still faster and faster by the communication of that motion through the intermediate fluid. Since, therefore, action and re-action are equal, and tend to contrary parts, this internal *loadstone*, thus accelerated by the upper part, must have all along retarded that upper earth, and made the diurnal rotation still slower and slower. This acceleration on one side, and retardation on the other, must have been very great at the first beginning of the diurnal motion, when the difference of their motion was equal to the entire motion itself, and must have been diminishing ever since. To which cause is probably owing that acceleration of the moon's motion with respect to that of the earth, since the time of the old astronomers, first taken notice of by Dr. Halley, and embraced by Sir Isaac Newton. And the same consideration seems to suggest a method for determining the age of the world; for, were the proportions of the quantity of matter in the upper earth to the internal *magnet*, with the tenacity of the intermediate fluid, &c. known, one might go back from the known difference of their velocity now, and find those differences and quantities of motion themselves, *a priori*, in all past ages; or, were the velocity of the first diurnal rotation of the upper earth known, we might geometrically determine, *a priori*, how long ago that rotation began, or how ancient our earth is.

22. The variation of *magnetic* needles from the azimuth of the meridians of the internal *magnet* is derived from the difference of the strength of the several parts of the internal *magnet*'s surface; which as it is only to be known by experience, that variation cannot be determined beforehand, unless where there are good accounts how much it had formerly been; it being probable, that it returns round, and will be the same in any year of the next revolution of the internal *magnet*, that it has been in the like year of any former revolution, or will itself have a revolution in about 1920 years.

23. The two fixed *magnetic* poles in our upper earth first introduced by Dr. Halley, as necessary to solve the irregularity of the variation of the horizontal needle from the meridians of the moveable internal *magnet* seem not to have any just foundation in nature, the like irregularities being found in the common *terrestrial*, or spherical *loadstones*, and being both accounted for from the composition of the *magnet*, which are found to have parts of different degrees of purity, strength and perfection; so that where the parts are weaker than ordinary, the stronger neighbouring parts prevail, and draw the needle that way: not but Dr. Gilbert's notion of prominent and depressed parts on *magnets* may have some room, and be allowed to contribute somewhat to such variations. See VARIATION.

MAGNETISM, *on the cause of*, or the manner in which these phænomena of the *magnet* are produced, we have yet no hypothesis that will satisfactorily account for them. Plutarch tells us, the *magnet* attracts iron, by emitting some spherical effluvia, whereby the contiguous air being opened and driven on either side, does again drive that contiguous to it; and thus the action being communicated round, the iron is thereby protruded: but this is contradicted by the equally vigorous action of the *loadstone* in vacuo, and in the open air. Others of the ancients ascribe the action of the *magnet* to a soul that animates it; and others to an unknown sympathy between the effluvia of the iron and those of the *magnet*.

An opinion that has much prevailed among the moderns, is that of Descartes, maintained by Malebranche, Rohault, Regis, &c. and even admitted and confirmed by Mr. Boyle, &c. In this it is supposed, that there is continually flowing, from the poles of the world, a subtile, impalpable, and invisible matter, channelled or striated: which matter, circulating round the earth, in the planes of the meridians, re-enters at the pole, opposite to that from which it issued, and passes again through the poles parallel to its axis: that the *magnet* has two poles answerable to those of the earth; and that out of these there issues a matter like that just mentioned; and that this matter, entering at one of the poles, gives the impulse whereby iron tends to the *magnet*, and produces what we call *attraction*. Now, besides the *magnetical* matter re-entering the poles of the *magnet*, there is always a certain quantity thereof circulating round the *magnet*, composing a kind of vortex about it. The space wherein this matter moves, is the sphere of activity of the *magnet*, within which its attractive faculty is confined.

Dr. Gilbert, in his work De Magnete, folio, printed 1600, concludes, from some experiments which he made, that the needle is not attracted by the *magnet*, but turned into its position, by what he calls a disponent virtue; which he supposed to surround the stone, somewhat in form of an atmosphere.

As to its directive faculty, or the inclination of a needle touched with it to the poles of the world, and its dip to a point beneath the horizon, they follow from the same principle; since were the *magnet* or needle to have any other situation, the *magnetic* matter would strike on its other surfaces in vain; and, not being able to get admission, would, by degrees, change its situation, till such time as its pores corresponded to the course of the *magnetical* matter; which situation having once acquired, it would cease to move, the *magnetical* matter then ceasing to disturb it.

The form or essence of a *magnet* therefore is supposed to consist in its being perforated by an infinite number of parallel pores; some whereof are disposed to admit the striated matter from the north pole of the world, others that of the south: hence the north and south poles of the *magnet*.

Mr. Harsfocker maintains, that the *magnet* is no more than a common stone, full of an infinite number of hollow prisms; which, by the diurnal motion of the earth, are ranged parallel to each other, and nearly parallel to the axis of the earth. These prisms have their cavities filled with an extremely subtile matter, which, by the diurnal motion of the earth, is passed from prism to prism; thus making a circulation, and returning into the prisms where it first began. From these principles he deduces all the phænomena of the *magnet*; and M. Andry does the same, from the doctrine of alkali and acid.

For the directive power of the *magnet*, Mr. Whiston, from the first, second, third, &c. laws of *magnetism*, inclines to think it mechanical; and ascribes it to *magnetic* effluvia circulating continually round the *loadstone*; of which circulations, he thinks, there are evident indications in *magnetic* experiments; as Mr. Boyle thinks there are of the *magnetism*, or *magnetic* effluvia, of the earth; though these effluvia are never yet rendered sensible, as electric effluvia began to be in his time. But the attractive power Mr. Whiston thinks entirely unmechanical, as the power of gravity is; not being able to devise any such motion of a subtile fluid belonging to the *loadstone*, as will account for the attractive power in the reciprocal ratio proportion of the distances reciprocally; though if he could, yet would that be no more than to remove the immediate power of the Supreme Being one step farther; the last resort of all mechanical principles whatever being in the unmechanical power and efficacy of the Deity.

Dr Knight deduces from several experiments the following propositions, which he offers not so much to explain the nature of the cause of *magnetism*, as the manner in which it acts: the *magnetic* matter of a *loadstone*, he says, moves in a stream from one pole to the other internally; and is then carried back in a curve line externally, till it arrive again at the pole where it first entered, to be again admitted; the immediate cause why two or more *magnetical* bodies attract each other in the first degree and the same stream of *magnetical* matter thro' them: and the immediate cause of *magnetic* repulsion is the endless and accumulation of the *magnetic* matter. Phil. Trans. vol. xliv. p. 671. See Mr. Michel reflects the notion of a subtile fluid, but though he proposed to publish a theory of *magnetism* established by experiments, no such theory has appeared. Signior Beccaria, from observing that a sudden stroke of LIGHTNING gives polarity to *magnets*, conjectures, that a regular and constant circulation of the whole mass of the electric fluid from north to south may be the original cause of *magnetism* in general. This current he would not suppose to arise from one source, but from several, in the northern hemisphere of the earth: the aberration of the common centre of all the currents from the north point, may be the cause of the *variation* of the needle; the period of this declination of the centre of the currents may be the period of the variation; and the obliquity with which the currents strike into the earth may be the cause of the dipping of the needle, and also why bars of iron

more easily receive the *magnetic* virtue in one particular direction. Lettie dell' Elettricismo p. 269. or Priestley's Hist. Elec. vol. i. p. 409, &c. For the principal properties, with respect to which *magnetism* and electricity differ from or resemble each other, see ELECTRICITY.

MAGNETISM is also used, by some *Chemists*, to signify a certain nature whereby one thing becomes affected at the same time with another, either in the same, or in a different manner. This amounts to the same with what they otherwise call SYMPATHY.

MAGNIFYING, among *Philosophers*, is chiefly used in speaking of microscopes, which are said to *magnify* objects, that is, to make them appear bigger than they really are, though, in reality, they do not, nor can, *magnify* any object, but only shew it nearer, and discover more of its parts, than before were taken notice of.

The *magnifying* power of denſe mediums of certain figures was known to the ancients, though they were far from underſtanding the cauſe of this effect. Seneca ſays, that ſmall and obſcure letters appear larger and brighter through a glaſs globe filled with water; and he abſurdly accounts for it by ſaying, that the eye ſlides in the water, and cannot lay hold of its object. Nat. Queſt. lib. i. c. 6.

Alexander Aphrodiſienſis, the great commentator upon Ariſtotle, who flouriſhed near two centuries after Seneca, ſays, that the reaſon why apples appear large when they are immerſed in water is, that the water which is contiguous to any body is affected with the ſame quality and colour; ſo that the eye is deceived in imagining the body affected to be larger. But the firſt diſtinct account we have of the *magnifying* power of glaſſes is in the writings of Alhazen, who flouriſhed in the twelfth century; and he was preceded by our own countryman Roger Bacon, who, in his Opus Majus, demonſtrates, that if a tranſparent body interpoſed between the eye and an object be convex towards the eye, the object will appear magnified; nor is it improbable that from the obſervations of Alhazen and Bacon the conſtruction of SPECTACLES was derived.

MAGNIFYING *glaſs*, in *Optics*, denotes a little ſpherical convex lens; which, in tranſmitting the rays of light, inflects them ſo, as that the parallel ones become converging, and thoſe which were diverging become parallel; by means whereof, objects viewed through them appear larger than when viewed by the naked eye. See MICROSCOPE.

MAGNISSA, in *Mineralogy*, a name given by ſome of the ancients to the white pyrites, called by others *lenadithes* and *oppobalſus*. See MARCASITE.

MAGNITUDE, any thing that has parts without (or *extra* to) parts connected together by ſome common term.

Magnitude is any thing locally extended, or continued; or that has ſeveral dimenſions.

The origin of all *magnitude* is a point, which, though void of parts itſelf, yet its flux forms a line, the flux of that a ſurface, and of that a body.

Magnitude amounts to much the ſame with what is otherwiſe called *quantity*.

MAGNITUDE *geometrical* may be uſefully conſidered as generated or produced by motion. Thus lines may be conceived as generated by the motion of points; ſurfaces, by the motion of lines; ſolids, by the motion of ſurfaces; angles may be ſuppoſed to be generated by the rotation of their ſides.

Geometrical magnitude is always underſtood to conſiſt of parts; and to have no parts, or to have no *magnitude*, are conſidered as equivalent in this ſcience. There is, however, no neceſſity for conſidering *magnitude* as made up of an infinite number of ſmall parts; it is ſufficient that no quantity can be ſuppoſed to be ſo ſmall, but it may be conceived to be farther diminiſhed: and it is obvious, that we are not to eſtimate the number of parts that may be conceived in a given *magnitude*, by thoſe which in particular determinate circumſtances may be actually perceived in it by ſenſe, ſince a greater number of parts become ſenſible, by varying the circumſtances in which it is perceived. See Mac-Laurin's Fluxions, art. 290, &c.

Many of late have ſuppoſed geometrical *magnitude* to be compoſed of infinitely ſmall parts, and infinite in number; and hence have raiſed many paradoxes and myſteries in a ſcience wherein there ought to be none. Nay, infinitely ſmall parts of infinitely ſmall parts, &c. *ad infinitum*, have been introduced without the leaſt neceſſity. See Mac-Laurin's Fluxions in the Introduction, where he makes ſeveral remarks on Monſieur de Fontenelle's *Geometrie de l'Infini*. See EXTENSION.

MAGNITUDE, *literal*, denotes a *magnitude* expreſſed by letters.

MAGNITUDE, *numerical*, is that expreſſed by numbers.

MAGNITUDE, *broken*, denotes a fraction.

MAGNITUDE, *complex*, is that formed by multiplication.

MAGNITUDE *incommenſurable* is that which has no proportion to unity.

MAGNITUDE *apparent* of a body, in *Optics*, is that meaſured by the optic or viſual angle, intercepted between rays drawn from its extremes to the centre of the pupil of the eye. It is one of the fundamental maxims in this ſcience, that whatever things are ſeen under the ſame or equal angles, appear equal; and *vice verſa*.

The *apparent magnitudes* of an object, at different diſtances are in a ratio leſs than that of their diſtances reciprocally.

The *apparent magnitudes* of the two great luminaries the ſun and moon, at riſing and ſetting, are a phenomenon that has extremely embarraſſed the modern philoſophers. According to the ordinary laws of viſion, they ſhould appear the leaſt when neareſt the horizon, as being then fartheſt diſtant from the eye; and yet we find the contrary to be true in fact.

Thus, it is well known, that the mean *apparent magnitude* of the moon is 30′ 20″, in round numbers 30′, at a full moon in the midſt of winter, and when ſhe is in the meridian, and at her greateſt northern latitude, and conſequently at her leaſt elevation above our horizon: it is alſo as well known, that when ſhe is in this ſituation, being looked upon by the naked eye, ſhe appears to be, accommodating her *magnitude* to our ſenſible meaſures, about a foot broad. But when ſhe is looked upon as ſhe riſes, ſhe appears to be three or four foot broad, and yet if we take her diameter with an inſtrument, both in the one ſituation and the other, we ſhall find that ſhe is only 30′.

Ptolemy, in his Almageſt, lib. i. cap. 3, has aſcribed this appearance to a refraction of the rays by vapours, which actually enlarge the angle under which the moon appears; juſt as the angle is enlarged by which an object is ſeen from under water: and his commentator Theon explains diſtinctly how the diſtortion of the angle in the object immerſed in water is cauſed. But it was afterwards diſcovered, that there is no alteration in the angle: upon which another ſolution was ſtarted by the Arab Alhazen; and followed and improved by Vitello, Kepler, Peckham, Rog. Bacon, and others. According to Alhazen, the ſight apprehends the ſurface of the heavens as flat, and judges of the ſtars as it would of ordinary viſible objects extended upon a wide plain; the eye ſees them under equal angles, but withal perceives a difference in their diſtances, and (on account of the ſemidiameter of the earth, which is interpoſed in one caſe, and not in the other) that it is hence induced to judge thoſe which appear more remote to be greater. Some farther improvement was made in this explanation by Mr. Hobbes, though he fell into ſome miſtakes in his application of geometry to this ſubject. For he obſerves, that this deception operates gradually from the zenith to the horizon; and that if the apparent arch of the ſky be divided into any number of equal parts, thoſe parts, in deſcending towards the horizon will gradually ſubtend a leſs and leſs angle; and he was the firſt who expreſly conſidered the exalted appearance of the ſky as a real portion of a circle. Deſcartes, and from him Dr. Wallis, and moſt other authors, account for the appearance of a different diſtance under the ſame angle, from the long ſeries of objects interpoſed between the eye and the extremity of the ſenſible horizon; which makes us imagine it more remote than when in the meridian, where the eye ſees nothing in the way between the object and itſelf. This idea of a great diſtance makes us imagine the luminary the bigger; for any object being ſeen under any certain angle, and believed at the ſame time, very remote, we naturally judge it muſt be very large, to appear under ſuch an angle, at ſuch a diſtance. And thus a pure judgment of the mind makes us ſee the ſun, or the moon, bigger in the horizon than in the meridian; notwithſtanding their images painted on the retina are really leſs in the former ſituation than the latter.

James Gregory Geom. Par. Univerſ. p. 141. ſubſcribes to this opinion: Father Malebranche alſo, in the firſt book of his Recherche de la Verité, printed in 1673. has explained this phenomenon almoſt in the expreſſion of Des Cartes: and Huygens, in his Treatiſe on the Parhelia, tranſlated by Dr. Smith, Optics, art. 436, has approved, and very clearly illuſtrated the received opinion. The cauſe of this fallacy, ſays he, in ſhort, is this; that we think the ſun or any thing elſe in the heavens, to be remoter from us, when it is near the horizon, than when it approaches towards the vertex, becauſe we imagine every thing in the air that appears near the vertex to be no farther from us than the clouds that fly over our heads;

heads; whereas, on the other hand, we are uſed to obſerve a large extent of land lying between us and the objects near the horizon, at the far end of which the convexity of the ſky begins to appear; which, therefore, with the objects that appear in it, is uſually imagined to be much farther from us. Now when two objects of equal magnitudes appear under the ſame angle, we always judge that object to be larger which we think is remoter. And this is the true cauſe of the deception we have been ſpeaking of. It is a wonder that an hypotheſis ſo rational as this ſhould ever loſe its credit, after having been maintained by writers of reputation, and for a great number of years. But it was generally imagined, that the actual perception of thoſe objects which divide the ſpace that is intercepted betwixt the eye and the horizon was neceſſary, in order to its ſuggeſting the idea of its extraordinary diſtance: and thus philoſophers were led to form much more objectionable ſolutions of the phenomenon. Accordingly Gaſſendus was of opinion, that the pupil of the eye, which is always more open as the place is more dark; being more ſo in the morning and evening than at other times, by reaſon the earth is covered with groſs vapours; and beſides, being obliged to paſs through a longer column or ſeries of vapours to reach the horizon; the image of the luminary enters the eye at a greater angle, and is really painted there larger at the former times than the latter. In anſwer to which, it may be ſaid, that, notwithſtanding this dilatation of the pupil, occaſioned by the obſcurity, if the moon be viewed through a little pin-hole made in a paper, ſhe appears leſs when in the horizon, than in the meridian. Nor can any thing be more abſurd, than the poſition of Gaſſendus, who aſſerts, that a dilated pupil magnifies an object for the ſame reaſon as a convex glaſs does.

F. Gouye advances another hypotheſis, which is, that when the luminaries are in the horizon, the neighbourhood of the earth, and the groſs vapours wherewith they then appear enveloped, have the ſame effect with regard to us, as a wall, or other denſe body, placed behind a column; which, in that caſe, appears bigger than when inſulate, and encompaſſed on all ſides with an illumined air. Farther, it is obſerved, that a column, when fluted, appears bigger than before, when it was plain; the flutes being ſo many particular objects, which, by their multitude, occaſion the mind to imagine the whole object, whereof they are compoſed, of a larger extent. The ſame thing may be ſaid of the ſeveral objects ſeen towards the horizon, to which the ſun or moon correſpond at their riſing and ſetting. And hence it is, that they appear larger ſtill, when they riſe or ſet between trees; the narrow, yet diſtinct, intervals whereof have the ſame effect with regard to the apparent diameter of the luminary, as a greater number of flutes with regard to the ſhaft of a column.

Biſhop Berkeley ſuppoſed, that the moon appears larger near the horizon, becauſe her appearance is then fainter, and her beams affect the eye leſs; but this hypotheſis is refuted by Dr. Smith. Mr. Robins has recited ſome other opinions on this ſubject, Math. Tracts, vol. ii. p. 242. The commonly received opinion has been diſputed not only by F. Gouye, who obſerves, Acad. Par. 1700, p. 11, that the horizontal moon appears equally large acroſs the ſea, where there are no objects to produce the effect aſcribed to them; but alſo by Mr. Molyneux, who ſays, Phil. Tranſ. abr. vol. i. p. 221. that if this hypotheſis be true, we may at any time increaſe the apparent magnitude of the moon, even in the meridian; for, in order to divide the ſpace between it and the eye, we need only to look at it behind a cluſter of chimnies, the ridge of a hill, or the top of a houſe. He alſo makes the ſame obſervation with F. Gouye, above mentioned, and farther obſerves, that when the height of all the intermediate objects is cut off, by looking through a tube, the imagination is not helped, the moon being ſtill conceived to be as large as before. However, Mr. Molyneux advances no hypotheſis of his own. Dr. Deſaguliers has well illuſtrated the doctrine of the horizontal moon, Phil. Tranſ. abr. vol. viii. p. 130, upon the ſuppoſition of our imagining the viſible heavens to be only a ſmall portion of a ſpherical ſurface, and conſequently ſuppoſing the moon to be farther from us in the horizon than near the zenith, and by ſeveral ingenious contrivances he demonſtrated how liable we are to ſuch deceptions. But the moſt complete illuſtration of this curious ſubject is given us by Dr. Smith. The concavity of the heavens, he ſays, appears to the eye, which is the only judge of an apparent figure, to be a leſs portion of a ſpherical ſurface than a hemiſphere. In other words, the centre of the concavity is much below the eye, and by taking a medium among ſeveral obſervations, he found that the apparent diſtance of its parts at the horizon was generally between three or four times greater than the apparent diſtance of its parts over head. This he determined by meaſuring the actual height of ſome of the heavenly bodies, when, to his eye, they ſeemed to be half way between the horizon and the zenith. In this caſe their real altitude was only twenty-three degrees. When the ſun was but 30° high, the upper arch always appeared leſs than the under, and he thought that it was always greater when the ſun was about 18° or 20° high. Mr. Robins, in his Tracts, vol. ii. p. 245, ſhews how to determine the apparent concavity of the ſky in a more accurate and geometrical manner; by which it appears, that if the altitude of any of the heavenly bodies be 20° at the time when it ſeems to be half way between the horizon and the zenith, the horizontal diſtance will be hardly leſs than four times the perpendicular diſtance; but if that altitude be 28°, it will be little more than two and a half. Dr. Smith, having determined the apparent figure of the ſky, is able to give a ſatisfactory explanation of the phenomenon of the horizontal moon, and other ſimilar appearances in the heavens. For ſuppoſing the arc A B C, *Tab. III. Optics fig.* 43, to repreſent that apparent concavity, he found that the diameter of the ſun and moon would ſeem to be greater in the horizon that at any propoſed altitude, meaſured by the angle A O B, in the proportion of its apparent diſtances O A, O B. The numbers that expreſs theſe proportions he reduced into the following table, anſwering to the correſponding altitudes of the ſun or moon, which are alſo exactly repreſented to the eye in the figure, in which the moon, placed in the quadrantal arc F G deſcribed about the center O, are all equal to each other, and repreſent the body of the moon in the heights there noted, and the unequal moons in the concavity A B C are terminated by the viſual rays that come from the circumference of the real moon, at O. Thoſe diameters of theſe unequal moons at A and B do, therefore, bear the ſame proportion to each other, as their apparent diſtances O A, O B; and they muſt appear in the ſame proportion that they really have in this concave, becauſe we judge all objects in the heavens to be in this ſurface: ſo that the appearance to the eye is exactly the ſame, as if ſeveral moons were painted upon a real ſurface A B C in the proportions here aſſigned; in which caſe we ſhould certainly judge the real magnitudes of the larger paintings of the lower moon to be really larger, though the viſible *magnitudes* of them all, anſwering to their equal images upon the retina, were exactly equal. For the ſame reaſon Dr. Smith obſerves, that all the objects and diſtances of ſtars in the heavens, as well as the ſun and moon, muſt ſeem to be greater in the horizon than in higher ſituations; which is known to be the caſe. He alſo obſerves, that the apparent concave of the ſky being leſs than an hemiſphere is the cauſe that the breadths of the colours in the inward and outward rainbows, and the interval between the bows appear leaſt at the top, and greater at the bottom; and by an eſtimate of the apparent breadths of the inward rainbow, at two different heights, made by a friend, he determined the apparent concavity of the ſky to be much the ſame as by the former methods. See HALO. This theory of the horizontal moon is alſo confirmed by the appearances of the tails of comets, which, whatever be their real figure, *magnitude*, and ſituation in abſolute ſpace, do always appear to be an arc of the concave ſky; and in farther confirmation of it, he gives us Mr. Cotes's explanation of the optical appearance of a remarkable meteor, ſeen in the year 1716. Beſides the general cauſe above ſtated of the appearance of the horizontal moon, Dr. Smith acknowledges, that, at different times, the moon appears of different magnitudes even in the ſame horizon, and occaſionally of an extraordinary large ſize. This, he is inclined to believe is chiefly owing to an extraordinary largeneſs of her picture upon the retina, which, in the preceding general theory, was ſuppoſed to be invariable. This, he ſays, might beſt be examined by taking the diameter of the moon with a micrometer, or by noting the year and day of the month, together with the heights of the barometer and thermometer. For if it ſhould appear, by many ſuch obſervations, that the largeſt horizontal moons generally happen at her perigee, in the warmeſt ſummer evenings, the barometer being low, and the thermometer high; ſince theſe cauſes are independent of one another, and all conſpire to enlarge the picture of the moon, we may reaſonably conclude that theſe extraordinary moons are chiefly owing to the concurrence

The ſun or moon's altitude in degrees.	Apparent diameter or diſtances.
00	100
15	68
30	50
45	40
60	34
75	31
90	30

of these circumstances. But since the difference in the apparent magnitude of the moon is not increased $\frac{1}{30}$th part of the whole in consequence of her being in her perigee, and the enlargement of the image in all the other cases here mentioned is very inconsiderable, it is probable that when the moon is imagined to be so much larger than usual, the imagination is farther imposed upon by some circumstances, which have not been attended to. Smith's Optics, vol. i. p. 63, &c. Remarks, p. 53.

MAGNOLIA, in *Botany*. See *Laurel-leaved* TULIP-*tree*.

MAGNUM *os carpi*. This is the third bone of the second row in the carpus, and is the largest of all the bones of that part. It is of a considerable length, and has a kind of articular round head, which is received into the cotyloide cavity formed by the two first bones of the first row; and this articulation is capable of a small degree of flexion and extension. The digital side is a cartilaginous basis unequally and obliquely triangular, the apex being turned inward. It is articulated with the second metacarpal bone, and is also a little notched on the radial edge for its articulation with the small edge of the metacarpal bone. The radial side is very small, and near the basis, being articulated with the os pyramidale; the rest of this surface is without cartilage; the cubital side is double, answering to a like side in the os uniforme with which it is articulated. The outer surface, which forms a part of the outer surface of the carpus, is broad, rough, and uneven, for the insertion of ligaments: the inner surface is likewise rough, but narrower, and round both surfaces are several depressions, which, while the bone is in the body, are filled with small glands, ligaments, &c. Winslow's Anatomy, p. 83.

MAGODUS, among the Romans, a name given to those players who sometimes acted the part of men, and sometimes of women: the word is derived from μαγος, *magus*, and ωδη, *ode*, properly denotes those players who performed extraordinary feats and gestures.

MAGOPHONIA, formed from μαγος, *magus*, and φονος, *slaughter*, the name of a feast among the ancient Persians, held in memory of the expulsion of the Magians.

The Magus Smerdis having usurped the throne of Persia, upon the death of Cambyses, 521 years before Jesus Christ, seven of the principal lords of the court conspired to drive him out of it. Their design was executed with good success: Smerdis, and his brother, another Magus, called Patizithes, were killed. Upon which the people also rose, and put all the Magi to the sword; insomuch that there would not one have escaped, had not night come upon them. Darius, son of Hystaspes, was then elected king: and, in memory of this massacre of the Magi, a feast was instituted, says Herodotus, called *Magophonia*. See MAGI.

MAGPYE, in *Ornithology*, a well known species of the CORVUS, or the *corvus pica*, in the Linnean system. The colours of this bird are remarkable: its beak, white, green, and purple, and the rich and gilded combination of the glosses on the tail are at least equal to those that adorn the plumage of any other: it feeds on worms, insects, and small birds, and will destroy young chickens: it is a crafty, restless, noisy bird, called by Ovid *nemorum custodia picta*. This bird is easily tamed, and may be taught to imitate the human voice: its nest is entirely covered with thorns, except one small hole for admittance: it lays six or seven eggs, of a pale green colour spotted with brown. Pennant.

MAGRA, a word used by some writers for a sort of red earth, and by others for the cornelian, the red jasper, or any other stone of a red colour.

MAGUDARIS, a name by which Dioscorides calls the HIERBIUM.

MAGYDARIS, in *Botany*, a name used by Theophrastus, and other of the old authors, for the lasserpitium or LASERWORT.

MAHALEB, in the *Materia Medica*, the name of the fruit of a sort of wild CHERRY called *cerasus sylvestris amara*, or the wild bitter cherry, by Bauhine. The wood of the tree is of a greyish cast, and fine grain, with a mixture of red in the veins, and is very firm, and of a sweet smell, and used by the French in making cabinets; the leaves and flower carry a rude resemblance of those of the common cherry; the fruit is round, black, and resembles a cherry, having the same sort of stone in it, the kernel of which is like the bitter almond in taste. It is commended in external applications, and the perfumers of France use it in their washballs. It is to be chosen fresh and sweet, for it very often has an intolerable stinking smell, like that of bugs.

MAHERNIA, in *Botany*, a genus of the *pentandria polygynia* class: the characters of which are, that the calyx is dentated into five horizontal points, that it has five petals, and five heart-shaped nectaria, and the fruit is a capsule with five cells. There are two species.

MAHIE, the name given by the inhabitants of Otaheite, or George's island, to their BREAD-FRUIT when made into a kind of sour paste, which, in consequence of having undergone a fermentation, will keep a considerable time, and supply them with food when no ripe fruit is to be had. When therefore they see a great shew of new fruit on the trees, they strip them all at once of their former crop, of which they make *mahie*. This *fuccinneum* for ripe bread-fruit is thus made. They gather the fruit before it be perfectly ripe, and laying it in heaps cover it closely with leaves. In this state it ferments, and becomes disagreeably sweet; the core is then taken out entire, and the rest of the fruit thrown into a hole in their houses, dug on purpose, and neatly lined in the bottom and sides with grass. The whole is then covered with leaves, and heavy stones are laid upon them. In this state it undergoes a second fermentation, and becomes sour, after which it will suffer no change for many months. It is taken out of this hole, as it is wanted for use, and being made into balls, it is wrapped up in leaves and baked, and thus dressed it will keep for five or six weeks. It is eaten, both cold and hot, and the natives of those countries seldom make a meal without it; but to captain Cook and his company the taste was as disagreeable, as that of a pickled olive generally is, the first time it is eaten. Hawkesworth's Account, &c. vol. ii. p. 143, 196.

MAHIM, MAHEM, MAIHEM, or MAYHEM, in *Law*, a *maim*, or corporal hurt, whereby a man loseth the use of any member, that is, or may be, of defence to him in battle; as the eye, hand, foot, scalp of the head, foretooth, or, as some say, a finger, or toe: but the cutting off his ear or nose are not held to be *mayhems* at common law, because they do not weaken but only disfigure him. The word comes from the French *mehain*, of *mehaigner*, *to mutilate*: the canonists call it *membri mutilatio*; and all agree, it consists in the loss of a member, or of the use thereof.

By the ancient law of England he that *maimed* any man was sentenced to lose the like part, which is still the law in Sweden: but this was disused, and *mayhem*, by the common law, was only punishable by fine and imprisonment; unless perhaps the offence of *mayhem* by castration, which all our old writers held to be felony. But by subsequent statutes the crime and punishment of *mayhem* were put more out of doubt. 5 Hen. IV. cap. 5. 37 Hen. VIII. cap. 6. and by 22 and 23 Car. II. cap. 1. called the Coventry Act, it is enacted, that if any one shall, of malice aforethought, or by lying in wait, cut or disable the tongue, put out an eye, slit the nose, cut off the nose or lip, or cut or disable any limb or member of another person, with intention in so doing to *maim* or disfigure him, it is felony without benefit of clergy; and, when the case is difficult to judge whether it be a *mayhem*, or not, the judges commonly view the party wounded, and sometimes take the opinion of the *surgeons*.

A person who *maims* himself, for the purpose of begging, and also a person who disables himself, that he may not be impressed for a soldier, may be indicted and fined. The offence of wilfully and maliciously shooting at any person, which may endanger either killing or *maiming* him, though no such evil consequence ensue, is made felony without benefit of clergy, by 9 Geo. I. cap. 22. Maliciously *maiming* of cattle in the night time incurs a forfeiture of treble damages, by action of trespass, or upon the case, 22 and 23 Car. II. c. 7.

MAYHEM, *appeal of*. See APPEAL.

MAHO *Tree*. See *Spinus* MALLOW.

MAHOGANY. See CEDAR.

MAHOMET *Pigeon*, the common English name of a species of pigeon, called by Moore the *columba Numidica alba*. It is of the same shape and size with the Barbary pigeon, and has all the characters of that species, but is always perfectly white, which gives the red circle about the eyes a more lively look.

MAHOMETANISM, MAHOMETISM, or MOHAMMEDISM; the system of religion broached by *Mahomet*, and still adhered to by his followers.

Mahomet was born at Meccain Arabia, in the year of Christ 571 or 572 according to the most probable opinion: in the thirty-eighth year of his age he began to withdraw himself into a solitary cave near Mecca, called the cave of Hira, for the purpose of forming his system of imposture; the propagation of which he commenced in the fortieth year of his age, when he assumed the title of the apostle of God: and having gained nine disciples, some of whom were the principal men of the city, in the forty-fourth year of his age he openly published his imposture to the people of

Mecca, and declared himself a prophet sent by God to recover them from Paganism, and to teach them the true religion. However, he was obliged to abandon Mecca, and to settle at Medina, on the 16th of July, A.D. 622, the year of the hegira or *Mahometan* epocha: here his party confiderably increased, and having made feveral fucceisful excurfions againit the Arab tribes, and conitrained them by force to embrace his religion, his fovereignty was eitablished in 628, and he united in himfelf the facred character of chief pontiff of his religion, as well as the royal; both which characters he tranfmitted to all his fucceffors, who, by the title of caliphs, reigned after him. But they were afterwards deprived of the regal authority, firit by the governors of the provinces, who, about the year of hegira 325, aflumed it to themfelves, and made themfelves kings in their refpective governments; and then by others who arofe on this diftraction of the empire to ufurp upon them, till at laft they had nothing left but the name and fhadow of what they had once been. In the year of Chriit 629 *Mahomet*, at the head of an army of ten thoufand men, reduced Mecca, and extended his conquefts, with his religion, through moft parts of Arabia: and the remaining Arabs fubmitted and embraced his impofture in 631. In the next year he died at Medina, being, according to fome hiitorians, fixty-three years of age. It has been faid by many, that *Mahomet*'s tomb, being of iron, under a vault of loadftones, hangs in the air, and that this paffes for a great miracle in the opinion of his followers. But this is a mere fable. Pliny informs us, lib. xxxiv. cap. 14, that Dinocrates the architect, had begun to roof the temple of Arfinoe at Alexandria with loadftone, that her image made of iron, might feem to hang there in the air; but the defign was interrupted by his own death, and that of Ptolemy, who had ordered it to be done in honour of his fifter.

Mahometanifm is embraced by the Turks, Perfians, and feveral nations among the Africans, and many among the Eaft Indians.

Brerewood fays, that if we divide the known countries of the earth into thirty equal parts, five of them are Chriftians, fix *Mahometan*, and nineteen Pagan.

The fyftem of *Mahometanifm* is contained in the Koran, commonly called the Alcoran.

The firft and chief article of the *Mahometan* creed is, that *there is no other god but one God*; which they have from the Koran, where thefe words are repeated inceffantly: *there is no other god but he. Your God is the only God. I am God, and there is no other God but I.* This grand axiom of their theology feems to have been taken from the Jews, who were continually rehearfing thofe words of Deuteronomy, *Hear, O Ifrael; the Lord our God is One.*

For this reafon, the *Mahometan* account all fuch as own any thing of number in the deunity, to be infidels or idolaters. And accordingly, one of the firft leffons they teach their children is, that God is neither male nor female, and confequently can have no children.

The fecond article of *Mahometanifm* conffits in this, *that Mahomet was fent from God.* By which they exclude all other religions; under pretence that their prophet was the laft and greateft of all the prophets that God would ever fend, and that as the Jewifh religion ceafed with the coming of the Meffiah, fo likewife the Chriftian religion was to be abrogated with the coming of *Mahomet.* Not but they own Mofes and Jefus Chriit to have been great prophets; but *Mahomet* they hold to be *The Prophet*, by way of excellence, commiffioned to purge the holy fcriptures of the Old and New Teftament, which they allow, from the corruption introduced in them by Jews and Chriftians, and to reftore the law of God to its original purity; and the paraclete or comforter promifed in the fcriptures.

The *Mahometans* call their religion *Islam*, denoting as fome fay, *refignation* or *fubmiffion* to the fervice and commands of God, but, according to others, formed from the root *falama*, fignifying *to be fawed*, and therefore the fame with *the religion* or *ftate of falvation*; and they divide it into two diftinct parts, *viz. iman*, i. e. *faith* or *theory*; and *din*, i. e. *religion* or *practice*: and teach, that it is built on five fundamental points, one belonging to faith, and the other four to practice.

Under the confeffion of faith already recited, they comprehend fix diftinct branches, viz. belief in God; in his angels; in his fcriptures; in his prophets; in the refurrection and day of judgment; and in God's abfolute decree and predeftination both of good and evil. The four points relating to practice, are prayer, under which are comprehended thofe waihings or purifications which are neceffary preparations required before prayer; alms; faiting; and the pilgrimage to Mecca. Their faith in God has been already mentioned: with refpect to the r

opinion of angels, they believe them to have pure and fubtil bodies, created of fire, and that they are differently employed, in writing down the actions of men, or in carrying the throne of God, and other fervices. The four angels whom they regard as moft diftinguifhed by God's favour, and on account of the offices affigned them, are Gabriel, Michael, Azrael the angel of death, who feparates men's fouls from their bodies, and Ifrafil, whofe office it will be to found the trumpet at the refurrection. They alfo believe that two guardian angels, changed every day, attend on every man, to obferve and write down his actions. Their whole doctrine concerning angels they have borrowed from the Jews, who learned the names and offices of thofe beings from the Perfians. The devil, called by *Mahomet Eblis* from his defpair, was one of thofe angels who are neareft to God's preference, called Azazil, and fell, according to the doctrine of the Koran, for refufing to pay homage to Adam at the command of God. They alfo admit an intermediate order of beings, called genii, fome of which are good and others bad.

As to the fcriptures, the *Mahometans* are taught by the Koran, that God, in divers ages of the world, gave revelations of his will in writing to feveral prophets, the whole, and every word of which, it is abfolutely neceffary for every good Moflem to believe. *Mahomet* acknowledges the divine authority of the Pentateuch, Pfalms, and Gofpel, and often appeals to the conformity of the Koran with thofe writings, and to the prophecies which he pretended were contained concerning himfelf, which the Jews and Chriftians have fuppreffed.

At death, they maintain, that the bodies of thofe who believe the unity of God, and the miffion of *Mahomet*, reft in peace, and are refrefhed with the air of paradife; otherwife they are grievoufly tormented. The fouls of the former are conveyed to heaven, where a place is affigned them according to their merit and degree; thofe of the wicked are tormented, till they are rejoined to their bodies at the refurrection; the approach of which will be known by certain figns that precede it: thefe are the leffer and the greater figns: the latter of which are the fun's rifing in the weft; the appearance of a monftrous beaft, which fhall rife out of the earth in the temple of Mecca; war with the Greeks and the taking of Conftantinople; the coming of Anti-chriit; the defcent of Jefus on earth; war with the Jews; the eruption of Gog and Magog; a fmoke which fhall fill the whole earth; an eclipfe of the moon; the return of the Arabs to the worfhip of their ancient idols; the difcovery of a vaft heap of gold and filver by the retreat of the Euphrates; the demolition of the temple of Mecca by the Ethiopians; the fpeaking of beafts and inanimate things; the breaking out of fire; the appearance of a man, who fhall drive men before him with his ftaff; the advent of the Mhodi, or director, a perfon of the family of *Mahomet*, to govern the Arabians, and fill the world with righteoufnefs; and a wind that fhall fweep away the fouls of all who have but a grain of faith in their hearts. But the immediate fign of the refurrection will be the firft blaft of the trumpet, which will be founded three times. The day of judgment will continue, as the Koran fays in one place, one thoufand years, but according to another paffage, fifty thoufand years: the refurrection, fay they, will be general, extended to all creatures, angels, genii, men, and animals; who will be aflembled on the earth, give an account of their actions, and receive retribution. On this occafion each perfon will have the book wherein all the actions of his life are written delivered to him, and their works will be weighed in a balance, which they minutely defcribe. When the examination is finifhed mutual retaliation will follow; which will be executed by taking away a proportionable part of the good works of him who offered injury to another, and adding it to him who fuffered it. Brutes will be changed into duft; and the believing genii be afligned a place near the confines of paradife, and the unbelieving punifhed eternally and caft into hell, with the infidels of mortal race. After this procefs, the good and wicked are conducted to a bridge, called ALSIRAT; over which the former fhall fafely pafs, while *Mahomet* and his Moflems lead the way, but the latter will fall down headlong into hell; where there are feven different apartments, adapted to as many diftinct claffes of the damned, who will fuffer both from intenfe heat and exceffive cold. In this ftate infidels only will be liable to eternal punifhment; but the Moflems, or believers will be delivered thence, after they have expiated their crimes by their fufferings. This place of punifhment is feparated from paradife by a wall, fo fmall in breadth as to admit the bleffed and damned to converfe together. The righteous, after having paffed the bridge above mentioned, will be refrefhed by drinking at the pond of their prophet, and then admitted into paradife, fituated

situated in the seventh heaven, and next to the throne of God; where they will feed on the most delicious fruits, be clothed in the most splendid silken garments, refreshed with rivers of water, wine, milk, and honey, and entertained with the most delightful music, and the ravishing girls of paradise with black eyes, the enjoyment of whose company will be a principal felicity of the faithful.

It appears from the Koran, that women as well as men will not only be punished for their evil actions, but also receive the reward of their good deeds, and that both will enjoy a perpetual youth.

Farther, the orthodox doctrine with respect to predestination is, that every thing which happens in this world proceeds entirely from the divine will, and is irrevocably fixed from all eternity in the preserved table; God having secretly predestinated not only the adverse and prosperous fortune of every person in this world, in the most minute particulars, but also his faith and infidelity, his obedience or disobedience, and consequently his everlasting happiness or misery after death; which fate or predestination it is not possible for any foresight or wisdom to avoid.

In regard to the four fundamental points of religious practice, *Mahomet* is said to have declared, that the practice of religion is founded on cleanliness, which is one half of the faith, and the key of prayer, without which it will not be heard by God. Such is the opinion which the *Mahometans* entertain of cleanliness, that it is purely on this account they seem to have adopted circumcision, though it be not mentioned in the Koran. *Mahomet* has obliged his followers to pray five times every twenty-four hours, at certain stated times, turning their faces towards the temple of Mecca, which is pointed to by a niche in their mosques: the life and spirit of prayer, they hold, is the inward disposing of the heart; nor do they ever perform this duty in sumptuous apparel, nor suffer their women to attend them on these occasions.

Alms, among the *Mahometans*, are legal and voluntary; the giving of which is frequently inculcated in the Koran. Fasting is called by *Mahomet*, the gate of religion; and his followers are expressly required to fast during the month of Ramadan; which they observe by abstaining from meat, drink, and women, from day-break till sunset. Besides this, they have several other voluntary fasts. The pilgrimage to Mecca is so necessary a point of practice, that, according to a tradition of *Mahomet*, he who dies without performing it may as well die a Jew or a Christian; and it is expressly commanded in the Koran. The various ceremonies prescribed to those who perform this pilgrimage are extremely absurd and ridiculous, and appear to be relicks of idolatrous superstition.

Besides the fundamental points of faith and practice above recited, the *Mahometans* are required by the Koran, to abstain from wine, gaming, usury, divining by arrows, the eating of blood and swine's flesh, and whatever dies of itself, or is slain in honour of any idol, or strangled, or killed by accident, or by any other beast. The Koran allows polygamy within certain limits; forbidding any man to have more than four, whether wives or concubines: but *Mahomet* had the privilege of marrying as many wives, and keeping as many concubines as he pleased. It allows also of divorce; but severely punishes fornication and adultery. The day of the week which *Mahomet* has set apart for public worship is Friday; besides which they have two annual feasts called BEIRAM.

After the death of *Mahomet*, a schism arose among his followers, which divided them into two great factions, whose separation not only gave rise to a variety of opinions and rites, but also excited the most implacable hatred, and the most deadly animosities. Of these factions, the one acknowledged Abubeker, the father-in-law of *Mahomet*, as his successor, or the true caliph, and its members were distinguished by the name of SONNITES; while the other adhered to Ali, his son-in-law, and were known by the title of SCHIITES. Both, however, adhered to the Koran as a divine law, and the rule of faith and manners; to which indeed the former added, by way of interpretation, the Sonna, i. e. a certain law, which they looked upon as descended from *Mahomet* by oral tradition, and which the Schiites refused to admit. Among the Sonnites we are to reckon the Turks, Tartars, Arabians, Africans, and the greatest part of the Indian *Mahometans*; whereas the Persians, and the subjects of the grand mogul are generally considered as the followers of Ali, though the latter indeed seem rather to observe a strict neutrality in this contest. Besides these two grand factions, there are other subordinate sects among the *Mahometans*, which dispute with warmth concerning several points of religion, though without violating the rules of mutual toleration. Of these sects there are four, which far surpass the rest in point of reputation and importance, viz. the Hanefites, the sect of Malec, the sect of Al Shafei, and that of Ebn Hanbal, which are called the orthodox *Mahometans*. Sale's Preliminary Discourse. See ALCORAN.

The rapid success, which attended the propagation of this new religion, was owing to causes that are plain and evident, and must remove, or rather prevent, our surprize, when they are attentively considered. The terror of *Mahomet*'s arms, and the repeated victories which were gained by him and his successors, were, no doubt, the irresistible arguments that persuaded such multitudes to embrace his religion, and submit to his dominion. Besides his law was artfully and marvellously adapted to the corrupt nature of man; and, in a more particular manner, to the manners and opinions of the eastern nations, and the vices to which they were naturally addicted: for the articles of faith which it proposed were few in number, and extremely simple; and the duties it required were neither many nor difficult, nor such as were incompatible with the empire of appetites and passions. It is to be observed farther, that the gross ignorance, under which the Arabians, Syrians, Persians, and the greatest part of the eastern nations, laboured at this time, rendered many an easy prey to the artifice and eloquence of this bold adventurer. To these causes of the progress of *Mahometanism*, we may add the bitter dissensions and cruel animosities that reigned among the Christian sects, particularly the Greeks, Nestorians, Eutychians, and Monophysites; dissensions that filled a great part of the East with carnage, assassinations, and such detestable enormities, as rendered the very name of Christianity odious to many. We might add here, that the Monophysites and Nestorians, full of resentment against the Greeks, from whom they had suffered the bitterest and most injurious treatment, assisted the Arabians in the conquest of several provinces, into which, of consequence, the religion of *Mahomet* was afterwards introduced. Other causes of the sudden progress of that religion will naturally occur to such as consider attentively its spirit and genius, and the state of the world at this time. Mosheim's Eccl. Hist. vol. ii. p. 9. ed. 8vo.

MAJA, in *Ornithology*, the name of a bird described by Nieremberg as very common in the island of Cuba, and frequenting the fields of rice in large flocks. It is described to be a small bird of a yellowish colour, very delicate, and well tasted, and remarkable for having a remarkable on the back or outside of the neck.

MAIAGUE, in *Ornithology*, the name of a Brasilian bird of the web-footed kind, but having its hinder toe loose. It is of the size of the common goose; its head is large and round; its neck long, and it always carries it crooked like a swan; its beak is strong and hooked at the end; it is all over of a brownish black in colour, except that its throat is yellow. It is found about the mouths of rivers, and feeds on fish; it builds on the ground; it is very nimble in running, flying, and diving, and is not easily taken, but is a very well tasted fowl.

MAIDEN, an edged instrument used in some countries, particularly Scotland, for the beheading of criminals.

The *maiden* is a broad piece of iron, of a foot square, sharp on the lower part, and loaded above with lead, so as scarce to be lifted: at the time of execution, it is pulled up to the top of a narrow wooden frame ten feet high, with a groove on each side for the *maiden* to slide in. The prisoner's neck being fastened to a bar underneath, on a sign given, the *maiden* is let loose, and the head in an instant separated from the body.

MAIDEN is also the name of a machine first used in Yorkshire, and since introduced into other places, for washing of linen; consisting of a tub nineteen inches high, and twenty-seven in diameter at the top, in which the linen is put, with hot water and soap, to which is adapted a cover, fitting it very closely, and fastened to the tub by two wedges; through a hole in the middle of the cover passes an upright piece of wood, kept at a proper height by a peg above, and furnished with two handles, by which it is turned backward and forward: to the lower end of this upright piece is fastened a round piece of wood, in which are fixed several pieces, like cogs of a wheel. The operation of this machine is to make the linen pass and repass quick through the water. Gent. Mag. vol. xxii. p. 32.

MAIDEN-*assizes*, are those where no person is condemned to die.

MAIDEN-*hair*, *adiantum*, in *Botany* and *Medicine*. See ADIANTUM.

MAIDEN-*hair*, *black*, a name sometimes given to the *dwarf-fern*. See MILTWASTE.

MAIDEN-*hair*, *Spanish*. See TRICHOMANES.

MAIDEN-*hair*, *white*. See *Wall*-RUE.

MAIDEN-*plum*. See *American* PLUM.

MAIDEN-

MAIDEN-*rents*, in our *Old Writers*, a noble paid by the tenants of some manors on their marriage. This was said to be given to the lord, for his omitting the cuſtom of marcheta, whereby he was to have the firſt night's lodging with his tenant's wife; but it ſeems more probably to have been a fine for a licence to marry a daughter.

MAJESTY, *majeſtas*, a title or quality given to kings; and which frequently ſerves as an appellation to diſtinguiſh them by.

The word ſeems compoſed of the two Latin words, *major*, *greater*, and *ſtatus*, *ſtate*.

The emperor is called, his Cæſarian or imperial *majeſty*; the king of Spain, his Catholic *majeſty*; the king of France, his moſt Chriſtian *majeſty*; the king of Great Britain, his Britannic *majeſty*, &c. Some have alſo extended this title to the popes.

Paſquier obſerves, that our forefathers uſed this quality very ſparingly; and that the frequent uſe of the word, which now obtains, had not its beginning before the reign of their Henry II. He inſtances ſeveral letters of St. Gregory, who, writing to king Theodoret and Theodoric, only compliments them with EXCELLENCY.

Till the time of Charles V. the king of Spain had no title but that of highneſs; Louis XI. was the firſt in France who aſſumed this title; and before our king Henry VIII. the kings of England were only addreſſed under the titles of grace, which began in the time of Henry IV. and excellent grace, under Henry VI. and HIGHNESS. See KING.

At the peace of Munſter, there was a great conteſt between the miniſters of the emperor and thoſe of France: the firſt would not allow the title of ſerenity to the king of France, and the latter would not give that of *majeſty* to the emperor. At laſt it was agreed, that, whenever the French king ſhould write with his own hand to the emperor, he ſhould give him the title of imperial *majeſty*; and reciprocally, when the emperor ſhould write to the king, he ſhould give him that of royal *majeſty*.

Under the Roman republic, the title *majeſty*, *majeſtas*, belonged to the whole body of the people, and to the principal magiſtrates; ſo that to diminiſh or wound the *majeſty* of the commonwealth, was to be wanting in reſpect to the ſtate, or to its miniſters. But the power afterwards palling into the hands of a ſingle perſon, the appellation of *majeſty* was tranſferred to the emperor, and the imperial family. Pliny complimente Trajan on his being contented with the title of greatneſs; and ſpeaks very invidiouſly of thoſe who affected that of *majeſty*. And yet *majeſty* ſeems to be the moſt modeſt and juſt title that can be attributed to ſovereigns, ſince it ſignifies no more than the royalty, or ſovereign power.

St. MAIEUL, *regular clerks of*. See FATHERS *of St. Maiolus*.

MAIL, *maille*, is primarily applied to the maſhes or holes in net-work.

MAIL, *coat of*. See COAT *of mail*.

It is called alſo a HABERGEON.

Anciently they alſo wore ſhirts of *mail* under the waiſtcoat, to ſerve as a defence againſt ſwords and poniards. We alſo read of gloves of *mail*.

MAIL, or MALL, alſo ſignifies a round ring of iron; whence the play of pall-mall, from *palla*, a *ball*, and *maille*, the round ring through which it is to paſs.

MAILLE, in our *Old Writers*, a ſmall kind of money. Silver half-pence were likewiſe termed *mailles*, 9 Hen. V. By indenture in the mint, a pound weight of old ſterling ſilver was to be coined into three hundred and ſixty ſterlings, or pennies, or ſeven hundred and twenty *mailes*, or half-pennies, or one thouſand four hundred and forty farthings. Hence the word *mail* was derived, which is now vulgarly uſed in Scotland to ſignify an annual rent. See GOLD-*coin*.

MAILS, on *Ship-board*, are ſquare machines, compoſed of a number of rings interwoven net-wiſe, and uſed for rubbing off the looſe hemp which remains on lines or white cordage, after it is made.

MAILED implies a thing ſpeckled, or full of ſpecks; as the feathers of hawks, partridges, &c. or the furs of ſome wild beaſts.

MAIN, a term applied to ſeveral parts of a ſhip, as the *main-capſtan*, *main-maſt*, *main-top-maſt*, *main-ſail*, &c. and ſignifying the chief or largeſt of the kind. See CAPSTAN, MAST, SAIL, &c.

MAIN-*body of an army*, is the body of troops that marches between the advance and the rear guard. In a camp it is that part of an army which is encamped betwixt the right and left wings.

MAIN-*guard*. See GUARD.

MAIN-MORTE, a term in ſome ancient cuſtoms, ſtill obtaining in Burgundy, ſignifying a right which the lord has, on the death of the chief of a family that is *mainmortable*, of taking the beſt moveable in the houſe; or, in default of that, the right hand of the deceaſed was offered him, in token that he could ſerve him no longer. See MORT-MAIN.

MAINIS, in *Ichthyology*, a name uſed by Ariſtotle, Athenæus, and others of the old Greek writers, for the fiſh now called the *mena*, *menerela*, and *menula*. It is a ſpecies of the SPARUS, and is diſtinguiſhed from all the other ſpecies of that genus, by having four large teeth, and a variegated body, ornamented with a black ſpot in the middle of the ſides. This is the ſth the Narbons call *ſaſſala*.

MAINOUR, MANOUR, or MEINOR, in *Law*, ſignifies the thing that a thief takes away, or ſteals.

Thus, to be taken with *mainour*, is to be taken with the thing ſtolen about him. If the defendant were taken with the *mainour*, and ſo carried to court, in ancient times they would arraign him on the *mainour*, without any appeal or indictment.

MAINPERNORS. See MAINPRISE.

MAINPRISE, compounded of the French *main*, *hand*, and *priſe*, or *prins*, *taken*, in *Law*, the taking or receiving a man into friendly cuſtody, who otherwiſe might be committed to priſon; upon ſecurity given for his forthcoming at a day aſſigned.

They who thus undertake for any one, are called *mainpernors*, becauſe they receive the perſon into their hands; whence alſo comes the word *mainpernable*, denoting the perſon who may be thus bailed. See BAIL.

The writ of *mainprize* is a writ directed to the ſheriff, (either generally, when any man is impriſoned for a bailable offence, and bail hath been refuſed; or ſpecially, when the offence or cauſe of commitment is not properly bailable below), commanding him to take ſureties for the priſoner's appearance, and to ſet him at large. Mainpernors differ from bail, in that a man's bail may impriſon or ſurrender him up before the ſtipulated day of appearance. Mainpernors can do neither, but are barely ſureties for his appearance at the day: bail are only ſureties, that the party be anſwerable for the ſpecial matter which they ſtipulate: mainpernors are bound to produce him to anſwer all charges whatſoever.

MAINTAINERS, are thoſe that maintain or ſecond a cauſe depending between others, by diſburſing money, or making friends for either party, &c. not being intereſted in the ſuit, or attornies employed therein. Stat. 19 Hen. VII. cap. 14. See MAINTENANCE.

MAINTENANCE, *manutenentia*, in *Law*, an unlawful maintaining, or officious intermeddling in a ſuit between others, by aſſiſting either party with money or otherwiſe, to proſecute or defend it.

The word is metaphorically taken from the ſuccouring a young child, that learns to go by one's hand; but it is uſed in the bad ſenſe in ſome of our ſtatutes.

By the Roman law, it was a ſpecies of the *crimen falſi* to enter into any confederacy, or do any act, to ſupport another's law-ſuit, by money, witneſſes, or patronage. A man may, however, maintain the ſuit of his near kinſman, ſervant, or poor neighbour, out of charity and compaſſion, with impunity: otherwiſe the puniſhment by common law is fine and impriſonment; and by ſtat. 32 Hen. VIII. cap. 9. a forfeiture of 10l. The puniſhment of BARATRY, or *barratry* in a common perſon, is alſo fine and impriſonment; but if the offender belongs to the profeſſion of the law, a barrator ought to be diſabled from practiſing for the future.

There lies a writ againſt a *maintainer*, called a writ of *maintenance*.

MAJOR, in *Logic*, is underſtood of the firſt propoſition of a regular ſyllogiſm.

It is called *major*, becauſe it has a more extenſive ſenſe than the *minor* PROPOSITION, as containing the principal term.

MAJOR *and minor*, in *Muſic*, are applied to concords which differ from each other by a ſemi-tone.

There are *major* and *minor* thirds, &c.

Major tone is the difference between the fifth and fourth; and *major* ſemi-tone the difference between the *major* fourth and the third. The *major* tone ſurpaſſes the *minor* by a comma. See TONE.

MAJOR, in *Law*, a perſon who is of age to manage his own affairs. See AGE.

By the civil law, a man is not a *major* till the age of twenty-five years; in England, he is a *major* at twenty-one, and in Normandy at twenty.

MAJOR, in the *Art of War*, a name given to ſeveral officers of different qualities and functions. Thus,

MAJOR-*general* is a general officer, who receives the general's orders, and delivers them out to the *majors* of brigades, with whom he concerts what troops are to mount the guard, what to go on parties, and what to form detachments, or to be ſent on convoys, &c.

It is his buſineſs alſo to view the ground to encamp on,

and do other ſervices; he is ſubordinate to the general and lieutenant-general; and the next commanding officer to them.

MAJOR *of a brigade*, either of horſe or foot, is he who receives orders, and the word, from the *major-general*; and gives them to the particular *majors* of each regiment. See BRIGADE-*major*.

MAJOR *of a regiment* is an officer, whoſe buſineſs is to convey all orders to the regiment, to draw it up, and exerciſe it, to ſee it march in good order, to look to its quarters, and to rally it, if it happen to be broken in an engagement, &c.

The *major* is next to ſubordination to the lieutenant-colonel, and generally promoted from the eldeſt captain. He is the only officer of a regiment of foot, who is allowed to be on horſeback in time of ſervice; but he always rides, that he may ſpeedily get from place to place, as occaſion requires.

MAJOR *of a regiment of horſe* is the firſt captain of the regiment; and commands in the abſence of the colonel.

MAJOR *of artillery* is the next officer to the lieutenant-colonel. In the field he receives daily orders from the brigade *major*, and communicates them, with the parole, to his ſuperiors, and then dictates them to the adjutant.

MAJOR *of engineers*. See ENGINEER.

MAJOR, *ſergeant*, is a non-commiſſioned officer, ſubordinate to the adjutant, as he is to the *major*.

MAJOR, *town*, is the third officer in order in a garriſon, being next to the deputy-governor.

He ought to underſtand fortification, and hath charge of the guards, rounds, patrols, and centinels.

There are alſo *aids-major*, *drums-major*, and other officers; ſo called, on account of ſome ſeniority or prerogative that they have over the reſt. See AID-*major*, and DRUM-*major*.

MAJOR, *fife*, has the ſame authority over the fifers as the *drum-major* has over the drummers. He teaches them their duty, appoints them for guards, &c.

MAJOR *helicis*, in *Anatomy*, a name given by Albinus to one of the muſcles of the eye, called by Santorini and others, *helicis muſculus*. This author diſtinguiſhes it under the name *major*, from another muſcle which he calls the *minor helicis*, and which Santorini calls only *fibræ muſculares in plana helicis ſucie*, though it be a true and proper muſcle.

MAJOR-DOMO, an Italian term, frequently uſed to ſignify a ſteward, or maſter of the houſhold.

The title of *major-domo* was formerly given in the courts of princes to three different kinds of officers. 1. To him who took care of what related to the prince's table, or eating; otherwiſe called *elector*, *præfectus menſæ*, *architriclinii*, *dapifer*, and *principis epulorum*. 2. *Major-domo* was alſo applied to the ſteward of the houſhold. 3. The title of *major-domo* was alſo given to the chief miniſter, or him to whom the prince deputed the adminiſtration of his affairs, foreign and domeſtic, relating to war as well as peace. Inſtances of *major-domos* in the two firſt ſenſes are frequent in the Engliſh, French, and Norman affairs.

MAJORANA, in *Botany*. See MARJORAM.

MAIZE, or INDIAN CORN, *zea*, in *Botany*, a genus of the *monœcia triandria* claſs. Its characters are theſe: it has male and female flowers, ſituated at remote diſtances on the ſame plant; the male flowers are diſpoſed in a looſe ſpike, having oval, oblong, chaffy empalements, opening with two valves, each including two flowers; theſe have two ſhort compreſſed nectariums, and three hair-like ſtamina, terminated by quadrangular ſummits, which open in four cells at the top; the female flowers, which are ſituated below the male, are diſpoſed in a thick ſpike, incloſed with leaves; theſe have thick chaffy empalements, with two valves; the flowers are compoſed of two ſhort membranaceous broad valves, which are permanent, and a ſmall germen, with a ſlender ſtyle, crowned by a ſingle ſtigma, which is hairy toward the point; the germen afterward turns to a roundiſh compreſſed ſeed, angular at the baſe, and half incloſed at its proper receptacle. Miller reckons three ſpecies, and Linnæus only one.

The Indians in New England, and many of our other ſettlements in America, had no other vegetable but *maize*, or Indian corn, for making their bread. They call it *nocake*; and where our colonies are at this time numerous, there is yet much of the bread of the country made of this grain, not of the European corn. In Italy and Germany alſo there is a ſpecies of *maize*, which is the food of the poor inhabitants.

The ear of the *maize* yields a much greater quantity of grain than any of our corn ears. There are commonly about eight rows of grain in the ear, often more, if the ground be good. Each of theſe rows contains at leaſt thirty grains, and each of theſe gives much more flour than a grain of any of our corn. The grains are uſually either white or yellowiſh, but ſometimes they are red, bluiſh, greeniſh, or olive-coloured, and ſometimes ſtriped and variegated.

This ſort of grain, though ſo eſſentially neceſſary to the natives of the place, is yet liable to many accidents. It does not ripen till the end of September; ſo that the rains often fall heavy upon it while on the ſtalk, and the birds, in general, peck it while it is ſoft and unripe. Nature has, to defend it from theſe accidents, covered it with a thick huſk, which keeps off ſlight rains very well; but the birds, if not frighted away, often eat through it, and devour great quantity of the grain.

There ſeem to be three or four diſtinct ſpecies of *maize* in different parts of America. That of Virginia is very tall and robuſt, growing to ſeven or eight foot high; that of New England is ſhorter and lower. And the Indians, farther up in the country, have a yet ſmaller kind in common uſe. The ſtalk of the *maize* is joined like the ſugar-cane; it is very ſoft and juicy, and the juice is ſo ſweet and ſaccharine, that a ſyrup, as ſweet as that of ſugar, has been often made of it; and things ſweetened with it have been found not diſtinguiſhable from thoſe done with ſugar. It has not been tried yet whether it will cryſtallize into ſugar; but in all probability it will.

The Americans plant this corn any time from the beginning of March to the beginning of June; but the beſt ſeaſon is the middle of April. The ſavage Indians, who knew nothing of our account of months, uſed to guide themſelves in the ſeed-time of this uſeful plant, by the budding of ſome particular trees of that country, and by the coming up of a ſort of fiſh into their rivers, which they call the *alooſe*. Theſe things were both ſo regular, that they were in no danger of miſtaking the time.

The manner of planting *maize* is in rows, at equal diſtances, every way about five or ſix feet. They open the earth with a hoe, taking away the ſurface to three or four inches deep, and of the breadth of the hoe; they then throw in a little of the finer earth, ſo as to leave the hoe four inches deep, or thereabouts, and in each of theſe holes they place four or five grains at a little diſtance from one another. If two or three of theſe grow up, it is very well; ſome of them are uſually deſtroyed either by the birds or other animals.

When the young plants appear, they hoe up the weeds from time to time; and when the ſtalk gathers ſome ſtrength, they raiſe the earth a little about it, and continue this at every hoeing, till it begins to put forth the ears; then they enlarge the hill of earth, round the root, to the ſize of a hop-hill, and after this they leave it till the time of harveſt, without any farther care.

When they gather the ears, they either immediately ſtrip off the corn, or elſe hang up the ears, tied in traces at diſtances from one another; for if they are laid near together, they will heat and rot, or elſe ſprout and grow; but kept cool and ſeparate, they will remain good all the winter. The beſt method is to threſh out the corn as ſoon as the harveſt is over, to dry it well on mats in the ſun, and then lay it up in holes of the ground, well lined with mats, graſs, or the like, and afterwards covered at top with more earth. The moſt careful among the Indians uſe this method, and this ſort of ſubterranean granary always proves good. See TRAGUS.

The uſes of this plant among the Indians are very many. The great article is the making their bread of it; but beſides this, the ſtalks, when cut up before they are too much dried, are an excellent winter food for cattle; but they uſually leave them on the ground for the cattle to feed on. The huſks about the ear are uſually ſeparated from the reſt, and make a particular ſort of fodder, not inferior to our hay. The Indian women have a way of ſlitting them into narrow parts, and they then weave them artificially into baſkets and many other toys.

The original way of eating the grain, among the Indians, was this; they boiled it whole in water till it ſwelled and became tender, and then they fed on it either alone, or eat it with their fiſh and veniſon, inſtead of bread. After this, they found the way of boiling it into a ſort of pudding, after bruiſing it in a mortar; but the way of reducing it to flour is the beſt of all. They do this by parching it carefully in the fire, without burning, and then beating it in mortars, and ſifting it. This flour they lay up in bags, as their conſtant proviſion, and take it out with them when they go to war, eating it either dry or with water.

The Engliſh have contrived, by mixing it into a ſtiff paſte, either by itſelf, or with rye or wheat-meal, fermenting it with leaven or yeaſt, and baking it in a hot oven, to make good bread of it. They have likewiſe found out a method of making good beer, either of the bread, or by malting the grain. Phil. Trans. N° 142. or Abridg. vol. ii. p. 630, &c.

MAKE, in *Law*, signifies to perform and execute.

Thus, to *make* his law, is to perform that law to which a man had formerly bound himself; *v. gr.* to clear himself of action commenced against him by his own oath, and the oath of his neighbours; otherwise called to wage law. See WAGER *of law*.

So, to *make* services, or customs, is nothing else but to perform what belongs to them.

MAKE-*hawk*, in *Falconry*. See HAWK.

To MAKE, in *Sea-language*, is variously applied: e. g. *to make a board*. See BOARD.

To make, the land is to discover it from a distant situation, in consequence of approaching it after a sea-voyage: to *make* land is to increase the quantity of sail already extended, either by letting out the reefs, and by hoisting an additional number of small sails, or by either of these operations separately: to *make* stern-way is to retreat or move with the stern foremost: to *make* water ealually signifies to leak; but a ship is said to *make* foul water, when running in shallow water, her keel disturbs the mud or ooze, lying at its bottom.

MAKINBOY, a name given by the people of Ireland to a kind of spurge, or tithymale, common there: this is a very violent purge, as all the other spurges are; but the Irish have an opinion, that it will produce this effect only by being carried in the pocket. This opinion, which had been universally believed for many ages, was proved to be false by Dr. Mullen, who carried a large quantity of it about him many days together, on purpose to give a fair trial; but it had not any the least effect on him.

MAKING *up*, a term used by the distillers to express the bringing spirits to a certain standard of strength by the addition of water. See LOWERING.

It is used principally in the distilling spirits, after their first drawing, either by way of rectifying them, or of giving them the virtues of aromatic ingredients, in order to make the compound waters; such as cinnamon, anniseed, and the like. See DISTILLATION.

In the making these compounds, some use an alcohol, or totally inflammable spirit, which is much the best method; others use ordinary proof spirit of malt, or molasses. If the latter be used, it is best not to put any water with it into the still; but if the former, so much water is to be added as will reduce it to the proof strength, which is just an equal quantity. When this is done, there should be drawn off three fifths of the whole by distillation; and the far better way would be to keep this liquor in this very state, which is just the strength of the trois cinques brandy of the French: but as people require these waters to be kept for drinking, in such a state as not to exceed, at the utmost, the strength of proof spirit, generally to fall much short of it, it is necessary to reduce this three fifths to the whole, or more than the whole quantity of the proof spirit put into the still. The apothecaries, to this end, usually let the still continue to work without changing the receiver, till an equal quantity is produced to the spirit put in, or one fourth more; it being the usual standard in these waters to have five quarts made from a gallon of the spirit. By the method of doing this, by letting the still run, the faints are taken into the water, and give it a vapid and disagreeable taste. Instead of this the distiller, when he has drawn off his three fifths of the quantity of proof, makes up the whole to the destined quantity, by adding the two other fifths, or more than that, if required, of common water, in which it is also customary to dissolve some fine sugar; and this gives a fulness in the mouth to the water, and makes it mellow, or lose the fiery taste of the still much sooner. If it be only made up to the strength of proof, it will mellow much sooner than if reduced one fifth below that standard, as the oil is much more perfectly dissolved in spirit of a standard proof strength, than in such as is weaker. The water employed in the *making up*, should be either soft and clear river water, or else spring-water rendered soft by distillation, otherwise it is apt to turn the water thick, and precipitate a sediment, especially if the water be drawn lower than proof, or if the spirit, originally employed, partake of an alkaline nature from the fats used in its rectification, as is usually the case in the malt spirits, the gross oil of which requires to be separated, by mixing fair of tartar or pot-ash with it in the still in the rectification.

When it is necessary to *make up* waters lower than proof, they are generally cloudy; but this may be remedied, and they may be fined down in a day or two with a small quantity of alum, or with whites of eggs, or the jelly of isinglass beat up to a froth, and mixed in the same manner as is usually done in the refining of wines.

The sugar, added to these cordial waters, has not only the advantages of mellowing and filling the mouth, but it unites the oil to the spirit in a manner that it could never be united in without it. Shaw's Eday on Distillery.

MALA *aurea*, in *Botany*, a name by which some authors have called the *poma amoris*, or fruit of the lycopersicon.

MALABAR *nut*, in *Botany*, a species of the JUSTICIA. See ADHATODA.

MALABATHRUM, among the *Ancients*, an excellent sweet-scented ointment.

MALABATHRUM, *Indian leaf*, in *Botany*. See TAMALAPATRA.

MALACCA *finces*, a name given by many authors to the *pedra del porco*, or *hog-bezoar*.

MALACHE, formed of μαλασσω, *I soften*, a term used by authors in a different sense; sometimes expressing such medicines as gently loosen the belly, and sometimes such ointments as relax and mollify.

MALACHI, *the prophecy of*, is one of the canonical books of the Old Testament, written by *Malachi*, who was probably contemporary with Nehemiah, and lived about 428 years before Christ. The chief corruptions which he charges upon the Jews are the same with those for which they were reproved by Nehemiah; he forbids them to expect any farther succession of prophets, exhorts them to observe the law of Moses, and predicts the coming of Elias or John the Baptist, as the fore-runner of the Messiah.

MALACHITES, or MOLOCHITES, in *Natural History*, a species of jasper, but of less beauty than most of those of that class. It is naturally of a pure and deep green, but sometimes variegated with whitish or blackish spots and clouds. It is found in the East and West Indies; also in many parts of Europe. See JASPER.

Its amuletic virtues, formerly in great esteem, are too ridiculous to be particularised. It is said to be a violent purgative, operating both by vomit and stool, and as such given in drachms. In so small a dose as five or six grains. If, as is very probable, its green colour be owing to particles of COPPER, it is not wonderful that it should have this effect; but there are so many better medicines for this purpose, as to supersede its use.

MALACHRA, in *Botany*, a genus of the *monadelphia pentandria* class; the characters of which are, that the calyx is three-leaved, and that the seeds, which are single, are covered with five coats. There are two species.

MALACIA, MALACIA, a disease consisting in a depraved appetite, wherein the patient covets and longs for some particular kind of food with extraordinary earnestness, and eats it to excess.

The word seems derived from the Greek μαλακια, *soft*; too lax a tone of the stomach being generally the occasion of indigestion, and of these unusual cravings.

Many authors confound this affection with another called PICA, which consists in a depravation of appetite, leading the patient to covet things unnatural and absurd, as lime, coals, &c.

The *malacia* seems to arise from an evil disposition of the menstruum in the stomach; or from some defect in the imagination, which determines it to some one thing rather than another.

MALACOCISSOS, in *Botany*, a name used by some authors for the common ground-ivy, or *hedera terrestris*; and by some others for the marsh-marygold.

MALACODERMATA, formed of μαλακος, *soft*, and δερμα, *skin*, in *Natural History*, a term used to express such animals as have only soft skins for their covering; in opposition to the ostracodermata, which have hard shelly matters for their covering, such as crabs, lobsters, &c.

MALACOIDES, in *Botany*. See *Bastard* MALLOW.

MALACOPTERYGII, in *Ichthyography*, the name of a large order of fishes, which have not prickly fins.

The term is derived from the Greek μαλακος, *soft*, and πτερυγιον, *a fin*. The fish of this order, are those which have bony fins, with all their extremities not pointed or sharp, but soft and harmless. Of this order are the carp, &c.

MALACOSTOMOUS, in *Ichthyography*, the name of a large genus of fishes, called in English the leather-mouthed kind. These fishes are wholly destitute of teeth in their jaws, but have them placed in their throats, near the orifice of the stomach.

The word is derived from the Greek μαλακος, *soft*, and στομα, *a mouth*. All the fish of this genus have their swimming, or air-bladder, divided into two parts; and of this genus are the carp, tench, bream, chub, and the like.

MALACOSTRACA, in *Natural History*, a term used by some, as Aristotle, to distinguish what we call crustaceous animals of the sea, &c. from those which he calls ostracodermata, or testaceous, as we express it. See table of testaceous and crustaceous animals. See CRUSTACEOUS.

MALAGMA, formed of μαλασσω, *I soften*, a word used by some authors to express a cataplasm in general, of whatever nature, or made of whatever ingredients; but some have used it only for the emollient cataplasms.

MALAN-

MALANDERS, *malandria*, a diſeaſe in horſes, ſo called from the Italian *malandrare*, *to go ill*.

It conſiſts in certain ulcerous chaps, or chinks, appearing on the inſide of the fore-legs, juſt againſt the bending of the knee, which void a red, ſharp, and pungent humour.

This diſtemper may be cured by waſhing the parts with a warm lather of ſoap, or old chamber-lye; and then applying over the cracks a ſtrong mercurial ointment, ſpread on tow, with which they ſhould be dreſſed night and morning, till all the ſcabs fall off; but if this treatment fail, make an ointment of half an ounce of æthiops mineral, one dram of white vitriol, ſix ounces of ſoft green ſoap; and having clipped off the hair, and cleared away the ſcabs, anoint often with this, and apply the above unguent over the ſores. When they dry up, give a gentle purge or two; or let the nitre-balls be taken for two or three weeks. Bartlet.

MALANKUA, in the *Materia Medica*, the name by which ſome authors have called the plant whoſe root is the round zedoary.

Many indeed eſteem the long and round zedoary the roots of different plants, but they ſeem rather to be only the different parts of the roots of the ſame ſpecies.

MALARMAT, in *Ichthyology*, a name given by authors to the fiſh called by ſome *lyra altera*, and *cornuta*. It is a ſpecies of the trigla, and is diſtinguiſhed by Artedi by the name of the trigla with many cirrhi, and with an octogonal body.

MALARUM *oſſa*, in *Anatomy*, are the cheek bones; they make the prominent upper part of the cheeks moſt remarkable in lean perſons: they form likewiſe a portion of the orbit, and complete the zygomatic arches. They have their name from the Latin *mala*, the *cheek*; they are two in number, and are ſituated in the lateral and middle parts of the face. They are, in ſome meaſure, triangular or irregularly ſquare, and are divided into two ſides, the external gently convex, the internal unequally concave.

The eminences in each bone are the ſuperior or angular orbitary apophyſis, which joins by future with the external angular apophyſis of the os frontis, and aſſiſts in forming the external angle of the orbit: from this apophyſis another ſubaltern proceſs runs inward on the inſide of the bone, one ſide of which forms a portion of the orbit, the other a portion of the zygomatic foſſa: the inferior or maxillary orbitary apophyſis, which with the angular apophyſis forms the inferior external portion of the orbit: the apophyſis malaris, which is in ſome meaſure the baſis of the reſt, and together with the apophyſis maxillaris, joins the orbitary apophyſis of the os maxillare, and the zygomatic apophyſis, which makes a part of the zygoma, and alſo of the zygomatic foſſa.

The cavities are the great orbitary ſlope, which makes the inferior external portion of the edge of the orbit; the zygomatic notch above the zygoma, and one or more little holes on the outſide, and in the orbitary apophyſis. Each bone is compoſed of two pretty compact tables, with a ſmall quantity of diploe between them, except in the anterior part of the apophyſis malaris. The os male on each ſide is joined to the os frontis by the angular apophyſis; to the os ſphenoides, by the ſubaltern apophyſis; to the os temporis, by the zygomatic apophyſis; and to the os maxillare, by its baſis. Winſlow's Anatomy, p. 34.

MALE, the ſex which has the parts of generation without-ſide, and which has ordinarily the pre-eminence over the other.

In this ſenſe *male* ſtands oppoſed to *female*.

For the proportion of *males* to *females*, ſee MARRIAGE.

MALE *baiſam apple*. See BALSAM-*apple*.

MALEBRANCHISM, the doctrine or ſentiments of father *Malebranche*, who was born at Paris in 1638, and became a prieſt of the Oratory of France in 1660, and died in 1715.

Malebranchiſm is in a great meaſure the ſame with CARTESIANISM. It muſt be owned, however, that though *F. Malebranche* thought the ſame with Deſcartes, yet he does not ſo properly ſeem to have followed him, as to have met with him.

Malebranchiſm is contained in the Recherche de la Verité; and, to give a general notion of it, we need only repeat what M. Fontenelle ſays of that work. The Inquiry after Truth, ſays he, is full of God: God is the only agent, and that too in the ſtricteſt ſenſe. All power of acting, all actions, belong immediately to him. Second cauſes are no cauſes. They are only occaſions that determine the action of God; or occaſional cauſes.

F. Malebranche, however, does not here lay down his ſyſtem entire, with regard to religion, or rather the manner in which he would reconcile religion to his ſyſtem of philoſophy; that he reſerved for his Entretiens Chrétiens, printed in 1677, where he proves the exiſtence of a God, the corruption of human nature by original ſin, and the neceſſity of a Mediator, and of grace.

Malebranchiſm, notwithſtanding, appears to many perſons not only ill-grounded, but even dangerous, and deſtructive to religion; and it has accordingly been vigorouſly oppoſed by many zealous French authors. The firſt was M. Foucher. After him came M. Arnaud; and in 1715, F. du Tertre, a Jeſuit, publiſhed an ample confutation (as he imagines) of his whole ſyſtem. It was alſo charged with atheiſm by F. Hardouin, in his Atheiſts Unmaſked; though his ſyſtem, formed by a warm and exuberant imagination, tends more to fanaticiſm and enthuſiaſm, than to atheiſm. That part which relates to our ſeeing all things in God, has been anſwered by Mr. Locke.

MALEDICTION, *maledictio*, in *Law*, a curſe uſually annexed to donations of lands, &c. to churches, and religious houſes; imprecating the moſt direful puniſhments on thoſe who ſhould infringe them.

MALICE, in *Ethics* and *Law*, is a formed deſign of doing miſchief to another; it differs from hatred. In murder, it is *malice* makes the crime; and if a man, having a *malicious* intent to kill another, in the execution of his *malice* kills a perſon not intended, the *malice* ſhall be connected to his perſon, and he ſhall be adjudged a murderer. The word *ex malitia præcogitata*, are neceſſary to an indictment of MURDER, &c. And this *malitia præcogitata*, or *malice prepenſe*, may be either expreſs or implied in law. Expreſs *malice* is, when one, with a ſedate, deliberate mind, and formed deſign, kills another; which formed deſign is evidenced by external circumſtances, diſcovering that intention; as lying in wait, antecedent menaces, former grudges, and concerted ſchemes to do him ſome bodily harm. Beſides, where no *malice* is expreſſed, the law will imply it; as where a man wilfully poiſons another, in ſuch a deliberate act the law preſumes *malice*, though no particular enmity can be proved. And if a man kills another ſuddenly, without any, or without a conſiderable provocation, the law implies *malice*; for no perſon, unleſs of an abandoned heart, would be guilty of ſuch an act, upon a ſlight or no apparent cauſe.

MALIGNANT, in *Medicine*, that quality in a diſeaſe which renders it more than ordinarily dangerous, and difficult of cure.

Malignant is generally applied to ſuch fevers as are epidemical, or infectious, and are attended with ſpots and eruptions of various kinds. See *Putrid* FEVER.

MALKARABALIA, in *Zoology*, the name of an Eaſt Indian ſpecies of ſerpent found in the iſland of Ceylon. It is remarkably variegated with white and duſky brown, in various figures.

MALL, or See-MALL, in *Ornithology*, the Engliſh name of a bird of the gull or larus kind, being the common gull, and diſtinguiſhed by authors by the name of *larus cinereus minor*, and called by Linnæus *larus canus*. It is very like the *larus cinereus major*, or HERRING-*gull*, but much ſmaller, not weighing above a pound; its head and neck are grey, with ſome brown ſpots; the lower part of the neck is white, the back is grey, and the breaſt and belly white as ſnow; the tail is alſo perfectly white, and is not forked. Theſe birds breed on the ledges of cliffs that hang over the ſea, and in winter are found in vaſt flocks on all our ſhores. See GULL.

MALLARD. See DUCK.

MALLEABLE, ſomething hard and ductile, and that may be beaten, forged, and extended under the hammer, without breaking.

All metals are *malleable*, not excepting even quickſilver; but gold is ſo in the greateſt degree of all. The chemiſts have long fought the fixation of mercury, or to render it *malleable*. See MERCURY, and FREEZING.

It is a popular error, that the art of making glaſs *malleable* was ever known; its nature is incapable of it. For if it were ductile, its pores would not be oppoſite to each other, and of conſequence it would not be tranſparent; ſo that its principal criterion would be loſt.

MALLEAMOTHE, in *Botany*, a low tree, or rather ſhrub, growing in Malabar. Of the roots are made hafts for knives, the leaves ſerve to dreſs the ground, and being fried in oil of palm, furniſh a liniment for removing the impetigo, and drying the puſtules of the ſmall pox. A decoction of the ſame, in common water, is uſed as a fomentation, to mitigate the pains of the hæmorrhoids.

The root pulverized with ginger and ſaffron, and exhibited in an infuſion of rice, cures the dropſy, by powerfully promoting a diſcharge of ſuperfluous ſerofities by the urinary paſſages. Acoſta commends the ſhrub principally for two effects; firſt, againſt ſtitches of the belly, for which purpoſe, however, it is of leſs efficacy than other

ther medicines; secondly, for curing all kinds of erysipelas, especially such as proceed from mere bile. They macerate the whole root or trunk, bruised in a decoction of rice, and suffer them to remain there for some hours, that the water may contract an acidity; after which they anoint the erysipelas therewith, and order the patient to drink a sufficient quantity of the same twice a day, the stomach being first purged. They give the same water to those who labour under an inflammation of the liver, and the burning heat of a fever; and use it mixed with a small quantity of the juice of the leaves of tamarind, to anoint the lips of the wounds, in order to prevent an inflammation.

MALLEMUCKE, in *Ornithology*. See FULMAR.

MALLEOLI, among the Romans, bundles of any combustible matter besmeared with pitch, and used by the Roman soldiers either for giving light in the night-time, or for setting fire to some of the enemies works.

The *malleoli* were sometimes fixed to a dart or javelin, that they might be sure to catch firm hold, and communicate the fire wherever they happened to light.

MALLEOLUS, a process in the lower part of the leg, just above the foot.

There is one *internal*, and another *external malleolus*.

The *internal malleolus* is an eminence of the tibia; the *external* of the fibula; the two together form the ancle. See *Anat. Chirurg. (Osteol.) fig.* 3. *n.* 23.

MALLEOLUS, in *Ichthyology*, a name given by Gaza and some others, to the fish called by Aristotle and the other old writers, *sphyræna*, and by the Italians *luccio marino*. It is a beautiful fish, and seems to belong to the scomber, or mackerel-kind. Salvian has figured it under the name of *pisciculus*, a name by which it is also called by Varro and some other old authors; but Salvian's figure is very imperfect; he has omitted the back fin.

MALLET, a large kind of hammer, made of wood, much used by artificers who work with a chissel, as sculptors, masons, and stone-cutters, whose *mallet* is ordinarily round; and by carpenters, joiners, &c. who use it square. See HAMMER.

There are several sorts of *mallets* used for different purposes on ship-board. The *caulking mallet* is chiefly employed to drive the oakum into the seams of a ship, where the edges of the planks are joined to each other in the sides, deck, or bottom. The head of this *mallet* is long and cylindrical, being hooped with iron to prevent it from splitting in the exercise of CALKING. There is also the *serving mallet*, used in serving the rigging, by binding the spun-yarn more firmly about it than could possibly be done by hand; which is performed in the following manner: the spun-yarn being previously rolled up in a large ball, or clue, two or three turns of it are passed about the rope, and about the body of the *mallet*, which for this purpose is furnished with a round channel in its surface, that conforms to the convexity of the rope intended to be served. The turns of the spun-yarn being strained round the *mallet*, so as to confine it firmly to the rope, which is extended above the deck, one man passes the ball continually about the rope, whilst the other, at the same time, winds on the spun-yarn by means of the *mallet*, whose handle acting as a lever, strains every turn about the rope as firm as possible. Falconer.

MALLEUM *incudis*, in *Anatomy*, a name given by Fabricius to one of the muscles of the ear, called by Cowper the *internus auris*, and by Albinus, who had considered its proper use, TENSOR *tympani*.

MALLEUS, in *Anatomy*, denotes one of the bones of the ear; so called from its resemblance to a hammer, or mallet; first discovered, as some assert, by Alexander Achillinus; though others have mistakenly attributed it to Jac. Carpensis. Vide Douglas Bibl. Anat. p. 48.

The *malleus*, or hammer of the ear, is a long bone with a large head, a small neck, a handle, and two apophyses, the one in the neck, the other in the handle. The top of the head is considerably rounded, and from thence it contracts all the way to the neck; both head and neck are in an inclined situation, and the eminences and cavities in it answer to those in the body of the incus. The handle is looked on by some as one of the apophyses of the *malleus*, and in that case it is the greatest of the three. It forms an angle with the neck and head, near which it is something broad and flat, and decreases gradually towards its extremity. The apophysis of the handle, terminated by others the small or short apophysis of the *malleus*, terminates the angle already mentioned, being extended toward the neck, and lying in a strait line with that side or border of the handle which lies next it. The apophysis of the neck, called also the apophysis gracilis, is in a natural state very long, but is slender withal, that it is very easily broken, especially when dry, which is the reason why the true length of it was for a long time unknown. It arises from the neck, and sometimes appears much longer than it really is, by the addition of a small dried tendon sticking to it. When the *mallei* is in its true situation, the head and neck are turned upwards and inwards, the handle downwards, parallel to the long leg of the incus, but more forward; the apophysis of the handle upwards and outward, near the superior portion of the edge of the tympanum, near the center of which is the extremity of the handle; and the apophysis gracilis forward, reaching all the way to the articular fissure in the os temporis. By the knowlege of this, the *mallei* of the right ear may be known from that of the left when out of their places. Winslow's Anat. p. 49. See EAR.

MALLOW, *mallow*, in *Botany*, a genus of the *monadelphia polyandria* class. Its characters are these: the flower has a double empalement, the outer composed of three, the inner of one leaf, cut into five broad segments at the brim; the flower is of one petal; it has a great number of stamina, which coalesce at bottom in a cylinder, but spread open above; in the center is situated an orbicular germen, supporting a short cylindrical style, with many briefly figmas; the empalement afterward turns to several capsules, which are joined in an orbicular depressed head fastened to the column, opening on their inside, each containing one kidney-shaped seed. Miller reckons fifteen, and Linnæus twenty-three species; two of which grow wild in most parts of England.

The fresh roots of the wild *mallow*, with a smooth leaf, are used as a diuretic and emollient, and the dried leaves as an ingredient in clysters, and in emollient fomentations and cataplasms. The ancients gave the juice of the *mallow*, in large doses, for inflammations and obstructions of the viscera. A strong decoction of *mallow* root is apt to be mucilaginous, and to fit ill on the stomach. It is a good common drink in pleurisies, peripneumonies, and peculiarly in cases of gravel, or inflammations of the kidneys; also in strangories and suppression of urine of all kinds. Infusions or decoctions of the leaves and flowers, and a conserve made by boiling the fresh flowers with thrice their weight of fine sugar, are sometimes prescribed for the same complaints.

MALLOW, *hastard*, *marsh*, in *Botany*, a genus of the *monadelphia polyandria* class. Its characters are these: the flower is shaped like that of the *mallow*, and hath a double empalement, the outer composed of three, and the inner of one leaf, cut into five segments; the flower is of one petal, divided into five parts to the bottom; in the center is situated the column, having a great number of stamina and styles joined closely to it; the germen becomes a fruit composed of many cells, which are collected into a head, in each of which is lodged a single seed. There is but one species, which has greatly the appearance of the *mallow*. Miller.

MALLOW, *Jews*, *corchorus*, in *Botany*, a genus of the *pentandria monogynia* class. Its characters are these: the flower, which is included in a five-leaved empalement, has five oblong blunt petals, and many hairy stamina, which are shorter than the petals; in the center is situated an oblong furrowed germen, which becomes a cylindrical pod, having five cells, which are filled with angular pointed seeds. Miller reckons five species, which, being natives of the East and West Indies, are too tender to thrive in the open air in England. Linnæus enumerates seven species.

The common *Jews mallow*, Rauwolf says, is cultivated about Aleppo as a pot-herb, and used by the Jews with their meat; and he supposes it to be the olus Judaicum of Avicenna, and the corchorum of Pliny.

A decoction of the whole plant, but especially of the leaves, is beneficial to the breast, by moistening it; for which reason, being taken with sugar-candy, it is a present remedy for rough and dry coughs.

MALLOW, *Indian*, *arum*, in *Botany*, a genus of the *monadelphia polyandria* class. Its characters are these: it hath a malvaceous flower, with a double empalement, the outer being of one leaf slightly cut at the brim into five parts, but the inner is five-leaved, permanent, and cut to the bottom; the flower is composed of five leaves, which are oblong, and blunt at their extremity, but narrow at their base, where they coalesce; in the center there are many stamina, which are joined, and form a column at their base, but spread open above; it has a roundish, five-cornered germen, with a single style, and ten hairy, reflexed stigmas; the germen changes to a pentagonal fruit, which is a berry, and divides into five cells, each having one angular seed. There are three species.

MALLOW, *Indian*, or *yellow*, *jute*, in *Botany*, a genus of the *monadelphia polyandria* class. Its characters are these: the empalement of the flower is single, permanent, angular, and five-pointed; the flower has one petal cut into five broad segments, joined at their base, and indented at their points; it has many stamina joined in a column at bottom, but spread open above, and an orbi-

culat germen, supporting a short multifid style; the germen becomes a five-cornered capsule, having five cells, each containing an angular roundish seed. There are twenty-one species.

MALLOW, *marsh*, *althea*, in *Botany*, a genus of the *monadelphia polyandria* class. Its characters are these: the flower has a double calyx; the outer cut into nine segments at the brim; the inner into five broad acute segments at the top; the flower has five petals, coalescing at their base, spreading open above, and shaped like a heart; there are many stamina, forming a kind of cylinder; in the center is placed the orbicular germen, supporting a short cylindrical style; the empalement becomes a compressed capsule, divided into several cells, each containing one compressed kidney-shaped seed. There are four species.

The common *marsh-mallow*, with single woolly leaves, indented in sharp segments, and growing naturally in moist places in many parts of England, though frequently cultivated in gardens, is perennial, and flowers from June to almost the end of summer.

The parts of this plant used in medicine, are the leaves and roots. The leaves, by decoction, afford a soft mucilaginous substance, good in all complaints arising from acrimony; of great service in dysenteries, &c. where the mucus of the intestines is raked off, and in many kinds of colics. It is also found of use in obstructions of the urinary passages, stranguries, heat of urine, &c. and is by some held a great secret for the cure of a gonorrhœa. Ray and others also speak of it as a pectoral; of use in coughs, and also pleurisies.

Marsh-mallow root is a very valuable medicine. It is emollient and diuretic, and gives great relief in disorders of the kidneys and bladder; whether arising from acrimony of the urine or gravel. It is good also in all disorders of the breast and lungs, arising from a thin acrimonious phlegm; in both which cases, a decoction of the fresh root is the best way of giving it. In diarrhœas and dysenteries, a strong decoction of *marsh-mallow* root, given clysterwise, is also of great use. Externally, in form of a cataplasm, it is excellent for softening and maturating hard tumors. The root is sometimes given in powders, from a scruple to a dram or two, either by itself, or in conjunction with other materials of a similar intention, as gum tragacanth, starch, &c.

The syrup of *marsh-mallows* is made by boiling a pound of the fresh roots in a gallon of water, till half the liquor is wasted, pressing out the decoction, and after settling for a night, boiling it down with four pounds of fine sugar, till the weight of the whole is six pounds; this is kept in the shops, and occasionally employed in some disorders of the breast, and for sweetening emollient decoctions in nephritic cases. This, however, is less efficacious than the decoction; on account of the sugar in the former, which makes an improper mixture with medicines of the mucilaginous kind.

Ointment of *marsh-mallows*, called *unguentum dialthææ*, is applied to tumors and inflammations, as an emollient and suppurative; which qualities it derives from the mucilage of the plant, being boiled a long time with the oil, before any of the other ingredients are mixed. See DIALTHEA.

The *emplastrum diachylon* receives much of its virtue from the same plant.

The *althea* of the ancients was plainly a different plant from that which we call by that name. Our *althea*, or *marsh-mallow*, is a very common plant, and grows in watery places, principally near the sea; but the *althea* of the ancients was a scarce herb, and grew in the barren deserts of Arabia, Asia, and the island of Sicily.

The descriptions, as we find them in the ancients, seem rather to refer us to the ABUTILON, or yellow *mallow* kind, than our own *althea*.

MALLOW, *rose*. See HOLLYHOCK.

MALLOW, *sea*, *malva marina*, in *Natural History*, a name not very judiciously given by some writers to a species of submarine substance, supposed in some degree to resemble the leaves of the common *mallow*. It is very common in the places where they fish for coral, and grows to the rocks without any regular root; it is found at different depths, but most usually far from the surface, and its height is usually about two inches: it is of a dusky greenish colour, with an admixture of a faint yellow; it is composed of several leaves of about half an inch broad, and a little more than that in length; each of these is fastened to a pedicle of about an inch and half long; the leaves are of a fine thin membranaceous substance, but their stalks or pedicles are thick and tough like horn. When examined by the microscope many glandules discover themselves upon the surfaces of the leaves, but the stalks or pedicles are entirely covered with glandules in form of small protuberances, which make it as rough in those parts as the common shagreen. The stalks when cut transversely shew an infinite number of pipes or vessels running up to every part of the leaves. Count Marsigli has given an elegant figure of this, both as it appears to the naked eye, and by the microscope.

MALLOW, *Syrian*, *hermia*, or *bibiscus*, in *Botany*, a genus of the *monadelphia polyandria* class. Its characters are these: the flower has a double permanent empalement; the outer has eight or ten narrow leaves; the inner is of one leaf, cut into five acute points; it has five heart-shaped petals, which join at their base into one; and many stamina, which are joined in form of a column, but expand toward the top; it has a round germen, which turns to a capsule with five cells, opening in five parts, including kidney-shaped seeds. There are twenty-five species of this plant propagated in gardens, where most of them grow to be shrubs of six or seven feet high; and, in the time of their flowering, which is during a great part of the latter end of the summer, they make a very beautiful figure. They may all be propagated by sowing their seeds in February or March on a light bed of earth; they must be suffered to remain in these beds till the following spring, being well weeded, and often watered in the summer. In the March following, the plants are to be transplanted into beds of the same sort of earth, setting them at about ten inches distance every way; here they are to remain two years more, being well weeded and watered in the time; and in the March following, they should be carefully removed to the places where they are to remain; they must be taken up carefully, without injuring the roots; the ground must be well watered where they are planted, and some mulch should be laid about their roots, to prevent the ground's drying too fast.

Some choose to propagate them by suckers from the old roots, but this is by no means advisable, as the plants this way raised are never well rooted, and are always subject to produce great numbers of suckers themselves, which renders them very unsightly.

The Historia Plantarum ascribed to Boerhaave, informs us, that all the species of this plant, except those which taste like sorrel, agree in virtue with the *mallow*.

MALLOW, *tree*, *variegated*, or *Venetian*. See LAVATERA.

MALLOW, *wall*, a species of the *mallow*, or common MALLOW. Some have called the ALCEA by this name.

MALLOW, *yellow*. See *Indian* MALLOW.

MALMIGNATTO, in *Natural History*, a name given by the inhabitants of the island of Corsica to a species of animal, or large insect, called by some *tarantula*, and ignorantly supposed to be the same with the tarantula of Apulia. This island produces neither wolves, serpents, nor many other of the mischievous and destructive animals which infest the neighbouring countries; but it produces two species of this venomous insect, called the *malmignatto*: the one of these has a round body, and the other an oblong one, resembling that of our large kind of ant; it has also six legs, not eight, and never makes any web; from all which it appears not to be a spider, but truly of the ant-kind, though a monstrous sized one, and very venomous. The round-bodied kind, by its bite, occasions violent pains, a sensation of coldness and cramps all over the body; and the long-bodied one is yet more venomous. Its sting occasions an immediate lividness of the flesh, with intolerable cramps and convulsions over the whole body; sometimes the natural evacuations by stool and urine are also wholly stopped by it. The cure, in both cases, is to be attempted by cutting and cauterizing the wound, and dressing it with Venice treacle, as also by giving the same in large doses dissolved in wine.

MALMSEY, or MALVASY, a rich luscious kind of wine brought from Greece or Candia; so called from Malvasia, a city in Peloponnesus, the ancient Epidaurus, whence this celebrated liquor was first brought.

That brought from Candia is now esteemed the best.

MALMSEY, or MALVISY, is also the name of a kind of muscadine wine brought from Provence.

MALOBATHRUM, among the Romans, a precious kind of ointment, brought from the Indies through Syria to Rome.

MALOGRANATUM, in *Botany*. See POMEGRANATE.

MALPIGHIA, in *Botany*. See *Barbadoes* CHERRY.

MALOPE, in *Botany*. See *Bastard* MALLOW.

MALPOLON, in *Zoology*, the name of a species of serpent found in the island of Ceylon, and beautifully variegated with red marks in the form of stars.

MALT denotes barley cured, or prepared to fit it for making a potable liquor, under the denomination of beer or ale. The manner of making *malt*, Sir Robert Murray describes as follows:—take good barley newly threshed, &c. put about six English quarters into a stone trough, or cistern lined with lead, full of water, where let it steep till the water be of a bright reddish colour; which will

be in about three days, more or leſs, according to the moiſture or dryneſs, and the ſmallneſs or bigneſs of the grain, and the ſeaſon of the year, or the temperature of the weather. In ſummer, *malt* never makes well; in winter, it requires longer ſteeping than in ſpring or autumn. It may be known when it is ſteeped enough, by other marks beſides the colour of the water; as by the exceſſive ſwelling of the grain, if it be over-ſteeped, and by too much ſoftneſs; being, when it is in a right temper, like the barley prepared to make broth of.

When it is ſufficiently ſteeped, take it out of the trough, and lay it on heaps to let the water drain from it; then after two or three hours turn it over with a ſcoop, and lay it in a new heap, about twenty or twenty-four inches deep.

This is called the *coming heap*, in the right management whereof lies the principal ſkill. In this heap it may lie forty hours, more or leſs, according to the fore-mentioned qualities of the grain, &c. before it comes to the right temper of *malt*; which that it may do equally, is the principal thing deſired.

While it lies in this heap, it muſt be carefully looked to, after the firſt fifteen or ſixteen hours; for about that time the grains begin to put forth roots: which when they have equally and fully done, the *malt* muſt within an hour after be turned over with a ſcoop; otherwiſe the grains will begin to put forth the blade or ſpire alſo, which muſt by all means be prevented. If all the *malt* do not come equally, but that which lies in the middle, being warmeſt, comes the ſooneſt, turn it, ſo that the outmoſt may lie inmoſt; and thus manage it till it be all alike.

As ſoon as the *malt* is ſufficiently come, turn it over, and ſpread it to a depth not exceeding five or ſix inches; and by that time it is all ſpread out, begin and turn it over and over again three or four times. Afterwards turn it over in like manner once in four or five hours, making the heap deeper by degrees; and continue ſo to do for the ſpace of forty-eight hours at leaſt. This frequent turning it over, cools, dries and deadens the grain; whereby it becomes mellow, melts eaſily in brewing, and ſeparates entirely from the huſk.

Then throw up the *malt* into an heap, at high as you can; where let it lie, till it grow as hot as your hand can endure it. This uſually comes to paſs in about thirty hours. This perfects the ſweetneſs and mellowneſs of the *malt*.

After it is ſufficiently heated, throw it abroad to cool, and turn it over again about ſix or eight hours after, and then lay it on a hair-cloth, or wire ſpread under it; where, after one fire, which muſt laſt for twenty-four hours, give it another more ſlow, and afterwards, if need be, a third; for, if the *malt* be not thoroughly dried, it cannot be well ground, neither will it diſſolve well in the brewing; but the ale it makes will be red, bitter, and unfit to keep.

The beſt fewel for drying it is peat, turf, or Welch coal, prepared by a previous burning; the next is charcoal. If there be not enough of one kind, burn the beſt firſt; for that gives the ſtrongeſt impreſſion. Phil. Tranſ. Abr. vol. ii. p. 627, &c. Indeed the beſt and moſt natural method of drying is in the ſun, in the months of April and May. This yields the paleſt, the moſt wholeſome, and the fineſt liquor. However this be, take care the *malt* be not ſmoked in the drying. As to the complexion or colour of *malt*, the white is accounted the beſt, becauſe the moſt natural. Brown malt is dried with ſtraw for London Porter.

The ſtrength and duration of the fire are different according as the *malt* is intended to be dried pale, amber, or brown. Pale and amber *malt* are dried with coke or culm, which, not emiting any ſmoke, give the *malt* a brighter colour, and do not impart that bad taſte which *malt* has when dried with wood, ſtraw, &c. Coke is beſt, becauſe its fire gives a ſteady and conſtant heat, whereby the *malt* is dried uniformly. If wood, or any vegetable fuel is uſed, it ſhould be extremely well dried, that it may yield the leſs ſmoke.

Almoſt every maſter has his ſecret in making *malt*, but there are ſome neceſſary cautions to be obſerved by all, which will enſure ſucceſs in the work; theſe are, 1. That the barley be newly thraſhed, or at leaſt newly winnowed. 2. That the whole be of one kind, not mixed up of ſeveral ſorts. 3. That it be not over-ſteeped in the ciſtern, or ſo long as to make it ſoft. 4. That it be well drained. 5. That it be carefully looked after in the wet couch, ſo as to ſtop the firſt tendency of the blade to ſhooting. 6. To turn the wet couch inſide outermoſt, if the barley comes, that is, ſhoots more in the middle than on the ſides. 7. To keep it duly turning after it is out of the wet couch. 8. To give it the proper heating in the dry heap. 9. To dry and criſp it thoroughly on the kiln, but without a fierce fire, ſo as to be ſeveral days in drying a kiln of pale *malt*. Shaw's Lectures, p. 187.

By 12 Ann. ſtat. 1. cap. 2, continued yearly, and by 33 Geo. II. cap. 7, there ſhall be paid by the maker for all *malt* made in England, except it be made for exportation only 12 Geo. cap. 4, 2 duty of nine pence a buſhel: and by 19 Geo. III. cap 25, an additional duty of 15*l.* per cent. which duty is under the management of the commiſſioners and officers of exciſe. No *malt* ſhall be imported, on pain of forfeiting the ſame and its value. *Aſalt* brought from Scotland ſhall be entered at the port of landing, and pay the ſame duty as Engliſh *malt*, unleſs a certificate is produced that it hath paid the duty of 4½ *d.* a buſhel in Scotland, and then it ſhall only pay 4½ *d.* more, to make it equal with the Engliſh. Places for making *malt* are to be entered, on pain of 50*l.* and the officers ſhall be permitted to enter and ſurvey, without interruption, on forfeiture of 20*l.* By 2 and 3 Edw. VI. cap. 12. no perſon ſhall make any barley *malt*, except in June, July and Auguſt, which ſhall not be three weeks at leaſt in making; nor in theſe months, under ſeventeen days, on pain of forfeiting *ſix* every quarter 2*l.* and ſelling *malt*, which has not been well dreſſed, ſo that there may not be ſanned out of one quarter half a peck of duſt or more, incurs a forfeiture of 20*s.* for every quarter: and mixing bad *malt* with good for ſale is liable to a forfeiture of 2*l.* for every quarter. In the proceſs of malting, preſſing *malt* in the ciſtern to prevent its ſwelling, mixing corn of one wetting with corn of a former wetting, and mixing *malt* with unmalted corn, incur each of them a penalty of 5*l.* a buſhel. 1 Geo. III. cap. 3. 12 Geo. II. cap. 1. 1. Geo. I. 2. cap. 2. Again, mixing *malt* that has been gaged with the ungaged, ſubjects to a forfeiture of 10*l.* 1 Geo. III. cap. 3. By the ſame ſtatute the ſame penalty is inflicted on thoſe who conceal *malt* to avoid being gaged in the couch: and by 12 Ann. ſtat. 1. cap. 2. concealing *malt* to avoid the duty incurs a forfeiture of 10*l.* a buſhel: and an allowance ſhall be made of four buſhels out of twenty for the ſwelling of *malt*, within thirty hours after the ſame ſhall be thrown out of the ſteeping veſſel, and ten buſhels out of twenty, after it hath been thrown out of the ciſtern thirty hours or more. But a maltſter, not covering his barley, &c. in the ciſtern with water, and ſuffering it to remain for forty hours, ſhall not be allowed the ſaid four buſhels in every twenty. The maltſter is required to give twenty-four hours notice within a city or market-town, and elſewhere forty-eight hours notice in writing to the officer of the time of the day when he intends to wet corn to be made into *malt*; and he ſhall not begin but between four in the morning and nine in the evening: the omiſſion of ſuch notice, &c. incurs a forfeiture of 100*l.* by 3 Geo. III. cap. 13. and by 12 Ann. ſtat. 1. cap. 2. he ſhall every month make entry at the office of Exciſe of all the *malt* made in ſuch month, on pain of 10*l.* within four months after entry, he ſhall pay off the duties, on pain of forfeiting double. 1 Geo. ſtat. 2. cap. 2.

A drawback of the duty is allowed for *malt* damaged in exportation, and alſo for *malt* deſtroyed by fire or water. A compoſition of 7*s.* and 6*d.* a head by the year ſhall be made for the duties of *malt* made to be conſumed in private houſes; and the houſes of perſons thus compounding ſhall not be liable to the duty or to the ſurvey of the officers: a perſon tranſgreſſing in this reſpect ſhall forfeit 5*l.* loſe the benefit of his compoſition, and forfeit for every buſhel of *malt* 20*s.* 12 Ann. ſtat. 2. cap. 2. 33 Geo. II. cap. 7. By the laſt ſtat. and 12 Geo. cap. 4. no *malt* entered and made for exportation ſhall be liable to the duties, and no drawback ſhall be allowed for any *malt* exported: but the maker ſhall be allowed for his trouble 3*d.* for every quarter. By 1 Geo. III. cap. 3. there ſhall be allowed for every twenty quarters of grain made into *malt* for exportation thirty quarters of *malt* and no more, on exportation: and notice ſhall be given of ſteeping and the quantity, on pain of 50*l.* and this ſhall be kept ſeparate from that deſigned for home conſumption, on pain of 5*l.* a buſhel, 12 Geo. cap. 4. and the corn of one ſteeping ſhall be kept ſeparate from any other, until it hath been meaſured, on pain of 50*l.* 3 Geo. II. cap. 7. Perſons oppoſing officers ſhall forfeit 50*l.* 12 Geo. cap. 4. Notice of meaſuring ſhall be given; and the *malt* carried on ſhip-board, or kept ſeparate and locked up, on pain of 50*l.* Opening ſuch locks, and carrying away the *malt*, without conſent of the officer, or notice given to him, incur a forfeiture of 100*l.* The officer having received forty hours notice ſhall attend, keep an account of the *malt* delivered out, and of the perſon to whom it belongs, and give a certificate to the officer of the diviſion to which it is to be removed, who ſhall file the ſame and make entry thereof: and if the proprietor neglect to deliver ſuch certificate, he ſhall forfeit 50*l.* Thoſe intending to

ſhip *malt* for exportation ſhall give forty-eight hours notice to the officer of the port in writing, with the name of the ſhip, on pain of 5*l.* a buſhel. The ſhip ſhall be locked, and perſons breaking open the hatches, forfeit 50*l.* The landing *malt* after ſhipping for exportation, ſubjects, beſides the penalty of the bond for its exportation, to a forfeiture of the ſame, and treble the value, 1 Geo. III. cap. 3. Storehouſes ſhall be cleared out in fifteen months, on pain of 50*l.* and unmalted oats or barley mixed among *malt* for exportation incurs a forfeiture of 5*l.* a buſhel, 6 Geo. cap. 21. See MALT TAX. For the duty on barley. See HORDEUM. The infuſion of *malt* has been much recommended as an antiſcorbutic. See SCURVY and WORT.

Good *malt* may be made of the grain of the maiz or Indian corn, but then a particular method muſt be taken for the doing it. Our barley *malt*-makers have tried all their ſkill to make good *malt* of it in the ordinary way, but to no purpoſe; that is, the whole grain will not be this way malted or rendered tender and flowry, as in other *malt*; for it is found, by experience, that this corn, before it be fully malted, muſt ſprout out both ways, that is, both root and blade, to a conſiderable length, that of a finger at leaſt, and if more the better. For this purpoſe it muſt be laid in a heap a convenient time; and in this proceſs, if it be of a ſufficient thickneſs for coming, it will quickly heat and grow mouldy, and the tender ſprouts will be ſo entangled, that the leaſt moving of the heap will break them off; and the farther maturation of the grain into *malt*, will be hindered by this means; and on the other hand, if it be laid thin, and often ſtirred and opened to prevent too much heating, thoſe ſprouts which have begun to ſhoot ceaſe growing, and conſequently the corn again ceaſes to be promoted to the mellowneſs of *malt*. Phil. Tranſ. N° 142.

To avoid all theſe difficulties, the following method is to be uſed: take away the top of the earth in a garden or field, two or three inches, throwing it up half one way, and half the other; then lay the corn for *malt* all over the ground ſo as to cover it; the earth that was pared off is now to be laid on again, and nothing more is to be done till the field is all over covered with the green ſhoots of the plant. The earth is then to be taken off, and the roots of the grain will be found ſo entangled together, that they will come up in large cakes or parcels; it muſt be gently waſhed in order to take off all the dirt, and then dried on a kiln, or on a clean floor expoſed to the ſun. Every grain of the maiz will be thus tranſmuted into good *malt*, and the beer brewed with it will be very pleaſant and very wholeſome, and of an agreeable brown colour, but very clear.

It may be worth trying whether the ſame proceſs is not with due care applicable to the malting of turneps, potatoes, carrots, parſneps, and the like. It might poſſibly be of ſervice alſo to attempt this leſs laborious way of making *malt* of barley and other ſmall grains: the diſadvantages would be the not ſo eaſily ſeparating the dirt from the grain as in that larger kind; and as barley requires the root only, not the ear, to ſhoot in order to the making of *malt*, it would be ſome difficulty to know the exact time of taking it up; but with all theſe diſadvantages the method is worth a trial.

MALT *for the manner of preparing liquors of*, ſee BREWING.

MALT *liquors* have different names as well as different virtues, properties, and uſes, both from the different manners of preparing the *malt*; whence they are diſtinguiſhed into *pale* and *brown*; and from the different manners of preparing or brewing the *liquors* themſelves; whence they are divided into *beer* and *ale*, *ſtrong* and *ſmall*, *new* and *old*.

Malt drinks are either pale or brown, as the *malt* is more or leſs dried on the kiln; that, which is the ſtendereſt dried, tinging the liquor leaſt in brewing, and therefore being called *pale*: whereas that higher dried, and as it were roaſted, makes it of a higher colour. A mixture of both theſe makes an amber colour; whence ſeveral of theſe liquors take their name.

Now, it is certain, the pale *malt* has moſt of the natural grain in it, and is therefore the moſt nouriſhing; but, for the ſame reaſon, it requires a ſtronger conſtitution to digeſt it. Thoſe who drink much of it, are uſually fat and ſleek in their bloom, but are often cut off by ſudden fevers; or, if they avoid this, they fall early into a diſtempered old age.

The brown *malt* makes a drink much leſs viſcid, and fitter to paſs the ſeveral ſtrainers of the body; but, if very ſtrong, it may lead on to the ſame inconveniencies with the pale; though a ſingle debauch wears off much more eaſily in the brown.

Dr. Quincy obſerves, that the beſt pale *malt liquors* are thoſe brewed with hard waters, as thoſe of ſprings and wells; becauſe the mineral particles, wherewith theſe waters are impregnated, help to prevent the coheſions of thoſe drawn from the grain, and enable them to paſs the proper ſecretions the better; as the viſcid particles of the grain do likewiſe defend theſe from doing the miſchief they might otherwiſe occaſion. But ſofter waters ſeem beſt ſuited to draw out the ſubſtance of high-dried *malts*, which retain many fiery particles in their contexture, and are therefore beſt left in a ſmooth vehicle.

For the differences in the preparation of *malt liquors*, they chiefly conſiſt in the uſe of hops, as in beer; or in the more ſparing uſe of them, as in ale.

The difference made by hops is beſt diſcovered from the nature and quality of the hops themſelves: theſe are known to be a ſubtile grateful bitter; in their compoſition, therefore, with this *liquor*, they add ſomewhat of an alkaline nature, *i. e.* particles that are ſublime, active, and rigid. By which means, the ropy, viſcid parts of the *malt* are more divided and ſubtilized; and are therefore not only rendered more eaſy of digeſtion and ſecretion in the body, but alſo, while in the *liquor*, they prevent it from running into ſuch coheſions as would make it ropy, vapid, and ſour.

For want of this, in unhopped drinks, that clammy ſweetneſs, which they retain after working, ſoon turns them acid, and unfit for uſe; which happens ſooner or later, in proportion to the ſtrength they receive from the *malt*, and the comminution that has undergone by fermentation.

It is a common opinion, that ale is more diuretic than beer, that is, liquor leſs hopped more than that with a greater quantity of hops in it: which may hold in ſome conſtitutions, becauſe ale being more ſmooth, ſoftening, and relaxing, where urine is to be promoted by enlarging the paſſage, as in thin, dry conſtitutions, this is the moſt likely to effect it. But, where the promoting of urine is to be done by attenuating and breaking the juices, and rendering them more fluid, it is certainly beſt anſwered by thoſe drinks which are well hopped.

As to the diſpute, whether or no hops tend to breed the ſtone; it is too long to enter upon here. Quincy is of opinion, there is but little reaſon for the affirmative ſide of the queſtion; and in the general, makes no ſcruple to ſay, that, for one conſtitution damaged by beer, there are numbers ſpoiled by ale. This laſt manifeſtly fouls the glands, ſtuffs the veſſels with ſlime and viſcidity, makes the body unwieldly and corpulent, and paves the way for cachexies, jaundice, aſthmas, and at laſt incurable dropſies. The urinary paſſages, alſo, which it is ſuppoſed to clear, will, in time, be filled by it with ſlough, and matter of as ill conſequence as gravel.

The different ſtrengths of *malt liquors* alſo make their effects different. The ſtronger they are, the more viſcid parts they carry into the blood; and though the ſpirituous parts make theſe imperceptible at firſt, yet when thoſe are evaporated, which will be in a few hours, the other will be ſenſibly felt by pains in the head, nauſeouſneſs at the ſtomach, and laſſitude or liſtleſſneſs to motion. This, thoſe are the moſt ſenſible of, who have experienced the extremes of drinking theſe *liquors*, and wines; for a debauch of wine they find much ſooner worn off, and they are much more lively and brisk afterwards, than after ſuddling *malt liquors*, whoſe viſcid remains will be long before they be ſhaken off.

Malt liquors therefore are, in general, the more wholeſome for being ſmall; *i. e.* of ſuch a ſtrength as is liable to carry a ſmall degree of warmth into the ſtomach, but not ſo great as to prevent their being proper diluters of the neceſſary food. Indeed, in robuſt people, or thoſe who labour hard, the viſcidities of the drink may be broken into convenient nouriſhment; but in perſons of another habit and way of living, they ſerve rather to promote obſtructions and ill humours.

The age of *malt liquors* is the laſt thing by which they are rendered more or leſs wholeſome. Age ſeems to do nearly the ſame thing as hops; for thoſe *liquors* which are longeſt kept are certainly leaſt viſcid; age breaking the viſcid parts, and, by degrees, rendering them ſmaller, and fitter for ſecretion.

But this is always determined according to their ſtrength; in proportion to which, they will ſooner or later come to their full perfection, as well as decay; for, when ale or beer is kept till its particles are broken and comminuted as far as they are capable, then it is that they are beſt; and, beyond this, they will be continually on the decay, till the finer ſpirits are entirely eſcaped, and the remainder becomes vapid and ſour.

MALT *Diſtillery*. This is an extenſive article of trade, and by which very large fortunes are made. The art is to convert fermented *malt* liquors into a clear inflammable ſpirit, which may be either ſold for uſe in the common ſtate of a proof ſtrength, that is, the ſame ſtrength with French brandy;

brandy; or is rectified into that purer spirit usually sold under the name of spirit of wine; or made into compound cordial waters, by being distilled again from herbs and other ingredients. See BREWING and WASH.

To brew with *malt* in the most advantageous manner, it is necessary, 1. That the subject be well prepared. 2. That the water be suitable and duly applied; and, 3. That some certain additions be used, or alterations made, according to the season of the year, and the intention of the operator; and by a proper regulation in these respects, all the fermentable parts of the subject will thus be brought into the tincture, and become fit for fermentation.

The due preparation of the subject consists in its being justly *malted* and well ground. When the grain is not sufficiently *malted* it is apt to prove hard, so that the water can have but very little power to dissolve its substance; and if it be too much *malted*, a part of the fermentable matter is lost in that operation. The harder and more flinty the *malt* is, the finer it ought to be ground; and in all cases, when intended for distillation, it is advisable to reduce it to a kind of finer or coarser meal. When the *malt* is thus ground, it is found, by experience, that great part of the time, trouble and expence of the brewing is saved by it, and yet as large a quantity of spirit will be produced; for thus the whole substance of the *malt* may remain mixed among the tincture, and be fermented and distilled among it. This is a particular that very well deserves the attention of the *malt* distiller, as that trade is at present carried on; for the dispatch of the business, and the quantity of spirit procured, is more attended to, than the purity or perfection of it.

The secret of this matter depends upon the thoroughly mixing, or briskly agitating and throwing the *meal* about, first in cold, and then in hot water; and repeating this agitation after the fermentation is over, when the thick turbid wash being immediately committed to the still, already hot and dewy with working, there is no danger of burning, unless by accident, even without the farther trouble of stirring, which in this case is found needless, though the quantity be ever so large, provided that requisite care and cleanliness be used; and thus the business of brewing and fermenting may very commodiously be performed together, and reduced to one single operation. Whatever water is made choice of, it must stand in a hot state upon the prepared *malt*, especially if a clear tincture be desired, but a known and very considerable inconvenience attends its being applied too hot, or too near to a state of boiling, or even scalding with regard to the hand. To save time in this case and to prevent the *malt* running into lumps and clods, the best way is to put a certain measured quantity of cold water to the *malt* first; the *malt* is then to be stirred very well with this, so as to form a sort of thin uniform paste or pudding; after which the remaining quantity of water required may be added in a state of boiling, without the least danger of making what, in the distillers language, is called a pudden.

In this manner the due and necessary degree of heat in the water, for the extracting all the virtues of the *malt*, may be hit upon very expeditiously, and with a great deal of exactness, as the heat of boiling water is a fixed standard which may be let down to any degree by a proportionate mixture of cold water, due allowances being made for the season of the year, and for the temperature of the air.

This little obvious improvement added to the method just above hinted for the reducing brewing and fermentation to one operation, will render it practicable to very considerable advantage, and the spirit improved in quality as well as quantity.

A much more profitable method than that usually practised for the fermenting *malt* for distillation, in order to get its spirit, is the following: take ten pounds of *malt* reduced to a fine meal, and three pounds of common wheat-meal; add to these two gallons of cold water, and stir them well together, then add five gallons of water boiling hot, and stir all together again. Let the whole stand two hours, and then stir it again, and when grown cold, add to it two ounces of solid yeast, and set it by loosely covered in a warmith place, to ferment.

This is the Dutch method of preparing what they call the wash for *malt* spirit; whereby they save much trouble and procure a large quantity of spirits: thus commodiously reducing the two businesses of brewing and fermenting to one single operation. In England the method is to draw and wash for spirit as they ordinarily do for beer, only instead of boiling the wort, they pump it into large coolers, and afterwards run it into their fermenting back, to be there fermented with yeast. Thus they bestow twice as much labour as is necessary, and lose a large quantity of their spirit by leaving the gross bottoms out of the still for fear of burning.

All simple spirits may be considered in the three different states of low wines, proof spirit, and alcohol, the intermediate degrees of strength being of less general use; and they are to be judged of only according as they approach to, or recede from these. Low-wines, at a medium, contain a sixth part of pure inflammable spirit, five times as much water as spirit necessarily arising in the operation with a boiling heat. Proof goods contain about one half of the same totally inflammable spirit; and alcohol entirely consists of it.

Malt low-wines, prepared in the common way, are exceeding nauseous; they have, however, a natural vinosity, or pungent agreeable acidity, which would render the spirit agreeable to the palate, were it not for the large quantity of the gross oil of the *malt* that abounds in it. When this oil is detained in some measure from mixing itself among the low-wines, by the stretching a coarse flannel over the neck of the still, or at the orifice of the worm, the spirit becomes much purer in all respects; it is less fulsome to the taste, less offensive to the smell, and less milky to the eye. Shaw's Essay on Distillery. When these low-wines, in the rectification into proof spirits, are distilled gently, they leave a considerable quantity of this gross fetid oil behind them in the still along with the phlegm; but if the fire be made fierce, this oil is again raised and brought over with the spirit; and being now broken somewhat more fine, it impregnates it in a more nauseous manner than at first. This is the common fault both of the *malt* distiller and of the rectifier; the latter, instead of separating the spirit from this nasty oil, which is the principal intent of his process, attends only to the leaving the phlegm in such quantity behind, that the spirit may be of a due strength as proof or marketable goods, and brings over the oil in a worse state than before. To this inattention to the proper business of the process, it is owing, that the spirit after its several rectifications, as they are miscalled, is often found more stinking than when delivered out of the hands of the *malt* distiller. All this may be prevented by the taking more time in the subsequent distillations, and keeping the fire low and regular, the sudden stirring of the fire, and the hasty way of throwing on the fresh fuel, being the general occasions of throwing up the oil by spurts, where the fire in general, during the process, has not been so large as to do that mischief.

The use of a balneum mariæ, instead of the common still, would effectually prevent all this mischief, and give a purer spirit in one rectification, than can otherwise be procured in ten, or indeed according to the common methods at all.

Malt low-wine, when brought to the standard of proof spirit, loses its milky colour, and is perfectly clear and bright, no more oil being contained in it than is perfectly dissolved by the alcohol, and rendered miscible with that proportion of phlegm, which is about one half the liquor; its taste also is cleaner, though not more pleasant; there being less of the thick oil to hang on the tongue in its own form, which is not the case in the low-wines, where the oil being undissolved, adheres to the mouth in its own form, and does not pass lightly over it.

When proof-spirit of *malt* is distilled over again, in order to be rectified into alcohol, or, as we usually call it, spirits of wine, if the fire be raised at the time when the faints begin to come off, a very considerable quantity of oil will be raised by it, and will run in the visible form of oil from the nose of the worm. This is not peculiar to *malt* spirit, but the French brandy shews the same phenomenon, and that in so great a degree, that half an ounce of this oil may be obtained from a single piece of brandy.

Malt spirit, more than any other kind, requires to be brought into the form of alcohol, before it can be used internally, especially as it is now commonly made up in the proof state, with as much of this nauseous and viscous oil as will give it a good crown of bubbles. For this reason it ought to be reduced to an alcohol, or totally inflammable spirit, before it is admitted into any of the medicinal compositions. If it be used without this previous caution, the odious taste of the *malt* oil will be distinguished among all the other flavours of the ingredients.

Malt spirit, when it has once been reduced to the true form of an alcohol, is afterwards more fit for all the curious internal uses than even French brandy, it being after this purification a more uniform, hungry, tasteless, and impregnable spirit, than any other spirits which we esteem so much finer.

A pure spirit being thus procured, should be kept carefully in vessels of glass or stone, well stopped, to prevent the

the evaporation of any of its volatile part. If preserved in casks, it is apt to impregnate itself very strongly with the wood. The quantity of pure alcohol obtainable from a certain quantity of *malt*, differs according to the goodness of the subject, the manner of the operation, the season of the year, and the skilfulness of the workman; according to which variations, a quarter of *malt* will afford from eight or nine, to thirteen or fourteen gallons of alcohol. This should encourage the *malt* distiller to be careful and diligent in his business, as to very large a part of his profit depends wholly on the well conducting his processes.

After every operation in this business, there remains a quantity of faints, which in their own coarse state ought never to be admitted into the pure spirit; these are to be saved together, and large quantities of them at once wrought into alcohol. It is easy to reduce these to such a state, that they will serve for lamp spirits. Their disagreeable flavour being corrected by the adding of aromatics during the diftillations, the reducing them into a perfect and pure alcohol is practicable, but not without such difficulties as render it scarce worth the trader's while. One way of doing it is by diftilling them from water into water, and that with a very flow fire. By this means a pure alcohol may be made out of the foulest faints.

The *malt* diftiller always gives his spirit a single rectification *per ſe*, in order to purify it a little, and make it up proof, but in this state it is not reckoned fit for internal uſes, but ſerves to be diftilled into geneva and other ordinary compound ſtrong waters for the vulgar.

The Dutch who carry on a great trade with *malt ſpirit*, never give it any farther rectification than this, and it is, on this account that the *malt ſpirit* of England is in general ſo much more in eſteem. The Dutch method is only to diſtil the wash into low wines, and then to full proof ſpirit; they then directly make it into geneva, or elſe ſend it as it is to Germany, Guinea, and the Eaſt-Indies, for the Dutch have little notion of our rectification. Their ſpirit is by this means rendered very foul and coarſe, and is rendered yet more nauſeous by the immoderate uſe they make of rye meal. *Malt* ſpirit, in its unrectified ſtate, is uſually found to have the common bubble proof, as the *malt* diſtiller knows that it will not be marketable without it.

The whole matter requiſite to this is, that it have a conſiderable portion of the groſs oil of the *malt* well broke and mixed along with it; this gives the rectifier a great deal of trouble if he will have the ſpirit fine; but in the general run of the buſineſs, the rectifier does not take out this oil, but breaks it finer, and mixes it faſter in by alkaline ſalts, and diſguiſes its taſte by the addition of certain flavouring ingredients. The ſpirit loſes in theſe proceſſes the vinoſity it had when it came out of the hands of the *malt* diſtiller, and is in all reſpects worſe, except in the diſguiſe of a mixed flavour. Shaw's Eſſay on Diſtillery.

The alkaline ſalts uſed by the rectifier, deſtroying the natural vinoſity of the ſpirit, it is neceſſary to add an extraneous acid in order to give it a new one. The acid they generally uſe is the *ſpiritus nitri dulcis*; and the common way of uſing it is the mixing it to the taſte with the rectified ſpirit: this gives our *malt* ſpirit, when well rectified, a flavour ſomewhat like that of French brandy, but this ſoon flies off; and the better method is to add a proper quantity of Glauber's ſtrong ſpirit of nitre to the ſpirit in the ſtill. The liquor in this caſe comes over impregnated with it, and the acid being more intimately mixed, the flavour is retained. See SPIRITUS *nitri dulcis*.

MALT-*duſt*, or the duſt ſeparated from the *malt* in drying, &c. is eſteemed a warm, rich MANURE for barren ground.

MALTSTER, a perſon who makes or trades in *malt*.

MALTA, *knights of*, an order of military religious, who have borne various other names; as, Hoſpitalers of St. John of Jeruſalem, knights of St. John, knights of Rhodes, order of *Malta*, religion of *Malta*, &c.

About the year 1048, ſome Neapolitan merchants founded a church after the Latin rite at Jeruſalem, giving it the name of *Sanctæ Mariæ della Latina*. They alſo founded a monaſtery of religious after the order of St. Benner, for the reception of pilgrims; and afterwards an hoſpital near the monaſtery, to take care of the diſeaſed, under the direction of a maſter or rector, to be nominated by the abbot of Santa Maria della Latina. Beſides which, they alſo built a chapel in honour of St. John Baptiſt.

In 1099, Godfrey of Bulloign, having taken Jeruſalem, endowed this hoſpital with ſome demeſnes which he had in France; and others imitating his liberality, the revenues of the hoſpital became conſiderably augmented. Upon this, Gerhard Tom, their rector, in concert with the Hoſpitalers, reſolved to ſeparate from the abbot and religious of Santa Maria, and to form a diſtinct congregation, under the name and protection of St. John Baptiſt: and hence it was that they had the name of *Hoſpitalers, or Brothers of St. John of Jeruſalem*.

Pope Paſcal II. by a bull in the year 1113, confirmed the donations made to this hoſpital, which he ſettled under the protection of the holy ſee; ordering, that the rectors, after Gerhard's death, ſhould be choſen by the Hoſpitalers. Raymond de Puy, Gerhard's ſucceſſor, took the title of *maſter*; and he gave a rule to the Hoſpitalers, which was approved by Calixtus II. in 1120. Such was the firſt riſe of the order of *Malta*.

Their firſt grand-maſter, finding the revenues of the hoſpital vaſtly to exceed what was neceſſary for the entertainment of poor pilgrims, and diſeaſed perſons, reſolved to employ the ſurplus againſt the infidels; and with this view he offered himſelf to the king of Jeruſalem.

He divided his Hoſpitalers into three claſſes; the firſt conſiſted of nobles, whom he deſtined to the profeſſion of arms, for the defence of the faith, and the protection of pilgrims; the ſecond conſiſted of prieſts or chaplains, who were to ſay maſs; and the third of ſervitors, who were not noble, but were alſo appointed for the war. He alſo regulated the manner of admitting knights brothers; and had the whole confirmed in 1130, by pope Innocent II. who gave them for arms a white croſs in a field argent, which continues ſtill the ſtandard of this order.

After the loſs of Jeruſalem, they retired firſt to Margath, then to Acre, which they defended very vigorouſly in 1290. After the entire loſs of the Holy Land, they withdrew to Cyprus, where king Henry of Luſignan, whom they had followed thither, gave them the city of Limiſſon. Here they continued eighteen years, when, taking the iſland of Rhodes from the Saracens in 1308, they ſettled there. And now it was that they firſt took the name of knights, *viz. the knights of Rhodes*.

Andronicus, emperor of Conſtantinople, granted to their grand maſter, Fulk de Villaret, the inveſtiture of this order; and the donation was confirmed by pope Clement. The year following, with the aſſiſtance of Amadeus IV. duke of Savoy, they defended themſelves, and their iſland, againſt an army of Saracens. In 1480, their grand-maſter d'Aubuſſon made a vigorous defence againſt Mahomet II. and preſerved the iſland, in ſpite of a formidable army, which beſieged it for the ſpace of three months. But, in 1522, it was attacked by Soliman with an army of three hundred thouſand men, and taken by him, after having been in the poſſeſſion of the knights two hundred and thirteen years.

After this loſs, the grand-maſter and knights retired firſt into the iſle of Candia. Some time after, pope Clement VII. gave them Viterbo. Laſtly, Charles V. in 1530, gave them the iſland of *Malta*, which they ſtill hold; and hence they come by the appellation of *knights of Malta*; though their proper name is that of *knights of the order of St. John of Jeruſalem*; and their grand-maſter, among his other titles, ſtill retains that of *maſter of the hoſpital of St. John, and guardian of the poor of our Saviour Jeſus Chriſt*.

The order of *Malta* have no other dominions beſides their iſland, and ſome other little places in the neighbourhood, the chief whereof are Goza and Comino.

The government is both monarchical and ariſtocratical, the grand-maſter being the ſovereign, and the chapter the ſenate. It is monarchical with regard to the inhabitants of *Malta*, and the iſles adjacent, and even with regard to the knights in every thing relating to the ſtatutes and rule of their order; and it is ariſtocratical with regard to the deciſion of any important affairs, which are not to be diſpatched, but by the grand-maſter and the chapter.

There are two councils; the one ordinary, compoſed of the grand-maſter as chief, and the grand-croſſes; the other complete, conſiſting of the grand-maſter, the grand-croſſes, and the two ſenior knights of each language.

By the languages of *Malta* are meant the ſeveral nations whereof the order is compoſed. Of theſe there are eight, viz. Provence, Auvergne, France, Italy, Arragon, Germany, Caſtile, and England.

The pillar (as he is called) of the language of Provence is the grand-commander of the order; he of Auvergne the grand marſhal; he of France the grand-hoſpitaller; he of Italy the grand-admiral; he of Arragon grand-conſervator, or draper, as he was anciently called; the pillar of the language of Germany is grand-bailiff; and he of Caſtile grand-chancellor: the language of England, which has been extinct ſince the time of the Reformation under king Henry VIII. had for its pillar or chief, the grand-turcopolier, or colonel of the cavalry. The language of Provence is the firſt, on account of Raimond de Puy, their firſt grand-maſter, who was a Provençal.

In each language there are ſeveral grand-priories, and

capital bailliages. To each language belongs a hall, where the knights eat, and hold their ordinary assemblies. Each grand-prior has a number of commanderies.

The commanderies are either magisterial, or else by right, or, finally, by favour. The magisterial are those annexed to the grand-masterſhip, whereof there is one in each grand-priory: commanderies by right are thoſe which come by right of ſeniority; their ſeniority is computed from the time of their admiſſion; but they muſt firſt have lived five years at *Malta*, and have made four caravanies, or cruiſing voyages, on the Turks and Corſairs: commanderies by favour are thoſe which the grand-maſter, or the grand-prior, have a right of conferring; one of theſe they confer every five years on whom they pleaſe. The noble knights are called knights by right; and none but theſe can be bailiffs, grand-priors, or grand-maſters. Knights by favour are thoſe, who, not being noble of themſelves, are raiſed on account of ſome great exploit, or ſome notable ſervice, into the rank of nobles.

The ſervitors, or ſerving-brothers, are of two kinds; 1. The ſervitors of war, whoſe functions are the ſame with thoſe of the knights. 2. The ſervitors of religion, whoſe whole buſineſs is to ſing the praiſes of God in the conventual church, and to aſſiſtate each in his turn as chaplain on board the veſſels and gallies of the order.

The brothers of obedience are prieſts, who, without being obliged to go to *Malta*, take the habit of the order, make the vows, and attach themſelves to the ſervice of ſome of the churches of the order, under the command of a grand-prior or commander, to whom they pay obedience.

The knights of minority are thoſe who, according to the ſtatutes, are admitted at ſixteen years of age. The knights of minority are thoſe who are admitted from the time of their birth; which, however, cannot be done, without a diſpenſation from the pope.

The chaplains can only be admitted regularly from ten to fifteen years of age: after fifteen, they muſt have a brief from the pope; till fifteen, the grand-maſter's letter is ſufficient. Theſe are called *diaconi*, and muſt give proof of their being born of creditable families.

For the proofs of nobility to be made before the admiſſion of knights, in the language of Germany, they go back ſix generations; in the reſt, it is ſufficient to go back to the great-grandfather on the father's or mother's ſide.

All the knights, after their profeſſion, are obliged to wear a white croſs, or ſtar with eight points, over the cloak or coat, on the left-ſide; which is the proper habit of the order, the golden croſs being only an ornament.

There are alſo female Hoſpitallers of the order of St John of Jeruſalem, ſometimes alſo called *chevaliereſſes*, or *knights*, of equal antiquity with the knights themſelves; whoſe buſineſs was to take care of the women-pilgrims, in an hoſpital apart from that of the men.

MALTA *earth*, in the *Materia Medica*. See MELITENSIS *terra*.

MALTHA, Μαλθα, in *Antiquity*, denotes any cement, or glutinous body, which has the faculty of binding things together.

Ancient writers make mention of divers ſorts of *maltha*, native and factitious: one of the latter much in uſe was compoſed of pitch, wax, plaiſter, and greaſe.

Another kind, wherewith the Romans plaiſtered and whitened the inſides of their aqueducts, was made of lime ſlacked in wine, incorporated with melted pitch, and freſh figs.

Natural *maltha* is a kind of bitumen, wherewith the Aſiatics plaiſter their walls. When this is once ſet on fire, water will not quench it; but ſerves rather to make it burn more fiercely.

MALTHA, the name of a voracious fiſh of the ſhark-kind, called the *ſerra*, and the *lamia* by ſome authors, a diminutive of *lamia*, ſignifying a ſmall ſhark. Its teeth are broad and pointed as thoſe of the ſhark; the fiſh has alſo many rows of theſe; the noſe is ſhort, and its fleſh lax and ſoft.

MALTHOCODE, a term by which the Greek writers expreſs the emollient topical remedies prepared with oil. Hippocrates expreſly forbids the uſe of theſe in old ulcers.

MALVA, in *Botany*. See MALLOW.

MALVINDA, *fides*, in *Botany*. See *Indian* MALLOW.

MALUS, in *Botany*. See APPLE-*Tree*.

MALUS *Aſſyria*, in *Botany*, one of the many names given by the ancients to the citron: they alſo called it *malus Medica*, and by ſeveral other names, as theſe were expreſſive of the country whence they had the fruit. See CITRON and CITREA *mensa*.

MAMALUKES, MAMMELUKES, or MAMMALUCKS, the name of a dynaſty, which reigned a conſiderable time in Egypt.

The word comes from מלך, *regere, imperare*, the Arabic participle whereof is ممليك *Mamlus*, which ſignifies *ſubject*, or one under the dominion of another. Scaliger holds, that the word is Arabic, and that it properly ſignifies ſomething bought with money; but others will have it ſignify any thing acquired, either as prize or purchaſe.

The *Mamalukes* were originally Turkiſh and Circaſſian ſlaves, bought of the Tartars by Meliſcaleb, to the number of a thouſand; whom he bred up to arms, and raiſed ſome to the principal offices of the empire. They killed ſultan Moadam in 1250, being affronted at his concluding a treaty with his priſoner St. Louis, without their privity. This Moadam was the laſt ſultan of the Ajoubites; to whom ſucceeded the *Mamalukes*, the firſt of whom was ſultan Azeddin, or Moux Ibec, the Tourcoman.

Others, ſay that the *Mamalukes* were ordinarily choſen from among the Chriſtian ſlaves; and that they were the ſame thing, in great meaſure, with the janizaries among the Turks. They never married. The firſt are ſaid to have been brought from Circaſſia; and ſome add that they firſt began to be talked of about the year 869.

MAMIRA, in the *Materia Medica of the Arabians*, a root frequently mentioned by Avicenna, Serapion, and other of the Arabian writers. It ſeems mentioned as a poiſonous drug, and is ſo deſcribed, that it ſeems to be the ſame with one ſpecies of the durunegi, or doronicum of the ſame authors, and the common doronicum of the ſhops, diſtinguiſhed from the antitheri, or other ſort of durunegi, by the yellowneſs of the inſide of the root. Avicenna ſays that it is hard and woody, and formed of knots or joints. This is the very deſcription the ſame author gives of the durunegi of the firſt or poiſonous kind. Paulus Ægineta ſays its root is compoſed of ſeveral joints alſo; and Alphagus calls it a *nodoſa* or jointed root. Some have ſuppoſed that the *mamira* was the ſame plant which we call ſmall celandine, but this has no title to be placed among the plants ſuſpected as poiſonous, nor any other pleas to be gueſſed at as the *mamira*, but only becauſe its roots conſiſt of many tubercles. Many things beſide have been conjectured to be the *mamira* of the Greeks and Arabians, but the DORONICUM ſeems to be the plant.

MAMMALIA, in *Natural Hiſtory*, the firſt claſs of animals in the Linnæan ſyſtem, divided into ſeven orders, viz. *primates, bruta, feræ, glires, pecora, belluæ*, and *cete*; comprehending forty genera, and two hundred and nineteen ſpecies.

MAMMÆ. See BREAST.

MAMMÆANÆ. See ALIMENTARY.

MAMMEE-*tree*, *mammea*, in *Botany*, a genus of the *polyandria monogynia* claſs. Its characters are theſe: the empalement of the flower is compoſed of two ſmall oval, concave leaves, which fall off; the flower has four large concave petals, which ſpread open; it hath many awl-ſhaped ſtamina, and in the centre a roundiſh germen, which afterwards turns to a fleſhy fruit of a ſpherical figure, incloſing one, two, or three large, almoſt oval ſtones: there is one ſpecies of this tree, which grows to a large ſize in the Weſt Indies, where the fruit is ſold in the markets: it has the taſte of a peach.

Ray mentions two ſpecies of this tree, and ſays that from inciſions made in the body of it, diſtils the liquor known by the name of toddy wine. Linnæus alſo mentions two ſpecies, one of which is the American and the other the Aſiatic *mammea*.

MAMMIFORM, MAMMIFORMIS, in *Anatomy*, a name given to two apophyſes of the bone in the back part of the ſkull; ſo called from their reſembling a breaſt.

MAMMILLARY, MAMMILLARIS, in *Anatomy*, an epithet given to two little protuberances, ſomewhat reſembling the nipples of the breaſt, found under the fore-ventricles of the brain, and ſuppoſed to be the organs of ſmelling. *See Tab. Anat. (Oſteol.) fig.* 7. *n.* 3. *fig.* 13. *lit.* d.

Theſe are called *apophyſes mammillares*.

There is alſo a muſcle called *mammillaris*, or *maſtoides*, ſerving to ſtoop the head.

MAMMOTH'S-*teeth*, or MAMMOUT *bones*, and MAMMON'S *horn*, in *Natural Hiſtory*, names given by travellers and other writers to certain foſſile teeth, and other bones, found in Ruſſia and ſome other parts of the world, and that uſually at great depths in the earth. The Ruſſians and other people give them this name, ſuppoſing them to have belonged to an animal which they deſcribe as being of a monſtrous ſize, and living in caverns under ground. But the true account of them is, that they are in reality the teeth and other bones of an animal now unknown, there being no ſuch beaſt as theſe people deſcribe. See ELEPHANT'S *Bones*, IVORY, &c.

MAN, *homo*, in *Zoology*, is ranked by Linnæus at the head of a claſs of animals, which he calls PRIMATES.

He diſtinguiſhes *men*, according to their colours; into the European, or white *men*; the American, or reddiſh-coloured *men*; the Aſiatic, or tawny-brown coloured *men*; and laſtly, thoſe of Africa, or the blacks. Linnæi,

Syſtem. Natur. tom. i. pars ii. p. 28, &c. Monſ. Buffon, among many other curious particulars, has given us ſeveral relating to the natural hiſtory of *man*. See Hiſtoire Naturelle, vol. iii. p. 305. edit. Paris. That ingenious author has entered into a conſiderable detail with reſpect to the varieties of the human ſpecies. See vol. iii. p. 371, ſeq. of the ſame work.

MAN *of the wood*. See ORANG-*Outang*.

MAN, in the *Materia Medica of the Ancients*, a name by which manna has been called by the oldeſt writers. There has been, however, ſome confuſion in the hiſtory of manna, owing to the too general uſe of this word, the ſame authors uſing it as the name of ſeveral other ſubſtances of very different kinds, which came to their hands in form of ſmall granules or flakes like the manna. The fragments of frankincenſe in particular were called by this name, with the addition of the word *thuris*, and ſometimes without, *man* or *men* ſtanding ſingly for that drug.

MAN, in *Mythology*, the name of a deity among the ancient Germans; whom they ſuppoſed to be the ſon of Tuiſton, and celebrated with ſongs, as the founder of their nation: and to him they conſecrated their groves and foreſts.

MAN *the capſton*, on board a *Ship*. See CAPSTAN.

MAN *the ſide, or ladder*, on board a *Ship*, is when an officer or any perſon of diſtinction is at the ſhip's ſide ready to come aboard, the men are commanded to wait, and help him up the ſide.

MAN *the top, or yard*, on board a *Ship*, a word of command for the men to go up to the top, or yard, for ſome particular ſervice.

MAN *of war*, the ſame with a ſhip of war. See SHIP and RATTE.

MAN-*bird*. See BIRDS *Anomalous*.

MANAA, in the *Jewiſh Cuſtoms*, a kind of offerings made in the temple, otherwiſe called MINCHA. The word *manaa* is uſed in the Septuagint.

MANACA, in *Botany*, a Braſilian baccifereous ſhrub, with an umbilicated *fruit*, like that of the juniper, containing three elliptical ſeeds, of the ſize of lentils; the part uſed in medicine is the root, which is great, ſolid and whitiſh; its medullary ſubſtance, reduced to powder, has very conſiderable effects; but becauſe it works too violently, both upwards and downwards, in the ſame manner as ſcammony, or the eſula, it is uſually given only to very robuſt perſons, and then with correctives, in a juſt dole; it has ſomewhat of a bitterneſs and acor. The root, macerated in water, makes a fomentation, or bath, for thoſe who are afflicted with wandering pains of the joints, eſpecially ſuch as are contracted by cold: the plant is uſed as a vulnerary by the Braſilians.

MANAGE, or MANEGE, an academy, or place for learning to ride the great horſe; as well as for breaking horſes to the proper motions and actions.

The word is borrowed from the French *manage*, and that from the Italian *maneggio*, or, ſome will have it, *a manu agendo*, from acting with the hand.

In every *manage* is a centre, or a place deſtined for vaulting round a pillar; a courſe or career for running the ring; and, on the ſide, are pillars, between which are placed the horſes intended for high airs.

MANAGE is alſo uſed for the exerciſe itſelf, either of the horſe, or the rider. See HORSEMANSHIP.

MANANAOG, in the *Materia Medica*, a name by which ſome call the fruit known with us by the name of St. Ignatius's bean.

MANATI, in *Zoology*. See SEA-*Cow*.

MANATI *lapis*, a name given to a bone, of which there are two found in the head of the *manati*, or ſea-cow; they are roundiſh and are uſually of the ſize of a hand-bell. They are ſaid to have great virtues againſt the ſtone and gravel, when burnt to aſhes, and given in white wine. The world need not, however, regret the ſcarcity of this remedy, for probably any animal bone, when burnt to aſhes, is poſſeſſed of all its virtues.

MANBALLA, in *Zoology*, the Ceyloneſe name of a ſpecies of ſerpent, called alſo the *canine*, or *dog ſerpent*, from its manner of flying at every thing that comes in its way, as our dogs do: it is of a deep brown colour, beautifully variegated with white.

MANBOTE, in our *Old Writers*, a compenſation or recompence for *homicide*, particularly due to the lord for killing his man or vaſſal.

MANCANILLA, in *Botany*, a name given by Plumier to a genus of plants, ſince characterized by Linnæus in the name of hippomane.

MANCHINEEL, *hippomane*, in *Botany*, a genus of the *monœcia monadelphia* claſs. Its characters are theſe: it hath male and female flowers on the ſame ſpike; the male flowers come out in ſmall cluſters, from a ſhort cup-ſhaped empalement, and have no petals: the female flowers have no petal, but an oval germen, which becomes a roundiſh fruit with a fleſhy cover, incloſing a rough hard ſhell with ſeveral cells; each including one ſeed: there are three ſpecies, natives of the Weſt Indies and of New Spain. Two of the ſpecies grow almoſt as large as the oak, but the third is of humbler ſize.

The wood of this tree is much eſteemed for cabinet work, being very durable, taking a fine poliſh, and as it is ſaid, not being eaten by worms; but the tree abounding with a milky cauſtic juice, before they are felled, they make fires round their trunks to burn out the juice; otherwiſe thoſe who fell them would be in danger of loſing their ſight, by this juice flying into their eyes: wherever this juice touches the ſkin, it raiſes bliſters; and if it falls upon linen, it turns it black, and waſhes into holes. The like danger to the eyes is to be apprehended from the ſaw-duſt; the workmen therefore generally cover their faces with a fine lawn.

This tree produces fruit ſomewhat like a golden pippin, which if ignorantly eaten, inflames the mouth and throat to a great degree; and is very dangerous to the ſtomach, unleſs remedies are timely applied. Miller.

Dr. Feyſſonnel, in his obſervations on this fruit, informs us that the ſavages uſe the juice of it to poiſon their arms, the wounds of which are thereby rendered mortal; that the rain which waſhes off the leaves, and falls on the human body, cauſes bliſters to riſe like boiling oil, and that even the ſhade of the tree is fatal to thoſe who ſit under it. However timely evacuation by purges and emetics, have prevented their ill effects. Phil. Tranſ. vol. l. art. 105. p. 772.

MANCIPLE, MANCEPS, in *Old Authors*, denotes a caterer. There was anciently an officer in the Temple called by this name: he is now called the ſteward; and both name and office are ſtill retained in the colleges in both univerſities.

MANCORON, a word uſed by the ancients to expreſs what they call a ſort of honey, which ſeems to have been evidently our modern SUGAR. They ſay that it was a ſort of dry honey found concreted in canes or reeds, and was of the conſiſtence of ſalt, and that it was found in India and Arabia Felix, and that when taken into the mouth, it broke under the teeth like ſalt.

MANCUS, formed of *manu cuſus*, in *Antiquity*, an Anglo-Saxon gold coin, equal in value to 25 ſolidi, or thirty-pence; and in weight to fifty-five Troy grains. The firſt account of this coin that occurs in the hiſtory of our country, is about the cloſe of the eighth century, in an embaſſy of Cenwulf, king of Mercia, to Leo III. requeſting the reſtoration of the juriſdiction of the ſee of Canterbury: this embaſſy was enforced by a preſent of one hundred and twenty *mancuſes*. Ethelwolf alſo ſent yearly to Rome three hundred *mancuſes*: and theſe coins are ſaid to have continued in ſome form or other, till towards the concluſion of the Saxon government. The heriots of the nobility are chiefly eſtimated by this ſtandard in Canute's laws. It came originally from Italy, where it was called *ducat*: and is ſuppoſed to have been the ſame with the drachma or miliarenſis, current in the Byzantine empire. Clarke on Coins, p. 280, &c. See MARK.

MANDAMUS, in *Law*, a writ iſſuing out of the court of king's-bench, ſent by the king, and directed to any perſon, corporation, or inferior court of judicature, within the king's dominions; requiring them to do ſome particular thing therein ſpecified, which pertains to their office and duty, and which the court of king's bench has previouſly determined, or, at leaſt, ſuppoſes to be conſonant to right and juſtice. This is a high prerogative writ, of a moſt extenſively remedial nature; and may be iſſued in ſome caſes, where the injured party has alſo a more tedious method of redreſs, as in the caſe of admiſſion or reſtitution to an office: but it iſſues in all caſes where the party hath a right to have any thing done, and hath no other ſpecific means of compelling its performance. A *mandamus*, therefore, lies to compel the admiſſion or reſtoration of the party applying to any office or franchiſe of a public nature, whether ſpiritual or temporal; to academical degrees; to the uſe of a meeting-houſe, &c. It lies for the production, inſpection, or delivery of public books and papers; for the ſurrender of the regalia of a corporation; to oblige bodies corporate to affix their common ſeal; to compel the holding of a court, &c. The writ of *mandamus* is made by ſtatute 9 Ann. cap. 20. a moſt full and effectual remedy for refuſal of admiſſion, where a perſon is intitled to an office or place in any corporation, and alſo for wrongful removal, when a perſon is legally poſſeſſed. It may alſo be iſſued, in purſuance of the ſtatute 2 Geo. I. cap. 4. in caſe within the regular time no election ſhall be made of the mayor or other chief officer, of any city, borough, or town corporate, or (being made) it ſhall afterwards become void; to require the electors to proceed to election, and proper courts to be held, for admitting and ſwearing in the magiſtrates ſo reſpectively choſen. This writ iſſues to the judges of any inferior court, commanding them to do juſtice according to the powers of their office, whenever

the

the ſame is delayed. For it is the peculiar buſineſs of the court of king's bench to ſuperintend all other inferior tribunals, and to grow in to inforce the due exerciſe of thoſe judicial or miniſterial powers, with which the crown or legiſlature hath inveſted them; and this, not only by reſtraining their exceſſes, but by quickening their negligence, and obviating their denial of juſtice. A *mandamus* may, therefore, be had to the courts of the city of London, to enter up judgment; to the ſpiritual courts to grant an adminiſtration, to ſwear a church-warden, and the like. This writ is founded on a ſuggeſtion, by the oath of the party injured, of his own right, and the denial of juſtice below; whereupon, in order more fully to ſatisfy the court that there is a probable ground for ſuch interpoſition, a rule is made (except in ſome general caſes, where the probable ground is manifeſt), directing the party complained of to ſhew cauſe why a writ of *mandamus* ſhould not iſſue: and if he ſhews no ſufficient cauſe, the writ itſelf is iſſued, at firſt in the alternative, to do this, or ſignify ſome reaſon to the contrary; to which a return or anſwer muſt be made, at a certain day. And if the inferior judge, or other perſon to whom the writ is directed, returns or ſignifies an inſufficient reaſon, then there iſſues in the ſecond place a peremptory *mandamus*, to do the thing abſolutely; to which no other return will be admitted, but a certificate of perfect obedience and due execution of the writ. If the inferior judge or other perſon make no return, or fails in his reſpect and obedience, he is puniſhable for his contempt by attachment. But if he, at the firſt, returns a ſufficient cauſe, although it ſhould be falſe in fact, the court of king's bench will not try the truth of the fact upon affidavits; but will for the preſent believe him, and proceed no farther on the *mandamus*. But then the party injured may have an action againſt him for his falſe return, and (if found falſe by the jury) ſhall recover damages equivalent to the injury ſuſtained; together with a peremptory *mandamus* to the defendant to do his duty. Blackſt. Com. book iii. p. 110, &c. and p. 264, &c.

MANDAMUS was alſo a charge to the ſheriff, to take into the king's hands all the lands and tenements of the king's widow, who, againſt her oath formerly given, married without the king's conſent.

MANDARIN, a name given by the Portugueſe to the nobility and magiſtracy of the eaſtern countries, eſpecially to thoſe of China.

The word *mandarin* is unknown in this ſenſe among the Chineſe, who, in lieu thereof, call their grandees and magiſtrates *quan*, or *quan fu*, q. d. ſervant or miniſter of a prince.

There are in China nine orders of *mandarins*, or nine degrees of nobility; which have as many different animals for their characteriſtics. The firſt is diſtinguiſhed by a crane, the ſecond by a lion, the third by an eagle, the fourth by a peacock, &c.

There are in all thirty-two or thirty-three thouſand *mandarins* in China. There are *mandarins* of letters, and *mandarins* of arms; both the one and the other of which paſs ſeveral examinations: beſides civil *mandarins*, or thoſe of juſtice.

Since the time that the Tartars have rendered themſelves maſters of China, moſt of the tribunals, or courts of juſtice, &c. inſtead of one *mandarin* for a preſident, have two; the one a Tartar, the other a Chineſe.

The *mandarinate* is not hereditary, nor are any raiſed to it but men of letters.

MANDARIN is alſo a name which the Chineſe give to the learned language of the country.

Beſides the proper and peculiar language of each nation and province, they have one common to all the learned men in the empire. This they call the *mandarin* tongue, or the language of the court. Their public officers, as notaries, lawyers, judges, and chief magiſtrates, write and ſpeak the *mandarin*.

MANDATARY, *mandatarius*, he to whom a command or charge is given: and he that comes to a benefice by a *mandamus* is called by this name.

MANDATE, MANDATUM, in the *Canon Law*, denotes a reſcript of the pope, by which he commands ſome ordinary, collator, or preſenter, to put the perſon there nominated in poſſeſſion of the firſt benefice vacant in his collation.

An apoſtolical *mandate* for the proviſion of benefices, is a monitorial and comminatory letter from the pope to a biſhop, by which he is injoined to provide a ſubſiſtence for thoſe who have been ordained by him, or his predeceſſors, from the tonſure to ſacred orders incluſively; and to allow them their ſubſiſtence till they be provided with a benefice. This practice was occaſioned by the biſhops formerly laying hands on great numbers, and afterwards abandoning them to miſery and want.

At firſt the popes only gave monitory *mandates*, which were no more than ſimple prayers and requeſts, that did not bind the ordinary; afterwards they gave preceptory *mandates*, which did not annul the proviſions of the ordinary; at laſt they ſet up executory *mandates*, by which the proviſions made by the ordinary, in prejudice of the *mandate*, were declared null; and the executor of the *mandate*, in default of the ordinary, conferred the benefice on the mandatory: but the pope's power in iſſuing theſe *mandates* is now very much reſtrained.

MANDIBULA, the JAW. See MAXILLÆ. Hence

MANDIBULARES, or *mandicatorii muſculi*. See MASSETER.

MANDIL, or MANDRIL, the name of a kind of cap or turban worn by the Perſians.

The *mandil* is formed by firſt wrapping round the head a piece of fine white linen five or ſix ells long; over this they wrap in the ſame manner, a piece of ſilk of the ſame length, and ſometimes of great value. To make the *mandil* genteel, care muſt be taken, that, in wrapping the ſilk, it be ſo managed, as that the ſeveral colours found in the ſeveral folds made a kind of waves, ſomewhat like what we ſee in marbled paper.

This dreſs is extremely majeſtic, but at the ſame time very heavy: it ſerves either as a ſhelter to the head from cold, or as a ſcreen from the exceſſive heat of the ſun; if is ſaid, that a blow of a cutlaſs will not penetrate it. In rainy weather they cover it with a kind of caſe or hood, made of red cloth.

The mode of the *mandil* has been for ſome time altered: during the time of Schah-Abbas II. it was round at top; in the time of Schah-Soliman, they brought one end of the ſilk out of the middle of the *mandil* over the head; and, laſtly, in the reign of Schah-Huſſein, the end of the ſilk, in lieu of its being gathered as before, was plaited in manner of a roſe; and this the Perſians account extremely graceful, and uſe it to this day.

MANDRAKE, *mandragora*, in *Botany*. Its characters are theſe: the empalement is bell-ſhaped, and of one leaf, cut at the top into five acute ſegments; the flower hath one erect, bell-ſhaped petal, which is a little larger than the empalement; and has five awl-ſhaped ſtamina, which are arched, and hairy at the baſe; in the centre is ſituated a roundiſh germen, which turns to a large round berry, with two cells, having a fleſhy receptacle convex on each ſide, filled with kidney-ſhaped ſeeds. We have but one ſpecies of this genus at preſent in the Engliſh gardens; which grows naturally in Spain, Portugal, Italy, and the Levant.

Mandrake has been recommended in caſe of barrenneſs, but without foundation. Its freſh root is a violent purge, the doſe being from ten grains to twenty in ſubſtance, and from half a dram to a dram in infuſion. It has been found to do ſervice in hyſteric complaints, but muſt be uſed with great caution, otherwiſe it will bring on convulſions, and many other very miſchievous ſymptoms. It has alſo a narcotic quality. At preſent we only uſe the freſh leaves in anodyne and emollient cataplaſms and fomentations.

Naturaliſts tell ſtrange ſtories of this plant; but, ſetting aſide its ſoporiferous virtue, the modern botaniſts will ſcarce warrant any of them, not even that human figure ordinarily aſcribed to its roots, eſpecially ſince the diſcovery of the artifice of charlatans in faſhioning it, to ſurpriſe the credulity of the people.

MANDRAGORAS, *Chineſe*, is the plant GINSENG.

MANDRAKE-*wine*, *mandragoritis vinum*, a ſort of medicinal impregnation of wine with the virtues of *mandrake* root. It is prepared by cutting into thin ſlices half a pound of the bark of *mandrake* roots, and ſtringing them on a thread, and letting them down into a veſſel containing nine gallons of white wine, ſo that they may hang looſely in it, and by that means fully impregnate it with their virtues. It was uſed in ſmall doſes as an anodyne and ſoporific. It had the ſame effects alſo, if only ſmelled to, and was ſometimes injected in cliſters to the ſame purpoſe. They ſay that half a pint of this liquor mixed with twelve times its quantity of wine, brings on a carus; and that even a ſmaller doſe than this, leſs diluted, is mortal.

MANDREL, a kind of wooden pulley, making a member of the turner's lathe.

Of theſe there are ſeveral kinds; as

MANDRELS, *flat*, which have three or more little pegs or points near the verge, and are uſed for turning flat boards on.

MANDRELS, *pin*, which have a long wooden ſhank to fit into a round hole made in the work to be turned.

MANDRELS, *hollow*, which are hollow of themſelves, and uſed for turning hollow work.

MANDRELS, *ſcrew*, for turning ſcrews, &c.

MANDRIL, in *Zoology*, a ſpecies of BABOON, or MONKEY.

MANDSJADE, in *Botany*, is an Indian ſiliquous or pod-bearing tree, with a ſpiked pentapetalous flower, and

long pods containing nodous scarlet-coloured beans; the tree is one of the tallest in the kingdom of Malabar, bears fruit the twentieth year after planting, and living near two hundred years.

The wood is of common use for various purposes, on account of its solidity; the leaves, reduced to powder, are used in the pagan religious rites; the seeds, which are not ungrateful to the taste, are eaten by the common people, either boiled whole, or ground to a meal; and are besides, of great use to goldsmiths and jewellers, who, on account of their exact equality, employ them instead of grains in weighing their wares; for each maijelins, as they call them, weighs four grains, such as are in use among the goldsmiths; who, also of the bruised seeds, moistened with water and borax, prepare a glue for conglutinating the finer sort of vessels, when broken. Of the bruised leaves the physicians prepare a potion for mitigating pains in the loins.

MANDUCATION, the action of *chewing*, otherwise called *mastication*.

Manducation is a term seldom used but in speaking of the eucharist. The catholics maintain a real *manducation* of the body of Christ; the reformed, on the contrary, take this *manducation* to be only figurative, and by faith. St. Augustine calls it *spiritual manducation*.

MANE-*short*, in the *Manege*, is a sort of covering for the upper part of a horse's head, and all round his neck, which at one end has two holes for the ears to pass through, and then joins to the halter upon the fore part of the head, and likewise to the surcingle, or long girth, upon the horse's back.

MANEGE. A horse is said to *manege* when he works upon volts and airs, which supposes him broke and bred. See MANAGE.

MANEGE *for a soldier's horse*, is a gallop of unequal swiftness, but so that the horse changes hands readily.

MANEGE, *high*, is the high or raised airs, which are proper for leaping horses. See AIRS.

MANEGED. A horse is said to be thoroughly *managed*, or a finished horse, that is well broken, bred, and confirmed in a particular air or manege, so as to bear well upon the hand, know the heels, and sit well upon the hips.

MANEQUIN, among *Painters*. See LAYMAN.

MANES, a poetical term, signifying the shades or ghosts of the deceased.

The heathens used a variety of ceremonies and sacrifices to appease the *manes* of those who were deprived of burial. See LEMURES and LEMURIA.

MANES, *dii*, were the same with *Inferi*, or the infernal gods, who tormented men; and to these the heathens offered sacrifices, to assuage their indignation.

The heathen theology is a little obscure with regard to these gods *manes*. Some hold, that they were the souls of the dead; others, that they were the genii of men; which last opinion suits best with the etymology of the word.

The heathens, it is pretty evident, used the word *manes* in several senses; so that it sometimes signified the ghosts of the departed, and sometimes the infernal or subterraneous deities, and in general all divinities that presided over tombs.

The evocation of the *manes* of the dead seems to have been very frequent among the Thessalians; but it was expressly prohibited by the Romans. See LARES.

MANGABEY, in *Zoology*, the white eye-lid MONKEY, described by Buffon, vol. xiv. p. 244, and Pennant, Brit. Zool. p. 114.

MANGANESE. See MAGNESIA.

MANGANUM, *Μάγγανον*, among the Greeks, a general name for instruments to throw large stones with.

MANGARATIA, in *Botany*, a name given by some authors to the plant of which the common ginger of the shops is the root.

MANGER, in a ship, a circular place made with planks fastened on the lower deck of a ship of war, right under the hawses, being about a foot and half in height; the use of which is to catch and receive the sea-water, beating in at the hawses in a storm of weather.

MANGO-*tree*, *mangifera*, in *Botany*, a genus of the *pentandria monogynia* class: the flower hath five petals, and the fruit is a kidney-shaped drupe; this is a vast tree, forty feet high, and eighteen in thickness, growing in the East Indies, where it spreads its numerous branches all around, at a great distance, being always green, and bearing fruit once or twice every year from six or seven years old to an hundred: it is propagated by incision, or sowing the seed, in Malabar, Goa, Bengal, Pegu, and many other countries of the East.

The fruit is of a roundish oblong figure, flat, slightly fluted, or hollowed at the sides, and shaped much like a sydney, bigger than a goose egg, smooth, shining, first green speckled with white, then inclining to yellow, and at the last of a gold colour; it has a yellowish and excellent pulp, not unlike that of a peach; or rather a plum, first acid, then acidulated, and pleasant to the taste; within the pulp is contained an oblong, compressed, and lanuginous stone, thin, yet very hard and tenacious, and including an oblong kernel, very like an almond, and of the same bigness, and of a bitterish though not unpleasant taste.

There are various sorts of this fruit, as there are of our apples and pears, which are very different, according to the countries where they grow: that species, which is without a stone, and is very grateful to the palate, seems to us only a variety or a degenerated fruit: the fruit is cut into slices, and eaten either without wine, or macerated in wine: it is also candied, in order to its preservation: sometimes they open it with a knife, and fill up the middle with fresh ginger, garlick, mustard, and salt, with oil or vinegar, that they may eat it with rice, or after the manner of pickled olives.

As to its temperament, this fruit is cold and moist, though the Indian physicians affirm the contrary. We make use of pickled mangoes which are imported to us, as we do of pickled cucumbers. The stones roasted are said to cure a looseness, which Garcias found to be true. The wood of the tree, with cinders is used for burning the carcases of the pagans, as being consecrated to this rite; whence it serves also for coffins, in which they deposit their dead; but it is but of a soft substance, and of a short duration. The stalks supply the place of areqna, or caunga, in the chewing of betel; the same calcined and reduced to powder, take away warts. Of the tender leaves, with the bark of the avanocoe, that is, the ricinus, the seed of cummin and parpaciagam, is made a decoction, which is highly beneficial in the cough, asthma, and other affections of the thorax. The bark of the tree pulverized, and taken in chicken broth, is an excellent dissolvent of extravasated and coagulated blood, occasioned by a fall, in any part of the body. The juice of the bark, with the white of an egg, and a very little opium, taken inwardly, is a present remedy against the diarrhœa, dysentery, and tenesmus. Of the gum of the tree, and the flowers of rice, with the addition of a small quantity of opium and pepper, are prepared pills, which also cure all sorts of fluxes of the belly. Of the flour of the dried kernels the natives have the art of preparing various kinds of food. James.

MANGOSTEEN, or MANGOSTAN, *garcinia*, in *Botany*, a genus of the *dodecandria monogynia* class. Its characters are these: the flower hath a three-leaved empalement, and four roundish petals, which are larger than the empalement; it has fifteen stamina, formed into a cylinder, and in the centre is situated an oval germen, crowned by a buckler-shaped plain stigma, divided into eight parts, which becomes a thick globular berry, with one cell, including eight hairy fleshy seeds, which are convex and angular. We know but one species, which grows naturally in the Molucca islands and New Spain. Miller. Linnæus enumerates two species.

The tree is large, and usually much branched; the leaves are six inches long, and two inches wide, of a lively green, and ornamented with a double series of ribs, one part of which makes a border that surrounds the whole verge of the leaves: the flower is small, and of a pale green colour; it is composed of four petals, which, when they open, shew the rudiments of the fruit forming itself within; these leaves do not fall off at all, but remain fastened to the bottom of the fruit till it is ripe, serving as a sort of support to it; the fruit grows to the bigness of an apple; it is perfectly round, and is covered with a hard and tough skin, which is of the twelfth of an inch thick, and is of a lively red, streaked with several yellow lines, which are so many filaments running along it; at the extremity there are placed several rays, which, running to the length of the tenth of an inch, meet together, and terminate in a point; the substance of the fruit is white, soft, and of a very agreeable taste, approaching to that of raspberries; the body of the fruit is composed of several lobes or quarters, as we call them, which will separate from one another like those of an orange; but they are not inclosed each in a separate skin as these are; there are in number the same with the rays at the end of the fruit, that is, there are seven of them. When the fruit is eaten before it is perfectly ripe, the whole is eaten together; but when it is thoroughly ripened, there is found a single kernel in the middle; this is greenish without and white within, and is of an insipid taste, and therefore usually thrown away. Mem. Acad. Scienc. Par. 1699.

This is an extremely agreeable fruit, and the eating it is never attended with any bad consequences, even though it be eaten in ever so large quantities. People who are

not used to the Indies are apt to give this the preference to all the fruits of the place; but the natives, and others who have accuſtomed themſelves to the ſmell of the *durio*, give that infinitely the preference. This is a large prickly fruit, of the ſize of a melon, of an intoxicating quality, and of a taſte like that of ſugar and cream, but with a ſmell like that of rotten onions. The ſmell is intolerable to ſtrangers, but cuſtom has made it familiar to the Indians, and they diſregard it. The peel or rind of the *mangouſtan* is a more powerful aſtringent than the pomegranate bark, and is given in decoction in diarrhœas and dyſenteries with great ſucceſs, as alſo in all other hæmorrhages. There is a ſort of wild *mangouſtan*, called by the Portugueſe *mato*, which grows in the woods both in the Eaſt Indies and in America. The fruit of this perfectly reſembles the true *mangouſtan*, but is not eatable.

MANGOUSTE, of Buffon, in *Zoology*. See ICHNEUMON.

MANGROVE, *rhizophora*, in *Botany*, a genus of the *dodecandria monogynia* claſs: the empalement and flower are each divided into four ſegments; and the ſeed, which is ſingle, is very long, and has a fleſhy baſe. Of this plant there are ſeveral ſpecies, which grow in ſalt water rivers, both in the Eaſt and Weſt Indies, where it is called *mangrove*, but as they will not grow upon land, it is needleſs to ſay more concerning them.

MANGROVE *grape*. See *Sea-ſide* GRAPE.

MANGROVE *tree*. See *Syrian* MALLOW.

MANHEB, a word uſed by ſome chemical writers to expreſs ſeorie of any kind.

MANIA, *madneſs*, in *Medicine*, the moſt violent and acute ſpecies of a delirium, ariſing from a perturbation of the imagination and judgment.

Signs of it. Theſe are a bold and reſolute aſpect, eyes ſuffuſed with blood, a tremulous motion of the eye lids, great pride diſcovering itſelf in the countenance, voice, and geſture, a grinding of the teeth, an uncommon hatred to particular perſons, little ſleep, a violent cephalalgia, a quickneſs of hearing, a ringing in the ears: but it is to be obſerved, as to the firſt-mentioned ſymptom, that thoſe perſons who have become *mad* through fear, have always in their aſpect a mixture of that terror the object firſt gave, and of that natural boldneſs which ariſes from *madneſs*. The patient often lays traps and ſnares for getting other people into his power, with intent to hurt them, though they never have injured him. Sometimes mad people have been known to murder others; and they always have ſo much ſtrength as to overpower almoſt any one perſon; and though they have no actual fever, yet they are inſenſible of the external cold, and in general of other pains or injuries; nay, they are ſo loſt in ſpeculation, as often ſcarce to feel the blows and laſhes they receive in the courſe of their cure. They often do not even hear the people who ſpeak to them, and are naturally of a very jocund and cheaſtful imagination, fancying themſelves kings and princes, and are delighted with muſic. They have a violent propenſity to venery, and ſuch an abſence of ſhame, that they will go to ſtool, or do any thing of a like kind, before any body. This is the uſual caſe in the height of the diſorder; and in its decline ſome are dull and ſtupid, others very ſorrowful and melancholy, and ſenſible of their unhappy diſorder.

The cauſe of the *mania* is thus accounted for by Quincy. As often as the ſpecies of things, wherewith we have been acquainted, are hurried together, we may be ſaid to dream; and thence in ſleep theſe ſpecies are added with other things, and variouſly compounded, from the manifold repercuſſions of the animal ſpirits, which ariſe from the cauſe producing ſleep, and preſſing the nerves, ſo as to revert the fluctuation of their juice. A delirium is therefore the dream of waking perſons, wherein ideas are excited without order or coherence, and the animal ſpirits are driven into irregular fluctuations.

If then the cauſe inducing a delirium be of that nature, that it can excite ideas or motions of a conſiderable impetus, without any regularity or order, ſuch a delirium will be attended with boldneſs or rage, and violent motions of the body; that is, a *mania* will be produced.

Now, it is plain, that all the known cauſes of this diſtemper give a greater diſpoſition to the blood for motion, and render it fluxile, but not conſiſtent, and uniformly thick enough; and therefore that they diſpoſe perſons likewiſe to continued fevers, ſince they occaſion the blood to be thrown out of the heart with an increaſed force, unleſs ſome other cauſe intervene, whereby the efficacies of theſe are interrupted in diſpoſing the blood into febrile motions; and the blood is ſo diſpoſed, as often as it can be rarefied into its minuteſt parts; that is ſo uniformly rarefied, that it can eaſily, with any force by the motion received from the heart, go into parts divifible at the occurſions of thoſe orifices, into which it ought to be diſtributed: for then the cohesion of the parts, which can be but very ſmall, will not be any obſtruction to the increaſe and propagation of the blood's velocity. But if it happen that the efficient cauſe, or the heart, throws the blood with a greater force, or that the blood can be more eaſily propelled in any given time, it will occaſion, at the ſame time, that ſome parts of the blood will be more nearly united, ſo as to form moleculæ, conſiſting of cohering particles; which moleculæ will cohere to one another, and not ſo eaſily obey the direction of the heart's propelling force. The blood hereupon cannot be uniformly rarefied, nor enter ſo eaſily into the ſmall orifices of the veſſels, and ſo ſoon travel through them: and therefore there will no fever ariſe, but a delirium without a fever, wherein the heat of the blood will be greater, and the preſſure in the brain uncertain: whence inconſtant recurſions of the ſpirits, inordinate undulations, confuſed vibrations of the nerves, and a remarkable energy of imagination; whence will proceed audacity and paſſion beyond meaſure. It is a diſeaſe very hard to cure, and is generally found to baffle the phyſician.

From diſſection of thoſe who died mad or melancholy, it appears that a congeſtion of blood or other fluids, in the veſſels of the brain, is a principal cauſe of theſe diſorders: or it may ariſe from ſuch an impreſs on ſome part of this organ of ſenſe, as excites the preternatural ſenſations which more particularly work on the imagination. Dr. Battie in his Treatiſe on *Madneſs*, having determined it to be a deluded imagination, ariſing from a preternatural ſtate or diſorder of ſenſation, the ſeat of which ſenſation he fixes in the nervous or medullary ſubſtance, derived from, or rather communicating with the brain, and the cauſe of it a preſſure upon the medullary ſubſtance contained in the nervous filaments, diſtinguiſhes *madneſs* into two ſpecies; one called *original*, which he aſcribes to an internal diſorder of the nervous ſubſtance, and the other *conſequential*, ariſing from a diſorder of the ſame nervous ſubſtance *ab extra*. The former may be known or reaſonably ſuſpected, when it neither follows nor accompanies any accident, which may be juſtly termed its external or remoter cauſe; when there is room to believe it hereditary, and when it both ceaſes and appears afreſh, without any imaginable cauſe: under all which circumſtances, he concludes it to be irremediable by medicine. Conſequential *madneſs* ſometimes admits of relief, though it frequently becomes habitual, and, in effect the ſame as *madneſs* ſtrictly original.

Though the brain, ſays Dr. Battie, is undoubtedly the principal ſeat of deluſive ſenſation, nevertheleſs it is not the only one; foraſmuch as the ſame ſanguinary or ſerous obſtructions are capable in any other part of the body of exciting falſe ideas, as well as *in the* brain, at leaſt to ſome degree, and in proportion to the quantity of medullary matter there collected, ſo as to be ſufficiently compreſſed by ſuch obſtructions. Thus the ſtomach, inteſtines, and uterus, are frequently the real ſeats of *madneſs*, occaſioned by the contents of theſe viſcera being ſtopped in ſuch a manner as to compreſs the many nervous filaments, which here communicate with one another by the meſenteric ganglia.

Perſons ſubject to it. Theſe are principally men of a choleric habit of body, and of violently paſſionate diſpoſitions. Thoſe who have continual domeſtic quarrels, are alſo frequently thrown into *madneſs* by it; and women frequently incur this diſeaſe from long ſuppreſſion of the menſes, and a habit of giving looſe to laſcivious thoughts. Suppreſſions of the hæmorrhoids, and of the evacuation of the ſemen, have ſometimes alſo driven men into *madneſs*; worms have alſo ſometimes occaſioned it, and ſometimes drunkenneſs.

Prognoſtics. Madneſs ariſing from immaterial cauſes, is much more difficult of cure than when it ariſes from diſorders of the bodily organs; hence when it ariſes from violent perturbations of the mind, or from intenſe ſtudy, it is almoſt incurable. When it ariſes from ſuppreſſions of the ſemen, or of the uterine or hæmorrhoidal diſcharges, there is great hope of a cure by proper means. But *mad* perſons in general, when they ſleep ſound, and always awake in outrageous fits, are to be eſteemed incurable, or at leaſt much more difficult of cure than others.

When *madneſs* proceeds from internal exoſtoſes of the cranium, or induration of the dura mater, it is incurable by art. Fracture, or impreſſion of the cranium, and conculſion of the head, have been ſometimes relieved. When inſolation is the cauſe, a free and early uſe of the lancet has been found uſeful. But if *madneſs* is the more immediate conſequence of the ſun's action upon the nervous ſubſtance, and if, however occaſioned, it is of conſiderable duration, it is very often incurable. From inflammation of thoſe membranes that ſurround the brain, *madneſs* is very dangerous, and frequently terminates in either apoplexy or mortification. When it is the conſequence of a chronical congeſtion of fluids, it frequently admits

admits of relief, if timely applied; and such congestion is less dangerous, and more easily removed, whenever the mesenteric nerves alone are affected. When produced by spasm, in consequence of the tumultuous passions of joy and anger, or by intoxicating drugs, and vinous spirits, it is generally very violent, and often fatal by its immediate effects; but if the patient is able to bear the first shock, this species of *madness* is much sooner relieved than the gradual and continual muscular constriction, occasioned by the more gentle passions of love, grief, or despair; or by long and uninterrupted attention to any one object, however pleasing. Laxity intervening between spasm and delirious pressure, whereby it becomes a remoter cause of *madness*, admits of cure, if duly applied; nor is it uncommon that the weakened membranes spontaneously recover their elastic tone, provided the spasmodic impulse is abated before their continuent fibres are distracted beyond their natural tendency to approximation. *Madness* consequent upon gluttony or idleness, easily submits to medicine, properly applied. If it is accompanied with other disorders, the prognostic is to be formed from those disorders; anxiety, like original *madness*, when it proceeds from a natural defect in the internal constitution of the nervous substance, is not radically curable: if it proceeds from any external cause, there is a prospect of better success. Insensibility or idiotism, arising from any constitutional imperfection, is pronounced incurable by physic; nor when it appears to be only the effect of consequential *madness*, has it been frequently known to be relieved by art or nature.

Method of Cure. A brisk purge is first to be given; after this the patient is to be blooded pretty freely, ten ounces at the least should be taken away; after this the senses are to be attempted to be roused by strong vomits. White hellebore was famous on this occasion among the ancients; and there are some cases in which it may be given with safety, and with great good effect. After this the violent emotion of the blood is to be attempearated by nitrous and absorbent medicines; and, after these, the several remedies usually esteemed specifics take place. Of this number are decoctions of the red anagallis or pimpernel, the ruta muraria, or white maidenhair, the several preparations of silver, the berries of the *herba Paris*, asses blood, and the like; and great care is to be taken to bring the haemorrhoidal and menstrual discharges as far as possible to regularity. In cases of retention of the semen, purified nitre is to be given in great quantities, and may be also externally used, applying it to the testes in a cataplasm. The use of opiates is scarce to be suffered in any delirium, but of all things is never to be given in *madness*, for it never gives them any sleep, but enrages and adds to the complaint, having the same effect that strong liquors would have upon them. The use of white hellebore, as a vomit, may be of great service in some cases; but in all hypochondriac complaints, and consequently in *madness*, in the causes of which these complaints have a share, it is certain to increase the disease. Junker.

We read of a *mania* arising from a callous pia mater. See Med. Ed. Edinb. vol. iv. art. 26.

Dr. Micheletti relates the cure of a young man, who, after being exposed to very hot weather at sea, and having committed violent debauches in drinking, became mad, without any fever. He was cured by violent bleeding, starving, weak very cold drink, the cold bath, and pouring cold water on his head. Hist. de l'Acad. des Scienc. 1734.

Madness, says Dr. Battie, considered as a delusive sensation, unconnected with any other symptom, requires the patient's being removed from all objects that act forcibly upon the nerves, and excite too lively a perception of things, more especially from such objects as are the known causes of his disorder. The visits, therefore, of affecting friends, as well as enemies, and the impertinent curiosity of those, who think it pastime to converse with madmen, and sport with their passions, ought strictly to be forbidden. On the same account, the place of confinement should be at some distance from home, and none of his own servants should be suffered to wait on him. Every unruly appetite should be checked; and every fixed imagination, if possible, diverted. The patient's body and place of residence should be kept clean; the air he breathes should be dry and free from noisome steams; his food easy of digestion, and simple, neither spirituous, nor high seasoned; and his amusement not too engaging, nor too long continued, but rendered agreeable by a well-timed variety; and his employment should be about such things as are indifferent, and which approach the nearest to an intermediate state, between pleasure and anxiety. In the cure of *madness*, supposed by Dr. Battie to arise from delirious pressure of the brain, or medullary substance in the nerves, he directs our first attention to lessen, divert, or dislodge the compressing matter from the part affected: the intentions for which purposes are depletion, revulsion, removal, and expression. When pressure of the brain and nerves is sudden, the two first intentions may be safely and effectually answered by the lancet and cupping glass, repeated in proportion to the strength of the patient and the greatness of the pressure. To the same purpose are recommended the neutral salts, such as nitre, sal catharticus amarus, magnesia alba, tartar, and all its preparations, but more especially the sal diureticus: this latter is also highly extolled by Dr. Muzzel, of Berlin, in his Treatise of Melancholy, who directs a dram to be given three times a-day in a draught of warm water, sweetened with honey: this with other moistened diet, the warm bath every night, and the flesh-brush every morning, bath, he says, great efficacy.

To promote revulsion, in particular, we are advised to the use of the oily and penetrating steams, arising from the skins and other soft parts of animals, newly slain; tepid fomentations and cataplasms, applied to the head, legs, and feet, and oily and emollient glysters. Sinapisms, caustics, errhines, and vesicatories, as also the rougher cathartics, emetics, and volatile diaphoretics, are liable to endanger farther constriction, and therefore, if employed at all, to be used with the utmost caution. In the case of phrenzies or sudden inflammations, Dr. Battie is suspicious of the cathartic salts, and even of nitre, if administered in too large doses. Delirious pressure, when gradual and chronical, in robust and plethoric habits, also indicates depletion and revulsion. But if the subject is naturally infirm, or exhausted by preceding illness, the lancet must be cautiously used, or entirely prohibited: these intentions being safely answered only by the mildest solutives, as the neutral salts, cassia, manna, &c. and the gums quickened with a few grains of aloes. Nevertheless, when the weakness of the patient does not contraindicate, if the stagnating matter refuses to submit to these gentle evacuants, though often and properly repeated, and more especially when the nervous substance contained in the abdomen is affected, the third and fourth intentions take place; and it becomes absolutely necessary to shake with violence the head and hypochondria, by convulsing the muscular fibres with emetics, rougher purges, and errhines. Dr. Battie observes, that though bleeding is in some cases serviceable and necessary, yet to a feeble or convulsed lunatic, the lancet is not less destructive than a sword. Blisters, caustics, and sharp purges, in short all painful applications, or pungent substances, are to be tried with great caution, or rather not to be tried at all in fits of fury. Nor does even defect of sensation allow their use, whenever such defect is occasioned by the preceding excess of the nervous energy, or when it is accompanied by spasm. For the same reason, the gums, and all the foetid anti-hysterics, though useful in *madness*, arising from, or complicated with some sort of spasmodic disorders, are condemned in all preternatural actions of the muscles; also in *madness* attended with a feverish heat, or which happens in a plethoric habit of body, or that follows an inflammatory obstruction of the brain. Opium, though approved by Dr. Battie for allaying the more tumultuous passions, and obtunding an excess of sensibility, is highly dangerous in that species of the disease which approaches to stupor and insensibility. Mineral waters, drank at the fountain-head, and bathing in the sea, or cold fresh water, though remedies that have been much depended on for the cure of *madness*, are contraindicated, whenever there is sufficient reason to suspect, that irresoluble congestions of the fluids clog the membranes contiguous to the nervous substance; or that the solids are strained beyond the possibility of recovering their natural elasticity. Dr. Battie also pronounces vomits to be not only improper, but mischievous, whenever there is a reasonable suspicion that the vessels of the brain or nervous integuments are so much clogged or strained as to endanger a rupture, or farther disunion, instead of a deliverance from their oppressive loads. He likewise urges the same objection against such muscular irritation, whenever the vessels are contracted with cold, or when their contents are rarefied with heat, and likewise in constitutions that are lax and feeble, and naturally spasmodic.

The anodyne medicines proper in this case, are camphor, camphor with nitre, musk, &c. and, after due evacuations, strong opiates may be used with advantage. If musk is given, the doses should consist of from ℈ i. to ʒ ß. Opium may be given to two grains. Camphor hath been given with great benefit, from ℈ i. to ʒ i. ß in a dose, and repeated every morning, and sometimes morning and night. Dr. Kennedy used to begin with an antimonial vomit, the next day he gave a large dose of camphor, and repeated it at night, and thus continued a few days; then in the day he gave pills of æthiops, gum guaiacum, &c. and at nights the camphor, till a cure was

was effected; in which he often soon succeeded. Dr. Mouro gives borax to ʒ ij. as a dose for procuring sleep. The emetics recommended in this disorder, are those of the antimonial kind; and the most effectual diuretics are alkaline salts in large doses. Dr. Mead observes, that in the cure of maniacs, evacuations by the kidneys are of greater consequence than is generally supposed; especially if the *mania* is of the furious kind, and accompanied with febrile heat. See LUNATIC, MADNESS, and MELANCHOLY.

MANICA, properly a sleeve. See HIPPOCRATES's *sleeve*. Hildanus calls by this name a particular sort of purse, open at both ends, which he describes in his Treatise de Gangræna & Sphacelo, and gives a figure thereof. This he directs to be put about a limb, just before the place of amputation, before the operation is performed.

MANICHEES, or MANICHEANS, MANICHEI, a sect of ancient heretics, who asserted two principles; so called from their author *Manes*, or *Manichæus*, a Persian by nation, and educated among the MAGI, being himself one of that number before he embraced Christianity.

This heresy had its first rise about the year 277, and spread itself principally in Arabia, Egypt, and Africa. St. Epiphanius, who treats of it at large, observes, that the true name of this heresiarch was Cubricus; and that he changed it for *Manes*, which in the Persian or Babylonish language signifies *wight*. A rich widow, whose servant he had been, dying without issue, left him store of wealth: after which he assumed the title of the apostle or envoy of Jesus Christ.

Manes was not contented with the quality of apostle of Jesus Christ, but he also assumed that of the Paraclete, whom Christ had promised to send: which Augustin explains, by saying, that *Manes* endeavoured to persuade men, that the Holy Ghost did personally dwell in him with full authority. He left several disciples, and among others, Addas, Thomas, and Hermas. These he sent, in his life-time, into several provinces to preach his doctrine. *Manes*, having undertaken to cure the king of Persia's son, and not succeeding, was put in prison upon the young prince's death; whence he made his escape; but he was apprehended soon after, and flayed alive.

However, the admiral writers, cited by D'Herbelot and Hyde, tell us, that *Manes*, after having been protected in a singular manner by Hormisdas, who succeeded Sapor in the Persian throne, but who was not able to defend him, at length, against the united hatred of the Christians, the Magi, the Jews, and the Pagans, was shut up in a strong castle, to serve him as a refuge against those who persecuted him on account of his doctrine. They add, that, after the death of Hormisdas, Varanes I. his successor, first protected *Manes*, but afterwards gave him up to the fury of the Magi, whose resentment against him was due to his having adopted the Sadducean principles, as some say; while others attribute it to his having mingled the tenets of the Magi, with the doctrines of Christianity. However it is certain that the *Manichæans* celebrated the day of their master's death. It has been a subject of much controversy, whether *Manes* was an impostor. The learned Dr. Lardner has examined the arguments on both sides; and though he does not choose to deny that he was an impostor, he does not discern evident proofs of it. He acknowledges that he was an arrogant philosopher, and a great schemist; but whether he was an impostor, he cannot certainly say. He was much too fond of philosophical notions, which he endeavoured to bring into religion, for which he is to be blamed: nevertheless, he observes, that every bold dogmatiser is not an impostor.

The doctrine of *Manes* was a motley mixture of the tenets of Christianity with the ancient philosophy of the Persians, in which he had been instructed during his youth. He combined these two systems, and applied and accommodated to Jesus Christ, the characters and actions which the Persians attributed to the god Mithras.

He established two principles, viz. a good and an evil one: the first, a most pure and subtile matter, which he called *light*, did nothing but good: and the second, a gross and corrupt substance, which he called *darkness*, nothing but evil. This philosophy is very ancient; and Plutarch treats of it at large in his Isis and Osiris.

Our souls, according to *Manes*, were made by the good principle, and our bodies by the evil one; those two principles being, according to him, coeternal, and independent of each other. Each of these is subject to the dominion of a superintending being, whose existence is from all eternity. The being who presides over the *light* is called God; he that rules the land of *darkness* bears the title of hyle or demon. The ruler of the *light* is supremely happy, and in consequence thereof, benevolent and good: the prince of *darkness* is unhappy in himself, and desirous of rendering others partakers of his misery, and is evil and malignant. These two beings have produced an immense multitude of creatures, resembling themselves, and distributed them through their respective provinces. After a contest between the ruler of *light* and the prince of *darkness*, in which the latter was defeated, this prince of *darkness* produced the first parents of the human race. The beings, engendered from this original stock, consist of a body formed out of the corrupt matter of the kingdom of *darkness*, and of two souls, one of which is sensitive and sinful, and owes its existence to the evil principle; the other rational and immortal, a particle of that divine *light*, which had been carried away in the contest, by the army of *darkness*, and immersed into the mass of malignant matter. The earth was created by God, out of this corrupt mass of matter, in order to be a dwelling for the human race, that their captive souls might, by degrees, be delivered from their corporeal prisons, and the celestial elements extended from the gross substance in which they were involved. With this view God produced two beings from his own substance, viz. Christ, and the Holy Ghost: for the *Manichæans* held a consubstantial Trinity. Christ, or the glorious intelligence, called by the Persians Mithras, subsisting in and by himself, and residing in the sun, appeared in due time among the Jews, clothed with the shadowy form of a human body, to disengage the rational soul from the corrupt body, and to conquer the violence of malignant matter. The Jews, incited by the prince of *darkness*, put him to an ignominious death, which he suffered not in reality, but only in appearance, and according to the opinion of men. When the purposes of Christ were accomplished, he returned to his throne in the sun, appointing apostles to propagate his religion, and leaving his followers the promise of the Paraclete or Comforter, who is *Manes*, the Persian. Those souls, who believe Jesus Christ to be the son of God, renounce the worship of the god of the Jews, who is the prince of *darkness*, and obey the laws delivered by Christ, and illustrated by *Manes*, the comforter, are gradually purified from the contagion of matter; and their purification being completed, after having passed through two states of trial, by water and fire, first in the moon, and then in the sun, their bodies return to their original mass; for the *Manichæans* derided the resurrection of bodies; and their souls ascend to the regions of *light*. But the souls of those, who have neglected the salutary work of purification, pass, after death, into the bodies of other animals, or natures, where they remain till they have accomplished their probation. Some, however, more perverse and obstinate, are consigned to a severer course of trial, being delivered over, for a time, to the power of malignant aerial spirits, who torment them in various ways. After this, a fire shall break forth and consume the frame of the world; and the prince and powers of *darkness*, shall return to their primitive bears of anguish and misery, in which they shall dwell for ever. These mansions shall be surrounded by an invincible guard, to prevent their ever renewing a war in the regions of *light*.

Manes borrowed many things from the ancient Gnostics; on which account, many authors consider the *Manichæans* as a branch of the Gnostics.

In truth, the *Manichæan* doctrine was a system of philosophy rather than of religion. They made use of amulets, in imitation of the Basilidians; and are said to have made profession of astronomy and astrology. They denied that Jesus Christ, who was only God, assumed a true human body, and maintained it was only imaginary: and, therefore, they denied his incarnation, death, &c. They pretended that the law of Moses did not come from God, or the good principle, but from the evil one; and that for this reason it was abrogated. They rejected almost all the sacred books, in which Christians book for the sublime truths of their holy religion. They affirmed, that the Old Testament was not the work of God, but of the prince of *darkness*, who was substituted by the Jews in the place of the true God. They abstained entirely from eating the flesh of any animal; following herein the doctrine of the ancient Pythagoreans: they also condemned marriage. The rest of their errors may be seen in St. Epiphanius and St. Augustin; which last, having been of their sect, may be presumed to have been thoroughly acquainted with them.

Though the *Manichees* professed to receive the books of the New Testament, yet, in effect, they only took so much of them as suited with their own opinions. They first formed to themselves a certain idea or scheme of Christianity; and to this adjusted the writings of the apostles; pretending that whatever was inconsistent with this, had been foisted into the New Testament by later writers, who were half Jews. On the other hand, they made fables and apocryphal books pass for apostolical writings; and even are suspected to have forged several

others, the better to maintain their errors. St. Epiphanius gives a catalogue of several pieces published by *Manes*, and adds extracts out of some of them. These are the Mysteries, Chapters, Gospel, and Treasury.

The rule of life and manners which *Manes* prescribed to his followers, was most extravagantly rigorous and severe. However, he divided his disciples into two classes; one of which comprehended the perfect Christians, under the name of the *elect*; and the other, the imperfect and feeble, under the title of *auditors* or *hearers*. The *elect* were obliged to a rigorous and entire abstinence from flesh, eggs, milk, fish, wine, all intoxicating drink, wedlock, and all amorous gratifications; and to live in a state of the severest penury, nourishing their emaciated bodies with bread, herbs, pulse, and melons, and depriving themselves of all the comforts that arise from the moderate indulgence of natural passions, and also from a variety of innocent and agreeable pursuits. The *auditors* were allowed to possess houses, lands, and wealth, to feed on flesh, to enter into the bonds of conjugal tenderness; but this liberty was granted them with many limitations, and under the strictest conditions of moderation and temperance. The general assembly of the *Manichæans* was headed by a president, who represented Jesus Christ. There were joined to him twelve rulers or masters, who were designed to represent the twelve apostles, and these were followed by seventy-two bishops, the images of the seventy-two disciples of our Lord. These bishops had presbyters or deacons under them, and all the members of these religious orders were chosen out of the class of the elect. Their worship was simple and plain; and consisted of prayers, reading the scriptures and hearing public discourses, at which both the auditors and elect were allowed to be present. They also observed the Christian appointments of baptism and the eucharist. They kept the Lord's day, observing it as a fast; and they likewise kept Easter and Pentecost.

Towards the fourth century, the *Manichæans* concealed themselves under various names, which they successively adopted, and changed in proportion as they were discovered by them. Thus they assumed the names of Encratites, Aporactics, Saccophori, Hydroparastatæ, Solitaries, and several others, under which they lay concealed for a certain time, but could not however long escape the vigilance of their enemies. About the close of the fifth century, this sect gained a very considerable influence, particularly among the Persians.

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The better sort among the Negroes wear silver and gold *manilles*; but these are of their own manufacture; most of the money they receive for their other merchandizes being melted into *manilles*.

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Each *manipule* had two centurions, or captains, called *manipularii*, to command it; one whereof was lieutenant to the other. Each cohort was divided into three *manipules*, and each *manipule* into two centuries.

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This heresy had its first rise about the year 277, and spread itself principally in Arabia, Egypt, and Africa. St. Epiphanius, who treats of it at large, observes, that the true name of this heresiarch was Cubricus; and that he changed it for *Manes*, which in the Persian or Babylonish language signifies *light*. A rich widow, whose servant he had been, dying without issue, left him store of wealth: after which he assumed the title of the apostle or envoy of Jesus Christ.

Manes was not contented with the quality of apostle of Jesus Christ, but he also assumed that of the Paraclete, whom Christ had promised to send: which Augustin explains, by saying, that *Manes* endeavoured to persuade men, that the Holy Ghost did personally dwell in him with full authority. He left several disciples, and, among others, Addas, Thomas, and Hermas. These he sent, in his life-time, into several provinces to preach his doctrine. *Manes*, having undertaken to cure the king of Persia's son, and not succeeding, was put in prison upon the young prince's death; whence he made his escape; but he was apprehended soon after, and flayed alive.

However, the oriental writers, cited by D'Herbelot and Hyde, tell us, that *Manes*, after having been protected in a singular manner by Hormisdas, who succeeded Sapor in the Persian throne, but who was not able to defend him, at length, against the united hatred of the Christians, the Magi, the Jews, and the Pagans, was shut up in a strong castle, to serve him as a refuge against those who persecuted him on account of his doctrine. They add, that, after the death of Hormisdas, Varanes I. his successor, first protected *Manes*; but afterwards gave him up to the fury of the Magi, whose resentment against him was due to his having adopted the Seduccean principles, as some say; while others attribute it to his having mingled the tenets of the Magi, with the doctrines of Christianity. However it is certain that the *Manichæans* celebrated the day of their master's death. It has been a subject of much controversy, whether *Manes* was an impostor. The learned Dr. Lardner has examined the arguments on both sides; and though he does not choose to deny that he was an impostor, he does not discern evident proofs of it. He acknowledges that he was an arrogant philosopher, and a great schemist; but whether he was an impostor, he cannot certainly say. He was much too fond of philosophical notions, which he endeavoured to bring into religion, for which he is to be blamed: nevertheless, he observes, that every bold dogmatist is not an impostor.

The doctrine of *Manes* was a motley mixture of the tenets of Christianity with the ancient philosophy of the Persians, in which he had been instructed during his youth. He combined these two systems, and applied and accommodated to Jesus Christ, the characters and actions which the Persians attributed to the god Mithras.

He established two principles, viz. a good and an evil one; the first, a most pure and subtile matter, which he called *light*, did nothing but good; and the second, a gross and corrupt substance, which he called *darkness*, nothing but evil. This philosophy is very ancient; and Plutarch treats of it at large in his Isis and Osiris.

Our souls, according to *Manes*, were made by the good principle, and our bodies by the evil one; those two principles being, according to him, coeternal and independent of each other. Each of these is subject to the dominion of a superintending being, whose existence is from all eternity. The being who presides over the *light* is called God; he that rules the land of *darkness* bears the title of hyle or demon. The ruler of the *light* is supremely happy, and in consequence thereof, benevolent and good: the prince of *darkness* is unhappy in himself, and desirous of rendering others partakers of his misery, and is evil and malignant. These two beings have produced an immense multitude of creatures, resembling themselves, and distributed them through their respective provinces. After a contest between the ruler of *light* and the prince of *darkness*, in which the latter was defeated, this prince of *darkness* produced the first parents of the human race. The beings, engendered from this original stock, consist of a body formed out of the corrupt matter of the kingdom of *darkness*, and of two souls, one of which is sensitive and lustful, and owes its existence to the evil principle; the other rational and immortal, a particle of that divine *light*, which had been carried away in the contest, by the army of *darkness*, and immersed into the mass of malignant matter. The earth was created by God, out of this corrupt mass of matter, in order to be a dwelling for the human race, that their captive souls might, by degrees, be delivered from their corporeal prisons, and the celestial elements extended from the gross substance in which they were involved. With this view God produced two beings from his own substance, viz. Christ, and the Holy Ghost: for the *Manichæans* held a consubstantial Trinity. Christ, or the glorious intelligence, called by the Persians Mithras, subsisting in and by himself, and residing in the sun, appeared in due time among the Jews, clothed with the shadowy form of a human body, to disengage the rational soul from the corrupt body, and to conquer the violence of malignant matter. The Jews, incited by the prince of *darkness*, put him to an ignominious death, which he suffered not in reality, but only in appearance, and according to the opinion of men. When the purposes of Christ were accomplished, he returned to his throne in the sun, appointing apostles to propagate his religion, and leaving his followers the promise of the Paraclete or Comforter, who is *Manes*, the Persian. Those souls, who believe Jesus Christ to be the son of God, renounce the worship of the god of the Jews, who is the prince of *darkness*, and obey the laws delivered by Christ, and illustrated by *Manes*, the comforter, are gradually purified from the contagion of matter; and their purification being completed, after having passed through two states of trial, by water and fire, first in the moon, and then in the sun, their bodies return to their original mass; for the *Manichæans* derided the resurrection of bodies; and their souls ascend to the regions of *light*. But the souls of those, who have neglected the salutary work of purification, pass, after death, into the bodies of other animals, or natures, where they remain till they have accomplished their probation. Some, however, more perverse and obdurate, are consigned to a severer course of trial, being delivered over, for a time, to the power of malignant aerial spirits, who torment them in various ways. After this, a fire shall break forth and consume the frame of the world: and the prince and powers of *darkness*, shall return to their primitive seats of anguish and misery, in which they shall dwell for ever. These mansions shall be surrounded by an invincible guard, to prevent their ever renewing a war in the regions of *light*.

Manes borrowed many things from the ancient Gnostics; on which account, many authors consider the *Manichæans* as a branch of the Gnostics.

In truth, the *Manichæan* doctrine was a system of philosophy rather than of religion. They made use of amulets, in imitation of the Basilidians; and are said to have made profession of astronomy and astrology. They denied that Jesus Christ, who was only God, assumed a true human body, and maintained it was only imaginary: and, therefore, they denied his incarnation, death, &c. They pretended that the law of Moses did not come from God, or the good principle, but from the evil one; and that for this reason it was abrogated. They rejected almost all the sacred books, in which Christians look for the sublime truths of their holy religion. They affirmed, that the Old Testament was not the work of God, but of the prince of *darkness*, who was substituted by the Jews in the place of the true God. They abstained entirely from eating the flesh of any animal; following herein the doctrine of the ancient Pythagoreans: they also condemned marriage. The rest of their errors may be seen in St. Epiphanius and St. Augustin; which last, having been of their sect, may be presumed to have been thoroughly acquainted with them.

Though the *Manichees* professed to receive the books of the New Testament, yet, in effect, they only took so much of them as suited with their own opinions. They first formed to themselves a certain idea of scheme of Christianity; and to this adjusted the writings of the apostles; pretending that whatever was inconsistent with this, had been foisted into the New Testament by later writers, who were half Jews. On the other hand, they made fables and apocryphal books pass for apostolical writings; and even are suspected to have forged several

others, the better to maintain their errors. St. Epiphanius gives a catalogue of several pieces published by *Manes*, and adds extracts out of some of them. These are the Mysteries, Chapters, Gospel, and Treasury.

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The doctrine of *Manes* was a motley mixture of the tenets of Christianity with the ancient philosophy of the Persians, in which he had been instructed during his youth. He combined these two systems, and applied and accommodated to Jesus Christ, the characters and actions which the Persians attributed to the god Mithras.

He established two principles, viz. a good and an evil one: the first, a most pure and subtile matter, which he called *light*, did nothing but good; and the second, a gross and corrupt substance, which he called *darkness*, nothing but evil. This philosophy is very ancient; and Plutarch treats of it at large in his Isis and Osiris.

Our souls, according to *Manes*, were made by the good principle, and our bodies by the evil one; those two principles being, according to him, coeternal, and independent of each other. Each of these is subject to the dominion of a superintending being, whose existence is from all eternity. The being who presides over the *light* is called God; he that rules the land of *darkness* bears the title of hyle or demon. The ruler of the *light* is supremely happy, and in consequence thereof, benevolent and good: the prince of *darkness* is unhappy in himself, and desirous of rendering others partakers of his misery, and is evil and malignant. These two beings have produced an immense multitude of creatures, resembling themselves, and distributed them through their respective provinces. After a contest between the ruler of *light* and the prince of *darkness*, in which the latter was defeated, this prince of *darkness* produced the first parents of the human race. The beings engendered from this original stock, consist of a body formed out of the corrupt matter of the kingdom of *darkness*, and of two souls, one of which is sensitive and lustful, and owes its existence to the evil principle; the other rational and immortal, a particle of that divine *light*, which had been carried away in the contest, by the army of *darkness*, and immersed into the mass of malignant matter. The earth was created by God, out of this corrupt mass of matter, in order to be a dwelling for the human race, that their captive souls might, by degrees, be delivered from their corporeal prisons, and the celestial elements extended from the gross substance in which they were involved. With this view God produced two beings from his own substance, viz. Christ, and the Holy Ghost: for the *Manichæans* held a consubstantial Trinity. Christ, or the glorious intelligence, called by the Persians Mithras, subsisting in and by himself, and residing in the sun, appeared in due time among the Jews, clothed with the shadowy form of a human body, to disengage the rational soul from the corrupt body, and to conquer the violence of malignant matter. The Jews, incited by the prince of *darkness*, put him to an ignominious death, which he suffered not in reality, but only in appearance, and according to the opinion of men. When the purposes of Christ were accomplished, he returned to his throne in the sun, appointing apostles to propagate his religion, and leaving his followers the promise of the Paraclete or Comforter, who is *Manes*, the Persian. Those souls, who believe Jesus Christ to be the son of God, renounce the worship of the god of the Jews, who is the prince of *darkness*, and obey the laws delivered by Christ, and illustrated by *Manes*, the comforter, are gradually purified from the contagion of matter; and their purification being completed, after having passed through two states of trial, by water and fire, first in the moon, and then in the sun, their bodies return to their original mass; for the *Manichæans* derided the resurrection of bodies; and their souls ascend to the regions of *light*. But the souls of those, who have neglected the salutary work of purification, pass, after death, into the bodies of other animals, or natures, where they remain till they have accomplished their probation. Some, however, more perverse and obstinate, are consigned to a severer course of trial, being delivered over, for a time, to the power of malignant aerial spirits, who torment them in various ways. After this, a fire shall break forth and consume the frame of the world: and the prince and powers of *darkness*, shall return to their primitive seats of anguish and misery, in which they shall dwell for ever. These mansions shall be surrounded by an invincible guard, to prevent their ever renewing a war in the regions of *light*.

Manes borrowed many things from the ancient Gnostics; on which account, many authors consider the *Manichæans* as a branch of the Gnostics.

In truth, the *Manichæan* doctrine was a system of philosophy rather than of religion. They made use of amulets, in imitation of the Basilidians; and are said to have made profession of astronomy and astrology. They denied that Jesus Christ, who was only God, assumed a true human body, and maintained it was only imaginary: and, therefore, they denied his incarnation, death, &c. They pretended that the law of Moses did not come from God, or the good principle, but from the evil one; and that for this reason it was abrogated. They rejected almost all the sacred books, in which Christians look for the sublime truths of their holy religion. They affirmed, that the Old Testament was not the work of God, but of the prince of *darkness*, who was substituted by the Jews in the place of the true God. They abstained entirely from eating the flesh of any animal; following herein the doctrine of the ancient Pythagoreans: they also condemned marriage. The rest of their errors may be seen in St. Epiphanius and St. Augustin; which last, having been of their sect, may be presumed to have been thoroughly acquainted with them.

Though the *Manichees* professed to receive the books of the New Testament, yet, in effect, they only took so much of them as suited with their own opinions. They first formed to themselves a certain idea or scheme of Christianity; and to this adjusted the writings of the apostles; pretending that whatever was inconsistent with this, had been foisted into the New Testament by later writers, who were half Jews. On the other hand, they made fables and apocryphal books pass for apostolical writings; and even are suspected to have forged several

others, the better to maintain their errors. St. Epiphanius gives a catalogue of several pieces publiſhed by *Manes*, and adds extracts out of ſome of them. Theſe are the Myſteries, Chapters, Goſpel, and Treaſury.

The rule of life and manners which *Manes* preſcribed to his followers, was moſt extravagantly rigorous and ſevere. However, he divided his diſciples into two claſſes; one of which comprehended the perfect Chriſtians, under the name of the *elect*; and the other, the imperfect and feeble, under the title of *auditors* or *hearers*. The *elect* were obliged to a rigorous and entire abſtinence from fleſh, eggs, milk, fiſh, wine, all intoxicating drink, weſtlock, and all amorous gratifications; and to live in a ſtate of the ſevereſt penury, nouriſhing their emaciated bodies with bread, herbs, pulſe, and melons, and depriving themſelves of all the comforts that ariſe from the moderate indulgence of natural paſſions, and alſo from a variety of innocent and agreeable purſuits. The *auditors* were allowed to poſſeſs houſes, lands, and wealth, to feed on fleſh, to enter into the bonds of conjugal tenderneſs; but this liberty was granted them with many limitations, and under the ſtricteſt conditions of moderation and temperance. The general aſſembly of the *Manichæans* was headed by a preſident, who repreſented Jeſus Chriſt. There were joined to him twelve rulers or maſters, who were deſigned to repreſent the twelve apoſtles, and theſe were followed by ſeventy-two biſhops, the images of the ſeventy-two diſciples of our Lord. Theſe biſhops had preſbyters or deacons under them, and all the members of theſe religious orders were choſen out of the claſs of the elect. Their worſhip was ſimple and plain; and conſiſted of prayers, reading the ſcriptures and hearing public diſcourſes, at which both the auditors and elect were allowed to be preſent. They alſo obſerved the Chriſtian appointments of baptiſm and the euchariſt. They kept the Lord's day, obſerving it as a faſt; and they likewiſe kept Eaſter and Penteco.

Towards the fourth century, the *Manichæans* concealed themſelves under various names, which they ſucceſſively adopted, and changed in proportion as they were diſcovered by them. Thus they aſſumed the names of Eorrites, Aporatics, Saccophori, Hydroparaſtatæ, Solitaries, and ſeveral others, under which they lay concealed for a certain time, but could not however long eſcape the vigilance of their enemies. About the cloſe of the ſixth century, this ſect gained a very conſiderable influence, particularly among the Perſians.

Toward the middle of the twelfth century the ſect of *Manichees* took a new face, on occaſion of one Conſtantine, an Armenian, and an adherer to it; who took upon him to ſuppreſs the reading of all other books beſides the Evangeliſts, and the Epiſtles of St. Paul, which he explained in ſuch manner, as to make them contain a new ſyſtem of *Manicheiſm*. He entirely diſcarded all the writings of his predeceſſors; rejecting the chimæras of the Valentinians, and their thirty æons; the fable of *Manes*, with regard to the origin of rain, and other dreams; but ſtill retained the impurities of Baſilides. In this manner he reformed *Manicheiſm*, inſomuch that his followers made no ſcruple of anathematizing Scythian, Buddas, called alſo Addas, and Terebinth, the contemporaries and diſciples, as ſome ſay, and according to others, the predeceſſors and maſters of *Manes*, and even *Manes* himſelf, Conſtantine being now their great apoſtle.

After he had ſeduced an infinite number of people, he was at laſt ſtoned by order of the emperor.

This ſect prevailed in Boſnia and the adjacent provinces, about the cloſe of the fifteenth century; propagated their doctrines with confidence, and held their religious aſſemblies with impunity. See on the ſubject of this article, Moſheim's Eccl. Hiſt. vol. i. p. 230, &c. 8vo. edit. Lardner's Cred. of the Goſpel Hiſt. vol. viii. paſſim, and Bayle, art. *Manichees*.

MANICORDION, a muſical inſtrument, in form of a ſpinet.

Du-Cange derives the word from *manichord*, on a ſuppoſition this inſtrument has but one chord: but he is miſtaken; it has fifty, or more.

Its ſtrings are covered with pieces of ſcarlet cloth, to deaden, as well as ſoften, the ſound; whence it is alſo called the *tomis ſpinnet*, and is much uſed in nunneries for the religious to learn to play on; ſo as not to diſturb the ſilence of the dormitory. Scaliger makes the *manichord* more ancient than the ſpinet or harpſichord.

MANICOU, in *Zoology*. See OPOSSUM.

MANICUM *Strychnum*, in *Botany*, a term uſed by the old Greek writers to expreſs a kind of nightſhade, which, when taken internally, cauſed madneſs. Pliny, deſcribing this ſpecies, ſays, that it has leaves like the cotyledon or baſil; and Theophraſtus and Dioſcorides ſay it has leaves like the eruca or rocket. Where Pliny had his information is not eaſy to gueſs, for he commonly copies from theſe authors: they are, however, much more to be depended on; and as the leaves of the cotyledon or baſil are not at all like thoſe of the rocket, Pliny is certainly wrong in his account; and the moſt probable reaſon for his error is, that he miſtook the Greek name of the plant, to which theſe authors compared the leaves of the *manicum ſtrychnum*, and tranſlated *cotyledon*, which is the name of the rocket, into *cotyledon*, both a name ſomewhat like the Greek one in ſound, but wholly different in ſignification; the two plants baſil and rocket not only having leaves very unlike one another, but being alſo of different powers. A yet greater error of Pliny, in regard to this plant, is his placing it among the eſculent garden herbs, and ſaying that it was in uſe as a food, immediately after he had ſold us of its cauſing madneſs in thoſe who eat it. This is an evident confuſion of the orantze balauſtin with the pomum amoris or love apple, the fruit of which is eaten in ſoups at this time.

MANIFESTO, an apology, or public declaration in writing, made by a prince, ſhewing his intentions in any enterpriſe, the motives that induced him to it, and the reaſons on which his right and pretenſions are founded.

MANIFESTUS *oſſiculi*, in *Anatomy*, a name given by Veſalius and others to one of the muſcles of the female pudenda, called by Verheyhen ſimply the *muſculus clitoridis*, but by Albinus and Cowper, *arctor clitoridis*. Verheyhen is not to be cenſured for calling it only the *muſculus clitoridis*, for it is properly the only muſcle of that part, the other generally attributed to the clitoris, and called by Riolan and others, *clitoridis inferior* and *latus*, not properly belonging to that part, but being truly a ſphincter vaginæ, or, as Albinus calls it, the *ſphincter cunni*. See SPHINCTER.

MANIHOT, in *Botany*. See CASSADA.

MANILLE, or MENILLE, in *Commerce*, one of the principal commodities carried by the Europeans to the coaſts of Africa, to traffick with the Negroes in exchange for ſlaves. It is a large braſs ring in form of a bracelet, either flat or round, plain or engraven; with which the natives uſed to deck themſelves, putting them on the ſmall of the leg, and the thick of the arm above the elbow.

The better ſort among the Negroes wear ſilver and gold *manilles*; but theſe are of their own manufacture; moſt of the money they receive for their other merchandizes being melted into *manilles*.

MANIPULATION, a term uſed in the mines, to ſignify the manner of digging the SILVER, &c. out of the earth.

MANIPULUS, MANIPULE, among the Romans, was a little body of infantry, which, in the time of Romulus, conſiſted of a hundred men; and in the time of the conſuls, and firſt Cæſars, of two hundred.

The word properly ſignifies a handful; and, according to ſome authors, was firſt given to the handful of hay which they bore at the end of a pole, to diſtinguiſh themſelves by, before the cuſtom was introduced of bearing an eagle for their enſign: and hence alſo the phraſe, a handful of men. But Vegetius, Modeſtus, and Varro, gave other etymologies of the word: the laſt derives it from *manus*, a little body of men following the ſame ſtandard. According to the former, this corps was called *manipulus*, becauſe they fought hand in hand, or all together: *Contubernium autem manipulare vocabatur ab eo, quod conjunctis manibus pariter dimicabant.*

Each *manipule* had two centurions, or captains, called *manipularii*, to command it; one whereof was lieutenant to the other. Each cohort was divided into three *manipules*, and each *manipule* into two centuries.

Aulus Gellius quotes an old author, one Cincius, who lived in the time of Hannibal (whoſe priſoner he was), and who, writing on the art of war, obſerves, that then each legion conſiſted of ſixty centuries, of thirty *manipules*, and of ten cohorts. And again, Varro and Vegetius mention it as the leaſt diviſion in the army, only conſiſting of the tenth part of a century; and Spartian adds, that it contained no more than ten men. This ſhews, that the *manipule* was not always the ſame thing. See LEGION.

MANIPULUS is alſo an eccleſiaſtical ornament, worn by the prieſts, deacons, and ſubdeacons, in the Romiſh church. It conſiſts of a little ſtiff in form of a ſtole, three or four inches broad, and made of the ſame ſtuff with the chaſuble; ſignifying and repreſenting an handkerchief, which the prieſts in the primitive church wore on the arm, to wipe off the tears they were continually ſhedding for the ſins of the people. There ſtill remains a mark of this uſage in a prayer rehearſed by thoſe who wear it, *Merear, Domine, portare manipulum fletus & doloris.*

The Greeks and Maronites wear two *manipules*, one on each arm.

MANIPULUS, in *Phyſic*, denotes a meaſure, or fixed quan-

tity, of herbs, or leaves, viz. a handful; or ſo much as the whole hand can graſp: it is generally marked in preſcription with *M.*

MANIQUE, in the *Materia Medica*, the name given by authors to an American root, commended greatly for curing tertian and quartan agues, and as an infallible remedy againſt venomous bites. Redi procured ſome of this famous root, and gave it many very fair trials, but could never diſcover any of theſe virtues in it.

MANIS, in the Linnæan ſyſtem of *Zoology*, a genus of brutes in the claſs of *mammalia*, having no teeth, a taper extenſile tongue, a mouth narrowed to the ſnout, and a body covered with ſcales. There are two ſpecies, one with five toes, and the other with four on the feet. See LACERTA *ſquamoſa*.

MANNA, in *Pharmacy*, a medicinal drug, of great uſe in the modern practice, as a gentle purgative, and cleanſer of the firſt paſſages.

Manna is a white ſweet juice oozing from the branches and leaves of a kind of aſh-*tree*, being the aſh-tree with rounder leaf, and of low growth, chiefly in Calabria, during the heats of ſummer.

Manna has been commonly held a kind of *mel aereum*, or honey-dew, which, falling in the night, gathers on certain trees, and even on rocks, and on the earth itſelf; where it hardens with the ſun. But what refutes this opinion is, that ſuch dews melt in the ſun; whereas *manna* whitens and hardens in it. Add, that ſuch dews are only found on the tops and extremes of the leaves; whereas *manna* is chiefly found to lodge near the trunks of the branches: and that the honey-dew falls only on trees open to the air; whereas *manna is* found on trees which are under cover; as was experienced by Dr. Cornelius, who gathered *manna* from branches covered on purpoſe with cloth; and Lobel aſſures us, that *manna* had been gathered from branches of the aſh, which had been thrown the day before into a cellar. It is much more rational to rank *manna* amongſt the number of gums, which, exuding from the juice of the tree, and mixing with ſome ſaline particles of the air, is condenſed into thoſe flakes in which we ſee it.

Manna is far from being peculiar to the aſh-tree of Calabria, on which it is uſually found. It is no other than the matter of the ſenſible tranſpiration of trees and plants in general, and is found on many different kinds in different quantities. The lime and ſycamore uſually have a great deal of it on their leaves in the heats of ſummer, and if ſteeped in water, render it ſweet and purgative. The ſweet matter found in the bottom of the treſoil, or jaſmine flowers, is alſo *manna* in a certain ſtate. The bees are well acquainted with the ſameneſs of this extravaſated juice in different plants, and collect it for their honey, as well from the leaves of the lime and ſycamore, and many other trees, as from the flowers of plants. The elaboration it ſuffers under their management afterwards is all that makes the difference between that and what men collect in Calabria; and honey is *manna* in a certain ſtate.

At Briançon, in France, they collect *manna* from all ſorts of trees that grow there; and the inhabitants obſerve, that ſuch ſummers as produce them the greateſt quantities of *manna*, are very fatal to their trees. Their walnut trees produce annually a conſiderable quantity; but if there happen a year in which they produce more than ordinary, they uſually find many of them periſh in the following winter.

It ſeems very plain from the whole, that *manna* is only the extravaſated juice of the tree, which cannot ſurvive ſo great a loſs of it: and what not a little confirms this is, that the very hot ſummers are always thoſe which are the moſt abundantly productive of *manna*. The ancients were ſenſible of this ſpontaneous production of *manna*, of ſeveral ſpecies of trees, ſo very different from one another, and from thence fell into the error of ſuppoſing it ſomething wholly foreign to the tree; an error very natural to thoſe who did not know that the nutritive juices of very many trees are nearly, if not wholly the ſame. It was from this opinion of its origin, that they called it aerial honey.

Mr. Boyle tells us, that in Apulia and Calabria, between the months of March and November, they obtain, by inciſion, from the common aſh-tree, a ſweet juice ſo like *manna*, in that ſeaſon adhering to the leaves of the ſame kind of trees, that they call it *manna del corpo, trunk-manna*; and uſe it ſucceſsfully. Works Abr. vol. i. p. 51.

The Italians gather three kinds of *manna*:—*Manna di corpo*, which ouſes ſpontaneouſly from the branches of the tree in the month of July. *Manna formata*, or *forzatella*, which is not gathered till Auguſt, after an inciſion of the tree, when the flux of the firſt has ceaſed. *Manna di fronda*, which iſſues of itſelf, in little drops, like a kind of ſweat, from the nervous part of the leaves of the aſh, and gathers into grains about the bigneſs of thoſe of wheat, which are hardened by the ſun in Auguſt. The leaves are frequently found ſo loaden with theſe grains, that they ſeem covered with ſnow.

This is a ſubſtance in many things very nearly related to ſugar and to honey; it is inflammable in the ſame manner, and it melts in water as eaſily as ſugar, and liquefies even in a moiſt air, and by the aſſiſtance of heat, in rectified ſpirit alſo; the impurities only being left by both menſtrua.

M. Lemery, in his analyſis, drew from *manna* a vinous liquor, of the ſame kind with that obtained from honey. Mead may alſo be made of *manna*, in the ſame way that it is made from honey; but it is neither ſo ſtrong, nor ſo agreeable to the taſte as that of honey. From as much mead as was made from two pounds of *manna*, M. Lemery drew off by diſtillation eight ounces of a ſort of brandy, and on rectifying this, procured an ounce and half of a pure burning ſpirit, like in all reſpects to rectified ſpirit of wine. This ſpirit of *manna* is accounted by ſome a ſudorific, and is given from half a dram to a dram and a half. M. Lemery having left the remaining liquor, after the diſtillation of the ſpirituous part of the *manna* mead, in a warm place for two years, found that it depoſited to the bottoms of the bottles ſeven drams of an eſſential ſalt of *manna*, which was white, hard, brittle, and formed into fine needles, and was of an acid taſte, with an admixture of ſweet. This ſalt is purgative, and its doſe is a dram. All the remaining acid liquor being diſtilled, there remained at the bottom of the retort a quantity of matter of the conſiſtence of honey, which weighed twenty ounces; ſo that out of two pounds of *manna*, there had been twelve ounces conſumed, to make the ſpirit, and to give the acidity to the remaining liquor. This honey-like reſiduum, being finally diſtilled with a ſtrong fire, there aroſe a reddiſh liquor of an acrid taſte, and with a ſtrong empyreumatic ſmell, and with this a few drops of a blackiſh oil; after this operation, the remainder in the retort was four ounces of a very light black coal. The coal, it is to be obſerved, is here only one eighth of the weight of the *manna*, which is ſomewhat ſingular, ſince in the pureſt honey, treated in the ſame manner, it always weighs one fourth of the original whole quantity. It is plain from hence, that *manna* is a much purer ſubſtance than honey: it is alſo remarkable, that in farther treatment of this coal, there is a ſmall quantity of iron always diſcovered in it. *Manna*, honey, and all the other ſweet ſubſtances, we ſee, alſo loſe all their ſweetneſs, as ſoon as ever their acid is ſeparated from their oil. Hiſt. Acad. Par. 1708, p. 56.

Manna is a ſafe and gentle purge, and is alſo uſed in broths: Altimarus, a phyſician of Naples, has written a treatiſe expreſly upon it; and Doncella another. *Manna*, though accounted a kind of honey, purges the bile; whereas common honey increaſes it. Formerly the Syrian *manna* was in the moſt repute, but now it gives way to the Calabrian. Fuchſius obſerves, that the peaſants of mount Libanus eat *manna* ordinarily, as others do honey. At Mexico they are ſaid to have a *manna*, which they eat as we do cheeſe.

The *manna* moſt eſteemed is that in flakes; which many take to be factitious, and the work of the Jews at Leghern; but it is certainly natural: and what gives it this figure is, that they put ſtraws and ſlips of wood in the inciſions, along which the *manna* gliding, is condenſed as it comes out, and aſſumes this form.

This beſt ſort, or Calabrian *manna*, is moderately dry, friable, very light, of a whitiſh, or pale yellow colour, and, in ſome degrees tranſparent: the inferior kinds are moiſt, unctuous, and brown. *Manna* of both ſorts, is ſometimes counterfeited by compoſitions of ſugar, honey, and purgative materials, which may be diſtinguiſhed in their ſolid form by their weight, compactneſs, and tranſparency; and in the dry and moiſt ſtate, by their taſte, and by their habitude to menſtrua. *Manna*, in doſes of an ounce and upwards, proves a gentle laxative; it operates in general with great mildneſs, ſo as to be ſafely given in inflammatory or acute diſtempers, where the ſtimulating purgatives have no place. It is particularly proper in ſtomachic coughs; in which intention it is ſometimes made up into a linctus or lohoch, with equal quantities of oil of almonds, and ſyrup of violets. The gripes, flatulencies, and other inconveniencies attending it in ſome conſtitutions, may be obviated by a ſmall addition of ſome grateful aromatic. *Manna* does not produce the full effect of a cathartic, unleſs taken in large doſes, as two ounces or more; and, therefore, is ſeldom employed for this purpoſe by itſelf: it may be commodiouſly diſſolved in the purging mineral waters, or ſharpened with the cathartic ſalts, or other purgatives: its efficacy is ſaid to be much promoted by CASSIA *ſiſtularis*. Lewis.

MANNA is alſo a ſcripture-term, ſignifying a miraculous

kind of food, which fell from heaven, for the support of the Iſraelites, in their paſſage through the wilderneſs; being in form of coriander ſeeds; its colour like that of bdellium, and its taſte like honey.

They called it *manna*, either from the Hebrew word *manah*, *a gift*, to intimate its being a gift from heaven; or from *mennah*, which ſignifies *to prepare*, becauſe the *manna* came to them ready for eating, and needed no preparation but gathering; or from the Egyptian word *man*, *what is it?* which laſt etymology ſeems the more probable, in regard the ſcripture takes notice of the ſurprize they were under when they firſt ſaw this new food deſcend.

Salmaſius, however, preſers another: according to him, the Arabs and Chaldeans uſed the word *man* to ſignify a kind of dew or honey that fell on the trees, and was gathered in great abundance on mount Libanus. On which footing the Iſraelites did not uſe the term *manna* out of ſurprize, but becauſe they found this food fall with the dew, in the ſame manner as the honey-dew, ſo well known to them under the name of *man*. Salmaſius adds, that the *manna* of the Iſraelites was in reality no other than that honey, or dew, condenſed; and that the one and the other were the ſame with the wild honey wherewith St. John was fed in the wilderneſs; ſo that the miracle did not conſiſt in the formation of any new ſubſtance in favour of the Iſraelites, but in the punctual manner in which it was diſpenſed by Providence for the ſuſtenance of ſo vaſt a multitude.

MANNA *alhagina*, a word uſed by ſome authors to expreſs that kind of *manna* called by others *manna maſtichina*, from its drops reſembling maſtic in ſmall tears. It is called *alhagina* from the plant which produces it, it being collected from the *alhagi maurorum*, in the ſame manner as the common *manna* from the Calabrian aſh.

MANNA *libanotis*, in the *Materia Medica*, a name given by the old Greek writers to the ſmall flakes and fragments of the frankincenſe, which flew off the larger pieces in the gathering and putting them up. See LEPTOI *libanotis*.

MANNA *maſtichina*, in the *Materia Medica*, a name given by ſome authors to a kind of *manna* which they deſcribe as reſembling maſtich in its colour, and the ſize of the lumps it is collected in. This is what we uſually know at this time under the name of *manna Perſicum*, or *Perſian manna*, which is at this time in uſe in medicine in the Eaſt, as a common purge.

MANNA *Perſicum*, *Perſian manna*. It does not appear in the writings of the ancient Greek phyſicians, that they were acquainted with any ſpecies of *manna*, though that medicine be now ſo common in the ſhops. They had the word indeed, but they applied it to a very different ſenſe; what they called *manna* being what ſome authors ſtill call the *manna* of frankincenſe, that is, ſuch pieces of the common olibanum as broke off in the carriage from the larger pieces. Philoſ. Tranſ. N° 472. p. 86. in vol. xliii.

The Arabians are by ſome ſuppoſed to have firſt brought what we call *manna* into uſe in medicine; but if they were not the abſolute inventors of this uſe of it, it is certain they were the firſt who made it general and common as a purge. Their country afforded ſeveral diſtinct ſpecies of *manna*, all which ſeem to have been ſo common among them, that they thought deſcriptions of them needleſs; and for that reaſon have not left us ſufficient accounts of them, from which to determine what were their characters and differences. They diſtinguiſhed three kinds of this purging medicine, under three abſolute different names, which were *manna*, *terenjabin*, and *ſtrunjbi*; but it is not eaſily proved whether theſe are all now known, or by what appellations they are at this time diſtinguiſhed.

Rawwolf, in his Itinerary publiſhed by Mr. Ray, and Tournefort in his Voyage to the Levant, have given the cleareſt intimations, in regard to this ſubject, of any of the known writers; and if to theſe we add Cluſius, we have among the three all that is to be expected of any certainty upon the ſubject; yet the deſcriptions of theſe, though eye-witneſſes of all they write, have not prevented ſo eminent and late a writer as Geoffroy from falling into an error concerning the *manna* of the Arabians. It is very evident, however, that we have ſtill one ſpecies of the *manna Arabum*, that is, the *terenjabin*, produced in ſome parts of the world, there having been ſpecimens of it ſent over into England from Peterſburgh, near which place it is collected from a plant known among botanical writers under the name of *alhagi maurorum*.

This is uſually called *manna Perſicum*; it appears at firſt ſight a mixed maſs of a dirty reddiſh-brown colour, but, upon a nearer view, it is ſeen to conſiſt of ſeveral ſorts of particles. Firſt, a great number of globular, cryſtalline, and almoſt tranſparent bodies of different ſizes, and of a yelloviſh white colour; the largeſt of theſe do not much exceed a large coriander-ſeed in ſize, and they have ſomewhat of the appearance of ſmall lumps of maſtic, but are of a ſomewhat reddiſh caſt. Secondly, there is among theſe a large quantity of ſmall prickles, and other little woody bodies, which ſeem to have been the pedicles of leaves. Thirdly, there are a few ſmall leaves, which are of a firm texture, and terminate in narrow points. Fourthly, there are a large number of ſmall long reddiſh-coloured pods, of a ſweetiſh gelatinous taſte, containing from one to ſix or ſeven hard, irregular, and kidney-ſhaped ſeeds, which to the taſte are very four. And fifthly, there is uſually ſome ſand and earth among it. Four ounces of this *manna* diſſolved in water uſually leave about one ounce of theſe ſubſtances in the filtre.

The globules firſt deſcribed are ſomething hard, they break between the teeth like ſugar-candy, and are of a pleaſant ſweet taſte, but have much leſs of the *manna* flavour than the Calabrian, but enough of it to diſcover to what family the ſubſtance belongs: the ſeeds, ſticks, leaves, and pods, ſeem to be all of them parts of the plant which produces the *manna*; and the ſeeds having been ſown with us, have raiſed plants of the alhagi. About the year 1537, when Rawwolf wrote his Itinerary, it appears that large quantities of this kind of *manna* were brought from Perſia to Aleppo, where it was then known by the name of *trunſchibil*, or *trunſchibin*, a corruption doubtleſs of the word *terenjabin*, or, as it ought to be written, according to Deſingius, *tereng jabin*.

Rawwolf alſo expreſly informs us, that this ſpecies of *manna* was gathered from a plant called *alhagi*. This plant is minutely deſcribed by Tournefort, who confirms the account of the *manna* being gathered from it, which Rawwolf had given ſo long before.

Tournefort ſays, that it is chiefly gathered about Tauris, a city of Perſia, under the name of *trunjbin*, or *terenjabin*, mentioned by Avicenna and Serapion; he adds, that thoſe authors thought it fell upon certain prickly ſhrubs, whereas it is really the nutritious juice of the plant; and that, during the great heats in that part of the world, there are perceived ſmall round drops, as it were, of honey ſtanding upon the leaves of this plant; and that theſe harden into globules about the ſize of coriander-ſeeds, and are then gathered by the inhabitants, together with leaves, ſtalks, dirt, and the like foreign matter, which greatly take off from their virtue. Mr. Tournefort obſerves, that this *manna* is greatly inferior to the Calabrian in virtue; and that twenty or thirty drams of it are given for a doſe. Philoſ. Tranſ. N° 472, p. 90. ubi ſupra.

Cluſius tells us, that the *terenjabin* of the Arabians is gathered from a prickly ſhrub, ſuch as the alhagi is deſcribed to be; and Avicenna declares, that it was found upon a thorny plant; though his tranſlators have been miſled from the near reſemblance of two Arabic words, to make it ſtones, not a plant, that it was gathered from.

It appears very plainly from the whole, that this ſubſtance now known in Ruſſia and ſome other parts of the world, under the name of *manna Perſicum*, is truly the TERENJABIN of the Arabians and of Cluſius, Rawwolf, and Tournefort; only that the word is differently ſpelt by the latter authors, and it is probably alſo that *manna* called by Bauhine, and ſome other writers, *manna maſtichina orientalis*, from the round globules it is compoſed of, reſembling the drops of maſtich.

MANNA *thuris*, the *manna of frankincenſe*, a term uſed by the ancient phyſicians to expreſs ſuch ſmall pieces of FRANKINCENSE, or olibanum, as broke off from the larger in the carriage. See LEPTOI *Libanotis*.

MANNER, in *Painting*, &c. expreſſes that particular character obſervable in the works of painters, poets, and other artiſts, by which their pencil, hand, or ſtyle, are diſtinguiſhed.

The curious in pictures know the *manners* of the painters, and diſtinguiſh readily between the *manners* of Rubens, Titian, and Da Vinci; between the ancient and the new *manner* of the ſame painter; and between the Flemiſh, and the Italian *manner*.

Manner is uſed with reſpect both to the invention, the deſign, and the colouring. The *manner* of Michael Angelo, or Raphael, may even be known in their ſcholars. Thus we ſay, ſuch a piece is of Raphael's ſchool, &c.

MANNERS, in *Poetry*, denote the inclinations, genius, and humour, which the poet gives to his perſons, and whereby he diſtinguiſhes his characters.

Ariſtotle defines *manners* to be that which diſcovers the inclination of him who ſpeaks, and ſhews what he will reſolve upon, or what reject, before he was actually determined; whence he concludes, that *manners* have not place always, and in all kinds of diſcourſes.

One inſtance will make this definition clear. In the firſt book of Virgil, Æneas is repreſented extremely pious, and determined

determined to execute the will of the gods, at all adventures. In the fourth book he has a difficult choice proposed; being engaged, on the one hand, out of a principle of love, gratitude, and honour, not to quit Dido; and having, on the other hand, an express order from the gods to depart for Italy. Now, before it appears on which side he has determined, what he has before said, should shew his will and inclinations, and which part he will take. And those preceding discourses, which discover his future resolution, make what we call the poetical *manners*.

Those make it past doubt he will abandon Dido, to obey the gods; this he does in effect; and the *manners*, therefore, are good, and well conducted. Had he disobeyed the orders of Jupiter, to stay with Dido, the *manners* had been ill; because they would have foretold a resolution contrary to what he was really to take. But had there been nothing to make us foresee any resolution of Æneas at all, neither that which he actually took, nor the contrary, in that case there had been no *manners* at all. It is the *manners*, as before observed, that distinguish the characters; and, unless the *manners* be well expressed, we shall never be acquainted with the persons at all; nor, consequently, shall we be either terrified with foreseeing their dangers, nor melted into pity, by seeing their sufferings.

The *manners* should have four qualities; they should be *good*, *like*, *suitable*, and *equal*.

The *manners* are *good*, when they are well marked, or expressed; that is, when the discourse of the persons makes us clearly and distinctly see their inclinations, and what good or evil resolutions they will take. *Likeness* of *manners* only relates to known and public persons, whose characters are in history, with which the poetic characters must agree; that is, the poet must not give a person any quality contrary to any of those which history has already given him. And here it may be observed, that the evil qualities given to princes, and great men, ought to be omitted by poets, if they be contrary to the character of a prince; &c. but the virtues opposite to those known vices ought not to be imposed; as by making him generous and liberal in the poem, who was avaricious in the history.

The *manners* must likewise be *suitable*; that is, they must be agreeable to the age, sex, rank, climate, and condition, of the person that has them. Horace observes, *Interereit multum Davusne loquatur, an heros.* Again, the *manners* must be *equal*; that is, they must be constant, or consistent, through the whole character; or the variety or inequality of the *manners*, as in nature, so in the drama, must be equal. The fearful must never be brave, nor the brave timorous; the avaricious must never be liberal, nor *vice versâ*. In this part, Shakspeare's *manners* are admirable.

Besides these four qualities above mentioned, there is a fifth essential to their beauty; which is, that they be necessary; that is, that no vicious quality, or inclination, be given to any poetic person, unless it appear to be absolutely necessary, or requisite, to the carrying on of the action.

MANNIFERA *arbor*, in the *Materia Medica*, the name by which the round-leaved ASH, on which the manna is found, is often called.

MANNING *a hawk*, in *Falconry*, the making her tractable and tame.

MANNING *the fleet* is the providing of it with a sufficient number of men for any expedition. One of the methods commonly recurred to for this purpose is that of impressing men, by warrants from the lord high admiral to the captains, which are by them assigned to their lieutenants; and to render this the more effectual, vessels, called TENDERS, are hired into the service, to proceed from place to place with those officers and press-gangs, not only to receive volunteers, but to impress any seamen whom they find. The power of impressing men for the sea-service by the king's commission, says judge Blackstone, has been a matter of some dispute, and submitted to with great reluctance; though it hath very clearly and learnedly been shewn by sir Michael Foster, that the practice of impressing, and granting powers to the admiralty for that purpose, is of very ancient date, and hath been uniformly continued by a regular series of precedents to the present time; whence he concludes it to be a part of the common law. The difficulty arises from hence, that no statute has expressly declared this power to be in the crown, though many of them very strongly imply it. The stat. 2 Ric. II. c. 4. speaks of mariners being arrested and retained for the king's service, as of a thing well known and practised without dispute; and provides a remedy against their running away. By stat. 2 & 3 Ph. & M. c. 16. if any waterman, who uses the river Thames, shall hide himself during the execution of any commission of pressing for the king's service, he is liable to heavy penalties. By 5 Eliz. c. 5. no fisherman shall be taken by the queen's commission to serve as a mariner; but the commission shall be first brought to two justices of the peace, inhabiting near the sea-coast, where the mariners are to be taken, to the intent that the justices may choose out and return such a number of able-bodied men, as in the commission are contained, to serve his majesty; and by 7 & 8 W. III. c. 21. 2 Ann. c. 6. 4 & 5 Ann. c. 19. 13 Geo. II. c. 17. &c. especial protections are allowed to seamen in particular circumstances, to prevent them from being impressed. And ferrymen are also said to be privileged from being impressed, at common law; all which do most evidently imply a power of impressing to reside somewhere; and, if any where, it must, from the spirit of our constitution, as well as from the frequent mention of the king's commission, reside in the crown alone.

But, beside this method of impressing, which is only defensible from public necessity, to which all private considerations must give way, there are other means tending to the increase of seamen, and for *manning* the royal navy. Parishes may bind out poor boys apprentices to masters of merchantmen, who shall be protected from being impressed for the first three years; and if they are impressed afterwards, the masters shall be allowed their wages, 2 Ann. c. 6. Great advantages in point of wages are given to volunteer seamen, in order to induce them to enter into his majesty's service, 1 Geo. II. stat. 2. c. 14. It is also usual to premise, by proclamation, a bounty to all seamen and able-bodied landmen, who come into the service by a certain time; and every foreign seaman who, during a war, shall serve two years in any man of war, merchantman, or privateer, in navibus *regis sallo*. 13 Geo. II. c. 3.

About the middle of king William's reign, a scheme was set on foot (7 & 8 W. III. c. 21.) for a register of seamen, to the number of 10,000, for a constant and regular supply of the king's fleet, with great privileges to the registered seamen, and, on the other hand, heavy penalties in case of their non-appearance, when called for; but this registry, being judged to be rather a badge of slavery, was abolished by 9 Ann. c. 21. Blackst. Comm. vol. i. p. 419. &c.

MANŒUVRE, in *Military Language*, consists solely in distributing equal motion to every part of a body of troops, to enable the whole to form, or change their position, in the most expeditious and best method, so as to answer the purposes required of a battalion, brigade, or line of cavalry, infantry, or artillery. The term is also applied to the operation of managing a ship in an engagement.

MANOMETER, or MANOSCOPE, formed from *πανος, rarus*, and *μετρον, mensura*, &c. an instrument to shew, or measure, the alterations in the rarity, or density, of the air.

The *manometer* differs from the barometer in this, that the latter only measures the weight of the atmosphere, or of the column of air over it; but the former, the density of the air in which it is found; which density depends not only on the weight of the atmosphere, but also on the action of heat and cold, &c. Authors, however, generally confound the two together; and Mr. Boyle himself gives us a very good *manometer* of his contrivance, under the title of a *statical barometer*; the structure whereof see under BAROMETER.

The *manometer*, constructed by Mr. Ramsden, and used by captain Phipps, in his Voyage to the North Pole, was composed of a tube of a small bore, with a ball at the end; the barometer being at 29·7, a small quantity of quicksilver was put into the tube, to take off the communication between the external air, and that contained in the ball and the part of the tube below this quicksilver. A scale is placed on the side of the tube, which marks the degrees of dilatation arising from the increase of heat in this state of the weight of the air, and has the same graduation as that of Fahrenheit's thermometer, the point of freezing being marked 32. In this state, therefore, it will shew the degrees of heat in the same manner as a thermometer. But if the air becomes lighter, the bubble inclosed in the ball, being less compressed, will dilate itself, and take up a space as much larger, as the compressing force is less; therefore the changes arising from the increase of heat will be proportionably larger; and the instrument will shew the differences in the density of the air, arising from the changes in its weight and heat. Mr. Ramsden found, that a heat equal to that of boiling water, increased the magnitude of the air from what it was at the freezing point $\frac{1}{28}$ of the whole. Hence it follows, that the ball and the part of the tube below the beginning of the scale is of a magnitude equal to almost 414 degrees of the scale. If the height of both the *manometer* and thermometer be given, the height of the barometer

rometer may be thence deduced by this rule; as the height of the *mannometer* increased by 414 is to the height of the thermometer increased by 414, so is 29.7 to the height of the barometer.

MANONOETOC, in *Natural History*, a name given by the people of the Philippine islands to a species of horned owl, common in those parts.

MANOR, or MANNOR, an ancient lordship, or royalty; consisting of demesnes and services, and of a court-baron, as incident thereto.

The word is formed from the French *manoir*, a *mansion-house*; and that from the Latin *manere, to remain or dwell*; as being the lord's usual place of residence.

Manor is the same with what was formerly called *baronia, barony*.

A *manor* is a kind of noble fee, granted out partly to tenants for certain services to be performed, and partly reserved to the use of the lord's family; with jurisdiction over his tenants, for the lands, or estates, held of him.

For the original of *manors*, we are told there was anciently a certain compass of ground, granted by the king to some man of worth, for him and his heirs to dwell upon, and to exercise some jurisdiction, more or less, within that circuit, such as he thought good to grant; but performing such services, and paying such yearly rent, as by this grant was required. Now the lord afterwards parcelling the same to other meaner men, received rent and services from them, and by that means, as he became tenant to the king, the inferiors became tenants to him.

But at this time a *manor* rather signifies a jurisdiction, and royalty incorporeal, than the land and soil; for a man may now have a *manor* in gross, i. e. the right and interest of a court-baron, with the perquisites, and another enjoy every foot of land belonging to it.

A *manor* may be compounded of divers things; as of an house, arable land, pasture, meadow, wood, rent, advowson, court-baron, &c. And this ought to be, by long continuance of time, beyond man's memory.

It is held by some, that a *manor* cannot now be made, since a court-baron cannot be made; and, without a court-baron, and at least two suitors, there can be no *manor*.

A *manor* may contain one or more villages or hamlets, or only great part of a village; and there are capital *manors* or honours, which have other *manors* under them, the lords whereof perform customs and services to the superior lords. There may be also *customary manors*, granted by copy of court-roll, and held of other *manors*. But it cannot be a *manor* in law, without freehold tenants; nor a customary *manor*, without copyhold tenants. The custom remains, when tenements are divided from the rest of the *manor*, the tenants paying their services; and he who hath the freehold of them may keep a court of survey, &c.

MANSE, MANSUS, MANSA, or MANSUM, formed *a manendo, abiding*, as being the place of dwelling, or residence, in ancient *Law-Books*, denotes a house, or habitation; either with or without land.

MANSE, *capital, manſum capitale*, denotes the manor-house, or lord's court.

MANSUS *presbyteri*, is a parsonage or vicarage-house, for the incumbent to reside in.

This was originally, and still remains, an essential part of the endowment of a parish church, together with the glebe and tithes. It is sometimes called *presbyterium*.

MANSION, *mansio*, a *manendo*, a dwelling-house, or habitation, especially in the country.

Among the ancient Romans, *mansio* was a place appointed for the lodging of the princes, or soldiers, in their journey; and in this sense we read *primum mansionem*, &c. It is with us most commonly used for the lord's chief dwelling house within his fee; otherwise called the capital messuage or manor place; and *mansion* house is taken in law for any house of dwelling of another; in case of committing burglary, &c.

MANSIO, or MANSUS, was sometimes also used in the same sense with HIDE; that is, for as much land as one plough could till in a year.

MAN-SLAUGHTER, is a species of *felonious* HOMICIDE, and denotes the unlawful killing of a man, without any malice, either express or implied; which may be either voluntarily, upon a sudden heat; or involuntarily, but in the commission of some unlawful act. As, when two persons, who before meant no harm to one another, falling out on some sudden occasion, the one kills the other: this is voluntary *man-slaughter*. But in this, and every other case of homicide upon provocation, if there be a sufficient time for passion to subside, and reason to interpose, and the person provoked afterwards kills the other, this is deliberate revenge, and amounts to MURDER. Thus, if a man takes another in the act of adultery with his wife, and kills him directly upon the spot; though this was allowed by the laws of Solon, as likewise by the Roman civil law, if the adulterer was found in the husband's own house, and also among the ancient Goths; yet in England it is not absolutely ranked in the class of *juſtifiable* HOMICIDE, as in the case of a forcible rape; but it is the lowest degree of *man-slaughter*. Further, if two persons play at sword and buckler, unless by the king's command, and one of them kills the other, this is involuntary *man-slaughter*, because the original act was unlawful. So where a person does an act, lawful in itself, but in an unlawful manner, and without due caution and circumspection; as when a workman flings down a stone or piece of timber into a street, and kills a man; this may be either misadventure, *man-slaughter*, or murder, according to the circumstances attending it: if it were in a country village, and he calls out to all people to have a care, it is misadventure only; but if it were in London, or other populous town, where people are continually passing by, it is *man-slaughter*, though he gives loud warning; and murder, if he knows of their passing, and gives no warning at all. The crime of *man-slaughter* amounts to felony, but within the benefit of clergy; and the offender shall be burnt in the hand, and forfeit all his goods and chattels.

By a law of king Canutus, if a man is killed openly and premeditatedly, the murderer shall be committed to the relations of the deceased; but if, on his trial, the fact be proved, but not to have been wilful, the bishop is to judge him.

There is a *man-slaughter* punishable as murder, by statute; by 1 Jac. I. cap. 8. if any person shall stab another, not having then a weapon drawn, or not being stricken first, so that he dies within six months, although it were not of malice afore-thought, it is felony without benefit of clergy; but this doth not extend to persons stabbing others *se defendendo*, or by misfortune, &c. with no intent to commit *man-slaughter*; and the statute relates to the party only that actually gave the stroke, or stabbed the other, and not to those that were aiding or abetting. Blackst. Com.

MANSORIUS *muſculus*, in *Anatomy*, a name given by some writers to that muscle of the face more generally known under the name of the MASSETER.

MANTECU, a sort of preparation of butter used by the Turks when they travel with their caravans. This is first boiled over the fire, and then salted and kept in vessels made of a tough leather, worked round a wooden frame, of the same shape with the vessels in which they bring their balsam from Mecca.

MANTEGAR, or MAN-TIGER, as it is sometimes written, in *Zoology*, is the tufted APE, with a nose and head fourteen inches long; the nose of a deep red, face blue, and both naked; black eye-brows; ears like the human; on the top of the head is a long upright tuft of hair, and on the chin another; two long tusks in the upper jaw; fore-feet like hands, and the nails on the fingers flat; the hind feet have the thumbs less perfect, and the nails imbricated; the fore-part of the body and the inside of the legs and arms naked; the outside covered with mottled brown and olive hair; that on the back dusky; the buttocks red and bare; and the length from the nose to the rump three feet two inches. This animal is very fierce and salacious; will sit on its rump, and support itself by a stick; and in this attitude hold a cup in its hand, and drink out of it; its food is fruit. Pennant. See *Tab.* III. *Quadrupeds*, N° 31.

MANTELETS, in *Military Language*, a kind of moveable parapets, made of planks, about three inches thick, nailed one over another, to the height of almost six feet, generally cased with tin, set upon little wheels, and guided by a long pole; so that in a siege they may be driven before the pioneers, and serve as blinds, to shelter them from the enemy's small shot.

There are also other sorts of *mantelets*, covered on the top, whereof the miners make use, to approach the walls of a town, or castle. See *Tab.* VIII. *Fortif. fig.* 48.

The double *mantelets* form an angle, and stand square, making two fronts, which cover both the front and flank of the sappers, &c. when at work: these have double planks, with earth rammed in between them; they are five feet high, and three in breadth, sometimes covered with plates of iron.

It appears from Vegetius, that *mantelets* were in use among the ancients, under the name of vines; but they were built lighter and much larger than ours, being eight or nine feet high, as many broad, and sixteen long; they were defended by a double covering, the one of boards, the other of faggots, with the ribs of oxen; and were cased without with skins, steeped in water, to prevent fire.

MANTICA, in *Zoology*, the name by which Piso and some other writers have expressed the pouch or bag of skin un-

der the belly of the OPOSSUM, into which the young are received in time of danger.

MANTICHORA, in *Natural History*, a name given by the Roman authors to a fierce and terrible creature, which they describe from the Greeks, who call it sometimes also *mantichora*; but when they write more correctly, *martichora* and *martiora*. We have formed the name *man-tiger* on the sound of the Roman name, though expressing a very different sense; and our authors of the histories of animals, figure to us under this name a terrible creature, partly from the accounts of Pliny exaggerated, and partly from their own imagination, with three rows of teeth, and with such a shape as no animal ever possessed. See MANTEGAR.

The whole story of this animal seems founded on the love of the wonderful; and very probably the *mantichora*, properly speaking, was no other than some of the largest hyænas, which was at first ill described, and afterwards more and more wonders were added to the story, till all shadow of truth was lost.

MANTICLUS, in *Mythology*, a name given to Hercules, under which title he had a temple without the walls of Messina, in Sicily. This temple was built by *Manticlus*, the chief of a colony of Messenians, about 664 years before Christ.

MANTIS, the praying locust. See *Tab. of Insects*, N° 4. and LOCUST.

MANTLE, or MANTLE-*tree*, in *Architecture*, is the lower part of the breast or front of a chimney. It was formerly a piece of timber that lay across the jambs, and supported the breast-work; but by a late act of parliament, chimney-breasts are not to be supported by a wooden *mantle-tree*, or turning piece, but by an iron bar, or by a brick or stone arch. See CHIMNEY.

MANTLE, or MANTLING, in *Heraldry*, that appearance of folding of cloth, flourishing, or drapery, that is in any atchievement drawn about the coat of arms.

It is supposed originally to have been the representation of a *mantle*, or military habit, worn by ancient cavaliers over their armour, to preserve it from rust; or, as others hold, a short covering, only worn over the helmet; which, in after-times, was lengthened, and made to hang from the helmet below the whole shield. See *Tab. Herald. fig. 29.*

The *mantle* is always said in blazon to be doubled, that is, lined throughout with one of the furs, as ermin, pean, vairy, &c. See COAT.

MANTLE *of the Knights of the Garter*. See GARTER.

MANTLE is likewise a term used in *Falconry*. They say the hawk *mantles*, that is, spreads her wings after her legs.

MANTLE, *lady's*, in *Botany*. See LADY'S *mantle*.

MANUAL, *manualis*, signifies what is employed, or used by the hand, and whereof a present profit may be made. Thus such a thing is said to be in the *manual* occupation of one, where it is actually used or employed by him.

MANUAL is the name of a service book used in the church of Rome, containing the rites, directions to the priests, and prayers used in the administration of baptism and other sacraments; the form of blessing holy water, and the whole service used in processions.

MANUAL *exercise*. See EXERCISE.

MANUALIS *lapis*, in *Natural History*, the name of a stone found in America, of which Monardes relates that it has great virtues in curing chaps and cracks in the hands and feet; but he does not describe it.

MANUBIÆ, among the *Romans*, the spoils of the enemy, or rather the money made of the booty, when sold by the quæstor.

MANUCAPTIO, in *Law*, a writ which lies for a man, who, being taken on suspicion of felony, and offering sufficient bail for his appearance, is refused to be admitted thereto by the sheriff, or other having power to let to mainprise.

MANUCMANUC, in *Natural History*, a name given by the people of the Philippine islands to a very beautiful species of parrot, which is found very frequently wild in the woods there. It is of the same bigness with the common parrot, and is variegated with a great many different colours.

MANUCODIATA, in *Ornithology*. See *Bird of* PARADISE.

MANUDUCTOR, a name given to an ancient officer in the church; who, from the middle of the choir, where he was placed, gave the signal for the choristers to sing, and marked the measure, beat time, and regulated the music.

The Greeks called him *mesechoros*, because seated in the middle of the choir; but, in the Latin church, he was called *manuductor*, from *manus*, and *duco*, *I lead*; because he led and guided the choir, by the motions and gesture of the hand.

MANUFACTURE, from *manufactus*, q. d. *made with hands*, a place where several artists and workmen are employed in the same kind of work, or make a commodity of the same kind.

MANUFACTURE is also popularly used to signify the work itself; and by extension, the like work carried on independently in different parts of the country.

In this sense we say, the woollen *manufacture*, silk *manufacture*, velvet *manufacture*, tapestry *manufacture*, muslin *manufacture*, &c. *manufacture* of hats, stockings, &c.

By 23 Geo. II. c. 13. if any person exports any tools or utensils used in the silk or woollen *manufactures*, he forfeits the same, and 200*l.* and the captain of the ship, having knowlege thereof, 100*l.* And if any captain of a king's ship, or officer of the customs, knowingly suffers such exportation, he forfeits 100*l.* and his employment; and is for ever made incapable of bearing any public office.

MANUFACTURERS. Persons enticing artificers into foreign countries, incur the penalty of 500*l.* and twelve months imprisonment, for the first offence, for each person so seduced, and 1000*l.* and two years imprisonment, for the second offence. 23 Geo. II. c. 13. § 1. And such artificers not returning within six months after warning, shall be deemed aliens, forfeit all their lands and goods, and be incapable of any legacy or gift. 5 Geo. I. c. 27. § 3.

MANULCA, in *Antiquity*, that part of the CATAPULTA to which the cord used in working it was fixed.

MANULEA, in *Botany*, a genus of the *didynamia angiospermia* class; the characters of which are, that the calyx is divided into five segments; the limb of the flower is also separated in the same manner, and awl-shaped; the fruit is a double-celled polyspermous capsule.

MANUMISSION, *manumissio*, an act whereby a slave, or villain, is set at liberty, or let out of bondage.

The word comes from the Latin *manus*, *hand*, and *mittere*, *to send*; *quia servus mittebatur extra manum, seu potestatem domini sui.*

Some authors define *manumission* an act by which a lord enfranchises his tenants, who till that time had been his vassals, and in a state of slavery, inconsistent with the fanciity of the Christian faith.

Among the Romans, the *manumission* of slaves was performed three several ways. 1. When, with his master's consent, a slave had his name entered in the census, or public register, of the citizens. 2. When the slave was led before the prætor, and that magistrate laid his wand, called *vindicta*, on his head. 3. When the master gave the slave his freedom by his testament. Servius Tullus is said to have set on foot the first manner; and P. Valerius Publicola the second. A particular account is given of the third in the Institutes of Justinian.

It was not necessary that the prætor should be on his tribunal, to perform the ceremony of *manumission*: he did it any where, indifferently, in his house, in the street, in going to bathe, &c. He laid the rod on the slave's head, pronouncing these words, *Dico eum liberum ajo more Quiritum*, I declare him a freeman, after the manner of the Romans. This done, he gave the rod to the lictor, who struck the slave with it on the head, and afterwards, with his hand, on his face and back; and the notary, or scribe, entered the name of the new-freed man in the register, with the reasons of his *manumission*.

The slave had likewise his head shaved, and a cap given him by his master, as a token of freedom. Tertullian adds, that he had then also a third name given him: if this were so, three names were not a token of nobility, but of freedom.

The emperor Constantine ordered the *manumissions* at Rome to be performed in the churches.

Of *manumission* there have also been various forms in England. In the time of the Conqueror, villains were *manumitted*, by the master's delivering them, by the right hand, to the viscount, in full court, throwing them the door, giving them a lance, and a sword, and proclaiming them free.

Others were *manumitted* by charter. There was also an implicit *manumission*; as when the lord made an obligation for payment of money to the bondman at a certain day; or sued him, where he might enter without suit; and the like.

MANURING *of ground*, the application of a matter proper for meliorating the soil, and rendering it more fertile. The matters used for *manure* are various in various countries: the most ordinary are DUNG, LIME, and MARLE. In some parts of England and Ireland they use sea-shells, as those of cockles, periwinkles, &c. which are found to agree well with boggy, heathy, clayey, wet, or stiff land; as they seem to give it a kind of ferment, as barm does to bread, opening and loosening the clods, and by that means making way for the roots to penetrate, and the moisture

moiſture to enter into the fibres of them. This kind of *manure* continues a long time, before its effects are exhauſted; whereas lime, &c. ſpend themſelves at once. The ſhells, being hard, melt away very ſlowly; ſo that the operation needs not be repeated for twenty or thirty years.

The vaſt beds of foſſile-ſhells, buried in many parts of the world, are not uſeleſs matter, but will ſerve to one of the greateſt purpoſes of huſbandry, the manuring of barren lands. The people of many parts of France, and in ſome places in our own country, dig up the maſſes of broken ſhells, connected into a ſort of ſtrata by marly, or other earths, for this purpoſe; and ſpreading them upon the lands as dung, they ſoon moulder away, and are found extremely beneficial to the earth.

The *manure* of ſhells upon theſe lands does not produce nearly ſo great an effect for the two firſt years, as it does in the ſucceeding ones; the reaſon of which is, that it is not then ſufficiently mixed, but in ſucceeding time it breaks itſelf into a number of very ſmall particles, and theſe all become intimately blended with the molecules of earth, and produce their effect more perfectly.

Sea-ſand is often made uſe of by way of *manure*, in ſome parts of Cornwall, near the ſea-ſhore. When the ſand is much mixed with broken pieces of ſea-ſhells, it is reckoned beſt. It is ſpread upon ſuch land as is intended for wheat, or uſually in the firſt crop of four, whatever be the grain; for after four crops it is the cuſtom in Cornwall to leave the land ſix or ſeven years for paſture before it is tilled again; and the grais will be ſo good the firſt year, where this *manure* is uſed, as to be fit for mowing: this is called *mowing of gratten* by the people there. The Corniſh acre is eight ſcore yards, at eighteen feet to the yard. In one of theſe acres, the farmers beſtow, according to the diſtance from the ſea-ſhore, from three hundred ſacks to one hundred, each ſack containing thirteen gallons, which is called a horſe-load, the roads in many parts of this country being ſo bad, that they are forced to carry the ſand on horſe-back from the waterſide to the land, though eight or ten miles diſtant. In this caſe the ſand coſts them in the whole about eight-pence a load. Where the lands lie very diſtant from the ſhore, and from all water-carriage, they beſtow very little of this *manure*, but they do not care to be any where wholly without it. In ſome of theſe places they lay twenty load on an acre, and find a proportionable advantage from it. Where much ſand is uſed, the corn is large and plentiful, and the ſtraw little. Hence has grown the old Corniſh phraſe of *a buſhel of corn to a peck of ſtraw*; which is not miraculous in a place where the ears of barley are frequently found as long or longer than the ſtalks they grow on.

Where little of this ſand is uſed, there is generally a great deal of ſtraw, and but little and hungry ears of ſmall grain. After the corn is taken off, the graſs that naturally comes up is a white clover; and where the land is any thing deep, a red kind comes up among it. This is uſually but ſhort the firſt year, but it grows thick, and affords good feeding for the cattle; and they are found to thrive the better, and give better milk than when they are fed on the high graſs, which generally ſucceeds where there has been leſs ſand uſed.

Another great advantage of the lands where much ſand is uſed, is, that no ſnow lies upon them; there is a continual winter-ſpring, and an early harveſt, uſually ſix weeks before the neighbouring lands that do not uſe it in proper quantities; ſo that all the expence of procuring it in quantities, is many ways amply repaid to the farmers.

We have about Erith, and many other places, the ſame ſort of ſand in great abundance in the Thames, that is uſed with this great advantage in Cornwall; and if it ſhould be found on trial to anſwer as well, probably there would be found few places where this river would not afford it at ſome depth, or in ſome part of its bed. The coral-ſand of Falmouth is dredged up from under about a foot thickneſs of the ooze; and perhaps in the Thames, where the bottom ſeems of another nature, the ſame ſand, or ſome of equal efficacy, may be found underneath. The ſand taken up out of the Thames at Erith, is uſed by the brick-makers, and they obſerve that the graſs always grows particularly freſh and ſtrong about the edges of their heaps of it, and that clover naturally grows there among other graſs. Phil. Tranſ. N° 113.

Sea-ſand, Dr. Berry obſerves, quickens dead land; ſo that what would otherwiſe be the barreneſt part of that country, is now the richeſt. Sea-ſalt, he obſerves, is too ſtrong and active of itſelf, and that it does beſt when mingled with loam. Glauber orders the mixture to be made up and burnt like bricks, and then applied.

In ſome countries they burn the ſurface of their heathy ground, inſtead of *manuring* it: this others think but all huſbandry, inaſmuch as it impoveriſhes it; and, by deſtroying the ſap of the earth, and roots of the graſs, and other vegetables, renders it uſeleſs for ſeveral years after the third, when it is plowed. See BURNING *of land*.

Dr. Jackſon obſerves, that all the ground about Nantwich, where ſalt or brine is ſpilt, is, when dug up, an excellent *manure* for grazing ground; and even bricks, thoroughly impregnated with it, diſſolve and fertilize land very conſiderably.

Dr. Beal ſays, it is a common obſervation of gardeners, and ſkilful huſbandmen, that froſt and ſnow improve and fertilize the land, both more ſpeedily, and more effectually, than the influence and warmth of the ſun.

Dr. Liſter tells us, that in ſome parts of the North-riding of Yorkſhire, the ſoil is ſandy, and the people manure it with clay. The ſoil, with any other *manure*, bears nothing but rye; but with clay it bears oats, barley, &c. This clay *manuring* will, by certain experience, laſt forty-five years in the ground, before it need be repeated. Burnt clay, in the quantity of about ten large cart-loads on a ſtatute acre, has been found an excellent *manure* for meadow, paſture, or corn: this may be burnt with bruſh-wood or furze; and has been found very uſeful for cloſe, compact ſoils, and wet cold land.

The bogs in Ireland are ſaid to be beſt improved by ſandy, or other gravelly *manures*.

In ſome counties of England, particularly in Oxfordſhire, they uſe, by way of *manure* for ſome of their lands, the cuttings and chippings of ſtones in the quarries, which is ſuppoſed to enrich the land by means of a ſalt that the ſtone contains, which being diſſolved by the weather, is imbibed by the earth.

A new kind of *manure* has lately been introduced with conſiderable advantage; and that is the waſhings of a farm-yard, conſiſting of dung and water, reſerved for this purpoſe in reſervoirs or pools, into which they are ſuffered to drain. This has been ſucceſsfully tried on meadows and fields of wheat, and has been found to yield a conſiderable quantity of graſs and grain. It may be alſo laid to great advantage on land that is freſh ſown with barley, oats, or any other grain; but on graſs it ſhould be only laid in winter time, when the rains will waſh the ſalts off the blade; or in the ſpring, when the lands are laid up for hay; as the cattle will not feed on the graſs, while the dung or ſalt adheres to the blade. This dung-water ſhould likewiſe be carried on the land, not at a time when it rains, but in the dry weather, and at a time when the dung-water in the pools is of a deep brown colour, and ſtrongly impregnated with ſalt. By this means the land may be *manured* from time to time, and the pools kept almoſt empty for the reception of freſh matter every time it rains, and nothing will be loſt. For another uſe to which this dung-water may be applied, ſee POT-*aſhes*.

Oak-bark, after it has been uſed for the tanning of leather, when laid in a heap and rotted, is an excellent *manure*, eſpecially for ſtiff cold land; in which one load of this *manure* will improve the ground more, and laſt longer, than two loads of the richeſt dungs. When this *manure* is laid on graſs, it ſhould be done ſoon after Michaelmas, that the winter rains may waſh it into the ground; for if it is laid on in the ſpring, it will burn the graſs, and inſtead of improving it, will greatly injure it for that ſeaſon. When it is uſed for corn land, it ſhould be ſpread on the ſurface before the laſt ploughing, that it may be turned down for the fibres of the corn to reach it in the ſpring; for if it lies too near the ſurface, it will forward the growth of the corn in winter. Vegetables of moſt ſorts, as the weeds of ponds and ditches, laid up to rot before they begin to ſeed, and mixed with earth or mud, and alſo buck-wheat, vetches, ſpurry, lupines, &c. ploughed into the ground when they are full grown, greatly enrich land. The refuſe of kitchen gardens laid in heaps and rotted, and fern cut down green and tender, and ſuffered to rot, will afford an excellent *manure*. The aſhes of all kinds of vegetables ſpread on the land will much improve it: rotten wood and tan-duſt, when rotted, are a very good *manure* for ſtrong land; ſo are likewiſe bones, horns, and other parts of animals, and alſo decayed fiſh. It may be obſerved in general, that when dung or any other ſoft *manure* is uſed, it ſhould not be laid on the ground till the laſt time of ploughing, when it ſhould be buried as ſoon as poſſible, to prevent the evaporation of the ſalts.

MANUS, was anciently uſed for an oath, and for him that took it as a compurgator. And it often occurs in old records: *tertia quarto, &c.* manu *jurare*; that is, the party was to bring ſo many to ſwear with him that they believed what he vouched was true; and we read of a woman accuſed of adultery: *mulieri huic negativ purgatio facta* manu *extitit indicta*; i. e. *She was to vindicate her reputation upon the teſtimony of ſix compurgators.* Reg. Eccl. Chriſt. Cant. If a perſon ſwore alone, it was *pro-*

feria manus & pedes. The use of this word came probably from its being required at a person's hands to justify himself; or from laying the hand upon the New Testament, on taking the oath.

MANUS *Martis, in Botany*, a name given by some authors to the common cinquefoil, or *quinquefolium vulgare.*

MANUS *interfossi, in Anatomy.* See INTEROSSEI.

MANUSCRIPT, a book, or paper, written with the hand. By which it stands opposed to a printed book, or paper.

A *manuscript* is usually denoted by the two letters MS. and, in the plural, by MSS, or MMSS. What makes public libraries valuable, is the number of ancient *manuscripts* repositied in them. See ALEXANDRIAN, CAMBRIDGE, CLERMONT, COTTONIAN, HARLEIAN, VATICAN, &c.

MANWORTH, in *Old Law-Books*, denotes the price, or value, of a man's head.

In ancient times, every man, according to his degree, was rated at a certain price, according to which, satisfaction was made to his lord, if any one killed him.

MANZEL. See CARAVANSERA.

MAO, or MAU, in *Botany*, a name by which some authors have called the *mapou Indica*, or Indian MANGO-tree.

MAP, a plain figure, representing the surface of the earth, or a part thereof, according to the laws of perspective.

A *map* is a projection of the surface of the globe, or a part thereof, on a plain surface, representing the forms and dimensions of the several countries and rivers; with the situation of cities, mountains, and other places.

Maps are either *universal*, or *particular*.

MAPS, *universal*, are those which exhibit the whole surface of the earth, or the two hemispheres.

MAPS, *particular*, are those which exhibit some particular region, or part thereof.

Each kind are frequently called *geographical*, or *land-maps*, in contradistinction to *hydrographical*, or *sea-maps*, representing only the seas and sea-coasts; and properly called CHARTS.

There are three qualifications required in a *map*: 1. That all places have their just situation with regard to the chief circles of the earth, as the equator, parallels, meridians, &c. because on these depend many properties of regions, as well as celestial phænomena. 2. That the magnitudes of the several countries have the same proportion as on the surface of the earth. 3. That the several places have the *same* distances and situation with regard to each other, as on the earth itself.

For the foundation of MAPS, and the laws of projection, see PERSPECTIVE, and PROJECTION *of the Sphere.*—*The application thereof, in the construction of* MAPS, is as follows.

Construction of a MAP, *the eye being placed in the axis.*—Suppose, v. g. the northern hemisphere to be represented with the eye in a point of the axis, v. g. the south pole: for the plane, whereon the representation is to be made, we take the plane of the equator, and, from all the points of the surface of the northern hemisphere, conceive lines passing through the plane to the eye; which points, connected together, constitute the *map* required.

In this case, the equator will be the limit of the projection; the pole, the centre. The meridians will be right lines passing from the pole to the equator: the parallels of latitude, &c. circles concentric with the equator; and all the other circles, and arches of circles, as the horizon, vertical circles, &c. ecliptic, &c. conceived in that hemisphere, will be ellipses, or arches of ellipses.

The better to apprehend the projection of the circles on the plane, conceive a radiant cone, whose vertex is the eye, its base the circle to be represented, and its sides the rays passing between the circle and the eye. Suppose this cone cut by the plane, it is obvious, that, according to the various position of the cone, there will be a different section, and consequently a different line of representation.

For the application of this theorem in practice.——In a plane, v. g. a paper, take the middle point P (*Vide Geography, fig.* 30) for the pole; and from this, as a centre, describe a circle, of the intended bigness of your *map*, to represent the equator. These two may be pitched on at pleasure, and from these all the other points and circles are to be determined. Divide the equator into 360°, and drawing right lines from the centre to the beginning of each degree, these will be meridians; whereof that drawn to the beginning of the first degree, we suppose the first meridian.

For the parallels.—There are four quadrants of the equator; the first, 0, 90; the second 90, 180; the third, 180, 270; the fourth, 270, 0; which for the better distinction, we will note with the letters A B, B C, C D, D E. Taking one of these, v. g. B C, from the several degrees thereof, as also from 23° 30', and 66° 30' thereof, draw occult right lines to the point D, marking where those lines cut the semidiameter B P C; and from P, as centre, describe arches passing through the several points in P C.——These arches will be parallels of latitude. The parallel at 23° 30', will be the tropic of Cancer, and that at 66° 30', the arctic circle. The meridians and parallels thus described, from a table of longitudes and latitudes, lay down the places; reckoning the longitude of each place on the equator, commencing at the first meridian, and proceeding to the meridian of the place; and for the latitude of the place choosing a parallel of the same latitude: the point wherein this meridian and parallel intersect, represents the place; and in the same manner all the other places may be determined, till the *map* be complete.

For the ecliptic, half of which comes in this hemisphere; we have observed, that it makes an ellipsis; so that the points through which it passes are to be found. The first point, or that wherein the ecliptic cuts the equator, is the same with that wherein the first meridian cuts the equator, which is therefore distinguished by the sign of Aries: the last point of this half ellipsis, or the other intersection of the equator, and ecliptic, viz. the end of Virgo, will be in the opposite point of the equator, viz. at 180°. The middle point of the ellipsis is that wherein the meridian 90 cuts the tropic of Cancer. Thus we have three points of the ecliptic determined: for the rest; viz. for 1° and 15° of Taurus, 1° and 15° of Gemini, 1° of Leo, 1° of Virgo; the declinations of those points from the equator must be taken from a table, and set off in the *map*. See DECLINATION, &c.

Thus where the meridian of 13° cuts the parallel of 5°, that point will be 15 degrees of *Aries*. Where the meridian 27° cuts the parallel 11½, will be the first degree of Taurus; and so of the rest. These points, being all joined by a curve line, will be a portion of an ellipsis representing the ecliptic.

Maps of this projection have the first qualification above required; but they are defective in the second: the surface being stretched farther, as it approaches nearer the equator. For the third, they are still farther erroneous. By this method may almost the whole earth be represented in one *map*, placing the eye, v. g. in the antarctic pole, and assuming for the plane of projection that of some circle near it, v. g. the antarctic circle. Nothing is here required besides the former projection, but to continue the meridian, draw parallels on the other side of the equator, and complete the ecliptic; but this distorts too much for practice.

This projection is of all others the easiest: but that, where the eye is placed in the plane of the equator, is preferred for use. It is, in effect, of the latter kind that *maps* are ordinarily made. The former are added to them, in small, by way of supplement, to represent the intermediate spaces left between the two hemispheres.—Farther, as the situation of the ecliptic, with regard to the earth, is continually changing; strictly speaking, it has no place on the earth's surface: but is used to be represented according to its situation some certain moment; viz. so as the beginning of Aries and Libra may be in the intersections of the first meridian and equator.

Construction of MAPS, *with the eye in the plane of the equator.*—This method of projection though more difficult, is yet much juster, more natural, and more commodious, than the former. To conceive it, we suppose the surface of the earth cut into two hemispheres by the entire periphery of the first meridian, each of which hemispheres we represent in a distinct *map*. The eye is placed in the point of the equator 90° distant from the first meridian: and for the transparent plane, wherein the representation is to be, we take the plane of the first meridian. In this projection, the equator is a right line, and the meridian 90° distant from the first, is also a right line; but the other meridians, and all the parallels of the equator, are arches of circles, and the ecliptic is an ellipsis.

The method is thus. From a point E, as a centre (*fig.* 5.), describe a circle according to the intended bigness of the *map*. This represents the first meridian, and its opposite; for, drawing the diameter B D, there arise two semicircles, the one whereof B A D is the first meridian, the other B C D its opposite, or the meridian of 180°. This diameter B D represents the meridian of 90 degrees, wherein the point B is the arctic pole, and the point D the antarctic. The diameter A C, perpendicular to that B D, is the equator. Divide the quadrants A B, B C, C D, D A, each into 90 degrees; and to find the arches of the meridians and parallels, proceed thus: divide the equator into its degrees; viz. 180 (as being indeed only half the equator); through these several divisions, and the two poles, describe arches of circles, representing meridians, as B 1 D, B 2 D, &c.—How to find centres for describing those arches, see under the word CIRCLE.

Indeed,

Indeed, the operation will be both more eaſy and accurate, if performed by a canon of tangents.

To deſcribe the parallels, the meridian B D muſt be in like manner divided into 180 degrees; then through each of theſe diviſions, and the correſponding diviſions of the quadrants A B, C B, deſcribe arches of circles. Thus ſhall we have parallels of all degrees, with tropics, polars, and meridians.

The ecliptic may be deſigned two ways; for its ſituation over the earth may either be ſuch, as that its interſection with the equator may be over the place A; in which caſe the projection of its ſemicircles, from the firſt degree of Cancer, to the firſt of Capricorn, will be a ſtrait line, to be determined by numbering 23° 30′ from A towards B, and from the extreme of that numeration drawing a diameter through E; which line will be half the ecliptic in this ſituation, and may be divided, as before, into degrees, to which the numbers, ſigns, *&c.* are to be affixed. But if the ecliptic be ſo placed, as that its interſection with the equator is over the place A, in the firſt meridian, its projection in that caſe will be a ſegment of an ellipſis; whereof two of the points are A, C; a third that wherein the meridian 90 cuts the tropic of Cancer. The other points muſt be determined in the manner laid down above; viz. by taking the declinations and right aſcenſions of 15° of Aries, 1° of Taurus, 15° of Gemini, &c. For where the parallels, according to their ſeveral degrees of declination, cut the meridians, taken according to the ſeveral right aſcenſions, thoſe points of interſection are the points of the 15° of Aries, &c. A curve line therefore being drawn, theſe will give the projection of the ecliptic.

Nothing then remains to complete the *map*, but to take the longitudes and latitudes of places from a table; and to ſet them off on the *map*; as was directed under the former method.

In this projection the whole ſurface of the earth may be repreſented in one *map*; if inſtead of the plane of the firſt meridian, ſome other plane parallel to it, but very near the eye, be taken; for by this means the entire parallels and meridians will be deſcribed. But as this diſtorts the face of the earth too much, it is ſeldom uſed; and we rather make the two hemiſpheres in two diſtinct tables.

One great advantage in this projection is, that it repreſents the longitudes and latitudes of places, their diſtance from the pole and from the equator, almoſt the ſame as they really are on the earth. Its inconveniencies are, that it makes the degrees of the equator unequal; being the greater as they are nearer the firſt meridian D A B, or its oppoſite B C D; and for this reaſon equal tracts of the earth are repreſented unequal; which defect may be in ſome meaſure remedied, by removing the eye far from the earth. And, laſtly, the diſtances of places, and ſituation, with regard to each other, cannot be well determined in *maps* of this projection.

Conſtruction of MAPS *on the plane of the horizon*, or wherein any given place ſhall be the centre, or middle. Suppoſe, for inſtance, it is deſired to have London the centre of the *map*. Its latitude we will ſuppoſe to be 51 degrees, 32 minutes. The eye is placed in the nadir. The tranſparent table is the plane of the horizon, or ſome other plane, if it is deſired to repreſent more than an hemiſphere. Take then the point E (*fig.* 6.) for London; and from this, as a centre, deſcribe the circle A B C D to repreſent the horizon, which you are then to divide into four quadrants, and each of theſe into 90 degrees. Let the diameter B D be the meridian, B the northern quarter, D the ſouthern; the line of equinoctial eaſt and weſt ſhews the firſt vertical, A the weſt, C the eaſt, or a place of 90 degrees from the zenith in the firſt vertical. All the verticals are repreſented by right lines drawn from the centre E to the ſeveral degrees of the horizon. Divide B D into 180 degrees, as in the former methods; the point in E B, repreſenting 51 deg. 32 min. of the arch B C, will be the projection of the north pole, which note with the letter P. The point in E D, repreſenting 51 deg. 32 min. of the arch D C (reckoning from C towards D), will be the projection of the interſection of the equator and meridian of London, which note with the letter Q; and from this, towards P, write the numbers of the degrees, 1, 2, 3, &c. As alſo from Q towards D, and from B towards P; viz. 51, 52, 53, &c. Then taking the correſponding points of equal degrees; viz. 99 and 99, 88 and 88, &c. about thoſe, as diameters, deſcribe circles, which will repreſent parallels, or circles of latitude, with the equators, tropics, and polar circles. For the meridians, firſt deſcribe a circle through the three points A, P, C. This will repreſent the meridian 90 degrees from London. Let its centre be M in B D (continuing to the point N, which repreſents the ſouth pole), P N being the diameter; through M draw a parallel to A C; viz. F H, continued each way to K and L. Divide the circle P H N F into 360 degrees, and from the point P draw right lines to the ſeveral degrees, cutting K F H L; through the ſeveral points of interſection, and the two poles P, N, as through three given points, deſcribe circles repreſenting all the meridians. The centres for deſcribing the arches will be in the ſame K L, as being the ſame that are found by the former interſection; but are to be taken with this caution, that for the meridian next B D N towards A, the moſt remote centre towards L, be taken for the ſecond, the ſecond from this, &c. The circles of longitude and latitude thus drawn, inſert the places from a table, as has been directed.

Conſtruction of MAPS *on the plane of the meridian.*——This projection is taught by Ptolemy, and recommended by him as proper for that part of the earth then known. In this, the equator and parallels are arches of circles, and the meridians arches of ellipſes; the eye hanging over the plane of that meridian which paſſes over the middle of the inhabited world. But in regard the deſcription of theſe ellipſes is ſomewhat perplexing, and becauſe this method ſeems calculated only for a part of the earth, it is not now uſed.

There is a ſecond method ſomething akin to it, which repreſents the circles of latitude by right lines, and the meridians by arches of ellipſes; as muſt be the caſe, if lines be conceived to fall from the ſeveral points of each hemiſphere, perpendicularly on the plane of the firſt meridian, and the eye be ſuppoſed at an infinite diſtance from the earth; ſo that all the rays emitted from the places of the earth to it, may be accounted parallels, as well as perpendiculars to the plane of the firſt meridian.

MAPS, *general*, are the hemiſpheres; which are for the moſt part conſtructed ſtereographically.

MAPS, *rectilinear*, are thoſe wherein both the meridians and parallels are repreſented by right lines, which by the laws of perſpective is impoſſible; in regard there can no ſuch poſition be aſſigned the eye and the plane, as that the circles both of longitude and latitude ſhall be right lines.

In the firſt method above laid down, the meridians are right lines, but the parallels are circles: in the fifth, the parallels are right lines, and the meridians ellipſes. In all other perſpective methods, both kinds of circles are curve: one method indeed muſt be excepted, wherein the meridians are right lines, and the parallels hyperbolas; as when the eye is placed in the centre of the earth, and the plane, through which it is viewed, is parallel to the firſt meridian: but this method is rather pretty than uſeful.

Rectilinear maps are chiefly uſed in navigation, to facilitate the eſtimation of the ſhip's way. See CHART.

Conſtruction of particular MAPS.——*Particular Maps of large tracts*, as Europe, Aſia, Africa, and America, are projected after the ſame manner as general ones; only let it be obſerved, that for different parts, different methods may be choſen. Africa and America, for inſtance, in regard the equator paſſes through them, cannot be conveniently projected by the firſt method, but much better by the ſecond. Europe and Aſia are moſt conveniently repreſented by the third; and the polar parts, or the frigid zones by the firſt.

To begin then, draw a right line on your plane or paper, for the meridian of the plane over which the eye is conceived to hang, and divide it into degrees, as before, which will be the degrees of latitude. Then from the tables take the latitude of the two parallels, which terminate each extreme. The degrees of theſe latitudes are to be noted in the meridian; and through them draw perpendiculars, bounding the *map* towards north and ſouth. This done, meridians and parallels are to be drawn to the ſeveral degrees, and the places to be inſerted, till the *map* is complete.

For particular MAPS *of leſs extent.*——In *maps* of ſmaller portions of the earth, the geographers take another method. Firſt, a tranſverſe line is drawn at the bottom of the plane, to repreſent the latitude, wherein the ſouthermoſt part of the country, to be exhibited, terminates. In this line, ſo many equal parts are taken, as that country is extended in longitude. On the middle of this ſame line erect a perpendicular, having ſo many parts as there are degrees of latitude between the northern and ſouthern limits of the country. How big theſe parts are to be, may be determined by the proportion of a degree of a great circle to a degree of the parallel repreſented by the tranſverſe line at bottom. Through the other extreme of this perpendicular, draw another perpendicular, or a parallel to the line at bottom, in which are to be ſeen as many degrees of longitude, as in the lower line, and theſe too equal to each other, unleſs the latitudes happen to be remote from each other, or from the equa-

ter. But if the loweſt parallel be at a conſiderable diſtance from the equinoctial, or if the latitude of the northern limit go much beyond that of the ſouthern; the parts or degrees of the upper line muſt not be equal to thoſe of the lower, but leſs, and that according to the proportion which a degree of the more northern parallel has to a degree of the more ſouthern. After parts have been thus determined, both on the upper and lower line, for the degrees of longitude, right lines muſt be drawn through the beginning and end of the ſame number, which lines repreſent the meridians; then through the ſeveral degrees of the perpendicular erected on the middle of the firſt tranſverſe line, draw lines parallel to that tranſverſe line: theſe will repreſent parallels of latitude. Laſtly, at the points wherein the meridians of longitude and the parallels of latitude concur, infert the places from a table, as before directed. But though there are various modes of conſtructing theſe *maps*, they are, in general defective, ſo as not to be applied with accuracy and facility to the purpoſes intended in determining the courſes or bearings of places, their diſtances, or both.

For MAPS *of provinces*, or ſmall tracts, as pariſhes, manors, *&c.* we uſe another method, more ſure and accurate than any of the former. In this, the angles of poſition, or the bearings of the ſeveral places, with regard to one another, are determined by proper inſtruments, and tranſferred to paper. This conſtitutes an art apart, called SURVEYING.

MAPS, *the uſe of*, is obvious from their conſtruction. The degrees of the meridians and parallels ſhew the longitudes and latitudes of places, and the ſcale of miles annexed, their diſtances; the ſituation of places, with regard to each other, as well as to the cardinal points, appears by inſpection, the top of the *map* being always the north, the bottom the ſouth, the right hand the eaſt, and the left the weſt; unleſs the compaſs uſually annexed ſhew the contrary.

MAPLE, *acer*, in *Botany*, a genus of the *polygamia monoecia* claſs. Its characters are theſe: it hath hermaphrodite and male flowers on the ſame tree; the hermaphrodite flowers have an epalement cut into five parts; the corolla has five petals, eight ſtamina, and one pointal; the flowers are ſucceeded by two winged capſules, joined at their baſe, each including a ſingle ſeed; the male flowers have the ſame characters, but have no ſtyle, ſo are not fruitful. There are twelve ſpecies.

The ſeveral ſorts of this tree are eaſily propagated by ſowing the ſeeds, ſoon after they are ripe, in an open bed of common earth, covering them about half an inch thick with light earth: the ſpring following they will appear above ground, and will grow to a foot high the firſt ſummer. About the Michaelmas following they are to be removed, and planted in rows at three feet diſtance, and two feet diſtance in the rows, in which place they may remain three or four years; and at that time they will be large enough to plant out into the places they are to ſtand in.

The great *maple* commonly, though very improperly called the *ſycamore-tree*, is raiſed very eaſily in this manner, and is a very valuable tree for gentlemen who have plantations near the ſea, as it bears the ſpray of the ſalt-water very well, and will defend all the reſt if planted behind them. The Norway *maple* will alſo anſwer this purpoſe. The timber of the common *maple* is far ſuperior to the beech for all uſes of the turner; and when it abounds with knots is highly eſteemed by the joiners, for inlaying, *&c.* On account of the lightneſs of the wood, it is often employed by the muſical inſtrument makers; and, on account of its whiteneſs, it was formerly much uſed for tables, *&c.*

The Virginian kinds may be propagated, either thus by ſowing, or by laying down the young branches early in the ſpring, giving them a little ſlit at a joint, by which means they will take ſufficient root in a twelve-month to be tranſplanted out. Miller.

MAPLE *ſugar*, a kind of ſugar made from a ſpecies of the *maple*, called by monſieur Sarazin, *acer Canadenſe ſaccariferum fructu minori*. Mr. Sarazin, a phyſician at Quebec, intending to inquire at large into the nature of this ſort of ſugar, obſerved that there were four ſpecies of *maple* common in the places where it was made, all which he ſent over to the garden at Paris. One of theſe ſpecies, diſtinguiſhed from the reſt by the ſmallneſs of its fruit, is called the ſugar-*maple*; this grows to ſixty or eighty feet high, and its juice, which is very redundant in the months of April and May, is eaſily made into a very good ſugar. They procure this juice from the tree by piercing a hole into the trunk, and placing veſſels to receive it. This juice, being evaporated, yields about one twentieth part of its own weight in pure ſugar. A middle-ſized tree, of this ſpecies, will yield ſixty or eighty pints of this juice, without receiving any damage as to its growth; and much more than this may be drawn, but then the tree manifeſtly ſuffers for it.

Mr. Sarazin obſerved ſome very remarkable particulars in regard to the ſaccharine quality of this juice, without which it never had it in the proper perfection. 1. The tree at the time that the juice is drawn out, muſt have its bottom covered with ſnow; and if it is not naturally ſo, the Indians know ſo well the neceſſity of it, that they always bring ſnow from elſewhere, and heap it up round it. 2. This ſnow muſt afterwards be melted away by the ſun-ſhine, not gradually thawed by a warm air. 3. There muſt have been a froſty night before the opening the hole in the trunk. It is remarkable that theſe circumſtances are ſuch as cuſtom and experience alone could have pointed out, ſince they ſeem contrary to reaſon; and ſo it is in many of the operations in chemiſtry, where the moſt ſeemingly rational means fail, while thoſe which ſhould ſeem quite contradictory to reaſon ſucceed. It is obſerved, that if the juice of the *maple* be not in a condition to become ſaccharine while the ſnow lies at its root unthawed, that it almoſt immediately becomes ſo on the melting of the ſnow, and its penetrating into the earth. Mem. Acad. Par. 1730.

The juice of the *maple*, unboiled, has been drank as an antiſcorbutic: the ſugar and molaſſes, which are ſaid to be leſs ſweet than thoſe extracted from the ſugar-cane, are ſuppoſed to be more medicinal in diſorders of the breaſt.

MAPPARIUS, an officer among the Romans, who in the public games, as thoſe of the circus, and of the gladiators, gave the ſignal for their beginning, by throwing an handkerchief (*mappa*) which he had before received from the emperor, conſul, prætor, or other ſupreme officer then preſent.

MARACANA, in *Ornithology*, the name of a bird of the parrot-kind, but larger than the common ſpecies, and covered all over with bluiſh-grey feathers. It is very common in the Braſils.

The natives alſo call another bird of the parrot-kind by the ſame name, which is of a fine green on the head, neck, and back, but the crown of the head looks a little bluiſh; the tail is mixed of red and a bluiſh-green; the under part being red, as is alſo the under part of the wings; at the origin of each wing, it has alſo a red ſpot; and on each ſide of the head a brown one. The noiſe this bird makes, is oe, oe, oe.

MARACOCK, in *Botany*; ſee PASSION-*flower*.

MARANA, in *Botany*, a name by which ſome authors have called the ſtramonium, or thorn-apple, a plant kept in ſome gardens.

MARANTA, in *Botany*; ſee *Indian* ARROW-*root*.

MARASMUS, Μαρασμος, derived from the verb μαραινω, *to waſte*, in *Medicine*, an extreme waſting, or conſumption of the whole body.

A *maraſmus* is an extreme degree of atrophy; as an hectic fever is an extreme degree of *maraſmus*.

MARAUDING, from the French, *maraude*, in *Military Language*, is a term applied to a party of ſoldiers, who, without any order, go into the neighbouring houſes or villages, when the army is either in camp or garriſon, to plunder and deſtroy, *&c.*

MARAVEDI, a little Spaniſh copper COIN, worth ſomewhat more than a French denier, or half a farthing Engliſh.

The word is Arabic, and took its riſe from the *Almoravides*, a dynaſty of Moors, who, paſſing out of Africa into Spain, impoſed their own name on this coin, which by corruption was afterwards changed into *maravedi*.—Mention is made of it in the Decretals, as well as in other Latin writers, under the name of *maravitinus*.

The Spaniards always count by *maravedis*, both in commerce and in their finances, though the coin itſelf is no longer current among them. Sixty-three *maravedis* are equivalent to a rial of ſilver; ſo that the piſtler, or piece of eight rials, contains five hundred and four; and the piſtole of four pieces of eight, two thouſand and ſixteen *maravedis*.

This ſmallneſs of the coin produces vaſt numbers in the Spaniſh accounts and calculations; inſomuch that a ſtranger or correſpondent would think himſelf indebted ſeveral millions for a commodity that coſt but a few pounds.

In the laws of Spain, we meet with ſeveral kinds of *maravedis*; Alphonſine *maravedis*, white *maravedis*, *maravedis* of good money, *maravedis* Combrenſes, black *maravedis*, and old *maravedis*. When we find *maravedis* alone, and without any addition, it is to be underſtood of thoſe mentioned above. The reſt are different in value, fineneſs of metal, time, *&c.* Mariana aſſerts, that this coin is older than the Moors; that it came from the Goths; that it was anciently equal to a third

part of the rial, and consequently of twelve times the value of the present *maravedi*. Under Alphonsus XI. the *maravedi* was seventeen times; under Henry II. ten times; and under Henry III. five times; and under John II. two times and an half the value of the present *maravedi*.

MARBASIS, in *Botany*, a name given by some to a kind of plant which they say climbed up trees, and there hung down from their branches in form of long jointed and naked filaments.

The word seems to be only a corruption of the word *ambasis* of Pliny, which he calls also EPIMEDIA, and gives the same character to.

The *marbasis* of the ancients seems to mean our GENEA.

MARBLE, MARMOR, a precious kind of stone, found in great masses, and dug out of pits or quarries; being of a constitution to hand and compact, and a grain so fine, as readily to take a beautiful polish: much used in ornaments of buildings, as columns, statues, altars, tombs, chimney-pieces, tables, and the like.

The word comes from the French *marbre*, and that from the Latin *marmor*, of the Greek μαρμαιρω, *to shine*, or *glitter*.

Aforisis make a peculiar genus of fossils, the characters of which are these: they are bright and beautiful stones, composed of small separate concretions, moderately hard, not giving fire with steel, and fermenting with and soluble in acid menstrua, and calcining in a slight fire.

There is an infinite number of different kinds of *marble*, and they are usually denominated, either from their colour, their age, their country, their grain, their degree of hardness, their weight, or their defects: some are of one simple colour, as white or black; others streaked or variegated with stains, clouds, waves, veins, &c. but almost all are opake, excepting the white, which, when cut in thin slices, becomes transparent.

By these characters the *marbles*, properly so called, are distinguished from the PORPHYRITES and GRANITES, which are properly stones of a very different kind, being composed of very different particles, and exhibiting contrary properties. Sir William Hamilton observes, that many variegated *marbles* and precious stones are the produce of volcanos. Phil. Trans. vol. lviii. p. 12.

MARBLES, *ancient*, are those, whose quarries are lost, or inaccessible to us, and whereof we have only some wrought pieces remaining.

MARBLES, *modern*, are those, whose quarries are still open, and out of which blocks continue to be dug.

The *marbles* are a genus of bodies supposed to be very well known, because seen every day, and in common use; but they are in reality, notwithstanding that, perhaps one of the most confused, and least understood of all the bodies of this kind. The people who work upon them, know nothing more of them than that this will, and that will not receive a polish in a high degree; and that this may be worked, and another refuses the tools; and the men of science have considered them even less than these.

The *marbles* were one of those sets of bodies that the ancients were well acquainted with, and it may give no small light into their true history, to pay a strict attention to what they have left us concerning them, and inquire which of those in use among them are known to us, and which lost, and by what names we now call their *Augusteum*, *Tiberianum*, *Lucullæum*, and the rest. This may serve to give a certain account of what they knew, and perhaps may point out to the builder, statuary, and physician, some new uses, at least new to us, of many of them. Hill's Hist. of Foss. p. 361.

Mr. Mendes da Costa, in his History of Fossils, has arranged the different species of *marbles* into four general divisions. The first division comprehends those of one plain uniform colour, the kinds of which are easily distinguished: and this division includes the black, white, ash and grey, brown and red, yellow, blue, and green *marbles*. The second division contains those *marbles*, which are only of two colours: and in this division he has first placed the *marbles*, whose chief or ground colour is black, variegated with the other colours; as black with white, black with ash and grey, black with brown and red, with yellow, with blue, and with green, all in their due order: and in the same manner he has proceeded with all the other chief colours, e. g. white with black, with grey, brown, red, &c. ash and grey *marbles*, variegated with other colours; brown and red *marbles*, variegated with other colours, &c. His third division comprehends those *marbles*, that are variegated with many colours. And his fourth division includes those that contain shells, corals, and other extraneous bodies. At the end of each section he has given a list or catalogue of all the *marbles* of these colours, slightly mentioned by authors, and which seem of different species from those which he has described. By this regular arrangement of colours, which he has pursued through the whole genus, he has made it easy for his readers readily to find whether a *marble*, as far as his knowledge extends, has been hitherto described or not, or whether there are any which approach it in colour, on only reviewing the single section where those colours are arranged.

MARBLE, *African*, has a black ground, diversified with moderately large white spots, which do not communicate with each other: they are sometimes also tinged a little reddish, and the *marble* has some marcasitical grains intermixed with it. It admits a good polish, and will not strike fire with steel.

MARBLE, *Alabandinum* MARMOR, a name given by the ancients to a very remarkably glofsy species of black marble, dug near a city of that name in Caria, and much used in building among the Romans.

MARBLE, *Augustan*. See *Egyptian* MARBLE.

MARBLE of *Antwerpen*, in France, is of a pale red, mingled with violet, green, and yellow.

MARBLE of *Brabanton*, in Hainault, is black veined with white.

MARBLE of *Breccia*, in Italy, is yellow, with spots of white.

MARBLE, *Brocatello*, is mingled with little shades of Isabella, yellow, pale, and grey. It comes from Tortosa in Spain, where it is dug out of an ancient quarry. There is also another kind of ancient *Brocatello* dug near Adrianople. There is also an Italian *marble*, called *Brocatello*, which is elegant and beautiful, of a fine bright yellow colour, thickly variegated with irregular veins and spots of purple, and spots or spaces of fine pellucid crystallized spar, and also of semipellucid spar: the polish is admirable, and equal to that of the finest agate; but its surface is not perfectly smooth, being generally somewhat flawed.

MARBLE, *Cavaggion*, is an Italian *marble*, so called from its flesh-like colour, exhibiting shades of a pale, whitish, and yellowish cast, and also of a rosy hue, stronger in some parts than others. It is capable of a very fine polish.

MARBLE of *Carrara*, on the coasts of Genoa, is very white, and fittest of all others for works of sculpture. See *Parian* MARBLE.

MARBLE, *Carystium* MARMOR, a name given by the ancients to a species of *marble*, dug in the island of that name, and much used in ornamenting the public buildings; it was of a beautiful green, deeper than the Thessalian and Augustan *marble*. We meet with it sometimes among ancient remains; and the Italian antiquaries particularly mean this, by a name also in use among us, and prostituted to every other species of green *marble*, the *verde antique*.

MARBLE of *Champagne* resembles the Brocatello, being mixed with blue, in round stains, like partridges eyes.

MARBLE, *Chernitian*. See CHERNITES and *Lydium* below.

MARBLE, *Chium* MARMOR, in the *Natural History of the Ancients*, the name of a black *marble*, called also the lapis obsidianus. It is very hard, and of a fine black: and beside the many uses which the antients put it to, is well known among our goldsmiths by the name of the touch-stone, most of them being furnished with nothing better for that purpose than a piece of this, though the basaltes, which might be had plentifully enough, is greatly preferable for those uses; any black *marble*, however, that is tolerably hard will do.

MARBLE, *Cipolino* or *Cipollin*, the true Egyptian *marble*, is of a sea-green colour, mixed with large waves or clouds of white or pale green. Scamozzi takes this to be the same with that which the ancients called *Augustum & Tiberium marmor*; because discovered in Egypt in the times of Augustus and Tiberius. This *marble* is dug in Italy, and is called *Cipollaccio*, from its leek-like colour: or, according to others, from its veins sometimes running within one another, like the coat of an onion. This is supposed to be the same with the *Carystium marmor* of the ancients.

MARBLE, *Corallitium* MARMOR, of the ancients, was found near the river Coralius, otherwise Sangarus, in Phrygia, and resembled ivory. It was probably the same with the CHERNITES.

MARBLE, *Corallitic*, in *Natural History*, the name given by authors to such *marbles* as have specimens of the marine corals, or bodies of that kind, immersed in them; as the sea-shells are buried in, and make a part of the body of others.

There are several species of *marble* subject to hold these bodies, but we have in England principally two in use, the one of a greyish black, the other of a fine deep jetty black.

The first is found in many parts of Derbyshire, and the corals it contains are of the porus kind, and of one of the

the moſt elegant ſpecies in the world; they are lodged in it at all angles, and in all directions, and are in general about an inch and half long, and three quarters of an inch broad, though ſome are much larger, and others ſmaller. They are compoſed of longitudinal plates, very fine and thin, and of a ſnow-white, ranged in diſtinct orders, and finely interſperſed at ſmall diſtances, with thin tranſverſe plates; the whole internal part of the coral being thus divided into a ſort of ſquare cells. This net-like diviſion runs through about three-fourths of the body, but the top has only the longitudinal plates without the tranſverſe ones. It is plain that theſe, before they were received into the bed of *marble*, had been ſuſtained in a fluid containing a very beautiful greyiſh-white ſpar, for the net-like plexus of the bed is full of this matter; but the open part at top having no plates for the retaining this matter, has remained empty till received into the *marble*, and is there found filled up with the common blackiſh matter of the reſt of the ſtratum. It is an extremely beautiful ſubſtance when poliſhed, and is uſed in many ornamental works. It is found in many parts of Derbyſhire, and in Wales.

The other, or black *coralloide marble*, is alſo a very beautiful ſpecies; it is a very cloſe compact ſubſtance, and of a fine even texture, very hard, of a deep jetty black, and capable of a high poliſh. It is elegantly variegated with fair and perfect ſpecimens of a coralloide pores, approaching to the nature of the former, but ſmaller and of a leſs elegant texture; and among theſe has uſually a great number of ſea-ſhells, both of the turbinated and bivalve kinds. Theſe are lodged in various directions, and all of them, the corals as well as the ſhells, are of a pure ſnow-white; and as the matter and texture of the others plainly ſhewed, that they had been filled with ſpar before they were immerſed into the bed of *marble*; theſe, on the other hand, retaining now no part of their original texture, though exactly their external figure, but being all made up of the ſame plain white ſpar, plainly ſhew that they were lodged in the *marble* empty, and in their own native ſtate; for the cavities both of the corals and ſhells are all nicely filled with the matter of the *marble*; but they have now no coralline nor teſtaceous matter about them, but in tract of time have plainly periſhed, and the cavities they left in the hard and ſmooth maſs of the *marble* have been nicely and finely filled up with this ſpar, which therefore now as perfectly repreſents their figures, as if themſelves were there. Hill's Hiſt. Foſſ. p. 473.

It is found in great plenty in many parts of Ireland, particularly about Kilkenny, and is brought in great quantities to London, and uſed about chimney-pieces, and other ornamental works, and is commonly known among artificers by the name of Kilkenny-*marble*.

MARBLE, *Derby*, among our artificers, a name given to a very beautiful ſpecies of *marble*, found in many parts of Derbyſhire, and frequently worked into chimney-pieces in London.

It is a very ſingular and beautiful ſpecies; its conſtituent matter is a pale, fine, whitiſh-brown *marble*, of a fine cloſe texture, and very bright and glittering hue. This is ſo full of entrochi, that they make more than half the ſubſtance of the maſs; and theſe cutting in different directions, and taking a fine poliſh, add greatly to the beauty of the whole, when wrought. Hill's Hiſt. of Foſſ. p. 479.

The various forms in which theſe bodies appear in the ſtone, when cut, might give a ſuſpicion that many of them were ſome other foſſil; but this is only owing to their lying in all directions in the maſs; but when nicely examined, the oddeſt of them will be found to be no other than what a ſingle common entrochus may be cut into. They are of all ſizes, from the thickneſs of a large pin, to half an inch or more.

MARBLE, *Docimenum* MARMOR. See DOCIMENUM.

MARBLE, *Egyptian*, a name given by our artificers to a very beautiful green-and-white *marble*, greatly in uſe among us, and brought in great quantities from Egypt, and other places. It was alſo in frequent uſe, and in great eſteem, among the Romans, who received it alſo from Egypt, and diſtinguiſhed, without ſufficient reaſon, two kinds of it, from the different diſpoſition and order of its variegations, and honoured them with the names of two of their emperors, in whoſe reigns they were firſt brought into uſe. Theſe were the *marmor Auguſteum* and *Tiberianum*. Thoſe pieces in which the variegations were waved and thrown into arches and circular figures, they called the *Auguſtan*, and thoſe which were marked with more diſtuſed and ſcattered veins, they called the *Tiberian*. Theſe were the whole differences between the two; and if we were to acknowledge different ſpecies from ſuch differences as theſe, we muſt allow almoſt as many different ſpecies as we can ſee blocks of *marble*.

This kind of *marble*, in all its appearances, is, though a very beautiful, yet a very rude, irregular, and various maſs. It is of a firm compact texture, and moderately heavy, and may be properly called a green *marble* variegated with white, for thoſe are its two conſpicuous colours; but it has theſe mixed in ſo great a variety as to afford lights and ſhades of a vaſt number of degrees of colours. It has beſides theſe, alſo many other variegations of a duſky colour approaching to black. It is very bright and glittering, when freſh broken, and variouſly ſo in its various parts. In the white parts it is brighteſt of all, and the other colours are more lucid as they are paler, or nearer approach to the white. It has, however, among its other particles, ſome of a very beautiful green ſoliaceous talc. The whole is capable of a good poliſh, and is common in tables, &c. in the houſes of the polite part of the world. Hill's Hiſt. Foſſ. p. 481.

MARBLE of *Dinan*, near Liege, is of a pure black, very beautiful, and very common.

MARBLE *fuſile*, a very common but very improper term uſed for the green or greeniſh grey *marble*, full of ſmall ſea ſhells, of which the ſlender pillars of our Gothic buildings are made. The two kinds of *marble* called by this general name are diſtinguiſhed by Dr. Hill, by the names of, 1. *marmor viridi-cinereum conchyliis frequenter aſperſum*; green *marble*, thick ſet with ſea ſhells: and, 2. *marmor cinereo-viride conchyliis paucioribus refertum*; greyiſh green *marble*, more thinly interſperſed with ſea ſhells. The firſt is moſt frequent in Italy, and is the *fuſile marble* of that part of the world: and the ſecond is dug in Derbyſhire, Dorſetſhire, Suſſex, and many other parts of England, and is what the pillars in our cathedrals are made of, and is conſequently the ſpecies called *fuſile marble* in England. Hill's Hiſt. of Foſſ. p. 470.

From the length and ſlenderneſs of thoſe columns it has been vulgarly ſuppoſed, that they were caſt in moulds, but reaſon and a knowledge of nature ſufficiently explode the conjecture, ſince we well know that *marble* will burn to lime inſtead of melting in the fire, and that the ſhells it contains muſt have been calcined to powder alſo, not having been found as they now are, if it were poſſible that *marble* could have been run.

We have in England, in many places, vaſt quarries of *marble*, all full of ſea ſhells, and theſe pillars have been all cut out of the *marble* of ſuch quarries. The ſhells it contains are of different kinds, ſome turbinated, and others bivalve, and of the tellina and pectunculus kind; and theſe being filled with a pure and white ſpar, give a fine variety to the whole *marble* when wrought.

MARBLE of *Gnacheret*, near Dinan, is of a reddiſh brown, with white ſpots and veins.

MARBLE, *Herboſum* MARMOR. See HERBOSUM.

MARBLE, *Hymettium* MARMOR, a name given by many of the old writers to a ſort of white *marble*, ſometimes variegated with other colours, but remarkable for its great gloſs, and the high poliſh it was capable of: this was greatly uſed among the Romans for the columns of their public buildings.

MARBLE, *Jaſſenſe* MARMOR, a name given by the ancients to a very beautiful ſpecies of *marble*. It was remarkably hard, capable of a very fine poliſh, and was of a beautiful red approaching to what we call blood-colour, elegantly variegated with veins and clouds of a bluiſh white.

MARBLE, *Italian*, a name uſed by our artificers for two or three of the variegated *marbles*, of great beauty, commonly wrought into chimney-pieces and other ornamental things.

The name is a very indeterminate one, many of the plain, as well as the variegated *marbles*, being from Italy, and indeed many of the variegated ones which have other peculiar names, though known to be brought from Italy, being never called by it; ſo that if any meaning is to be fixed to the word at all, it muſt be ſaid to mean ſuch of the variegated foreign *marbles* as are not diſtinguiſhed by any other peculiar title.

The artificers chiefly comprehend, however, under this name, five ſpecies: 1. The common purple and white variegated one. This is a very beautiful maſs, and in general moderately fine, but of very different degrees of purity and hardneſs in its different parts. It is, in general, white, veined, ſpotted, and variegated with purple; but, in ſome blocks, the purple makes the ground, and the white the variegation, and in moſt it is variegated beſide with ſpots of pale red and brown, ſometimes of yellow, and ſometimes of a greeniſh brown. This is the moſt common *marble* of Italy. 2. A brown and white friable one. This emulates the figure of the former in the diſpoſitions of its veins, but is only of a white ground, veined with a duſky brown, and is the ſofteſt of all the *marbles*. The white part of it appears compoſed of granules, looſely hung together, and, on a near view, much reſembles loaf-ſugar of the fineſt kind, an

and if scraped with a knife readily falls away in large granules like sand. This is also common in Italy. 3. A hard variegated blue and white *marble*. This is a somewhat coarse *marble*, of a rough grain, and of a loose shattery texture, and is variegated with a dusky blue, and a pearl colour or bluish white, each making usually an equal part of the mass. This is very common in Italy, and great quantities of it are imported hither. 4. A fine black and yellow one, the yellow veins appearing like streaks of gold. This is much esteemed and used. And, 5. A purple and yellow one, of great beauty, and very great price. This last of late been sold at a higher rate than ordinary. Hill's Hist. of Foss. p. 476, 477, 478.

MARBLE, *Kilkenny*. See *Cipollinis* MARBLE *fasperis*.

MARBLE, *Lacedæmonium* MARMOR. See LACEDÆMONIUM.

MARBLE of *Languedoc* is of a vivid red, with large white veins or flains, and is very common: there is also, whole white boulders pretty much on the blue; but this is of less value.

MARBLE of *Lisnoe*, in Maine, has a black ground, with little narrow veins of white: there is another kind of it, red with veins of dirty white.

MARBLE, *Lucullum* MARMOR. See LECHEUM.

MARBLE, *Lucullæum* MARMOR. See LUCULLEUM.

MARBLE, *Lumachella*, is so called, because mingled with spots, brown, black, and white, formed of periwinkle-shells petrified in it. This is ancient, and its quarry is loft.

MARBLE, *Lunense* MARMOR. See LUNENSE.

MARBLE, *Lychnites* MARMOR, in the *Natural Hiftory of the Ancients*, a name given by many to the *Parian* MARBLE, of which the fineft ftatues among the ancients were formed.

Varro imagines that it had this name from λυχνος, a *lamp*, becaufe, as he fuppofes, it was cut by candle-light in the quarries; but it feems much more probable, that it had it from the verb λευκαινω, *to fhine*, or *be bright*, from its remarkable fplendor.

MARBLE, *Lydium* MARMOR, a name given by the ancients, not only to the black *marble*, ufed as a touch-ftone for the trial of gold, See but alfo to another very different one brought from the fame place; the ground of which was red, and the veins, which were very numerous, and ufually beautifully difpofed, were white. This was an elegant *marble*, and was ufed in moft of the public buildings for pavement, and covering the inner fide of the walls.

MARBLE, *Lygdinum* MARMOR, in the *Natural Hiftory of the Ancients*, the name of a fort of alabafter, which may properly be diftinguifhed by the name of the white kind. It is a very elegant and beautiful ftone, of a whitenefs greatly fuperior both to the Parian *marble* fo famed of old, and to the Carrara of the moderns; and in fplendor greatly furpaffing all the *marbles* clafs. It is of a loofe, rough, and fhattery texture; and when broken, is feen to be compofed of a multitude of *broad*, *flat*, and large particles, of a very bright, and perfectly white *marble* tone. It is always found pure and free from veins, and is moderately hard in the mafs, but eafily crumbles in fmall pieces; it is however eafily cut, and takes a very high and elegant polifh. It is found in immenfe ftrata in Egypt and Arabia, and is not uncommon in Italy. It is feldom found in large blocks, the ftrata being, from the nature of the ftone, fubject to very frequent perpendicular fiffures. And the ancients give us the fame account of it, and ufed it for making vafes and other ornamental furniture. Hill's Hift. of Foff. p. 492.

MARBLE of *Margelia*, in the Milanefe, has a white ground, with brownifh veins, refembling the colour of iron-rufl. This is very common, and extremely hard.

MARBLE, *Melleum* MARMOR, in *Natural Hiftory*, the name of a plain yellow *marble*, refembling honey or pure Venice turpentine in colour, and thence called by Caffiodorus, *marmor fpecie mellis aut ftrobinthino*. It is a very beautiful *marble*, though but of one plain colour, and it is a wonder it is not more imported into England. It is of a very agreeable colour, and is confiderably hard, and capable of a very elegant polifh. It is dug in many parts of Italy, and is greatly efteemed there. It never has any veins. Hill's Hift. of Foff. p. 464.

MARBLE of *Namur* is a fpecies of black *marble*, very hard and capable of a good polifh, without any variegations of other colours. It is dug near the city of Namur, and is common in Italy, France, and Germany. It is chiefly ufed for monuments, tomb-ftones, and fuch purpofes. See LUCULLEUM *Marmor*.

MARBLE, *Nomadicum* MARMOR, in the *Natural Hiftory of the Ancients*, the name of a peculiar fpecies of *marble*, which was of no great beauty, but fingular in its remarkable hardnefs, and capable of a very elegant polifh. It feems to have been one of the firft *marbles* the Romans brought into ufe in pavements. It is a very firm, hard, and ftrong kind, of a clofe texture, and in colour of a pale afh-coloured blue. It is found in Italy, Spain, France, and Germany, but no where fo plentifully as in the laft country. It is a very durable and ftrong kind: but its want of variety in colour, makes it but little eftemed. Hill's Hift. of Foff. p. 463.

The inhabitants of Namur and Holland call it the blue ftone.

MARBLE, *Obfidianus*. See OBSIDIANUS *Lapis* and *Onyx* above.

MARBLE, *Parian*, is antique, and much celebrated in authors; it is of a beautiful white: the greateft part of the Grecian ftatues were made of it. Varro calls it *ftellaries*, becaufe the workmen dug it out of the quarry by lamplight.

It is called by us, at this time, *ftatuary marble*.

Too many of the later writers have confounded all the white *marbles* under the name of the *Parian*; and among the workmen, this and all the other white *marbles* have the common name of *alabaflers*; fo that it is in general forgotten among them, that there is fuch a thing as alabafter different from *marble*; which however, is truly the cafe. Almoft all the world alfo have confounded the Carrara *marble* with this, though they are really very different; the Carrara kind being of a finer ftructure and clearer white than the *Parian*, but lefs bright and fplendid, harder to cut, and not capable of fo glittering a polifh.

The true *Parian marble*, fays Hill, has ufually fomewhat of a faint bluifh tinge among the white, and often has blue veins in different parts of it. But Da Coffa denies that thefe blue ftreaks are ever obfervable in the true *Parian marble*, which is always of a pure white throughout; whereas, he fays, the Saligno *marble* has fome admixture of that colour.

It is fuppofed, by fome, to have had its name from the ifland Paros, one of the Cyclades in the Ægean fea, where it was firft found; but others will have it to have been fo called from Agoracritus Parius, a famous ftatuary, who ennobled it by cutting a ftatue of Venus in it. Hill's Hift. of Foff. p. 462.

This *marble*, according to Pliny, was fent for from Egypt, to adorn the frontifpiece of that celebrated labyrinth, which was counted one of the wonders of the world.

Among the many famous ftatues of antiquity cut of this *marble*, the valuable and elegant ftatue of LAOCOON and his two fons, mentioned by Pliny, l. xxxvi. c. 5. has efcaped the injuries of time, and is yet preferved at Rome, as are alfo three other elegant ftatues of this *marble*, of Apollo, Antinous, and the trunk of a ftatue, fuppofed to have been of Hercules, which is called by the common people *il Torfo*.

MARBLE of *Porta Santa*, at Rome called *Serua*, is mingled with large clouds and veins of red, white, and grey.

MARBLE, *Porter*, has a black ground, with clouds and veins of yellow. It is dug out of the foot of the Alps towards Carrara.

MARBLE of *Rance*, in Hainault, is of a dirty red, mixed with blue and white clouds and veins: this is pretty common; but is different in degree of beauty.

MARBLE of *Sarza* is of a deep red, mixed with other colours; each piece whereof feems cemented on to the reft.

MARBLE of *Sicily* is a brownifh red, ftained with oblong fquares of white and ftabrilia, like ftriped taffaty. The ancient has very vivid colours; and the modern comes pretty near it.

MARBLE of *Siguan*, in the Pyrenean, is ordinarily of a greenifh brown, with red ftains; though this is fomewhat various in its colours.

MARBLE, *Thafium* MARMOR, in the *Writings of the Ancients*, a name given to a fpecies of *marble*, ufed in building. It had its name from the ifland Thafus, one of the Cyclades, where it was dug; it was of a duffy greyifh white, and feemed to be compofed of the fame matter with the common white *marbles*, with greyifh veins: only that the matter of the veins here did not run into thofe determinate parcels, but were blended among the whole mafs.

MARBLE of *Thin*, near Namur in Liege, is a pure black, foft, kind, and eafy to work, and receives a more beautiful polifh than thofe of Namur and Dinan.

MARBLE, *Thiburtinum* MARMOR, in the *Natural Hiftory of the Ancients*, the name of the green and white *marble*, common in tables, &c. at this time, and by our artificers called Egyptian *marble*.

The ancient Romans had it from Egypt, and we alfo have the fineft pieces thence; though the greater part of what we ufe is not brought quite fo far. Hill's Hift. of Foff. p. 481.

MARBLE *Bigio Nero*, or black grey, is antique.

MARBLE, *white-veined*, has large veins, with grey and blue ftains on a white ground. It comes from Carrara.

MARBLE, *white*, that dug out of the Pyrenæans, on the side of Bayonne, is inferior to that of Carrara, its grain being coarser, and shining, like a kind of salt. It is something like the ancient white Greek *marble*, whereof their statues were made; but it is not so hard or beautiful.

MARBLE, *ancient black and white*, is now very rare, its quarries being entirely lost; it is divided between a pure white and a bright black in lamine.

MARBLE, *blue Turquin*, is mixed with a dirty kind of white, and comes from the coast of Genoa.

MARBLE *Fior di Persico* comes from Italy. It consists of red and white stains, somewhat yellowish.

MARBLE, *yellow*, is a kind of yellow Isabella, without veins: it is antique, and now very rare.

MARBLE, *black antique*, is of a pure black, without stains, and softer than the modern black. There was some of it brought from Greece, called *marmor* LUCULLEUM; but this was not so much prized as that which the Egyptians brought from Ethiopia, approaching to an iron-colour, and called BASALTES, or the touch-stone, because it served them for a trial of metals.

MARBLE, *white and black*, has a pure black ground, with some very white veins.

MARBLE called *occhio di pavone*, or peacock's eye, is mingled with red, white, and bluish clouds, somewhat resembling the eyes at the end of a peacock's tail.

MARBLE, *green, antique*, is a mixture of grass-green and black, in clouds of unequal forms and bignesses; and is very rare, the quarries being lost.

MARBLE, *common modern green*, improperly called Egyptian, is brought from Carrara, on the coast of Genoa: it is of a deep green, spotted with grey.

MARBLE, *rapid*, is that which, being too hard, works with difficulty, and is liable to splinter, as the black of Namur.

MARBLE, *fibrous*, is that full of threads or filaments.

MARBLE, *brittle*, is that which crumbles under the instrument, as the white Greek *marble*, and that of the Pyrenæans, &c.

MARBLE, *stony*, that which has soft places in it, which must be filled up with cement, as that of Languedoc.

There are two defects frequent in *marble*, which augment the difficulty in cutting and polishing them; the one, what they sometimes call *nails*, answering to the knots in wood; the other, called *emeril*, is a mixture of mundic, or other minerals, forming black stains in the *marble*. The knots are common to all *marbles*; the emeril is peculiar to the white.

MARBLES, *artificial*. The stucco, whereof they make statues, bulls, basso-relievos, and other ornaments of architecture, ought to be *marble* pulverized, mixed in a certain proportion with plaister; the whole well sifted, worked up with water, and used like common plaister. See STUCCO.

There is also a kind of artificial *marble* made of the flaky selenites, or a transparent stone, resembling plaister; which becomes very hard, receives a tolerable polish, and may deceive a good eye. This kind of selenites resembles Muscovy tale.

There is another sort of artificial *marble*, formed by corrosive tinctures, which, penetrating into white *marble* to the depth of a line, or more, imitate the various colours of other dearer *marbles*.

There is also a preparation of brimstone in imitation of *marble*.

To do this, you must provide yourself with a flat and smooth piece of *marble*; on this make a border or wall, to encompass either a square or oval table, which may be done either with wax or clay. Then having provided several sorts of colours, as white-lead, vermilion, lake, orpiment, mafticot, smalt, Prussian blue, &c. melt on a slow fire some brimstone, in several glazed pipkins; put one particular sort of colour into each, and stir it well together; then having before oiled the *marble* all over within the wall, with one colour quickly drop spots upon it of larger and less size; after this, take another colour and do as before, and so on till the stone is covered with spots of all the colours you design to use. When this is done, you are next to consider what colour the mass or ground of your table is to be; if of a grey colour, then take fine sifted ashes, and mix it up with melted brimstone; or if red, with English red oker; if white, with white-lead; if black, with lamp or ivory black. Your brimstone for the ground must be pretty hot, that the coloured drops on the stone may unite and incorporate with it. When the ground is poured even all over, you are next, if judged necessary, to put a thin wainscot board upon it: this must be done whilst the brimstone is hot, making also the board hot, which ought to be thoroughly dry, in order to cause the brimstone to stick the better to it. When the whole is cold, take it up, and polish it with a cloth and oil, and it will look very beautiful. Smith's Laboratory, p. 228.

MARBLE, *colouring of*. The colouring of *marbles* is a nice art, and in order to succeed in it, the pieces of *marble* on which the experiments are tried, must be well polished, and clear from the least spot or vein. The harder the *marble* is, the better it will bear the heat necessary in the operation; therefore alabaster, and the common soft white *marble*, are very improper to perform these operations upon.

Heat is always necessary for the opening the pores of the *marble*, so as to render it fit to receive the colours; but the *marble* must never be made red hot, for then the texture of the *marble* itself is injured, and the colours are burnt, and lose their beauty. Too small a degree of heat is as bad as too great: for, in this case, though the *marble* receive the colour, it will not be fixed in it, nor strike deep enough. Some colours will strike, even cold, but they are never so well sunk in as when a just degree of heat is used. The proper degree is that which, without making the *marble* red, will make the liquor boil upon its surface. The menstruums used to strike in the colours must be varied according to the nature of the colour to be used. A lixivium made with horse's or dog's urine, with four parts quick-lime, and one part pot-ashes, is excellent for some colours; common ley of wood-ashes does very well for others: for some, spirit of wine is best; and finally, for others, oily liquors, or common white wine.

The colours which have been found to succeed best with the peculiar menstruums, are these: stone-blue dissolved in six times the quantity of spirit of wine, or of the urinous lixivium; and that colour which the painters call litmus, dissolved in common ley of wood-ashes. An extract of saffron, and that colour made of buck-thorn berries, and called by the painters sap-green, both succeed well dissolved in urine and quick-lime, and tolerably well in spirit of wine. Vermilion, and a fine powder of cochineal, succeed also very well in the same liquors. Dragon's blood succeeds very well in spirit of wine, as does also a tincture of logwood in the same spirit. Alkanet-root gives a fine colour, but the only menstruum to be used for this is oil of turpentine; for neither spirit of wine, nor any lixivium, will do with it. There is another kind of *sanguis draconis*, called dragon's blood in tears, which, mixed with urine alone, gives a very elegant colour. Phil. Trans. N° 268. or Abridg. vol. iv. part ii. p. 205.

Beside these mixtures of colours and menstruums, there are some colours which are to be laid on dry and unmixed. These are dragon's blood, of the purest kind, for a red; gamboge for a yellow; green wax for a green; common brimstone, pitch, and turpentine, for a brown colour. The *marbles*, for these experiments, must be made considerably hot, and then the colours are to be rubbed on dry in the lump. Some of these colours, when once given remain immutable, others are easily changed or destroyed. Thus the red colour given by dragon's blood, or by a decoction of logwood, will be wholly taken away by oil of tartar, and the polish of the *marble* not hurt by it.

A fine gold-colour is given in the following manner: take crude sal ammoniac, vitriol, and verdigris, of each equal quantities; white vitriol succeeds best, and all must be thoroughly mixed in fine powder.

The staining of *marble* to all the degrees of red, or yellow, by solutions of dragon's blood or gamboge, may be done by reducing these gums to powder, and grinding them, with the spirit of wine, in a glass mortar; but for smaller attempts, no method is so good as the mixing a little of either of these powders with spirit of wine, in a silver spoon, and *holding it over* burning charcoal. By this means a fine tincture will be extracted, and with a pencil dipped in this, the finest traces may be made on the *marble*, while cold, which, on the heating it afterwards, either on sand, or in a baker's oven, will all sink very deep, and remain perfectly distinct in the stone. It is very easy to make the ground-colour of the *marble* red or yellow by this means, and leave white veins in it. This is to be done by covering the places where the whiteness is to remain with some white paint, or even with two or three doubles only of paper, either of which will prevent the colour from penetrating in that part. All the degrees of red are to be given to *marble* by means of this gum alone; a slight tincture of it, without the assistance of heat to the *marble*, gives only a pale flesh-colour, but the stronger tincture give it yet deeper; to this the assistance of heat adds yet greatly: and finally the addition of a little pitch to the tincture gives it a tendency to blackness, or any degree of deep red that is desired.

A blue colour may be given also to *marble* by dissolving turnsol in a lixivium of lime and urine, or in the volatile spirit of urine; but this has always a tendency to purple, whether made by the one or the other of these ways. A better blue, and used in an easier manner, is furnished by

the Canary tartrifol, a fubſtance well-known among the dyers: this needs only to be diſſolved in water, and drawn on the place with a pencil; this penetrates very deep into the *marble*, and the colour may be increaſed by drawing the pencil wetted in freſh ſeveral times over the ſame lines. This colour is ſubject to ſpread and diffuſe itſelf irregularly; but it may be kept in regular bounds, by circumſcribing its lines with beds of wax, or any other ſuch ſubſtance. It is to be obſerved, that this colour ſhould always be laid on cold, and no heat given even afterwards to the *marble*: and one great advantage of this colour is, that it is therefore eaſily added to *marbles* already ſtained with any other colours, and it is a very beautiful tinge, and laſts a long time. Mem. Acad. Par. 1732.

This art has in ſeveral people's hands been a very lucrative ſecret, though there is leaſtwife any thing in it that has not at one time or other been publiſhed.

Kircher has the honour of being one of the firſt, who publiſhed any thing practicable about it. This author meeting with ſtones in ſome cabinets ſuppoſed to be natural, but having figures too nice and particular to be ſuppoſed to be nature's making, and theſe not only on the ſurface, but ſunk through the whole body of the ſtones, was at the pains of finding out the artiſt who did the buſineſs; and on his refuſing to part with the ſecret on any terms, this author with Albert Gunner, a Saxon, endeavoured to find it out; in which they ſucceeded at length very well. Their method is this: take aqua fortis and aqua regia of each one ounce, ſal ammoniac one ounce, ſpirit of wine two drams, about twenty-ſix grains of gold, and two drams of pure ſilver; let the ſilver be calcined and put into a vial, and pour upon it the aqua fortis; let this ſtand ſome time, then evaporate it, and the remainder will firſt appear of a blue and afterwards of a black colour: then put the gold into another vial, pour the aqua regia upon it, and when it is diſſolved evaporate it as the former; then put the ſpirit of wine upon the ſal ammoniac, and let it be evaporated in the ſame manner. All the remainders and many others made in the ſame manner from other metals diſſolved in their proper acid menſtrua, are to be kept ſeparate and uſed with a pencil on the marble. Theſe will penetrate without the leaſt aſſiſtance of heat, and the figure being traced with a pencil on the *marble*, the ſeveral parts are to be touched over with the proper colours, and this renewed daily till the colours have penetrated to the deſired depth into the ſtone. After this the maſs may be cut into thin plates, and every one of them will have the figure exactly repreſented on both ſurfaces, the colours never ſpreading: the neateſt method of applying theſe, or the other tinging ſubſtances, to *marble* that is to be wrought into any ornamental work, and where the back is not expoſed to view, is to apply the colours behind, and renew them ſo often till the figure is ſufficiently ſeen through the ſurface on the front, though it does not quite extend to it. This is the method that of all others brings the ſtone to a nearer reſemblance of natural veins of this kind.

The ſame author gives another method to colour *marble*, by vitriol, bitumen, &c. forming a deſign of what you like upon paper, and laying the ſame deſign between two pieces of poliſhed *marbles*; then cloſing all the interſtices with wax, you bury them for a month or two in a damp place. On taking them up, you will find, that the deſign you painted on the paper, has penetrated the *marbles*, and formed exactly the ſame deſign on them. Kircher's Mund. Subter. lib. viii. § 1. cap. 9.

Wallerius, in his Mineralogy, vol. ii. p. 128. recommends the laſt method of Kircher; and the firſt method is copied in the Phil. Tranſ. № 7.

The art was practiſed by Mr. Bird, a ſtone-cutter at Oxford, before the year 1666; but his method is not recorded. Mr. Robert Chambers, of Minching Hampton, in Glouceſterſhire, diſcovered and practiſed a method of colouring *marble*, which he kept a ſecret. Mr. Da Coſta has publiſhed an account of experiments made on ſeveral pieces of *marble*, ſtained by this artiſt. Phil. Tranſ. vol. li. art. 5. p. 30, &c.

Spots of oil ſtain white *marble*, ſo that they cannot be taken out. See STAINING *of Stones*.

MARBLE, *poliſhed*, is that, which, being well rubbed with free-ſtone, and afterwards with pummice-ſtone, is at laſt poliſhed with emery, if the *marble* be of ſeveral colours; and with calcined tin, if it be white. In Italy, they poliſh with a piece of lead and emery.

There are various ways of poliſhing *marble*: ſome lay three or four blocks in a row, and with another, fixed to a broad beetle, and an handle fixed at oblique angles, with ſand and water between, work the upper ſtone backwards and forwards on the lower ones, till the ſtrokes of the ſaw are worn off; after which, they poliſh them with emery and putty.

MARBLES, *Arundel*. See ARUNDELIAN *marbles*.

MARBLE-*colour*. To give this variegated colour to glaſs is a very eaſy operation: there needs no more than to put cryſtal-frit into a pot in the furnace, and to work it before it has ſtood the uſual time to putrify in the fire. Neri's Art of Glaſs, p. 99.

MARBLE-*wood*, a name given by the people of ſome parts of America to the *lignum rhodium*, or role-wood, from the heart of the tree being ſometimes variegated like *marble*.

MARBLED, ſomething veined, or clouded, reſembling marble. *Marbled paper* is a paper ſtained with various clouds and ſhades, reſembling, in ſome meaſure, the divers veins of marble; the method of making which, ſee under PAPER.

MARBLED *China-ware*, a name given by many to a ſpecies of porcelain or China-ware, which ſeems to be full of cemented flaws. It is called by the Chineſe, who are very fond of it, *ſſa-tchu*.

It is generally plain white, ſometimes blue, and has exactly the appearance of a piece of China which had been firſt broken, and then had all the pieces cemented in their places again, and covered with the original varniſh. The manner of preparing it is eaſy, and might be imitated with us. Inſtead of the common varniſh of the China-ware, which is made of what they call oil of ſtone and oil of ſern mixed together, they cover this with a ſimple thing made only of a ſort of coarſe agates, calcined to a white powder, and ſeparated from the groſſer parts by means of water, after long grinding in mortars. When the powder has been thus prepared, it is left moiſt, or in form of a ſort of cream, with the laſt water that it ſuffered to remain in it, and this is uſed as the varniſh. Our cryſtal would ſerve full as well as theſe coarſe agates, and the method of preparation is perfectly eaſy. Obſerv. ſur les Cout. de l'Aſie.

The occaſion of the ſingular appearance of this ſort of porcelain is, that the varniſh never ſpreads evenly, but runs into ridges and veins. Theſe often run naturally into a ſort of moſaic-work, which can ſcarce be taken for the effect of chance. If the *marbled* China be deſired blue they firſt give it a general coat of this colour, by dipping the veſſel into a blue varniſh; and when this is thoroughly dry, they add another coat of this agate-oil.

MARBLES, *ſtoping*, are moſtly imported from Holland; where it is ſaid they are made by breaking the ſtone alabaſter, or other ſubſtance, into pieces, or chips of a ſuitable ſize; theſe are put into an iron-mill which turns by water: there are ſeveral partitions with raſps within, cut ſideways, not with teeth, which turn conſtantly round with great ſwiftneſs: the friction againſt the raſps makes them round, and as they are formed, they fall out of different holes, into which ſize or chance throws them. They are brought from Nuremberg to Rotterdam, down the Rhine, and from thence diſperſed over Europe.

MARBLING, the art or act of painting or diſpoſing colours in ſuch a manner, that they may repreſent marble. Thus we *marble* books, paper, wood, &c. See PAPER, and *Coloring*, &c. of BOOKS.

MARBLING *of books*, among *Bookbinders*, denotes the ſprinkling over the cover of a book firſt with ink, and afterwards with weak aquafortis. See BOOK-*binding*.

They alſo *marble* books on the edges; but, in this *marbling*, there is no black uſed, but in lieu thereof, red, blue, &c.

MARCASITE, MARCALITA, a ſort of metallic mineral, ſuppoſed by many to be the ſeed or firſt matter of metals. On this principle, there ſhould be as many different *marcaſites* as metals; which is alſo ſaid to be true in effect, the name being applied by ſome to every mineral body that has metallic particles in its compoſition, though not enough to make it worth working; in which caſe it would be called *ore*.

There are only three kinds in the ſhops, which are called *marcaſite* of gold, of ſilver, and of copper; though ſome repute the laſt alone to be a *marcaſite* of iron; biſmuth, *marcaſite* of tin; and zinc, or ſpelter, *marcaſite* of lead: but this we leave to the chemiſts.

Marcaſite of gold is found in little balls or nodules, about the bigneſs of nuts, nearly round, heavy, of a brown colour without. *Marcaſite* of ſilver is like that of gold, only paler coloured within, the colour differs much, the one having a gold-colour and the other a ſilver-colour, both ſhining and brilliant. The *marcaſite* of copper is about the bigneſs of a ſmall apple, round or oblong, brown without, yellow and ſtriated within, brilliant and ſhining.

Marcaſites are found in mines of metals; they all contain ſulphur, and a vitrioline ſalt, eſpecially that of copper; ſome of them alſo contain antimony and biſmuth.

This name is uſed in a very vague ſenſe by many writers upon foſſils, but is by ſome reſtrained to a peculiar genus of foſſils, the characters of which are, that they are compound inflammable metallic bodies, naturally conſtituting whole ſtrata; of a ſolid and firm conſiſtance, of an obſcurely and irregularly foliaceous ſtructure, and of a bright glittering appearance, very freely and readily giving fire with ſteel, not fermenting with acid menſtruums,

flimums, and when put into the fire, yielding a deep blue flame, and finally calcining into a purple powder.

Though the natural difpofition of thefe bodies be to form whole ftrata, and they are moft ufually found in this ftate, yet they are at times found in loofe maffes, as many, even of the ftones of ftrata, at times are. They are fubject alfo, by their frequent admixture with adventitious matter, the ores of metals, and other foffile bodies, to fuch various external appearances, that their varieties are almoft innumerable, and moft of them are very beautiful: but though thefe accidental differences are fo very numerous, the genuine fpecies are very few, the naturalift obferving only three: thofe are, 1. The bright filver colourrd *marcaffite*. 2. The bright gold-colored *marcaffite*. And 3. The pale heavy dead white *marcaffite*.

The firft fpecies ufually conftitutes ftrata of great extent, and of about a foot in thicknefs; very often much lefs, but fcarce ever much more: it is compofed of a number of foliaceous flakes, not regularly difpofed, but oddly contorted and waved, and often folding round one another; though fometimes this ftructure is lefs diftinct, and the whole feems run into one folid mafs: its colour is extremely bright, very like filver, but more glittering. This is its common and its more pure ftate; but it is liable to a vaft number of varieties. Sometimes it contains a large quantity of the ore of lead or tin; and very often a duiky brown ferruginous matter is intimately mixed with it; at other times many of the angular and regularly figured phlogonitæ are immerfed in it, and feem to make a part of its very ftructure; and fometimes where it has room, its conftituent flakes rife on its furface in feveral conjunct ferics, and form a very elegant foliaceous top to it. Nor is this all the difference of appearance it puts on; for very often, where there has not been a fufficient quantity of it to form itfelf into any figure alone, it is found depofited in fparks, or flat cakes, of a more or lefs complex, but always of a flaky ftructure, on ftones or ores of various kinds; and frequently, befide its native filvery white, it has all the rainbow colours on its different parts, as differently turned to the light. The *golden marcaffite* is a more beautiful fubftance than the former: it is of a lefs firm or compact ftructure than the others, and is ufually found in very long but very thin ftrata, and is of an extremely bright and glittering appearance, and is fometimes found in large and mif-fhapen nodules, or loofe maffes. It is liable to all the accidental varieties that the former is, and in many of them makes a very elegant appearance.

The third, or dead white kind, is the hardeft and heavieft of all: it is, in its more ufual and natural appearance, of much lefs beauty than the former kinds, but it is, like them, fubject to various accidents, under fome of which it makes a very gay and fplendid appearance: it, like the reft, fometimes forms complete ftrata, fometimes detached nodules; but its moft ufual appearance is in the horizontal cavities of other ftrata; in thefe it often forms a fort of ball-ftratum of many yards continuance, and frequently of very conliderable thicknefs, for it almoft always fills up the whole vacuity, and that fo clofely as feldom to leave room for any foliaceous fhoots at its furface, or protuberances at its edges, but forms a plain mafs like that of a metal melted and poured into the place; it in the fmoothefl furface of all the *marcaffites*, and is fomewhat foft to the touch, and in colour refembles tarnifhed pewter.

This is its common appearance, but it fometimes fhews itfelf like the reft in fmall patches on the furfaces of ftones, and is there often very beautifully foliated; it is liable alfo to all the accidents of the other kinds.

The *marcaffites* are all found in great plenty in the Engliih and German mines. Devonfhire and Cornwall afford vaft quantities of them; and very beautiful ones are found in Derbyfhire. They often contain the feveral metals, but the quantity of fulphur has yet baffled all the attempts that have been made to work them to advantage. Hift Hift. of Foff. p. 619.

Ariceuna mentions four kinds of *marcaffite*; the golden, the filvery, the braffy, and the iron *marcaffite*. He does not pretend that the two firft contain really the metals whofe names they bear, but fays they are fo called from their likenefs in colour, and that they are thought by fome to poffefs, in part, their virtues. Diofcorides mentions only one kind, that is, the braffy pyrites or *marcaffite*. This is, of all others, the moft common; and the preference is given by this author to fuch of it as is of a bright braſs-colour, and fuch as, when ſtruck againſt ſteel, yields the largeſt ſparks. This is the kind called by Avicenna and Serapion, *marcaſita aurea*, and it is called by the Perſians, *ſapar aſtraneuſi*, that is the ſtone of light or brightneſs, there being a very vivid and ſparkling luſtre in this ſtone when newly broken. The ancients uſed to calcine it, and then made it an ingredient in their ſeveral compoſitions for diſeaſes of the eye. The calcining it renders it a ſort of coleothar of vitriol, for the ſulphureous parts burn away in the operation, and leave only the *caput mortuum* of the vitriol behind; ſome have ſuppoſed it called *lapis hæræ*, from its reſtoring light to the eyes; but this is a very far-fetched etymology.

The firſt opinion of the world, in regard to this glittering ſubſtance, was, that it was almoſt all gold or ſilver, according to the colour: but the error of this opinion being ſoon diſcovered by trial, there roſe another contrary one, that *marcaſite* never contained any metal at all. This is, in general, true of our *marcaſites*, but it is not to be extended into a general rule for thoſe of all the world. The ſearchers after royal mines are not to throw away all theſe ſubſtances as uſeleſs, wherever they find them: for Alonſo Barba, a very great judge of theſe things, and himſelf very converſant in mines, aſſures us, that the *marcaſitas* of the mines of Moncerrat en los Chicas contain uſually one half ſilver: and in the mines of Potoſi there is great plenty of a *marcaſite*, in which there is ſometimes a large quantity of the black ſilver-ore, well known there, and eſteemed one of the richeſt kinds, except the native ſilver. They always are glad to find this *marcaſite* vein, it being eſteemed a proof that the black ore is very rich in ſilver; they make the ſame ſort of obſervation in regard to orpiment and gold, that they do in regard to *marcaſite* and ſilver; that the orpiment uſually contains itſelf ſome gold, and is a certain ſign that there is gold in the neighbourhood wherever it is found. Alonſo Barba, de Met. This name, ſays the author of the Dictionary of Chymiſtry, has long been given indifferently to all ſorts of minerals, to ores, pyrites, and to ſemi-metals: lately it ſeems to be confined to PYRITES; and Wallerius propoſes to apply it only to ſuch pyrites as are regularly formed.

MARCELLIANISM, the doctrines and opinions of the *Marcellians*, a ſect of ancient heretics, towards the cloſe of the ſecond century, ſo called from *Marcellus* of Ancyra, their leader, who was accuſed of reviving the errors of Sabellius.

Some, however, are of opinion, that *Marcellus* was orthodox, and that they were his enemies the Arians, who fathered their error upon him. St. Epiphanius obſerves, that there was a great deal of diſpute with regard to the real tenets of *Marcellus*; but that, as to his followers, it is evident they did not own the three hypoſtaſes: for *Marcellus* conſidered the Son and Holy Ghoſt, as two emanations from the divine nature, which, after performing their reſpective offices, were to return again into the ſubſtance of the Father: and this opinion is altogether incompatible with the belief of three diſtinct perſons in the Godhead.

MARCGRAVE, or MARGRAVE, a kind of dignity in Germany, anſwering to our MARQUIS.

The word is derived from the German *marck*, or *mark*, which ſignifies *a frontier*, formed, as Junius conjectures, from the laſt ſyllable of the Greek ακρωτηριον, which ſignifies both a *mark*, and a *limit*; and *graffe*, *count*, *governor*; *margraves* being originally governors of cities lying on the frontiers of a country or ſtate.

MARCGRAVIA, in *Botany*, a genus of the *polyandria monogynia* claſs: the characters of which are, that the corolla has a ſingle petal, and is calyptriform; the calyx is ſix-leaved, and imbricated; and the fruit is a berry, conſiſting of many cells, and containing many ſeeds. There is only one ſpecies.

MARCH, MARTIUS, the third month of the year, according to the common way of computing.

Among the Romans, *March* was the firſt month; and, in ſome eccleſiaſtical computations, that order is ſtill preſerved; as particularly in reckoning the number of years from the incarnation of our Saviour, which is done from the 25th of *March*.

In England, (before the alteration of the ſtyle) *March*, properly ſpeaking, was the firſt month in order, the new year commencing from the 25th; though, in compliance to the cuſtoms of our neighbours, we uſually ranked it as the third; but, in this reſpect, we ſpoke one way, and wrote another.

Till the year 1564, the French reckoned the beginning of their year from Eaſter; ſo that there were two months of *March* in one year, one of which they called *March before Eaſter*, and the other *March after Eaſter*, and, when *Eaſter* fell within the month of *March*, the beginning of the month was in one year, and the end in another.

It was Romulus who divided the year into months: to the firſt of which he gave the name of his ſuppoſed father *Mars*. Ovid, however, obſerves, that the people of Italy had the month of *March* before Romulus's time; but that they placed it very differently, ſome making it the third, ſome the fourth, ſome the fifth, and others the tenth month of the year.

In this month it was that the Romans ſacrificed to Anna

Perenna; that they began their comitia; that they adjudged their public farms and leases; that the mistresses served the slaves and servants at table, as the masters did in the Saturnalia; and that the Vestals renewed the sacred fire.

The month of *March* was always under the protection of Minerva, and always consisted of thirty-one days. The ancients held it an unhappy month for marriage, as well as the month of May.

MARCH, in *Military Language*, is in general the motion of a body of men from one place to another.

But the beat of the drum, when the soldiers are upon *march*, or beginning to *march*, is likewise called the *march*. It is likewise a word of command, when a battalion is to alter its disposition.

As many accidents may happen in the *march* of an army, from defiles, marshes, woods, and the like, it is the prudence of a general to order his *march* accordingly, and to take care that the columns of his army have a free communication one with the other. The *march* of an army is composed of an advance guard, the main body, and the rear guard, and is sometimes in two, four, six, or eight columns, according as the ground will allow.

MARCHANTIA, in *Botany*, a genus of the *cryptogamia* class of plants, and of the order of *algæ*: the characters are, that it has male and female flowers on different parts of the same plants; the male flower stands on a long erect pedunele; the cup is a common perianthium of the peltated kind, divided into several segments, and containing under it as many flowers as there are segments; each flower is monopetalous, of a turbinated form, standing erect, and somewhat shorter than the cup; having a single stamen, which is a slender filament, longer than the flower; the anthers is oval, and commonly found burst at the top into as many parts as there are segments in the perianthium; the female flower has no pedicle; the cup is a single-leaved perianthium, sessile, campanulated, and polyspermous. There are seven species.

MARCHES, *marchia*, from the German, *march*, i. e. *limes*, or from the French *marque*, viz. *signum*, being the notorious distinction between two territories, are the limits between England and Wales, or Scotland; which last are divided into west and middle *marches*. 4 H. V. cap. 7. 23 Edw. IV. cap. 8. 24 H. VIII. cap. 9. And there was formerly a court, called the court of the *marches* of Wales, where pleas of debt or damages, not above the value of 50*l.* were tried and determined; and if the council of the *marches* held plea for debts above that sum, &c. a prohibition might be awarded.

MARCHERS, or *Lords* MARCHERS, in our *Old Writers*, noblemen that lived on the marches of Wales, or Scotland. These, in times past, according to Camden, had their laws, and power of life and death, &c. like petty kings. But such powers were abolished by the stat. 27 Hen. VIII. cap. 27. and 1 Edw. VI cap. 10.

MARCHESVAN, in *Chronology*, the eighth month of the Jewish ecclesiastical year, answering to part of our October and November.

MARCHET, or MARCHETTA, a pecuniary fine, anciently paid by the tenant to his lord, for the marriage of one of the tenant's daughters.

This custom obtained, with some difference, throughout all England and Wales, as also in Scotland; and it still continues to obtain in some places. According to the custom of the manor of Dinover in Carmarthenshire, every tenant, at the marriage of his daughter, pays ten shillings to the lord; which, in the British language is called *gwabr-merched*, i. e. *maid's fee*. See AMABYR.

In Scotland, and the north parts of England, the custom was, for the lord to lie the first night with the bride of his tenant; but this usage was abrogated by king Malcolm III. at the instance of his queen; and, instead thereof, a mark was paid by the bridegroom to the lord: whence it is called *marcheta mulieris*. See BOROUGH-*English*.

MARCHIONIS *pulvis*, a term used for a certain compound powder, prescribed in the Leyden Dispensatory, and greatly recommended by many as an anti-epileptic and absorbent.

The ingredients are male piony-root, half an ounce, wood of misletoe of the oak, raspings of ivory, elks hoof, spodium, the roots of the unicorn-fish, or, in its stead, the antlers of the stag's horn, red and white coral, and pearls, of each a dram. These are all to be rubbed into a powder, with twenty leaves of pure gold, and given half a dram twice a day.

MARCIONITES, or MARCIONISTS, MARCIONISTÆ, a very ancient and popular sect of heretics, who, in the time of St. Epiphanius, were spread over Italy, Egypt, Palestine, Syria, Arabia, Persia, and other countries: they were thus denominated from their author *Marcion*. *Marcion* was of Pontus, the son of a bishop, and at first made profession of the monastical life; but he was excommunicated by his own father, who would never admit him again into the communion of the church, not even on his repentance. On this, he abandoned his own country, and retired to Rome, where he began to broach his doctrines.

He laid down two principles, the one good, the other evil: between these they imagined an intermediate kind of deity of a mixed nature, who was the creator of this inferior world, and the god and legislator of the Jewish nation: the other nations, who worshipped a variety of gods, were supposed to be under the empire of the evil principle. These two conflicting powers exercise oppressions upon rational and immortal souls; and, therefore, the supreme God, to deliver them from bondage, sent to the Jews a being more like unto himself, even his son Jesus Christ, clothed with a certain shadowy resemblance of a body: this celestial messenger was attacked by the prince of darkness, and by the god of the Jews, but without effect. Those who follow the directions of this celestial conductor, mortify the body by fastings and austerities, and renounce the precepts of the god of the Jews, and of the prince of darkness, flesh, after death, ascend to the mansions of felicity and perfection. The rule of manners which *Marcion* prescribed to his followers, was excessively austere, containing an express prohibition of wedlock, wine, flesh, and all the external comforts of life. See MANICHÆANS.

Marcion denied the real birth, incarnation, and passion of Jesus Christ, and held them to be all apparent only. He denied the resurrection of the body; and allowed none to be baptized, but those who preferred their continence; but these, he granted, might be baptized three times.

In many things, he followed the sentiments of the heretic Cerdon, and rejected the law and the prophets. He pretended, the gospel had been corrupted by false prophets, and allowed none of the evangelists, but St. Luke, whom also he altered in many places, as well as the epistles of St. Paul, a great many things in which he threw out. In his own copy of St. Luke, he threw out the two first chapters entire.

MARCITES, MARCITÆ, a sect of heretics in the second century, who also called themselves the *perfecti*, and made profession of doing every thing with a great deal of liberty, and without any fear.

This doctrine they borrowed from Simon Magus, who, however, was not their chief; for they were called *Marcites* from one *Marcus*, who conferred the priesthood, and the administration of the sacraments, on women.

MARCOSIANS, or COLORBARSIANS, an ancient sect in the church, making a branch of the VALENTINIANS. St. Irenæus speaks at large of the leader of this sect, *Marcus*, who it seems, was reputed a great magician.

The *Marcosians* had a great number of apocryphal books, which they held for canonical, and of the same authority with our's. Out of these they picked several idle fables touching the infancy of Jesus Christ, which they put off for true histories. Many of these fables are still in use and credit among the Greek monks.

MARCULUS, among the Romans, a knocker, or instrument of iron to knock at the doors with.

MARDAC, in the *Materia Medica of the Ancients*, a name given by some to litharge. The Arabian writers have sometimes called it by this name, and sometimes by that of *mardesengi*. Many of their commentators have thought that they meant two different substances by these two names; but it does not appear to be truly the case, the two words standing, in different writers, for the same thing. Avicenna has given us a chapter on *mardac*, in which he has translated the chapter of Dioscorides on litharge: and Serapion has given us a chapter on the *mardesengi*, in which he has given us an account of the same substance, under the terms that Galen uses for the descriptions of litharge, and even quotes him for the account.

MARDAITES, in *Ecclesiastical History*. See MARONITES.

MARE, *equa*, in *Zoology*, the female of the HORSE kind.

No *mares* in the world are better for breeding than the English, provided they are properly chosen for the sort of horse intended to be bred. The *mare*, whatever sort of horse is intended to be raised from her, should be perfectly sound, and as free from all defects as the stallion. They should have no splaint, spavin, nor curb about them; for the colt will certainly take after them, if they have. The highest spirited mares are best, and, in general, if there be any natural defect in the *mare*, it should be remedied in the stallion; and if any in the stallion, it should be remedied in the *mare*, as much as possible, in order to the having good colts.

The particular directions regarding the kinds of horses to be bred, are these: if for the manege, or pads, the *mare* should have their heads well set on, and their breasts broad;

broad; their legs not too long, their eyes bright and sparkling, and bodies large enough, that the foal may have room to lie in their belly. They should be of a good and gentle disposition, and their motions easy and graceful: the more good qualities the *mares* have, the better, in general, the colts will prove.

If the owner would breed for racing, or for hunting, the *mares* must be chosen lighter, with short backs and long sides; their legs must be longer, and the breast not so broad; and such should always be chosen as have good blood in their veins. If the speed and wind of any particular *mare* have been tried, and found good, there is the more certainty of a good colt from her: but she should be in full health and vigour at the time, and not above seven years old, or eight at the utmost. The younger the breeders are, the better, in general, the colts will be.

A *mare* may be covered any time after she is three years old; but the best time is after she is four; at this age, or between this and seven, she will nourish a colt best of all; and though she will breed till she is thirteen, yet it is generally observed, that when she is past ten, the colts bred from her are dull and heavy. People who regard the moon, in these cases, will have their *mares* covered only between the end of the first quarter and the full; they presume that these colts will be the most strong and vigorous; but that these beget in the waning of the moon, will always be weakly and tender. A much more essential caution, however is, that before the *mare* is to be covered, she should be taken into the house for six weeks, at least, and fed well with good hay and oats, well sifted, to give her strength to go through the operation. If there is any reason to suspect that the *mare* will not conceive, the best method to insure it is to let her blood in the neck, about six days before she is covered: the quantity of blood taken away should be about two quarts, or somewhat less. It is a general caution to open the veins on both sides the neck for this, taking half the quantity from each, but this is trifling.

The method of covering, so as to make it most sure to succeed, is this: the *mare* is to be brought into some open place, and tied to a post; and the stallion is to leap her in the morning fasting, and as soon as he dismounts, a pail of cold water is to be thrown upon her, to make her shrink in and retain the seed. She is then to be taken away out of hearing of the horse, and is neither to eat nor drink for four or five hours after.

It may be known if the stands to her covering, by her keeping a good stomach, and not neighing at the sight of a horse. Some, to make it quite secure, put the *mare* and horse together in an empty house every night, for four or five nights, taking away the horse in the morning, and feeding him very liberally, and the *mare* very sparingly, and particularly giving her very little water.

There must be proper care taken of her after covering; the same method of feeding her with good hay, and sifted oats, must be continued three weeks or a month, and the must be kept within doors, and without any exercise; her stable must be kept very clean, and her feet pared, and with thin shoes on. After this she may be turned out for the summer season, and only taken up in September, in order to be kept well fed till the foals. If there be great difficulty in her fosling, or the secundine be retained, the method is to hold her nostrils, so that she cannot breathe; and if this does not do, a decoction of madder-root, or of fennel, in water, with a mixture of ale or wine, is found very effectual.

When the whole is over, the *mare* is very apt to eat up her secundine; but this should be prevented, for it is an unnatural food for her, and will injure her health. When she has licked her foal, some persons should streak and milk her before the foal sucks. This will make the milk come down in greater plenty, and will prevent it from clotting into lumps, or from disagreeing with the young creature's stomach. It often happens, that the milk clods in the udder, and the foal, being able to get none out, the *mare* is supposed to be dry, and in consequence of this supposition, she actually becomes so. But the remedy is easy: let as much milk as can be got from her be boiled with some lavender-flowers, and the udder bathed thoroughly with it warm, several times a day: if no milk, or not enough can be obtained from her, other milk or common water will do; for the principal effect is from the heat of the liquor, and the virtue of the lavender, which breaks the clods and lumps, and then the foal's sucking more as it grows stronger, will prevent the like accident for the future.

The water given the *mare* for the first month after foaling, must be what the dealers in horses call the white mash, that is, bran and water, stirred together till the liquor is white: a month after foaling a decoction of brimstone and farin will be very proper, and will give strength to the colt.

After this the *mare* may be put to any moderate exercise, as harrowing or the like, and both she and the colt will be the better for it; only care is to be taken that she do not let the colt suck while she is hot.

Many are of opinion, that the winter is a very bad time for a *mare* to be foaling; but though there is scarcity of grass, the *mare* may be housed at this time, and well fed with hard meat, and, in this case, it will prove better both for her and the colt; he will be better limbed and stronger than if bred at grass. See FOAL.

MARECA, in *Ornithology*, the name of a Brasilian species of duck, much valued there at table. It is of the shape of our duck; its head is grey, but has a beautiful red spot on each side, at the insertion of the beak, and a whiteness in the lower part under the eyes; its breast and belly are of the colour of fresh cut oak, variegated with black spots; its legs and feet are black; its tail grey; and its wings elegantly variegated with grey and brown; but they have in the middle a large mixture of that glossy green, which we see in the necks of our drakes. There is besides this, another species of the *mareca*, which is of a dusky olive-coloured brown on the back, white on the throat, and grey on the breast and belly, and very remarkable for the fine bright red colour of its feet.

MARENA, in *Ichthyology*, the name of a fish of the haringform kind, much approaching to the nature of the common pilchard; but differing from it in that it has not the serrated longitudinal line under the belly, and lives in lakes, not in the ocean. It seldom arrives to more than five inches in length; its back is blackish, and its sides white and silvery, and its scales are very loose, and easily rubbed off. It is a better tasted fish than the pilchard, and its flesh is firmer.

MARGA, *marle*. See MARLE.

MARGARITÆ. See PEARLS.

MARGARITINI are glass ornaments, made at Venice of small glass tubes of different colours, which are blown at Murano, and which the women of the lower class wear about their arms and necks. The largest sort are used for making rosaries. This work is performed with great dispatch, the artisan taking a whole handful of those tubes at once, and breaking them off one after another with an iron tool. Those short cylinders are mixed with a kind of ashes, and put over the fire in an iron pan; and when the two ends begin to melt, by stirring them about with an iron wire, they are brought to a round figure; but care is taken not to leave them too long over the fire, lest the hole through which they are to be strung, should be entirely closed by the melting of the glass. There are several streets at Francisco di Vigna, entirely inhabited by people, whose sole occupation is to make and string these *margaritini*. Keyller's Travels, vol. iii. p. 301.

MARGEN, in the *Materia Medica*, a name used by some of the later Greek writers, to express red coral. It is founded on an error, however, the word *margen* being made from the Arabian *margian*, which does not signify coral, but a purple seaweed, or fucus, used in dying. See MARGIAN.

MARGENSTEIN, in *Natural History*, a name given by the German writers to a sort of indurated marle, which while in the strata, is nearly of the hardness of stone, but when laid on the surface of the earth, and exposed to the wind and rain, soon dissolves, and enters the pores of the ground, enriching the soil to a very great degree.

We have the same sort of stony marle in some parts of England, only that our's is less hard, and yet takes more time to break and dissolve in the air. They are both most proper for lands of a loose loamy nature, and keep them in heart a long time.

MARG-GRAVE. See MARGRAVE.

MARGIAN, in *History*, a name given by some of the ancient writers, particularly, the Arabian physicians, to the plant called by others *argema*, or *argimon*. This is described to be a purple sea-plant. Some have supposed that cochineal was meant by this word, but that is an error. Others have come somewhat nearer, in supposing it to be the name of coral; but as the ancients have said that it was used in dying, it could not be coral; and indeed there is no other plant that it can mean, but that fucus used by the Greeks in dying, and called *fucus porphyreus*, or the purple-dying sea-plant.

MARIA *Æg.* See AVE MARIA.

MARIENG-*glass*, in *Natural History*, a species of crystal, chiefly found in Russia, where, on account of its transparency, it is used for window-panes. It is a particular species of stone, lying in strata or flakes, like so many sheets of paper, and as easily separated. It is also called *shenglass*, and *ryssglass*.

MARIGOLD, in *Botany*. See MARYGOLD.

MARINE *barometer*. See BAROMETER.

MARQUES *de lodes*, in the *Mintage*. See DUEL.

MARINE-*chair*, is a contrivance of Mr. Irwin, for facilitating the neceſſary obſervations, in order to determine the LONGITUDE at ſea. It is ſaid that Mr. Irwin, on a trial of this machine, found the longitude within twenty-three miles, or about one-third of a degree.

MARINE *remains*, a term uſed by many authors to expreſs the ſhells of ſea-fiſhes, and parts of cruſtaceous and other ſea-animals, found in digging at great depths in the earth, or on the tops of high mountains. Their being lodged in theſe places, is an evident and unqueſtionable proof of the ſea's having once been there, ſince it muſt have covered theſe places where it has left its productions. It has been a favourite ſyſtem with many, and particularly with the late Dr. Woodward, that all theſe *marine* bodies were brought to the places where they now lie, by the waters of the univerſal deluge; which, as we are informed by holy writ, covered the whole ſurface of the globe, and even the higheſt mountains. But though this is a very ready expedient to account for many of the natural phenomena, yet there are evident proofs that it cannot have been the cauſe of all that is attributed to it; and there muſt neceſſarily have been ſome other cauſe of many of theſe remains having been placed where we now find them. Neither does the opinion of ſome particular authors, that partial inundations of different places have left theſe *marine* bodies behind them at the receſs of the waters, ſeem ſufficient to account for the multitudes of theſe remains, many of which we find thrown upon places inacceſſible to ſuch floods. Moro, de Cruſtaceis in Montib. deprehenſ.

Signior Moro has attempted to account for theſe phenomena on a new plan of reaſoning. He obſerves, that it is the beſt baſis of argument to begin from facts; and that if we can certainly find how ſome part of theſe animal remains came to be depoſited at ſuch great diſtances from their natural reſidence, we may very rationally conclude, that by the ſame means, be they what they will, all the reſt were alſo brought thither. He adds, that the earth, once the bottom of the ſea, or the level ſurface of a plain, may be, and frequently has been, in the memory of man, raiſed up into a mountain by ſubterranean fires, earthquakes, and volcanos. He mentions the famous inſtance of the new iſland raiſed out of the bottom of the ſea near Santorini in the year 1707, which became of a circumference not leſs than ſix miles, and of the new mountain raiſed near Puzzoli in 1538.

Theſe, and many other like facts, prove that the origin of mountains and iſlands may have been ſuch, and that the matter they conſiſt of may have been the ſame with what was once the bottom of the ſea; and that the *marine* bodies found in theſe mountains, were ſuch as were living, or remaining of living fiſh at the time when the iſlands or mountains were ſo raiſed above the ſurface of the water which before covered it.

This is no new opinion; but this author has ſet it in a new and much ſtronger light than it ever had appeared in before, by the inſtances and examples he has brought in proof of it. Some have been fond of believing that the bodies we call *marine remains*, were never indeed any parts of living animals, but that they are mere *lusus naturæ* formed in the places where they are found; but Fabius Columna proved this to be an error, ſhewing that the ſhark's teeth, or glоſſopetræ of the iſland of Malta, when calcined by a ſtrong fire, yielded aſhes the ſame with thoſe from animal bodies, and by no means of the ſame nature with thoſe produced from calcined ſtones.

That changes of parts of the bottom of the ſea into dry land, have often been made, is proved not only from the late known inſtances, but from the teſtimonies of Strabo, Pliny, and other writers of credit; and nothing is more obvious to reaſon, than that in the ſudden riſe of ſuch parts of the bottom of the ſea, all its contents, all the ſhells, and other hard parts of fiſhes lying there, would be carried up with it.

As ſome mountains and ſome iſlands muſt have certainly been produced in this manner, it is not impoſſible but that all of them may have been ſo; and there is no more than this required to account clearly and evidently for all the vaſt profuſion of *marine* bodies at land as we find them, without having recourſe to the improbable means of the univerſal deluge, which for many plain reaſons cannot have been the cauſe; or to the effects of particular inundations, which muſt have been wholly incapable of lodging many of them there. The lodgment of ſhells in the ſolid ſtrata of mountains, is better accounted for by this ſyſtem of ſignior Moro than any other: and if it be aſked why ſome mountains afford them in great plenty, and others not at all, it will not be difficult to anſwer, by obſerving, that among the mountains of the more known parts of the world, ſome conſiſt of mere ſolid rock, and others of various ſtrata of earthy and other matter; that the firſt of theſe may be ſuppoſed primary or natural mountains, and the others ſecondary or accidental ones; and that theſe *marine remains* are always wanting in the former, and uſually are found in the latter, which is a fact greatly favourable to this ſyſtem.

There are many difficulties attending the accounts of all authors of the formation of the earth, and the lodging theſe bodies in it; nor is this laſt ſyſtem without difficulty. The cauſes here alleged as to the origin of mountains and iſlands, doubtleſs have been ſo in regard to ſome, but ſcarce to all; and the bodies here treated of are ſo numerous, in ſome particular places, that ſcarce any account can ſolve the difficulty of their being collected together in ſo ſtrange a manner. *See Addenda*] FOSSILS.

MARINE *ſalt*. See SALT.

MARINE *ſurveyor*, is the name of a machine contrived by Mr. H. de Saumarez, for meaſuring the way of a ſhip in the ſea. This machine is in the form of the letter Y, and is made of iron or any other metal. At each end of the lines which conſtitute the angle or upper part of that letter, are two pallets, not much unlike the figure of the log; one of which falls in the ſame proportion as the other riſes. The falling or pendant pallet meeting a reſiſtance from the water, as the ſhip moves, has, by that means, a circular motion under water, which is faſter or ſlower, according as the veſſel moves. This motion is communicated to a dial within the ſhip, by means of a rope faſtened to the tail of the Y, and carried to the dial. The motion being thus communicated to the dial, which has a beſt in it, it ſtrikes exactly the number of geometrical paces, miles, or leagues, which the ſhip has run. Thus the *ſhip's* diſtance is attained; and the forces of tides and currents may alſo be diſcovered by this inſtrument; which, however, has been very little uſed. See a large account of it in the Abr. Phil. Tranſ. vol. vi. p. 444, &c.

MARINES, or *Marine Forces*, a body of troops employed in the ſea-ſervice, under the direction of the lords of the admiralty. Theſe forces, while on ſhore, are regulated by martial law, and to be provided with quarters, &c. 28 Geo. II. cap. 2. 29 Geo. II. cap. 6. 30 Geo. II. cap. 11.

MARINELLA, in *Botany*, a name by which ſome authors have called the great *ſow* or garden valerian.

MARINER, the ſame with ſeaman or ſailor.

The *mariners* of a ſhip are accountable to the maſter; the maſter to the owners; and the owners to the merchant, for all damages by negligence, or otherwiſe. If a *mariner* be hired, and he deſerts the ſervice before the voyage is ended, by the law martial, and by common law, he ſhall loſe his wages: and if a ſhip is loſt by tempeſt, &c. the *mariners* loſe their wages, as well as the owners their freight; and this is to oblige them to uſe their utmoſt endeavours to preſerve the ſhip.

Perſonating *mariners*, and receiving their wages, and forging letters of attorney, &c. or falſely taking out letters of adminiſtration for the receipt of ſeamen's wages, incurs a forfeiture of 200*l.* &c. 9 and 10 W. III. cap. 41. A law act has ordained, that no maſter of a ſhip ſhall retain any *mariner*, without a contract in writing for his wages, on pain of forfeiting 5*l.* And if a *mariner* refuſe to proceed afterward on the voyage, he ſhall forfeit his wages, and on complaint to a juſtice of peace, he may commit the offender to the houſe of correction, to be kept to hard labour. Alſo *mariners* abſenting from ſhips, incur a forfeiture of two day's pay, for every day's abſence, to the uſe of *Greenwich* HOSPITAL; and leaving the ſame before diſcharge by writing, forfeit one month's wages. But this ſhall not debar any *mariner* belonging to a merchant ſhip, from entering into the king's ſervice, &c. and on the arrival of any ſhip, the maſter is to pay his men their wages in thirty days, or at the time of their diſcharge (deducting the penalties impoſed), on pain of 20*l.* 2 Geo. II. cap. 36. Maſters of Britiſh and Iriſh ſhips, trading to the chief ports of Spain, are to pay a certain tonnage duty to perſons there, on the freight of goods and merchandize, as a contribution for relief of ſeamen ſhipwrecked, and other diſtreſſed ſubjects, &c. 9 Geo. II. cap. 25. A like duty to be paid by all maſters of veſſels, &c. going from any part of his majeſty's dominions to Leghorn, for relieving *mariners* that are ſhipwrecked, and taken in war. 10 Geo. II. cap. 14.

By 20 Geo. II. cap. 38. for the relief and ſupport of maimed and diſabled ſeamen, and the widows and children of ſuch as ſhall be killed or drowned in the merchants ſervice, reciting that there is no penſion for ſeamen diſabled, &c. in the merchants ſervice, and that they are willing to allow 6*d.* per month out of their wages, for the relief of ſuch as ſhall be diſabled, &c. and the widows and children of ſuch as ſhall be killed, &c. a corporation is erected, by the name of the preſident and governors, for the relief and ſupport of, &c. who may purchaſe lands for building an hoſpital, and are to pro-

vide

vide for disabled seamen therein, and to allow pensions to such as they shall think proper, their widows and children. Seamen who have not served five years in the merchants service, and contributed 6d. per month, are not to have the benefit of this act. Seamen in the merchants service are to pay 6d. per month, which the master of the ship is to retain out of their pay, and pay it to the corporation. *Mariners* in the East India company's service are exempted from the duty, and excluded the benefit of this act. 13 Geo. II. cap. 17. See GREENWICH HOSPITAL.

Mariners wandering up and down, and who shall not settle themselves to work, or have not a testimonial under the hand of a justice, shewing where they landed, and whither to go, &c. or having such testimonial, if they exceed the time limited more than fourteen days, not being sick in their passage home, &c. are guilty of felony by 39 Eliz. cap. 17. But if they cannot work, for want thereof, the two next justices, upon their complaint, shall take order that they may be provided of work; or otherwise may tax the whole hundred, till relief shall be had. Stat. ibid. And every parish may be charged for relieving *mariners*, as for maimed soldiers; and they shall be relieved by the treasurer of the county, &c. 43 Eliz. cap. 3.

By 1 Geo. II. stat. 2. cap. 14. no seaman aboard his majesty's ships can be arrested for any debt, unless the same be sworn to amount to at least 20*l*. The method of ordering seamen in the royal fleet, and keeping up a regular discipline there, is directed by certain express rules, articles, and orders, first enacted by the authority of parliament, soon after the Restoration: 13 Car II. stat. 1. cap. 9. but since new-modelled and altered, after the peace of Aix la Chapelle, 22 Geo. II. cap. 33. to remedy some defects, which were of fatal consequence in conducting the preceding war. In these articles of the navy, almost every possible offence is set down, and the punishment thereof annexed: in which respect the seamen have much the advantage over their brethren in the land service; whose articles of war are not enacted by parliament, but framed from time to time, at the pleasure of the crown. For these articles, see NAVY. Blackst. Com. vol. i. p. 420.

MARINERS-*compass*. See COMPASS.

MARIO, in *Ichthyology*, a name given by Pliny, and other of the old Roman authors, to a large fish allied to the accipenser or sturgeon. There seems, from all that they have said of it, great reason to believe that it was the fish we at present call HUSO, or the ichthyocolla-fish, from isinglass made of it. Artedi makes this a species of the accipenser or sturgeon, and distinguishes it by the name of the accipenser without tubercles.

MARJORAM, *origanum*, in *Botany*, a genus of the *didynamia gymnospermia* class. Its characters are these: the flower is of the lip kind, having a cylindrical compressed tube; the upper lip plain, erect, obtuse, and indented; the under lip trifid, the segments being nearly equal; these are disposed on spikes, composed of oval coloured leaves, placed over each other like the scales of a fish; the flowers have four slender stamina, two being as long as the petal, the other two longer, terminated by single summits; they have a four-cornered germen, supporting a slender style, inclining to the upper lip, crowned by a bifid stigma; the germen afterward turns to four seeds, that up in the empalement of the flower. Miller enumerates thirteen species, and Linnæus eleven.

The common sweet *marjoram*, though a plant so commonly cultivated with us, seldom or ever ripens its seeds in England; and, as it is an annual plant, we are obliged yearly to have a supply of its seeds from the south of France and Italy, where it grows wild in great abundance. The seeds are sown in the latter end of March, on a dry warm spot; and when they are come up about an inch high, they should be transplanted into beds of rich earth, at six inches distance every way, these are to be watered till they have taken root, and cleared from the weeds; and it is always found that those which have been transplanted produce finer and larger knots of heads, than those which remain where they were sown. They flower toward the latter end of July, at which time they are to be pulled up, and dried in a shady place for use. Miller.

An essential oil is obtained from the leaves and tops of sweet *marjoram*, which, when carefully drawn, is of a pale yellow colour, and of a hot penetrating taste. This plant has been chiefly recommended in disorders of the head and nerves, in uterine obstructions and mucous discharges, proceeding from a laxity and debility of the solids, and a sluggish state of the juices, and in the humoural asthmas and catarrhs of old people. The powder of the leaves, their distilled water, and the essential oil properly diluted, are agreeable errhines, and accounted particularly useful in pituitous obstructions of the nostrils, and disorders of the olfactory organs. Lewis.

The leaves and flowery tops of the common wild *marjoram*, which grows on dry chalky hills and gravelly grounds, in several parts of England, and flowers in June, have an agreeable aromatic smell, and a pungent taste, warmer than that of the garden *marjoram*, and much resembling thyme; with which they appear to agree in medicinal virtue. Infusions of them are sometimes drank, as tea, in weakness of the stomach, disorders of the breast, for promoting perspiration of the fluid secretions in general; they are sometimes used also in nervine and anti-rheumatic baths; and the powder of the dried herb as an errhine. Distilled with water, they yield a moderate quantity of a very acrid, penetrating, essential oil, smelling strongly of the *marjoram*, but less agreeable than the herb itself; this oil [illegible] a little cotton, for easing the pains of [illegible] and sometimes diluted and rubbed on the [illegible] up the nose, for attenuating and [illegible] moors. Lewis.

The dittany of Crete, which is a species of *origanum*, with all the leaves woolly, and nodding spikes of flowers, is a very warm aromatic; the leaves, which impart their virtues both to water and rectified spirit, tinging the former of a yellowish, and the latter of a greenish colour, have been chiefly recommended as emmenagogue, alexipharmic, and vulnerary. This sort was much valued among the ancients, and applauded by their poets. It was esteemed a specific for wounds of arrows, which it drew out with wonderful ease, and according to them only grew in the island of Crete, and only in a little obscure corner of it, whence it obtained its name *Dictamnus Cretica*. It still grows in that island. M. Tournefort, who was in Crete, describes the place where it grows, and says it flourishes there almost all the year.

This is a perennial plant, and though a native of stony grounds in Greece, and the island of Candy, bears the ordinary winters of our own climate. The tops are generally supplied from Italy, with the leaves tied up in bundles, which are often damaged or decayed, and at best not superior to those of our own growth. Lewis.

MARIS, in *Ichthyology*, a name given by Charleton and some others, to a fish called by the generality of both the ancient and modern writers, *smaris*, and by some *scaramouider*, from its whitish colour, and its external resemblance to the fish called *mœnis* and *mana*; it is, like that fish, a species of the sparus; and is distinguished by having a black spot on each side, and the tail and bellyfins red.

MARISCA, a word used by chirurgical writers to express an excrescence about the anus.

MARITACACA, in *Zoology*, the name of a very remarkable American animal, more usually known by the name of the OPOSSUM.

MARITIME, of *mare*, *sea*, denotes any thing belonging to the sea.

MARITIME *courts*. See COURT *of Admiralty*.

MARITIME *affairs*, is used in contradiction to the CIVIL and MILITARY estate, to express that part of his majesty's subjects, that are occupied in naval or sea service. See MARINERS and NAVY.

MARITUS, in the chemical jargon, a word used to express the sulphur of metals. The writers on the subject of the philosophers stone usually express themselves in this enigmatical manner, calling sulphur the husband, and mercury the wife in all metals; which, as they are more or less perfectly combined, make the metal more or less pure, and approaching to perfection.

MARK, in *Matters of Commerce and Manufactures*, a certain character struck, or impressed, on various kinds of commodities, either to shew the place where they were made, and the persons who made them; or to witness they have been viewed and examined by the officers or magistrates charged with the inspection of that manufacture; or, lastly, to shew that the duties imposed thereon have been regularly acquitted.

Thus are cloths, leathers, cutlery-ware, paper, plate, weights, measures, &c. to be *marked*.

The *mark* on goods also is what ascertains the property or goodness thereof, &c. And if one man shall use the mark of another, to the intent to defraud him damage, action upon the case lieth. A penalty is inflicted in this case, by the stat. 33 Eliz. cap. 8.

MARK is also a particular sign or character, known only to the trader who pitches on it; whereby, being fixed to any commodity, he recollects the price it cost him.

These *marks*, otherwise called *numerals*, are taken according to the fancy of those who use them; but, ordinarily, they are chosen from among the letters of the alphabet, each having a relation to some particular number of figures. They are of so much use in trade, that the

the reader will not take it amiss, if we infert a little table to ſerve as a model for their conſtruction:

A	B	C	D	E	F	G	H	I	K	L	M
0	1	2	3	4	5	6	7	8	9	10	20

One example will give the whole uſe of this table. Suppoſe, v. g. I would put on a piece of ſtuff, that it coſt 37*s.* 6*d.* per ell. I put an M for 20*s.* an L for 10*s.* an H for 7*s.* and a G for 6*d.* ſo that the ſeveral letters written after each other (obſerving always to ſeparate ſhillings from pounds, and from pence, by points) will make this *mark* M. LH. G. equal to 37*s.* 6*d.*

Note, the *mark* may be diverſified infinitely, by adding other figures to the letters, in lieu of theſe.

Ordinarily ſome word of a proper number of letters, all different ones, is choſen; that no relation may be traced among the letters: which may be done in the table here given.

MARK, *ſpecies*, the ſame with LAND-*mark*.

MARK, *letter of*. See LETTERS and MARQUE.

MARE, in the *Manege*. A horſe *marks*, that is, he ſhews his age by a black ſpot, called the bud or eye of a bean, which appears when he is five and a half, in the cavity of the corner teeth, and is gone when the horſe is eight years old. After that age he ceaſes to *mark*, and is ſaid to have razed. See EYE *of a bean*.

Full-MARKED is the ſame with *counter-marked*.

MARK, among *Bowlers*. See BOWLING.

St. MARK's *Goſpel*, a canonical book of the New Teſtament, being one of the four Goſpels. *St. Mark* wrote his Goſpel at Rome, where he accompanied St. Peter, in the year of Chriſt 64, or 65. Many of the moſt ancient writers aſſert, that *St. Mark* was no more than an amanuenſis or interpreter to St. Peter, who dictated this Goſpel to him; others affirm that he wrote it after St. Peter's death. It is probable that it was not compoſed long before Peter's death, and that it was not publiſhed, or did not become generally known, till after the death of Peter and Paul. This Goſpel appears, from the accounts given of it by the ancients, to contain the ſubſtance of Peter's preaching: and the Goſpel itſelf affords evidences of its being writ according to that apoſtle's diſcourſes, or according to information and directions given by him to this evangeliſt. Many circumſtances tending to Peter's honour, are not mentioned in this Goſpel: however there are many things that occur in this Goſpel, which are omitted by the other evangeliſts; and this fact proves, that *Mark* was not an epitomiſer of Matthew, as ſome have ſuppoſed, nor of any other author. The learned have been alſo divided as to the language this Goſpel was wrote in, ſome affirming it was compoſed in Greek, which is the more general and probable opinion, others in Latin. Several of the ancient heretics received only the Goſpel of *St. Mark*; others, among the Catholics, rejected the twelve laſt verſes of this Goſpel. But Dr. Lardner refers thoſe who doubt the genuineneſs of this part of the Goſpel, for ſatisfaction to Dr. Mill, and to the obſervations of Grotius, at the beginning of that chapter, and to Beza upon the ninth verſe; and for explaining thoſe twelve verſes, and reconciling them with the other evangeliſts, he refers to Grotius and other commentators. Lardner's Cred. vol. xv. p. 209.

St. MARK, *canons of*, a congregation of regular canons, founded at Mantua, by Albert Spinola, a prieſt, towards the end of the twelfth century.

Spinola made a rule for them, which was approved, corrected, and confirmed, by ſeveral ſucceeding popes. About the year 1450, they were reformed, and followed only the rule of St. Auguſtine.

This congregation, which at firſt conſiſted of eighteen or twenty houſes of men, and of ſome for women, ſituate in Lombardy, and the ſtate of Venice, having flouriſhed for the ſpace of four hundred years, declined by little and little, and was at length reduced to two convents; and, in 1584, that of *St. Mark* at Mantua, which was the chief, was given, with the conſent of pope Gregory XIII. to the CAMALDULIANS; and ſo the congregation became extinct.

St. MARK, *knights of*, an order of knighthood in the republic of Venice, under the protection of *St. Mark* the evangeliſt.

The arms of the order are, a lion winged gules, with this device, *Pax tibi, Marce evangeliſta*. This order is never conferred but on thoſe who have done ſignal ſervices to the common cauſe.

MARK, or MARC, alſo denotes a weight uſed in ſeveral ſtates of Europe, and for ſeveral commodities, eſpecially gold and ſilver in France: where it was introduced under Philip I. about the year 1080.

The *mark* is divided into eight ounces, or ſixty-four drachms, or a hundred and ninety two deniers or penny-weights, or a hundred and ſixty oſterlins, or three hundred mailles, or ſix hundred and forty ſelins, or four thouſand ſix hundred and eight grains.

In Holland, particularly at Amſterdam, the *mark* weight is alſo called Troy-weight, and is equal to that of Paris.

When gold or ſilver are ſold by the *mark*, it is divided into twenty-four carats; the carat into eight penny-weights, the penny-weight into twenty-four grains; and the grain into twenty-four primes. See CARACT.

MARK is alſo uſed among us for a money of account; and, in ſome other countries, for a coin.

The *Engliſh mark* is two-thirds of a pound ſterling, or 13*s.* 4*d.* and Matthew Paris obſerves, it was of the ſame value in 1194. The ancient Saxons, as many antiquarians have ſuppoſed, called the *mare*, MANCUS, or *mancuſa*, and *mares*; among them it was equivalent to thirty pence, i. e. to ſeven ſhillings and ſix pence of our money. But Dr. Miller, dean of Exeter, has lately ſuggeſted that the MANCUS and *mark* were not the ſame. Dr. Clarke obſerves, that the Daniſh ſilver *mark* was 20*s.* or one hundred Saxon pennies; and that the gold *mark* was twelve times as much; whereas the French *mark* was 13*s.* 4*d.* or one hundred and ſixty pence: and he has ſhewn, that the method of computing by the ſilver *mark* was introduced later into France, where it commenced between A. D. 1075, and 1093, than into England. He diſcovers traces of it in England, from the Daniſh kings till after the time of Henry II. The gold coins ſtruck from Edw. III. to Edw. IV. were diviſions of the *mark*, as half-*marks*, quarter-*marks*, and half-quarter-*marks*, at 6*s.* 8*d.* 3*s.* 4*d.* 2*s.* 2*d.* each: but from Edw. IV. when our connections with France ceaſed, the old way of computing by the pound came again into faſhion; but, as that by *marks* was jointly uſed, angels, and angelots, or half-angels, at 6*s.* 8*d.* and 3*s.* 4*d.* each, paſſed ſometimes as parts of them. However about forty years afterwards, this regard to the *marks* in our coins was quite laid aſide, and all the principal gold coins were ſtruck in proportion to the pound ſterling. Connexion of the Roman, Saxon, and Engliſh Coins, &c. p. 307, &c.

The *mark-lubs*, or *Lubeck-mark*, uſed at Hamburgh, is alſo a money of account, equal to one-third of the rix-dollar, or to the French livre. Each mark is divided into ſixteen ſols lubs.

Mark-lubs, or *daniſh*, is alſo a Daniſh coin, equal to ſixteen ſols-lubs, or twenty French ſols.

Laſtly, *mark* is a copper-coin in Sweden, equal to two pence farthing ſterling. It is divided into eight rouſtiqs, and each rouſtiq into two allerreures.

The Sweediſh ſilver *mark* is a money of account, equal to three copper *marks*; though ſome make it a real coin. See COIN.

MARKET, a public place in a city or town, where proviſions are expoſed to ſale.

The word is formed from the French *marché*, which ſignifies the ſame.

MARKET is alſo uſed for a liberty or priviledge, either by grant or preſcription, whereby a town is enabled to keep a *market*.

Bracton obſerves, that one *market* ought to be diſtant from all others at leaſt ſix miles and a half, and a third of an half. See FAIR.

In former times, it was cuſtomary to have moſt fairs and *markets* kept on Sundays, and in the church yard; ſo that matters of buſineſs and devotion were tranſacted all at the ſame place and time; which cuſtom, though prohibited by ſeveral kings, particularly 13 Ed. I. ſtat. 2. cap. 6. was yet held up till the reign of king Henry VI. when it was effectually ſuppreſſed, 27 Hen. VI. cap. 5. In many places they are ſtill kept in the church-yard.

In the country, things ſold in the *markets*, are to be in the uſual place appointed for the ſale; but in London, every ſhop is a *market* overt, for ſuch goods as are put there, to be ſold by the trade of the owner; though if the ſale be in a warehouſe, and not publicly in the ſhop, the property is not altered. Sale upon a Sunday, though in a fair or *market*, will not alter the properties of the thing ſold.

Perſons that dwell in the country, may not ſell wares by retail in a *market*-town, except in open fairs; but countrymen may ſell goods in groſs there. 1 and 2 P. and M. cap. 7. All contracts for any thing vendible in *markets*, &c. ſhall be binding, and ſales alter the property, if made according to the following rules. 1. The ſale is to be in a place that is open, ſo that any one who paſſeth by may ſee it, and be in a proper place for ſuch goods. 2. It muſt be an actual ſale, for a valuable conſideration. 3. The buyer is not to know, that the ſeller hath a wrongful poſſeſſion of the goods ſold. 4. The ſale muſt not be fraudulent, betwixt two, to bar a third perſon of his right.

5. There

5. There is to be a sale and a contract, by persons able to contract. 6. The contract must be originally and wholly in the *market* overt. 7. Toll ought to be paid, where required by statute. 8. The sale ought not to be in the night, but between sun and sun; though if the sale be made in the night, it may bind the parties. Sale of goods stolen in London, to brokers, &c. alters not the property, 1 Jac. I. cap. 21. And the statutes, which ordain, that toll-takers shall be appointed in *markets* and fairs, to enter in their books the names of horses, &c. secure the property of stolen horses to the owner, although sold in a fair or *market*, if he repays what was *bona fide* paid for the HORSE. 2 and 3 P. and M. cap. 7. 31 Eliz. cap. 12. A pie-powder COURT is incidental to a *market*, as well as a fair: keeping a fair or *market*, otherwise than it is granted, as on two days, when only one is granted, or on any other day than that appointed, &c. is cause of forfeiture. And if a person erects stalls in a *market*, and does not leave room for the people to stand and sell their wares, so that they are thereby forced to hire such stalls, taking money for the use of them is extortion.

MARKET, *court of the clerk of the*, is incident to every fair and *market* in the kingdom, to punish misdemeanors therein; and a COURT of *pie poudre* is to determine all disputes relating to private or civil property. The object of this jurisdiction, (see stat. 17 Car. II. cap. 19. 22 Car. II. cap. 8. 23 Car. II. cap. 12.) is principally the cognizance of weights and measures, to try whether they be according to the true standard thereof or no: which standard was anciently committed to the custody of the bishop, who appointed some clerk under him to inspect the abuse of them more narrowly; and hence this officer, though now usually a layman, is called the clerk of the *market*. If they be not according to the standard, then, beside the punishment of the party by fine, the weights and measures themselves ought to be burnt. This is the lowest court of criminal jurisdiction in the kingdom.

MARKET, *clerk of the*, in the king's household. See CLERK-MARKET-*towns*. See TOWNS.

MARKING-*yarn*, in ships of war, is white yarn spun the wrong way, and put into all cordage of three inches and upwards, as the king's work. Blanki. Nav. Exped. p. 103.

MARLE, MARGA, a kind of slightly coherent earth, not in the least ductile or viscid while moist, most easily diffusible in, and difunited by water, and by it reduced into a soft loose incoherent mass. *Marles* are earths composed of different proportions of argillaceous and calcareous earths: from the latter they derive the property of effervescing with acids, and they are fusible by fire, as all mixtures of these two earths are. By a less heat, if the calcareous earth predominates, they are calcinable into a kind of quick-lime; and if the clay predominates, they may be changed by fire into hard masses, capable of striking ignited sparks from steel.

The word comes from the ancient Celtic *margo*, mentioned by Pliny: it was afterwards called *margila*.

There are several sorts of *marle*, of different colours and qualities; as the ash and grey, the yellow, the brown, and the blue; but the principal are *white* and *red*. Of the white, some are not acted upon by acids, as the *terra* SAMIA and MELIA, and others are alcaline, as the TERRA *Cimolia* and CIMOLIA. The red *marles* are not acted upon by acids, and are used as manure; the ashen grey are alcaline; the yellow are not acted upon by acids, and are used as manures; the brown are the different species of FULLER'S *earth*; and the blue, not acted upon by acids, are used for manure.

The *marles* in the northern parts of England contain sand, and run into a sort of loam: those in Sussex are more like fuller's earth, and therefore are by much the fattest and richest.

Marle, in general, is much of the nature of chalk; and the potters find, that when either chalk or *marle* happens to be mixed with their clay, they will burn with the red of the substance, and the vessels will seem very sound; but as soon as any water is put in them, they will run, the chalk or *marle* having been burnt into a sort of lime, and flaking like common lime with the water.

The *marles* that are so sandy, that they can scarce hold together, are a very good manure for cold clay-lands, and are an objection to the general rule, that *marle* is not to be used to clay. *Marle*, in general, suits best with hot lands, for it is apt to bind and fadden the tough clays; but as there are no rules without their exceptions, where *marle* is not laid too thick, and is not of too binding a kind, it will often very much improve pasture-grounds, though they are upon a clayey soil.

Cow-shut or stone-*marle* is, in most countries, found under clay, or low black land, seven or eight feet deep; clay and steel-*marle* sometimes under sandy land: in clayey ground it seldom lies more than three foot deep; but in sandy ones it is often much deeper. The stone, slate, or *flag marle* is found near rivers and sides of hills, and is a very lasting manure: the peat or delving *marle* is the strongest of all, and found on the sides of hills, and in wet boggy grounds. The paper *marle*, which lies near coals, is little esteemed. The Sussex *marle* commonly shews itself pretty low among the broken strata of hanging grounds.

For the digging of *marle* they commonly use pick-axes, shovels, spades, and wheel-barrows; and where the pit is broad, that they can make an easy ascent, small carts of four feet ten inches long, and two feet three inches wide, and about fourteen inches deep, made so that a load is very easily shot out of them.

The goodness of *marles*, says Miller, may be better judged of by their purity and uncompoundedness than by their colour: thus, if the *marle* will break in pieces like dice, or into thin flakes, or is found [illegible] ore, and without mixture of gravel or sand [illegible] Like flate stones, and shatter after [illegible] when it has been exposed to the [illegible] gether when thoroughly dry, like [illegible] and tender, and will open, and [illegible] which it is laid, it will be beneficial [illegible] the goodness of *marle*, by putting some of it into [illegible] of water; and reckon it good, if it diffolves as soon as it comes to the bottom; if it sparkle in the water, and feel fat between the fingers; but the fureft fign of its goodness is, if it diffolves by wet or froft. The ftrength of *marle* may alfo be known, by putting a lump of it into a glafs of good vinegar, where a conſiderable fermentation indicates its goodneſs.

Marle is fuppoſed by ſome to be fruitful from its falt and oily quality; the falt it is fuppoſed to contract from the air, and therefore many are of opinion, that the longer it is expoſed to the air before it is uſed, the better. They lay it upon the graſs-ground, in ſome places, three or four years before they plow it up: and when they cover the arable lands with *marle*, they will not plow, in many places, to more than an inch deep, that they may not bury it. Markham, indeed is of a contrary opinion, and would have it buried deep, that the ſun may not draw out its virtue. The *marles* of different places are in themſelves ſo different, that both theſe opinions ſeem right in part; the *marle* of Suſſex being found to ſucceed beſt where buried deep, as ſoon as taken from the pit; and thoſe of the north of England feldom doing much good to the lands, unleſs they are expoſed a long time firſt.

Others, however, aſcribe the fertilizing quality of *marle* to its calcareous earth, which is known to be a powerful fertilizer of land: or it may introduce a certain degree of tenacity into too light and ſandy ſoils, by which means the water, which is the principal pabulum of plants, is prevented from eſcaping too faſt by evaporation. The experience of the farmers in different places has ſhewn alſo, that different times are to be obſerved for the laying it on, according to its nature and that of the land to be improved by it. In Suſſex they always lay on the *marle* in the beginning of winter; and in Staffordſhire in May and June. Good *marle* will flake lime with the ſun's heat in a hot day, eſpecially if there has happened any rain. Some farmers harrow in the *marle*, juſt before they plow the land, which is a very good way to mix it perfectly. Cole-ſeed, clover, and all kinds of hay-plants, grow well upon *marled* lands. Lands ſcated on *marle* are uſually very rich, though in their own nature cold and heavy. The deeper theſe lands are turned up in plowing, the better crops they will always yield. Mortimer's Huſbandry, p. 95.

It is a very material circumſtance in the *marling* of land, to find out how much the land requires of this manure; and till experience has thoroughly ſhewn this, it is better to err in laying on too little than too much, becauſe the latter is a fault not to be remedied. It is to be obſerved alſo, that *marle* never makes ſo great improvement on land the firſt year as it does afterwards.

In Staffordſhire, they lay two [illegible] of *marle* upon an acre of land of the [illegible] lands; [illegible] where the ſoil is black, looſe, and [illegible] they will lay on three or four hundred [illegible] an acre; it being a rule with them, that this [illegible] *marled* too much. If the mould be thin, [illegible] inches; if deep, it muſt have the more.

It is beſt ſowing of *marle* [illegible] in winter; becauſe if theſe lands are well [illegible] they will be very mellow and hollow, which will [illegible] the earth's ſinking from the roots of the corn, [illegible] ſo much. If *marle* ſuddens land, or makes it [illegible] muſt be well dunged, and laid down for [illegible] In Staffordſhire, after their land is *marled*, they [illegible] crops following: after the firſt crop [illegible] they plow in the wheat ſtubble in December, [illegible] if the weather proves frothy, to mellow it; they [illegible] it again in April. They then ſow it with barley, allowing three buſhels

bushels of seed to an acre. The common produce of this is thirty bushels. After they sow peas, for which they plow only once in the February following, allowing only three bushels of seed to an acre, as in the barley. Next after this, if they intend six crops, they sow wheat again upon the peas-crop; the fifth crop is barley again; and the sixth year's crop is red oats. Some sow two or three crops more, when the ground has been well *marled*, but that is much better let alone.

In digging for the *marle* they use in manuring their lands in Ireland, they meet with fossile horns, and other curious fossils. The *marle* always lies in the bottoms of low bogs. It is never met with in any other places, and is found by boring with augres made for that purpose. It usually lies at five, seven, or nine feet depth. The obtaining it in many places is attended with very considerable expences, in draining off the water. The manner of digging it is this: they employ six able labourers, and a supernumerary; and these cut up a hole of twelve feet square, which is supposed a pit that this number of men can manage in one day. Four men dig, two throw it up, and two throw it by, and the supernumerary man supplies defects on all occasions. For the first three feet they dig through a fuzzy earth, fit for making of turf or fuel. Under this lies a stratum of gravel, of about half a foot. Under this often, for three feet more, there is a more kindly moss, which would make better fuel. This lower stratum of turf is always full of fossile wood, which is usually so soft, that the spade cuts as easily through it, as through the earth it lies in. Under this, for about three inches, is found a series of leaves, principally of the oak; these appear very fair to the eye, but fall to pieces on touching; and this stratum is sometimes interrupted with vast heaps of seed, which seem to be broom or furze-seed. In some places there appear berries of different kinds; and in others, several species of sea-plants, all lying in the same confused manner as the oak-leaves. Under this vegetable stratum there lies one of blue clay, half a foot thick, and usually full of sea-shells. This blue clay is not so tough as common clay, but is thrown carefully up, and used as *marle* in some places. Under this always appear the right *marle*; the stratum of this is usually from two to four feet thick, and sometimes much more. Phil. Trans. N° 204. p. 122.

This *marle* looks like buried lime, and is full of shells; which are usually of a small size, and of the periwinkle kind; but there are several other sorts, at times, found among them. Among this *marle*, and often at the very bottom of it, are found great numbers of very large horns of the deer-kind, which are vulgarly called elks-horns. These, where they join to the head, are thick and round; and at that joining there grows out a branch, which is about a foot long, and seems to have hung just over the creature's eyes; it grows still round for about a foot above this, and then spreads broad, and terminates in branches, long and round, turning with a small bend. The labourers are obliged to work in a hurry in all these pits, so that they seldom bring them out whole. There are also, at times, found the leg-bones, and other parts of the skeletons of the same beasts; but this more rarely, only a few together, and but in few places.

MARLE, in *Medicine*, has been esteemed an astringent, and given as such in diarrhœas, dysenteries, and hæmorrhages: the red kind is preferred for the last intention, though the difference is hardly worth regarding. The Germans give it also in fevers, in convulsions, and particularly in epileptic cases; also in internal bruises.

MARLE *dice*, in *Husbandry*, a name given by the people of Staffordshire to a reddish *marle*, that breaks into small square pieces like dice, or else into thin flakes, in the manner of lead-ore, and looks smooth on the surface. This is a good manure, and the way of judging which of it is best, is to expose it to the air in rainy weather, or to put it in water. That which moulders soonest to powder in the air, and breaks quickest in the water, is sure to be the best, and proves very beneficial to land.

MARLY, *marling of*, in *Hydraulics*, is a very complex machine for raising water, at *Marly*, about ten miles north-west of Paris, the primum mobile whereof is an arm of the river Seine, which, by its stream, furnishing a fall of water, of three feet, turns fourteen large wheels, which work the bellows, and these with pistons raise the water into the pumps; and with other pistons force it up its pipes against the front of a hill to a reservoir in a stone tower. The cistern of the tower, which receives the water raised from the river, is 600 feet higher than the lower and of the first stages of the lower engines of the machine. The latter is also an aqueduct of thirty-six arches; whence the water is separated into different conduits, which lead it to *Marly*, and formerly led it to Versailles and Trianon. The number of pumps in this machine is 253; and the quantity of water raised by it, amounts to 5258 tons in twenty-four hours, or near 220 tons per hour, or 3⅔ tons per minute: but the *London-bridge* WATER-*works*, with four wheels only, raise 11724 tons in twenty-four hours, which is almost twice and a quarter as much. Some of the largest of our fire or STEAM-*engines*, used in England, will raise as much water as that of *Marly* to the same height, and not cost above 10,000l.

This *machine*, which began to work in 1682, and is said to have cost cost above four millions of pounds sterling, was made by one Rennequin, a common mechanic of Liege, and has a great many excellent contrivances; but yet does not raise all the water that it might have done, because the maker did not know how to give the river Seine all the advantages of which it was capable. Hence appears the necessity of a mechanic's being well acquainted with mathematics; or that able mathematicians should apply themselves to mechanics more than they do, and not think it below them to direct workmen. See Desagul. Exper. Philos. vol ii. p. 442 to 449.

According to Dan. Bernoulli's computation, the effect of the *machine at Marly* is not more than ⅓ of its absolute force; that is, there is a loss of ⅔ of that force. Dan. Bernoul. Hydrodyn. p. 182.

MARLINE, on board a ship, is a small line made of hemp untwilled, that it may be the more gentle and pliable: its use is to seize the ends of ropes from fairing out. They use it also to seize the straps at the arse (as they call it) or lower end of the block. See HOUSE-*line*.

MARLING, in *Sea Language*, denotes the art of winding any small line, as *marling*, spun-yarn, pack-thread, &c. about a rope, so that every turn is secured by a sort of knot, so as to remain fixed in case all the rest should be cut through by friction, &c.

Marling is commonly used to fasten slips of canvas, called parrils, or PARCELLING, upon the surface of a rope, to prevent it from being galled by another rope that rubs against it, to attach the foot of a sail to its bolt-rope, &c.

MARLING *a sail*, is when being so rip't out of the bolt-rope, that it cannot be sewed in again, the sail is fastened by a *marline*, put through the eye-let holes, made in it for that purpose, under the bolt-rope.

MARLINGS*pike*, is an iron pin, tapered to a point, and furnished with a large round head. It is principally used to penetrate the twists or strands of a rope, in order to introduce the ends of some other through the intervals, in the art of knotting or splicing. It is also used as a lever, on many other occasions, about the rigging, particularly in fixing the seizings upon the shrouds, block-strops, clues of the sails, &c. Falconer.

MARMALADE, a confection made of the juice or pulp of some fruit, as plums, apricots, quinces, boiled with sugar into a consistence.

The *marmalade* of quinces is the most frequent: it is astringent, and grateful to the stomach.

MARMARO-*sphera*, in *Natural History*, is a species of stones forming continued strata, bright and beautiful, of very lively colours, and of a constitution so fine, that they will take a good polish: in all which particulars they agree with the genus of MARBLES, but differ from them in that they are never calcareous, nor do they ferment with acids. To the same class belong the GRANITES and the PORPHYRIES.

The *marmaro-sphera* are stones of a compact, uniform texture, like that of marbles; some of them are vitrifiable, others not; and some are of such hardness, as to strike fire with steel. Of this kind is the BASALTES. Da Costa's Hist. Foss. p. 252, &c.

MARMARYGÆ, a word used by the old writers in medicine, to express sparks of fire, or the appearance of such flashing before the eyes in some disorders.

MARMOR, *marble*, in *Natural History*. See MARBLE.

MARMORARIA, in *Botany*, a name given by some authors to the *branchia ursina*.

MARMORATA *aurium*, a term used by some authors to express ear-wax.

MARMORELLA, in *Botany*, a name by which some authors have called AGRIMONY.

MARMOREUS *tartarus*, a word used by some authors to express the hardest kind of the calculus, or STONE in the human bladder.

MARMOROIDÆ, in *Natural History*, are stones, which, in their nature, texture, appearance, and other properties, resemble MARBLES; and only differ from them, in that the bodies of this genus never form continued strata, but are only found in loose independent masses, lodged in strata of other substances. Mr. Da Costa subdivides these into *marmoroida* of a plain structure, and those which contain shells, corals, and other extraneous bodies. Hist. Fossils, p. 241, &c.

MARMOT-*fish*. See FALX.

MAR-

MARMOTTE, *marmotta*, *mus marmota*, of Linnæus, in *Zoology*, the mountain-rat, a creature very common in many parts of Europe, and frequently carried about as a shew by the poor Savoyards. It is about the size of a leveret; its whole figure and appearance are like the common rat, whence it has its name; its fur is much harder or farther than that of the rabbit, and its colour a reddish tawney; the end of its tail is black; its eyes are large and prominent, and its ears short, hid in the fur, and seeming as if cut off; it has two large teeth at the front of each jaw, as the squirrel, and other creatures of this kind, and these are not white, but yellow, as in the beaver; its nose and mouth are adorned with a large number of black whiskers, making a sort of beard; the tail is about five inches long, and the legs are thick and covered with long hair; its toes, which are four before and five behind, are disposed as in the bear, and its claws are very long and strong, by means of which it digs the earth very readily; it makes great use of its hinder legs, and sometimes walks on them in an erect posture; its back always appears very fleshy and fat, though the rest of the body be ever so lean. Ray, Syn. Quad. p. 221. *Vol.* III. *Synd. fig.* 32. They will play with one another in the manner of kittens, and make a soft and not disagreeable noise on those occasions; but when they are provoked, or when they are affected, as they always are by a change of weather, they make a very shrill and disagreeable squeaking. The *marmotte* is a creature easily bred up tame, and will be perfectly good humoured and familiar, but it hates dogs. This animal, in Poland, is said to herd in large communities, and to be governed by a regular policy.

There are other species in Maryland, Canada, Germany, Russia, and Lapland. See *Sable*-MOUSE. Pennant's Zool. p. 270, &c.

MARONITES, in *Ecclesiastical History*, a sect of eastern Christians, who follow the Syrian rite, and are subject to the pope; their principal habitation being on mount Libanus.

Motheim informs us, that the doctrine of the MONOTHELITES, condemned and exploded by the council of Constantinople, found a place of refuge among the Mardaites, a people who inhabited the mounts Libanus and Antilibanus, and who, about the conclusion of the seventh century, were called *Maronites*, after *Maro*, their first bishop; a name which they still retain. None, he says, of the ancient writers, give any certain account of the first person who instructed these mountaineers in the doctrine of the Monothelites: it is probable, however, from several circumstances, that it was John Maro, whose name they had adopted; and that this ecclesiastic received the name of Maro, from his having lived in the character of a monk, in the famous convent of St. Maro, upon the borders of the Orontes, before his settlement among the Mardaites of mount Libanus. One thing is certain, from the testimony of Tyrius and other unexceptionable witnesses, as also from the most authentic records, viz. that the *Maronites* retained the opinions of the Monothelites until the twelfth century, when abandoning and renouncing the doctrine of one will in Christ, they were re-admitted, in the year 1182, to the communion of the Roman church. The most learned of the modern *Maronites* have left no method unemployed to defend their church against this accusation; they have laboured to prove, by a variety of testimonies, that their ancestors always persevered in the Catholic faith, in their attachment to the Roman pontiff, without ever adopting the doctrine of the Monophysites, or Monothelites. But all their efforts are insufficient to prove the truth of these assertions to such as have any acquaintance with the history of the church, and the records of ancient times; for to all such, the testimonies they allege will appear absolutely fictitious and destitute of authority. Eccl. Hist. vol. ii. p. 37, &c. 8vo. edit.

Faustus Nairon, a *Maronite*, settled at Rome, has published an apology for *Maron*, and the rest of his nation. His tenet is, that they really took their name from the *Maron*, who lived about the year 400, and of whom mention is made in Chrysostom, Theodoret, and the Menologium of the Greeks. He adds, that the disciples of this *Maron* spread themselves throughout all Syria; that they built several monasteries, and, among others, one that bore the name of their leader; that all the Syrians, who were not tainted with heresy, took refuge among them; and that, for this reason, the heretics of those times called them *Maronites*.

Motheim observes, that the subjection of the *Maronites* to the spiritual jurisdiction of the Roman pontiff, was agreed to with this express condition, that neither the popes nor their emissaries should pretend to change or abolish any thing that related to the ancient rites, moral precepts, or religious opinions of this people: so that, in reality, there is nothing to be found among the *Maronites* that savours of popery, if we except their attachment to the Roman pontiff, who is obliged to pay very dear for their friendship. For, as the *Maronites* live in the utmost distress of poverty, under the tyrannical yoke of the Mahometans, the bishop of Rome is under the necessity of furnishing them with such subsidies as may appease their oppressors, procure a subsistence for their bishop and clergy, provide all things requisite for the support of their churches, and the uninterrupted exercise of public worship, and contribute in general to lessen their misery. It is certain that there are *Maronites* in Syria, who still behold the church of Rome with the greatest aversion and abhorrence; nay, what is still more remarkable, great numbers of that nation residing in Italy, even under the eye of the pontiff, opposed his authority during the last century, and threw the court of Rome into great perplexity. O[illegible] these non-conforming *Maronites* retired [illegible] of Piedmont, where they joined the [illegible], above six hundred in number, with [illegible] ecclesiastics at their head, fled [illegible] protection of the republic of [illegible] the violence of the inquisitors. Eccl. Hist. vol. iii. p. 208.

The *Maronites* have a patriarch, who resides in the monastery of Cannubin, on mount Libanus, and assumes the title of patriarch of Antioch, and the name of Peter, as if he deemed desirous of being considered as the successor of that apostle. He is elected by the clergy and the people, according to the ancient custom; but, since their reunion with the church of Rome, he is obliged to have a bull of confirmation from the pope. He keeps a perpetual celibacy, as well as the rest of the bishops his suffragans: as to the rest of the ecclesiastics, they are allowed to marry before ordination; and yet the monastic life is in great esteem among them. Their monks are of the order of St. Antony, and live in the most obscure places in the mountains, far from the commerce of the world.

As to their faith, they agree in the main with the rest of the Eastern church. Their priests do not say mass singly; but all say it together, standing round the altar. They communicate in unleavened bread; and the laity have hitherto partaken in both kinds, though the practice of communicating in one has of late been getting footing, having been introduced by little and little. In Lent they eat nothing, unless it be two or three hours before sunrising: their other fastings are very numerous.

To MAROON, in *Sea Language*, is to put one or more sailors ashore upon a desolate island, under pretence of their having committed some great crime. This detestable expedient has been repeatedly practised by some inhuman commanders of merchant-ships, particularly in the West Indies.

MAROTIC *style*, in the *French Poetry*, denotes a peculiarly gay, pleasant, yet simple and natural manner of writing, introduced by Clement *Marot*, and since imitated by other authors, but with most success by De la Fontaine and Rousseau.

The difference between the *Marotic* and the burlesque style is thus assigned: the *Marotic* makes a choice; the burlesque admits of all. The first is the most simple; but its simplicity has its noblenes; and, where its own age will not furnish natural expressions, it borrows them from former times: the latter is low and grovelling, and borrows false and fulsome ornaments from the crowd, which people of taste despise. The one resigns itself to nature; but examines first of all, whether the objects she presents be fit for its paintings, and takes nothing but what carries with it somewhat of delicacy and mirth: the other runs headlong into buffoonery, and affects every thing that is extravagant and grotesque. See BURLESQUE.

MAROTTI, in *Botany*, is a tall tree growing in Malabar, with leaves like those of bay, bearing a round oblong fruit, including a very large, hard, and yellowish stone, containing ten or eleven [illegible] extracted from the seeds or kernels of the [illegible] and cures the scabies and itching [illegible] the parts: it is good also, for eyes [illegible] humours; and mixed with allies, it is [illegible] impostumes and abscesses in cows [illegible] and beasts of burden. Raii Hist. P[illegible]

MARQUE, *law of*. S[illegible]

MARQUE, *letters of*, are [illegible] granted by [illegible] or state, whereby the [illegible] are legalized to make reprisals on tho[illegible] by reason application has been made for [illegible] against whom to the aggressor belongs, [illegible] subject.

The first *letter of marque* [illegible] any account in the history of this country, was [illegible] Edw. I. in 1295, against the subjects of [illegible]

These letters are granted by the law of nations, when-

ever

ever the subject of one state are oppressed and injured by those of another; and justice is denied by that state to which the oppressor belongs: and with us it is declared by stat. 4 Hen. V. cap. 7. that if any subjects of the realm are oppressed in time of truce by any foreigners, the king will grant *marque* in due form to all that feel themselves aggrieved. Which form is thus directed to be observed: the sufferer must first apply to the lord privy seal, and he shall make out letters of request under the privy-seal: and if, after such request of satisfaction made, the party required do not within convenient time make due satisfaction or restitution to the party grieved, the lord chancellor shall make him out letters of *marque*, under the great seal: and by virtue of these he may attack and seize the property of the aggressor nation, without hazard of being condemned as a robber or pirate. Blackst. Comm. vol. i. p. 259.

They are so called from the German *marche, limit, frontier*; being *jus concessum in alterius principis marcas seu limites impetendi, sibique jus faciendi*; as being a right of passing the limits or frontiers of another prince, and doing one's self justice. See LETTERS and REPRISALS.

MARQUETRY, *inlaid work*; a curious kind of work, composed of pieces of hard fine wood of different colours, fastened, in thin slices, on a ground, and sometimes enriched with other matters, as tortoise-shell, ivory, tin, and brass.

There is another kind of *marquetry* made, instead of wood, of glasses of various colours; and a third, where nothing but precious stones, and the richest marbles, are used: but these are more properly called MOSAIC *work*.

The art of inlaying is very ancient, and is supposed to have passed from the East to the West, as one of the spoils brought by the Romans from Asia. Indeed, it was then but a simple thing; nor did it arrive at any tolerable perfection till the fifteenth century, among the Italians. It seems finally to have arrived at its height, in the seventeenth century, among the French.

Till Jofin of Verona, a contemporary with Raphael, the finest works of this kind were only black and white, which are what we now call *marqueterie*; but that religious, who had a genius for painting, stained his woods with dyes, or boiled oils, which penetrated them. But he went no farther than the representing buildings and perspectives, which require no great variety of colours. Those who succeeded him, not only improved on the invention of dying the woods, by a secret which they found of burning them without consuming, which served exceedingly well for the shadows; but they had also the advantage of a number of fine new woods of naturally bright colours, by the discovery of America. With these assistances, the art is now capable of imitating any thing; whence some call it, the *art of painting in wood*.

The ground, whereon the pieces are to be arranged and glued, is ordinarily of oak or fir, well dried; and, to prevent warping, it is composed of several pieces glued together. The wood to be used, being reduced into leaves of the thickness of a line, is either stained with some colour, or made black for shadow; which some effect by putting it in sand extremely heated over the fire; others by steeping it in lime-water and sublimate; and others, in oil of sulphur. Thus coloured, the contours of the pieces are formed, according to the parts of the design they are to represent.

The last is the most difficult part of *marquetry*, and that wherein most patience and attention are required. The two chief instruments used herein are the saw and the vice; the one to hold the matters to be formed; the other to take off from the extremes, according to occasion. The vice is of wood, having one of its chaps fixed, the other moveable, and is opened and shut by the foot, by means of a cord fastened to a treadle. Its structure is very ingenious, yet simple enough, and will be easily conceived from the figure, *Joh. II. Miscellany, fig. 20*.

The leaves to be formed (for there are frequently three or four of the same kind formed together) are put within the chaps of the vice, after being glued on the outermost part of the design, whose profile they are to follow; then the workman, pressing the treadle, and thus holding fast the piece, with his saw runs over all the outlines of the design. By thus joining and forming three or four pieces together, they not only gain time, but the matter is likewise the better enabled to sustain the effort of the saw; which, how delicate soever it may be, and how lightly soever the workman may conduct it, without such a precaution, would be apt to raise splinters, to the ruin of the beauty of the work.

When the work is to consist of one single kind of wood, or of tortoise-shell, on a copper or tin ground, or *vice versa*, they only form two leaves on one another, i. e. a leaf of metal and a leaf of wood or shell: this they call sawing in counter-parts; for, by filling the vacuities of one of the leaves by the pieces coming out of the other, the metal may serve as a ground to the wood, and the wood to the metal.

All the pieces, thus formed with the saw, are marked, to know them again; and the shadow being given in the manner already mentioned, they veneer or fasten each in its place on the common ground; using for that purpose the best English glue. The whole is then put in a press to dry, planed over, and polished with the skin of the sea-dog, wax, and shave-grass, as in simple *veneering*; with this difference, however, that in *marquetry*, the fine branches, and several of the most delicate parts of the figures, are touched up, and finished with a graver.

They are the cabinet-makers, joiners, and toymen, among us, who work in *marquetry*; and the enamellers and stone-cutters, who deal in mosaic work; the instruments used in the former are mostly the same with those used by the ebonists. See EBONY.

MARQUIS, or MARQUESS, MARCHIO, a title given to a person in possession of a considerable demesne erected into a *marquisate* by letters patent; holding a middle place between the dignity of a duke and that of an earl or count.

The word, according to some authors, comes from the *Marcomanni*, an ancient people, who inhabited the marches of Brandenburg. Others derive it from the German *marche, limit*; and others from *marrisa*, which, in the Celtic language, signified *a wing of cavalry*. Nicod derives it from the corrupt Greek μαρχια, *provinces*. Alciat and Pauchet bring it from *marc, horse*, taking a *marquis* to be properly an officer of horse. Menage derives it from *marca, frontier*; and Selden, Krantzius, and Hottoman do the same. Lastly, Pasquier fetches *marquis* from the old French *marche, limit*; or from *marchir, to confine*; the guard of the frontiers being committed to them. *Marquises* were anciently governors of frontier cities or provinces, called *marches*. In Germany, they are called *margraves*.

Marquis is originally a French title: the Romans were unacquainted with it. In the Notitia Imperii, they were called *comitates limitanei*. The first time we hear of *marquises, marchiones*, is under Charlemagne, who created governors in Gascony under this denomination.

Alciat has started a question, whether a *marquis* or count should have the precedence? To decide it he goes back to the ancient function of counts; and observes, that counts, who are governors of provinces, are above *marquises*, who are only governors of frontiers; and that *marquises*, who are governors of frontier-cities, are above those counts, who are governors of small towns. He adds, that, in consequence of this distinction, the book of fiefs sometimes places *marquises* above counts, and sometimes counts above *marquises*.

Froissart observes, that the *marquisate* of Juliers was erected into a county: but now-a-days, neither *marquises* nor counts are any longer governors; and, as they are mere titles of honour, the counts make no scruple of resigning the precedency.

King Richard the Second was the first who introduced the dignity of *marquis* among us, by creating Robert de Vere earl of Oxford, *marquis* of Dublin: but this was a title without office; the frontiers being governed by *lords* MARCHERS. Selden's Titles of Honour, p. 216.

MARQUIS'S *coronet*. See CROWN.

MARRIAGE, a civil and religious contract, whereby a man is joined and united to a woman, for the ends of procreation.

The essence of *marriage* consists in the mutual consent of the parties. *Marriage* is part of the law of nations, and is in use among all people. The Romanists account it a sacrament.

The woman, with all her moveable goods, immediately upon *marriage*, passes wholly *in potestatem viri*, into the power and disposal of the husband.

The first inhabitants of Greece lived together without *marriage*. Cecrops, king of Athens, is said to have been the first author of this honourable institution among that people. After the commonwealths of Greece were settled, *marriage* was very much encouraged by their laws, and the abstaining from it was discountenanced, and in many places punished. The Lacedæmonians were very remarkable for their severity towards those who deferred *marriage* beyond a limited time, as well as to those who wholly abstained from it. The Athenians had an express law, that all commanders, orators, and persons entrusted with any public affair, should be married men. POLYGAMY was not commonly tolerated in Greece. The time of *marriage* was not the same in all places; the Spartans were not permitted to marry till they arrived at their full strength; the reason assigned for this custom by Lycurgus was, that the Spartan children might be strong and vigorous; and the Athenian laws are said to

have once ordered, that men should not marry till thirty-five years of age. The season of the year which they preferred for this purpose was the winter, and particularly the month of January, called GAMELION. The Greeks thought it scandalous to contract *marriage* within certain degrees of consanguinity; whilst most of the barbarous nations allowed incestuous mixtures.

Most of the Grecian states, especially such as made any figure, required their citizens should match with none but citizens, and the children were not allowed to marry without the consent of their parents. The usual ceremonies in promising fidelity was kissing each other, or giving their right hands, which was a general form of ratifying all agreements. Before the *marriage* could be solemnized, the gods were to be consulted, and their assistance implored by prayers and sacrifices, which were offered to some of the deities that superintended these affairs, by the parents, or nearest relations of the persons to be *married*. When the victim was opened, the gall was taken out and thrown behind the altar, as being the seat of anger and malice, and therefore the aversion of all the deities who had the care of love, as well as those who became their votaries. For the particularities relating to the bride and bridegroom, see BRIDE and BRIDEGROOM.

The ceremonies of the Spartan *marriages* being different from all others, deserve to be mentioned at length, as related by Plutarch. "When the Spartans had a mind "to *marry*, their courtship was a sort of rape upon the "persons they had a fancy for; and those they chose "not tender and half-children, but in the flower of their "age, and full ripe for a husband. Matters being agreed "between them, the *nuptiæ*, or woman that contrived "and managed the plot, shaved off the bride's hair close "to her skin, dressed her up in man's cloaths, and left "her upon a mattress: this done, the bridegroom entered in his common cloaths, sober and composed, as "having supped at his ordinary in the common hall, and "stole as privately as he could into the room where the "bride lay, untied her virgin girdle, whence ΛΥΣΙΖΩΝΟΣ, is "*to deflower*, and took her into his embraces. Having "stayed a short time with her, he returned to his comrades, with whom he continued to spend his life, remaining with them as well by night as by day, unless "when he stole a short visit to his bride; and that could "not be done without a great deal of circumspection, "and fear of being discovered. Nor was the wanting "(as may be supposed) on her part, to use her wit in "watching the most favourable opportunities for their "meeting, and making appointments when company "was out of the way. In this manner they lived a long "time, insomuch that they frequently had children by "their wives before they saw their faces by day-light. "The interview being thus difficult and rare, served not "only for a continual exercise of their temperance, and "farthered very much the ends and intentions of *marriage*, but was a means to keep their passion still alive, "which flags and decays, and dies at last by too easy "access, and long continuance with the beloved object." Potter, Archæol. book iv. c. xi. p. 205, seq.

The Romans, as well as the Greeks, disallowed of POLYGAMY. A Roman might not marry any woman who was not a Roman. Among the Romans, the kalends, nones, and ides of every month, were deemed unlucky for the celebration of *marriage*, as was also the feast of the PARENTALIA, and the whole month of May. The most happy season in every respect was that which followed the ides of June.

The Roman laws speak of second *marriages* in very hard and odious terms: *Matre jam fœcundis nuptiis functâ*, L. iii. C. de sec. nuptiis. By these laws it was enacted, that the effects of the husband or wife deceased should pass over to the children, if the survivor should marry a second time. By the law *Hoc edictali*, Cod. de sec. nupt. the survivor, upon *marrying* a second time, could not give the person he married a portion more than equal to that of each of the children. In the primitive church, the respect to chastity was carried so high, that a second *marriage* was accounted no other than a lawful whoredom, or a species of bigamy; and there are some ancient canons, which forbid the ecclesiastics from being present at second *marriages*.

Marriage, by the Mosaic law, was subject to several restrictions: thus by Levit. chap. xviii. ver. 16. a man was forbid to marry his brother's widow, unless he died without issue; in which case, it became enjoined as a duty. So it was forbid to marry his wife's sister, while she was living, ver. 18. which was not forbidden before the law, as appears from the instance of Jacob.

The ancient Roman law is silent on this head; and Papinian is the first who mentions it, on occasion of the marriage of Caracalla. The lawyers who came after him stretched the bonds of AFFINITY so far, that they placed ADOPTION on the same foot with nature.

Affinity, according to the modern canonists, renders marriage unlawful to the fourth generation, inclusive; but this is to be understood of direct affinity, and not of that which is secondary or collateral. *Affinis mei affinis, non est affinis meus.* It is farther to be observed that this impediment of *marriage* does not only follow an affinity contracted by lawful matrimony, but also that contracted by a criminal commerce; with this difference, that this last does not extend beyond the second generation; whereas the other, as has been observed, reaches to the fourth.

In Germany, they have a kind of *marriage* called *morganatic*, wherein a man of quality contracting with a woman of inferior rank, he gives her the left [illegible] lieu of the right; and stipulates in the contract that the wife shall continue in her former rank only, and that the children born of them shall [illegible] that they become bastards as to matters of [illegible] though they are legitimate in effect. They cannot bear the name or arms of the family.

None but princes, and great lords of Germany, are allowed this kind of *marriage*. The universities of Leipsic and Jena have declared against the validity of such contracts; maintaining, that they cannot prejudice the children, especially when the emperor's consent intervenes in the *marriage*.

The Turks have three kinds of *marriages*, and three sorts of wives; *legitimate*, *wives in lobin*, and *slaves*. They marry the first, hire the second, and buy the third.

The people in Java marry and have children at nine or ten years old, and the women leave child-bearing before they are thirty; and at Tonquin there are women common to any that will hire them, at eight or nine years of age.

Among all the savage nations, whether in Asia, Africa, or America, the wife is commonly bought by the husband from her father, or those other relations who have an authority over her; and the conclusion of a bargain for this purpose, together with the payment of the price, has, therefore, become the usual form or solemnity in the celebration of their *marriages*. The Hebrews also purchased their wives, by paying down a competent dowry for them; and Aristotle makes it one argument to prove that the ancient Grecians were an uncivilized people, because they used to buy their wives; and in proportion as they laid aside their barbarous manners, they left off this practice.

The English law considers *marriage* in no other light than as a civil contract; the holiness of the matrimonial state being left entirely to the ecclesiastical law, to which it pertains to punish or annul incestuous or other unscriptural *marriages*. The law allows *marriage* to be good and valid, where the parties at the time of making it were willing and able to contract, and actually did contract, in the proper forms and solemnities required by law. The disabilities for contracting are of two sorts; first, such as are canonical, and, therefore, sufficient by the ecclesiastical laws to avoid the *marriage* in the spiritual court; such as pre-contract, CONSANGUINITY, or relation by blood; and AFFINITY, or relation by *marriage*, and some particular corporal infirmities. But these disabilities in our law do not make the *marriage ipso facto* void, but voidable only by sentence of separation; and *marriages* are effected valid to all civil purposes, unless such separation is actually made during the life of the parties. Thus, when a man had married his first wife's sister, and after her death the bishop's court was proceeding to annul the *marriage*, and bastardize the issue, the court of king's bench granted a prohibition *quoad hoc*; but permitted them to proceed to punish the husband for incest.

By 32 Hen. VIII. c. 38. it is declared, that all persons may lawfully marry, but such as are prohibited by God's law, &c. And that nothing [illegible] shall impeach any *marriage* but within the [illegible] degrees: these are enumerated in the [illegible] Leviticus, and are illustrated by [illegible] manner: a man may not marry his mother, [illegible] mother's sister, daughter, [illegible] daughter, father's wife, uncle's wife, [illegible] brother's wife, wife's sister, [illegible] daughter and daughter of his wife's [illegible] a woman may not marry her father, [illegible] mother's brother, brother, son, [illegible] mother's husband, aunt's husband, [illegible] husband's brother, and son of [illegible] daughter. By the civil law first cousins [illegible]; but by the canon law both first and second [illegible] prohibited. Therefore, when [illegible] that first cousins may marry, but second [illegible] this prohibably

bably arose by confounding these two laws; for first cousins may marry by the civil law, and second cousins cannot by the canon law. But by the forefaid ſtat. 32 Hen. VIII. c. 38. it is clear, that both firſt and ſecond cousins may marry. By the ſame ſtatute all impediments, ariſing from pre-contracts to other perſons, were abolished, and declared of none effect, unleſs they had been conſummated with bodily knowledge; in which caſe the canon law holds ſuch contract to be a *marriage de facto*. But this branch of the ſtatute was repealed by 2 & 3 Ed. VI. c. 23. How far the act of 26 Geo. II. c. 33. (which prohibits all ſuits in eccleſiaſtical courts to compel a *marriage*, in conſequence of any contract) may collaterally extend to revive this clauſe of Henry the Eighth's ſtatute, and abolish the impediment of pre-contract, judge Blackſtone leaves to be conſidered by the canoniſts. We ſhall here obſerve, that on a promiſe of *marriage*, if it be mutual on both ſides, damages may be recovered, in caſe either party refuſes to marry; and though no time for the *marriage* is agreed on, if the plaintiff avers that he offered to marry the defendant, who refuſed it, an action is maintainable for the damages; but no action ſhall be brought upon any agreement, except it is in writing, and ſigned by the party to be charged. The canonical hours for celebrating *marriage* are from eight to twelve in the forenoon.

The other ſort of diſabilities are thoſe which are created, or at leaſt enforced, by the municipal laws. Theſe civil diſabilities make the contract void *ab initio*, by rendering the parties incapable of forming any contract at all. The firſt legal diſability is a prior *marriage*, or having another huſband or wife living; in which caſe, beſides the penalties conſequent upon it as a felony, the ſecond *marriage* is to all intents and purpoſes void. See BIGAMY, and POLYGAMY.

The next legal diſability is want of age: therefore, if a boy under fourteen, or a girl under twelve years of age, marries, when either of them comes to the age of conſent, they may diſagree, and declare the *marriage* void, without any divorce or ſentence in the ſpiritual court. However in our law it is ſo far a *marriage*, that, if at the age of conſent, they agree to continue together, they need not be married again. Another incapacity ariſes from want of conſent of parents or guardians. By ſeveral ſtatutes, viz. 6 & 7 W. III. c. 6. 7. 8 W. III. c. 35. 10 Ann. c. 19. penalties of 100*l.* are laid on every clergyman who marries a couple, either without publication of banns, which may give notice to parents or guardians, or without a licence, to obtain which the conſent of parents or guardians muſt be ſworn to. And by 4 & 5 Ph. & M. c. 8. whoſoever marries any woman-child under the age of ſixteen years, without conſent of parents or guardians, ſhall be ſubject to fine, or five years impriſonment; and her eſtate, during the huſband's life, ſhall be enjoyed by the next heir. Thus alſo in France, the ſons cannot marry without conſent of parents, till thirty years of age, nor the daughters till twenty-five; and in Holland, the ſons are at their own diſpoſal at twenty-five, and the daughters at twenty. And by the *marriage* act, viz. 26 Geo. II. c. 33. it is enacted, that all *marriages* celebrated by licence (for banns ſuppoſe notice) where either of the parties is under twenty-one, not being a widow or widower, without the conſent of the father, or, if he be not living, of the mother or guardians, ſhall be abſolutely void. However, proviſion is made, where the mother or guardian is non compos, beyond ſea, or unreaſonably froward, to diſpenſe with ſuch conſent, at the diſcretion of the lord chancellor; but no proviſion is made, in caſe the father ſhould labour under any mental, or other incapacity. A fourth incapacity is want of reaſon. It is provided by 15 Geo. II. c. 30. that the *marriage* of lunatics, and perſons under phrenſies (if ſound lunatics under a commiſſion, or committed to the care of truſtees by any act of parliament) before they are declared of ſound mind by the lord chancellor, or the majority of ſuch truſtees, ſhall be totally void. Laſtly, the parties muſt not only be willing and able to contract, but muſt actually contract themſelves in due form of law, to make it a good civil *marriage*. Any contract made, *per verba de præſenti*, or in words of the preſent time, and in caſe of cohabitation *per verba de futuro* alſo, between perſons able to contract, was before the late act deemed a valid *marriage* to many purpoſes, and the parties might be compelled in the ſpiritual courts to celebrate it *in facie eccleſiæ*. But theſe ſpiritual contracts are now of no force, to compel a future *marriage*. Nor is any *marriage* at preſent valid, that is not celebrated in ſome pariſh-church, or public chapel, unleſs by diſpenſation from the archbiſhop of Canterbury. It muſt alſo be preceded by publication of BANNS, or by LICENCE from the ſpiritual judge. A *marriage* in purſuance of banns muſt be ſolemnized in one of the churches or chapels, where the banns were publiſhed. No parſon, vicar, &c. ſhall be obliged to publiſh banns of matrimony, unleſs the perſons to be married ſhall ſeven days before the time required for the firſt publication, deliver to him a notice in writing of their true names, and of the houſe or houſes of their reſpective abode, within ſuch parith, &c. and of the time that they have dwelt in ſuch houſe or houſes. And the ſaid banns ſhall be publiſhed upon three Sundays preceding the ſolemnization of *marriage*, during the time of public ſervice: in caſe the parents or guardians, or either of the parties who ſhall be under the age of twenty-one years, ſhall openly and publicly declare, or cauſe to be declared in the church or chapel, where the banns ſhall be ſo publiſhed, at the time of ſuch publication, their diſſent to ſuch *marriage*, ſuch publication of banns ſhall be void. And when the parties dwell in divers parithes, the curate of the one pariſh ſhall not ſolemnize matrimony betwixt them, without a certificate of the banns being thrice aſked, from the curate or the other parith. A *marriage* in purſuance of a licence (except a ſpecial licence) muſt be ſolemnized in ſuch church or chapel where the licence is granted; and no licence of *marriage* ſhall be granted by any archbiſhop, biſhop, &c. to ſolemnize any *marriage* in any other church, &c. than in the pariſh-church, &c. within which the uſual place of abode of one of the parties ſhall have been for four weeks immediately before the granting ſuch licence. By the ſame ſtatute all *marriages* ſhall be ſolemnized in the preſence of two credible witneſſes at the leaſt, beſides the miniſter, who ſhall ſign their atteſtation thereof; and immediately after the celebration of every *marriage*, an entry thereof ſhall be made in the pariſh-regiſter, expreſſing that the ſaid *marriage* was celebrated by banns or licence; and if both or either of the parties be under age, with conſent of the parents or guardians, as the caſe ſhall be, ſigned by the miniſter, and alſo by the parties married, and atteſted by the two witneſſes preſent. It is held to be alſo eſſential to a *marriage*, that it be performed by a perſon in orders; though the intervention of a prieſt to ſolemnize this contract is merely *juris poſitivi*, and not *juris naturalis aut divini*; it being ſaid that pope Innocent III. was the firſt who ordained the celebration of *marriage* in the church, before which it was totally a civil contract. And in the times of the grand rebellion, all *marriages* were performed by the juſtices of the peace; and theſe *marriages* were declared valid, without any freſh ſolemnization, by 12 Car. II. c. 33. But as the law now ſtands, we may upon the whole collect, that no *marriage* by the temporal law is *ipſo facto* void, that is celebrated by a perſon in orders; in a pariſh-church, a public chapel, or elſewhere, by ſpecial diſpenſation; in purſuance of banns or a licence; between ſingle perſons; conſenting; of ſound mind; and of the age of twenty-one years; or of the age of fourteen in males, and twelve in females, with conſent of parents or guardians, or without it, in caſe of widowhood. And no *marriage* is voidable, by the eccleſiaſtical law, after the death of either of the parties; nor during their lives, unleſs for the canonical impediments of precontract, if that indeed ſtill exiſts; of conſanguinity; and of affinity, or corporal impotency, ſubſiſting previous to the *marriage*. Blackſt. Com. vol. i. p. 433. &c.

By 26 Geo. II. c. 33. the ſubſtance of which has been already recited, if any perſon ſhall ſolemnize matrimony in any other place than a church, &c. where banns have been uſually publiſhed, unleſs by ſpecial licence, or without publication of banns, unleſs licence of *marriage* be firſt obtained, from ſome perſon having authority to grant the ſame, every ſuch perſon knowingly ſo offending, ſhall be guilty of felony, and tranſported for fourteen years; the proſecution to be within three years. By the ſame ſtatute, to make a falſe entry into a *marriage* regiſter; to alter it when made; to forge or counterfeit ſuch entry, or a *marriage* licence, or aid and abet ſuch forgery; to utter the ſame as true, knowing it to be counterfeit; or to deſtroy or procure the deſtruction of any regiſter, in order to vacate any *marriage*, or ſubject any perſon to the penalties of this act; all theſe offences, knowingly and wilfully committed, ſubject the party to the guilt of felony, without benefit of clergy. But this act doth not extend to the *marriages* of the royal family; nor to Scotland; nor to any *marriages* among the people called quakers, or among perſons profeſſing the Jewiſh religion, where both the parties are quakers or Jews reſpectively; nor to any *marriages* beyond the ſeas.

For the proportions which *marriages* bear to births, and births to burials, in ſeveral parts of Europe, Mr. Derham gives us the following table:

Names

Names of Places.	*Marriages* to Births, as	Births to Burials, as
England in general	1 to 4.63	1.12 to 1
London	1 to 4	1 to 1.1
Hantſhire, from 1569 to 1638	1 to 4	1.2 to 1
Tiverton in Devonſhire, from 1656 to 1664	1 to 3.7	1.26 to 1
Cranbrook in Kent, from 1560 to 1649	1 to 3.9	1.6 to 1
Aynho in Northamptonſhire, for 118 years	1 to 6	1.6 to 1
Upminſter in Eſſex, for 100 years	1 to 4.6	1.8 to 1
Frankfort on the Maine, in 1695	1 to 3.7	1.2 to 1
Old, Middle, and Lower Marck, in 1698	1 to 3.7	1.9 to 1
Dominions of the Elector of Brandenburg, in 1698	1 to 3.7	1.5 to 1
Breſlaw in Sileſia, from 1687 to 91		1.6 to 1
Paris, in 1670, 1671, 1672	1 to 4.7	1.6 to 1

The Editor has formed the following table, ſimilar to the preceding, from the obſervations collected and referred to by Dr. Price.

Names of Places.	*Marriages* to Births, as	Births to Burials, as
London, annual medium from 1710 to 1730	— — —	18000 to 26520, or 1 to 1.4, &c.
——— from 1759 to 1768	— — —	15710 to 21956, or 1 to 1.4, &c.
Northampton, ditto, from 1741 to 1770	— — —	155 to 191, or 1 to 1.23, &c.
Norwich, ditto, from 1740 to 1769	— — —	1057 to 1266, or 1 to 1.1, &c.
Shrewſbury, ditto, from 1762 to 1768	— — —	301 to 329, or 1 to 1.09, &c.
Mancheſter and Salford, excluſive of diſſenters, ditto, from 1755 to 1759	— — —	756 to 743.
Ditto, ditto, including diſſenters, from 1768 to 1772	— — —	1098 to 958, or 1.14, &c. to 1.
Gainſborough in Lincolnſhire, ditto, from 1752 to 1771	1 to 3.7	126 to 105, or 1.2 to 1.
Madeira, ditto, from 1759 to 1766	1 to 4.68	2201 to 1293, or 1.7 to 1.
Boſton in New England, from 1731 to 1752	— — —	538 to 668, or 1 to 1.13, &c.
Chriſtiana in Norway, in 1761	— — —	11.024 to 6929, or 1.5 to 1.
Paris, mean of ſome of the laſt years	1 to 4.3	10100 to 10400, or 1 to 1.01, &c.
Vienna, annual medium from 1757 to 1769	— — —	5800 to 6600, or 1 to 1.1, &c.
Amſterdam, ditto, for ſome of the laſt years	1 to 1.9, &c.	4600 to 8000, or 1 to 1.7, &c.
Copenhagen, ditto	1 to 3.04, &c.	2700 to 3306, or 1 to 1.2, &c.
Berlin, ditto, for five years, ending at 1759	1 to 3.9, &c.	3855 to 5054, or 1 to 1.3, &c.
Breſlaw, ditto, from 1633 to 1734	— — —	1089 to 1256, or 1 to 1.15, &c.
———, ditto, from 1717 to 1725	— — —	1252 to 1507, or 1 to 1.2, &c.
Rome, ditto, from 1759 to 1761	— — —	5167 to 7153, or 1 to 1.3, &c.
Vaud in Switzerland, ditto, for 10 years before 1766	1 to 3.9	3155 to 2564, or 1.2, &c. to 1.

For an account of the numbers of male and female ſtill-born children and chryſoms, and of boys and girls under ten, of married men and married women, and of widows and widowers, who died for a courſe of years at Vienna, Breſlaw, Dreſden, Leipſic, Ratiſbon, and ſome other towns in Germany, ſee Phil. Tranſ. Abr. vol. vii. part iv. p. 46, &c.

The reader may find many curious calculations and remarks relating to this ſubject in Dr. Price's excellent work, entitled Obſervations on Reverſionary Payments.

From the preceding table it appears, that *marriages*, one with another, do each produce about four births, both in England, and other parts of Europe. Dr. Price obſerves, that the births at Paris, as may be ſeen in the table, are above four times the weddings; and therefore it may ſeem, that in the moſt healthy country ſituations, every wedding produces above four children; and though this be the caſe in Paris, for reaſons which he has given, he has obſerved nothing like it in any other great town. He adds, that from comparing the births and weddings, in countries and towns where regiſters of them have been kept, it appears, that in the former, *marriages*, one with another, ſeldom produce leſs than four children each; generally between four and five, and ſometimes above five: but in towns ſeldom above four, generally between three and four, and ſometimes under three. It is neceſſary to be obſerved here, that though the proportion of annual births to weddings has been conſidered as giving the true number of children derived from each *marriage*, taking all *marriages* one with another; yet this is only true, when, for many years, the births and burials have kept nearly equal. Where there is an exceſs of the births occaſioning an increaſe, the proportion of annual births to weddings muſt be leſs than the proportion of children derived from each *marriage*; and the contrary muſt take place, where there is a decreaſe: and by Mr. King's computation, about one in an hundred and four perſons *marry*; the number of people in England being eſtimated at five millions and a half, whereof about forty-one thouſand annually *marry*.

In the diſtrict of Vaud in Switzerland, the married are very nearly a third part of the inhabitants.

Major Graunt and Mr. King diſagree in the proportions between males and females, the latter making ten males to thirteen females in London; in other cities and towns, and in the villages and hamlets, a hundred males to ninety-nine females; but major Graunt, both from the London and country bills, computes, that there are in England fourteen males to thirteen females; whence he juſtly infers, that the Chriſtian religion, prohibiting polygamy, is more agreeable to the law of nature than Mahometaniſm, and others that allow it.

This proportion of males to females Mr. Derham thinks pretty juſt, being agreeable to what he had obſerved himſelf. In the hundred years, for inſtance, of his own pariſh-regiſter of Upminſter, though the burials of males and females were nearly equal, being ſix hundred and thirty-three males, and ſix hundred and twenty-three females, in all that time; yet there were baptized ſeven hundred and nine males, and but ſix hundred and ſeventy-five females, which is 13 females to 13.7 males.

From a regiſter kept at Northampton for twenty-eight years, from 1741 to 1770, it appears, that the proportion of males to females that were born in that period is 2361 to 2288, or nearly 13.4 to 13. However, though more males are born than females, Dr. Price has ſufficiently ſhewn, that there is a conſiderable difference between the probabilities of life among males and females, in favour of the latter; ſo that males are more ſhort-lived than females; and as the greater mortality of males takes place among children, as well as among males at all ages, the fact cannot be accounted for merely by their being more ſubject to untimely deaths by various accidents, and by their being addicted to the exceſſes and irregularities which ſhorten life. Mr. Kerſeboom informs us, that, during the courſe of 125 years in Holland, females have, in all accidents of age, lived about three or four years longer than the ſame number of males.

In ſeveral towns of Germany, &c. it appears, that of 7270 married perſons who had died, the proportion of married men who died to the married women, was 5 to 2; and in Breſlaw for eight years, as 5 to 3. In all Pomerania, during nine years, from 1748 to 1756, this proportion was nearly 15 to 11. Among the miniſters and profeſſors in Scotland, twenty married men die to twelve married women, at a medium of twenty-ſeven years, or in the proportion of 5 to 31 ſo that there is the chance of 3 to 2, and in ſome circumſtances even a greater chance, that the [illegible] ſhall be the ſurvivor of a *marriage*, and no [illegible] this difference cannot be accounted for ma[illegible] exceſſive of age between men and their wive[illegible] among the proportionality of males. In the [illegible] Vaud, in Switzerland, it appears, that half the [illegible] do not die till the age of forty-ſix and upward[illegible] the males do not thirty-ſix. It is [illegible] remarkable fact, that, in the beginning of life, the [illegible] mortality among males is much greater than among [illegible]. From a table formed by Dr. [illegible] from a regiſter kept for twenty years [illegible] it appears, that

those who live to eighty, the major part, in the proportion of 49 to 32, are females. Mr. Deparcieux at Paris, and Mr. Wargentin in Sweden, have farther observed, that not only women live longer than men, but that married women live longer than single women. From some registers examined by Mr. Muret in Switzerland, it appears, that of equal numbers of single and married women between fifteen and twenty-five, more of the former died than of the latter, in the proportion of 2 to 1. With respect to the difference between the mortality of males and females, it is found to be much less in country parishes and villages than in towns; and hence it is inferred, that human life in males is more brittle than in females, only in consequence of adventitious causes, or of some particular debility, that takes place in polished and luxurious societies, and especially in great towns.

From the inequality, above stated, between the males and females that are born, it is reasonable to infer, that one man ought to have but one wife; and yet that every woman, without polygamy, may have a husband; this surplusage of males above females being spent in the supplies of war, the seas, &c. from which the women are exempt.

Perhaps, says Dr. Price, it might have been observed with more reason, that this provision had in view that particular weakness or delicacy in the constitution of males, which makes them more subject to mortality; and which consequently renders it necessary that more of them should be produced, in order to preserve in the world a due proportion between the two sexes. See EXPECTATION *of life*, and MORTALITY.

That this is a work of Providence, and not of chance, is well made out by the very laws of chance, by Dr. Arbuthnot; who supposes Thomas to lay against John, that, for eighty-two years running, more males shall be born than females; and, giving all allowances in the computation to Thomas's side, he makes the odds against Thomas, that it does not so happen, to be near five millions of millions of millions to one; but for ages of ages, according to the world's age, to be near an infinite number to one.

According to Mr. Kerseboom's observations, there are about 325 children born from 100 marriages.

Mr. Kerseboom, from his observations, estimates the duration of *marriages*, one with another, as in the following table.

Those whose ages, taken together, make		
40	live together between 24 and	25 years.
50	22	23
60	23	21
70	19	20
80	17	18
90	14	15
100	12	13

Phil. Transf. N° 468. sect. iii. p. 319.

Dr. Price has shewn, that on De Moivre's hypothesis, or that the probabilities of life decrease uniformly (see COMPLEMENT *of life*) the duration of survivorship is equal to the duration of *marriage*, when the ages are equal; or, in other words, that the expectation of two joint lives, the ages being equal, is the same with the expectation of survivorship; and, consequently, the number of survivors, or (which is the same, supposing no second *marriages*) of widows and widowers, alive together, which will arise from any given set of such *marriages* constantly kept up, will be equal to the whole number of *marriages*; or half of them (the number of widows in particular) equal to half the number of *marriages*. Thus, the expectation of two joint lives, both 40, is the third of 46 years, or their complement, i. e. 15 years and 4 months; and this is also the expectation of the survivor. That is, supposing a set of *marriages* between persons all 40, they will, one with another, last just this time, and the survivors will last the same time. In adding together the years which any great number of such *marriages*, and their survivorships, have lasted, the sums would be found to be equal. It is observed farther, that if the number expressing the expectation of single or joint lives, multiplied by the number of single or joint lives whose expectation it is, be added annually to a society or town, the sum gives the whole number living together, to which such an annual addition would in time grow: thus, since 10, or the third of 27, is the expectation of two joint lives, whose common age is 29, or common complement 57, twenty *marriages* every year between persons of this age would, in fifty-seven years, grow to 20 times 19, or 380 *marriages* always existing together. The number of survivors also arising from these *marriages*, and always living together, would, in twice 57 years, increase to the same number. Moreover, the particular proportion that becomes extinct every year, out of the whole number constantly existing together of single or joint lives, must, wherever this number undergoes no variation, be exactly the same with the expectation of those lives, at the time when their existence commenced. Thus, if it were found that a nineteenth part of all the *marriages* among any body of men, whose numbers do not vary, are dissolved every year by the deaths of either the husband or wife, it would appear, that 19 was, at the time they were contracted, the expectation of these *marriages*. Dr. Price observes, that the annual average of weddings among the ministers and professors in Scotland, for the last twenty-seven years, has been thirty-one; and the average of married persons, for seventeen years, ending in 1767, had been 667. This number, divided by 31, gives 21½, the expectation of *marriage* among them; which, he says, is above 2½ years more than the expectation of *marriage* would be, by Dr. Halley's rule, on the supposition, that all first, second, and third *marriages*, may be justly considered as commencing, one with another, so early as the age of thirty; and he has proved, that the expectation of two equal joint lives is to the expectation of a single life of the same age as 2 to 3: consequently, the expectation of a single life at 30, among the ministers in Scotland, cannot be less than 32.25. If we suppose the mean ages of all who marry annually to be 33 and 25, the expectation of every *marriage* would be 19 years; or one with another they would be all extinct in 19 years; the *marriages* which continue beyond this term, though fewer in number, enjoying among them just as much more duration, as those that fail short of it enjoy less. But it appears from the observations and tables of Mr. Muret, that, in the district of Vaud (dividing half the number of married persons, viz. 38,328, by the annual medium of weddings, viz. 868) the expectation of *marriage* is only 23½ years: so much higher are the probabilities of life in the country than in towns, or than they ought to be, according to De Moivre's hypothesis. Price's Obs. &c. See EXPECTATION *of life*, LIFE-*annuities*, and SURVIVORSHIP.

MARRIAGE, *marriagium*, in *Law*, signifies not only the lawful joining of man and wife, but also the right of bestowing a ward, or a widow, in *marriage*; as well as the land given in *marriage*.

MARRIAGE, *dissolution of*. See DIVORCE.

MARRIAGE, *forcible*. See FORCIBLE *marriage*.

MARRIAGE, *frank*. See FRANK.

MARRIAGE, *inticitation of*, in *Law*, is one of the first and principal matrimonial causes, when one of the parties boasts or gives out, that he or she is married to the other, whereby a common reputation of their matrimony may ensue. On this ground the party injured may libel the other in the spiritual court; and unless the defendant undertakes and makes out a proof of the actual marriage, he or she is enjoined perpetual silence on that head; which is the only remedy the ecclesiastical courts can give for this injury. Blackst. Comm. vol. iii. p. 93.

MARRIAGE *settlement*, is a legal act, previous to *marriage*, whereby a JOINTURE is secured to the wife after the death of the husband. These settlements seem to have been in use among the ancient Germans, and their kindred nations the Gauls. Of the former Tacitus gives us this account: *Dotem non uxor marito, sed uxori maritus offert: interest parentes & propinqui, & munera probant.* De Mor. Germ. c. 18. And Cæsar, De Bell. Gallic. lib. vi. c. 18. has given us the terms of a *marriage* settlement among the Gauls, as nicely calculated as any modern jointure. *Viri, quæ tantas pecunias ab uxoribus dotis nomine acceperunt, tantas ex suis bonis, æstimatione facta, cum dotibus communicant. Hujus omnis pecuniæ conjunctim ratio habetur, fructusque servantur. Uter eorum vita superavit, ad eum pars utriusque cum fructibus superiorum temporum pervenit.* The dauphin's commentator supposes that this Gaulish custom was the ground of the new regulations made by Justinian, Nov. 97. with regard to the provision for widows among the Romans; but surely there is as much reason to suppose, says judge Blackstone, that it gave the hint for our statutable jointures. Comm. vol. ii. p. 138.

See an excellent *marriage* settlement by Blackstone, in the appendix to the second volume of his Commentaries.

MARRIAGE, *duty of*, is a term used in some ancient customs, signifying an obligation on women to marry.

To understand this, it must be observed, that old maids, and widows about sixty, who held fees in body, or were charged with any personal or military services, were anciently obliged to marry, to render those services to the lord by their husbands, or to indemnify the lord for what they could not do in person. And this was called *duty* or *service of marriage*.

MARROQUIN, vulgarly MOROCCO-*leather*. See MOROCCO.

MARROW, a soft oleaginous substance contained in the cavities of the bones.

All the bones of the body, which have any considerable thickness, have either a large cavity, or elſe they are ſpongeous, and full of little cells: in both the one and the other is an oleaginous ſubſtance, called *marrow*, contained in proper veſſels or membrances, which open into one another.

This ſubſtance, while it lies in the cavities of the large bones, is more particularly called *marrow*; when diſperſed in the ſmall cellulous cavities, it is commonly called the medullary juice. The *marrow* of the large hollow bones is a maſs compoſed of an infinity of ſmall veſicles, or membranous cells, joined together, and communicating with each other, furniſhed with blood-veſſels and nerves, and filled with a fine ſweet oily matter. All theſe cells are ſurrounded by a fine membrane, which, like an internal periоſteum, ſticks cloſe to the inner ſurface of the bone, by means of an infinite number of capillary veſſels, and of ſeveral other kinds of very ſmall filaments. The reticular ſubſtance of the bones runs through this medullary maſs, and, as it were, interſtands it, and by this means ſuſtains it in the middle of the great cavities. The *marrow* of the cellulous or cavernous ſubſtance of the bones, is divided by ſmall bony ſepta or plates, and by filaments of the reticular ſubſtance of the bones into a vaſt number of veſicles or membranous cells, which line the bony cells, and communicate with each other.

This cellular *marrow* in the cavernous texture of ſome bones, differs from that in the great cavities of others both in colour and conſiſtence; it is liquid, and of a red colour throughout; while the other is more ſolid, and is only red on its ſurface. This difference is owing to the blood-veſſels which run through each membranous cell, whereas the *marrow* in the great cavities ſeems to be furniſhed with them in the common membrane only. Many of thoſe medullary cells are likewiſe divided by the bony filaments of the cavernous ſubſtance; and theſe ſmall filaments, as well as thoſe of the reticular texture, are covered by portions of the medullary membrane, as by a periоſteum.

The medullary membranes may be ſeparated from the liquor which they contain, by ſteeping the whole maſs in very hot water, and afterwards compreſſing it by gentle degrees. But it is to both theſe ſubſtances, taken together, that the anatomiſts give the common name of *marrow*, not to either of them taken ſingly. The medullary membrane is very ſenſible, as is likewiſe the juice, which is neceſſary to be obſerved, to underſtand properly what is meant by the ſenſibility of the *marrow*. The *marrow*, by its liquid and unctuous part, renders the bones in ſome meaſure pliable, and leſs brittle, as it continually pervades their ſubſtance in ſmall degrees: this continues to old age, and then the bones, being deprived of their *marrow*, become very brittle.

In the bones of the oſſa innominata, there are no internal large cavities; but their ſubſtance being cellulous or cavernous, they contain no medullary maſs, but their cells are all moiſtened with a medullary juice, which diſtils inceſſantly through the membrane with which they are lined. In the os femoris the *marrow* lies in a large maſs, in the middle cavity of the bone, and in ſmall diſtinct cluſters in the cells of each extremity. The firſt is penetrated at different diſtances by the bony filaments, and is thereby ſuſtained in all violent motions and ſhocks, as running, leaping, and the like. In the bones of the leg the diſpoſition is exactly the ſame; and in the bones of the foot, the *marrow* is ſuitable to their internal ſtructure, and is lodged in moleculæ, in the cavernous portions, and in maſſes in thoſe which have cavities to receive them. Thus the *marrow* of all the tarſal bones is diſperſed in moleculæ, becauſe their internal ſtructure is ſpongy. In the metatarſal bones, and firſt phalanges of the toes, it is diſpoſed in the ſame manner as in the tibia and fibula, that is, it lies in moleculæ in the extremities, and in their middles in greater or leſſer maſſes, according to the ſizes of the cavities. In the other phalanges, which are entirely ſpongy, it is accordingly diſpoſed in moleculæ. In the vertebræ, ſternum, and ribs, the internal ſtructure of all which is cellular and ſpongy, the *marrow* is contained only in ſmall ſeparate portions, and is no other than a red medullary juice. The bones of the head alſo being in like manner cellular in their internal ſtructure, contain alſo their *marrow*, in like manner, in diſtinct portions, and lying in membranous cells in the diploe. Winſlow's Anatomy, p. 118, 136, 150, 152.

The tranſpiration of the unctuous matter of the *marrow* is not confined to the time of the animal's life, it is even carried on in the dead carcaſe, and is one great obſtacle to the whitening and cleaning the bones in a ſkeleton; for if there be not an opening made at one end of a bone, and the *marrow* waſhed out of the whole bone at this aperture, by means of proper liquors injected with a ſyringe, the bone, though made ever ſo white at firſt, will certainly turn yellow afterwards, by this tranſpiration of the *marrow* contained within it, which certainly happens on the leaſt heat of the weather, or otherwiſe. For this reaſon it is alſo, that the workmen who uſe bones always cut them longitudinally in two, and take out all the *marrow*, and even all the ſpongy ſubſtance of the bone, which might be ſuppoſed to contain it, otherwiſe they know that the heat of any one's hand will turn their works yellow, though ever ſo white when firſt made. It is to be obſerved, that there are in the hollow bones ſeveral ſmall apertures, through which there paſs blood-veſſels, which go from the membrane including the *marrow*; whence it appears that the bones are indeed nouriſhed from within as well as from without, though that be not by the *marrow*, but by the blood-veſſels only: thus the [illegible] bles of the ſkull are evidently nouriſhed; the [illegible]bie by the veſſels of the pericranium, and the [illegible] by the branches of thoſe veſſels which are ſpread [illegible] dura mater.

It has been ſuppoſed that the quantity of *marrow* increaſed in the bones according to the increaſe of the moon; but this has been found a wholly erroneous opinion, the increaſe of the *marrow* in all the bones depending on the quantity of nouriſhment, and the ſtate of reſt which the creature is allowed.

The ſenſation of the *marrow* has been a point very variouſly ſpoken of. When a limb has been taken off, and the *marrow* is left bare, if any thing touch it roughly, the patient feels an exquiſite pain. Some had ſuppoſed that this ſenſation might rather ariſe from the membranes, than from the ſubſtance of the *marrow*: this, however, was put beyond all doubt by a curious, though very cruel operation, performed before the Paris academy. A living animal had its leg taken off before the academy, and the end of the bone left very bare; the membranes were all carefully removed, to the exquiſite pain and torture of the creature; and when the pain of this was over, the end of a ſtyle was plunged into the *marrow*, without touching any other part whatever, and the creature, on this, expreſſed as violent a ſenſation of pain as from any of the former operations. This was repeated ſeveral times, and always with the ſame event; ſo that it is very evident that the *marrow* is, in its natural ſtate, highly ſenſible of pain; and how much more may it be ſo in diſtempered bodies!

The ancients ſuppoſed that the *marrow* ſerved for the nouriſhment of the bones; and their reaſons for believing it were, that they ſaw no blood-veſſels enter the ſubſtance of the bones, by which they could be nouriſhed, all the veſſels of that kind, which they could diſcover, going directly into their cavities, where the blood they contained ſeem to undergo a ſort of concoction, which converted it into *marrow*, and by that means rendered it fit nutriment for the bones; and they obſerved, in proof of this, that the longer any bone was, and the more violent uſes it was intended for, the larger was its cavity for containing this nutritious matter.

Theſe reaſons, though they carry a great ſhew of probability, yet are eaſily refuted by accurate obſervation. We ſee, in young ſubjects, a vaſt number of blood-veſſels diſtributed through the ſubſtance of the bones, the texture of which, at that time, is lax and ſpongy. It is alſo to be obſerved, that there are many bones in the human body, as well as in brutes, which, according to this ſyſtem, could not be nouriſhed at all, ſince they contain no *marrow*. Of this kind alſo are the horns of deer, and many other creatures, which, though they contain no *marrow*, yet grow very vigorouſly. There are alſo other bones which are hollow, yet are only clothed with a glandulous membrane; ſuch are the cavities between ſeveral parts of the two tables of the ſkull; and in the elephant, the foliaceous bones, which are in the place of the diploe, contain no *marrow*, and are only covered with a membrane, which has ſeveral blood-veſſels ſcattered through it. The hollows of thoſe bony ſubſtances alſo which compoſe the claws of crabs, lobſters, and the like, contain no *marrow* [illegible] only the muſcles, whoſe office it is to move thoſe [illegible] theſe grow, and are nouriſhed, as well [illegible] which contain ever ſo much *marrow* in [illegible] ſine, it may be well concluded, that [illegible] the uſe of containing *marrow*, that the bon[illegible] but merely that they may be lighter, [illegible]tion. Mem. Acad. Par. 1700.

Obſervation gives abundant [illegible] great quantity of the *marrow* continu[illegible] through the whole ſubſtance of the bones, [illegible] is of no uſe, though not in the [illegible] weſerving the bones, its oily and [illegible] ſerving the ſmall fibres of which the bone [illegible] ſoftening and rendering them [illegible]

more supple, soft, and flexile, and consequently the whole bone much less liable to break.

MARRUBIASTRUM, in *Botany*. See IRON-*wort*.

MARRUBIUM, in *Botany*. See HOREHOUND.

MARS, in *Mythology*, the god of war, the son of Jupiter and Juno, or, as Ovid tells the story, of Juno alone; she being displeased that Jupiter should have a daughter, Minerva, without female aid: being therefore a son of discontent, he was made the god of war and strife. He had a sister called BELLONA, the goddess of war.

He had for his priests the *salii* and *flamines*, who from him were called *Martiales*. They sacrificed asses to him, on account of the harsh dissonance of their voice. The vulture was a bird sacred to him, from their always flying to those places where armies are going to engage, and his chariot is to be expected. The usual attributes of *Mars* are the helmet and spear, which he does not lay aside, even when he is going on his amours. Several of the old Roman poets of the first age speak of a wife of *Mars*, called Nerienе, signifying, according to some, *mildness*, and given to him in order to soften and humanize the roughness of his temper; but we find no traces of her in their later poets. The temples of *Mars* were of the Doric order, and usually placed without the walls; hereby denoting that this deity was to preserve the walls from the perils of war.

MARS, in *Astronomy*, one of the five planets, and of the three inferior ones; its place being between the earth and Jupiter.

Its character is ♂. Its mean distance from the sun is 1524 of those parts, whereof the distance of the sun from the earth is 1000; its EXCENTRICITY 1415, and its real distance 145,914,148 miles; the inclination of its orbit, that is, the angle formed by the plane of its orbit with the plane of the ecliptic, 1 degree 52 minutes; the periodical time, in which it makes its revolution round the sun, is 686 days 23 hours; which is the length of his year, and contains 6693 of his days; every day and night together being 40 minutes longer than with us; and its revolution about its own axis is performed in 24 hours 40 minutes.

For the diameter of *Mars*, its denſity, the force of gravity on its ſurface, &c. ſee DIAMETER, DISTANCE, and PLANETS.

Its parallax, according to Dr. Hook, and Mr. Flamſteed, is ſcarce 30 ſeconds.

In the acronical riſing of this planet, that is, when it is in oppoſition to the ſun, it is found five times nearer to us, than when in conjunction with him; and, therefore, he appears to much bigger and brighter at one time than another.

Dr. Hook, in 1665, obſerved ſeveral ſpots in *Mars*; which having a motion, he concluded the planet to turn round its center. In 1666, M. Caſſini obſerved ſeveral ſpots in the two faces or hemiſpheres of *Mars*, which, by continuing his different obſervations very diligently, he found to move by little and little from eaſt to weſt, and to return, in the ſpace of 24 hours 40 minutes, to their former ſituation. Theſe obſerrations were repeated in 1672, and confirmed by Miraldi in 1704, and 1719. Whence both the motion and period, or natural day, of that planet, were determined.

Mars always appears with a ruddy, troubled light; whence we conclude, it is encompaſſed with a thick, cloudy atmoſphere; which, by diſturbing the rays of light in their paſſage and re-paſſage through it, occaſion that appearance.

Mars, having his light from the ſun, and revolving round it, has an increaſe and decreaſe like the moon: it may alſo be obſerved almoſt bihected, when in its quadratures with the ſun, or in his perigeon; but never is ſeen cornicular, or falcated, as the inferior planets; which both ſhews that his orbit includes the earth's within it, and that he ſhines not by his own light. The phaſes of *Mars* were firſt diſcovered by Galileo.

This planet's diſtance from the ſun is to the diſtance of the earth and ſun, as 13 to 12; ſo that a man, placed in *Mars*, would ſee the ſun's diameter leſs by one third than it appears to us; and, conſequently, the degree of light and heat, which *Mars* receives from the ſun, is leſs than that received by the earth, in the proportion of 4 to 9. This proportion, however, will admit of a ſenſible variation, on account of the great excentricity of this planet. Though the period or year of this planet, 22 has been already obſerved, nearly twice as long as our's; and his natural day, or the time in which the ſun appears above his horizon (leaving out the conſideration of twilight), is almoſt every where equal to his night; yet it appears, that, in one and the ſame place on his ſurface, there will be but very little variety of ſeaſons, or ſcarce any difference of ſummer and winter; and the reaſon is, that the axis of his diurnal rotation is nearly at right angles with the plane of his orbit. It will be found, notwithſtanding, that places ſituate in different latitudes, that is, at different diſtances from his equator, will have very different degrees of heat, on account of the different inclination of the ſun's rays to the horizon; as it is with us, when the ſun is in the equinoxes, or in the tropics.

From this conſideration, Dr. Gregory endeavours to account for the appearance of the faſciæ in *Mars*, which are certain ſwathes or fillets ſeen in this planet, and poſited parallel to his equator: for, as among us, the ſame climate has, at different ſeaſons, very unequal degrees of heat; but, as in *Mars* it is otherwiſe, the ſame parallel having always a pretty equable degree of heat, it follows, that theſe ſpots may probably be formed in *Mars*, or in his atmoſphere, as ſnow and clouds are in our's, viz. by the conſtant different intenſities of heat and cold in the different parallels; and ſo come to be extended in circles or belts parallel to his equator, or the circle of his diurnal revolution. And this ſame principle may, perhaps, ſolve the phenomenon of Jupiter's belts; that planet, like *Mars*, having a perpetual equinox.

Beſides the ruddy colour of *Mars*, we have another argument of his being encompaſſed with an atmoſphere; and it is this: that, when any of the fixed ſtars are ſeen near his body, they appear extremely obſcured, and almoſt extinct. If this be the caſe, an eye placed in *Mars* would ſcarce ever ſee Mercury, unleſs, perhaps, in the ſun at the time of conjunction, when Mercury paſſes over his diſk, as he ſometimes appears to us, in form of a ſpot. A ſpectator in *Mars* will ſee Venus about the ſame diſtance from the ſun, as Mercury appears to us; and the earth as big as Venus appears to us, and never above 48 degrees from the ſun; and when the earth is found in conjunction with, and very near, the ſun, he will ſee the earth appear horned, or falcated, and its attendant the moon of the ſame figure, and, at its utmoſt diſtance from the earth, not above 15 minutes of a degree, though they are really two hundred and forty thouſand miles aſunder. This planet being but a fifth part ſo big as the earth, if any moon attends him, ſhe muſt be very ſmall, and has not yet been diſcovered by our beſt teleſcopes.

MARS, among *Chemiſts*, ſignifies IRON; becauſe imagined to be under the influence of that planet.

Phyſical writers hold iron preferable, for all medicinal purpoſes, to STEEL, which is only a more hardened, compact iron, made ſo by art; whereby it is rendered more unfit to yield thoſe principles or parts in preparation, which the phyſician requires to be drawn out.

MARS *ſaccharatus*. See IRON.

MARS *ſulphuratus*. See IRON.

Crocus MARTIS, ruſt of iron. See CROCUS *martis*.

MARS, *cryſtals of*. See CRYSTAL.

MARS, *tree of*, *arbor Martis*. See ARBOR.

MARS, *games of*, *ludi Martiales*, were combats inſtituted at Rome in honour of the god *Mars*.

They were held twice in the year; once in the circus, on the fourth of the ides of May; and a ſecond time on the firſt of Auguſt. Theſe latter were eſtabliſhed ſome time after the other, in memory of the dedication of the temple of *Mars*, on that day. Theſe games conſiſted in courſes of horſes, and combats with wild beaſts. Germanicus is ſaid to *have* killed two hundred lions in the circus, on theſe occaſions. See FIELD *of Mars*.

MARSH, in *Agriculture*, &c. See MARSH *lands*.

MARSH, or *water elder*, in *Botany*. See WAYFARING-*tree*.

MARSH-*fever*, is a ſpecies of BILIOUS *fever*.

Thoſe ſeized with the *marſh-fever* are tormented with a burning heat, and violent head-ach. They complain likewiſe of intenſe thirſt, aching of the bones, a pain of the back, great reſtleſs and inquietude; and frequently of a nauſea, ſickneſs, or a pain about the pit of the ſtomach; which is ſometimes attended with a vomiting of green or yellow bile, of an offenſive ſmell. The head is ſometimes ſo ſuddenly and violently affected, that without any previous complaint, the patients run about in a wild manner, as if they were mad; and would throw themſelves out of windows, or into the water, if not prevented. Pringle.

MARSH-*mallow*. See MALLOW.

MARSH-*orchis*, *mentorchis*. See *Bog*-BEAN.

MARSHAL, or MARESCHAL, *mareſcallus*, primarily denotes an officer, who has the care of the command of horſes.

Nicod derives the word from *palemarchus*, *maſter of the camp*; Matthew Paris from *Martis ſeneſchallus*. In the old Gauliſh language, *march* ſignified *horſe*; whence *marechal* might ſignify him who commanded the cavalry. Spelman, Skinner, and Menage, derive it from the German *mar*, *marre*, a *mare*, or even a horſe, and *ſchall*, *ſervant*; which makes ſome imagine the title was firſt

given

given to farriers, or those who shod and bled horses; and that, in succession of time, it passed to those who commanded them. Palquier makes four several derivations for the four several kinds of *marshals* in use among the French; viz. *marshals* of France, *marshals de camp*, *marshals de logis*, or quarter-masters, and farriers, who are also called by the name of *marshals*. The third he derives from *marche*, or *marcher*, *to march*, *limit*; and the last from *maire*, *mayor*, and *chal*, *horse*.

Earl-MARSHAL *of England*. See EARL-*marshal*.

Knight-MARSHAL, or MARSHAL *of the king's house*, is an officer, whose business, according to Fleta, is to execute the commands and decrees of the lord steward, and to have the custody of prisoners committed by the court of verge. Under him are six *marshal's* men, who are properly the king's bailiffs, and attest in the verge of the court, when a warrant is backed by the board of green-cloth. The COURT where causes of this kind, between man and man, are tried, is called the *Marshalsea*, and is under the *knight-marshal*.

This is also the name of the prison in Southwark; the reason of which may probably be, that the *marshal* of the king's house was wont to sit there in judgment, or keep his prison.

There are some other inferior officers of this name; as,

MARSHAL of the justices in eyre.

MARSHAL of the king's bench, who has custody of the prison called the king's bench in Southwark.

This officer gives attendance upon the court, and takes into his custody all prisoners committed by the court; he is fineable for his absence, and non-attendance incurs a forfeiture of his office. The power of appointing the *marshal* of the king's bench is in the crown. 27 Geo. II. c. 17.

In Fleta, mention is also made of a *marshal of the exchequer*, to whom the court commits the custody of the king's debtors, &c.

MARSHAL, or MARESCHAL, of France, is the highest dignity of preferment in the French armies. The dignity of *marshal* is now for life, though, at its first institution, it was otherwise. They were then only the king's first ecuyers under the constable, but in time they became the constable's lieutenants in the command of the army, the constable himself being then become captain-general. At first they were but two in number, and their allowance was but five hundred livres per annum in time of war, and nothing in time of peace; but in the reign of Francis I. a third was added; Henry II. created a fourth. Since it has been various; Lewis XIV. increased it to twenty. Their office at first was, to *marshal* the army under the constable, and to command in his absence.

They did then what the *marshals de camp* do now; to which last they have given their title, and the least considerable part of their authority.

The first *marshal* does the office of constable in an assembly of the *marshals*.

Arch-MARSHAL. See ARCH.

Clerk-MARSHAL. See CLERK.

Field-MARSHAL. See FIELD-*marshal*.

Provost-MARSHAL. See PROVOST.

MARSHALLING a *coat*, in *Heraldry*, signifies the due and proper joining of several coats of arms belonging to distinct families in one and the same shield, or escutcheon; together with their ornaments, parts, and appurtenances.

MARSHALSEA. See COURT *of Marshalsea*.

MARSHY, or MARSH *lands*, a name given by our farmers to a sort of pasture-land, or grazing-ground, which lies near the sea, rivers, or fens.

As to lands lying near rivers, the great improvement of them is their being overflowed; which brings the soil of the uplands upon them, so that they need no other manuring, though kept constantly mowed. The great inconveniency of these lands, is their being subject to floods, which high hills near the sides of rivers, and the long course of them, bespeak to be frequent. And though the richest land generally lies near such rivers, yet there is the greatest danger of the crops being spoiled, especially when they are not inclosed; and therefore cannot be fed with cattle. This, when feeding bears any thing of a price, would be the very best way of managing these uncertain lands; and inclosing them would be highly beneficial on this account.

The *marsh*-lands in Lincolnshire, and many other parts of England, produce a sort of grass, which feeds sheep in a better manner than that of almost any other land, in regard to their size, and the quantity of wool. The sheep about Grimsby, and some other places in this county, produce such lusty wool, or, as they call it, wool of so large a staple, that three or four fleeces usually make a tod of twenty-eight pounds weight. Several hundred loads of this wool are yearly carried from these places to Norfolk, Suffolk, and other parts of the kingdom, for the cloth-manufacturers. They send this in large packs, which they call pockets, each containing about five and twenty hundred weight. Philos. Trans. N° 223.

When *marsh*-lands lie flat, it is necessary for the owner to keep all the water he can from them. The sea-water, in particular, is to be kept from them as much as possible; and this is usually done at a very great expence, by high banks and walls.

Two things greatly wanting in these lands in general, are good shelter for the cattle, and fresh water. The careful farmer may, however, in a great measure, obviate these by digging, in proper places, large ponds to receive the rain water, and by planting trees and hedges in certain places toward the sea, where they may not only afford shelter to the cattle, but keep off the [illegible], which often will eat off the tops of [illegible] in those places, and make it look as if it had [illegible]. These lands often cattle the sooner [illegible] preserve sheep from the rot. It would be a great [illegible] to them, if there were raised, in the middle [illegible] very large *marsh*, banks of earth in a cross, or in form of two semicircles, and these planted with trees; these would serve as a shelter for cattle, let the wind blow from what quarter it would, and would soon repay the expence of making.

There are, in different parts of England, very large quantities of land upon the sea-coasts, that would be worth taking in, though no one yet has thought of doing it. The coasts about Holland, Spalding, and many other parts of Lincolnshire, give frequent instances of this, where the sea falls from the land, so that on the outside of the sea-walls, on the ouse, where every tide the salt-water comes, there grows a good deal of good grass, and the ouse is firm to ride upon, when the water is upon it.

This ouse, when taken in, hardly sinks any thing at all, and they dig the walls from the outside of it, all the earth they are made of, being taken from thence, and the sea, in a few tides, filling it up again: and though the sea, at high water, comes only to the foot of the bank, yet once in a year or two, some extraordinary tides go over the banks, though they are ten feet high. These banks are fifty feet broad at the bottom, and three feet at the top; and the common price of making them is twenty-six shillings a pole, the earth being all carried in wheel-barrows, and the face toward the sea, where the greatest slope is, being turfed. Mortimer's Husbandry. See FEN and DRAINS, &c.

It is to be observed, that neither coasts, nor even large inundations, where the water is deep, are nearly so dangerous in regard to people's health, or exhale so much noxious vapour, as *marshy* grounds, or meadows that have been once floated, and but lately drained; and that fields, though dry in appearance, may nevertheless be moist by the transpiration of subterraneous water.

By this exhalation, as well as by that of ditches and canals, in all which innumerable plants and insects die and rot, the atmosphere is filled, especially during the latter part of summer and autumn, with moist, putrid, and insalubrious vapours. Add to this, that *marshy* countries being low, and without hills to receive the winds, or direct them in streams upon the lower grounds, the air is apt to stagnate and corrupt. The common water too, being either collected from rains, and preserved in cisterns, or drawn from shallow wells, is, in hot and dry seasons, soon corrupted; so that every thing conspires, in summer, not only to relax the solids, but to dispose the humours to putrefaction.

In *marshy* countries rainy and moist seasons differ greatly; since intense and continued heats occasion the greatest moisture in the atmosphere, by the immense exhalations they raise; whereas frequent showers, during the hot season, cool the air, check the excess of vapours, dilute and refresh the corrupted stagnating water, and precipitate all putrid and noxious effluvia. But if heavy rains, in the beginning of summer, are succeeded by great and uninterrupted heats, those rains, by overflowing the meadows, serve only for matter of more exhalation, and to make the season more sickly, and the distempers more fatal.

The epidemic of the hot [illegible] great endemic of *marshy* countries, is a [illegible] remitting nature, commonly of a tertian [illegible] kind; which in the damper places, and [illegible] appears in the form of a double tertian, [illegible] putrid, or even an ardent fever.

Arabian countries are [illegible] more than any others, to the cholera [illegible] and a kind of scurvy, peculiar to a moist [illegible], the symptoms of which [illegible] sea-scurvy, that they may be accounted [illegible]; the exhalations

halations of the canals and *marshes*, in hot weather, acting like the vapour which rises from the bildge-water of a ship. Id. ibid. p. 6, seq.

As to the diet necessary in moist places, it may be observed in general, that those who can afford to live above the common rate, keep freest from the diseases of the *marshes*. For such climates require dry houses, the apartments raised from the ground, proper exercise without labour in the sun, or in the evening damps, a just quantity of vinous liquors, and victuals of good nourishment. Without such helps, not only strangers, but the natives themselves, are extremely sickly, after hot and close summers. Pringle's Obs. on Diseases of the Army.

It has been sufficiently demonstrated, by Dr. Priestley, and others, that air which arises from stagnant and putrid water, or which has been for some time in contact with it, must be very unfit for respiration; and, therefore, that the neighbourhood of putrid *marshes*, on account of the noxious quality of the effluvia issuing from them, must be exceedingly insalubrious. See EFFLUVIA.

MARSILEA, in *Botany*, a name given by Linnæus to a genus of the *cryptogamia* class of ferns: the male flowers of which are above the leaf; and the female part of the fructification consists at the root of a roundish fruit, composed of four capsules.

MARSUIN, in *Zoology*, a name by which many have called the *phocæna*, or PORPESSE, a fish too often confounded with the dolphin.

MARSUPIALE, in *Natural History*, a name given by Tyson to the creature commonly called the *possum*, or OPOSSUM. The peculiar distinction of this creature from all others, is its having a pouch, or *marsupium*, under its belly, into which it receives its young in time of danger: whence the name.

MARSUPIALIS *musculus*, in *Anatomy*, a name given by Cowper, and some others, to a muscle on the thigh, called also by some, BURSALIS. It is that muscle, called by Albinus, Winslow, and the generality of modern authors, OBTURATOR *internus*.

MARSUPIUM *carneum*, in *Anatomy*, a name given by Spigelius, Cowper, and some other authors, to certain muscles of the thigh, called by the French writers, *les petit jumeaux*, and by Albinus, *gemini*. Vesalius does not esteem them separate muscles, but calls them only *carneæ portiones decimo femur moventium musculo attenuatæ*, fleshy portions affixed to the tenth muscle of the thigh. Riolan, who calls the *pyriformis*, or pyramidal muscle of the thigh, the *quadrigeminus*, or *quadrigeminus prior*, calls these the *quadrigemini secundi et tertii*. They are sometimes distinct, sometimes they grow together.

MART, denotes a great FAIR or MARKET, for selling of goods, holden every year.

MART, *letters of*. See LETTERS.

MARTAGON, in *Botany*, a name given to several species of LILY.

MARTEAU, the name given by French naturalists to a peculiar species of OYSTER, called also *malleum* by others. It is one of the most curious shells in the world. Its figure is that of a hammer, with a very long head, or rather of a pick-ax. It has a body of moderate thickness, and two long arms. It is of a brownish colour, with a beautiful tinge of a violet-blue. Notwithstanding the strange shape of these shells, they close very exactly.

MARTIAL is sometimes used to express preparations of iron, or such as are impregnated therewith; as the *Martial* regulus of antimony, &c.

MARTIAL *court*. See COURT *martial*.

MARTIALE *bezoardicum*. See BEZOARDICUM.

MARTIAL *law* is the law of war, depending upon the arbitrary, but just power and pleasure of the king, or his lieutenants. The king, though in times of peace he makes no laws, but by the consent of his parliament; yet, in war, uses absolute power over the soldiery: though even this power hath been vested, of late years, in the king, or his generals of the army, by act of parliament, and under particular restrictions too.

Martial law, says sir Matthew Hale, is in reality no law, but something indulged, rather than allowed as law. The necessity of order and discipline in an army is the only thing that can give it countenance; and therefore it ought not to be permitted in time of peace, when the king's courts are open for all persons to receive justice, according to the laws of the land. The petition of RIGHT enacts, that no soldier shall be quartered on the subject without his own consent; and that no commission shall issue to proceed within this land according to *martial* law. See *Martial* COURT.

MARTIALES *flores*. See FLORES *martiales*.

MARTICHORA, in *Natural History*, the name given by the ancient Greeks to the animal which we call the MANTICHORA or *man-tiger*.

MARTIS *campus*. See CAMPUS and FIELD.

MARTIN, or *martlet*, in the *History of Quadrupeds*, the name of a creature of the weasel-kind, being the MUSTELA *martes* of Linnæus, with cloven feet, body of a deep yellow colour approaching to black, and whitish throat. There are two species of this creature, the one called the *martes abietum*, or fir-*martin*; the other, the *martes fagorum*, or beech-*martin*. The beech-*martin* is distinguished from the other by having a larger and blacker tail, and being all over of a darker colour, and by being white on the throat, whereas the others are yellow; but the species are scarce kept up distinct, the creatures mixing with one another in the breed. When distinct, the beech-*martin* is found to be a much tamer creature than the other, and may be kept about houses like a cat; and often lives of its own accord about houses, and among old walls. Their skins make a valuable fur; and that of the fir-*martin*, or yellow kind, is much the most valuable: prodigious numbers of their skins being annually imported from Hudson's Bay and Canada.

The *martin* is of the size of a cat, but longer bodied; its legs also are shorter, and its claws less sharp, and shorter. Its whole body is covered with hair of a yellowish black, except only the throat, which, in the beech-*martin*, or rarer kind, is white; and in the wild kind, or fir-*martin*, yellow. Its teeth are sharp and strong, and the dog-teeth, in particular, stand out a great way.

The beech-*martin*, with us, inhabits woods, makes its lodge in the hollows of trees, and brings from four to six young at a time. It makes great havock among poultry, game, &c. and will eat mice, rats, and moles.

The pine or fir-*martin* inhabits the north of Europe, Asia, and America; and is found also in Great Britain, particularly in Scotland; where it lodges in the fir-forests, building its nest at the top of the trees.

The *martin* leaves so strong a scent, that the hounds, when out in a morning, will often take it, and make a noble cry. The chace, in this case, is very good while it lasts, but it is very perplexed; for the creature is not able to run long, and when she is tired, she gets up into a tree; the hounds often lose her on this occasion; but if she is spied up in the tree, she is to be hunted down with sticks, &c. When killed, the hounds are not suffered to eat her flesh, for it is unwholsome. See *Tab.* III. *of Quadrupeds*, N° 33.

MARTIN, in *Ornithology*. See SWALLOW.

MARTIN, *Free*, in *Zoology*, is a name given in this country to a cow-calf, east at the same time with a bull-calf, which is a kind of HERMAPHRODITE; that is never known to breed, nor to discover the least inclination for the bull: nor does the bull ever take the least notice of this animal. It has all the external marks of a cow-calf, viz. the teats, and the external female parts, called by farmers the bearing. When these animals are preserved, it is not for propagation, but for all the purposes of an ox or spayed heifer, viz. to yoke with the oxen, and to fatten for the table. They are much larger than either the bull or the cow, and the horns grow larger, being very similar to the horns of an ox. The bellow of the free *martin* is like that of an ox; and the meat resembles that of the ox or spayed heifer; being generally finer than that of the bull or cow; and it is more susceptible of growing fat with good food. Mr. Hunter has anatomically described three animals of this kind, in the Phil. Trans. vol. lxix. part i. p. 289. &c.

MARTINAZZO, in *Ornithology*, the name of a species of water-fowl, of the larus or GULL kind, the *larus marinus* of Linnæus, and called, by the Dutch, the burgomaster of Greenland; by the Cornish people, the *waggell*, or the *great grey-gull*. It is a large bird, usually weighing from two to four pounds. It is all over of a mottled colour of brown, grey, and white; but is much darker on the back than on the belly. The back and wing-feathers are all brown in the middle, and grey at the edges; but those of the rump are mostly white; the legs are of a dirty white. They say that this gull will follow the smaller lari, and persecute and terrify them till they void their food in excrements half digested, which he afterwards picks up, esteeming it better than fresh food; and on this account it is sometimes called the *dung-hunter*.

MARTINGALE, invented by Evangelista, an eminent horseman of Milan; a thong of leather fastened at one end to the girths under the belly of an horse, and at the other end to the bit, or, which is the better way, to a thin mouth-piece of its own, to hinder him from rearing, or tossing up his head. It is also of service when the

horſe bears upon the hand, and his head is uncertain and inconſtant; when his jaws are too tight, and when he is ſtag-necked. If the SNAFFLE is uſed with the reins laſtened low, it becomes a *martingale*, or anſwers the purpoſe better; becauſe the hand can make it ſtrict or eaſy, or both by turns, as the rider pleaſes, and the horſe requires.

MARTINO *pescatore*, in *Ichthyology*, a name given by Salvian, and ſome others, to the RANA *piſcatrix* of authors; the *lophius* of Artedi.

St. MARTIN's *cope*. See COPE.

MARTIOBARBULI, among *the Romans*, a deſignation given to ſoldiers, who carried leaden balls to annoy the enemy with.

MARTIORA, or MARTICORA, in *Natural Hiſtory*, the name which the ancient Greeks gave to the animal which the Romans called MANTICHORA.

MARTLET, in *Heraldry*, a little bird repreſented without feet, and properly alſo without a beak.

It is uſed as a DIFFERENCE, or mark of diſtinction, of a younger brother; ſome ſay, more peculiarly of the fourth brother, or family. See HOUSE. See *Tab.* II. *Heraldry, fig.* 72.

MARTNETS, in *a ſhip*, ſmall lines laſtened to the leetch of a ſail, being reeved through a block on the top-maſt-head, and coming down by the maſt to the deck. Thoſe *martnets* which belong to the top-ſails are laſtened after the ſame way to the heads of the top-gallant-maſts, but their fall comes down no farther than the top, when it is haled. The word is, *cap the martnets*; i. e. haſe them up. Their deſign is, in furling the ſail, to bring that part of the leetch which is next the yard-arm cloſe to the yard, that ſo the ſail may furl up the cloſer.

MARTYNIA, in *Botany*, a genus of the *didynamia angioſpermia* claſs. Its characters are theſe: the flower, the empalement of which is cut into five parts, has one bell-ſhaped petal of the ringent kind, with a ſwelling tube, at the baſe of which is ſituated a gibbous nectarium; it has four ſlender incurved ſtamina, which are inflexed into each other, and an oblong germen ſituated under the flower; the empalement afterwards turns to an oblong gibbous capſule, which divides into two parts, including a hard nut ſhaped like the body of a ſtag beetle, with two incurved ſtrong horns at the end, having four cells, two of which are generally barren, the other two have an oblong ſeed in each. There are three ſpecies, natives of the ſouthern parts of North America.

MARTYR, a perſon who ſuffers torments, and even death, in defence of the truth of the goſpel.

The word is Greek, *μαρτυς*, and properly ſignifies *a witneſs*. It is applied by way of eminence, to thoſe who ſuffer in witneſs of the truth of the goſpel.

Anciently thoſe who were baniſhed for the faith, were called *martyrs*, and alſo thoſe who periſhed in the holy wars. In the time of St. Auguſtine, the title of *martyr* was given to confeſſors, or thoſe who were tortured for the faith, without loſing their lives. It is Tertullian's thought in his Apologetic: *Plures efficimur, quoties metimur; ſemen eccleſiæ eſt ſanguis Chriſtianus.*

St. Stephen is called the *proto-martyr*, or firſt *martyr*.—Nineteen thouſand ſeven hundred are computed to have ſuffered *martyrdom* with St. Irenæus at Lyons, under the empire of Severus: ſix thouſand ſix hundred and ſixty-ſix ſoldiers of the Theban legion are ſaid to have been *martyred* in Gaul: Father Papebroch reckons ſixteen thouſand Abyſſinian *martyrs*, and one hundred and fifty thouſand others under Dioclefian alone.

Mr. Dodwell endeavours to prove, in a diſſertation expreſs, that the number of *martyrs* who ſuffered under the Roman emperors, was very moderate; alledging, that thoſe we have accounts of in the fathers, come within a very ſmall compaſs; and that, excepting Nero and Domitian, the reſt of the emperors made ſcarce any. F. Ruinart, on the contrary, endeavours to prove, that the catalogue of *martyrs* is not at all ſwelled; that the carnage was immenſe under the firſt emperors, and eſpecially in the time of Dioclefian. F. Papebroch, in his *Acta ſanctorum*, alſo makes the number of *martyrs* immenſe. The truth lies probably between the extremes.

There is ſcarce any ſect or religion that does not pretend to its *martyrs*: Mahometans, heathens, idolaters, &c. all have their *martyrs*.

In the ancient church, the acts, ſayings, ſufferings, and deaths, of the *martyrs*, were preſerved with great care, in order to be read on certain days, and thus propoſed as models to future ages: and yet notwithſtanding all this diligence, we have but very little left of them: the greateſt part of them having been deſtroyed, during that dreadful perſecution, which Dioclefian carried on for ten years, with freſh fury, againſt the Chriſtians: for a moſt diligent ſearch was then made after all their books and papers; and all of them that were found were committed to the flames. Euſebius, indeed, compoſed a *martyrology*, but it never reached down to us; and thoſe ſince compiled are extremely ſuſpected.

From the eighth century downwards, ſeveral Greek and Latin writers endeavoured to make up the loſs, by compiling, with vaſt labour, accounts of the lives and actions of the ancient *martyrs*: but moſt of them have given us little elſe than a ſeries of fables, adorned with profuſion of rhetorical flowers, and ſtriking images, as the wiſer, even among the Romiſh doctors, frankly acknowledge. Nor are thoſe records, that paſs under the name of MARTYROLOGY, worthy of ſuperior credit, ſince they bear the moſt evident marks both of ignorance and falſhood.

MARTYRS, *æra of*, is an æra followed in Egypt and Abyſſinia, and which even the Mahometans, ſince their becoming maſters of Egypt, frequently obſerve. See EPOCHA.

The æra of *martyrs* is alſo called the æra of Dioclefian.

MARTYROLOGY, from *μαρτυς*, *witneſs*, and *λεγω*, *dico*, *I ſpeak*; or *λεγω*, *colligo*, *I gather*; a regiſter or catalogue of *martyrs*.

A *martyrology*, properly ſpeaking, ſhould contain no more than the name, place, and day of martyrdom of each ſaint; but the term is frequently extended to the hiſtories of martyrs. The cuſtom of collecting *martyrologies* is borrowed from the heathens, who inſerted the names of their heroes in their *faſti*, to preſerve to poſterity the memory and example of their noble actions. Baronius gives pope Clement the credit of being the firſt who introduced the cuſtom of collecting the acts of the martyrs.

The *martyrology* of Euſebius of Cæſarea was the moſt celebrated in the ancient church. It was tranſlated into Latin by St. Jerom; but the learned agree, that it is not now extant. That attributed to Beda, in the eighth century, is of very doubtful authority; the names of ſeveral ſaints being there found, who did not live till after the time of Beda. The ninth century was very fertile in *martyrologies*: then appeared that of Florus, ſubdeacon of the church at Lyons; who, however, only filled up the chaſms in Beda. This was publiſhed about the year 830, and was followed by that of Walden burtus, monk of the diocefe of Treves, written in verſe about the year 848, and this by that of Uſuard, a French monk, and written by the command of Charles the Bald, in 875, which laſt is the *martyrology* now ordinarily uſed in the Romiſh church. That of Rabanus Maurus is an improvement on Beda and Florus, written about the year 845; that of Notker, monk of St. Gal, was written about the year 894.

The *martyrology* of Ado, monk of Ferrieres, in the diocefe of Treves, afterwards archbiſhop of Vienne, is a deſcendant of the Roman, if we may ſo call it; for Du Solier gives its genealogy thus: the *martyrology* of St. Jerom is the great Roman *martyrology*; from this was made the little Roman one printed by Roſweyd; of this little Roman *martyrology* was formed that of Beda, augmented by Florus. Ado compiled his in the year 858.

The *martyrology* of Nevelon, monk of Corbie, written about the year 1089, is little more than an abridgment of that of Ado; father Kircher alſo makes mention of a Coptic *martyrology*, preferred by the Maronites at Rome.

We have alſo ſeveral proteſtant *martyrologies*, containing the ſufferings of the reformed under the papiſts; viz. an Engliſh *martyrology*, by J. Fox; with others, by Clark, Bray, &c.

MARTYROLOGY is alſo uſed, in the *Romiſh church*, for a roll or regiſter kept in the veſtry of each church, containing the names of all the ſaints and martyrs, both of the univerſal church, and of the particular ones of that city or monaſtery.

MARTYROLOGY, is alſo applied to the painted or written catalogues in the Romiſh churches, containing the foundations, obits, prayers, and maſſes, to be ſaid each day.

MARUZIAN, in the *Materia Medica*, a word formed by the modern Greek writers, to expreſs a ſort of ſea-plant, growing upon the rocks, and uſed in painting, dying, &c.

The word is formed of the Arabian name MARGIAN, by changing the *g* into *r*.

MARU, in *Botany*, a name by which Dodonæus, and ſome others, have called the *cerinthe*, or *honey-wort*.

MARUBIUM, in *Botany*, &c. See HORE-HOUND.

MARVEL *of Peru*, or *Four-o'Clock-Flower*, *mirabilis*, in *Botany*, a genus of the *pentandria monogynia* claſs. Its characters are, that the empalement of the flower has five oval, ſpear-ſhaped, ſmall leaves, membranaceous, ſwelling, and permanent; the flower has one funnel-ſhaped petal, with a long ſlender tube [illegible] the nectarium, which ſpreads open above, and is cut into five ob-

tuſe

tuse segments; it hath five slender stamina, which adhere to the petal, which are unequal and inclined, terminated by roundish summits, with a roundish germen within the nectarium, which becomes an oval five-cornered nut, inclosing one seed. There are three species. Tournefort was informed by father Plumier, that a species of this genus common in all the West Indian islands, where the inhabitants call it the *four o'clock* flower, from the flower's opening at that time of the day, was the officinal JALAP; but the late Dr. Houstoun was fully informed, in the Spanish West Indies, of the contrary, and brought over a drawing of the plant, which was made by a Spaniard at Halapa; and he carried two or three of the plants to Jamaica, where he planted them in a garden, but after he left the island they were destroyed by the hogs; however, he was fully satisfied of its being a CONVOLVULUS: but the roots of *marvel of Peru* are purgative, and when given in a double quantity for a dose will answer the purpose of JALAP.

There are two varieties of the first species of this beautiful plant propagated in flower-gardens, which are very ornamental during the months of July, August, and September. The flowers do not open till toward the evening, while the weather is warm; but in moderate cool weather, when the sun is obscured, they continue open almost the whole day. They are to be raised by sowing their seeds in March, on a moderate hot-bed. When they come up to the height of two inches, they are to be transplanted to another hot-bed; or if they are transplanted into pots filled with light earth, and plunged into a moderate hot-bed; while they are in the second hot-bed they should be shaded, till they have taken root; after which they must have plenty of fresh air; and in May they must be gradually inured to bear the open air; in the beginning of June they may be transplanted into the borders of the pleasure garden; and after they have taken new root they will require no farther care.

Some take up the roots when the stalks are dead, and lay them up in sand till spring, when they are planted again into pots, and plunged into a moderate hot-bed to facilitate their taking root. And the plants, from the roots of the former year, will always flower much stronger than the seedlings of the same year's growth. Miller.

MARUM, in *Botany*. See SAVORY, *Tree* GERMANDER, and *Herb* MASTICH.

MARY.—*Knights of St.* MARY, is a name by which several orders of knighthood are distinguished.—As, *St. Mary of the Thistle*. See THISTLE. *St. Mary of the Conception*. See CONCEPTION. *St. Mary of the Elephant*. See ELEPHANT. *St. Mary and Jesus*. *St. Mary of Loretto*. *St. Mary of Mount Carmel*. See CARMEL. *St. Mary of the Teutonics*. See TEUTONIC, &c.

MARYGOLD, *calendula*, in *Botany*, a genus of the *syngenesia polygamia necessaria* class. Its characters are these: it has a compound radiated flower, the borders or rays being composed of female florets, which are stretched out on one side like a tongue; the hermaphrodite flowers which compose the disk are tubulous and quinquefid; the germen is situated under the petal; these flowers are barren, but the female flowers are each succeeded by one oblong incurved seed, with angular membranes.

Miller enumerates ten, and Linnæus eight species of the common *marygold*: there are the following varieties, viz. the common single, the double flowering, the largest very double flower, the double lemon-coloured flower, and the greater and smaller childing *marygold*.

The flowers of the single *marygold* are said to be cordial and alexipharmic, to promote sweat, and to be good for throwing out the small-pox, or any other eruption.—They have been recommended also for promoting the menses, and have been deemed so far aperient, as to be of service in the jaundice, and in indurations of the spleen; but they appear from their sensible qualities to be of little activity. The midwives burn them under women whose labour does not come on properly, and suppose they are of great virtue in promoting the pains. They also distil a water from them, as a remedy for sore eyes: but these last virtues are not so well warranted as the former.

The leaves of the plant appear to be of greater virtue than the flowers: their expressed juice has been given, in doses of two or three ounces or more, as an aperient; and is said to loosen the belly, and promote the natural secretions in general. Lewis.

MARYGOLD, *African*. See *French* MARYGOLD.

MARYGOLD, *corn*, *chrysanthemum*, in *Botany*, a genus of the *syngenesia polygamia superflua* class. Its characters are these: it hath a compound flower, the rays composed of female florets, which are extended on one side like a tongue; these have an oval germen; the hermaphrodite flowers, which compose the disk, are funnel-shaped, divided into five parts at the top; these have five short hairy stamina, and an oval germen, which afterward becomes a single, oblong, naked seed. Linnæus enumerates twenty-two, and Miller only twelve species, native of various parts; one of them is the common *corn marygold*, which grows naturally in our corn fields.

MARYGOLD, *fig*, in *Botany*. See MESEMBRYANTHEMUM.

MARYGOLD, *French*, *tagetes*, in *Botany*, a genus of the *syngenesia polygamia superflua* class. Its characters are these: the common empalement of the flower is single, oblong, erect, and five-cornered; the flower is compound and radiated; the ray or border is composed of five female half florets, which are tongue-shaped; the disk or middle is made up of hermaphrodite florets, which are tubulous, cut into five obtuse segments; these have five short hair-like stamina, terminated by cylindrical summits and an oblong germen, supporting a slender style, crowned by a bifid, reflexed stigma; the germen afterwards becomes a single, linear, compressed seed, almost the length of the empalement, crowned by five acute, pointed, unequal scales; the female half-florets have an oblong germen, with a style and stigma like the hermaphrodite; and are succeeded by seeds of the same form, but have no stamina.

Miller enumerates four, and Linnæus three species, including several varieties, which are raised in our gardens, for the beauty of their flowers. They are propagated by sowing the seeds in spring, on a moderately hot-bed; when the young plants come up, they must have air allowed them; and when three inches high, they should be removed to another hot-bed, which should be arched over with hoops that it may be sheltered with mats. They are to be planted here at about six inches distance, and when they are grown stronger, as about the beginning of May, they are to be taken up with a ball of earth about their roots, and placed where they are to remain: or else at eighteen inches distance in a nursery, where, when they flower, the finest sorts may be marked and removed, with a large ball of earth to their roots, either into pots, or into the borders of the flower-garden. They are very beautiful; but their smell is very offensive. Miller.

MARYGOLD, *marsh*, *caltha*, in *Botany*, a genus of the *polyandria polygynia* class. Its characters are these: the flower hath no empalement, but is composed of five large oval petals, which are concave, and has a great number of slender stamina; in the centre are situated several oblong compressed germina, which afterward become so many short pointed capsules, containing many roundish seeds. Linnæus reckons only one species, which grows on boggy land, in many parts of England; but Miller mentions two.

MARYGOLD, *Zoophyte*, in *Natural History*, the name of a species of sea-animal, of a very beautiful kind, and of the nature of those commonly called *zoophytes*, or plant-animals, by the old naturalists. In St. Lucy's parish, in Barbadoes, there is a cave, in which is a basin of very clear salt water; and in the midst of this basin lies a stone, which has been for many years found to be the habitation of a great number of animals of this species. The stone is always covered with water; and from small holes in its sides, in several parts, there appear, at all times of the year, a number of creatures representing the flowers of some of the radiated plants, and particularly of the common *marygold*: they are yellow, and seem composed of a very great number of petals. These, in their natural state, are all regularly and beautifully expanded; but as soon as any thing disturbs them, if it be only the motion of a stick, that comes within three or four inches of them, they in an instant close all the leaves up together, and the whole body, flower, stalk and all, is retracted back into the hole of the stone; but if the water be left a few minutes undisturbed again, they will appear and expand themselves in the former manner.

When they are nicely observed, there is a yet farther resemblance of a flower in their structure; for there arise from the centre of the body certain oblong bodies, which very naturally resemble the stamina arising from the center of a flower; but these have evidently the powers of animal-limbs; for they no sooner appear, but they dart themselves about to the verge of the flower in several directions, and are plainly busied in search of prey.—They are composed of several joints, and the creature often makes them meet in the manner of a forceps, to lay hold of any thing it pleases. These parts, however, seldom appear thus extended any long time together, but are, after a time, received back into the body.

These arms may easily be conceived to be of use to draw in the prey within the compass of the body of the animal; and as soon as it is there, the same contraction of the several

ſeveral rays which ſerves them to eſcape danger, and bury themſelves in the cavity of the ſtone, will alſo ſerve to hold faſt the prey till the creature has fed on it. Beſide theſe large yellow radiated *zoophytes*, the top of the ſtone uſually affords a number of others of a blue colour, which ſtand among a ſort of veſicles of water-bladders, diſpoſed like cluſters of grapes. Philoſ. Tranſ. N° 470. p. 591.

MASARANDIBA PISON, in *Botany*, a tree which grows in Braſil, very like our European cherry-tree, in every reſpect, except that the fruit it produces is not ſo round as our cherries. This fruit contains a very hard ſtone, and a very agreeable milky juice; which is expreſſed by the inhabitants of Braſil, and taken by way of emulſion, as a remedy for cold affections of the breaſt, and hoarſeneſs, either alone or joined with other pectorals. James.

MASARINO, in *Ornithology*, a name given by the Portugueſe, in the Braſils, to a large bird of the curlew kind, approaching to the gooſe in ſize; and more commonly known by its Braſilian name CUBICACA.

MASBOTHÆI, or MESBOTHÆI, the name of a ſect, or rather of two ſects; for Euſebius, or rather Hegeſippus, whom he cites, makes mention of two different ſects of *Maſbotheans*. The firſt was one of the ſeven ſects that aroſe out of Judaiſm, and proved very troubleſome to the church: the other was one of the ſeven Jewiſh ſects before the coming of Jeſus Chriſt.

The word is derived from the Hebrew שבת, *ſchabat, to reſt, or repoſe*, and ſignifies idle, eaſy indolent people. Euſebius ſpeaks of them, as if they had been ſo called from one *Maſbotheus*, their chief: but it is much more probable, that their name is Hebrew, or at leaſt Chaldaic, ſignifying the ſame thing with a Sabbatarian in our language, that is, one who makes profeſſion of keeping ſabbath.

Valeſius will not allow the two ſects to be confounded together: the laſt being a ſect of Jews before, or at leaſt contemporary with Chriſt; and the former a ſect of heretics deſcended from them. Rufinus diſtinguiſhes them in their names: the Jewiſh ſect he calls *Maſbotheï*; and the heretics *Maſbotheani*. The *Maſbotheans* were a branch of the Simonians.

MASCHARADA, in the *Italian Muſic*, is applied to muſic compoſed for the geſtures of pantomimes, buffoons, mimics, and ſuch groteſque characters.

MASCLE, or MACLE, in *Heraldry*, a bearing in form of a lozenge, and voided of the field; that is, its inner part being cut out. See *Tab. Herald. fig.* 34.

He bears gules, a chevron ermin, between three *maſcles* argent, by the name of *Baltgrave*.

According to Guillim, the *maſcle* repreſents the maſh of a net and is an honourable bearing. It only differs from a lozenge, by being voided.

MASCULINE, ſomething belonging to the male, or the ſtronger of the two ſexes.

MASCULINE is more ordinarily uſed, in *Grammar*, to ſignify the firſt and worthieſt of the genders of nouns.

The *maſculine* gender is that which belongs to the male kind, or ſomething analogous to it.

Moſt ſubſtances are ranged under the heads of *maſculine* or feminine. This, in ſome caſes, is done with a ſhew of reaſon, but in others it is merely arbitrary; and, for that reaſon, is found to vary according to the languages, and even according to the words introduced from one language into another. Thus the names of trees are generally feminine in Latin, and *maſculine* in the French. Farther, the genders of the ſame word are ſometimes varied in the ſame language. Thus *abus*, according to Priſcian, was anciently *maſculine*, but is now become feminine. And *navire*, a ſhip, in French, was anciently feminine, but is now *maſculine*. See GENDER.

MASCULINE *rime*, in the *French Poetry*, is that made with a word which has a ſtrong, open, and accented pronunciation; as all words have, excepting thoſe which have an *e* feminine in their laſt ſyllable.

For inſtance, *amour* and *jour*, *mort* and *ſort*, are *maſculine* rimes; and *pere* and *mere*, *gloire* and *memoire*, are feminine. Hence alſo verſes ending with a *maſculine* rime, are called *maſculine* verſes; and thoſe ending with a feminine rime, feminine verſes.

It is now a rule eſtabliſhed among the French poets, never to uſe above two *maſculine*, or two feminine verſes ſucceſſively, except in the looſer kinds of poetry.

Marot was the firſt who introduced this mixture of *maſculine* and feminine verſes; and Ronſard was the firſt who practiſed it with ſucceſs. The *maſculine* verſes, in French, ſhould always have a ſyllable leſs than the feminine ones.

MASCULINE *Signs*.—Aſtrologers divide the ſigns, &c. into *maſculine* and feminine; by reaſon of their qualities, which are either active, and hot, or cold, accounted *maſculine*; or paſſive, dry, and moiſt, which are feminine. On this principle they call the Sun, Jupiter, Saturn, and Mars, *maſculine*; and the Moon and Venus, feminine. Mercury, they ſuppoſe, partakes of the two. Among the ſigns, Aries, Libra, Gemini, Leo, Sagittarius, and Aquarius, are ſaid to be *maſculine*; Cancer, Capricornus, Taurus, Virgo, Scorpio, and Piſces, are feminine.

MASH, the name of a drink given to horſes or cattle. It is made of half a peck of ground malt, put into a pail; on which is poured as much hot ſcalding water, as will wet it well; then ſtirring it about half an hour, till it becomes lukewarm, and ſweet like honey, it is to be given to the horſe.

A *maſh* is only given after a purge, to make it work better; after hard labour, or for drink in time of ſickneſs.

MASK, or MASQUE. See MASQUE.

MASLACH, the name of a medicine greatly in uſe among the Turks, and called alſo *amſun* or *amphion*. It is prepared principally of opium. They take a dram of it at a time, and ſometimes two or three: they always uſe it when going to battle, and very often as a provocative to venery, as they do the crude opium.

MASLIN. See BULLIMONY.

MASON, a perſon employed uſually under the direction of an architect, in the raiſing of a ſtone building.

The word comes from the French *maçon*, which ſignifies the ſame. Some derive this farther from the barbarous Latin *machio*, *a machiniſt*, in regard theſe artificers are obliged to uſe machines for raiſing walls. Du-Cange derives it from *macerie*, a name given to the long fence-walls which incloſe vineyards, &c. in which *maſons* are ſuppoſed to have been firſt employed: *Maſon eſt Macerarum conſtructor*. M. Huet derives it from *mas*, an old word, ſignifying *houſe*; hence *maſon* is a perſon who makes *maſſes*, that is, *houſes*. In the corrupt Latin, a *maſon* was called *magiſter comacinus*, which Lindenbroeck derives from Comacina, an iſland in Romanis, where, in the time of the Lombards, the beſt architects were found.

The chief buſineſs of a *maſon* is to prepare the mortar, raiſe the walls from the foundation to the top, with the neceſſary retreats and perpendiculars, form the vaults, and employ the ſtones as delivered to him.

When the ſtones are large, the buſineſs of hewing or cutting them belongs to the ſtone-cutters; though theſe are frequently confounded with the *maſons*. The ornaments of ſculpture are performed by carvers in ſtone, or ſculptors. The tools or implements principally uſed by *maſons* are, the ſquare, level, plumb-line, bevel, compaſs, hammer, chiſſel, mallet, ſaw, trowel, &c.

Beſides the common inſtruments uſed in the hand, they have likewiſe machines for the raiſing of great burdens, the conducting of large ſtones, &c. The principal of theſe are the lever, wheel, pulley, &c.

MASONS, *free or accepted*, a very ancient ſociety, or body of men, ſo called either from ſome extraordinary knowledge of maſonry or building, which they are ſuppoſed to be maſters of, or becauſe the firſt founders of the ſociety were perſons of that profeſſion.

They are now very conſiderable both for numbers and character; being found in every country in Europe, and conſiſting principally of perſons of merit and conſideration. As to antiquity, they lay claim to a ſtanding of ſome thouſand years; and, it is ſaid, can trace up their original as early as the building of Solomon's temple.—It is very doubtful when they were firſt introduced into this country: ſome have traced the origin of maſonry in general to the year 674, when GLASS-*making* was introduced: and it is certain that, after this time, many of our public buildings, in the Gothic ſtyle, were erected by men in companies, who, as ſome ſay, called themſelves *free*, becauſe they were at liberty to work in any part of the kingdom. Others have derived the inſtitution of *free maſons* from a combination among the *maſons* not to work without an advance of wages, when they were ſummoned from ſeveral counties, by writs of Edward III. directed to the ſheriffs, to aſſiſt in rebuilding and enlarging the caſtle, together with the church and chapel of St. George, at Windſor: accordingly it is ſaid, that the *maſons* agreed on tokens, &c. by which they might know one another, and to aſſiſt one another againſt being impreſſed, and not to work unleſs *free*, and on their own terms.

What the end of their inſtitution is, ſeems ſtill, in ſome meaſure, a ſecret; though ſo much of it as is known appears laudable enough, as it tends to promote friendſhip, ſociety, mutual aſſiſtance, and good fellowſhip.

The brothers of this family are ſaid to be poſſeſſed of a great number of ſecrets, which have been religiouſly obſerved from age to age.

MASONRY, a branch of architecture, conſiſting in the art of hewing or ſquaring ſtones, and cutting them level and perpendicular, for the uſes of building.

MASONRY, in a more limited ſenſe of the word, is the art of aſſembling and joining ſtones together with mortar. Hence there ariſe as many different kinds of *maſonry* as there are different forms and manners of laying or joining the ſtones. Vitruvius makes mention of ſeven kinds of *maſonry*, uſed among the ancients; three of hewed ſtone, viz. that in form of a *net*, that in *binding*, and that called the *Greek maſonry*: and three of unhewed ſtones, viz. that of an *equal courſe*, that of an *unequal courſe*, and that *filled up in the middle*. The ſeventh was a compoſition of all the reſt. See *Tab. Archit. fig.* 13. *to* 18.

MASONRY, *net*, called by Vitruvius, *reticulatum*, from its reſemblance of the meſhes of a *net*, conſiſts of ſtones ſquared in their courſes, and ſo diſpoſed, as that their joints go obliquely, and the diagonals are, the one perpendicular, and the other level. This is the moſt agreeable *maſonry* to the eye; but it is very apt to crack. See *fig.* 13.

MASONRY, *bound*, *inſerta*, is that wherein the ſtones were placed one over another, like tiles; the joints of the beds being level, and the mounters perpendicular. So that the joint that mounts and ſeparates two ſtones, always falls directly over the middle of the ſtone below. This is leſs beautiful than the net-work; but is more ſolid and durable. See *fig.* 16.

MASONRY, *Greek*, according to Vitruvius, is that where, after we have laid two ſtones, each of which makes a courſe, another is laid at the end, which makes two courſes; and the ſame order is obſerved throughout the building. This may be called *double binding*, in regard the binding is not only of ſtones of the ſame courſe with one another, but likewiſe of one courſe with another courſe. See *fig.* 14.

MASONRY *by equal courſes*, by the ancients called *iſodomum*, differs in nothing from the bound *maſonry*, but only in this, that its ſtones are not hewn.

MASONRY *by unequal courſes*, called *pſeudiſodomum*, is alſo made of unhewed ſtones, and laid in bound work: but then they are not of the ſame thickneſs, nor is there any equality obſerved, excepting in the ſeveral courſes; the courſes themſelves being unequal to each other. See *fig.* 15.

MASONRY *filled up in the middle*, called by the ancients *emplecton*, is likewiſe made of unhewed ſtone, and by courſes; but the ſtones are only ſet in order as to the courſes, the middle being filled up with ſtones thrown in at random among the mortar. See *fig.* 17.

MASONRY, *compound*, is of Vitruvius's propoſing; ſo called, as being formed of all the reſt. In this, the courſes are of hewed ſtone: and the middle, being left void, is filled up with mortar and pebbles thrown in together. After this, the ſtones of one courſe are bound to thoſe of another courſe, with cramp-irons faſtened with melted lead. See *fig.* 18.

All the kinds of *maſonry* now in uſe may be reduced to theſe five; viz. *bound maſonry*; that of *brick work*, where the bodies and projectures of the ſtones incloſe ſquare ſpaces or panels, &c. ſet with brick; that *de moilon* or of ſmall work, where the courſes are equal, well ſquared, and their edges or beds ruſticated; and that where the *courſes* are *unequal*; and that *filled up in the middle* with little ſtones and mortar.

MASONRY is ſometimes alſo uſed in a more general and unlimited ſenſe; ſo as, beſides proper *maſonry*, to include the hewing or ſawing of larger ſtones to fit them for building, properly called *ſtone-cutting*; and the carving of the ornaments on the members and mouldings, properly called *ſculpture*.

MASORA, a term in the *Jewiſh Theology*, ſignifying a work on the Bible, performed by ſeveral learned rabbins, to ſecure it from any alterations which might otherwiſe happen.

Their work regards merely the letter of the Hebrew text; in which they have, firſt, fixed the true reading by vowels and accents: they have, ſecondly, numbered not only the chapters and ſections, but the verſes, words, and letters of the text: and they find in the Pentateuch 5245 verſes, and in the whole Bible 23206. The *maſora* is called, by the Jews, the hedge or fence of the law, becauſe this enumeration of the verſes, &c. is a means of preſerving it from being corrupted and altered. They have, thirdly, marked whatever irregularities occur in any of the letters of the Hebrew text; ſuch as the different ſize of the letters, their various poſitions and inverſions, &c. and they have been fruitful in finding out reaſons for theſe irregularities and myſteries in them. See CABBALISTS. They are, fourthly, ſuppoſed to be the authors of the Keri and Cherib, or the marginal corrections of the text in our Hebrew Bibles.

The text of the ſacred books, it is to be obſerved, was originally written without any breaks, or diviſions into chapters or verſes, or even into words; ſo that a whole book, in the ancient manner, was but one continued word: of this kind we have ſtill ſeveral ancient manuſcripts, both Greek and Latin. In regard, therefore, the ſacred writings had undergone an infinite number of alterations, whence various readings had ariſen, and the original was become much mangled and diſguiſed, the Jews had recourſe to a canon, which they judged infallible, to fix and aſcertain the reading of the Hebrew text; and this rule they call *maſora*, *tradition*, from מָסַר *tradidit*, as if this critique were nothing but a tradition which they had received from their forefathers. Accordingly they ſay, that when God gave the law to Moſes, at Mount Sinai, he taught him, firſt, the true reading of it, and, ſecondly, its true interpretation; and that both theſe were handed down by oral tradition, from generation to generation, till at length they were committed to writing. The former of theſe, viz. the true reading, is the ſubject of the *maſora*; the latter, or true interpretation, that of the MISHNA and GEMARA.

According to Elias Levita, they were the Jews of a famous ſchool at Tiberias, about 500 years after Chriſt, who compoſed, or at leaſt began the *maſora*; whence they are called *maſorites*, and *maſoretic doctors*. Aben Ezra makes them the authors of the points and accents in the Hebrew text, as we now find it; and which ſerve for vowels. See POINTS.

The age of the *maſorites* has been much diſputed. Archbiſhop Uſſher places them before Jerom; Capel at the end of the fifth century; father Morin in the tenth century: Baſnage ſays, that they were not a ſociety, but a ſucceſſion of men; and that the *maſora* is the work of many grammarians, who, without aſſociating and communicating their notions, compoſed this collection of criticiſms on the Hebrew text. It is urged that there were *maſorites* from the time of Ezra and the men of the great ſynagogue, to about the year of Chriſt 1030; and that Ben Aſher and Ben Naphtali, who were the beſt of the profeſſion, and who, according to Baſnage, were the inventors of the *maſora*, flouriſhed at this time.—Each of theſe publiſhed a copy of the whole Hebrew text, as correct, ſays Dr. Prideaux, as they could make it. The eaſtern Jews have followed that of Ben Naphtali, and the weſtern that of Ben Aſher; and all that has been done ſince is to copy after them, without making any more corrections, or *maſoretical* criticiſms.

The Arabs have done the ſame thing by their Koran, that the *maſorites* have done by the Bible: nor do the Jews deny their having borrowed this expedient from the Arabs, who firſt put it in practice in the ſeventh century.

There is a *great* and a *little maſora*, printed at Venice, and at Baſil, with the Hebrew text, in a different character. Buxtorf has written a *maſoretic* commentary, which he calls *Tiberias*. See on this ſubject Jennings's Jewiſh Ant. vol. i. p. 400, &c. and the various authors there cited.

MASORITES, Jewiſh doctors, authors of the MASORA.

MASQUE, or MASK, a cover for the face, contrived with apertures for the eyes and mouth; originally worn chiefly by women of condition, either to preſerve their complexion from the weather, or out of modeſty, to prevent their being known.

Poppæa, wife of Nero, is ſaid to be the firſt inventor of the *maſque*; which ſhe did to guard her complexion from the ſun and weather, as being the moſt delicate woman, with regard to her perſon, that has been known.

Theatrical *maſques* were in common uſe both among the Greeks and Romans: Suidas and Athæneus aſcribe the invention of them to the poet Choerilus, a contemporary of Theſpis; Horace attributes them to Æſchylus; but Ariſtotle informs us, that the real inventor, and, conſequently, the time of their firſt introduction and uſe, were unknown. Brantome obſerves, that the common uſe of modern *maſques* was not introduced till towards the end of the ſixteenth century.

MASQUE is alſo uſed to ſignify any thing uſed to cover the face, and prevent a perſon's being known.

The penitents of Lyons and Avignon hide their faces with large white veils, which ſerve them for *maſques*.

MASQUE, in *Architecture*, is applied to certain pieces of ſculpture, repreſenting ſome hideous forms, groteſque, or letyrs faces, &c. uſed to fill up and adorn vacant places, as in friezes, the panels of doors, keys of arches, &c. but particularly in grottos.

MASQUERADE, or MASCARADE, an aſſembly of perſons maſqued or diſguiſed, meeting to dance and divert themſelves. This was much in uſe with us, and has been long a very common practice abroad, eſpecially in carnival time.

The word comes from the Italian *mascarata*, and that from the Arabic *maskara*, which signifies *raillery, buffoonery*. Granacci, who died in 1543, is said to have been the firſt inventor of *maſquerades*. Encyclopedie.

MASRAKITHA, a pneumatic inſtrument of muſic among the ancient Hebrews, compoſed of pipes of various ſizes, fitted into a kind of wooden cheſt, open at the top, and ſtopped at the bottom with wood covered with a ſkin. Wind was conveyed to it from the lips, by means of a pipe fixed to the cheſt: the pipes were of lengths muſically proportioned to each other, and the melody was varied at pleaſure, by ſtopping and unſtopping with the fingers the apertures, at the upper extremity. See Kircher's figure in *Tab. Muſic. fig.* 10.

MASS, MASSA, in *Mechanics*, the matter of any body cohering with it; i. e. moving and gravitating along with it. In this ſenſe, *maſs* is diſtinguiſhed from bulk, or volume, which is the expanſion of a body in length, breadth, and thickneſs.

The *maſs* of any body is rightly eſtimated by its weight. And the *maſſes* of two bodies of the ſame weight are in a reciprocal ratio of their bulks. See MATTER.

MASS, or MESS, *miſſa*, in a religious ſenſe, denotes the office, or public prayers made in the Romiſh church, at the celebration of the euchariſt.

Nicod, after Baronius, obſerves, that the word comes from the Hebrew, *miſſach, oblatum*; or from the Latin, *miſſa, miſſorum*; becauſe, in former times, the catechumens and excommunicated were ſent out of the church, when the deacon ſaid, *Ite, miſſa eſt*, after ſermon, and the reading of the epiſle and goſpel; they not being allowed to aſſiſt at the conſecration. Menage derives the word from *miſſo, diſmiſſing*: others from *miſſa, miſſan, ſending*; becauſe, in the *maſs*, the prayers of men on earth are ſent up to heaven.

Romiſh divines define the *maſs*, an oblation made to God, wherein, by the change of a ſenſible object by virtue of a divine inſtitution, the ſovereign dominion of God over all things is acknowledged.

This they eſteem the greateſt and moſt auguſt ceremony in uſe in the church; as being the ſacrifice of the new law, wherein the body and blood of Jeſus Chriſt are offered up to God.

They are divided about the queſtion, whether or no it be proper or allowable for the ſame perſon to celebrate *maſs* ſeveral times in one day? having the authority of pope Leo, in his letter to Dioſcorus, for the affirmative ſide of the queſtion, and that of ſeveral of the councils for the negative.

There is a great variety of *maſſes* in the Romiſh church; the thing acquiring new titles, and appellations, according to the different rites, intentions, and manners, in which it is performed, as well as other circumſtances. Thus they have a

MASS, *Ambroſian*, celebrated according to the rite of St. *Ambroſe*; particularly uſed in Milan. See AMBROSIAN.

MASS, *Engliſh*, was the form which anciently obtained in *England*.

MASS, *Galliean*, is the rite that formerly obtained in the churches of *France*.

MASS, *Greek*, is that rehearſed according to the *Greek* rites, in the *Greek* language, and by *Greek* prieſts.

MASS, *Latin*, is that uſed in the *Latin* church, in the *Latin* tongue, and according to the rites of the *Latin* church.

MASS, *Mozarabic* or *Gothic*, is that which was formerly celebrated in Spain, the rites of which are ſtill practiſed in the churches of Toledo and Salamanca.

MASS, *high*, called alſo *grand* MASS, is that ſung by the choriſters, and celebrated with the aſſiſtance of a deacon and ſubdeacon.

MASS, *low*, is that wherein the prayers are all barely rehearſed, without any ſinging, and performed without much ceremony, or the aſſiſtance of any deacon or ſubdeacon.

MASS *of the Beata*, or *our Lady*, is that offered to God, by the means, and through the interceſſion, of the *Virgin*.

MASS, *low*, is a *maſs* rehearſed every day, at which the ladies and *bonne-mouche* of the place attend. This is alſo called the *perfumed maſs*.

MASS, *common*, or MASS *of the community*, in a monaſtery, is that celebrated at certain hours, whereat the whole body aſſiſts.

MASSES, *ſolitary* or *private*, were thoſe that were celebrated by the prieſt alone, in behalf of the ſouls detained in purgatory, as well as upon ſome other particular occaſions. Theſe *maſſes* were prohibited by the laws of the church in the eighth century, but they were a rich ſource of profit to the clergy. They were condemned by the canons of a ſynod, aſſembled at Mentz, under Charlemagne, as criminal innovations, and as the fruits of avarice and ſloth.

MASS *of the Holy Ghoſt*, is that celebrated at the beginning of any ſolemnity, or church aſſembly, commencing with an invocation of the *Holy Ghoſt*.

MASS, *holiday*, is that wherein certain prayers, or leſſons, are read, ſuitable to the day.

MASS *of indemnity*, was that wherein a perſon cleared himſelf of any calumny, by ſome proof agreed upon.

MASS *for the death of our enemies*, was a form that obtained a long time in Spain; but it was at length aboliſhed, as inconſiſtent with Chriſtian charity.

MASS *of the dead*, or *requiem*, is that performed at the requeſt of the deceaſed: the introit whereof begins with *Requiem*. In the thirteenth century it was the cuſtom, before criminals were carried out to execution, to make them attend at a *maſs of the dead*, rehearſed for the repoſe of their ſouls.

MASS, *pariſh*, or *great* MASS, is that which the perſon is obliged to rehearſe to his pariſhioners on Sundays and holidays.

MASS, *little*, is that ſaid at private altars with leſs ceremony.

The firſt *maſs* is that ſaid at break of day.

MASS *of a ſaint*, is that wherein God is invoked by the interceſſion of ſome ſaint.

Thus there are alſo *maſſes* of apoſtles, martyrs, pontiffs, virgins, &c.

MASS *of ſcrutiny*, was formerly rehearſed at the examination of catechumens, when inquiry was made as to their diſpoſition for baptiſm.

MASS, *ſilent*. See MISSA *baſſa*.

MASS, *dry*, is that where there is no conſecration; as that, according to Durandus, where the prieſt cannot conſecrate, by reaſon of his having ſaid *maſs* before on the ſame day: or it is that uſed by the candidates of the prieſthood, in order to their becoming acquainted with the ceremonies; as Eckius will have it.

MASS, *votive*, is an extraordinary *maſs*, beſides that of the day, rehearſed on ſome extraordinary occaſion.

MASS *of the preſanctified* is that in which there is no conſecration of the elements; but after ſinging ſome hymns, the bread and wine which were before conſecrated are received. This *maſs* is performed among the Greeks, who conſecrate the euchariſt in Lent only on Saturdays and Sundays. Among the Latins, it is uſed only on Good Friday.

MASS-*books, importing or filling of*, and other popiſh books, incurs a penalty of 40*l.* by 3 Jac. I. cap. 5. ſec. 25.

MASS, *Candle*. See CANDLE-*maſs*.

MASS, *Childer*. See CHILDER-*maſs*.

MASS, *Chriſt*. See CHRIST-*maſs*.

MASS *of pope Julius is a* very celebrated picture of Raphael, repreſenting the ceremony of the *maſs*, in the Vatican, and diſtinguiſhed by its rich and excellent colouring.

MASSES, in *Painting*, denote thoſe parts of a picture which contain great lights, or great ſhadows. See CLAIR-OBSCURE.

When it is almoſt dark, we only ſee the *maſſes* of a picture; i. e. the places of the greateſt lights and ſhadows.

MASSALIANS, MASSALIANI, certain ſectaries, ſo called from a Hebrew word ſignifying *prayer*; it being their diſtinguiſhing tenet, that a man is to be continually in prayer.

St. Epiphanius diſtinguiſhes two kinds of *Maſſalians*, the *ancient* and the *later*.

The *ancient*, according to him, were neither Jews, Chriſtians, nor Samaritans, but pure Gentiles; who, owning ſeveral gods, adored only one, whom they called Almighty.

For the *later Maſſalians*, who were by profeſſion Chriſtians, their riſe was not till about the time of St. Epiphanius. Their doctrine was, that prayer alone was ſufficient to ſalvation. Many monks, who loved a life of lazineſs, and were averſe from labour, at times, joined theſe *Maſſalians*. See EUCHITES.

MASSETER, in *Anatomy*, a triangular two-headed muſcle, which ſurrounds the lower jaw, and helps to pull it upwards in eating. See MAXILLA.

The *maſſeter* is thick and ſhort, ariſing from the zygoma, and from the firſt bone of the upper jaw, and is inſerted into the lower edge of the lower jaw, from its external angle to its middle. Its fibres run in three directions; thoſe from the zygoma obliquely to the middle of the jaw, and thoſe from the upper bone of the firſt jaw croſs the former, and run to the angle of the lower jaw; and the fibres that are in its middle run perpendicularly from their origin to their inſertion. See *Tab. Anat. (Myol.) fig.* 1. *n.* 11. *fig.* 6. *n.* 6. *fig.* 7. *n.* 3.

MASSICOT. See MASTICOT.

MASSIMA, in the *Italian Muſic*, is a note or character made in a long ſquare, with a tail to it; thus, . It contains eight ſemi-breves in common time. This character is diſuſed in the modern muſic, for they have found other ways to ſeparate the bars, and to mark the length of notes.

MASSIVE, ſomething heavy and ſolid; a term uſed in oppoſition to tenderneſs and delicacy.

Thus we ſay, a building is too *maſſive*, that is, its walls are too thick; a wall is *maſſive*, that is, the lights and openings are too ſmall in proportion.

MASSIVE *column*. See COLUMN.

MAST *of a foreſt*, the fruit of that *genus* of trees called *glandiferous*, or *maſt-bearing*; as beech, oak, cheſnut, &c.

MAST, in *Navigation*, a large pole, or long piece of round timber, raiſed in veſſels, to which are attached the yards, ſails, and rigging, in order to their receiving the wind neceſſary for navigation.

The word *maſt* ſignifies the ſame thing in French, High-Dutch, Flemiſh, and Engliſh; the Italians uſe the word *albero*, and the Spaniards *maſtil*.

In large veſſels the number of *maſts* is four: their names are the *main-maſt*, the *fore-maſt*, the *mizen-maſt*, and the *bow-ſprit*. To which ſome add a fifth; viz. a *counter-mizen*.

Main-maſt is the chief *maſt*, ſtanding upright in the middle, or waiſt of the veſſel; it bears the main-yard, and main-ſail.

Fore-maſt is between the *main-maſt* and the head.

Mizen-maſt is between the *main-maſt* and the ſtern.

The *bow-ſprit* lies under the beak, in the prow, or head, of the ſhip.

The *counter-mizen*, in large veſſels, and galleons, is in the ſtern. See *Tab. Ship, fig. 1. n. 1.* 19. 38. 81.

When a *maſt*, with regard to its length, is formed of one ſingle piece, it is called a *pole-maſt*: and we alſo uſe the word *maſt* to ſignify thoſe diviſions, or additional pieces, in the *maſts*, placed over one another. The *main-maſt* and *fore-maſt* have each of them two; viz. the *main-maſt*, *main-top-maſt*, *main-top-gallant-maſt*; the *fore-maſt*, *fore-top-maſt*, *fore-top-gallant-maſt*: and the *mizen-maſt* has one; viz. the *mizen-top-maſt*.

The lower *maſts* of the largeſt ſhips are compoſed of ſeveral pieces united into one body: as theſe are generally the moſt ſubſtantial parts of various trees, a *maſt*, formed by this aſſemblage, is juſtly eſteemed much ſtronger than one conſiſting of any ſingle trunk, whoſe internal ſolidity may be very uncertain. The whole is ſecured by ſeveral ſtrong hoops of iron, driven on the outſide of the *maſt*, where they remain at proper diſtances.

For the proportion of *maſts* Sir H. Manwaring gives theſe rules: whatever the breadth of a ſhip be in feet, multiply it by 3, the product is the length of her *main-maſt* in feet: thus if a ſhip be 30 feet at the midſhip beam, 3 of 30 is 24; therefore that ſhip's *main-maſt* muſt be 24 yards, or 72 feet in length. Then for its bigneſs he allows an inch to every yard in length, and therefore this *maſt* muſt be 24 inches through, or thick. The *fore-maſt* of a ſhip muſt be $\frac{3}{4}$ of the length of the *main-maſt*, that is, in this caſe, 19 yards, and thick, or through, it muſt be near 20 inches. The BOWYRIT is always of the ſame length and bigneſs with the *fore maſt*; and the *mizen-maſt* muſt be juſt half the length of the *main-maſt*, and half as thick.

Mr. Mungo Murray has given us the following table of the proportions for *maſts* in the royal navy, for the year 1745:

		Guns.
1000 : breadth in feet : : 748 : 756 : 753 : 741 : 740 : 747 : 760 :	main-maſt in yards	100 90 80 70 and 60 50 44 24
1000 : main-maſt : : 895 : 901 :	fore-maſt	100 90 80 all the reſt
1000 : main-maſt : : 870 : 866 :	mizen-maſt	100 90 80 all the reſt
1000 : main-maſt : : 640 : 613 :	bow-ſprit	100 90 80 all the reſt
1000 : main-maſt : : 600 : 605 : 607 :	main-top-maſt	100 90 80 70 60 50 40 24
1000 : main-top-maſt : : 900 : 910 :	fore-top-maſt	100 90 80 all the reſt
1000 : main-top-maſt : : 710 : 717 :	mizen-top-maſt	100 90 80 all the reſt
1000 : main-top-maſt : : 480 : 508 :	main-top-gallant-maſt	100 90 80 all the reſt
1000 : fore-top-maſt : : 480 : 505 :	fore-top-gallant-maſt	100 90 80 all the reſt
1000 : bow-ſprit : : 360 :	ſprit-ſail-top-maſt	100 90 80

The uſe of this table is eaſily underſtood; e. g. for the main-*maſt* of a ſhip of 50 guns, 1000 : 740 :: breadth : length, i. e. ſuppoſing the breadth 41 feet, 1000 : 740 :: 41 to a fourth, which will be the length of the *maſt*: or, by the SLIDING-*rule*, draw out the ſlider till 1000 is right againſt 740, and right againſt 41, you will find 30; nearly, which is the length of the main-*maſt* in yards, &c.

The proportions for the diameters are as follow:

For the main and fore-*maſt* in all ſhips down to 60 guns, one inch diameter to every yard in length.

For 50 and 40 guns, twenty-ſeven twenty-eighths of an inch diameter, to one yard in length.

For 24 guns, twelve-thirteenths of an inch diameter to one yard in length.

All top-*maſts* are nine-tenths of an inch diameter to one yard in length.

The fore-top-*maſt* as big as the main-top-*maſt*.

The top-gallant-*maſt*, one inch to a yard.

The mizen-*maſt* $\frac{1}{4}$ of an inch to one yard in length.

The mizen-top-*maſt* five-ſixths of an inch to one yard in length.

The bow-ſprit an inch and half to one yard.

The dimenſions of *maſts* for Eaſt India ſhips are:

	Length. *Feet.*	*Diameter.* *Inches.*
MAIN-MAST	80	24½
Top-maſt	50	15
Top-gallant-maſt	28	8
FORE-MAST	72	24
Top-maſt	48	15
Top-gallant-maſt	25	7½
MIZEN-MAST	70	17
Top-maſt	36	10
Bowſprit	50	25

M. Bouguer has given us the general proportions for the length and diameter of *maſts* uſed in France, with remarks, in his Traité du Navire. For an abſtract, ſee Supplement to Murray's Treatiſe on Ship-building, p. 23, &c.

MAST, *heel of a*. See HEEL.

MAST, *jury*. See JURY.

MAST, *armed*, in a ſhip, one that is made of more than one tree.

MAST, *ſpending a*, at ſea, is when it is broke by foul weather.

MAST, *ſpringing a*, at ſea, is when it is cracked in any place.

MASTED. A ſhip is ſaid to be *maſted*, when ſhe has all her maſts complete.

MASTED, *over*, or *four*-MASTED, is ſaid of a ſhip whoſe maſts are either too long or too big; which makes her lie too much down by the wind, and labour too much *a-hull*.

MASTED, *under*, or *low*-MASTED *ſhips*, ſuch whoſe *maſts* are either too ſmall, or too ſhort: in which caſe the cannot bear ſo great a ſail as ſhould give her true way.

MASTER, a title given to ſeveral officers and perſons of authority and command; particularly to the chiefs of the orders of knighthood, &c.

Thus we ſay, the grand-*maſter* of Malta; of St. Lazarus; of the Golden Fleece; of the Free Maſons, &c.

MASTER, *magiſter*, was a title frequent among the Romans: they had their *maſter* of the people, *magiſter populi*, who was the dictator. *Maſter* of the cavalry, *magiſter equitum*, who held the ſecond poſt in an army, after the dictator. Under the later emperors there were alſo *maſters* of the infantry, *magiſtri peditum*. A *maſter* of the conſuls,

magiſter

magister census, who had nothing of the charge of a censor, or subcensor, as the name seems to intimate; but was the same with the *præpositus frumentariorum*.

MASTER *of the militia*, *magister militiæ*, was an officer in the lower empire, created, as it is said, by Diocletian, who had the inspection and government of all the forces, with power to punish, &c. somewhat like a constable of France.

At first there were two of these officers instituted, the one for the infantry, and the other for the cavalry; but the two were united into one under Constantine. Afterwards, as their power was increased, so was their number also; and there was one appointed for the court, another for Thrace, another for the East, and another for Illyria. They were afterwards called *comites*, *counts*, and *clarissimi*. Their power was only a branch of that of the *præfectus prætorii*, who by that means became a civil officer.

MASTER *of arms*, *magister armorum*, was an officer, or comptroller, under the *master* of the militia.

MASTER *of the offices*, *magister officiorum*, had the superintendance of all the officers of the court: he was also called *magister officii palatini*; simply *magister*; and his post *magisterio*.

This officer was the same in the western empire, with the curopalates in the eastern.

MASTER, in the Roman history and laws, is used for every officer who is the chief of his kind; and has others of the same species, or that have the same functions, under him. In Latin, *magister*, and oftentimes *proximus*, or PRIMICERIUS.

MASTER *of the armory* is an officer who has the care and oversight of his majesty's ARMS and ARMORY.

MASTER *at arms*, is an officer appointed to teach the officers and crew of a ship of war, the exercise of small arms; to confine and plant centinels over the prisoners, and superintend whatever relates to them during their confinement. He is also to observe that the fire and lights are all extinguished as soon as the evening-gun is fired, except those which are permitted by proper authority, or under the inspection of centinels. It is likewise his duty to attend the gangway, when any boats arrive aboard, and search them carefully, together with their rowers, that no spirituous liquors may be conveyed into the ship, unless by permission of the commanding officer. In these several duties he is assisted by proper attendants, called his corporals, who also relieve the centinels and one another, at certain periods. Falconer.

MASTER of *arts*, the first DEGREE taken up in foreign universities, but the second in our's; candidates not being admitted to it till they have studied in the university seven years.

MASTER-*attendant*, is an officer in the royal dock-yards, appointed to hasten, and assist at, the fitting out or dismantling, removing, or securing vessels of war, &c. at the port where he resides. He is particularly to observe, that his majesty's ships are securely moored, and for this purpose he is expected frequently to review the moorings, which are sunk in the harbour, and observe that they are kept in proper repair. It is also his duty to visit all the ships in ordinary, and see that they are frequently cleaned and kept in order; and to attend at the general musters in the dock-yards, taking care that all the officers, artificers, and labourers, registered at the navy-books, are present at their duty. Falconer.

MASTER *of the ceremonies*, is an officer instituted by king James I. for the more solemn and honourable reception of ambassadors, and strangers of quality, whom he introduces into the presence.

The badge of this office is a gold chain and medal, having on one side an emblem of peace, with king James's motto; and on the reverse the emblem of war, with *Dieu, & mon droit*. He is always supposed to be a person of good address, and a master of languages, and has an appointment of 300*l.* a year: he is constantly attending at court, and hath under him an assistant *master*, or deputy, at 6*s.* 8*d.* a day, who holds his place during the king's pleasure.

There is also a third officer, called *marshal of the ceremonies*, with 10*l.* a year, whose business is to receive and distribute the *master*'s orders, or the deputy's, for the service; but, without their order, he can do nothing. This is in the king's gift.

MASTERS *of chancery* are usually chosen out of the barristers of the common law, and sit in chancery, or at the rolls, as assistants to the lord chancellor, and master of the rolls. All these, so late as the reign of queen Elizabeth, were commonly doctors of the civil law.

To them are also committed interlocutory reports, examination of bills in chancery, stating of accounts, taking casts, &c. and sometimes, by way of reference, they are impowered to make a final determination of causes.

They have, time out of mind, had the honour to sit in the lords house, though they have neither writs, nor patent, to impower them; but they are received as assistants to the lord chancellor, and master of the rolls. They had anciently the care of inspecting all writs of summons, which is now performed by the clerk of the petty-bag. When any message is sent from the lords to the commons, it is carried by the *masters of chancery*. Before them also affidavits are made, and deeds and recognizances acknowledged.

Besides these, who may be called *masters of chancery ordinary* (being twelve in number, whereof the *master* of the rolls is reputed the chief), there are also *masters of chancery extraordinary*, appointed to act in the several counties of England, beyond ten miles distance from London, by taking affidavits, recognizances, &c. for the ease of the suitors of the court.

MASTER *of the faculties*, an officer under the archbishop of Canterbury, who grants licences and dispensations: he is mentioned in the statute 22 and 23 Car. II. See COURT *of Faculties*.

MASTER-*gunner* of England. See GUNNER.

MASTER *of the horse*, a great officer of the crown, to whom is committed the charge of ordering and disposing all matters relating to the king's stables, races, and breed of horses, with a salary of 1266*l.* 13*s.* 4*d.* a year.

He hath a power of commanding the EQUERRIES, and all the other officers and tradesmen employed in the king's stables; to all which he gives, by his warrant to the avenor, the oath of allegiance, &c. for the faithful discharge of their duty. He has the peculiar privilege of making use of any horses, pages, or footmen, belonging to the king's stables; so that his coaches, horses, and attendants, are the king's, and have the king's arms and liveries.

There is also a *master* of the horse in the establishment of her majesty's household, with a salary of 800*l.* a year.

MASTER *of the household* is an officer under the lord steward of the household, in the king's gift; his business is to survey the accounts of the household.

Anciently the lord steward himself was called *grand-master of the household*.

MASTER *of the jewel-office*, is an officer of the king's household, who has charge of all the gold and silver plate used at the king's table, or at that of any officer attending the court, and of all plate remaining in the Tower of London; as also of chains, and loose jewels, not fixed to any garment. See JEWEL-*Office*.

MASTER *of the mint*, was anciently the title of him who is now called WARDEN *of the mint*; whose office is to receive the silver and bullion which comes to the mint to be coined, and to take care thereof.

The office of *master* and worker is now distinct: and this officer is allowed for himself and three clerks, 650*l.* a year.

MASTER *of the ordnance*. See ORDNANCE.

MASTER *of the revels*, an officer with an appointment of 100*l.* a year, whose business is to order all things relating to the performance of plays, masques, balls, &c. at court. Formerly he had also a jurisdiction of granting licences to all who travel to act plays, puppet-shews, or the like diversions; neither could any new play be acted at either of the two houses, till it had passed his perusal and licence; but these powers were afterwards much abridged, not to say annihilated, by a statute for regulating playhouses, till the licensing plays by the lord chamberlain was established. This officer has a yeoman, with 46*l.* 11*s.* 8*d.* per ann.

MASTER *of the rolls*. See ROLLS.

MASTER *of the rolls*, a patent-officer for life; who has the custody of the rolls and patents which pass the great seal; and of the records of the chancery.

In the absence of the lord chancellor, or keeper, he also sits as judge in the court of chancery; and is, by Sir Edward Coke, called his *assistant*.

At other times he hears causes in the rolls-chapel, and makes orders and decrees. He is also the first of the masters of chancery, and hath their assistance at the rolls: but all hearings before him are appealable to the lord chancellor.

He hath also his writ of summons to parliament, and sits next to the lord chief justice of England, on the second woolpack: he hath the keeping of the parliament-rolls, and has the rolls-house for his habitation; as also the custody of all charters, patents, commissions, deeds, and recognizances, which, being made of rolls of parchment, gave rise to the name. Anciently he was called *clerk of the rolls*.

Concerning the authority of the *master* of the rolls to hear and determine causes, and his general power in the court of chancery, there were (not many years since) divers questions and disputes very warmly agitated; to quiet which it was declared by stat. 3 Geo. II. cap. 30. that all orders and decrees by him made, except such as

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by the course of the court were appropriated to the great seal alone, should be deemed to be valid; subject nevertheless to be discharged or altered by the lord chancellor, and so as they shall not be inrolled, till the same are signed by his lordship. Blackst. Com. vol. iii. p. 450.

In his gift are the six clerks in chancery, the examiners, three clerks of the petty-bag, and the six clerks of the rolls-chapel, where the rolls are kept. See ROLLS, CLERK, &c.

MASTER *of a ship*, an officer to whom is committed the direction of a merchant-vessel, who commands it in chief, and is charged with the merchandizes aboard.

In the Mediterranean the *master* is frequently called *patron*, and in long voyages *captain*.

It is the proprietor of the vessel that appoints the *master*, and it is the *master* who provides the equipage, hires the mates, sailors, &c. The *master* is obliged to keep a register of the seamen and officers, the terms of their contract, the receipts and payments, and, in general, of every thing relating to his commission.

MASTER *of a ship of war* is an officer appointed by the commissioners of the navy, to take charge of navigating a ship from port to port, under the direction of the captain. The management and disposition of the sails, the working of a ship into her station in the order of battle, and the direction of her movements in the time of action, and in other circumstances of danger, are also more particularly under his inspection. It is likewise his duty to examine the provisions, and accordingly to admit none into the ship but such as are sound, sweet, and wholesome. He is moreover charged with the stowage; and for the performance of these services, he is allowed several assistants, who are properly termed MATES and QUARTER-*masters*.

MASTER *of the Temple*. The founder of the order of the Templars, and all his successors, were called *magni templi magistri*; and ever since the dissolution of the order, the spiritual guide and director of the house is called by that name. See TEMPLE and TEMPLAR.

MASTER *or keeper of the wardrobe*, an officer in the lord chamberlain's district, who has the direction of all the royal robes, as those of the coronation, St. George's feast, and the parliament-robes; as well as of the wearing apparel, collar of SS's, George and garter, &c.

He has also the charge and custody of all former kings and queens robes, remaining in the Tower; all hangings, bedding, &c. for the king's house; and the charge and delivery of velvet and scarlet allowed for liveries.

He has under him a clerk of the robes, a yeoman, &c. See WARDROBE.

There are also several other officers, under this denomination, as the *master* of the tennis court, with a salary of 132*l.* a-year; *master* of the barges with 100*l.* a-year; *master* of the harriers, with 200*l.* a-year; master of the buck-hounds, with 234*l.* a-year; *master* of the flag-hounds, with 800*l.* a-year; *master*-falconer, with 210*l.* a-year, &c.

MASTER, *burgher*. See BURGHER.

MASTER, *fire*. See FIRE.

MASTER, *quarter*. See QUARTER.

MASTER-*arch*. See ARCH.

MASTER *load*, in *Mining*, a term used to express the larger vein of a metal, in places where there are several veins in the same hill. Thus it often happens, that there are seven, sometimes five, but more usually three veins or loads, parallel to each other, in the same hill. Of these the middle vein is always much the largest. This is called the *master-load*; and the others which lie three, two, or one, on each side of this, are called the concomitants of the *master-load*.

The general breadth of the *master-loads*, in Cornwall, is from three to seven foot; they are seldom larger than this, except in certain peculiar places, as where all the veins meet together, as they sometimes do, and form a knot, from which they separate again, and each takes its peculiar course; the five of such a knot is not easily determined, and it is usually very rich in tin, or the other metal of the mine. The several parts, even of the *master-load*, are not at all regular in breadth, but from six foot, it will, in some places, dwindle to one foot, or even to an inch broad, in a very small space; but the miners are not disheartened at this, for they know it will soon grow wider again, unless really worked out. Phil. Trans. N° 69.

The *master-load* usually lies in the hard rocky or shelly stratum, made up of metalline matter, spars, mundic, and other unprofitable substances, or weeds, as the miners call them, and is, as it were, all along a continued rock; but has many veins and joints as they are called. In some places the matter in which the ore lies is softer, and then it is much more easily worked. In Cornwall they usually allow two shovel-men to three beele-men or pickers; but where the load runs in a softer substance, there must be a greater proportion of the shovellers or carriers away.

There is generally water found about the *load* of the metal: in most places it is met with at some feet deep from the *load's* surface; and it often runs through the heart of the *load*, not in a direct channel, but winningly, in and out, intricately through the veins and joints of the *load*. When the miners have followed a *load* to some depth, and the water begins to be troublesome, as it generally soon is, if there be any in the work, they descend to the bottom of the hill, where they have that conveniency, and at the lowest place begin a little adrift as the convenience of working or driving will permit, scarce half so big as that for a *load*; they carry this on, on a level, till they come to the work itself. In this the use of the dial is needful, which they term PLOMMING and DIALLING.

By this means the exact place of the work is known, where to bring the adit, or where to sink down to make an air-shaft. Though the water is troublesome in the *loads*, yet there is always one great convenience attending it; which is, that where there is water, there is never want of air for the respiration of the miners, and the candles always burn well. But it is also to be observed, that in a soft, loose, quagmire country, the earth sometimes falls in after the workmen, in such a manner as, though it does not choak up the whole shaft, yet it so far stops it, as to render the current of air less free, and the miners find the utmost necessity of opening a shaft for air to respire from the surface. If the soil be so soft as not to be able to support itself in the working, as is sometimes the case in these wet clayey hills, it is necessary to prop it up, as they go on, with boards, posts, and the like. This adds greatly to the expence of mining; but in the working a *master load*, it is often worth while. When the miners are out of heart at the trouble of walling and propping, on this occasion, it sometimes happens, that a dipping of the *load* carries them down into a firmer stratum, and they are at once relieved from all that trouble and danger. See LOAD.

MASTER-PIECE, an exquisite, or extraordinary work, or performance, in any art or science.

MASTER-PIECE, *chef d'œuvre*, is particularly used among the French, for a work which those who aspire to be admitted *masters* in any art or trade, are to perform in presence of the masters, or jurands, of that company, by way of specimen of their capacity.

MASTER-*vault*. See VAULT.

MASTER-*wort*, *imperatoria*, in *Botany*, a genus of the *pentandria digynia* class. Its characters are these: it has an umbellated flower, the principal umbel plain, with no involucrum, which the small ones have; the principal umbel is uniform; and the flowers have five heart-shaped inflexed petals, with five hairy stamina; the germen is situated under the petals, which after becomes a roundish compressed fruit, divided into two parts, and contains two oval bordered seeds. We have but one species of this genus. Miller.

This plant grows naturally on the Alps and Pyrennees and other mountains in Italy, and is cultivated in the gardens of botanists, flowers in June, and the seeds ripen in August. Its black and fibrous roots are only used in medicine, which are said to purge melancholic humours. Hildanus prescribes it also for the cure of a scirrous spleen.

The root of *master-wort*, known in the materia medica, by the name *imperatoria radix*, should be chosen very fair and clean, fresh dried, hard to break, of a brown colour without, and a somewhat greenish one within; and of a strong smell, and aromatic taste. It is usually long, and of the thickness of one's thumb, wrinkled on the surface, and entangled with fibres. It is esteemed cardiac, sudorific, and alexipharmic, good against pestilential and malignant diseases, and against poisons. A decoction of it in wine, used as a gargle, is said to cure the tooth-ach; and externally it is much commended for the itch, and other scabs and ulcers. It is also an ingredient in some of the officinal compositions. Pomet's Hist. of Drugs, p. 44.

This root is likewise good in flatulencies; and, if Hoffman's authority may be depended on, it is one of the most effectual medicines in colics arising from windy causes. The seeds are reckoned by many among the provocatives, and are said by some, to be of the very first class of those medicines. The roots dried, and given in powder, are a powerful remedy in obstructions of the menses; and are of great service in asthmatic cases, tooth-ach, and in many disorders of the head. Simon Pauli tells us, that an ointment made of the fresh roots of this plant boiled in lard, is one of the best remedies known for ring-worms. The root has been also recommended for asthmas, the cramp, and all cold diseases of the nerves.

MASTER-*wort, black, ostruthium*, in *Botany*, a genus of the *pentandria digynia* class. Its characters are these: its flowers grow in an umbel; the involucrum of the general umbel is in one species composed of two large trifid leaves, and two entire, in another species of several small leaves; the involucrum of the small umbels is composed of many small-pointed leaves, which are longer than the umbels, coloured and spread open; the empalement of the flower is permanent, erect, and cut into five short acute segments; the flowers are composed of five petals, erect, bifid, and bent inward: the oblong germen is situated below the receptacle, and becomes an oval blunt channelled fruit, divided into two parts, having two oblong oval seeds, inclosed in the cover. Miller enumerates three species, and Linnæus only two, viz. the greater and less: these plants are seldom preserved in botanic gardens, as there is no great beauty in their flowers: all of them grow naturally upon the Alps.

MASTER-*wort*, a large *yaw* sometimes remaining after salivation. See YAWS.

MASTICA *de fobo*, in the *Materia Medica*, the name given by the Indians to the stone commonly known among authors by the name of *pedro del porco*, a sort of BEZOAR taken out of the gall-bladder of an Indian boar. The Indians, and many of the European nations, esteem this one of the greatest medicines in the world in pestilential diseases, and the small-pox.

MASTICATION, MASTICATIO, in *Medicine*, the action of chewing, or of agitating the solid parts of our food between the teeth, by means of the motion of the jaws, the tongue, and the lips, whereby it is broken into small pieces, impregnated with saliva, and so fitted for deglutition, and a more easy digestion in the stomach.

The mixture of saliva with the food is of absolute necessity; for the saliva, imbibed within the parts of it, dissolves the salts hid in them; and by so doing, prepares the food for fermentation in the stomach. The food, therefore, has the beginning of its digestion from the saliva, and its conclusion from the ferment in the stomach.

MASTICATORIES, MASTICATORIA, in *Medicine*, are such remedies as are taken in at the mouth, and chewed, in order to promote the evacuation of the salival humour; as tobacco, ginger, pepper, sage, rosmary, thyme, mastich, &c.

MASTICH *tree*, TURPENTINE-*tree*, or PISTACHIA-*nut-tree*, in *Botany*, a genus of the *dioecia pentandria* class. Its characters are these: male and female flowers grow upon different plants; the male flowers are disposed in loose sparsed katkins, having five pointed empalements, but no petals; they have five small stamina, terminated by oval, four-cornered, erect summits; the female flowers have five small trifid empalements, but no petals; they have each a large oval germen, supporting three reflexed styles, crowned by thick prickly stigmas; the germen turns to a dry berry, or nut, including an oval smooth seed. Linnæus enumerates five, and Miller nine species. The PISTACHIA nut, which grows upon one species of this tree, is better known in England than the tree which bears it, which grows naturally in Arabia, Persia, and Syria, whence the nuts are annually brought to Europe. The species which is called the common *mastich* tree, and is known by the Latin *lilli, or lentiscus*, grows naturally in Spain, Portugal, and Italy, and being an ever-green, is sometimes preserved in green-houses in England, through the winter.

The true *mastich* tree of the Levant, which furnishes the gum *mastich*, is, according to Miller, another species. From transverse incisions made in the bark of the tree, about the beginning of August, the *mastich* resin or gum, exudes in drops, which running down, and concreting on the ground, are thence swept up. The tree is raised also in several parts of Europe; but no resin has been observed to issue from it in these climates. It has its name *mastich*, from *masticare, to chew*, because it is thus used in Chio, and by the Turks, especially the women, for sweetening the breath, and strengthening the gums and teeth: and by producing a copious excretion of saliva, it proves serviceable in catarrhous disorders. This resin has a light agreeable smell, especially when rubbed or heated. It is almost totally soluble in spirit of wine, yielding a solution of a pale yellow colour, but not at all in water. It becomes soft and tough like wax, by being chewed. *Mastich* is recommended in doses from half a scruple to half a dram, as a mild corroborant and astringent, in old coughs, haemoptyses, diarrhœas, weakness of the stomach, &c. It is given either in substance, divided by other materials; or dissolved in spirit and mixed with syrups; or dissolved in water into an emulsion, by the intervention of gum Arabic or almonds. It is also an ingredient in varnishes. See VARNISH.

The jewellers mix *mastich* with turpentine and ivory-black, and lay it under their diamonds, to give them a lustre.

Mastich is chiefly the product of Chio: the trees that yield it are there cultivated with as much care as the vines. It brings in a revenue of eighty thousand ducats per annum to the grand signior. There is also a kind of *mastich* brought from Egypt, which serves to sophisticate camphor. The gum *mastich* is in small granules, and white, if good; though age makes it turn yellowish.

The Arabian writers, Avicenna and Serapion, in their chapters of the turpentine tree, often mention the lentisk and its resin, which they say was very much like the resin of the common turpentine tree. But beside this, Avicenna has a peculiar chapter on *mastich*; whence it should seem, that by the name lentisk they do not mean the tree which produces *mastich*, but some peculiar species of the turpentine tree.

Avicenna distinguishes two kinds of *mastich*, the one called *rumi*, and the other *cupri*: the *rumi* came from the island of Chio, and was white; the *cupri* was of a blackish colour, and was brought from Egypt.

MASTICH *herb, master-thyme, marum vulgare*, in *Botany*, a name given to one of the species of SATUREIA.

It is a plant that grows naturally in Spain, in dry gravelly grounds, and in the like soils bears the ordinary winters of our climate. It flowers in June, and its flowers are small, white, and standing in hairy bristly empalements: the whole plant has a grateful odour.

This plant is employed chiefly, like the Syrian *mastich*, as an errhine. It is considerably pungent, though less so than the other.

MASTICH, *Syrian herb, marum Syriacum*, is a species of *teucrium*, or *tree* GERMANDER, which grows naturally in Syria and in the kingdom of Valencia: the flowers, which are of a bright red colour, appear in July and August, but are not succeeded by seeds in England. This plant is easily propagated by slips or cuttings, planted in the summer months on a bed of light loamy earth, where they are to be carefully shaded, till they have taken root; after which they are to be removed into pots or borders. The cats are very fond of this plant, and tear it to pieces; but it is observed, that though they never spare a plant that grows single or where few grow, they will seldom touch them when planted in large clusters. Miller.

The leaves of this plant have a bitterish, aromatic, very pungent taste; and when rubbed a little, yield a quick piercing smell, which provokes sneezing. They have been chiefly made use of as an ingredient in sternutatory powders, though, from their sensible qualities, they promise to be applicable to more important purposes, and to have no ill title to the stimulating, attenuating, deobstruent, antiseptic virtues, ascribed to them by Wedelius.

MASTICH, *Indian, schinus*, in *Botany*, a genus of the *dioecia decandria* class. Its characters are these: the flower has a small empalement, with five indentures at the top; it has five small petals, which spread open, and nine or ten slender stamina, with a roundish germen supporting a short thick style, crowned by a single stigma; the germen afterwards turns to a globular berry with one cell, inclosing one globular seed. There are two species, which grow naturally in the southern parts of America. Miller.

A decoction of the bark of this tree, makes a fomentation of extraordinary efficacy in pains of the legs, and inflations. Of the small branches are made serviceable tooth-picks. Of the fruit boiled in water, according to the measure of the decoction, they prepare either a wine, a very good sort of drink, vinegar, or honey. A decoction of the leaves gives relief in pains proceeding from cold causes. Raii Hist. Plant.

MASTICHE *terra, mastich earth*, a name given by some of the old writers on the materia medica to the Chio earth, or TERRA *Chia*. The reason of this strange appellation seems to have been, that the finest *mastich* coming from the island of Chio, had obtained the name of *Ros*, or *Chios*, and *mastich* and *Chia* being thus become, in one sense, synonymous words, the use of them was, in this manner, carried much farther, and the earth of that island called by the name of the *gum*.

The Arabians seem to explain this very well, in their name of this earth; they not calling it *mastich earth*, but *thin beled almastichi*, that is *terra resinæ mastichis*, the earth of the country where *mastich* is produced.

MASTICOT, or *yellow lead*, is the calx or ashes of LEAD, gently calcined, by which it is changed to a yellow, or lighter, or deeper tint, according to the degree of calcination.

Massicot is sometimes used by painters, and it serves medicinally as a drier in the composition of ointments or plasters.

The *massicot* which is used by the Dutch as the ground of their

their GLAZING, is prepared by calcining a mixture of one hundred weight of clean sand, forty-four pounds of soda, sold with us under the name of barilla, and thirty pounds of pearl-ashes.

MASTIFF-*dog*, or *hand-dog*, *villaticus*, or *catenarius*, is a species of great size and strength, and a very loud barker. Manwood says, that it derives its name from *masse theefe*, being supposed to frighten away robbers by its tremendous voice. Great Britain was formerly to noted for its *mastiffs*, that the Roman emperors appointed an officer in this island, with the title of *Procurator Cynegii*, whose sole business was to breed, and transmit from hence to the amphitheatre, such as would prove equal to the combats of the place. Strabo, lib. iv. tells us, that the *mastiffs* of Britain were trained for war, and used by the Gauls in their battles.

MASTIGADOUR, or SLABBERING-BIT, in the *Manege*, is a snaffle of iron, all smooth, and of a piece, guarded with pater nosters, and composed of three halves of great rings, made into demi-ovals of unequal bignefs, the leſſer being inclosed within the greateſt, which ought to be about half a foot high. A *maſtigadour* is mounted with a head-ſtall and two reins. A horſe, by champing upon the *maſtigadour*, keeps his mouth freſh and moiſt.

To put a horſe to the *maſtigadour*, is to ſet his croupe to the manger, and his head between two pillars in the ſtable. Horſes that uſe to hang out their tongues cannot do it when the *maſtigadour* is on; for that keeps their tongue ſo much in ſubjection, that they cannot put it out.

MASTIGOPHORI, Μαστιγοφοροι, among the Greeks, certain officers appointed to preſerve the peace, and correct ſuch as were diſorderly at the Olympic games.

MASTOIDES, Μαστοειδης, from μαστος, *nipple*, and ειδος, *figure*, in *Anatomy*, the ſame with *mammillaris*, is applied to ſuch proceſſes in the body as have the appearance of breaſts, or dugs, ariſing from a broad baſis, and terminating in an obtuſe top.

MASTOIDES is ſometimes alſo applied to thoſe muſcles which ſtoop the head, proceeding from the neck-bone and breaſt-bone, and terminating in the proceſs mammiformis.

MASTON, in *Botany*, a name by which Pliny and ſome other authors have called the *ſcabioſa*, or *ſcabious*, a blue-flowered plant, common among corn.

MAT, in *Sea Language*. See MATTS.

MATCH, from the Saxon *macca*, *a companion*, becauſe, ſays Johnſon, the *match* is companion to the gun; a kind of rope, ſlightly twiſted, and prepared to retain fire, for the uſes of artillery, mines, fire-works, &c.

It is made of hempen tow, ſpun on the wheel like cord, but very ſlack; and is compoſed of three twiſts, which are afterwards again covered with tow, ſo that the twiſts do not appear; laſtly, it is boiled in lees of old wines, whence its colour. This, when once lighted at the end, burns on gradually and regularly, without ever going out, till the whole be conſumed.

Since fuſees have been introduced in lieu of *match*-lock muſkets, the conſumption of *match* has been much leſs conſiderable than before.

MATCHING, in the *Wine Trade*, the preparing veſſels to preſerve wines and other liquors, without their growing ſour or vapid. See WINE.

The method of doing it is this: melt brimſtone in an iron ladle, and, when thoroughly melted, dip into it ſlips of coarſe linen cloth; take theſe out, and let them cool. This is what the wine-coopers call *match*. Take one of theſe *matches*, ſet one end of it on fire, and put it into the bung-hole of a caſk; ſtop it looſely, and thus ſuffer the *match* to burn nearly out; then drive in the bung tight, and ſet the caſk aſide for an hour or two. At the end of this time examine the caſk, and you will find that the ſulphur has communicated a violently pungent and ſuffocating ſcent to the caſk, with a conſiderable degree of acidity, which is the gas, and acid ſpirit of the ſulphur. The caſk may, after this, be filled with a ſmall wine, which has ſcarce done its fermentation, and bunging it down tight, it will be kept good, and will ſoon clarify. This is a common and a very uſeful method; for poor wines could ſcarce be kept potable, even a few months, without it. Nor could ſtums be prepared in large quantities without this help. Shaw's Lectures, p. 191.

MATE *of a merchant ſhip*, is the officer who commands in the abſence of the MASTER, and ſhares the duty with him at ſea; being charged with every thing that regards the intended management of the ſhip, the direction of her courſe, and the government of her crew.

MATE *of a ſhip of war*, is an officer under the direction of the MASTER, by whoſe choice he is generally appointed, to aſſiſt him in the ſeveral branches of his duty.

Accordingly, he is to be particularly attentive to the navigation in his watch, &c. to keep the log regularly, and examine the line and glaſſes, by which the ſhip's courſe is meaſured, and to adjuſt the ſails to the wind, in the fore-part of the ſhip. He is alſo to attend diligently to the cables, ſeeing that they are well coiled and kept clean, when laid in the tiers, and ſufficiently ſerved, when employed to ride the ſhip. Finally, he is to ſuperintend and aſſiſt at the ſtowage of the hold, taking eſpecial care that all the ballaſt and proviſions are properly ſtowed therein.

The number of *mates* allowed to ſhips of war and merchantmen, is always in proportion to the ſize of the veſſel. Thus a firſt-rate man of war has ſix *mates*, and an Eaſt Indiaman the ſame number; a frigate of twenty guns and a ſmall merchant-ſhip have only one in each; and the intermediate ſhips have a greater or ſmaller number, according to their ſeveral ſizes, or to the ſervices on which they are employed. Falconer.

Other officers have alſo aſſiſtants, called *mates*; as the ſurgeon, gunner, carpenter, boatſwain, cook, and corporal.

MATER *metallorum*, in *Natural Hiſtory*, a name given by the Saxon mineraliſts, and thoſe of ſome other places, to a peculiar kind of MARCASITE or MUNDIC, which they ſuppoſe, according to the expreſſion, to be the mother or parent of metals.

The marcaſite they call by this name is the common yellow kind, but in a ſoft ſtate, it being uſually mixed with ſome poor ore of iron, or with ſome ſtony matter, which has made it concrete looſely and irregularly, and it is found ſometimes formed into thin undulated plates, and ſometimes into complex maſſes; but is always cavernous or ſpungy, or full of ſmaller or larger holes. Theſe are often empty: but in ſome pieces they contain parcels either of the pure native metals, or of rich ores. Pieces of native copper are found in ſome, and ores of iron and tin in others. And it is ſaid in Saxony, that native ſilver, in thin plates, is found in ſome few.

MATER *tenuis*, or *Pia* MATER. See MENINGES, and PIA.

MATER *dura*. See MENINGES, and DURA.

MATERFILON, in *Botany*, a name given by ſome authors to the *juncus nigra*, or common knapweed. Our Engliſh name *matfellon*, ſeems a corruption of this. See CENTAURY.

MATERIA. See MATTER.

MATERIA *chemica*, a term uſed by authors to expreſs ſuch bodies as are the peculiar objects of chemical experiments. The *materia chemica*, in a larger ſenſe, takes in all the bodies of the globe, all theſe being the ſubjects of chemiſtry, in its extenſive ſenſe; but the curious in chemical researches may be deſirous of knowing, in general, what bodies they ought to procure, and have in readineſs for them. Dr. Shaw has given a liſt of theſe for his Portable Laboratory, which will ſerve in general as well as on that particular occaſion.

This collection being diſtributed under proper claſſes, will come into a ſmall compaſs, and may be conveniently carried either by land or ſea, along with that uſeful furnace, and its neceſſary apparatus.

The natural arrangement of the *materia chemica* is into the general diviſion of animal, vegetable, and mineral ſubſtances. But thoſe who are deſirous of a larger collection, may enlarge the number of general diviſions, according to Becher's method, by which all chemical ſubjects are arranged into nine general claſſes; metals, minerals, decompounds, ſalts, gums, earths, ſtones, ſpirits, and oils.

The claſs of metals contains gold, ſilver, copper, iron, tin, and lead; and all theſe are to be kept both in their natural and artificial ſtate; that is, in their ores, and as ſeparated from them for human uſes. To theſe natural metals are to be added the artificial or compound ones, viz. pewter, bell-metal, braſs, gun-metal, pot-metal, Bath-metal, Wells-metal, prince-metal, London-metal, white copper, white gold, and yellow ſilver. Under minerals are included, antimony, biſmuth, zinc, manganeſe, cobalt, zaffer, ſmalt, arſenic, orpiment, mercury, native cinnabar, and ſulphur. All theſe are to be kept both in their natural ſtate as dug out of the earth, and as purified.

The decompounds of minerals include aurum fulminans, luna cornea, the calxes of gold and ſilver, ultramarine, diſtilled verdegris, burnt copper, putty, or calcined tin, ſugar of lead, cadmia, tutty, black-lead, red-lead, litharge, white-lead, glaſs of lead, ſimple and martial regulus of antimony, glaſs and cinnabar of antimony, the preparations of quick-ſilver, as ſublimate, precipitate, and the reſt. The ſame ſort of arrangement may alſo take in the ſeveral kinds of decompounds of animal and vegetable ſubſtances. Shaw's Port. Laborat.

The claſs of ſalts takes in ſea-ſalt, nitre, alum, vitriol, borax, tartar, ſugar, potaſh, and the compound ſaline fluxes for ſtubborn ores. And to theſe are to be added the tribe of artificial ſalts, of which number are the tartа-

rum vitriolatum, fixed nitre, soluble tartar, terra foliata tartari, nitrum nitratum, sal ammoniac, Epsom salts, volatile salts, and several others of a similar nature.

Under the gums are ranked pitch, resin, turpentine, wax, camphor, amber, pit-coal, jet, and all bitumens, balsams, and inspissated juices.

Among the earths are taken in ores, washed ores, fluds, calxes of metals, lime, plaister, gypsum, chalk, boles, shells, sand, and the fusils commonly and properly called earths, whether they be of the calcarious or of the vitrifiable kinds; that is, whether in the fire they are converted into a sort of lime, or run into a glass.

Stones include flints, pebbles, quarry stone, crystal, talc, the vulgar stones, and all the gems from the diamond down to the spars.

Lastly, under spirits and oils come aqua regis, aqua fortis, oil of vitriol, spirit of salt, spirit of nitre, spirit of sulphur, spirit of alum, spirit of vinegar, spirit of wine, spirit of urine, spirit of tartar, spirit of turpentine, oil of tartar per deliquium; the essential oils of nutmegs, cloves, and the like; the expressed oils of olives, almonds, linseed and the like; and the compound oils; as butter of antimony, artificial balsam, &c.

It is easy to see that this sort of elassing is not fit for the naturalist, who studies bodies for their natural qualities, not indeed for the nice distinguisher of any kind; but in this manner Becher advises the young operator in chemistry, to procure to himself a sort of artificial alphabet of nature, and this will serve the purpose very well, where no more is meant than a mere *materia chymica*, to be put in such order, that it may be readily had recourse to in all its parts. With this the young operator is to proceed regularly, as he would do in learning a language. Forming first syllables out of the joining of two or more letters of this alphabet, and then words, by combining these first sets together, and finally, whole discourses; that is, forming their various simple bodies into mixts, compounds and decompounds. Becher's Phyl. Subter. p. 179.

To avoid miscarriages, and prevent being imposed upon, it will be very proper to cultivate a knowlege of the productions of nature in their crude state, and peculiar places of growth, where being first viewed and examined before they are gathered or dug up, an exact knowlege of them as nature furnishes them, may be procured. For want of this previous qualification, men, otherwise of great sagacity, have erred in their operations, and perhaps blamed the original author of a process, in which they miscarry; while they are all the while using a wrong subject, or an adulterated or imperfect one, instead of the true. From this mistake alone, numberless complaints have arisen of the failure and uncertain success in the processes and experiments recorded even by the best authors.

The person who would work in chemistry with pleasure and success, should make a sufficiently copious collection of a *materia chymica* of this kind, all the particulars of which he is well assured of, as to their genuineness and perfection in their kinds. These being always ready, will prevent the necessity of sending to the druggist at every turn, where the things sent for are often either not to be had, or only in a sophisticated state; when this alphabet of nature, composed of the several materials of chemical researches, is like the letter in a printing-house, distributed and lodged in proper cells, it may readily be drawn out for use as occasion requires. It is impossible to express with how little expence and trouble, yet with how great profit and pleasure, numerous experiments, and those of the most difficult kind may be made, when the operator has, in this manner, all his materials about him. Becher tells us, that he has, in this manner, gone through fifty experiments in a day; and, while writing on chemical subjects, if any difficulty or uncertainty occurred, he immediately got up from his desk, made the necessary experiment, and sat down again to write the certain fact: so that he affirms, there was very little more trouble in making the experiment at the fire, than in describing the process by the pen.

MATERIA *subtilis*, denotes a fine subtile matter, which the CARTESIANS suppose to pervade and penetrate freely the pores of all bodies, and to fill up all the pores, so as not to leave the least vacuity, or interstice, between them.

This machine they have recourse to, to support the doctrine of an absolute plenum, and to make it consistent with the phenomena of motion, &c. and, accordingly, they make it act and move at pleasure, but in vain: for, were there any such matter, in order for it to be able to fill up the vacities of other bodies, it must, itself, be entirely void of any, i. e. it must be perfectly solid, vastly more solid than gold, and, therefore, more ponderous, and resist vastly more, which is inconsistent with phenomena. See VACUUM, and PLENUM.

Yet Sir Isaac Newton allows of the existence of a subtile matter, or medium, vastly finer than *air*, penetrating the closest bodies, and contributing to the production of many of the phenomena of nature. The existence of such a matter he argues from the experiment of two thermometers, which being inclosed in glass vessels, "one "of them, exhausted of its air, and both carried from "a cold to a warm place, the thermometer *in vacuo* "grows warm, and rises, almost as soon as that in the "air; and, if returned into the cold place, both cool "and fall about the same. Hence, says he, is not the "heat of the warm room conveyed through the vacuum "by the vibrations of a much subtiler medium than air, "which remained *in vacuo* after the exhaustion of the "air? And is not this medium the same whereby light "is refracted, reflected, &c?"

MATERIAL, denotes something composed of MATTER. In which sense the word stands opposed to IMMATERIAL. The Epicureans, Spinosists, &c. own no other but *material* substances. See SUBSTANCE. Among causes, some are *material*, others are formal. See CAUSE.

Material causes, having no understanding or liberty, must always act in the same manner, when under the same circumstances. Philosophers and divines dispute, whether or no there be any *material* forms really distinct from matter? See FORM. The Valentinians formerly applied the term *material* to all people but those of their own sect; asserting, that their souls perished with their bodies. Thus also the Stoics maintained, that none but the souls of their wise men survived the body.

MATERIAL *circle*. See CIRCLE.

MATERIAL *spirit*. See OBJECT.

MATERIALISTS, a sect in the ancient church, composed of persons, who, being prepossessed with that maxim in the ancient philosophy, *Ex nihilo nihil fit, Out of nothing nothing can arise*, had recourse to an eternal matter, on which they supposed God wrought in the creation; instead of admitting God alone as the sole cause of the existence of all things.

Tertullian vigorously opposes the doctrine of the *Materialists*, in his treatise against Hermogenes, who was one of their number.

Materialist is also a name given to those who maintain that the soul of man is material; or that the principle of perception and thought is not a substance distinct from the body, but the result of corporeal organization. See SOUL. There are others, called by this name, who have maintained that there is nothing but MATTER in the universe; and that the Deity himself is material. See SPINOSISM.

MATFILON, in *Botany*. See CENTAURY.

MAT-*weed*, in *Botany*. See LYCHNIS.

MATHEDORAM, a name by which some chemists have called *sal gemm*.

MATHEMATICAL *point*. See POINT.

MATHEMATICAL *sect*, in the *History of Learning*, is one of the two leading philosophical sects, which appeared towards the beginning of the seventeenth century: this sect directed its researches by the principles of Gassendi, and sought after truth by observation and experience. The disciples of this sect denied the possibility of erecting on the basis of metaphysical and abstract truths, a regular and solid system of philosophy, without the aid of assiduous observation and repeated experiments, which are the most natural and effectual means of philosophical progress and improvement. The advancement and reputation of this sect, and of natural knowledge in general, were much owing to the plan of philosophizing, proposed by lord Bacon, to the establishment of the Royal Society in London, to the genius and industry of Mr. Boyle, and to the unparalleled researches and discoveries of Sir Isaac Newton. Barrow, Wallis, Locke, and many others were of this sect. See CORPUSCULAR, EXPERIMENTAL, and NEWTONIAN *Philosophy*.

The other sect of philosophers was the METAPHYSICAL.

MATHEMATICS, the science of quantity; or a science that considers magnitudes either as computable, or measurable.

The word in its original, *μαθησις*, signifies *discipline*, or *science*, in the general, and seems to have been applied to the doctrine of quantity, either by way of eminence, or because, as this had the start of all other sciences, the rest took their common name from it.

For the origin of the *mathematics*, Josephus dates it before the flood, and makes the sons of Seth observers of the course and order of the heavenly bodies: he adds, that to perpetuate their discoveries, and secure them from the injuries either of a deluge, or conflagration, they had them engraven on two pillars, the one of stone, the other of brick; the former of which, he says, was standing in Syria in his days.

The first who cultivated *mathematics* after the flood, were the

the Assyrians and Chaldeans; from whom the same Josephus adds, they were carried by Abraham to the Egyptians; who proved such notable proficients, that Aristotle makes no scruple to fix the first rise of *mathematics* among them. From Egypt, five hundred eighty-four years before Christ, they passed into Greece through the hands of Thales, who, having learned geometry of the Egyptian priests, taught it in his own country. After Thales, comes Pythagoras; who, among other mathematical arts, paid a peculiar regard to arithmetic; fetching the greatest part of his philosophy from numbers: he was the first, as Laertius tells us, who abstracted geometry from matter; and to him we owe the doctrine of incommensurable magnitude, and the five regular bodies, besides the first principles of music and altronomy. Pythagoras was succeeded by Anaxagoras, Oenopides, Briso, Antipho, and Hippocrates of Chios; who all applied themselves particularly to the quadrature of the circle, the duplicature of the cube, &c. but the last with most success: this last is also mentioned by Proclus, as the first who compiled elements of *mathematics*.

Democritus excelled in *mathematics* as well as physics; though none of his works, in either kind, are extant: the destruction of which some authors ascribe to Aristotle. The next in order is Plato, who not only improved geometry, but introduced it into physics, and so laid the foundation of a solid philosophy. Out of his school proceeded a crowd of *mathematicians*. Proclus mentions thirteen of note; among whom was Leodamus, who improved the analysis first invented by Plato; Theaetetus, who wrote elements; and Archytas, who had the credit of being the first who applied *mathematics* to real use in life. These were succeeded by Neocles and Theon, the last of whom contributed to the elements. Eudoxus excelled in arithmetic and geometry, and was the first founder of a system of astronomy. Menechmus invented the conic sections, and Theudius and Hermotimus improved the elements.

As for Aristotle, his works are so stored with *mathematics*, that Blancanus compiled a whole book of them; out of his school came Eudemus and Theophrastus; the first of whom wrote of numbers, geometry, and invisible lines; the latter a mathematical history. To Aristeus, Isidorus, and Hypsicles, we owe the books of solids; which, with the other books of elements were improved, collected, and methodized by Euclid, who died two hundred and eighty-four years before Christ.

A hundred years after Euclid, came Eratosthenes and Archimedes. Contemporary with the latter was Conon, a geometrician and astronomer. Soon after came Apollonius Pergaeus, whose Conics are still extant. To him are likewise ascribed the fourteenth and fifteenth books of Euclid, which are said to have been contracted from Hypsicles. Hipparchus and Menelaus wrote on the solutions in a circle, the latter also on spherical triangles; Theodosius's three books of spherics are still extant. All these, Menelaus excepted, lived before Christ.

A. D. 70, Ptolemy of Alexandria was born; the prince of astronomers, and no mean geometrician: he was succeeded by the philosopher Plutarch, of whom we have still extant some mathematical problems. After him came Eutocius, who commented on Archimedes, and occasionally mentions the inventions of Philo, Diocles, Nicodemus, Sporus, and Heron, on the duplicature of the cube. To Ctesibes of Alexandria we owe our pumps; and Geminus, who came soon after, is preferred by Proclus to Euclid himself.

Diophantus of Alexandria was a great master of numbers, and the first inventor of algebra: and among others of the ancients, Nicomachus is celebrated for his arithmetical, geometrical, and musical works; Serenus, for books on the section of the cylinder; Proclus, for his comments on Euclid; and Theon has the credit among some, of being author of the books of Elements, ascribed to Euclid. The last to be named among the ancients, is Pappus of Alexandria, who flourished A. D. 400, and is celebrated for his books of *mathematical* collections still extant.

See the progress of each branch of *mathematics*, with the authors who have written on it, under the respective heads; as GEOMETRY, ALGEBRA, ASTRONOMY, &c.

Mathematics are distinguished, with regard to their end, into

MATHEMATICS, *speculative*, which rest in the bare contemplation of the properties of things: and

MATHEMATICS, *practical*, which apply the knowlege of those properties to some uses in life.

With regard to their object, *mathematics* are divided into *pure* or *abstract*, and *mixed*.

MATHEMATICS, *pure*, consider quantity abstractedly, and without any relation to matter or bodies.

MATHEMATICS, *mixed*, consider quantity, as subsisting in material being; e. g. length in a road, breadth in a river, height in a star, or the like.

Pure mathematics, again, either consider quantity as discrete, and so computable, as arithmetic; or as concrete, and so measurable, as geometry and trigonometry.

Mixed mathematics are very extensive, and are distinguished by various names, as the subjects they consider, and the views wherein people take them, vary; it being sufficient to determine an art to be a branch of *mixed mathematics*, that *pure mathematics* are applicable thereto, i. e. that it may be explained and demonstrated from the principles of arithmetic and geometry. Such are

MECHANICS, which consider motion, or the laws of moving bodies. HYDROSTATICS, which consider the laws of fluids, or of bodies gravitating in fluids. PNEUMATICS, the air, with regard to the laws and mensuration thereof. HYDRAULICS, the motion of fluids. OPTICS, direct light or vision. CATOPTRICS, reflected vision. DIOPTRICS, refracted vision. PERSPECTIVE, the images of objects, in order to delineate or represent them. ASTRONOMY, the universe, and the phenomena of the heavens. GEOGRAPHY, the earth, both as in itself, and in its affections. HYDROGRAPHY, the sea, principally as navigable. CHRONOLOGY, time, with regard to the measuring and distinguishing thereof. GNOMONICS, or DIALLING, shadows, in order for determining the hour of the day. PYROTECHNY, artificial fires, with regard both to diversion, and to the uses of war. *Military* ARCHITECTURE, the strength of places, with regard to their defence against an enemy. *Civil* ARCHITECTURE, (now become a branch of *mathematics*) or buildings. MUSIC, sounds, and their effects on the ear.

For the elements of each of these, see the respective heads: and for an accurate system of all the parts above mentioned (music alone excepted) orderly digested, and clearly demonstrated, see the excellent Wolfius's *Elementa Matheseos Universæ*.

MATHURINS, in *Ecclesiastical History*, a name given to the brethren of the Holy Trinity, from their having a monastery at Paris, erected in the place where there is a chapel confecrated to St. *Mathurin*. See TRINITARIANS.

MATITES, in *Natural History*, the name of a stone described by several authors. The characters they give of it are, that it is of a pale greyish colour, and of the form of the nipples of a woman's breast, several of these nipples appearing upon one stone.

There have been many absurd and idle conjectures, as to the origin of this stone; but it may be easy to account for its figure on very plain and natural principles. We find in the earth many stones, resembling exactly the figures of shells of various kinds, and parts of other animals. These have, in general, once been the things they thus represent petrified, or altered into the nature of stone, by the infinuation of stony particles into their pores.

Among these, none are so frequent as the remains of the *echini marini*, or sea-eggs, as we call them. These we find in various forms, sometimes single spines, sometimes whole shells, and sometimes only parts of shells preserved. It is well known, that all the *echini marini* have spines or spikes, whence they have their name; and in many of the species which we find recent on the shores, these spines are joined to the body of the shell by a small protuberance, which, from its resemblance to a nipple, we call *papillæ*. Now we frequently find these papillæ delineated in crux, in pebbles, and other stones, sometimes singly, and sometimes in numbers together, in the form in which they adhered to the shell. We find, in other fossils, that whatever shell, &c. is sometimes delineated in crux on stone, is also sometimes done in the elevated manner; and it is plain, that there needs no more to the formation of one of these *matites* than the petrifaction of a piece of the shell of one of those *echini* which have large papillæ, such as those of the Red Sea, with some of its papillæ upon it. As to the colour, it is not to be limited to grey alone, but may be various as the colours of stones, since any species of stone may have gone to the formation of it; and whatever colour the stony matter was, of that will the *matites* be.

MATKENELTZEL, in *Ornithology*, the name of a bird approaching to the SNIPE kind, and called by Gesner *gallinula erythra*; and by the common people of Germany, *mattkern*. It is all over of a reddish or ruddy hue, except the belly, which is white; on the back the colour is more dusky, and is variegated with black spots. On the wings the colour is much fairer and clearer, some of the longer feathers of them approaching to the colour of the painters red earth, called reddle. It is common in watery places, in many parts of Germany and Italy.

MATO, in *Natural History*, the name of a tree growing

both in the East and West-Indies, and bearing a fruit of the size of an apple, and covered with a thick and tough red skin. This is called by some, the wild MANGOUSTAN. Its fruit perfectly resembles that of the mangoustan in figure, but is not eatable. Mem. Acad. Par. 1699.

MATORIUM, a word used by some of the chemical writers to express the *gum ammoniacum*, and by others *galbanum*.

MATRASS, MATRACIUM, or BOLT-HEAD, a glass vessel, used by chemists in digestions, and other operations.

The *matrass* is made in form of a bottle somewhat bellied in the middle, with a long narrow neck; it is coated with earth, when it is to be placed on a very hot fire. And when it is required it should be stopped very close, they seal it hermetically.

The *matrass*, used in assaying, is a vessel of very pure and transparent glass, not too thick at the bottom, which would make it apt to burst in the fire. It is, for this use, to be about eight or ten inches high, and to have an orifice scarce so much as half an inch wide, lest the matters contained in it, being in a violent state of ebullition, should either rise over the mouth of the vessel, or at least be partly thrown out in form of small drops, like a thin rain, which drops always carry some of the metal with them. The bottom is capacious enough, when it will hold an ounce or two of aqua fortis, and the height of the vessel is of a farther use in making a greater repercussion of the fumes. The mouth ought also to be turned backwards, in form of a broad lip, that the solutions, when poured out, may not run down the sides of the vessel. Cramer, Art of Ass. p. 68.

Matrasses are also used as receivers: as to their form, some are spherical, others flattened at the bottom, and others in the shape of an egg, called PHILOSOPHICAL *eggs*. The most convenient of all, when only a small quantity of matter is used, are bottles of thin glass, called medical phials; because they are cheap, made of good glass, and may be quickly heated, so that the liquor contained in them shall boil without danger of being broken. See *Tab.* II. *Chemistry*, *fig.* 22 and 23.

MATRICARIA, in *Botany*. See FEVERFEW.

MATRICE, or MATRIX. See MATRIX.

MATRICE, or MATRIX, in *Dying*, is applied to the five simple colours, whence all the rest are derived or composed. These are, the black, white, blue, red, and yellow or root colour. See DYING.

MATRICE, or MATRICES, used by the *Letter-founders*, are those little pieces of copper or brass, at one end whereof are engraven, dent-wise, or *en creux*, the several characters used in the composing of books.

Each character, virgula, and even each point, in a discourse, has its several *matrix*; and, of consequence, its several puncheon to strike it. They are the engravers on metal, that cut, or grave, the *matrices*.

When types are to be cast, the *matrice* is fastened to the end of a mould, so disposed, as that when the metal is poured on it, it may fall into the creux, or cavity, of the *matrice*, and take the figure and impression thereof. See *Letter*-FOUNDERY.

MATRICES, used in *Coining*, are pieces of steel, in form of dyes, whereon are engraven the several figures, arms, characters, legends, &c. wherewith the species are to be stamped.

The engraving is performed with several puncheons, which being formed in relievo, or prominent, when struck on the metal, make an indented impression, which the French call *en creux*. See the manner hereof under ENGRAVING *on Steel*. See also COINING.

MATRICULA, a register kept of the admission of officers, and persons entered into any body, or society, whereof a list is made. Hence those who are admitted into our universities, are said to be *matriculated*.

Among ecclesiastical authors, we find mention made of two kinds of *matriculæ*; the one containing a list of the ecclesiastics, called *matricula clericorum*; the other of the poor subsisted at the expence of the church, called *matricula pauperum*.

MATRICULA was also applied to a kind of alms-house, where the poor were provided for. It had certain revenues appropriated to it, and was usually built near the church; whence the name was also frequently given to the church itself.

MATRIMONY. See ESPOUSALS, and MARRIAGE.

MATRISYLVA, in *Botany*, a name by which some authors call the common honey-suckle, or wood-bind, and others the wood-ruffe.

MATRIX, in *Anatomy*, the womb, or that part of the female of any kind, wherein the fœtus is conceived, and nourished till the time of its delivery. See WOMB, UTERUS, FOETUS, &c.

MATRIX, *suffocation of the*. See SUFFOCATION.

Speculum MATRICIS. See SPECULUM.

MATRIX is also applied to places proper for the generation of vegetables, minerals, and metals.

Thus, the earth is the *matrix* wherein seeds sprout; and marcasites are by many confidered as the *matrices* of metals.

The *matrix* of ORES is the earthy and stony substances in which these metallic matters are inveloped: these are very various, frequently spar, quartz, fluors, or horn-blend.

MATRIX *fossilis*, in *Natural History*, a name given by Hartman, and some other authors, to a sort of substance resembling fossil wood, or the barks of trees, common in the cliffs of the shores of the Baltic, and found in digging all over Prussia. This is the bed in which the fossil amber of that kingdom is lodged, and it is supposed to have no small share in the production or formation of that fossil. The workmen who dig for amber always make this their guide, and follow the veins of it, never searching any where else for the AMBER. The very surface of this fossil substance is often covered with a kind of amber; but this is poor, and of no value. Many authors have supposed this cortical or wood-like substance to be real fossil wood; but this is an error. The masses of it are too large ever to have been trees, and their fibres run often to twenty, thirty, or forty feet diameter, in the same unbroken compages. It differs from trees also in this, that as they have been formed by successive additions of matter by vegetation, their whole bulk is composed of circular strata, if they may be so called, or additions of coats round a medulla or pith; but in this fossil wood, as some have supposed it to be, there is no pith or medulla, no addition of circular coats, but the same vast mass of it is continued to a vast length and breadth, in the manner of an earthy stratum, and is composed of thin laminæ, or plates laid flatwise, one over another. Were this substance really formed of the bodies of trees, we should also find in it that variety of fibres which the several parts of wood are known to consist of; but nothing of this kind appears; for we see the whole mass consist of absolutely the same shaped fibres; and there never was found, in any of this substance, the least resemblance of a knot or leaf, or the pedicle of a leaf, as might well be expected, had leaves ever grown from it. Phil. Trans. N° 248. p. 14.

The fossil wood, which is truly such, and has been once vegetable matter, whatever part of the world it is found in, agrees in the same general marks of distinction; and knots, and other evident proofs of its having been once vegetable, are found in all of it: but this *matrix* of amber, whether found in Prussia, Denmark, or elsewhere, is still of the same kind, and shews none of these characteristic marks of wood. However, notwithstanding all this, it is said, that on opening the ditches for the fortifications at Copenhagen, several large masses of amber were found, all of them adhering to the sides of large bodies of trees, which were black as ebony. The pieces are preserved in the cabinet of the king of Denmark in that place, and some of them weigh forty or fifty ounces. This is an additional circumstance to the common observation of something resembling wood, being always found where amber is, and deserves to be considered, as it tends to overthrow the present received system of amber being originally a mineral production.

Dr. Rothergill, in his Essay upon the Origin of Amber, maintains, that it is a vegetable resin, the product, perhaps, of the fir or pine kind; and that it is changed into its present form by a mineral acid. In proof of its resinous nature, he alleges its aspect, texture, and form: besides, the bodies inclosed in it are mostly animals of the flying kind, few reptiles, except such as ants, spiders, &c. which are found in trees, and scarcely ever any aquatics; and this could not happen in the sea, nor in the earth, but upon its surface. He apprehends, likewise, that this resin, with the trees which afforded it, were buried in the earth by the deluge, or some violent convulsion of the same kind: to which purpose he observes, that the substance of which the proper veins of amber consist, hath several genuine characteristics of wood still remaining; the texture of amber, which is fibrous, and, when dried, capable of swimming in water, and burning like other wood, shews, he says, what it hath been. Nor is the amber disposed in these veins in one continued stratum; but lumps of it are irregularly disseminated through the whole of the supposed woody mass. The change which this wood undergoes, is produced partly by time, and completed by the vitriolic mineral acid of the earth. Such an acid, it is argued, is present, wherever amber occurs in its proper *matrix*, and is sometimes found in the amber itself. The acid of the salt of amber is vitriolic; and common turpentine affords, by proper management with a vitriolic acid, a considerable portion of the same chemical principles that amber does; and those pieces of amber which have been found soft and imperfect, are nearly related to a vegetable resin. Phil. Trans. vol. xliii N° 472. p. 26, &c.

MATRIX is alſo applied figuratively for ſeveral things wherein there appears a kind of generation, and where certain things ſeem to acquire a new being, or at leaſt a new manner of being. Of which kind are the moulds wherein the printers types, or letters, are caſt; and thoſe uſed in ſtriking money and medals, in coining. See MATRICE.

MATRON, *matrona*, among the Romans, ſignified a married woman, and ſometimes alſo the mother of a family. There was, however, ſome difference between *matrona*, and *mater-familias*. Servius ſays, that ſome imagined the difference to lie in this, that *matrona* was a woman who had one child, and *mater-familias* one that had ſeveral. But others, particularly Aulus Gellius, take the name *matrona* to belong to a married woman, whether ſhe had any children or no; the hope and expectation of having them being enough to warrant the title of mother, *matrona*; and for this reaſon it is, that marriage is called *matrimony*. This opinion is ſupported by Nonius.

MATRON *of a hoſpital*. See HOSPITAL.

MATRONS, *jury of*, is a jury of twelve diſcreet women, directed by the judge to enquire into the fact, when a woman is capitally convicted, and pleads her pregnancy. This plea, though it cannot be made in ſtay of judgment, may be urged in reſpite of execution. If the jury bring in their verdict quick with child, execution ſhall be ſtaid generally till the next ſeſſion; and ſo from ſeſſion to ſeſſion, till either the woman is delivered, or proves, by the courſe of nature, not to have been with child at all. But if ſhe once hath had the benefit of this reprieve, and been delivered, and afterwards becomes pregnant again, ſhe ſhall not be entitled to the benefit of a farther reſpite for that cauſe; for ſhe may now be executed before the child is quick in the womb, and ſhall not, by her own incontinence, evade the ſentence of juſtice.

If a widow feigns herſelf with child, in order to exclude the next heir, and a ſuppoſititious birth is ſuſpected to be intended, then upon the writ *de ventre inſpiciendo*, a jury of women is to be impanelled to try the queſtion, whether with child or no?

MATRONALIA, feaſts of the Roman ladies, or rather *matrons*, celebrated on the calends of March, in honour of the god Mars.

Ovid mentions many reaſons for the inſtitution of this feaſt; but the principal ſeems to have been the peace concluded between the Romans and Sabines, by the mediation of the women. The women granted to their ſervants on this occaſion the ſame privileges which were granted to the ſlaves by their maſters in the SATURNALIA.

No men living in celibacy were allowed to aſſiſt at the feaſt.

MATROSSES, ſoldiers in the train of ARTILLERY, next below the gunners, and properly apprentices to them; their duty is to aſſiſt the gunners in traverſing, ſponging, loading, and firing of guns, &c. They carry fire-locks, and march along with the guns and ſtore-waggons, both as a guard, and to help in caſe of emergency.

MATT, in *Chemiſtry*, is a name given to an ore not perfectly deprived of its ſulphur, when fuſed: it is obtained in the firſt fuſion for the extraction of metal from ſome ores.

MATTADORE. See OMBRE.

MATTAGES, *in Zoology*, the Engliſh name of the largeſt ſpecies of the *lanius* or *butcher-bird*.

The word *mattages* is borrowed from the Savoyards, and ſignifies the murdering pye; and has been given it from its ſavage diſpoſition, and its reſemblance to the magpye in the ſhape of its tail. See BUTCHER-*bird*.

MATTS, on board a ſhip, a kind of broad, thick clouts, wove out of ſpun-yarn, or of a variety of ſtrands, or ſeparate parts of a ſmall rope, or of a number of rope-yarns twiſted into foxes; and uſed to preſerve the main and fore-yards from galling againſt the maſts at the ties, and at the gunnel of the ſhoe. They alſo ſerve to keep the clews of the ſail from galling there; as alſo to ſave the clews of the fore-ſail from doing ſo at the beak-head and bolſprit. The longeſt and ſtrongeſt ſort of theſe *matts* are called panches.

MATTER, *materia, body*, or an extended, ſolid, diviſible, moveable, and paſſive ſubſtance, the firſt principle of all natural things, from the various arrangements and combinations whereof all bodies are formed.

Ariſtotle makes three principles, *matter*, form, and privation; which laſt the Carteſians throw out of the number, and others the two laſt.

The properties of *matter* we are pretty well acquainted with, and can reaſon about its DIVISIBILITY, SOLIDITY, &c. but the ſubject wherein theſe properties reſide, or their ſubſtratum, is ſtill a myſtery. Ariſtotle ſpeaks very darkly on the ſubject, defining *matter* to be *nec quid, nec quantum, nec quale*, nor any certain determinate thing at all; which many of his followers interpret ſo as to believe, that *matter* does not at all exiſt. The CARTESIANS make the eſſence of *matter* to conſiſt in extenſion; arguing, that ſince the properties abovementioned are all that are eſſential to *matter*, ſome of them muſt conſtitute its eſſence; and, ſince extenſion is conceived prior to all the reſt, and is that without which none of the reſt can be conceived, extenſion is that which conſtitutes the eſſence of *matter*. But the concluſion here is unjuſt; for, on this principle, the exiſtence of *matter*, according to Dr. Clarke, would have the faireſt title to conſtitute its eſſence, the *exiſtere* being conceived prior to all properties, and even to extenſion. Since, then, the word extenſion appears to go farther, and to be more general, than *matter*, that impenetrable ſolidity, which is eſſential to all *matter*, and to *matter* alone, and from which all its properties manifeſtly flow, may, with more propriety, be called the *eſſence of matter*.

Again, if extenſion were the eſſence of *matter*, and ſo *matter* and ſpace the ſame thing, it would follow, that *matter* is infinite and eternal, that it is a neceſſary being, and could neither be created nor annihilated; which is abſurd. Beſides, it appears, both from the nature of gravity, the motions of comets, the vibrations of pendulums, &c. that ſpace is not *matter*; and therefore it is not extenſive, but ſolid, impenetrable extenſion, which has a power of reſiſting, that conſtitutes *matter*.

Many among the old philoſophers maintained the eternity of *matter*, out of which they ſuppoſed all things to be formed by the hands of nature; as being unable to conceive how any thing ſhould be formed out of nothing. Plato maintained, that *matter* had exiſted eternally, and concurred with God in the production of all things, as a paſſive principle, or a kind of collateral cauſe.

Matter and form, the two ſimple and original principles of all things, according to the ancients, compoſed ſome ſimple natures, which they called *elements*; out of the various combinations whereof all natural things were afterwards compoſed.

Dr. Woodward ſeems of an opinion not very unlike this, viz. that *matter* is originally and really very different, being at its firſt creation divided into ſeveral ranks, ſorts, or kinds, of corpuſcles, differing in ſubſtance, gravity, hardneſs, flexibility, figure, ſize, &c. from the various compoſitures and combinations of which, he thinks, ariſe all the varieties in bodies, as to colour, hardneſs, gravity, taſtes, &c. But Sir Iſaac Newton takes all thoſe differences to reſult from the various arrangements of the ſame *matter*; which he *judges* to be homogeneous and uniform in all bodies.

Beſides the properties of *matter* hitherto known, Sir Iſaac Newton has diſcovered a new one; viz. "That of attraction, or that every particle of *matter* has an attractive power, or a tendency towards every other particle; which power is ſtrongeſt in the point of contact, and ſuddenly decreaſes, inſomuch that it acts no more at the leaſt ſenſible diſtance; and, at a greater diſtance, is converted into a repellent force, whereby the parts fly from each other." On this principle of ATTRACTION, he accounts for the cohesion of the particles of bodies, which is otherwiſe inexplicable.

For he takes occaſion to obſerve, "That all bodies ſeem to be compounded of hard particles, even light itſelf, and all other the moſt volatile of fluids; inſomuch that hardneſs may be eſteemed a property of all uncompounded *matter*; at leaſt, the hardneſs of *matter* ſtands on as good a footing as that of its impenetrability; all the bodies we know of being either hard themſelves, or capable of being hardened. Now, if compound bodies be ſo hard, as we find ſome of them, and yet if they are very porous, and conſiſt of parts which are only laid together, the ſimple particles, which are void of pores, and were never yet divided, muſt be much harder. Now, ſuch hard particles being heaped together, can ſcarce touch one another in more than a few points; and therefore they muſt be ſeparable with much leſs force than is requiſite to break a ſolid particle, whoſe parts touch in all the ſpace, without any pores or interſtices to weaken their cohesion. How then ſhould ſuch very hard particles, only laid together, and touching only in a few points, ſtick together, and that ſo firmly as they do, without the aſſiſtance of ſomething that cauſes them to be attracted or preſſed towards each other?"

The ſame great author obſerves farther, "That the ſmalleſt particles may cohere by the ſtrongeſt attractions, and compoſe bigger particles of weaker virtue; and many of theſe may cohere, and compoſe ſtill bigger particles, whoſe virtue is ſtill weaker, and ſo on for divers ſucceſſions, until the progreſſion end in the biggeſt particles; on which the operations in chemiſtry, and the colours of natural bodies, depend, and,

"which,

" which, by cohering, compose bodies of a sensible magnitude. If the body is compact, and bends or yields inward to pression, without any sliding of its parts, it is *hard*, and *elastic*; returning to its figure with a force arising from the mutual attraction of its parts. If the parts slide from one another, the body is *malleable* or soft. If they slip easily, and are of a fit size to be agitated by heat, and the natural heat is great enough to keep them in agitation, the body is *fluid*; and, if it be apt to stick to things, it is *humid*. And the drops of every fluid affect a round figure by the mutual attraction of their parts, as the globe of the earth and sea affects a round figure, by the mutual attraction of gravity of its parts."

Again, " Since metals, dissolved in acids, attract but a small quantity of the acid, their attractive force reaches but to a small distance. Now, as in algebra, where affirmative quantities cease, there negative ones begin; so in mechanics, where attraction ceases, there a repulsive virtue must succeed. That there really is such a virtue, seems to follow from the reflexions and inflexions of the rays of light; the rays being repelled by bodies in both these cases, without the immediate contact of the reflecting or inflecting body. The same thing seems also to follow from the emition of light; a ray, as soon as shaken off from a shining body by the vibrating motion of the parts of the body, and got beyond the reach of attraction, being driven away with exceeding great velocity: for that force, which is sufficient to turn it back in reflexion, may be sufficient to emit it. It seems also to follow from the production of air and vapour; the particles, when they are shaken off from the body by heat or fermentation, so soon as they are beyond the reach of the attraction of the body, receding from it, and also from one another, with great strength, and keeping at a distance, so as sometimes to take up above a million of times more space than they did before in the form of a dense body; which vast contraction and expansion seems unintelligible, by feigning the particles of air to be springy and ramous, or rolled up like hoops, or by any other means than a repulsive power. The particles of fluids, which do not cohere too strongly, and are of such a smallness, as renders them most susceptible of those agitations which keep liquors in a fluor, are more easily separated and rarefied into vapour, i. e. in the language of the chemists, they are *volatile*; rarefying with an easy heat, and condensing again with cold. But those which are grosser, and so are less susceptible of agitation, or which cohere by a stronger attraction, are not separated without a stronger heat, or perhaps not without fermentation. And these last are the bodies which chemists called *fixed*; and yet these, being rarefied by fermentation, become true permanent air; those particles receding with the greatest force, and being most difficultly brought together, which, upon contact, cohere the most strongly. And because the particles of permanent air are grosser, and arise from denser substances than those of vapours; thence it is, that true air is more ponderous than vapour; and that a moist atmosphere is lighter than a dry one, quantity for quantity. From the same repelling power it seems to be, that flies walk upon the water without wetting their feet; and that the object glasses of long telescopes lie upon one another without touching; and that dry powders are difficultly made to touch one another so as to stick together, unless by melting them, or wetting them with water, which, by exhaling, may bring them together; and that two polished marbles, which by immediate contact stick together, are yet difficultly brought so close together as to stick."

He farther observes, " That, all things considered, it seems probable, God, in the beginning, formed *matter* in solid, massy, hard, impenetrable, moveable particles, of such sizes, figures, and with such other properties, and in such proportion to space, as most conduced to the end for which he formed them; and that these primitive particles, being solid, are incomparably harder than any porous bodies compounded of them; even so very hard, as never to wear, and break in pieces: no ordinary power being able to divide what God himself made one in the first creation. While the particles continue entire, they may compose bodies of one and the same nature and texture in all ages; but should they wear away, or break in pieces, the nature of things depending on them would be changed. Water and earth, composed of old worn particles, and fragments of particles, would not be of the same nature and texture now with water and earth composed of entire particles in the beginning. And therefore, that nature may be lasting, the changes of corporeal things are to be placed only in the various separations, and new associations and motions, of these permanent particles; compound bodies being apt to break not in the midst of solid particles, but where those particles are laid together, and touch in a few points."

It seems farther, " That these particles have not only a *vis inertiæ*, accompanied with such passive laws of motion as naturally result from that force, but also that they are moved by certain active principles, such as is that of gravity, and that which causeth fermentation, and the cohesion of bodies. These principles are to be considered not as occult qualities, supposed to result from the specific forms of things, but as general laws of nature, by which the things themselves are formed; their truth appearing to us by phænomena, though their causes are not yet discovered."

Hobbes, Spinoza, &c. maintain all the beings in the universe to be *material*, and their differences to arise from their different modifications, motions, &c. Thus *matter* extremely subtile, and in a brisk motion, they conceive, may think; and so they exclude all spirits out of the world. See Hobbism and Spinozism.

Dr. Berkeley, on the contrary, argues against the existence of *matter* itself; and endeavours to prove, that it is a mere *ens rationis*, and has no existence out of the mind. See Abstraction, Body, and Existence.

Some late philosophers have advanced a new hypothesis concerning the nature and essential properties of *matter*. The first person who suggested, or at least published an account of this hypothesis, was M. Boscovich, in his Theoria Philosophiæ Naturalis. Venice, 1763. He supposes that *matter* is not impenetrable, as before him it had been universally taken for granted; but that it consists of physical points only, endued with powers of attraction and repulsion, taking place at different distances, that is, surrounded with various spheres of attraction and repulsion; in the same manner as solid *matter* is generally supposed to be. Provided, therefore, that any body move with a sufficient degree of velocity, or have sufficient momentum to overcome any power of repulsion that it may meet with, it will find no difficulty in making its way through any body whatever; for nothing will interfere, or penetrate another, but powers, such as we know do in fact exist in the same place, and counterbalance and over-rule one another; a circumstance which never had the appearance of a contradiction, or even of a difficulty. If the momentum of such a body in motion be sufficiently great, M. Boscovich demonstrates, that the particles of any body through which it passes will not even be moved out of their place by it. With a degree of velocity something less than this, they will be considerably agitated, and ignition might perhaps be the consequence; though the progress of the body in motion would not be sensibly interrupted; and with a still less momentum it might not pass at all. This theory M. Boscovich has taken great pains to illustrate and confirm; shewing, that it is by no means inconsistent with any thing that we know concerning the laws of mechanics, or our discoveries in natural philosophy; and that a great variety of phenomena, particularly those which relate to Light, admit of a much easier solution upon this hypothesis than upon any other. The most obvious difficulty, says Dr. Priestley, and indeed the only one that attends this hypothesis, as it supposes the mutual penetrability of *matter*, arises from the difficulty we meet with in attempting to force two bodies into the same place. But it is demonstrable, that the first obstruction arises from no actual contact of *matter*, but from mere powers of repulsion. This difficulty we can overcome; and having got within one sphere of repulsion, we fancy that we are now impeded by the solid *matter* itself. But the very same is the apprehension of the generality of mankind with respect to the first obstruction. Why, therefore, says he, may not the next resistance be only another sphere of repulsion, which may only acquire a greater force than we can apply to overcome it, without disordering the arrangement of the constituent particles; but which may be overcome by a body moving with the amazing velocity of light.

This scheme of the mutual penetration of *matter* first occurred to Mr. Michell, independently of any communication with M. Boscovich, on reading Baxter on the Immateriality of the Soul. He found that this author's idea of *matter* was, that it consisted, as it were, of bricks cemented together by an immaterial mortar. These bricks, if he would be consistent in his reasoning, were again composed of less bricks, cemented like wise by an immaterial mortar, and so on *ad infinitum*. This putting Mr. Michell upon the consideration of the appearances of nature, he began to perceive that the bricks were so covered with this immaterial mortar, that, if they had any existence at all, it could not possibly be perceived; every effect being produced at least in nine instances in ten certainly,

tainly, and probably in the tenth alſo, by this immaterial, ſpiritual, and penetrable mortar. Mr. Michell, finding it neceſſary, in order to ſolve the appearances of nature, to admit of extended and penetrable immaterial ſubſtance, if he maintained the impenetrability of *matter*; and obſerving farther, that all we perceive by contact, &c. is this penetrable immaterial ſubſtance, and not the impenetrable one, began to think, that he might as well admit of penetrable material, as penetrable immaterial ſubſtance; eſpecially as we know nothing more of the nature of ſubſtance than that it is ſomething which ſupports properties; which properties may be whatever we pleaſe, provided they be not inconſiſtent with each other, that is, do not imply the abſence of each other. This by no means ſeemed to be the caſe, in ſuppoſing two ſubſtances to be in the ſame place at the ſame time, without excluding each other; the objection to which is only derived from the reſiſtance we meet with to the touch, and is a prejudice that has taken its riſe from that circumſtance. Dr. Prieſtley obſerves, that if he were to make any alteration in this hypotheſis, it would be to ſuppoſe the force of the ſphere of repulſion next to any of the indiviſible points, which conſtitute what we call ſolid bodies, not to be abſolutely infinite, but ſuch as may be overcome by the momentum of light. If, however, we conſider that Mr. Boſcovich makes this neareſt power of repulſion not to extend to any real ſpace, but to be confined to the indiviſible point itſelf, it may appear to be ſufficient for the purpoſe. Such is the account which Dr. Prieſtley, a zealous and able advocate for this hypotheſis, has given of it, in his Hiſtory and preſent State of Diſcoveries relating to Light, &c. p. 390, &c.

In conformity to this hypotheſis, Dr. Prieſtley maintains, that *matter* is not that inert ſubſtance that it has been ſuppoſed to be; that powers of attraction or repulſion are neceſſary to its very being, and that no part of it appears to be impenetrable to other parts. Accordingly, he defines *matter* to be a ſubſtance, poſſeſſed of the property of extenſion, and of powers of attraction or repulſion, which are not diſtinct from *matter*, and foreign to it, as it has been generally imagined, but abſolutely eſſential to its very nature and being: ſo that when bodies are diveſted of theſe powers, they become nothing at all. However, though he ſuppoſes that theſe powers are eſſential to the being of *matter*, inſomuch that it cannot exiſt without them as a material ſubſtance at all, he by no means maintains that they are ſelf-exiſtent in it; but that from whatever ſource theſe powers are derived, or by whatever being they are communicated, *matter* cannot exiſt without them; and if that ſuperior power or being withdraw its influence, the ſubſtance itſelf neceſſarily ceaſes to exiſt, or is annihilated. Whatever ſolidity any body has, it is poſſeſſed of only in conſequence of being endued with certain powers, and together with this cauſe, ſolidity, being no more than an effect, muſt ceaſe. Dr. Prieſtley, in another place, has given a ſomewhat different account of *matter*; according to which it is only a number of centers of attraction and repulſion; or more properly of centers, not diviſible, to which divine agency is directed; and as ſenſation and thought are not incompatible with theſe powers, ſolidity, or impenetrability, and conſequently a *vis inertiæ*, only, having been thought repugnant to them, he maintains, that we have no reaſon to ſuppoſe that there are in man two ſubſtances abſolutely diſtinct from each other. Diſquiſitions on *Matter* and Spirit, 1777, paſſim. See SOUL.

Dr. Price, in a correſpondence with Dr. Prieſtley, publiſhed under the title of a Free Diſcuſſion of the Doctrines of Materialiſm and Philoſophical Neceſſity, 1778, has ſuggeſted a variety of unanſwerable objections againſt this hypotheſis of the penetrability of *matter*, and againſt the concluſions which are drawn from it. The *vis inertiæ* of *matter*, he ſays, is the foundation of all that is demonſtrated by natural philoſophers concerning the laws of the colliſion of bodies. This, in particular, is the foundation of Sir Iſaac Newton's philoſophy, and eſpecially of his three laws of motion. Solid *matter* has the power of acting on other *matter* by impulſe; but unſolid *matter* cannot act at all by impulſe; and this is the only way in which it is capable of acting, by any action that is properly its own. If it be ſaid, that one particle of *matter* can act upon another without contact and impulſe, or that *matter* can, by its own proper agency, attract or repel other *matter* which is at a diſtance from it, then a maxim hitherto univerſally received muſt be falſe, that "nothing can act where it is not." Sir I. Newton, in his Letters to Dr. Bentley, calls the notion, that *matter* poſſeſſes an innate power of attraction, or that it can act upon *matter* at a diſtance, and attract and repel by its own agency, an abſurdity into which, he thought, no one could poſſibly fall. And in another place he expreſſly diſclaims the notion of innate gravity, and has taken pains to ſhew that he did not take it to be an eſſential property of bodies. By the ſame kind of reaſoning purſued, it muſt appear, that *matter* has not the power of attracting and repelling; that this power is the power of ſome foreign cauſe, acting upon *matter* according to fixed laws; and that, conſequently, attraction and repulſion, not being actions, much leſs inherent qualities of *matter*, as ſuch, it ought not to be deemed by them. And if *matter* has no other property, as Dr. Prieſtley aſſerts, than the power of attracting and repelling, it muſt be a non-entity; becauſe this is a property that cannot belong to it. Beſides, all power is the power of ſomething; and yet if *matter* is nothing but this power, it muſt be the power of nothing; and the very idea of it is a contradiction. If *matter* is not ſolid extenſion, what can it be more than mere extenſion? Farther, *matter* that is not ſolid is the ſame with pure; it cannot, therefore, poſſeſs what natural philoſophers mean by the momentum or force of bodies, which is always in proportion to the quantity of *matter* in bodies, void of pore. Momentum is the cauſe of reſiſtance, and not *vice verſâ*. Moreover, within the ſphere of repulſion, the attraction of cohеſion takes place; and this is the power which, according to Dr. Prieſtley, unites the parts of *matter*, and gives it exiſtence. But, ſince *matter* is penetrable, will not this attraction drive all the parts of it into one another, and cauſe them to coaleſce into nothing? This effect muſt follow, unleſs there exiſts, beyond the ſphere of attraction, and nearer to *matter*, a ſecond ſphere of repulſion, which again prevents contact. Thus it appears evident, that if a power of attracting acts, it muſt contract itſelf into nothing; and that if a power of repulſion acts, it muſt diſſipate itſelf into nothing. For a farther account of the arguments pro and con on this ſubject, we muſt refer to the work already cited.

MATTER, *abſtract*. See ABSTRACT.

MATTER, *ſubtile*. See MATERIA *ſubtilis*.

MATTER, *quantity of*. See QUANTITY.

MATTER *of fact* ſignifies a truth to be proved, though not by any record: by which it ſtands diſtinguiſhed from

MATTER *of record*, which is that which may be proved by ſome record.

If a man be ſued to an exigent during the time he was in the king's wars, this is *matter in deed*, and not *matter of record*; and therefore he muſt allege this for himſelf, muſt come before the ſcire facias, or execution be awarded againſt him; for, after that, nothing will ſerve but *matter of record*; that is, ſome error upon the proceſs appearing upon record.

MATTER, *foreign*. See FOREIGN.

MATTHEW, or *Goſpel of St. Matthew*, 2 canonical book of the New Teſtament. St. *Matthew* is ſaid by many to have wrote his Goſpel in Judea, at the requeſt of thoſe he had converted, and it is thought by ſome, as Baronius, Grotius, Veſſius, Jones, Weſtein, &c. that he began it in the year 41, eight years after Chriſt's reſurrection. But according to others, as Mill, Baſnage, Dr. Lardner, &c. who follow the teſtimony of Irenæus, this goſpel was wrote in the time of Nero, about thirty years after our Savior's aſcenſion, or about the year 64 or 65 of the vulgar epoch. It was written, according to the teſtimony of moſt of the ancients, as Papias, A. D. 116, Irenæus in 178, Origen in 230, Euſebius in 315, Athanaſius, Cyril of Jeruſalem, Epiphanius, Gregory Nazianzen, Theodore Moplueſtia, Jerome, Chryſoſtom, &c. in the Hebrew or Syriac language, which was then common in Judea; but the Greek verſion of it, which now paſſes for the original, is ſaid to be as old as the apoſtolical times. However, many learned moderns, as Erafmus, Calvin, Le Clerc, &c. are of opinion, that this goſpel was firſt wrote in Greek, which was much uſed at that time throughout the whole Roman empire, and particularly in Judea; and it is alleged, that Papias, who firſt advanced this opinion, was a weak and credulous man. Le Clerc, Jones, Baſnage, Lardner, &c. are of this opinion. Dr. Lardner obſerves on this point, that if St. *Matthew* did not write till about thirty years after our Lord's aſcenſion, which he thinks moſt probable, he would uſe the Greek language; but if he wrote his goſpel within the ſpace of eight years after Chriſt's aſcenſion, it is moſt likely that he wrote in the Hebrew. He adds farther, that there was very early a Greek goſpel of St. *Matthew*, cited and referred to by Clement of Rome, Ignatius, Polycarp, Juſtin Martyr, and others; that many of the ancients do not ſeem to have fully believed that *Matthew* wrote in Hebrew, becauſe they have ſhewn very little regard to the Hebrew edition of it; that there are not in our Greek goſpel of St. *Matthew* any marks of a tranſlation; that there is no where any probable account who tranſlated this goſpel into Greek;

and besides, as the Greek gospel was translated into Hebrew in very early days of Christianity, many not examining it particularly, nor indeed being able to do it, for want of understanding the language, might imagine, that it was first writ in Hebrew. Hence, according to Dr. Lardner, sprung the opinion, that *Matthew* published his gospel at Jerusalem, or in Judæa, for the Jewish believers, and at their request, before he went abroad to other people: whereas he apprehends, that this gospel, as well as the others, were writ and intended for believers of all nations; and that the Nazarene gospel was St. *Matthew's* gospel, translated from Greek, with the addition of some other things, taken from the other gospels, and from tradition. Allowing the date of this gospel already assigned, he cannot conceive the reason why *Matthew* should write in Hebrew any more than any of the other evangelists; for it may be reckoned highly probable, or even certain, that he understood Greek, before he was called by Christ to be an apostle. Whilst a publican, he would have frequent occasions both to write and speak Greek, and could not discharge his office, without understanding that language. Lardner's Credibility, &c. vol. xv. chap. 5.

St. MATTHEW's *day*, is a festival observed on the twenty-first of September.

MATTHIOLA, in *Botany*, a genus of the *pentandria monogynia* class, the characters of which are these: the cup is a cylindric perianthium, is very short, erect, and undivided, and remains after the flower is fallen; the flower is monopetalous, and consists of a very long tube, which dilates, by degrees, into a large and wide mouth, with a smooth or undivided edge; the stamina are five pointed filaments, shorter than the flower; the apices are simple; the germen of the pistil is globose, and is placed beneath the cup; the style is very slender, and of the length of the cup; the stigma is large and obtuse; the fruit is a drupe of a globose figure, containing only one cell, and crowned with the cup; the seed is a globose nut or stone, containing a kernel of the same globose form.

MATTINS, from the Italian *mattino*, or the French *matin*, *morning*, the first part in the daily service of the Romish church.

Mattins are sometimes held early in the morning, sometimes at midnight, and sometimes the evening before; and infirm people, even in monasteries, are dispensed from attending *mattins*.

MATTKEM, in *Ornithology*, a common name in Germany for the MATKNELTZEL.

MATUITUI, in *Ornithology*, the name of a Brasilian bird, of the tardus or thrush kind, and of the bigness of the common starling. See CURICACA.

MATULAM.—*Hydrops ad* MATULAM. See HYDROPS.

MATURANTIA, in *Medicine*, &c. *ripeners*; or such things as promote maturation. See SUPPURATION.

MATURAQUE, in *Ichthyology*, the name of an American fish, of the harengiform kind, and having only one short fin on the back. It seldom grows to more than four inches long, and is somewhat flattish, but not very broad; its head is very broad, and covered with a shelly crust; it is caught in lakes, not in rivers, and is a well tasted fish.

MATURATION *of fruit*, *in Gardening*. See CAPRIFICATION, FORCING, and HOT-*beds*.

MATURATION, in *Pharmacy*, a preparation of fruits, or other simples, gathered before their maturity, to fit them to be eaten, or for other uses. See FRUIT, &c.

MAUCUACO, in *Zoology*, is made a distinct genus of animals, with six cutting teeth, and two canine teeth in each jaw, a sharp pointed visage like a fox, and feet formed like a hand. This genus comprehends several species of the LEMUR, according to the Linnæan system. See LORIS, MONGOOZ, &c.

MAUDIHOCA, the cassada, or the poisonous root of which bread is made in many parts of the West Indies.

MAUDLIN, in *Botany*. See YARROW, and AGERATUM.

MAVIS, in *Zoology*, the common name of the song thrush, or THROSTLE.

MAUNCH, the figure of an ancient sleeve of a coat, so called by the heraldry, and is borne in many gentlemen's escutcheons; as in the earl of Huntingdon's. See *Tab. Heraldry fig.* 40.

MAUND, in our *Old Writers*, a kind of great basket or hamper, containing eight bales, or two fats: it is commonly a quantity of eight bales of unbound books, each bale having one thousand pounds weight. Book of Rates, p. 3.

MAUNDY, or MAUNDEY *Thursday*, *Dies* MANDATI, the Thursday before Easter; so called from the French *manche*, i. e. *sportula*; it being a custom on that day to give a largess or bounty to certain poor men, whose feet the king formerly washed, as a mark of humility, and in obedience to the command of Christ.

St. MAUR, *congregation of*, in *Ecclesiastical History*, a famous society of BENEDICTINS, which was founded in the year 1620, by the express order of Gregory XV. and enriched by Urban VIII. in 1627, with several donations and privileges. This society has been distinguished by the great number of excellent rules and institutions that are observed in it, and by the regular lives and learned labours of its members. Those who have any acquaintance with the history and progress of learning in Europe, well know what signal advantages the republic of letters has derived from the establishment of this famous congregation, whose numerous and admirable productions have cast a great light upon all the branches of philology and belles lettres, and whose researches have taken in the whole circle of sciences, philosophy excepted. These Benedictins still maintain their literary fame, by the frequent publication of laborious and learned productions in all the various branches of sacred and profane literature.

MAUROCENIA, in *Botany*. See *Hottentot* CHERRY.

MAUROUSE, the name of a creature of the deer kind, mentioned by Josselyn. It seems to be the same with the *dama Virginiana* of Mr. Ray, one of which creatures was, in his time, kept alive in St. James's park.

This is not certain, however; for Josselyn's description is very imperfect; he only says it is like the moose-deer, but is small, and has small horns.

MAUSOLEUM, a magnificent tomb, or funeral MONUMENT, decorated with architecture and sculpture, and inscribed with an epitaph; erected in honour of some emperor, prince, or other illustrious person.

The word comes from *Mausolus*, the name of a king of Caria, to whom Artemisia, his widow, erected a most stately monument, that has since been numbered among the seven wonders of the world; calling it, from his name, *Mausoleum*. It was sixty three feet long, almost four hundred and eleven feet in compass, and about thirty-five feet high, surrounded with thirty-six columns, that were beautified in a wonderful manner. Pliny has described it, lib. xxxvi. cap. 5. Afterwards the same name was given to all costly monuments. Thus the stately monument was called, which Augustus built, during his sixth consulship, between the Flaminia via and the Tiber, to be a burial place for him and his family, and which Strabo has described in his fifth book. It is also the name which Florus, lib. iv. cap. 11. gives to the monuments of the kings of Egypt, wherein Cleopatra shut herself up, and put herself to death. Many authorities testify, that the Romans gave this name to those sepulchres whose structure was magnificent.

MAUSOLEUM is also used to signify the decoration of a fictitious tomb, or catafalcha, in a funeral pomp.

MAW. See ABOMASUS.

MAW, *sea*. See SEA-MALL.

MAXILLÆ, in *Anatomy*, the jaws; or those parts of an animal, wherein the teeth are set, and which serve for masticating the food.

The *maxillæ* are two in number, and are denominated, from their situation, *superior*, and *inferior*.

MAXILLA *superior*, or the upper jaw, is immoveable in man, and all other animals we know of; excepting parrots, crocodiles, and the acus vulgaris, or gar-fish. Vide Ray Synopf. Pisc. p. 109.

The upper jaw comprehends not only the two large bones named *ossa maxillaria*, from *maxilla*, by which this portion of the face is expressed, but likewise the two *ossa* MALARUM, the two *ossa* UNGUIS, or lachrymalia, the two *ossa* NASI, the two *ossa* PALATI, the two *ossa conchoidea*, or lower shells of the NOSE, and one single bone, called VOMER. All these amount to thirteen in number. In this jaw are alveoli, or sockets, for sixteen teeth. See *Tab. Anat. (Osteol.) fig.* 1. *lit. d.*

MAXILLA *inferior*, or the lower jaw, only consists of two bones, which unite in the middle of the chin, by the intervention of a cartilage, which hardens as the child grows; and at length, about the age of seven years, becoming bony, joins the two bones into a continued one, resembling the Greek ω. See *Tab. Anat. (Osteol.) fig.* 1. *lit. e.*

It consists of two tables, betwixt which is a spongy substance, in children medullary. The fore-part is shallow, just sufficient to afford sockets for sixteen teeth; it has two processes, the *coronæ* and *condyloides*; four holes or foramina for the passage of vessels, and five pair of proper muscles, viz. the crotaphytes or temporal, the masseter, biventer or digastricus, pterygoideus internus, and pterygoideus externus. See each in its place.

The lower jaw is connected with the ossa temporum, by a very singular kind of articulation, partaking of the nature both of a ginglymus and arthrodia, and termed by Winslow amphidiarthrosis. Its principal motions are upward and downward, and in all the different degrees thereof we can thrust it forward, pull it backward, and turn

turn it to either side; and in the same manner, in any degree of motion forward, backward, or laterally, we can raise or depress it. The mechanism of this articulation of its motions depend on a cartilage.

MAXILLÆ *quartus*, in *Anatomy*, a name given by Vesalius, and some others, to one of the muscles of the lower jaw, commonly known by the name of the DIGASTRICUS, and called by Albinus, BIVENTER *maxillæ inferioris*.

MAXILLAM *attollens tertius*, in *Anatomy*, a name given by Riolanus, and some others, to a muscle of the face, more generally known by the name of MASSETER.

MAXILLARY *bones*, *maxillaria ossa*, or great bones of the upper jaw, are two in number, situated one on each side, in the anterior and middle part of the face; their conformation is very irregular, and they are of very considerable extent. Anatomists generally divide them into the external and internal sides. By the external side they mean all that appears in an entire skull, without taking in the arch of the palate, and by the internal side, that which makes part of the arch of the palate, and all that is turned to the *septum narium*. The separation of this bone, by a small transverse suture behind the *foramen incisivum*, is seldom found but in young subjects, before the ossification is completed. The *maxillary* bone is almost all compact, and without diploe, except in the alveolary arch, and at the point of the orbitary apophysis.

The *ossa maxillaria* are connected with the *os frontis*, *os ethmoides*, *os sphenoides*, *ossa unguis*, *ossa malarum*, *ossa nasi*, *ossa palati*, *vomer*, *cornua narium inferiora*, and with one another. They assist in forming the organ of mastication, the arch of the palate, the cheeks, the orbits, the nose, &c. Winslow's Anatomy, p. 32, seq. See JAW.

MAXILLARY *gland*, MAXILLARIS *glandula*, a considerable gland of the conglomerate kind, situate on the inside, under the lower jaw-bone, near the musculus digastricus. It discharges itself by several branches of ducts, which form one trunk, that passes under the mylohyoideus, and meets with the *maxillary gland* of the other side within the fore-teeth of the lower jaw, having distinct orifices with a papilla on each side the frænum linguæ. See GLAND and MOUTH.

MAXILLARY *muscles*, in fish, two large muscles placed under the lower jaw, and serving to move it; these, with the two hypophthalmic muscles, which are placed under the eyes, are the four cephalic muscles of fishes, according to authors.

MAXIM denotes an established proposition or principle.

In which sense it amounts to much the same with AXIOM. *Maxims* are a kind of propositions, which have passed for principles of science; and which, being self-evident, have been by some supposed innate.

A *maxim* in law is said to be a proposition, of all men confessed and granted without argument or discourse. *Maxims* of the law are holden for law; and all other cases that may be applied to them, shall be taken for granted.* 1 Inst. 11. 67. 4 Rep. The *maxims* in our law-books, which are many and various, are such as the following, viz. It is a *maxim*, that land shall descend from the father to the son, &c. That if a man have two sons by divers venters, and the one purchase lands and die without issue, the other shall never be his heir, &c. That as no estate can be vested in the king without matter of record, so none can be divested out of him but by matter of record. That an obligation, or matter in writing cannot be dissolved by an agreement by word, without writing. Co. Litt. 11. 141. See LAW.

MAXIMUM, in *Mathematics*, denotes the greatest quantity attainable in any given case.

By which it stands opposed to MINIMUM.

Methodus de MAXIMIS *&* MINIMIS, a method so called, in use among mathematicians, whereby they arrive at the greatest or least possible quantity attainable in any case.

If the semiordinates of any curve continually increase or decrease to some certain term, which once passed they begin again to decrease or increase, the method whereby their *maxima & minima*, i. e. their greatest and least states are determined, is called the method *de maximis & minimis*; which, it is true, may be used to determine other quantities that increase or decrease to any certain term; but then they must always be represented by the semiordinates of curves.

If a flowing quantity in an equation be proposed to be determined to any extreme value; the rule is: having put the equation into fluxions, let the fluxion of that quantity (whose extreme value is sought) be supposed $=0$; by this means, all those members of the equation, in which it is found, will vanish, and the remaining ones will give the determination of the *maximum* or *minimum* desired.

The reason of the rule is, that every *maximum* or *minimum* is, in its own nature, a stable quantity, because at that term where a quantity becomes a *maximum* or *minimum*, it can neither be increasing nor decreasing: to determine therefore any flowing quantity to a *maximum* or *minimum*, is to make it (instead of a flowing) a permanent one; but the fluxion of a permanent quantity is equal to nothing. This we shall illustrate by the following examples.

I. To *determine the greatest or least applicate in an algebraic curve.* Since, in curves that have a *maximum* and a *minimum*, the tangent T M (*Tab. Analyt. fig.* 4. and *fig.* 26.) degenerates at length into D E, and becomes parallel to the axis, and so the perpendicular M H coincides with the greatest or least applicate C G; in the case of *maximum* and *minimum*, the subtangent T P becomes infinite, and the subnormal P H equal to nothing: but $PH=\frac{\dot{y}\dot{x}}{\dot{x}}$. If then $\frac{\dot{y}\dot{x}}{\dot{x}}=0$, we shall find $\dot{y}=0$; and because of $PT=\frac{\dot{y}x}{\dot{y}}=\infty$ (the note of infinity) $\dot{x}=\infty$. It is possible for the tangent H G (*fig.* 5.) to lie directly against the semiordinate G C; in which case, the subtangent P T is equal to nothing, and the subnormal P H is infinite. But $PT=\frac{y\dot{x}}{\dot{y}}=0$; therefore if $\frac{x\dot{x}}{\dot{y}}=0$, we shall have $\dot{x}=0$; or because $PH=\frac{\dot{y}\dot{x}}{\dot{x}}=\infty$, we find $\dot{y}=\infty$; both $\dot{x}$ and $\dot{y}$ being, in respect of $\dot{y}$, infinitesimals. From the equation of the curve therefore we are to find the value of $\dot{y}$, which is to be made equal either to nothing, or to infinity, that we may have the value of the abscis, to which the greatest applicate is co-ordinate.

II. To *cut a right line* A B (*fig.* 6.) *in such a manner in* D, *that the rectangle* A D *and* D B *shall be the greatest that can possibly be thus contributed.* Let A B $=a$, A D $=x$; then will D B $=a-x$; consequently A D $\times$ D B $=ax-xx$, some *maximum*; and hence its fluxion will be equal to nothing, as being conceived at a circle to which

$$\frac{a\dot{x}-x\dot{x}=\dot{y}}{}$$

Wherefore $a\dot{x}-2x\dot{x}=\dot{y}=0$

$$\frac{a-2x=0}{}$$

$$\frac{\frac{1}{2}a=x}{}$$

The line A B therefore is to be cut into two equal parts; and the square is the greatest of all rectangles, whose altitudes and bases, taken together, are equal to each other.

III. To *find the fraction which shall exceed its cube by the greatest quantity possible.* Let x denote a variable quantity, expressing number in general; then the excess of x above x^3 being universally represented by $x-x^3$, we shall have the fluxion of this quantity, or $\dot{x}-3x^2\dot{x}=0$; and therefore, $x=\sqrt{\frac{1}{3}}$ the fraction required.

IV. *To determine the greatest rectangle that can be inscribed in a given triangle.* Let the base A C of the triangle (*Tab.* III. *Analyt. fig.* 66.) $=b$, and its altitude B D $=a$; and let the altitude B S of the inscribed rectangle $=x$, considered as variable, be x: then, because of the parallel lines A C, $x\,x$, it will be B D (a) : A C (b) :: D S $(a-x)$: $\frac{ba-bx}{a}=x\,z$: whence the area of the rectangle, or $a\,c\times$ B S will be $=\frac{bax-bx^2}{a}$; whose fluxion $\frac{ba\dot{x}-2bx\dot{x}}{a}$ being $=0$, we shall have $x=\frac{1}{2}a$: and, therefore, the greatest inscribed rectangle is that whose altitude is just half the altitude of the triangle.

V. To *determine the greatest cylinder*, d g, *that can be inscribed in a given cone* A D B. (*Tab.* III. *Analyt. fig.* 67.) Let $a=$ B C, the altitude of the cone, $b=$ A D, the diameter of its base; $x=fg$ (de) the diameter of the cylinder, considered as variable; $p=\frac{3.14159}{4}$ &c. the area of the circle whose diameter is unity: then the areas of circles being to one another as the squares of their diameters, we have, $1^2 : x^2 :: p : px^2$ the area of the circle $fxgx$. Moreover, from the similarity of the triangles A B C and A df, we have $\frac{1}{2}b$ (A C) : a (B C) :: $\frac{1}{2}b-\frac{1}{2}x$ (A d) : $df=\frac{ab-ax}{b}$; which multiplied by the area px^2 gives $\frac{pabx^2-pax^3}{b}$ for the solid content of the cylinder; which being a *maximum*, its fluxion $\frac{2pabx\dot{x}-3pax^2\dot{x}}{b}$ must be $=0$; consequently $x=\frac{2b}{3}$ and $d\,f=\frac{a}{3}$: whence it appears that the inscribed

cylinder

cylinder will be the greatest possible, when the altitude thereof is just $\frac{1}{3}$ of the altitude of the whole cone.

VI. *To find the greatest cone that can be inscribed in a given sphere.* Let A D (*fig.* 68.) the diameter of the sphere be $= a$; 78539, &c. the area of a circle, whose diameter is 1, be $= r$; and A C, the altitude of the cone, $= x$; then C D $= a - x$. Then by 35 Euc. 3. A C × C D $=$ C B^2; i. e. $ax - x^2 = a^2 - 2ax + x^2 =$ C B^2; therefore (because the square of the diameter is four times the square of the radius) by 2 Euc. 12. $4arx - 4rx^2 =$ the area of the cone's base; which, by 10 Euc. 12. drawn into $\frac{1}{3}x$ is $\frac{1}{3}arx^2 - \frac{1}{3}rx^3 =$ the cone's solidity, a *maximum*: therefore, since all the affirmative powers of a quantity that is a *maximum* or *minimum*, as well as the sum, remainder, product, or quotient, arising from the *maximum* or *minimum*, and any invariable quantity, are *maxima* or *minima* likewise, $ax^2 - x^3$ a *maximum*: and its fluxion $2axx - 3x^2x = 0$; which divided by xx gives $2a - 3x = 0$, and $3x = 2a$, and $x = \frac{2}{3}a$: so that the cone will be a *maximum*, when its altitude is $\frac{2}{3}$ of the sphere's diameter. The reader may find a variety of other examples in Simpson's Fluxions, vol. I. sect. 2. and Rowe's Fluxions, chap. 4.

The fluxion of the base of a curve, or its abscissa being given, when the fluxion of the ordinate vanishes, the tangent becomes parallel to the base, and the ordinate, most commonly, is a *maximum* or *minimum*, according to the rule given by authors on this subject, and mentioned in the preceding part of this article. But it is to be observed, that if the second fluxion of the ordinate vanish at the same time, and the third fluxion be real, this rule does not hold; for the ordinate is, in that case, neither a *maximum* nor a *minimum*. If the first, second, and third fluxions vanish, and the fourth fluxion be real, the ordinate is a *maximum* or *minimum*. The general rule given by Mr. Maclaurin, is, that when the first fluxion of the ordinate, with its fluxions of any subsequent successive orders, vanish, and the number of all these fluxions that vanish is odd, then the ordinate is a *maximum* or *minimum*, according as the fluxion of the next order to these is negative or positive. But if the number of all the fluxions of the ordinate, of the first and subsequent successive orders that vanish, be an even number, the ordinate is then neither a *maximum* nor a *minimum*. See Treat. of Fluxions, book 1. chap. 9. and book 2. chap. 5. art. 859. The greatest and least ordinates are likewise discovered in some cases, by supposing y to be infinite in respect of x. But there are several exceptions to this rule. See Maclaurin, loc. cit. art. 262, 865.

A late author has formed some objections to the universality of Mr. Maclaurin's rule. See the Harmony of Ancient and Modern Geometry, by Mr. Paman. Lond. 1745. 4to, in the Preface.

MAIXY, in *Mineralogy*, a name given by some to mundic, a sulphureous mineral, common in the tin-mines of Cornwall, and elsewhere.

MAY, Maius, the fifth month in the year, reckoning from our first or January; and the third, counting the year to begin with March, as the Romans anciently did. It was called *Maius* by Romulus, in respect to the senators and nobles of his city, who were named *majores*; as the following month was called *Junius*, in honour of the youth of Rome, *in honorem juventutis*, who served him in the war, though some will have it to have been thus called from *Maia*, the mother of Mercury, to whom they offered sacrifice on the first day of it; and Papias derives it from *Maius, eo quod tunc terra maderet*.

In this month the sun enters Gemini, and the plants of the earth in general begin to flower.

The month of *May* was under the protection of Apollo; and in it also they kept the festival of Bona Dea, that of the goblins, called LEMURIA; and the ceremony of REGIFUGIUM, or the expulsion of the kings.

The vulgar have a great opinion of the virtues of *May*-DEW, and *May*-WATER.

The month of *May* has ever been effected favourable to love; and yet the ancients, as well as many of the moderns, look on it as an unhappy month for marriage. The original reason may perhaps be referred to the feast of the Lemures, which was held in it. Ovid alludes to this in the fifth of his Fasti, when he says,

Nec viduæ tecta adeas, nec virginis ædes
Tempora cum medio nocte silentia fuit:
Hæc quoque de cœnis, sole petente cubile,
Mane mihi Maio nubere turba vide.

MAY *apple*. See DUCK's *foot*.

MAY *bush*. See MEDLAR.

MAY *drop*. See DEW.

MAY *duke*, a species of CHERRY.

MAY *lily*. See LILY *of the valley*.

MAY *weed*. See CHAMOMILE.

MAYA, in *Natural History*, a name given by the people of the Philippine islands to a small species of sparrow, much less than our's, and very common among them. It feeds on rice, and is very destructive of it.

MAYS. See MAIZE.

MAYHEM. See MAHIM.

MAYHEM, *appeal of*. See APPEAL.

MAYL, in *Falconry*, signifies to pinion the wings of a HAWK.

MAYOR, or MAIOR, the chief magistrate or governor of the cities, and most corporation-towns of England, chosen annually by his peers out of the number of the aldermen. See ALDERMAN.

The word, according to Verstegan, comes from the ancient English *maier*, *able*, *potent*, of the verb *may*, or *main*. The *mayor* of the place is the king's lieutenant, and, with the aldermen and common-council, can make laws, called *bye-laws*, for the government of the place. He has also the authority of a kind of judge, to determine matters, and to mitigate the rigour of the law.

King Richard I. A. D. 1189, first changed the bailiffs of London into *mayors*; by whose example others were afterwards appointed.

Mayors of corporations are justices of peace, *pro tempore*, and they are mentioned in several statutes; but no person shall bear any office of magistracy concerning the government of any town, corporation, &c. that hath not received the sacrament, according to the church of England, within one year before his election; and who shall not take the oaths of supremacy, &c. Stat. 13 Car. II. cap. 1.

MAYOR's *court*. See COURT.

MAZA, a name given by the ancients to a sort of food, in common use among the poorer sort of people. It is made of the meal of parched barley, sprinkled with some liquid, and was eaten with honey or with defrutum.

Hippocrates every where speaks of this as of a coarse kind of bread, and advises the changing the common finer bread, in the spring season, for this coarser kind, as a thing very conducive to health. He seems every where to consider bread as the drier, and *maza* the moister diet.

MAZA, Maza, among the Athenians, a sort of cake, which was the common fare of such as were entertained at the public expence in the common hall, or PRYTANEUM. These cakes were made with flour boiled with water and oil. Pasise. Lex. Ant. in voc.

MAZE, in *Gardening*. See LABYRINTH.

MAZONOMUS, among the *Ancients*, a very large dish, commonly of wood, in which the MAZA was served.

MAZORAH, among the Jews, denotes the science of reading the scriptures. See MASORAH.

MAZUR, a species of birds, which the Arabian sailors esteem very lucky, because it lays its eggs close by the seashore before good weather; so that when these are observed, they promise themselves a safe voyage. They also pretend that this bird gives notice to sailors, when the ship approaches any danger, by flying and fluttering up and down.

MEAD, a wholesome, agreeable liquor, prepared of honey and water.

One of the best methods of preparing *mead* is as follows: Into twelve gallons of water slip the whites of six eggs; mixing these well together, and to the mixture adding twenty pounds of honey. Let the liquor boil an hour, and when boiled, add cinnamon, ginger, cloves, mace, and a little rosemary. As soon as it is cold, put a spoonful of yest to it, and tun it up, keeping the vessel filled as it works; when it has done working, stop it up close; and, when fine bottle it off for use.

Thorley says, that *mead*, not inferior to the best of foreign wines, may be made in the following manner: put three pounds of the finest honey to one gallon of water, and two lemon peels to each gallon; boil it half an hour, well scummed; then put in, while boiling, lemon peel: work it with yest; then put it in your vessel with the peel, to stand five or six months, and bottle it off for use. If it is to be kept for several years, put four pounds to a gallon of water.

The author of the Dictionary of Chemistry directs to chuse the whitest, purest, and best-tasted honey, and to put it into a kettle with more than its weight of water: a part of this liquor must be evaporated by boiling, and the liquor scummed, till its consistence is such, that a fresh egg shall be supported on its surface, without sinking more than half its thickness into the liquor; then the liquor is to be strained, and poured through a funnel into a barrel; this barrel, which ought to be nearly full, must be exposed to a heat as equable as possible, from 20 to 27 or 28 degrees of Mr. Reaumur's thermometer, taking care that the bung-hole be slightly covered, but not closed.

closed. The phenomena of the spirituous fermentation will appear in this liquor, and will subsist during two or three months, according to the degree of heat; after which they will diminish and cease. During this fermentation, the barrel must be filled up occasionally with more of the same kind of liquor of honey, some of which ought to be kept apart, on purpose to replace the liquor which flows out of the barrel in froth. When the fermentation ceases, and the liquor has become very vinous, the barrel is then to be put into a cellar, and well closed: a year afterwards the *mead* will be fit to be put into bottles.

The duty on *mead*, sold by retail, or otherwise, is 11½*d.* a gallon, to be paid by the maker.

MEADIA, *Dodecatheon*, in *Botany*, a genus of the *pentandria monogynia* class. Its characters are these: the flower has a permanent empalement of one leaf, cut into five long segments, which are reflexed; the flower hath one petal cut into five parts, whose limb is reflexed backward; it has five short stamina, sitting in the tube, connected at the top with a conical germen, terminated by an oblique stigma; the empalement becomes an oblong oval capsule, with one cell, opening at the top, and filled with small seeds: we have but one species of this plant, which is a native of Virginia, and was named after Dr. Mead.

MEADOW, in *Husbandry*, in its general signification, means pasture, or grass land, annually mown for hay; but is more particularly applied to lands that are so low as to be too moist for cattle to graze upon them, in winter, without spoiling the sward.

Too much water, and too little are equally prejudicial to *meadow*-grounds. The best lands for *meadow*-pasture are either low lands, or hanging grounds, where there is a rich soil and a moist bottom; especially where any little brook, or running spring, may be brought over it; and where there is some descent in the *meadow*, that the water may not lodge on it. These *meadows* are much better for the farmer than those near large rivers, where great crops are often lost.

Those that may be overflowed at pleasure are called *water-meadows*; these should never be overflowed till the end of March, except once or twice in winter, when there are such floods as bring a great deal of soil from the upper lands: and, if the season should prove dry, it will be of great service to the grass, if the *meadows* are overflowed again; but then the cattle should not be turned in till the sward is dry enough to bear their weight. Miller recommends the weeding of *meadows* in April and October, with a spaddle, and rolling them with a heavy roller in spring and autumn.

MEADOW *grass*. See GRASS.

MEADOW *rue*. See RUE.

MEADOW *saffron*. See SAFFRON.

MEADOW *sweet*. See SPIRÆA.

MEADOW *trefoil*. See TREFOIL.

MEAL. The *meal* or flour of England is the finest and whitest in the world. The French is usually browner, and the German browner than that. Our flour keeps well with us, but in carrying abroad it often contracts damp, and becomes bad. All flour is subject to breed worms; these are white in the white flour, and brown in that which is brown; they are therefore not always distinguishable to the eye; but when the flour feels damp, and smells rank and musty, it may be conjectured that they are there in great abundance.

The colour and the weight, are the two things which denote the value of *meal* or flour; the whiter and the heavier it is, other things being alike, the better it always is. Pliny mentions these two characters as the marks of good flour, and tells us, that Italy, in his time, produced the finest in the world. This country, indeed, was famous before his time for this produce; and the Greeks have celebrated it; and Sophocles, in particular, says, that no flour is so white, or so good, as that of Italy.

The corn of this country has, however, lost much of its reputation since that time; and the reason of this seems to be, that the whole country being full of sulphur, alum, vitriol, marcasites, and bitumens, the air may have, in time, affected them so far, as to make them diffuse themselves through the earth, and render it less fit for vegetation: and the taking fire of some of these inflammable minerals, as has sometimes happened, is alone sufficient to alter the nature of all the land about the places where they are. Dessand. Trait. Phys.

The flour of England, though it pleases by its whiteness, yet it wants some of the other qualities valuable in flour: the bread that is made of it is brittle, and does not hold together, but after keeping a few days becomes hard and dry, as if made of chalk, and is full of cracks in all parts; and this must be a great disadvantage in it, when intended for the service of an army, or the like occasions where there is no baking every day, but the bread of one making must necessarily be kept a long time.

The flour of Picardy is very like that of England, and after it has been kept some time, is found improper for making into paste or dough. The French are forced either to use it immediately on the grinding, or else to mix it with an equal quantity of the flour of Britanny, which is coarser, but more unctuous and fatty; but neither of these kinds of flour keep well.

The flour of almost any country will do for the home consumption of the place, as it may be always fresh ground; but the great care to be used in selecting it is in order to the sending it abroad, or furnishing ships for their own use. The saline humidity of the sea-air rusts metals, and fouls every thing on board, if great care be not taken in the preserving them. This also makes the flour damp and mouldy, and is often the occasion of its breeding insects, and being wholly spoiled.

The flour of some places is constantly found to keep better at sea than that of others; and when that is once found out, the whole caution needs only be to carry the flour of those places. Thus the French find, that the flour of Poitou, Normandy, and Guienne, all bear the sea-carriage extremely well, and they make a considerable advantage by carrying them to their American colonies.

The choice of flour for exportation being thus made, the next care is to preserve it in the ships: the keeping it dry is the grand consideration in regard to this: the barrels in which it is put up ought to be made of dry and well-seasoned oak, and not to be larger than to hold two hundred weight at the most. If the wood of the barrels have any sap remaining in it, it will mouldy and spoil the flour; and no wood is so proper as oak for this purpose, or for making the bins and other vessels for keeping flour in at home, since, when once well dried and seasoned, it will not contract humidity afterwards. The beech-wood, of which some make their bins for flour, is never thoroughly dry, but always retains some sap. The fir will give the flour a taste of turpentine; and the ash is always subject to be eaten by worms. The oak is preferable, because of its being free from these faults; and when the several kinds of wood have been examined in a proper manner, there may be others found as fit, or possibly more so, than this for the purpose. The great test is their having more or less sap. See FLOUR and WOOD.

MEAL *worm*. See WORM.

MEALY *tree*. See WAYFARING *tree*.

MEAN, the *middle*, between two extremes.

Thus we say, the *mean* motion of a planet; its *mean* distance, &c. meaning a motion or distance, which as far exceeds the least distance or motion, as it is exceeded by the greatest.

MEAN, in *Logic*. See MEDIUM.

MEAN *anomaly*, in *Astronomy*. See ANOMALY.

MEAN *axis*, in *Optics*. See AXIS.

MEAN { *conjunction*, / *opposition*, } in *Astronomy*, is when the *mean* place of the sun is in { *conjunction*, / *opposition*, } with the *mean* place of the moon in the ecliptic. See CONJUNCTION and OPPOSITION.

MEAN *diameter*, in *Gauging*. See DIAMETER and GAUGING.

MEAN *distance of a planet from the sun*, in *Astronomy*, is the right line drawn from the sun, to the extremity of the conjugate axis of the ellipsis in which the planet moves; and this is equal to the semitransverse axis, and is so called because it is a *mean* between the planet's greatest and least distance from the sun.

MEAN *motion*, in *Astronomy*, that whereby a planet is supposed to move equally in its orbit, and is always proportional to the time.

MEAN *proportion*. See EXTREME *proportion*.

MEAN *time*. See TIME.

MEAN, in *Law*, refers either to time, or dignity. Thus, in the first sense we say, his action was *mean* between the disseisin made to him, and his recovery; i. e. in the interim.

In the second sense, we say, there is lord *mean* or MESNE.

MEASLES, *morbilli*, in *Medicine*, a cutaneous disease, consisting in a general appearance of eruptions, not tending to suppuration; accompanied with a fever.

This distemper seems to bear a great affinity to the small-pox, and appeared in Europe about the same time with it: the symptoms being in many respects the same, the cause nearly the same, and the regimen and cure not much different.

The *measles* are most common in the spring season, and generally disappear in summer: they are preceded, like other fevers, by alternate fits of heat and cold, with sickness, and loss of appetite: the tongue is white, but generally moist; there is a short cough, a heaviness of the head and eyes, drowsiness, and a running at the

nose; but sometimes the cough does not come before the eruption has appeared. There is an inflammation and heat in the eyes, accompanied with a defluxion of sharp tears, and great acuteness of sensation, so that they cannot bear the light without pain: the eye-lids frequently swell so as to occasion blindness. The patient generally complains of his throat; and a vomiting or looseness often precedes the eruption. The stools in children are commonly greenish: they complain of an itching of the skin, and are remarkably peevish. Bleeding at the nose is common, both before, and in the progress of the disease. The eruptions, which, Dr. Watson observes, are merely symptomatic, and not critical as in the small-pox, usually appear about the fourth day, like flea-bites, first on the face, then upon the breast, and afterwards on the extremities. These may be distinguished from the small-pox by their scarcely rising above the skin. The fever, cough, and difficulty of breathing, instead of being removed by the eruption, as in the small-pox, are rather increased, but the vomiting generally ceases. About the sixth or seventh day, from the time of sickening, the *measles* begin to turn pale upon the face, and afterwards upon the body; so that by the ninth day they entirely disappear. The fever, however, and difficulty of breathing often continue, especially if the patient has been kept upon too hot a regimen. A violent looseness sometimes succeeds the *measles*, in which case the patient's life is in imminent danger. Those who die of the *measles*, generally expire about the ninth day from the invasion, and are commonly carried off by a peripneumony, or inflammation of the lungs. The most favourable symptoms are a moderate looseness, a moist skin, and a plentiful discharge of urine. The dangerous symptoms are a sudden disappearance of the spots, a delirium, great weakness, vomiting, restlessness, and difficulty of swallowing. If the spots turn pale too soon, or purple spots appear among them, these are unfavourable symptoms. When a continual cough, with hoarseness, succeeds the disease, there is reason to suspect an approaching consumption of the lungs. The regimen in this disease should be cool, the food light, and the drink diluting. Acids and small beer are not so proper in the *measles* as in the small-pox. The most suitable liquors are decoctions of liquorice with marsh-mallow roots and sarsaparilla, infusions of linseed, or of the flowers of elder, baum tea, clarified whey, barley water, &c. which, if the patient be costive, may be sweetened with honey, or mixed occasionally with a little manna. Bleeding is commonly necessary in this disease, especially when the fever runs high, and is attended with difficulty of breathing. Bathing the feet and legs in lukewarm water, and, when there is a tendency to vomiting, warm water or weak camomile tea, in order to encourage it, will be serviceable. The throat may be softened, and the tickling cough relieved, by licking sperma-ceti and sugar-candy pounded together; or by taking occasionally a spoonful of the oil of sweet almonds, with sugar-candy dissolved in it; or by drawing the steam of warm water into the lungs. If the *measles* should suddenly disappear, recourse must be had to the same treatment as in the similar circumstance of the SMALL-*pox*, the patient must be supported with wine and cordials. Blistering plasters must be applied to the legs and arms, and the body rubbed with warm flannels. Warm poultices may also be applied to the feet and palms of the hands. When purple or black spots appear, the patient's drink should be sharpened with spirits of vitriol; and if the putrid symptoms increase, the Peruvian bark must be administered, as in the small-pox.

This practice of giving the bark in the *measles* was first introduced by Dr. Cameron of Worcester, who observes, that it prevents the retrocession of the morbid acrimony, and continues the efflorescence on the skin, sometimes so long as the twelfth day. In this way, says Dr. Percival, the cough and other inflammatory symptoms are in a great measure obviated; and the patient is freed from all danger of a peripneumony, the fatality of which Sydenham describes in such strong terms.

Opiates should never be given except in cases of extreme restlessness, a violent looseness, or when the cough is very troublesome. For children, the syrup of poppies is sufficient; and a tea-spoonful or two may be occasionally given, according to the age of the patient, or the violence of the symptoms. When the *measles* are gone off, the patient ought to be purged, as in the small-pox: and if it is succeeded by a diarrhœa, this may be checked by a gentle dose of rhubarb, taken for some days in the morning, and an opiate at night: and if these fail, bleeding will be commonly effectual.

The *measles* is a disease more troublesome than dangerous; though it often inclines to consumptions, by a cough which it leaves behind. If such symptoms appear, small quantities of blood may be often let at proper intervals; and the patient should drink asses milk, remove to a sweet air, if in a large town, and ride daily on horseback; and keep close to a diet of milk and vegetables.

The *measles* may be inoculated by means of the hot sharp rheum which distils from the eyes, or blood, or by means of flannels placed under the arm-pits, or cotton rubbed upon the skin, and applied where the puncture is made. Tissot assures us, that he practised the INOCULATION of the *measles* for twelve years, with great success. Dr. Home, of Edinburgh, proposed, by inoculating the *measles*, to lessen its mortality, and to prevent the cough and other disorders, which are the consequences of the disease in the natural way: and his experience must [illegible] the advantages of this practice, and that it [illegible] exceed those which attend the inoculation of the small-pox. Buchan's Dom. Med. chap. 24. art. [illegible] vol. 5. art. 25. London Med. Obs. vol. 4. [illegible] Med Facts and Exp. Tissot's Advice, p. 235.

MEASNE. See MESNE.

MEASURE, MENSURA, in *Geometry*, denotes any certain quantity assumed as one, or unity, to which the ratio of other homogeneous or similar quantities is expressed.

This definition is somewhat more agreeable to practice than that of Euclid, who defines *measure* a quantity, which being repeated any number of times, becomes equal to another. Which only answers to the idea of an arithmetical *measure*, or quota part.

MEASURE *of an angle* is an arch described from the vertex *a*, *fig. 60.* III. *Geomet. fig. 60.* in any place between its legs; as at *d f*.

Hence angles are distinguished by the ratio of the arches, described from the vertex between the legs, to the peripheries.

Angles then are distinguished by those arches; and the arches are distinguished by their ratio to the periphery. Thus the angle *f a c* is said to be of so many degrees as there are in the arch *f d*. See ANGLE.

To *measure* the height of a hill, see the latter part of the article LEVELLING.

MEASURE *of a figure*, or plane surface, is a square, whose side is one inch, foot, yard, or some other determinate length.

Among geometricians, it is usually a rod, called a *square rod*, divided into ten square feet, and the square feet into square digits. Hence square *measures*.

MEASURE *of a line* is any right line taken at pleasure, and considered as unity.

The modern geometricians use a decempeda, or rod, divided into ten equal parts, called *feet*. The feet they subdivide into ten digits, the digit into ten lines, &c. This decimal division of the *measure* was first introduced by Stevinus, probably from the example of Regiomontanus. The index or character of the decempeda is made 0, that of feet 1, of digits 2, of lines 3, &c. which, because the *measure* was subdivided in a triple ratio, were the logarithms of the division. But, in lieu of these, expressed the logarithms by the Roman characters; v. g. 5 perches, 4 feet, 3 digits, and 2 lines, be expressed thus 5', 4, 3'', 2'''. It is frequently most commodious to separate the integers, or rods, from the fractions, by a point; thus, instead of 5', 4, 3'', 2''', to write 5.432. F. Noel observes, that, among the Chinese, the decimal division obtains in their common *measures*, and even in their weights.

MEASURES, *line of*. See LINE.

MEASURE *of the mass*, or *quantity of matter*, in *Mechanics*, is its weight; it being apparent, that all the matter which coheres and moves with a body, gravitates with it: and it being found by experiment, that the gravities of homogeneal bodies are in proportion to their bulks; hence, while the mass continues the same, the absolute weight will be the same, whatever figure it put on; but, as to its specific weight, it varies as the quantity of surface varies. See WEIGHT.

MEASURE *of a number*, in *Arithmetic*, is such a number as divides another, without leaving any fraction; thus 9 is a *measure* of 27.

MEASURE, *common*. See COMMON *measure*.

MEASURE *of a solid* is a cube, whose side is one inch, foot, yard, or other determined length.

Among geometricians, it is sometimes a rod or perch, called a *cubic perch*; divided into cubic feet, digits, &c. Hence cubic *measures*, or *measures* of capacity. See CUBE and TIMBER.

MEASURE *of velocity*, in *Mechanics*, is the space passed over by a moving body in any given time.

To *measure* a velocity, therefore, the space must be divided into as many equal parts as the time is conceived to be divided into. The quantity of space answering to such an article of time, is the *measure* of the velocity.

MEASURE, *universal* and *perpetual*, is a kind of *measure* unalterable by time, to which the *measures* of different nations and ages might be reduced, and by which they

might be compared and eſtimated. Such a *meaſure* is very deſirable, if it could be attained. Huygens, in his Horol. Oſcill. propoſes, for this purpoſe, the length of a pendulum, vibrating ſeconds, taken from the point of ſuſpenſion to the point of oſcillation. The third part of ſuch a pendulum may be called the horary foot, and ſerve as a ſtandard to which the *meaſure* of all other feet may be referred. Thus, v. g. the proportion of the Paris foot to the horary foot would be that of 864 to 881; becauſe the length of 3 Paris feet is 864 half lines, and the length of a pendulum, vibrating ſeconds, contains 3 horary feet, or 3 feet 8 ½ lines, i. e. 881 half lines. But this *meaſure*, in order to its being univerſal, ſuppoſes, that the action of gravity is every where the ſame, which is contrary to fact; and, therefore, it would really ſerve only for places under the ſame parallel of latitude; and in order to its being perpetual, it ſuppoſes, that the action of gravity continues always the ſame in the ſame place. See PENDULUM.

MEASURE, in a legal, commercial and popular ſenſe, denotes a certain quantity or proportion of any thing, bought, ſold, valued, or the like.

The regulation of WEIGHTS and *meaſures* ought to be univerſally the ſame throughout the kingdom, and ſhould, therefore, be reduced to ſome fixed rule or ſtandard; the prerogative of fixing which was veſted, by our ancient law, in the crown. This ſtandard was originally kept at Wincheſter: and we find, in the laws of king Edgar, cap. 8. near a century before the Conqueſt, an injunction, that the one *meaſure*, which was kept at Wincheſter, ſhould be obſerved throughout the realm. With reſpect to *meaſures* of length, our ancient hiſtorians (Will. Malm. in Vita Hen. I. Speim. Hen. I. apud Wilkins, 299.) inform us, that a new ſtandard of longitudinal *meaſure* was aſcertained by king Henry I. who commanded that the ulna, or ancient ell, which anſwers to the modern yard, ſhould be made of the exact length of his own arm: and one ſtandard of *meaſures* of length being once gained, all others are eaſily derived from hence; thoſe of greater length by multiplying, thoſe of leſs by ſubdividing the original ſtandard. Upon theſe principles the ſtandards were firſt made; which, being originally ſo fixed by the crown, their ſubſequent regulations have been generally made by the king in parliament. Thus, under king Richard I. in his parliament holden at Weſtminſter, A. D 1197, it was ordained, that there ſhould be only one weight and one *meaſure* throughout the kingdom, and that the cuſtody of the aſſize or ſtandard of weights and *meaſures* ſhould be committed to certain perſons, in every city and borough. See ALNAGER. In king John's time, this ordinance of king Richard was frequently diſpenſed with for money; (Hoved. A. D. 1202.) which occaſioned a proviſion to be made for inforcing it, in the great charters of king John and his ſon.

The ſtatute of Magna Charta, cap. 25, ordains, that there ſhall be but one *meaſure* throughout England, according to the ſtandard of the Exchequer; which ſtandard was formerly kept in the king's palace; and in all cities, market-towns, and villages, it was kept in the churches. By 17 Car. I. cap. 19. there is to be one weight and *meaſure*, and one yard, according to the king's ſtandard, and whoſoever ſhall keep any other weight or *meaſure*, whereby any thing is bought or ſold, ſhall forfeit for every offence 5l. And by 22 Car. II. cap. 8. water *meaſure*, as to corn and grain, or ſalt, is declared to be within the ſtatute 17 Car. I. And if any ſell grain or ſalt, &c. by any other buſhel, or *meaſure*, than what is agreeable to the ſtandard in the Exchequer, commonly called Wincheſter *meaſure*, he ſhall forfeit 40s. &c. Notwithſtanding theſe ſtatutes, in many places and counties there are different *meaſures* of corn and grain; and the buſhel in one place is larger than in another; but the lawfulneſs of it is not well to be accounted for, ſince cuſtom or preſcription is not allowed to be good againſt a ſtatute. Selling by falſe *meaſure* being an offence by the common law, may be puniſhed by fine, &c. upon an indictment at common law, as well as by ſtatute. See the ſtatute 11 Hen. VII. cap. 4. which inflicts particular fines for offences, pillory, &c.

Meaſures are various, according to the various kinds and dimenſions of the things *meaſured*. Hence ariſe

MEASURES, *lineal* or *longitudinal*, for lines or lengths:

MEASURES, *ſquare*, for areas or ſuperficies; and

MEASURES, *ſolid* or *cubic*, for bodies and their capacities.

All which again are very different in different countries, and in different ages, and even many of them for different commodities. Whence ariſe other diviſions of *domeſtic* and *foreign meaſures*, *ancient* and *modern* ones, *dry* and *liquid meaſures*, &c. The buſineſs of *meaſure* has been ſo confuſedly and imperfectly delivered by Engliſh writers, that the reader will not be diſpleaſed with the pains we have here taken to diſembroil and ſupply it. Under this head he will find enumerated the various general ſtanding *meaſures*, long, ſquare, and cubic, now or heretofore in uſe, with their proportions and reductions: for particulars, he muſt be contented to be referred to the particular heads; as FOOT, DIGIT, ELL, TUN, GALLON, BUSHEL, PERCH, LEAGUE, FURLONG, &c.

MEASURES, *long*, or MEASURES *of application*. *The Engliſh ſtandard long* MEASURE, for commerce, or that whereby the quantities of things are ordinarily eſtimated in the way of trade, is the yard; containing three Engliſh feet; equal to three Paris feet one inch $\frac{7}{10}$ of an inch; or $\frac{8}{9}$ of a Paris ell. Its diviſions are the foot, ſpan, palm, inch, and barley-corn, which ſee under their reſpective heads. Its multiples are the pace, fathom, pole, furlong, and mile. The proportions theſe ſeverally bear to each other will be expreſſed in a table for the purpoſe.—*Aſſay of meaſures*. See ASSAY.

MEASURE, *the French ſtandard*, for commerce, is the aune or ell, containing three Paris feet ſeven inches eight lines, or one yard $\frac{1}{8}$ Engliſh; the Paris foot royal exceeding the Engliſh by $\frac{1}{1000}$ parts, as in one of the following tables. This ell is divided two ways viz. into halves, thirds, ſixths, and twelfths; and into quarters, half-quarters, and ſixteenths.

This ell holds throughout the greateſt part of France; excepting at Troyes, in Champagne; at Arc, in the Barrois; and in ſome parts of Picardy and Burgundy, where the ell contains only two feet five inches one line; in Bretagne, where it contains four feet two inches eleven lines; and at St. Genoux, in Berry, where it exceeds the Paris ell by eight lines. See ELL. But in Languedoc, particularly at Marſeilles, Montpelier, Thouloufe, in Provence, and in Guienne, they meaſure by the canna, which at Thouloufe, and in Guienne, contains five Paris feet five inches and ſix lines; or one Paris ell and a half. But at Montpelier, and throughout the Lower Languedoc, as alſo in Provence and Avignon, and even Dauphine, the canna is ſix feet and nine lines, or one Paris ell and two thirds. See CANNA.

We have lately had ſome accurate compariſons between ſome of the French weights and *meaſures*, and thoſe of England, the reſult of which is, 1. The Paris half toiſe, as ſet off on the ſtandard kept in the Royal Society, contains of Engliſh inches, by the ſame ſtandard, 38.355, whence it appears, that the Engliſh yard and foot are, to the Paris half toiſe and foot, *nearly* as 107 to 114 ſo as 36 to 38.35514.

2. The Paris two marc, or fifteen ounce weight, weighs Engliſh troy grains 7560; whence it appears, that the Engliſh troy pound of twelve ounces, or 5760 grains, is to the Paris two marc, or fifteen ounce weight, as 16 to 21; that the Paris ounce weighs Engliſh troy grains 472.5, and that conſequently the Engliſh troy ounce is to the Paris ounce as 64 is to 63.

3. The Engliſh avoirdupois pound weighs troy grains 7004; whence the avoirdupois ounce, whereof ſixteen make a pound, is found equal to 437.75 troy grains.—And it follows, that the troy pound is to the avoirdupois pound as 88 to 107 nearly; for as 88 to 107 ſo is 5760 to 7003.636: that the troy ounce is to the avoirdupois ounce, as 80 to 73 nearly; for as 80 to 73 ſo is 480 to 438. And, laſtly, that the avoirdupois pound and ounce is to the Paris two marc weight and ounce, as 63 to 68 nearly; for as 63 to 68 ſo is 7004 to 7559.873. See WEIGHT.

4. The Paris foot, expreſſed in decimals, is equal to 1.0654 of the Engliſh foot, or contains 12.785 Engliſh inches. Phil. Tranſ. N° 465 ſect. 5. See FOOT.

MEASURE, *the ſtandard, in Holland, Flanders, Sweden*, a good part of *Germany*, many of the Hans-towns, as *Dantzick*, and *Hamburgh*, and at *Geneva*, *Frankfort*, &c. is likewiſe the ell: but the ell, in all theſe places, differs from the Paris ell. In Holland, it contains one Paris foot eleven lines, or four ſeventhsof the Paris ell. The Flanders ell contains two feet one inch five lines and half a line; or ſeven twelfths of the Paris ell. The ell of Germany, Brabant, &c. is equal to that of Flanders.

MEASURE, *the Italian*, is the bracchio, brace, or fathom: this obtains in the ſtates of Modena, Venice, Florence, Lucca, Milan, Mantua, Bologna, &c. but is of different lengths. At Venice, it contains one Paris foot eleven inches three lines, or eight fifteenths of the Paris ell. At Bologna, Modena, and Mantua, the brace is the ſame as at Venice. At Lucca it contains one Paris foot nine inches ten lines, or half a Paris ell. At Florence, it contains one foot nine inches four lines, or forty-nine hundredths of a Paris ell. At Milan, the brace for meaſuring of ſilks is one Paris foot ſeven inches four lines, or fourth ninths of a Paris ell: that for woollen cloths is the ſame with the ell of Holland. Laſtly, at

Bergamo,

Bergama, the brace is one foot feven inches fix lines, or five nipthe of a Paris ell. The uſual *meaſure* at Naples, however, is the canna, containing ſix feet ten inches and two lines, or one Paris ell and fifteen ſeventeenths.

MEASURE, *the Spaniſh*, is the vara, or yard, in ſome places called the barra; containing ſeventeen twenty-fourths of the Paris ell. But the *meaſure* in Caſtile and Valencia is the pan, ſpan, or palm; which is uſed, together with the canna, at Genoa. In Arragon, the vara is equal to a Paris ell and a half, or five feet five inches ſix lines.

MEASURE, *the Portugueſe*, is the cavedo, containing two feet, eleven lines, or four ſeventhe of a Paris ell; and the varra, a hundred and ſix whereof make a hundred Paris ells.

MEASURE, *the Piedmonteſe*, is the ras, containing one Paris foot nine inches ten lines, or half a Paris ell.

In Sicily, their *meaſure* is the canna; the ſame with that of Naples.

MEASURES, *the Muſcoviſe*, are the cubit, equal to one Paris foot four inches two lines; and the arcin, two whereof are equal to three cubits.

MEASURES, *the Turkiſh* and *Levant*, are the pick, containing two feet two inches and two lines, or three ſixths of the Paris ell. The Chineſe *meaſure*, the cobre; ten whereof are equal to three Paris ells. In Perſia, and ſome parts of the Indies, the gueze, whereof there are two kinds; the royal gueze, called alſo the *gueze mahaſſer*, containing two Paris feet ten inches eleven lines, or four fifths of the Paris ell; and the ſhorter gueze, called ſimply *gueze*, only two thirds of the former. At Goa and Ormuz, the *meaſure* is the vara, the ſame with that of the Portugueſe, having been introduced by them. In Pegu, and ſome other parts of the Indies, the cubit or candi, equal to the ell of Venice. At Goa, and ſome parts, they uſe a larger candi, equal to ſeven Paris ells; exceeding that of Babel and Baſſora by [illegible] and the vara by 6¼. In Siam, they uſe the ken, which is three Paris feet by one inch. The ken contains two ſoks, the ſok two keubs, the keub twelve nious or inches, the niou to be equal to eight grains of rice, i.e. to about nine lines. At Camboia, they uſe the haſter; in Japan, the tatam; and the ſpan on ſome of the coaſts of Guinea.

Engliſh Long MEASURES, *or* MEASURES *of Application.*

Barley-corn												
3	Inch											
9	3	Palm										
27	9	3	Span									
36	12	4	1⅓	Foot								
54	18	6	2	1½	Cubit							
108	36	12	4	3	2	Yard						
180	60	20	6⅔	5	3⅓	1⅔	Pace					
216	72	24	8	6	4	2	1⅕	Fathom				
594	198	66	22	16½	11	5½	3⅓	2¾	Pole			
23760	7920	2640	880	660	440	220	132	110	40	Furlong		
190080	63360	21120	7040	5280	3520	1760	1056	880	320	8	Mile	

Scripture Long MEASURES.

											Engl. Feet.	Inch. Dec.
Digit	—	—	—	—	—	—	—	—	—	—	0	0,912
4	Palm	—	—	—	—	—	—	—	—	—	0	3,648
12	3	Span	—	—	—	—	—	—	—	—	0	10,944
24	6	2	Cubit	—	—	—	—	—	—	—	1	9,888
96	24	8	4	Fathom	—	—	—	—	—	—	7	3,552
144	36	12	6	1½	Ezekiel's reed	—	—	—	—	—	10	11,328
192	48	16	8	2	1⅓	Arabian pole	—	—	—	—	14	7,104
1920	480	160	80	20	13⅓	10	Scenus, meaſuring line	—	—	—	145	11,04

N. B. There was another ſpan uſed in the Eaſt, equal to ⅞ of a cubit.

Grecian Long MEASURES *reduced to Engliſh.*

													Engl. Paces.	Feet.	Inch. Dec.
Dactylus, digit	—	—	—	—	—	—	—	—	—	—	—	—	0	0	0,75544⅛
4	Doron, dochme	—	—	—	—	—	—	—	—	—	—	—	0	0	3,02184⅜
10	2½	Lichas	—	—	—	—	—	—	—	—	—	—	0	0	7,5546⅝
11	2¾	1⅛	Orthodoron	—	—	—	—	—	—	—	—	—	0	0	8,31014⅜
12	3	1½	1⅓	Spithame	—	—	—	—	—	—	—	—	0	0	9,06564
16	4	1⅔	1½	1	Pous, foot	—	—	—	—	—	—	—	0	1	0,0875
18	4½	1⅞	1⅔	1⅛	1½	Pygme, cubit	—	—	—	—	—	—	0	1	1,59843
20	5	2	1⅔	1¼	1⅙	1⅓	Pygon	—	—	—	—	—	0	1	3,1093⅛
24	6	2½	2	1½	1⅓	1½	Pecus, cubit larger	—	—	—	—	—	0	1	6,13125
96	24	9½	8⅓	8	6	5⅓	4	4	Orgya, pace	—	—	—	0	6	0,525
9600	2400	960	800	600	533⅓	480	400	100	Stadius Arabicus	furlong	—	—	100	4	4,5
76800	19200	7680	6400	4800	4266⅔	3840	3200	800	8	Million, mile	—	—	805	5	0

Jewiſh

Jewish Long or Itinerary MEASURES.

					Eng. Miles.	Paces.	Feet. Dec.
Cubit	—	—	—	—	0	0	1,824
400 Stadium	—	—	—		0	145	4,6
2000 5 Sab. day's journey	—	—			0	729	3,0
4000 10 2 Eastern mile	—	—			1	403	1,0
12000 30 6 3 Parasang	—	—			4	153	3,0
96000 240 48 24 8 A day's journey	—				33	172	4,0

Roman Long MEASURES *reduced to English.*

									Engl. Paces.	Feet.	Inch. Dec.
Digitus transversus	—	—	—	—	—				0	0	0,7254
1¼ Uncia	—	—	—	—	—				0	0	0,907
4 3 Palmus minor	—	—	—	—	—				0	0	2,901
16 12 4 Pes	—	—	—	—	—				0	0	11,604
20 15 5 1¼ Palmipes	—	—	—	—					0	1	2,505
24 18 6 1½ 1¼ Cubitus	—	—	—						0	1	5,406
40 30 10 2½ 2 1⅔ Gradus	—	—	—						0	2	5,01
80 60 20 5 4 3⅓ 2 Passus	—	—	—						0	4	10,02
10000 7500 2500 625 500 416⅔ 250 125 Stadium	—	—	—						120	4	4,5
80000 60000 20000 5000 4000 3333⅓ 2000 1000 8 Milliare	—	—	—						967	0	0

Proportions of several long MEASURES *to each other, by M. Picard.*

The Rhinland or Leyden foot (12 whereof make the Rhinland perch) supposed	696
The English foot	675⅝
The Paris foot	720
The Amsterdam foot, from that of Leyden, by Snellius	629
The Danish foot (two whereof make the Danish ell)	701,⅛
The Swedish foot	658⅛
The Brussels foot	609⅛
The Dantzic foot, from Hevelius's Selenographia	636
The Lyons foot, by M. Auzout	757⅞
The Bologna foot, by the same	843
The braccio of Florence, by the same, and father Mersenne	1290
The palm of the architects at Rome, according to the observations of Messi. Picard and Auzout	494⅛
The Roman foot in the Capitol, examined by Messi. Picard and Auzout	653 or 653⅛
The same from the Greek foot	652
From the vineyard Mattei	657⅛
From the palm	658⅛
From the pavement of the Pantheon, supposed to contain ten Roman feet	653
From a slip of marble in the same pavement, supposed to contain 3 Roman feet	650
From the pyramid of Cestius, supposed to contain 95 Roman feet	653⅛
From the diameters of the columna in the arch of Septimius Severus	653⅛
From a slip of porphyry in the pavement of the Pantheon	653⅛

See on this subject Phil. Transf. vol. li. art. 69. p. 774.

Proportions of the Long MEASURES *of several nations to the English foot, taken from Mr. Greaves, Auzout, Picard, and Eisenschmid.* See FOOT.

The English standard foot being divided into 1000 equal parts, the other *measures* will have the proportions to it, which follow:

	Feet	Inches
English foot	1000	12
Paris foot	1068	12,816
Venetian foot	1162	13,944
Rhinland foot	1033	12,396
Strasburgh foot	952	11,424
Norimbergh foot	1000	12
Dantzick foot	944	11,328
Danish foot	1042	12,504
Swedish foot	977⅛	11,733
Derahot cubit of Cairo	1824	21,888
Persian arish	3197	38,364
Greater Turkish pike	2200	2644
Lesser Turkish pike	2131	25,572
Braccio at Florence	1913	22,956
Braccio for woollen at Siena	1242	14,904
Braccio for linen at Siena	1974	23,688
Canna at Naples	6880	82,56
Vera at Almaria and Gibraltar	2760	33,12
Palmo di Architetti at Rome	732	87,84
Canna di Architetti	7320	87,84
Palmo di braccio di mercantia	695⅛	8,340
Genoa palm	815	9,78
Bolognian foot	1250	15
Antwerp ell	2283	27,396
Amsterdam ell	2268	27,216
Leyden ell	2260	27,12
Paris drapers ell	3929	47,148
Paris mercer's ell	3937	47,244

MEASURES, *square or superficial.* English square or superficial *measures* are raised from the yard of 36 inches, multiplied into itself; and this producing 1296 square inches in the square yard, the divisions of this are square feet and inches; and the multiples, poles, roods, and acres, as in the table.

French square measures are regulated by 12 square lines in the inch square; 12 inches in the foot, 22 feet in the perch, and 100 perches in the arpent or acre.

English square MEASURES.

Inches						
144	Feet					
1296	9	Yards				
3600	25	2¾	Paces			
39204	272¼	30¼	10,89	Poles		
1568160	10890	1210	435,6	40	Rood	
6272640	43560	4840	1743,6	160	4	Acre

Grecian square measures were the plethron, or acre, by some said to contain 1444, by others 10,000 square feet; and aroura, the half of the plethron. The aroura of the Egyptians was the square of 100 cubits.

Roman square MEASURES *reduced to English.*

The integer was a jugerum or acre, which they divided like the libra, or as: thus,

	Uncia:		Jugerum contained Sq. Feet.	Scrup.	Eng. Roods.	Sq. Pol.	Sq. Feet.
1	As - - - 12	As - - -	28800	288	0	18	170,05
11/12	Deunx - - 11	Deunx - -	26400	264	0	10	183,85
5/6	Dextans - - 10	Dextans - -	24000	240	0	2	117,64
3/4	Dodrans - - 9	Dodrans - -	21600	216	1	34	5144
2/3	Bes - - 8	Bes - -	19200	192	1	25	257,96
7/12	Septunx - 7	Septunx - -	16800	168	1	17	191,44
1/2	Semis - - 6	Semis - -	14400	144	1	9	125,03
5/12	Quincunx - 5	Quincunx - -	12000	120	1	1	58,82
1/3	Triens - - 4	Triens - -	9600	96	0	32	204,85
1/4	Quadrans - 3	Quadrans -	7200	72	0	24	198,64
1/6	Sextans - - 2	Sextans - -	4800	48	0	16	134,43
1/12	Uncia - - 1	Uncia - -	2400	24	0	8	66,21

MEASURES, *cubical*, or MEASURES *of capacity for liquids. Engliſh liquid meaſures* were originally raiſed from troy-weight; it being enacted by ſeveral ſtatutes, that eight pounds troy of wheat, gathered from the middle of the ear, and well dried, ſhould weigh a gallon of wine *meaſure*; the diviſions and multiples whereof were to form the other *meaſures*: at the ſame time it was alſo ordered, that there ſhould be but one *liquid meaſure* in the kingdom; yet cuſtom has prevailed, and there having been introduced a new weight, viz. the avoirdupois, we have now a ſecond ſtandard gallon adjuſted thereto, and therefore exceeding the former in the proportion of the avoirdupois weight to troy weight. From this latter ſtandard are raiſed two ſeveral *meaſures*, the one for ale, the other for beer. For the method of reducing one into the other, ſee WEIGHT.

The ſealed gallon at Guildhall, which is the ſtandard for wines, ſpirits, oils, &c. is ſuppoſed to contain 231 cubic inches; and, on this ſuppoſition, the other *meaſures* raiſed therefrom will contain as in the following tables; yet, by actual experiment made in 1688, before the lord mayor and the commiſſioners of exciſe, this gallon was only found to contain 224 cubic inches: it was however agreed to continue the common ſuppoſed contents of 231 cubic inches, ſo that all computations ſtand on their old footing. Hence, as 12 is to 231, ſo is 14½ to 281¼, the cubic inches in the ale gallon; but in effect the ale quart contains 70½ cubic inches; on which principle the ale and beer gallon will be 282 cubic inches. See on this ſubject Phil. Tranſ. vol. xlvi. art. 15. p. 54.

The ſeveral diviſions and multiples of theſe *meaſures*, and their proportions, are exhibited in the tables underneath.

MEASURES, *French liquid*. At Paris, and in a great part of the kingdom, the *meaſures*, to begin with the ſmalleſt, are, the poſſon, which contains ſix cubic inches, or four Paris ounces of water at the freezing point: two poſſons make the demi-ſeptier; two demi-ſeptiers, the ſeptier or chopine; two chopines, a pint; two pints, the quart or pot; four quarts, the gallon, or ſeptier of eſtimation; and thirty-ſix ſeptiers, the muid, which is ſubdivided into two demi-muids, four quarter-muids, and eight half-quarter-muids. From the quart are likewiſe raiſed the *meaſures* uſed in other parts, as the queue uſed in Orleans, Blois, &c. containing a Paris muid and a half, or four hundred and twenty pints; the tun uſed at Bayonne and Bourdeaux, conſiſting of four barriques, and equal to three Paris muids; at Orleans to two; ſo that the firſt tun contains eight hundred and ſixty-four pints, and the ſecond five hundred and ſeventy-ſix. See TUN.

The demi-queue, uſed in Champagne, ninety-ſix quarts; the pipe, uſed in Anjou and Poictou, containing two hollards, equal to two demi-queues of Orleans, &c. or a muid and a half of Paris, or four hundred and thirty-two pints. The millerolle uſed in Provence, containing ſixty ſix Paris pints; and the poinçon uſed at Nantes, in Touraine, and the Iſle-de-France, equal to half the Orleans tun. The poinçon uſed at Paris is the ſame with the demi-queue.

MEASURES, *Dutch liquid*. At Amſterdam, their *meaſures*, to begin with the diminutions, are mengles, or bottles, equal to French pots, and containing two pounds four ounces, mart, of an ordinary liquor. The mengle is diviſed into two pints, four half-pints, eight mauſſes, ſixteen half-mauſſes, &c. Seven hundred and ſeventy mengles make their tun. The viertel, or quarter, conſiſts of five mengles, and one-ſixth of a mengle. The wine viertel is juſt ſix mengles. The ſtekan, or ſtekanmen, contains ſixteen mengles. The anker contains two ſtekans; and four ankers, the awm. For oils they uſe the tun, which contains ſix awms, or ahms; equal to ſixteen hundred Paris pints. See AAM.

MEASURES, *Spaniſh liquid*, are, the bota, containing between thirty-ſix and thirty-ſeven Dutch ſtekans, holding about a thouſand weight. The bota conſiſts of thirty arrobas, each weighing twenty-eight pounds. Each arroba is again divided into eight azumbres, and the azumbre into four quarts. The pipe conſiſts of eighteen arrobas.

MEASURES, *Portugueſe liquid*, are botas, almudes, cavadas, quartas; and for oil, alquiers, or cantars. The Portugueſe bota is ſomewhat ſmaller than the Spaniſh; the latter being equal to thirty-ſix or thirty-ſeven ſtekans, and the former only to twenty-five or twenty-ſix. The quartas is one-fourth of the cavadas. The cavadas, or cavado, is the ſame with the Dutch mengle. Six cavadas make an alquier, and two alquiers one almude, or almoud; twenty-ſix almudes, a bota.

MEASURES, *Italian liquid*. At Rome is the boccale, or pot, containing a little more than a Paris pint. Seven boccales and a half make the rubbo; and thirteen rubbos and a half, the brenta; ſo that the brenta contains ninety-ſix boccales. At Florence, the ſtaro, or ſtaio, containing three bariles, and the barile twenty-ſix fiaſcos, or flaſks, which are nearly equal to Paris pints. At Verona they uſe the baſſa, ſixteen whereof make a brenta; the bronta contains ninety-ſix boccales, or thirteen rubbos and a half. At Venice the amphora, containing two bottes; the botte, four bigoncios; the bigoncio, four quarts; the quart, four tiſchauffezas. The Venetian botte is again divided into moſtachios, ſeventy-ſix whereof make the amphora. At Ferrara the maſſilly, containing eight ſechios. In Iſtria, ſechios; ſix whereof make the urna. In Calabria, and Apulia, pignatolis, equal to French pints; thirty-two pignatolis make the ſtaro or ſtaio; and ten ſtaros, the ſalma.

MEASURES, *German liquid*. The fuder is uſed almoſt throughout all Germany, but with ſome difference in its length, as well as its ſubdiviſions. The fuder is ſuppoſed the load of a cart with two horſes. Two fuders and a half make the roeder; ſix awms, the fuder; twenty-ſertels, the awm; and four maſſems, or maaſſes, the fertel; ſo that the roeder contains one thouſand two hundred maaſſes, the fuder four hundred and eighty, the awm eighty, and the fertel forty-one. At Nuremberg, the diviſion of the fuder is into twelve heemers, and the heemer into forty-four maaſſes. At Vienna, they divide the fuder into thirty-two heemers, the heemer into thirty-two oehtelings, and the achtelling into four ſeltins: the awm, there, is eighty maaſſes; the fertel, called alſo *ſchenck*, four maaſſes; and the drieling twenty-four heemers. At Augſbourg, the fuder is divided into eight jez; the jez into two muids, or twelve beſons; the beſon into eight maaſſes, which makes ſeven hundred ſixty-eight maaſſes in the fuder, as in that of Nuremberg. At Heidelberg, the fuder is divided into ten awms; the awm into twelve vertels; and the vertel into four maaſſes. In Wirtemberg, the fuder is divided into awms; the awm into ſixteen eymes; the eyme into ten maaſſes.

MEASURES, *liquid, on the coaſts of Barbary*. At Tripoli, &c. they uſe the rotolo, or roſoli; thirty-two whereof make the matulo. At Tunis, forty-two of the roſoli of Tripoli make a matara, or mutaro; and the other places on the ſame coaſt uſe nearly the ſame *meaſures*. It may be here obſerved, that moſt, if not all the eaſtern nations, with whom the Europeans traffic, have not any ſuch thing as *meaſures* of capacity, whether for things liquid or dry; but that they ſell every thing, even liquors, by the weight. We may, however, rank among the number of *liquid meaſures*, the cocoa and canan of Siam. The firſt are the cocoa ſhells cleared of their kernel. And ſince theſe are not all of the ſame capacity, they meaſure them with cauris, or little ſhells found in the Maldives, which alſo ſerve for money in ſome ſtates of the Indies. Some cocoa hold a thouſand cauris, and ſome only five hundred. Above the cocoa is the canan, a little *meaſure* uſed in the ſame country, and called by the Portugueſe *chopa*; holding about a Paris quart.

Engliſh MEASURES *of capacity of liquids.*

Wine-MEASURE.

Solid Inches								
28¼	Pint							
231	8	Gallon						
4158	144	18	Rundlet					
7276½	252	31½	1¾	Barrel				
9702	336	42	2⅓	1⅓	Tierce			
14553	504	63	3½	2	1½	Hogſhead		
19279	672	84	4⅔	2⅔	2	1⅓	Puncheon	
29106	1008	126	7	4	3	2	1½	Butt or Pipe
58212	2016	252	14	8	6	4	3	2 Tun

Ale MEASURE.

Pints					
8	Gallon				
64	8	Firkin			
128	16	2	Kilderkin		
256	32	4	2	Barrel	
384	48	6	3	1½	Hogſhead

Beer-MEASURE.

Pints					
8	Gallon				
72	6	Firkin			
144	18	2	Kilderkin		
288	36	4	2	Barrel	
432	54	6	3	1½	Hogſhead.
864	108	12	6	3	2 Butt

N. B. In all places without the bills of mortality, 34 gallons ſhall be reckoned for a barrel of beer or ale to the exciſe

Attic MEASURES *of capacity for liquids, reduced to the Engliſh Wine*-Meaſure.

									Gall.	Pints.	Sol. Inch. Dec.
Cochliarion									0	$\frac{1}{10}$	0,03561
2	Cheme								0	$\frac{1}{5}$	0,07121
2½	1¼	Myſtron							0	$\frac{1}{4}$	0,08901
5	2½	2	Concha						0	$\frac{1}{2}$	0,17811
10	5	4	2	Cyathus					0	1	0,35611
15	7½	6	3	1½	Oxubaphon				0	$1\frac{1}{2}$	0,5351
60	30	24	12	6	4	Cotyle			0	6	2,1411
120	60	48	24	12	8	2	Xeſtes, ſextary		0	1	4,283
720	360	288	144	72	48	12	6	Chos, congius	0	6	25,698
864	432	345	1728	864	576	144	72	12 Metretes, amphora	10	2	19,626

MEASURES *of capacity for liquids, reduced to the Engliſh Wine*-Meaſure.

									Gall.	Pints.	Sol. Inch. Dec.
Ligula									0	$\frac{1}{2}$	0,1174
4	Cyathus								0	$\frac{1}{8}$	0,469
6	1½	Acetabulum							0	$\frac{1}{6}$	0,704
12	3	2	Quartarius						0	$\frac{1}{3}$	1,409
24	6	4	2	Hemina					0	$\frac{2}{3}$	2,818
48	12	8	4	2	Sextarius				0	1	5,636
288	72	48	24	12	6	Congius			0	7	4,942
1152	288	192	96	48	24	4	Urna		3	4½	5,33
2304	576	384	192	96	48	8	2	Amphora	7	1	10,66
46080	11520	7680	3840	1920	960	160	40	20 Culeus	143	3	11,095

Jewiſh MEASURES *of capacity for liquids, reduced to the Engliſh Wine*-Meaſure.

								Gall.	Pints.	Sol. Inch.
Caph								0	$\frac{1}{2}$	0,177
1½	Log							0	$\frac{1}{3}$	0,211
5½	4	Cab						0	3½	0,844
16	12	3	Hin					1	2	2,533
32	24	6	2	Seah				2	4	5,067
96	72	18	6	3	Bath, ephia			7	4	15,2
960	720	180	60	30	10	Coron, chomer		75	5	7,625

MEASURES, *cubical, of capacity for things dry. Engliſh dry or corn* MEASURES are raiſed from the Winchester gallon, which contains 272¼ ſolid inches, and is to hold of pure running or rain water, nine pounds thirteen ounces. This ſeems to ſtand on the foot of the old wine gallon, of 224 cubic inches; 12 being to 14½, as 224 to 272¼. Yet by an act of parliament, made 1697, it is decreed, that a round buſhel, eighteen inches and a half wide, and eight deep, is a legal Winchester buſhel. But ſuch a veſſel will only hold 2150,42 cubic inches; conſequently the gallon will contain 268¼ cubic inches. The diviſions and multiples are in the table following.

MEASURES, *French dry*, are, the litron, buſhel, minot, mine, ſeptier, muid, and tun. The litron is divided into two demilitrons, and four quarter-litrons, and contains thirty-ſix cubic inches of Paris. By ordonnance, the litron is to be three inches and a half high, and three inches ten lines broad. The litron for ſalt is larger, and is divided into two halves, four quarters, eight demi-quarters, and ſixteen meſurettes. The French buſhel is different in different juriſdictions. At Paris it is divided into demi-buſhels; each demi-buſhel into two quarts; the quart into two half-quarts; and the half-quart into two litrons: ſo that the buſhel contains ſixteen litrons. By ordonnance, the Paris buſhel is to be eight inches, two lines and an half, high; and ten inches broad, or in diameter, within-ſide. The minot conſiſts of three buſhels; the mine of two minots, or ſix buſhels; the ſeptier of two mines, or twelve buſhels; and the muid of twelve ſeptiers, or an hundred forty-four buſhels. *The buſhel of oats* is eſtimated double that of any other grain; ſo that there go twenty-four buſhels to make the ſeptier, and two hundred eighty-eight to make the muid. It is divided into four picotins; the picotin containing two quarts, or four litrons. *The buſhel for ſalt* is divided into two half-buſhels, four quarters, eight half-quarters, and ſixteen litrons; four buſhels make a minot, ſixteen a ſeptier, and a hundred ninety-two a muid. *The buſhel for wood* is divided into halves, quarters, and half-quarters. Eight buſhels make the minot, ſixteen a mine; twenty mines, or three hundred and twenty buſhels, the muid. For *plaſter*, twelve buſhels make a ſack, and thirty-ſix ſacks a muid. For *lime*, three buſhels make a minot, and forty-eight minots a muid. The minot is, by ordonnance, to be eleven inches nine lines high; and fourteen inches eight lines in diameter. The minot is compoſed of three buſhels, or ſixteen litrons; four minots make a ſeptier, and forty-eight a muid. The French mine is no real veſſel, but an eſtimation of ſeveral others. At Paris, the mine contains ſix buſhels, and twenty-four make the muid; at Rouen, the mine is four buſhels; and at Dieppe, eighteen mines make a Paris muid. See MUID. The ſeptier differs in different places: at Paris it contains two mines, or eight buſhels; and twelve ſeptiers the muid. At Rouen the ſeptier contains two mines or twelve buſhels. Twelve ſeptiers make a muid at Rouen, as well as at Paris; but twelve of the latter are equal to fourteen of the former. At Toulon, the ſeptier contains a mine and a half; three of which mines make the ſeptier of Paris. See SEPTIER. The muid, or muy, of Paris, conſiſts of twelve ſeptiers: and is divided into mines, minots, buſhels, &c. That for oats is double that for other grain; i. e. contains twice the number of buſhels. At Orleans, the muid is divided into mines; but thoſe mines only contain two Paris ſeptiers and a half. In ſome places they uſe the tun in lieu of the muid; particularly at Nantes, where it contains ten ſeptiers of ſixteen buſhels each, and weighs between two thouſand two hundred and two thouſand two hundred and fifty pounds. Three of theſe tuns make twenty-eight Paris ſeptiers. At Rochel, &c. the tun contains forty-two buſhels, and weighs two per cent. leſs than that of Nantes. At Breſt, it contains twenty buſhels, is equal to ten Paris ſeptiers, and weighs about two thouſand two hundred and forty pounds. See [illegible]

MEASURES, *Dutch, Swediſh, Poliſh, Pruſſian, and eaſtern dry*. In theſe places they eſtimate their [illegible] on the foot of the *laſt, laſt, leth*, or *lecht*; ſo [illegible] cording to the various pronunciations of the [illegible] uſe it. In Holland, the laſt is equal to nineteen Paris ſeptiers, or thirty-eight Bourdeaux buſhels, and weighs about four thouſand five hundred ſixty pounds; the laſt they divide into twenty-ſeven mudes, and the mude into four ſchepels. In Poland, the laſt is forty Bourdeaux buſhels, and weighs about four thouſand eight hundred Paris pounds. In Pruſſia, the laſt is a hundred and thirty-three Paris ſeptiers. In Sweden and Muſcovy, they meaſure by the great and little laſt; the firſt containing twelve barrels, and the ſecond half as many. See LAST. In Muſcovy, they likewiſe uſe the cheſſord, which is different in various places: that of Archangel is equal to three Rouen buſhels.

MEASURES, *Italian dry*. At Venice, Leghorn, and Lucca, they eſtimate their dry things on the foot of the ſtaro or ſtaio; the ſtaro of Leghorn weighs fifty-four pounds: a hundred and twelve ſtaros, and ſeven-eighths, are equal to the Amſterdam laſt. At Lucca, a hundred and nineteen ſtaros make the laſt of Amſterdam. The Venetian ſtaro weighs a hundred twenty-eight Paris pounds: the ſtaro is divided into four quarters. Thirty-five ſtaros, and one fifth, or a hundred and forty quarters, and four-fifths, make the laſt of Amſterdam. At Naples and other parts, they uſe the tomolo, or tomalo, equal to one-third of the Paris ſeptier. Thirty-ſix tomoli and a half make the carro: and a carro and a half, or fifty-four tomoli, make the laſt of Amſterdam. At Palermo, fifteen tomoli make the ſalma; and four mondili, the tomolo. Ten ſalmas and three-ſeventhe, or a hundred and ſeventy-one tomoli and three-ſevenths, make the laſt of Amſterdam.

MEASURES, *Flemiſh dry*. At Antwerp, &c. they meaſure by the vierttel; thirty-two and a half whereof make nineteen Paris ſeptiers. At Hamburgh, the ſchepel; ninety whereof make nineteen Paris ſeptiers.

MEASURES, *Spaniſh and Portugueſe dry*. At Cadiz, Bilbon, and St. Sebaſtian, they uſe the fanega; twenty-three whereof make the Nantes or Rochel tun, or nine Paris ſeptiers and a half: though the Bilboa fanega is ſomewhat larger, inſomuch that twenty-one fanegas make a Nantes tun. At Seville, &c. they uſe the anagoras, containing a little more than the Paris mine; thirty-ſix anagoras make nineteen Paris ſeptiers. At Bayonne, &c. the concha; thirty whereof are equal to nine Paris ſeptiers and an half. At Liſbon, the alquier a very ſmall *meaſure*, two hundred and forty wherefore make nineteen Paris ſeptiers, ſixty the Liſbon muid.

Engliſh dry or corn MEASURES.

Solid Inches

34½	Pint							
272¼	8	Gallon						
544½	16	2	Peck					
2178	64	8	4	Buſhel				
	128	16	8	2	Strike			
	265	32	16	4	2	Carnock or coom		
17424	512	64	32	8	4	2	Seam or quarter	
	3072	384	192	48	24	12	6	Weigh
	5120	640	320	80	40	20	10	1 Laſt

But if the corn gallon contain only 268,8 ſolid inches, the MEASURES will be as follow:

Solid Inches

268,8	Gallon		
537,6	2	Peck	
2150,4	8	4	Buſhel
17203,2	64	32	8 Quarter

N. B. Some make five quarters a weigh, and two weighs a laſt; and others reckon ten quarters to the weigh and twelve weighs to the laſt.

Jewiſh

Jewish dry MEASURES *reduced to Englisſh.*

							Pecks.	Gall.	Pints.	Sol. Inch.
Gachal						—	0	0	0$\frac{1}{10}$	0,031
20	Cab					—	0	0	2$\frac{1}{2}$	0,077
36	1$\frac{4}{5}$	Gomor				—	0	0	5$\frac{1}{2}$	1,211
120	6	3$\frac{1}{3}$	Seah			—	1	0	1	4,036
360	18	10	3	Epha		—	3	0	3	12,107
1800	90	50	15	5	Lotteeh	—	16	0	0	26,500
3600	180	100	30	10	2	Chomer, coron	32	0	1	18,969

Attic dry MEASURES *reduced to Englisſh.*

						Pecks.	Gall.	Pints.	Sol. Inch.
Cochliarion					—	0	0	0	0,2761$\frac{1}{2}$
10	Cyathus				—	0	0	0	2,763$\frac{1}{2}$
15	1$\frac{1}{2}$	Oxubaphon			—	0	0	0	4,144$\frac{1}{2}$
60	6	4	Cotyle		—	0	0	0	16,579
120	12	8	2	Xeſtes, ſextary	—	0	0	0	33,158
180	18	12	3	1$\frac{1}{2}$	Choinix	—	0	0	1	15,705$\frac{1}{2}$
8640	864	576	144	72	48	Medimnus	—	4	0	6	3,501

Roman dry MEASURES *reduced to Englisſh.*

						Peck.	Gall.	Pints.	Sol. Inch.	Dec.
Ligula					—	0	0	0$\frac{1}{2}$	0,01	
4	Cyathus				—	0	0	0$\frac{1}{2}$	0,04	
6	1$\frac{1}{2}$	Acetabulum			—	0	0	0$\frac{3}{4}$	0,06	
24	6	4	Hemina		—	0	0	0$\frac{3}{4}$	0,24	
48	12	8	2	Sextarius	—	0	0	1	0,48	
384	96	64	16	8	Semi d.	0	1	0	3,84	
768	192	128	32	16	2	Modius	—	1	0	0	7,68

The uſual MEASURE *of wood for firing*, is the CORD; four feet high, as many broad, and eight long; this is divided into two half-cords, called *ways*, and by the French *membrures*, from the pieces ſtuck upright to bound them; or *voyes*, as being ſuppoſed half a waggon-load.

The MEASURE *for horſes* is the HAND, or handful; which by the ſtatute contains four inches.

MEASURE is alſo uſed to ſignify the cadence and time obſerved in poetry, dancing, and muſic, to render them regular and agreeable.

The different *meaſures* or metres, in poetry, are the different manners of ordering and combining the quantities, or the long and ſhort ſyllables. Thus hexameter, pentameter, iambic, ſapphic, verſes, &c. conſiſt of different *meaſures*.

In Engliſh verſes, the *meaſures* are extremely various and arbitrary, every poet being at liberty to introduce any new form that he pleaſes. The moſt uſual are, the heroic, generally conſiſting of five long, and five ſhort ſyllables; and verſes of four feet; and of three feet and a cæſura, or ſingle ſyllable.

The ancients, by variouſly combining and tranſpoſing their quantities, made a vaſt variety of different *meaſures*. Of words, or rather feet, of two ſyllables, they formed a ſpondee, conſiſting of two long ſyllables; a pyrrhic, of two ſhort ſyllables; a trochee, of a long and a ſhort ſyllable; and an iambic, of a ſhort and a long ſyllable.

Of their feet of three ſyllables, they formed a moloſſus, conſiſting of three long ſyllables; a tribrach, of three ſhort ſyllables; a dactyl, of one long, and two ſhort ſyllables; and an anepæſt, of two ſhort and one long ſyllable.

The Greek poets contrived a hundred and twenty-four different combinations or *meaſures*, under as many different names, from feet of two ſyllables to thoſe of ſix.

MEASURE, in *Muſic*, the interval, or ſpace of time, which the perſon, who beats time, takes between the raiſing and falling of his hand or foot, in order to conduct the movement, ſometimes quicker, and ſometimes ſlower, according to the kind of muſic, or the ſubject that is ſung or played.

The *meaſure* is that which regulates the time we are to dwell on each note. See TIME.

The ordinary or common *meaſure* is one ſecond, or ſixtieth part of a minute, which is nearly the ſpace between the beats of the pulſe or heart; the ſyſtole, or contraction of the heart, anſwering to the elevation of the hand; and its diaſtole, or dilatation, to the letting it fall. The *meaſure* uſually takes up the ſpace that a pendulum, of two feet and an half long, employs in making a ſwing or vibration. The *meaſure* is regulated according to the different quality or value of the notes in the piece; by which the time, that each note is to take up, is expreſſed. The ſemi-breve, for inſtance, holds one riſe, and one fall; and this is called the *meaſure*, or *whole meaſure*; ſometimes the *meaſure-note*, or *time-note*; the minim, one riſe, or one fall; and the crotcher, half a riſe, or half a fall, there being four crotchets in a full *meaſure*.

MEASURE, *binary or double*, is that wherein the riſe and fall of the hand are equal.

MEASURE, *ternary or triple*, is that wherein the fall is double to the riſe; or where two minims are played during a fall, and but one in a riſe. To this purpoſe, the number 3 is placed at the beginning of the lines, when the *meaſure* is intended to be triple; and a C, when the *meaſure* is to be common or double. This riſing and falling of the hands was called by the Greeks ἄρσις and θέσις. St. Auguſtine calls it *plauſus*, and the Spaniards *compas*. See ARSIS and THESIS.

MEASURES, *powder*, in *Artillery*, are made of copper, and contain from an ounce to twelve pounds: theſe are very convenient in a ſiege, when guns or mortars are loaded with looſe powder, eſpecially in ricochet firing, &c.

MEASURING, MENSURATION, defined *geometrically*, is the aſſuming any certain quantity, and expreſſing the proportion of other ſimilar quantities to the ſame.

MEASURING, defined *popularly*, is the uſing a certain known meaſure, and determining thereby the preciſe extent, quantity, or capacity of any thing.

Meaſuring, in the general, makes the practical part of GEOMETRY. From the various ſubjects whereon it is employed, it acquires various names, and conſtitutes various arts. Thus

MEASURING *of lines*, or quantities of one dimenſion, we call LONGIMETRY; and when thoſe lines are not extended parallel to the horizon, ALTIMETRY. When the different altitudes of the two extremes of the line are alone regarded, we call it LEVELLING.

MEASURING *of superficies*, or quantities of two dimensions, is variously denominated, according to its subjects: when conversant about lands, it is called GEODESIA, or SURVEYING: in other cases, it is called simply *measuring*. The inſtruments uſed are the ten-foot rod, chain, compaſs, circumferentor, &c.

MEASURING *of ſolids*, or quantities of three dimenſions, we call STEREOMETRY; where it is converſant about the capacities of veſſels, or the liquors they contain particularly, GAUGING.

The inſtruments for this are the gauging-rod, ſliding-rule, &c.

From the definition of *meaſuring*, where the *meaſure* is expreſſed to be ſimilar or homogeneous to, i. e. of the ſame kind with the thing meaſured, it is evident, that in the firſt caſe, or in quantities of one dimenſion, the *meaſure* muſt be a line; in the ſecond, a ſuperficies; and in the third, a ſolid. For a line, v. gr. cannot *meaſure* a ſurface; to *meaſure*, being no more than to apply the known quantity to the unknown, till the two become equal. Now a ſurface has breadth, and a line has none: and if one line have no breadth, two or a hundred have none. A line, therefore, can never be applied ſo often to a ſurface, as to be equal to it, i. e. to *meaſure* it. And from the like reaſoning it is evident, a ſuperficies, which has no depth, cannot become equal to, i. e. cannot *meaſure*, a ſolid, which has.

While a line continues ſuch, it may be meaſured by any part of itſelf: but when the line begins to flow, and to generate a new dimenſion, the *meaſure* muſt keep pace, and flow too; i. e. as the one commences ſuperficies the other muſt do ſo too. Thus we come to have *ſquare meaſures*, and *cubic meaſures*.

Hence we ſee why the *meaſure of a circle* is an arch, or part of the circle; for a right line can only touch a circle in one point, but the periphery of a circle conſiſts of infinite points. The right line therefore, to meaſure the circle, muſt be applied infinite times, which is impoſſible.

Again, the right line only touches the circle in a mathematical point; which has no parts or dimenſions, and has conſequently no magnitude; but a thing that has no magnitude or dimenſions, bears no proportion to another, that has; and cannot therefore meaſure it. Hence we ſee the reaſon of the diviſion of circles into 360 parts or arches, called *degrees*. See ARCH, CIRCLE, and DEGREE.

MEASURING *triangles*, or from three given ſides or angles, to determine all the reſt, is called TRIGONOMETRY.

MEASURING *of the air*, its preſſure, ſpring, &c. is called AEROMETRY, or PNEUMATICS.

MEAT, *cibus*. See FOOD.

MEATS, *dreſſing of*. See DRESSING.

MEATS, *dry*. See XEROPHAGY.

MEATS, *white*. See WHITE.

MEATUS *auditorius*, the entrance of the EAR; that is a cartilaginous ſubſtance, irregularly divided with fleſhy membranous interpoſitions in ſeveral parts of it, not unlike the bronchi in the lungs, only that the fleſhy fibres are here thicker. The inner part, or that next the brain, is bony. It is lined throughout with a thin membrane, derived from the ſkin, which is continued on the membrana tympani, where it becomes thinner. See *Tab. Anat. Oſteol.* *fig.* 14. *lit. f.*

From the beginning of the *meatus*, almoſt half-way, ariſe a great number of ſmall hairs, at whoſe roots iſſues the ear-wax, which is entangled in thoſe hairs, the better to break the impetus of the external air, and prevent its too ſuddenly ruſhing in on the membrana tympani.

MEATUS *cyſticus*. See CYSTICUS *Ductus*.

MEATUS *urinarius*, or *urinary paſſage*, in women, is very ſhort, lined internally with a very thin membrane; next to which is a coat of a white ſubſtance. Through this coat, from ſome lacunæ in it, paſs ſeveral ducts, which convey a limpid glutinous matter, ſerving to anoint the extremity of the urethra. See *Tab. Anat. Splanch.* *fig.* 9 *litt. r fig.* 11. *lit. b.*

MEE, or *Sea*-MEE, in *Ornithology*, the name of a water-bird of the larus or GULL-kind, which is all over of a duſky grey on its upper part; its head is blackiſh at the top, and the beak is red; the legs are ſhort and black, and the wings very long, reaching beyond the tail when folded.

MECAXOCHITL, in the *Materia Medica*, the name of the *piper longum hondſuri*, or ſmall American long pepper.

MECHANICS, MECHANICA, MECHANIC, a mixed mathematical ſcience, which conſiders motion, and moving powers, their nature and laws, with the effects thereof, in machines, &c. It is diſtinguiſhed by Sir Iſaac Newton into practical and rational *mechanics*: the former treats of the *mechanical* powers and of their various combinations: rational *mechanics* comprehends the whole theory of motion, and ſhews when the powers or forces are given, how to determine the motions that are produced by them; and *vice verſa*.

That part of *mechanics*, which conſiders the motion of bodies ariſing from gravity, is by ſome called STATICS—in diſtinction from that part which conſiders the *mechanical* powers, and their application, and which is properly called *mechanics*. See MECHANICAL *Powers*.

The term *mechanics* has of old been, and ſtill is, uſed in a double ſenſe in very different ſciences, both with reſpect to their objects and principles. For the name *mechanics* is applied equally to that ſcience which treats of the equilibrium and compariſon of powers; and to that ſcience in which the nature, generation, and alteration of motion are explained. To avoid ambiguity, therefore, it would be proper to give the name *ſtatics* to the ſcience of the equilibrium and compariſon of powers, and to reſtrain the term *mechanics* to the ſcience of motion.

Theſe two ſciences not only differ as to their objects and principles, but alſo with reſpect to the times in which they have been cultivated. Some of the principles of *ſtatics* were eſtabliſhed by Archimedes; but Galileo laid the firſt foundation of *mechanics*, when he inveſtigated the deſcent of heavy bodies; and ſince his time, by the aſſiſtance of the new methods of computation, a great progreſs has been made, particularly by Sir Iſaac Newton, in his Principia. This admirable work is now rendered more acceſſible to beginners by the learned comment of the fathers le Seur and Jacquier, printed, with the text, at Geneva, 1739, 4to. 1742, 3 vols. 4to. We have alſo the ſciences of ſtatics and *mechanics* treated of under the name of Phoronomia, by the late learned profeſſor Herman. Amſt. 1716, 4to. Mr. Euler's *Mechanica, ſive de Motus Scientia*, is ſufficiently recommended by the name of the author, well known as one of the moſt eminent mathematicians in Europe. This work, however, did not eſcape the cenſure of a late ingenious writer; but, granting the juſtneſs of his remarks, it may be ſaid, that a few inaccurate expreſſions, owing to analogies carried too far, and to the ſtyle of infinitiſimals, are but ſmall flaws in ſuch a work. As to ſtatics, the ſubject has been almoſt exhauſted by Varignon, in his Mecanique, Paris, 1725, 2 vol. 4to.

The doctrine of machines or engines is a principal branch of *mechanics*; but has not as yet been treated as it deſerves. We ſhall here inſert a few obſervations on this uſeful ſubject, from a late eminent author.

In treating of machines, we ſhould conſider the weight that is to be raiſed, the power by which it is to be raiſed, and the inſtrument or engine by which this effect is to be produced. There are two principal problems that ought to be reſolved in treating of each of them.

The firſt is, to determine the proportion which the power and weight ought to have to each other, that they may juſt ſuſtain one another, or be in æquilibrio.

The ſecond is, to determine what ought to be the proportion of the power and weight to each other, in a given machine, that it may produce the greateſt effect poſſible, in a given time.

All the writers on *mechanics* treat of the firſt of theſe problems, but few have conſidered the ſecond, though equally uſeful with the other.

As to the firſt problem, this general rule holds in all powers: ſuppoſe the engine to move, and reduce the velocities of the power and weight to the reſpective directions in which they act; find the proportions of thoſe velocities; then if the power be to the weight, as the velocity of the weight is to the velocity of the power; or, which amounts to the ſame thing, if the power multiplied by its velocity, gives the ſame product as the weight multiplied by its velocity, this is the caſe wherein the power and weight ſuſtain each other, and are in æquilibrio; ſo that in this caſe, the one would not prevail over the other, if the engine was at reſt; and if it is in motion, it would continue to proceed uniformly, if it were not for the friction of its parts, and other reſiſtances.

The ſecond general problem in *mechanics*, is, to determine the proportion which the power and weight ought to bear to each other, that when the power prevails, and the machine is in motion, the greateſt effect poſſible may be produced by it in a given time. It is manifeſt, that this is an enquiry of the greateſt importance, though few have treated of it. When the power is only a little greater than that which is ſufficient to ſuſtain the weight, the motion is too ſlow; and though a greater weight is raiſed in this caſe it is not ſufficient to compenſate the loſs of time. When the weight is much leſs than that which the power is able to ſuſtain, it is raiſed in leſs time; and this may happen not to be ſufficient to compenſate the loſs ariſing from the ſmallneſs of the load. It ought, therefore, to be determined when the product of the weight, multiplied by its velocity, is the greateſt poſſible; for this product meaſures the effect of the engine in a given time,

which

which is always the greater in proportion as the weight which is raiſed is greater, and as the velocity with which it is raiſed is greater. We ſhall therefore ſubjoin ſome inſtances of this kind, that may be demonſtrated from the common elementary geometry; wiſhing that further improvements may be made in this moſt uſeful part of *mechanics*.

When the power prevails, and the engine begins to move, the motion of the weight is at firſt gradually accelerated. The action of the power being ſuppoſed invariable, its influence in accelerating the motion of the weight decreaſes, while the velocity of the weight increaſes. Thus the action of a ſtream of water, or air, upon a wheel, is to be eſtimated only from the exceſs of the velocity of the fluid above the velocity already acquired by the part of the engine which it ſtrikes, or from their relative velocity. On the other hand, the weight of the load that is to be raiſed, and the friction, tend to retard the motion of the engine; and when theſe forces, viz. thoſe that tend to accelerate it, and thoſe that tend to retard it, become equal, the engine then proceeds with the uniform motion it has acquired.

Let A B (*Tab.* IV. *Mechanics*, *fig.* 50.) repreſent the velocity of the ſtream, A C, the velocity of the part of the engine which it ſtrikes, when the motion of the machine becomes uniform; and C B will repreſent their relative velocity, upon which the effect of the engine depends. It is known that the action of a fluid, upon a given plane, is as the ſquare of this relative velocity; conſequently the weight raiſed by the engine, when its motion becomes uniform, being equal to this action, it is likewiſe as the ſquare of C B. Let this be multiplied by A C, the velocity of the part of the engine impelled by the fluid; and the effect of the engine in a given time will be proportional to $AC \times CB^2 =$ (ſuppoſing C B to be biſected in D) $AC \times 2CD \times 2DB = 4AC \times CD \times DB$; conſequently, the effect of the engine is greateſt when the product of AC, CD, and DB is greateſt. But it is eaſy to ſee, that this product is greateſt, when the parts A C, C D, and D B, are equal; for if you deſcribe a ſemicircle upon A D, and the perpendicular C E meet the circle in E, then $AC \times CD = CE^2$; and is greateſt, when C is the centre of the circle; ſo that in order that $AC \times CD \times DB$ may be the greateſt poſſible, A D muſt be biſected in C; and C B having been biſected in D, it follows, that AC, C D, D B, muſt be equal; or that A C, the velocity of the part of the engine impelled by the ſtream, ought to be but one third of A B, the velocity of the ſtream. In this caſe, when (abſtracting from friction) the engine acts with the utmoſt advantage; the weight raiſed by it is to the weight that would juſt ſuſtain the force of the ſtream, as the ſquare of C B, the relative velocity of the engine and ſtream, to the ſquare of A B, which would be the relative velocity, if the engine was quieſcent; that is, as 2×2 to 3×3, or 4 to 9. Therefore, that the engine may have the greateſt effect poſſible, it ought to be loaded with no more than $\frac{4}{9}$ of the weight, which is juſt able to ſuſtain the efforts of the ſtream. See Mac Laurin's Account of Sir Iſaac Newton's Diſcov. p. 171. and Fluxions, art. 908.

Again, ſuppoſe that a given weight P, (*fig.* 51.) deſcending by its gravity in the vertical line, raiſes a greater weight W, likewiſe given, by the rope P M W (that paſſes over the fixed pulley M) along the inclined plane B D, the height of which B A is given; and let it be required to find the poſition of this plane, along which W will be raiſed in the leaſt time, from the horizontal line A D to B. Let B C be the plane upon which if W was placed, it would be exactly ſuſtained by P; in which caſe, P is to W as A B to B C. But W is to the force with which it tends to deſcend along the plane B D, as B D to A B; conſequently the weight P is to that force, as B D to B C. Therefore the exceſs of P above that force (which exceſs is the power that accelererates the motion of P and W) is to P, as B D − B C to B D; or taking B H upon B C equal to B D, as C H to B D. But it is known that the ſpaces deſcribed by motions uniformly accelerated, are in the compound ratio of the forces which produce them and the ſquares of the times; or, that the ſquare of the time is directly as the ſpace deſcribed in that time, and inverſely as the force; conſequently, the ſquare of the time, in which B D is deſcribed by W, will be directly as B D, and inverſely as $\frac{CH}{BD}$, and will be leaſt when $\frac{BD^2}{CH}$ is a minimum; that is, when $\frac{BC^2}{CH} + CH + 2BC$, or (becauſe 2 BC is invariable) when $\frac{BC^2}{CH} + CH$, is a minimum.

Now as when the ſum of two quantities is given, their product is a maximum when they are equal to each other; ſo it is manifeſt, that, when their product is given, their ſum muſt be a minimum, when they are equal. Thus it is evident, that as in *fig.* 50. the rectangle or product of the equal parts A C and C D was equal to CE^2; ſo the rectangle of any two unequal parts, into which A D may be divided, is leſs than CE^2, and AD, is the leaſt ſum of any two quantities, the product of which is equal to CE^2. But the product of $\frac{BC^2}{CH}$ and C H is BC^2, and conſequently given: therefore the ſum of $\frac{BC^2}{CH}$ and C H is leaſt, when theſe parts are equal, that is, when C H is equal to B C, or B D equal to 2 B C. It appears, therefore, that when the power P and weight W are given, and W is to be raiſed by an inclined plane, from the level of a given point A to the given point B in the leaſt time poſſible; we are firſt to find the plane B C, upon which W would be ſuſtained by P, and to take the plane B D double in length of the plane B C; or we are to make uſe of the plane B D, upon which a weight that is double of W could be ſuſtained by the power P.

For another example, ſuppoſe a fluid, moving with the velocity and direction A C, (*fig.* 52.), ſtrikes the plane C E; and ſuppoſe that this plane moves parallel to itſelf in the direction C B, perpendicular to C A, or that it cannot move in any other direction. Then let it be required to find the moſt advantageous poſition of the plane C E, that it may receive the greateſt impulſe from the action of the fluid. Let A P be perpendicular to C E in P, draw A K parallel to C B, and let P K be perpendicular upon it in K, and A K will meaſure the force with which any particle of the fluid impels the plane E C, in the direction C B. For the force of any ſuch particle being repreſented by A C, let this force be reſolved into A Q parallel to E C, and A P perpendicular to it; and it is manifeſt, that the latter A P only has any effect upon the plane C E. Let this force A P be reſolved into the force A L perpendicular to C B, and the force A K parallel to it; then it is manifeſt, that the former, A L, has no effect in promoting the motion of the plane in the direction C B; ſo that the latter A K, only, meaſures the effort by which the particle promotes the motion of the plane C E in the direction C B. Let E M and E N be perpendicular to C A and C B, in M and N; and the number of particles, moving with directions parallel to A C, incident upon the plane C E, will be as E M. Therefore the effort of the fluid upon C E being as the force of each particle, and the number of particles together, it will be as $AK \times EM$; or, becauſe A K is to A P (= E M,) as E N to C E, as $\frac{EM \times EN}{CE}$; ſo that C E being given, the problem is reduced to this, to find when $EM \times EN$ is the greateſt poſſible or a maximum. But becauſe the ſum of EM^2 and of EN^2 (= CM^2) is given, being always equal to CE^2, it follows that $EN^2 \times EM^2$, is greateſt, when $EN^2 = \frac{1}{2} CE^2$; in the ſame manner as it was demonſtrated above, that when the ſum of A C and C B (*fig.* 50.) was given, $AC \times CB^2$ was greateſt, when $AC = \frac{1}{3} AB$. But when $EN^2 \times EM^2$ is greateſt, its ſquare root $EN \times EM^2$ is of neceſſity at the ſame time greateſt. Therefore the action of the fluid upon the plane C E, in the direction C B, is greateſt when $EN^2 = \frac{1}{2} CE^2$, and conſequently $EM^2 = \frac{1}{2} CE^2$; that is, when E M, the ſine of the angle A C E, in which the ſtream ſtrikes the plane, is to the radius, as the $\sqrt{2}$ to $\sqrt{3}$; in which caſe it eaſily appears, from the trigonometrical tables, that this angle is of 54° 44'.

Several uſeful problems in *mechanics* may be reſolved by what was ſhewn in the preceding paragraph. If we repreſent the velocity of the wind by A C, a ſection of the ſail of a wind-mill perpendicular to its length by C E, as it follows from the nature of the engine, that its axis ought to be turned directly towards the wind, and the ſail can only move in a direction perpendicular to the axis, it appears, that when the motion begins, the wind will have the greateſt effect to produce this motion, when the angle A C E, in which the wind ſtrikes the ſail, is of 54° 44'. In the ſame manner, if C B repreſent the direction of the motion of a ſhip, or the poſition of her keel, abſtracting from her lee-way, and A C be the direction of the wind, perpendicular to her way, then the moſt advantageous poſition of the ſail C E, to promote her motion in the direction C B, is when the angle A C E, in which the wind ſtrikes the ſail, is of 54° 44'. The beſt poſition of the rudder, where it may have the greateſt effect in turning round the ſhip, is determined in like manner. And the ſame angle enters likewiſe into the determination of the figure of the rhombuſes that form the baſes of the cells in which the bees depoſit their honey, in the moſt frugal manner. See HONEY-*Comb*. But it is to be carefully obſerved, that when the ſine of the

the angle A C E is to the radius as $\sqrt{2}$ to $\sqrt{3}$; or, which is the same thing, when its tangent is to the radius, as the diagonal of a square to its side; this is the most advantageous angle only at the beginning of the motion of the engine; so that the sails of a common wind-mill ought to be so situated, that the wind may indeed strike them in a greater angle than that of 54°. 44'. For it is demonstrable, that when any part of the engine has acquired the velocity v, the effort of the wind upon that part will be greatest, when the tangent of the angle in which the wind strikes it is to the radius, not as the $\sqrt{2}$ to 1, but $\sqrt{2 \times \frac{9cc}{4aa} \times \frac{3c}{2a}}$ to 1, the velocity of the wind being represented by a. If, for example, $c = \frac{1}{2}a$; then the tangent of the angle A C E ought to be double of the radius; that is, the angle A C E ought to be of 63° 26'. If $c = a$; then A C E ought to be of 74° 19'. This observation is of the more importance, because, in this engine, the velocity of the parts of the sail remote from the axis, bears a considerable proportion to the velocity of the wind, and perhaps sometimes is equal to it; and because a learned author, Mr. Daniel Bernoulli, has drawn an opposite conclusion from his computations in his Hydrodynamics, by mistaking a minimum for a maximum; where he infers, that the angle in which the wind strikes the sail, ought to decrease as the distance from the axis of motion increases; that if $c = a$, the wind ought to strike in an angle of 45°; and that if the sail be in one plane, it ought to be inclined to the wind, at a medium, in an angle of 50°. How he fell into these mistakes is shewn by Mr. Mac Laurin, in his Fluxions, § 914.

In like manner, though the angle A C E of 54° 44' be the most advantageous at the beginning of the motion, when a ship sails with a side wind; yet it ought to be enlarged afterwards as the motion increases. In general, let A a, (*fig.* 52.) parallel to C B, be to A C, as the velocity which the engine has already acquired in the direction C B, to that of the stream; upon A C produced take A D to A C as 4 to 3, draw D G parallel to C B, and let a circle described from the centre C with the radius C a, meet D G in g; and the plane C E shall be in the most advantageous situation for promoting the motion of the engine, when it bisects the angle a C g.

It is generally supposed, that a direct wind always promotes the motion of a ship, the sail being perpendicular to the wind, more than any side-wind; and this has been affirmed in several late ingenious treatises; but, to prevent mistakes, we are obliged to observe, that Mr. Mac Laurin has demonstrated the contrary, in his Treatise of Fluxions, § 919; where other instances of this second general problem in *mechanics* are given, to which we refer. See Mac Laurin's Account of Sir Isaac Newton's Philosophical Discoveries, book ii. chap. 3. p. 173.

MECHANICAL, something that relates to *mechanics*, or is regulated by the nature and laws of motion.

In which sense we say, *mechanical* powers, *mechanical* properties of affections, *mechanical* principles, reasoning, knowlege, &c.

MECHANICAL *affections* are such properties in matter, as result from their figure, bulk, and motion.

MECHANICAL *causes* are those founded on such affections.

MECHANICAL *force*. See FORCE.

MECHANICAL *solutions* are accounts of things on the same principles.

MECHANICAL *philosophy* is the same with what we otherwise call the *corpuscular philosophy*; *viz.* that which explains the phenomena of nature, and the operations of corporeal things, on the principles of *mechanics*; viz. the motion, gravity, figure, arrangement, disposition, greatness, or smallness of the parts which compose natural bodies. See CORPUSCULAR.

MECHANIC, or MECHANICAL *powers* (so called), are those machines which are used for raising greater weights, or overcoming greater resistances than could be effected by the natural strength without them; the power or strength being applied to one part of the machine, and another part of the machine applied to the weight or resistance.

The simple machines whereby power is gained, are six in number, viz. the LEVER, the *wheel and axle* or AXIS *in peritrochio*, the PULLEY (or rather system of pullies), the *inclined* PLANE, the WEDGE, and the SCREW. Of these, all sorts of mechanical engines do consist: and in treating of them, so as to settle their theory, we must consider them as mathematically exact, and moving without friction. Although these machines are treated of at large under their proper heads, it may not be amiss to give a short account of them all here.

1. A *lever* is an inflexible bar, turning upon a supporting prop as its center or motion, which must be firm enough to bear the lever and the weight with which it is charged. There are three kinds of levers, and in each of them the velocity of each *point* is directly as its distance from the prop.

A lever is said to be of the first kind when the prop is between the weight and the power. Here, the power and weight balance each other, when the power is in proportion to the weight as the distance of the weight from the prop is to the distance of the power from it, so that, if a weight be twenty pounds, and at one foot from the prop, a power of one pound at twenty feet from the prop will balance the weight, supposing the lever itself to have no weight. To this sort of lever may be reduced all iron crows, scissars, pluchers, candle-snuffers, and the like.

A lever is said to be of the second kind, when the weight is between the prop and the power. Here the lever and weight balance each other when the power is in proportion to the weight as the distance of the weight from the prop is to the distance of the power from it. Of this sort are doors turning on hinges, oars, and such knives as are fixed at the point.

A lever is said to be of the third kind when the power is between the weight and the prop. In this, the power and weight balance each other, when the power is in proportion to the weight, as the distance of the weight from the prop is to the distance of the power from it: but this lever is never used where power is wanted to be gained; for in it, the intensity of the power applied, must always exceed the intensity of the weight to be raised, or resistance to be overcome. Of this sort are the bones of our legs and arms, and the wheels of clocks and watches.

2. In the *wheel and axle*, where the power is applied to the wheel, and the weight drawn up by a rope winding round the axle, the velocity of the power is to the velocity of the weight, as the circumference of the wheel is to the circumference of the axle, and the advantage gained by the machine is in the same proportion: for the power and weight balance each other when the power is in proportion to the weight, as the circumference of the axle is to the circumference of the wheel. See *Tab. Mech. fig.* 7. This machine is the principal part of a common *crane*.

3. A *pulley*, that only turns on its axis, and does not rise with the weight, serves only to change the direction of the power; for it gives no mechanical advantage thereto. But when, besides the upper pullies, which turn round in a fixed frame, or block, there is a block of pullies moving equally fast with the weight, the velocity of the weight is to the velocity of the power as one is to twice the number of pullies in the moveable block: and the power and weight balance each other when the power is in proportion to the weight, as one is to twice the number of pullies in the moveable block.

4. An *inclined* PLANE is like one half of a wedge which has been cut in two equal parts lengthwise. A weight raised, or a resistance moved, by an inclined plane, moves only through a space equal to the height of that machine, in the time that the power drives it through a space equal to its whole length. Therefore, the velocity of the power is in proportion to the velocity of the weight, as the length of the machine is to its thickness or height at the back: and the power and weight balance each other when the power is in proportion to the weight, as the thickness of the plane is to its length. All edge tools, which are chamfered (or ground down only on one side to the edge) are inclined planes, as far as the chamfer goes from the edge.

5. A *wedge*, in the common form, is like two inclined planes, joined together at their bases; and the thickness of these planes (opposite their sharp edges) make the back of the wedge, to which the power of the sledge or hammer is applied in cleaving of wood.

When two equal resistances act perpendicularly against opposite sides of the wedge, and a power acts perpendicularly against the back of the wedge, the velocity of the power is in proportion to the velocity of the resistance, on either side, as the length of the side is to half the thickness of the back: and the power balances the resistance of the wood, when the power is in proportion to the resistance, as half the thickness of the back of the wedge is to the length of either of its sides, if the sharp edge goes to the bottom of the cleft in the wood. But when the wood splits before the wedge, as it generally does, the power balances the resistance, when the former is to the latter as half the thickness of the wedge (when it is driven quite into the wood) is to the whole length of the cleft below the back of the wedge.

6. The *screw* may be considered as if it were an inclined plane, wrapt round a cylinder. In this machine, the power must turn the cylinder quite round, in the time that the weight or resistance (as in a common press) moves through a space equal to the distance between the threads or spirals of the screw. Therefore, the velocity

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of the power is in proportion to the velocity of the weight or refiſtance, as the circumference of a circle, deſcribed by the power, is to the diſtance between the ſpirals of the ſcrew: and the power and reſiſtance balance each other, when the former is to the latter as the diſtance between the ſpirals is to the circumference of the circle deſcribed by the power. This machine, beſides the advantage peculiar to itſelf, has generally the benefit of the wheel and axle, on account of the winch or lever by which it is turned.

Of theſe ſix ſimple machines, all the moſt compound engines in the world are made. As the ſcrew includes the inclined plane, and two equally inclined planes make the wedge, we have all the mechanical powers combined together in a common *jack*, if it be turned by the fly; for then we have alſo the lever, the wheel and axle, and the pullies.

Thus, in a frame A B C D, *Tab.* IV. *Mechanics*, *fig.* 53. faſtened by the nut O upon the ſtand O O, and held together by the pillars V W and B *q*, is adapted firſt the piece E F, whoſe fans or flies may be put in motion by the wind, or drawn by a hair faſtened at F, which repreſents the lever and balance: at right angles to this piece is joined the perpendicular ſpindle G H having upon it the endleſs ſcrew H, which may be alſo conſidered as a wedge. This endleſs ſcrew or worm takes the ſkew teeth of the wheel K, which is the axis in peritrochio, and, in turning round, winds up the ſtring L M upon its axis, which paſſing round the pullies at M and N, or drawing by a tackle of five, raiſes the weight P. But as the ſcrew has no progreſſive motion on its axis, it cannot here be ſaid to comprehend the inclined plane; therefore, in order to make this machine take in all the *mechanical* powers, we may add the inclined plane, *r q* Q R, by making it reſt on the ground at Q R, and on the pillar *q* B, at *q r*, and thereby the force of the power drawing at F, will be farther increaſed in the proportion of Q T to T S. The whole force gained by this machine is found by comparing the ſpace gone through by the point F, with the height through which the weight is raiſed, in any determinate number of revolutions of F. A hundred pounds weight at P will be eaſily raiſed by the hair of a man's head drawing at F.

If an engine conſtructed in this manner be uſed for raiſing a weight, by means of a power applied to the fly, the power will balance the weight, if it be in proportion to the weight as the velocity of the weight is to the velocity of the fly. Now, conſidering how faſt the fly moves with reſpect to the motion of the weight, it is evident, that a crane, conſtructed in the manner of a common jack, would be an engine of very great power. But then the time loſt in raiſing the weight would alſo be very great: for, in any machine or engine whatever, the time loſt in working it will be as great as the power gained by it.

If machines or engines could be made without friction, the leaſt degree of power added to that which balances the weight, would be ſufficient to raiſe it. In the lever, the friction is next to nothing; in the wheel and axle it is but ſmall; in the pullies it is very conſiderable; and in the inclined plane, wedge, and ſcrew, it is very great. The univerſal law or principle in all *mechanical* machines or engines, made to gain power, is, that the power gained will be always as great as the velocity of the power exceeds the velocity of the weight or reſiſtance: and, upon this principle, it is eaſy to compute the power, force, or advantage, of any ſimple machine or compound engine, whatever.

E. gr. If the body A (*Tab. Mechanics*, *fig.* 6.) be triple the body B, and each of them be ſo fixed to the extremities of a lever A B, whoſe fulcrum, or fixed point is C, as that the diſtance of B C be triple the diſtance C A; the lever cannot be inclined on either ſide, but the ſpace B E, paſſed over by the leſs body, will be triple the ſpace A D, paſſed over by the great one. So that their motions or moments will be equal, and the two bodies in equilibrio.

Hence that noble challenge of Archimedes, *date ubi conſtem, totum ſpecies movere*; for as the diſtance C B may be increaſed infinitely, the power or moment of A may be increaſed infinitely. So that the whole of *mechanics* is reduced to the following problem.

Any body, as A, with its velocity C, *and alſo any other body, as* B, *being given; to find the velocity neceſſary to make the moment, or quantity of motion, in* B, *equal to the moment of* A, *the given body.* Here, ſince the moment of any body is equal to the rectangle under the velocity, and the quantity of matter; as B : A :: C : to a fourth term, which will be , the celerity proper to B, to make its moment equal to that of A. Wherefore in any machine or engine, if the velocity of the power be made to the velocity of the weight, reciprocally as the weight is to the power; ſuch power will always ſuſtain, or, if the power be a little increaſed, it will move the weight.

Let, for inſtance, A B be a lever, whoſe fulcrum is at C, and let it be moved into the poſition *a* C *b*. Here, the velocity of any point in the lever is as the diſtance from the centre. For let the point A deſcribe the arch A *a*, and the point B the arch B *b*; then theſe arches will be the ſpaces deſcribed by the two motions: but ſince the motions are both made in the ſame time, the ſpaces will be as the velocities. But it is plain, the arches A *a* and B *b* will be to one another, as their radii A C and C B, becauſe the ſectors A C *a*, and B C *b*, are ſimilar: wherefore the velocities of the points A and B are as their diſtances from the centre C.

Now, if any powers be applied to the ends of the lever A and B, in order to raiſe its arms up and down; their force will be expounded by the perpendiculars S *a*, and *b* N; which, being as the right lines of the former arches, *a* A and *b* B, will be to one another alſo as the radii A C and C B; wherefore the velocities of the powers are alſo as their diſtances from the centre. And ſince the moment of any body is as its weight, or gravitating force, and its velocity, conjunctly; if different powers or weights be applied to the lever, their moments will always be as the weights and the diſtances from the centre conjunctly. Wherefore, if to the ſame lever there be two powers or weights applied reciprocally proportional to their diſtances from the centre, their moments will be equal; and if they act contrarily, as in the caſe of a ſteelyard, the lever will remain in an horizontal poſition, or the balance will be in equilibrio. And thus it is eaſy to conceive how the weight of one pound may be made to equibalance a thouſand, &c.

Hence alſo it is plain, that the force of the power is not at all increaſed by engines; only the velocity of the weight in either lifting or drawing is ſo diminiſhed by the application of the inſtrument, as that the moment of the weight is not greater than the force of the power. Thus, for inſtance; if any force can raiſe a pound weight with a given velocity, it is impoſſible by any engine to effect, that the ſame power ſhall raiſe two pound weight with the ſame velocity: but by an engine it may be made to raiſe two pound weight, with half the velocity; or 1000 times the weight with $\frac{1}{1000}$th of the former velocity.

We ſhall here introduce into one view, an account of the principal methods that have occurred to us of explaining and demonſtrating the fundamental property of the ſeveral *mechanical* powers. It has been already obſerved, that, with regard to the lever, when any two forces act againſt each other on its arms, they will continue in equilibrio, if their quantities are inverſely as the diſtances between the points to which they are applied, and the point or fulcrum round which the lever turns. The demonſtration commonly aſcribed to Archimedes, is founded upon this principle, that when any cylindric or priſmatic body is applied upon a lever, it has the ſame effect as if its whole weight was united and applied at the middle point of its axis. Let A B, *Tab.* IV. *Mechanics*, *fig.* 54. be a cylinder, of an uniform texture, C its middle point; and it is manifeſt, that if the point C be ſupported, the equal halves of the cylinder, C A and C B, will balance each other about the point C, and the body will remain in equilibrio. Let the cylinder A B be diſtinguiſhed into any unequal parts, A D and D B; biſect A D in E, and D B in F; then a power applied at E, equal to the weight of the part A D, with a contrary direction, will ſuſtain it; and a power applied at F, equal to the weight of the part D B, with a contrary direction, will ſuſtain that part; ſo that theſe two powers acting at E and F, reſpectively equal to the weights of A D and D B, have preciſely the ſame effect as a prop at C, ſuſtaining the whole cylinder A B, and may be conſidered as in equilibrio with a power, acting at C, equal to the whole weight of the cylinder. But the diſtance C E = C A — A E = ½ A B — ½ A D = ½ D B; and, in like manner, the diſtance C F = C B — B F = ½ A B — ½ D B = ½ A D; conſequently C E is to C F as D B to A D; that is, as the power applied at F to the power applied at E, theſe being in equilibrio with the weight of the whole cylinder applied at C. From which it appears, that powers applied at E and F, which are to each other in the proportion of C F to C E, ſuſtain one another about the centre C.

It has been objected by M. Huygens, and others, to this demonſtration of Archimedes, that, when the whole cylinder is diſtinguiſhed into two ſegments, part of the weight of the greater ſegment acts on the ſame ſide of the fulcrum with the leſſer ſegment; and, therefore, when the whole weight of the greater ſegment is contracted into its middle point on one ſide of the fulcrum, and acts altogether againſt the leſſer ſegment, it requires ſome proof to ſhew, that this contracted weight will be

balanced by the weight of the leſſer ſegment. M. Huygens propoſed a method of his own, depending on a poſtulatum aſſumed in common with Archimedes, and needing demonſtration, viz. that when equal bodies are placed on the arms of a lever, the one which is fartheſt from the fulcrum will prevail and raiſe the other up.

Sir Iſaac Newton demonſtrates the fundamental propoſition concerning the lever, from the reſolution of motion: let C, *fig.* 55. be the centre of motion in the lever K L; let A and B be any two powers applied to it at K and L, acting in the directions K A and L B. From the centre of motion C, let C M and C N be perpendicular to thoſe directions in M and N; ſuppoſe C M to be leſs than C N, and from the centre C, at the diſtance C N, deſcribe the circle N H D, meeting K A in D. Let the power A be repreſented by D A, and let it be reſolved into the power D G acting in the direction C D, and the power D F perpendicular to C D, by completing the parallelogram A F D G. The power D G, acting in the direction C D from the centre of the circle, or wheel, D H N towards its circumference, has no effect in turning it round the centre, from D towards H, and tends only to carry it off from that centre. It is the part D F only that endeavours to move the wheel from D towards H and N, and is totally employed in this effort. The power B may be conceived to be applied at N as well as at L, and to be wholly employed in endeavouring to turn the wheel the contrary way, from N towards H and D. If therefore the power B be equal to that part of A which is repreſented by D F, their efforts, being equal and oppoſite, muſt deſtroy each other's effects; that is, when the power B is to the power A, as D F to D A, or (becauſe of the ſimilarity of the triangles A F D, D M C) as C M to C D or as C M to C N, then the powers muſt be in equilibrio; and thoſe powers always ſuſtain each other that are in the inverſe proportion of the diſtances of their directions from the centre of motion; or, when the product of the one power multiplied by the diſtance of its direction from the centre, is equal to the product of the power on the other ſide multiplied by the like diſtance from it.

Mr. Maclaurin propoſes a new method of demonſtrating the law of equilibrium in the lever, which ſeems, he ſays, to be founded on the plaineſt and moſt evident principles: theſe principles are the following, viz. that if equal powers act at equal diſtances on different ſides of the fulcrum or centre of motion, with directions oppoſite and parallel to each other, they will have the ſame effect: and that, if gravity be ſuppoſed to act in parallel lines, and the fulcrum be between the bodies, whoſe powers are eſtimated, it muſt bear the ſum of their weights; becauſe the lever being loaded with thoſe weights, it muſt give way if the fulcrum does not ſuſtain their ſum: but if the powers are on the ſame ſide of the fulcrum, in which caſe one of them muſt pull upwards whilſt the other pulls downwards, that there may be an equilibrium, it is then only loaded with the difference of the powers.

Suppoſing, therefore, firſt, two equal powers, A and B, *fig.* 56. acting in the directions A F, B H, to carry a body C, upon the lever A B, placed at C at equal diſtances from them; it is evident, that, in this caſe, each of the powers A and B ſuſtains one half of the weight C, by dividing it equally between them. Imagine now that the power A is taken away, and that inſtead of reſting upon it, the end A of the lever reſts upon a prop at A; it is manifeſt that the power B, and the prop at A, ſuſtain, as before, each one half of the weight C; the prop now acting, in every reſpect, as the power at A before; and, the equilibrium continuing, it appears, that in this caſe, a power B equal to one half of the weight C ſuſtains and balances it, when the diſtance of C from the prop A is one half of the diſtance of B from the ſame; that is, when B is to C, as C A to B A, or B × B A = C × C A. From this ſimple inſtance we ſee, that powers act upon a lever not by their abſolute force only, but that their effect neceſſarily depends upon the diſtance of the point where they act from the prop, or centre of motion; and particularly, that a power balances a double power which acts at half its diſtance from the prop, on the ſame ſide of it, with an oppoſite direction.

The caſe when the two powers act on different ſides of the prop, follows from this, by the principles already laid down. For let B H and C G (*fig.* 57.) repreſent the directions and forces with which the powers B and C act upon the lever; upon B A produced take A E equal to A C, or ½ A B, and in place of the power C G ſubſtitute an equal power E K at E, with an oppoſite direction; and, by the firſt of theſe principles, this power E K will have the ſame effect as C G, only the prop or centre of motion A will now ſuſtain the ſum of the forces E K and B H, by the ſecond of theſe principles. But the equilibrium between the powers B H and E K will continue as it was before, between B H and C G; ſo that the powers B H and E K will be in equilibrio, when the power B H is one half of E K, and the diſtance of E K from the prop A is one half of the diſtance of B H from the ſame; that is, when the power at B is to the power at E, as A E to A B, or B × B A = E × E A. In this caſe, the prop A being loaded with both the powers B and E which act with the ſame direction, its reaction muſt be equal to their ſum E K + B H = 3 B H, and muſt be in the oppoſite direction A F. In place of this reaction let us now (*fig.* 58.) ſubſtitute a power A F at A, equal to thrice B H; and in place of the power E K, let us ſubſtitute a prop at E, ſuſtaining that end of the lever B E; and ſince the equilibrium continues as before, it follows that the prop or centre of motion, being at E, the power B H ſuſtains the power A F which is triple of B H, when the diſtance of B H from the prop E is triple of the diſtance of the power A F from the ſame, that is, when B H × B E = A F × A E.

If we ſuppoſe the power E K to remain (*fig.* 59.) but the end B of the lever E B to reſt upon a prop, then the powers A F and E K will ſuſtain and balance each other, the prop at B now coming in place of the power B H; in which, A F = 3 B H, and E K = 1 B H; ſo that A F is to E K as 3 to 1; and the diſtances E B and A B being in the ſame proportion, it appears that when two powers in the proportion of 3 to 1 act upon a lever on the ſame ſide of the prop, or centre of motion, with oppoſite directions, at diſtances in the proportion of 2 to 3, they then ſuſtain each other. We have demonſtrated therefore, that when the powers are in the proportion either of 2 to 1, or of 3 to 1, or of 3 to 2, and the diſtances of their application from the centre of motion are in the inverſe proportion, then thoſe powers balance each other, or are in equilibrio.

Upon B E produced (*fig.* 60.) take E L = E A; and in place of the power A F ſubſtitute a power L M = A F, but with a contrary direction; this power L M will have the ſame effect to turn the lever round the centre of motion E as A F had; conſequently it will be in equilibrio with the power B H, as A F was. Therefore when two powers L M and B H in the proportion of 3 to 1, act upon a lever with the ſame direction, they are in equilibrio, if their diſtances from the centre of motion L E and E B be in the ratio of 1 to 3; that is, when L M × L E = B H × B E. In this caſe, the powers L M and B H acting with the ſame direction, the prop E muſt ſuſtain their ſum L M + B H = 4 B H, by the ſecond principle above premiſed. Therefore a power at L as 3, and a power acting at B with the ſame direction as 1, are ſuſtained by a power acting at E, with a contrary direction, as 4. From which it follows, by ſubſtituting in the place of the power L M a prop at L, that a power at B as 1 ſuſtains a power at E as 4, acting with a contrary direction, when B L is to E L as 4 to 1; that is, when the powers are inverſely as their diſtances from the prop, or centre of motion. By ſubſtituting the prop at B in the place of the power B H, it appears that a power L M at L, as 3, ſuſtains a power, acting with an oppoſite direction, at E, as 4, when their diſtances L B and E B from the prop B, are to each other as 4 to 3, or when L M × L B = E K × E B. By taking upon L B produced B *e* = B E, (*fig.* 61.) and in place of the power at E, ſubſtituting an equal power at *e* with a contrary direction, it appears, that a power at L as 3 ſuſtains a power acting at *e*, with the ſame direction, as 4, when the diſtance L B is to the diſtance *e* B, as 4 to 7. In this caſe, the prop at B ſuſtains the ſum of the powers acting at L and *e*, that is, a power equal to ſeven times B H. From which it follows, by ſubſtituting a prop at L, or *r*, in place of the powers that act there, that a power at *r* as 3 ſuſtains a power at B as 7, about the centre of motion L, when their diſtances from it *r* L, B L are to each other as 7 to 4: and that a power at L as 3 ſuſtains the power at B as 7, about the centre of motion *r*, when their diſtances from it, L *r* and B *r*, are to each other as 7 to 3.

By proceeding in this manner it appears, that when two powers are to each other as number to number, and when their diſtances from the centre of motion are in the inverſe ratio of the ſame numbers, then the powers ſuſtain each other, or are in equilibrio. From which it is eaſy to ſhew, in general, that when the powers are to each other in any ratio, though incommenſurable, and the diſtances of their application from the centre of motion in the ſame inverſe ratio, then they are in equilibrio; becauſe the ratio of incommenſurable quantities may be always limited to any degree of exactneſs at pleaſure between a greater and a leſſer ratio of number to number. To Mr. Maclaurin's demonſtration it has been objected, that it cannot be applied when the arms of

the lever are incommensurable, and as it cannot conclude generally, it muſt, therefore, be imperfect. Dr. Hamilton, having obſerved that theſe ſeveral methods of demonſtrating the fundamental property of the lever are liable to objections, propoſes a new proof, depending on the following poſtulatum, viz. If a force be uniformly diffuſed over a right line, ſo that an equal part of the force acts upon every point of the line, and if the whole force acts according to one and the ſame plane, this force will be ſuſtained, and the line kept in equilibrio, by a ſingle force applied to the middle point of the line equal to the diffuſed force, and acting in a contrary direction. He alſo premiſes this lemma; if a right line be divided into two ſegments, the diſtances between the middle of the whole line and the middle points of the ſegments, will be inverſely as the ſegments. This is ſelf-evident when the ſegments are equal; and, when they are unequal, ſince half of the whole line is equal to half of the greater and half of the leſſer ſegment, it is plain, that the diſtance between the middle of the whole line and the middle of one ſegment, muſt be equal to half of the other ſegment, ſo that theſe diſtances muſt be to each other inverſely as the ſegments.

Let the line G H, then, *fig.* 62. whoſe middle point is D, be divided into the unequal ſegments G L and L H, whoſe middle points are C and F, and let two forces or weights, A and B, which are to each other as the ſegments G L and L H, be applied to their middle points C and F, and let them act perpendicularly on the line G H: then (by the lemma) the weights A and B will be to each other inverſely as C D and F D (the diſtances of the points C and F, to which they are applied from the middle of the whole line); if then a third force or weight E, equal to the ſum of the forces A and B, be applied to the point D, and acts on the line in an oppoſite direction; I ſay theſe three forces will ſuſtain each other, and keep the line in equilibrio. For let us ſuppoſe the force E to be removed and inſtead of it another force, equal alſo to the ſum of A and B, to be uniformly diffuſed over the whole line G H, and to act directly againſt the forces A and B, then the part of this force which acts on the ſegment G L, will be equal to the force A, and therefore will be ſuſtained by it (poſtulatum); and the other part, which is diffuſed over the ſegment L H, will be equal to and ſuſtained by the force B, ſo that the forces A and B will ſuſtain this diffuſed force and keep the line in equilibrio. Let now two other forces act alſo on this line in oppoſite directions, one of them the force E acting on the point D, as it was firſt ſuppoſed to do, and the other an uniformly diffuſed force equal to E (and conſequently equal to the other diffuſed force), then theſe two additional forces will alſo balance each other, and therefore the equilibrium will ſtill remain. So that the two forces A and B, and a diffuſed force acting on one ſide of the line ſuſtain the force E, and a diffuſed force acting on the other ſide: but it is manifeſt, that in this equilibrium, the two diffuſed forces acting on oppoſite ſides are perfectly equivalent, and therefore if they are taken away from both ſides, the equilibrium muſt ſtill remain. Hence it appears that the three weights or forces A, B and E, any two of which are (by the conſtruction) to each other inverſely as their diſtances from the third, will ſuſtain each other and keep the line on which they act in equilibrio; which is the firſt and moſt ſimple caſe of the property of the lever: for here the directions of the weights are ſuppoſed to be perpendicular to the line on which they act, and it is evident that, if one of the points C, D, or F be fixed or conſidered as a fulcrum, the weights acting on the other two points will continue to ſupport each other. The ſecond caſe of the property of the lever is eaſily deduced from the firſt; for when two weights act on the arms of a lever in oblique directions, and are to each other inverſely as the perpendicular diſtances of the lines of direction from the centre of motion, then, by the reſolution of forces, it is eaſily proved that the parts of thoſe forces which act perpendicularly on the arms of the lever, and which only are exerted to turn the lever, are to each other inverſely as the lengths of thoſe arms; and therefore by the firſt caſe they muſt balance each other.

From what has been above demonſtrated, it appears, that the power with which any two forces move or endeavour to move the arms of a lever, are as the rectangles, under lines proportional to the forces, and the perpendicular diſtances of their lines of direction from the fulcrum: and alſo that when two bodies acting on the arms of a lever ſuſtain each other, if one of them be removed farther from the fulcrum, it will preponderate; but if it be brought nearer to the fulcrum, the other weight will prevail: becauſe the product to which its force is proportional will be increaſed in the firſt caſe, and diminiſhed in the ſecond.

When a weight is to be raiſed by means of an axle and wheel, it is faſtened to a chord that goes round the axle, and the power, which is to raiſe it, is hung to a chord that goes round the wheel. If then the power be to the weight as the radius of the axle to the radius of the wheel, it will juſt ſupport that weight; as will eaſily appear from what was proved of the lever. For the axle and wheel may be conſidered as a lever, whoſe fulcrum is a line paſſing through the centre of the wheel and middle of the axle, and whoſe long and ſhort arms are the radii of the wheel and axle which are parallel to the horizon, and from whoſe extremities the chords hang perpendicularly. And thus an axle and wheel may be looked upon as a kind of perpetual lever, on whoſe arms the power and weight always act perpendicularly, though the lever turns round its fulcrum. And in like manner when wheels and axles move each other by means of teeth on their peripheries, ſuch a machine is really a perpetual compound lever: and by conſidering it as ſuch, we may compute the proportion of any power to the weight it is able to ſuſtain by the help of ſuch an engine. And ſince the radii of two contiguous wheels, whoſe teeth are applied to each other, are as the number of teeth in each, or inverſely as the number of revolutions, which they make in the ſame time: we may, in the computation, inſtead of the ratio of theſe radii, put the ratio of the number of teeth on each wheel; or the inverſe ratio of the number of revolutions they make in the ſame time.

The moſt natural method of explaining the effects of the pulley, that is, of computing the proportion of any power to the weight it can ſuſtain by means of any ſyſtem of pullies is, by conſidering that every moveable pulley hangs by two ropes equally ſtretched, which muſt bear equal parts of the weight; and therefore when one and the ſame rope goes round ſeveral fixed and moveable pullies, ſince all its parts on each ſide of the pullies are equally ſtretched, the whole weight muſt be divided equally amongſt all the ropes by which the moveable pullies hang. And conſequently if the power which acts on one rope be equal to the weight divided by the number of ropes, or double the number of moveable pullies, that power muſt ſuſtain the weight.

The ſeveral caſes in which the wedge is applied may be comprehended in one general propoſition; let the equicrural triangle A B C, *fig.* 63. repreſent a wedge, the lines A B and C B will be the ſides of the wedge, A C its baſe or back, and its height will be the line P B biſecting the baſe A C and alſo the vertical angle A B C. When any two reſiſting forces act on the ſides of a wedge in directions which make equal angles with the ſides (as they are always ſuppoſed to do), a power acting perpendicularly at P on the baſe of the wedge will keep the reſiſting forces in equilibrio, when it is to the ſum of theſe forces, as the ſine of half the vertical angle of the wedge, to the ſine of the angle which the directions of the forces contain with the ſides of the wedge.

For let E and F be two bodies acting on the ſides of the wedge, and let them be firſt ſuppoſed to act in the directions E P and F P perpendicular to the ſides; then ſince the power P acts perpendicularly on the baſe A C, if theſe three forces keep the wedge in equilibrio, they will be to each other as the ſides of a triangle to which their directions are parallel, or (which is the ſame thing) as the ſides of the triangle A B C to which their directions are perpendicular. Therefore the power P is to the ſum of the reſiſting forces which it ſuſtains as A C the baſe of the wedge to the ſum of the ſides, or as P A, half the baſe, to A B one of the ſides; but P A is to A B as the ſine of P B A, half the vertical angle of the wedge, to the radius which is the ſine of a right angle, and the directions of the reſiſting forces are ſuppoſed in this caſe to contain a right angle with the ſides of the wedge.

Let now the reſiſting bodies E and F be ſuppoſed to act on the wedge in directions parallel to the lines D P and O P, which make oblique angles with its ſides, draw E G and F K perpendicular to thoſe lines. From what has been proved it appears that the power P is to the force with which it is able, by means of the wedge, to protrude the reſiſting bodies in the directions P E and P F, as the ſine of half the vertical angle to the radius, let this protruding force be expreſſed by the line P E, and let it be reſolved into two forces expreſſed by the lines P G and G E, the former of theſe only will act in oppoſition to the reſiſting bodies, therefore the whole protruding force of the power P to the force with which it acts againſt the reſiſting bodies E and F in the directions P D and P O as P E to P G, or (becauſe the triangles E P G and D P E are ſimilar) as P D to P E, that is as the radius to the ſine of the angle P D E; compounding therefore the ratio of the ſine of half the vertical angle to the radius, with the ratio of the radius to the ſine of the angle P D E, the power P, when the wedge is kept in equilibrio, will be to the force with which it protrudes the reſiſting bodies in directions oppoſite to thoſe in which they act, as the ſine of

half

half the vertical angle to the line of the angle PDE or POF, which the directions of the reſiſting forces conſiſt with the ſides of the wedge.

Hence, when the directions in which reſiſting bodies act on a wedge are given, we may eaſily find two lines that will expreſs the proportion between the reſiſtance and the power which ſuſtains it by means of the wedge. For from P, the middle point of the wedge, draw the line PD meeting one of the ſides, and parallel to the direction in which the reſiſting force acts on that ſide, then the power will be to the reſiſtance as PD to PB the height of the wedge. For PD and PB are to each other as the lines of the oppoſite angles, in the triangle PBD, that is as the lines of half the vertical angle, and the angle which the direction of the reſiſting force contains with the ſide of the wedge.

From what has been demonſtrated we may deduce the proportion of the power to the reſiſtance it is able to ſuſtain in all the caſes in which the wedge is applied. Firſt, when in cleaving timber the wedge fills the cleft, then the reſiſtance of the timber acts perpendicularly on the ſides of the wedge, therefore in this caſe, when the power which drives the wedge, is to the cohæſive force of the timber as half the baſe to one ſide of the wedge, the power and reſiſtance will be in equilibrio.

Secondly, when the wedge does not exactly fill the cleft, which generally happens becauſe the wood ſplits to ſome diſtance before the wedge: let ELF repreſent a cleft into which the wedge ABC is partly driven; as the reſiſting force of the timber muſt act on the wedge in directions perpendicular to the ſides of the cleft, draw the line PD in a direction perpendicular to EL the ſide of the cleft and meeting the ſide of the wedge in D; then the power driving the wedge and the reſiſtance of the timber, when they balance, will be to each other as the line PD to PB the height of the wedge.

Thirdly, when a wedge is employed to ſeparate two bodies that lie together on a horizontal plane, for inſtance two blocks of ſtone; as theſe bodies muſt recede from each other in horizontal directions, their reſiſtance muſt act on the wedge in lines parallel to its baſe CA; therefore the power which drives the wedge will balance the reſiſtance when they are to each other as PA half the breadth of the wedge to PB its height; and then any additional force ſufficient to overcome the reſiſtance ariſing from the friction of the bodies on the horizontal plane will ſeparate them from each other.

With reſpect to the inclined plane; let the line AB, *fig.* 64. repreſent the length of an inclined plane, AD its height, and the line BD we may call its baſe. Let the circular body GEF be ſuppoſed to reſt on the inclined plane, and to be kept from falling down it by a ſtring CS tied to its centre C. Then the force with which this body ſtretches the ſtring will be to its whole weight as the line of ABD, the angle of elevation, to the line of the angle which the ſtring contains with a line perpendicular to AB, the length of the plane. For let the radius CE be drawn perpendicular to the horizon, and CF perpendicular to AB, and from E draw EO parallel to the ſtring and meeting CF in O: then, as the body continues at reſt, and is urged by three forces, to wit, by its weight in the direction CE, by the reaction of the plane in the direction FC, and by the reaction of the ſtring in the direction EO; the reaction of the ſtring, or the force by which it is ſtretched, is to the weight of the body as EO to CE: that is, as the line of (the angle ECO, which is equal to) ABD, the angle of elevation, to the line of the angle EOC, equal to SCO, the angle which the ſtring contains with the line CF perpendicular to AB, the length of the plane.

When therefore the ſtring is parallel to the length of the plane, the force with which it is ſtretched, or with which the body tends down the inclined plane, is to its whole weight, as the line of the angle of elevation, to the radius, or as the height of the plane to the length. And in the ſame manner it may be ſhewn, that when the ſtring is parallel to BD, the baſe of the plane, the force with which it is ſtretched is to the weight of the body as AD to BD, that is, as the height of the plane to its baſe. If we ſuppoſe the ſtring, which ſupports the body GEF, to be faſtened at S, and that a force, by acting on the line AD, the height of the plane, in a direction parallel to the baſe BD, drives the inclined plane under the body, and by that means makes it riſe to a direction parallel to AD: then, from what was proved in the third caſe of the wedge, it will appear, that this force muſt be to the weight of the body, as AD to BD, or rather in a proportion ſomewhat greater; if it makes the plane move on and the body riſe.

From this laſt obſervation we may clearly ſhew the nature and force of the ſcrew; a machine of great efficacy in raiſing weights, or in preſſing bodies cloſely together.

For if the triangle ABD be turned round a cylinder whoſe periphery is equal to BD, then the length of the inclined plane BA will raiſe round the cylinder in a ſpiral manner, and form what is called the thread of the ſcrew, and we may ſuppoſe it continued in the ſame manner round the cylinder from one end to the other; and AD, the height of the inclined plane, will be every where the diſtance between two contiguous threads of this ſcrew, which is called a convex ſcrew. And a concave ſcrew may be formed to fit this exactly, if an inclined plane every way like the former be turned round the inſide of a hollow cylinder, whoſe periphery is ſomewhat larger than that of the other. Let us now ſuppoſe the concave ſcrew to be fixed, and the convex one to be fitted into it, and a weight to be laid on the top of the convex ſcrew; then, if a power be applied to the periphery of this convex ſcrew to turn it round, at every revolution the weight will be raiſed up through a ſpace equal to the diſtance between the two contiguous threads, that is to the line AD, the height of the inclined plane BA; therefore ſince this power, applied to the periphery, acts in a direction parallel to BD, it muſt be to the weight it raiſes as AD to BD, or as the diſtance between two contiguous threads, to the periphery of the convex ſcrew.

The diſtance between two contiguous threads is to be meaſured by a line parallel to the axis; if we now ſuppoſe that a hand-ſpike or handle is inſerted into the bottom of the convex ſcrew, and that the power which turns the ſcrew is applied to the extremity of this handle, which is generally the caſe; then as the power is removed farther from the axis of motion, its force will be ſo much increaſed, and therefore ſo much may the power itſelf be diminiſhed. So that the power, which, acting on the end of a handle, ſuſtains a weight by means of a ſcrew, will be to that weight, as the diſtance between two contiguous threads of the ſcrew to the periphery deſcribed by the end of the handle. In this caſe we may conſider the machine as compoſed of a ſcrew and a lever, or as Sir Iſaac Newton expreſſeth it, *Cuneus a vecte impellitur*. See Maclaurin's Account of Sir Iſaac Newton's Phil. Diſc. book ii. chap. 3. Hamilton's Phil. Eſſ. eſſ. 1. or Phil. Tranſ. liii. p. 116.

MECHANICAL is alſo applied to a kind of *reaſoning*, which of late has got great ground, both in phyſics and medicine; thus denominated, as being conformable to what is uſed in the contrivance, and accounting for the properties and operations of machines. See MEDICINE.

This manner of thinking and arguing, Dr. Quincy obſerves, is the reſult of rightly ſtudying the powers of an human mind, and the ways by which it is only fitted to get acquaintance with material beings: for conſidering an animal body as a compoſition out of the ſame matter from which all other bodies are formed, and to have all thoſe properties which concern a phyſician's regard, only by virtue of its peculiar make and conſtructure; it naturally leads a perſon to conſider the ſeveral parts, according to their figures, contexture, and uſe; either as wheels, pullies, wedges, levers, ſcrews, chords, canals, ciſterns, ſtrainers, or the like; and throughout the whole of ſuch enquiries, to keep the mind cloſe in view of the figures, magnitudes, and *mechanical* powers of every part or movement; juſt in the ſame manner, as is uſed in inquiring into the motions and properties of any other machine. For which purpoſe it is frequently found helpful to deſign, or picture out in diagrams, whatſoever is under conſideration, as it is cuſtomary in common geometrical demonſtrations.

The knowledge obtained by this procedure is called *mechanical knowledge*.

MECHANICAL is alſo uſed, in *Mathematics*, to ſignify a conſtruction or proof of ſome problem, not done in an accurate and geometrical manner, but coarſely and inartfully, or by the aſſiſtance of inſtruments; as are moſt problems relating to the duplicature of the cube, and the quadrature of the circle.

MECHANICAL *arts*. See ART.

MECHANICAL *curves*. See *Tranſcendental* CURVE.

MECHANISM *of the barometer*. See BAROMETER.

MECHANISM *of the double microſcope, &c.* See MICROSCOPE.

MECHOACAN, MECHOACANNA, called alſo *white jalap*, and *American ſcammony*, a medicine ſo taking its name from a province of Mexico, from which it is brought in thin tranſverſe ſlices, like JALAP, but larger and whiter. *Mechoacan* ſcarcely yields one fifth part ſo much reſin as jalap does. It is a ſpecies of bind-weed. See CONVOLVULUS.

Mechoacan was firſt introduced about the year 1571, and uſed as a purgative before jalap, though the latter is now in more general uſe, as being found more efficacious: but *mechoacan* is the milder and more gentle of the two,

on that account is preferable. The seat of its action is chiefly in the extreme parts; for which reason it is accounted good in arthritic pains. It has the advantage of needing no preparation, or corrective; and of purging in its own proper substance, as it grows.

It purges serous humours from all parts of the body; and helps the dropsy, jaundice, and rheumatism, working with gentleness, and without griping; and therefore it is fit for weakly tender constitutions; but by reason that a larger quantity must be given than most people are willing to take, it is grown very much out of use. The dose in substance is from one dram to two or more.

M. Boulduc found, by analysing it, that it contains twelve times as much salt as resin; but neither the saline nor resinous extract purge so freely as the substance, even though taken in larger doses; nor do they even purge so easily.

In the choice of *methonicum*, prefer those pieces which are the browneſt within, and whose substance is the closeſt, and most compact.

MECONIUM, Μηκώνιον, from μηκων, *poppy*, in *Pharmacy*, is the juice of the POPPY, drawn by incision, and dried.

Meconium differs from opium, in that this first oozes out spontaneously, after an incision made in the heads of the poppies, whereas the other is drawn by violence, both from the heads and leaves, and even from the whole plant, bruised and preſsed together.

The college of London directs the dried heads, cut and cleared from the seeds to be boiled in water, in the proportion of three pounds and a half to six gallons, and now and then stirred to prevent their burning, till only about one third part of the liquor remains, which will be almoſt entirely soaked up by the poppies: the decoction is to be strongly preſsed out, boiled down to about four pints, then strained whilſt hot, first through a sieve, and afterwards through a fine woollen cloth, and set by for a night to settle: to the liquor poured off clear six pounds of double refined sugar are to be added; and the mixture boiled till its weight comes to nine pounds or a little more, that it may become a syrup of a proper consistence.

An ounce of this syrup is reckoned equivalent to about a grain of opium. See DIACODIUM.

MECONIUM is also a black thick excrement, gathered in the intestines of a child during the time of gestation.

In colour and consistence it resembles pulp of cassia. It is also thought to resemble *meconium*, or juice of poppy; whence it takes its name. See INFANT.

MEDAL, MEDALIA, a small figure, or piece of metal, in form of a coin, destined to preserve to posterity the portrait of some great man, or the memory of some illustrious action.

Scaliger derives the word from the Arabic *methallia*, a coin whereon is impreſsed the figure of a human head. Menage and Vossius rather derive it from *metallum*. Du-Cange observes, that the obolus was anciently called *medalia quaſi medietas nummi*; as being half of another coin.

Medals may be distinguished by the metal of which they are made; which is commonly one of the three metals signified by the three A's, which, on several coins, are placed after the name of the mint-maſter, viz. gold, silver, and copper, or brass. There are also some *medals* compoſed of two different metals, not by melting them together, but either by plating over brass or iron with silver; a sort of false money, which had its rise in the triumvirate of Augustus; or by laying a rim of a different metal round the edge of a *medal*. Those of the latter sort are called by antiquaries *contorniate*, from the French *contour*, which signifies the outline that defines a figure. F. Hardouin allows these no higher antiquity than the thirteenth century; others date them from the fifth; and others make them as ancient as the time of Nero. *Medals* may again be distinguished by their different sizes. The size of the ancient *medals* is from three inches to one-fourth of an inch in diameter. Those of the larger size or volume are called MEDALLIONS. The others, which are very various, are ranked into three classes, viz. large, middle, and small; and the class is determined, not so much by the breadth and thickness of the *medal* itself, as by the size of the head that is stamped upon it. The shape of *medals* is rather roundish than perfectly round.

MEDAL, *the parts of a*, are the two sides; one whereof is called the *face*, or *head*, the other the *reverse*.

On each side is the area, or field, which makes the middle of a *medal*; the rim, or border; and the EXERGUM, which is beneath the ground whereon the figures represented are placed. On the two sides are distinguished the type, and the inscription or legend. The type or device, is the figure represented; the legend is the writing, especially that around the *medal*; though in the Greek *medals*, the inscription is frequently in the area. See LEGEND. What we find in the EXERGUM is frequently no more than some initial letters, whose meaning we are usually unacquainted with; though sometimes too they contain epochas, or words that may be accounted an inscription.

The exergue contains sometimes the date of the coin, expreſsing in what consulship of the emperor it was struck: as COS. III. upon the reverse of an Antoninus. Sometimes it signifies the place where it was struck, and to which the coin properly belonged, as S. M. AL. for *signa Moneta Alexandrina*, upon the reverse of a Licinius. Sometimes the name of a province, the reduction of which the *medal* is designed to celebrate; as Judæa in the reverse of a Vespasian. On the face of *medals* we have commonly the portrait of some great and illustrious person; usually, if not always, in profile. The consular *medals* have commonly the heads of some of their gods, or of their ancient kings, or of Rome, which is a manly face wearing a helmet. The heads of the Roman kings are generally dreſsed with a diadem; Julius Cæsar was the first among the Romans who struck his own head upon the coin, in which he was followed by all the succeeding emperors. The proper dreſs of the imperial head is a crown, commonly of laurel, the right of wearing which was decreed to Julius Cæsar by the senate, and afterwards continued to his succeſsors. Besides, there are several crowns found in *medals*, as the roſtral, mural, radiated, &c. The emperor Justinian was the first who used an arched crown, surmounted with a croſs; such as is wore by Christian kings at this day. Some heads of emperors are wholly naked, as those of Augustus, Nero, Galba, and some others. Though it is observed, that a naked head, struck in the imperial ages, is a sign that it is not the head of an emperor, but of one of his sons, or the presumptive heir of the empire. The heads of the gods are distinguished by their proper crown; as Ceres, by a crown of ears of corn; Flora, by a crown of flowers, &c. See CROWN. Heads are also distinguished, not only by their dreſs, but by certain symbols attending them; as the LITUUS, which is the symbol of the Pontifex Maximus. We have also on *medals* the heads of queens and other ladies of high rank; chiefly the wives of the emperors. Some *medals* are also charged with two heads, either set face to face, as the *medal* of Severus and the empreſs Donna, or back to back, as that of Julius Cæsar and Octavianus, afterwards Augustus, his adopted son and succeſsor: and some few are stamped with three heads or more on the face. The titles are also generally found upon the face of the *medal*. These are titles of honour, as Imperator, Cæsar, Augustus, given to all the Roman emperors after Octavianus; Dominus first assumed by Aurelian, and used by his succeſsors: other titles are ascribed to particular persons on account of their virtues, as Pius to Antoninus, assumed also by Commodus with the addition of Felix; Pater Patriæ, first bestowed on Cicero for discovering and defeating the conspiracy of Cataline, and afterwards assumed by the emperors; Justus, the title of Pisceninus; Beatissimus and Felicissimus, of Diocletian; Optimus and Clemens, decreed to Trajan by the senate; Maximus, assumed by Constantine; and Invictus, by Victorinus. Other titles are the names of offices; as cos. for consul, with a number annexed to it, signifying how many times the person had been thus elected: Tribunitia potestas, with the year of the tribuneship commonly expreſsed after the title, as TRIB. POT. X. or XVI. &c. The office of Pontifex maximus, expreſsed by P. M. was assumed by the emperors, and generally expreſsed among their titles from Augustus to Constantine, by whom it was refused; it was reassumed by Julian, and laid aside by Gratian. Julius Cæsar assumed the title of Dictator perpetuus; Claudius, that of Censor; and Domitian made himself Censor perpetuus.

Some authors imagine, that the ancient *medals* were used for money. M. Patin has a chapter expreſs to prove, that they had all a fixed regular price in payments, not excepting even the medallions. P. Joubert is of the same opinion. Others, on the contrary, maintain, that we have no real money of the ancients; and that the *medals* we now have, never had any course as coins. Between these two extremes there is a medium, which appears by much more reasonable than either of them. See MONEY.

MEDALS are divided into *ancient* and *modern*.

MEDALS *ancient*, are either of the higher or lower antiquity. The former class consists of such as were struck before the end of the third century: the latter, of such as were struck between the third and ninth centuries.

The *aruga* of ancient *medals* adds greatly to their value. It is sometimes found of a blue, sometimes of a crimson, and sometimes of a violet colour. It is said to be inimit-

able by art; for as to that produced by sal ammoniac and vinegar, it comes far behind it in beauty. The genuine kind insinuates itself into the finest strokes of the letters, &c. without effacing them, better than any enamel; it is only observed on brass coins: for as to those of silver, the *aruga* destroys them, and therefore is to be carefully scoured off with vinegar, or lemon juice. Joubert. Scient. des Medail. sect. 8. Act. Erud. Lipf. 1693. p. 226.

MEDALS, *modern*, are those struck within these few hundred years. See COIN.

Among the ancient *medals*, some are Greek, others Roman. These may be distinguished into two classes, viz. those of the state, and those of particular cities and colonies: for besides the money coined by the state, it appears that divers cities and colonies had the privilege of coining; where it is probable the chief magistrate was the mint-master. Hardouin has published a large catalogue of Grecian and Roman *medals*, of this sort, in a quarto volume, intitled, *Nummi antiqui Populorum et Urbium illustrati*. Vaillant has explained the devices and inscriptions of *medals*, in two volumes of the Latin colonies, in which he has also given cuts of the *medals* themselves. The *medals* belonging to cities were so numerous, that above two hundred may still be collected of the Greek cities only. The Greek *medals* are the most ancient. That people struck *medals* in all the three metals, with such exquisite art as the Romans could never come up to. The Greek *medals* have a design, accuracy, force, and a delicacy that expresses even the muscles and veins; and it must be owned goes infinitely beyond any thing of the Romans.

There are also Hebrew *medals*; and Punic, Gothic, and Arabic *medals*, which make new classes in the ancient and modern ones.

MEDALS, *consular*, are so called to distinguish them from the imperial; not that they were struck by order of the consuls, but because, in those times, the republic was governed by consuls. Of these, father Joubert reckons about fifty or sixty of gold; two hundred and fifty of copper; and near a thousand of silver. Goltzius has described them in a chronological order, according to the Fasti consulares; and Urſinus has disposed them genealogically, according to the order of the Roman families. M. Patin has collected an entire series of them, in the same order with Urſinus; and only computes one thousand thirty-seven consulars, which relate to one hundred seventy-eight Roman families. M. Vaillant, and M. Morel, each promised a new edition of the consular *medals*. M. Vaillant kept his word, and his book was printed before he died, in three volumes folio.

The consular *medals* are certainly the most ancient *medals* of the Romans, and yet those of copper and silver do not go beyond the four hundred eighty-fourth year of Rome; nor those of gold beyond the five hundred forty-sixth. If any are produced of an elder date, they are condemned as spurious.

MEDALS, *among the Imperial*, we distinguish between the *upper* and the *lower empire*: the upper empire commenced under Julius Cæsar, and ended about the year of Jesus Christ two hundred and sixty: the lower empire comprehends near one thousand two hundred years; viz. till the taking of Constantinople. It is the custom, however, to account all the imperial *medals*, till the time of the Paleologi, among the antique; and yet we have no imperial *medals*, of any considerable beauty, later than the time of Heraclius; who died in 641.

After the time of Phocas and Heraclius, Italy became a prey to the barbarians; so that the monuments we have remaining of those two emperors, finish the set, or series of imperial *medals*. To these are added the *medals* of the lower empire, and of the Greek emperors; whereof a series may be made as low as our times, taking in the modern ones. M. Patin has made an ample collection of the imperial *medals*, till the time of Heraclius.

The Gothic *medals* make part of the imperial ones: they are so called, as having been struck in the times of the Goths, and in the declension of the empire, and favouring of the ignorance and barbarity of the age.

As to modern *medals*, they are such as have been struck in Europe, since the usurpation of the Goths has been extinct, and sculpture and engraving have begun to re-flourish. The first was that of the famous reformer John Huſs, in 1415. If any pretend to be more ancient, they are spurious. In France, there were none struck with the king's effigy, before the reign of Charles VII.

The study of modern *medals* is so much the more useful, as they afford more light than the ancient, and mark the times and consequences of events more precisely; whereas the inscriptions of the ancient *medals* are very short and simple, and generally they are without any date. Add to this, that the ancient *medals* are extremely liable to be counterfeited, by reason of the considerable price they bear; but in the modern there is not that danger of being imposed upon.

There are few true Hebrew *medals*: those which we see of the heads of Moſes, and Jesus Christ, are spurious and modern. We have a few shekels of copper and silver with Hebrew or Samaritan legends, but none of gold; though there is mention made of one in the king of Denmark's cabinet. F. Souciet has a diſsertation on the Hebrew *medals*, commonly called *Samaritan medals*, where he diſtinguiſhes accurately between the genuine and the spurious; and shews, that they are true Hebrew coins, struck by the Jews, but on the model of the ancients; and that they were current before the Babyloniſh captivity.

MEDALS, *ſingular*, in the popular senſe, are such as are not found in the cabinets of the curious, and are only met with by chance; but in the ſtricter senſe, they are such whereof there is not above one of the kind extant. The Otho, in large copper, is a *ſingular medal*. When a *medal* exceeds the value of ten or twelve piſtoles, it is worth what the owner pleaſes. The Pescennius Niger, and Pertinax, are very rare in all metals. The Didius Juſianus is hardly found any where but in large copper. Carneros, a Dutchman, and some others, have made mills on purpoſe to ſtrike *medals* that never were; as those of Cicero, Virgil, Priam, &c.

MEDALS, *Greek*, are such as have either the heads of Greek emperors, or Greek inscriptions.

MEDALS, *falſe* or *ſpurious*, are those counterfeited, and put off for antique, when they are not.

MEDALS, *mutilated*, are those that are not entire, or are much defaced.

MEDALS, *reſtituti*, are those wherein we find the letters RESTIT. which ſhew that they have been reſtored by the emperors.

MEDALS, *dipt*, are ſtruck of pure copper, and afterwards silvered. This is a contrivance that the curious have frequent recourſe to, in order to complete their silver ſets.

MEDALS, *covered* or *plated*, are those which have only a thin ſilver leaf over the copper, but which are ſtruck ſo artfully, that the cheat does not appear without cutting them; these are the leaſt ſuſpected.

MEDALS, *grained* or *indented*, are those whoſe edges are cut, or notched, like teeth, which is a ſign of purity and antiquity. They are common among the consulars, but we have none later than Auguſtus. There are ſeveral of them, however, among those of the kings of Syria.

MEDALS, *counter-marked*, are those which have marks cut either on the ſide of the head, or of the reverſe. These countermarks ſerve to denote the change of their value; and this kind is much inquired for by the curious.

MEDALS, *caſt*, are those which are not ſtruck, but caſt in a mould.

MEDALS *without reverſe*. See REVERSE.

Medals have been ſtruck in three kinds of metals, which make three ſeveral ſets or series, in the cabinets of the curious. That of gold is the leaſt numerous, as not conſiſting of above one thouſand, or twelve hundred of the imperial; that of ſilver may contain about three thouſand imperial; and that of *brass* or copper, of the three ſeveral ſizes, viz. the great, the middle, or the ſmall, conſiſts of ſix or ſeven thouſand, all imperial.

It is not either the metal, or the ſize, which makes a *medal* valuable; but the ſcarcity of the head, or of the reverſe, or the legend. Some *medals* are common in gold, which yet are very rare in copper; and others very rare in ſilver, which in copper and gold are very common. The reverſe is ſometimes common, where the head is ſingular; and ſomeheads are common, whoſe reverſes are very ſcarce.

There are alſo *medals* very ſcarce in ſome ſets, and yet very common in others: for inſtance, there is no Annia in the ſets of large copper, and the middle copper is forced to ſupply its place. The Otho is very rare in all the copper ſets, and yet common in the ſilver ones. Othus, of the large copper, are held at an immenſe price; and thoſe of the middle copper at forty or fifty piſtoles. And the Gordians Afric are rated near as high. Singular *medals* are invaluable.

M. Vaillant has collected all the *medals* ſtruck by the Roman colonies; F. Hardouin thoſe of the Greek and Latin cities; F. Noris thoſe of Syria. M. Morel alſo undertook an univeral hiſtory of *medals*, and promiſed each of twenty-five thouſand. He ranges them under four claſſes; the firſt contains the *medals* of kings, cities, and people, which have neither the name nor image of the Roman emperors; the ſecond contains the conſular *medals*; the third the imperial *medals*; and the fourth, the Hebrew, Punic, Parthian, French, Spaniſh, Gothic, and Arabic. He begins with the imperial, and brings

them

them down as low as Heraclius: he places the Latin in order before the Greek.

Ad. Occo, a German phyſician, and count Mezzabarba, have endeavoured to range the *medals* in a chronological order; but that is impracticable: for in many of the imperial *medals* there is no mark, either of the conſulate, or of the year of the reign; and ſince Gallienus there are few of the Roman imperial *medals* that bear the leaſt footſteps of chronology.

The moſt noted *medalliſts*, or authors on *medals*, are Antonius Auguſtinus, Wolf. Lazius, Ful. Urſinus, a learned antiquary, Æneas Vicus, Hubert Goltzius, a famous graver, Orſelius, Seguin, Occo, Triſtan, Sirmond, Vaillant, Patin, Noris, Spanheim, Harduin, Morel, Joubert, Mezzabarba, Beger, &c.

There is an introduction to the Knowledge of *Medals*, by Dr. Jennings, publiſhed in 1764, which may be uſeful to convey a general acquaintance with the ſubject.

For the manner of ſtriking *medals*, ſee COINING.

MEDALS, *academy of*. See ACADEMY.

MEDAL, *repairing a*. See REPAIR.

MEDALS, *reſtitution of*. See RESTITUTION.

MEDALS, *votive*. See VOTIVE.

MEDALS, *impreſſion of*. A very eaſy and elegant way of taking impreſſions of *medals* and coins, not generally known, is this: melt a little iſinglaſs glue, made with brandy, and pour it thinly over the *medal*, ſo as to cover its whole ſurface; let it remain on for a day or two, till it is thoroughly dry and hardened, and then taking it off, it will be fine, clear, and hard as a piece of Muſcovy glaſs, and will have a very elegant impreſſion of the coin. Shaw's Lectures, p. 430.

Sulphur is ſometimes uſed to take off impreſſions of *medals*, coins, &c. The method is this: having made a ledge of clay about the work, whoſe impreſſion is deſired, and carefully oiled the whole, gently pour brimſtone melted in a covered veſſel, to prevent its firing, upon the metal. About the edge of this mould make a border of clay, as before, and lightly oil the internal ſurface of both; then gradually put into it, to the thickneſs of about a quarter of an inch, a mixture made up with calcined alabaſter and water, to the conſiſtence of ſtiff honey. This ſoon growing hard, may be taken out of the mould, and gives figures of the coin or *medal*.—Boyle's Works abr. vol. I. p. 151. A method ſomewhat different is deſcribed in the article BRIMSTONE.

The brittleneſs of ſulphur is a great objection to this method, and the plaiſter of Paris, which is often uſed for taking impreſſions, is too ſoft: however a coat or layer of thin metal, formed over the plaiſter, would be a conſiderable defence. This is the cheapeſt and moſt convenient metal for this purpoſe: let thin tin-foil, ſuch as is uſed for ſilvering looking-glaſſes, be laid over the *medal* or coin intended to be taken off, and then rubbed either with a brush, the point of a ſkewer or a pin, till it has received perfectly the impreſſion of the *medal*; then pare off the tin-foil round the edge of the *medal*, till it is brought to the ſame circumference; afterwards the *medal* muſt be reverſed, and the tin-foil will drop off into a chip-box or mould ready to receive it; the concave ſide of the foil, or that which is laid on the face of the *medal*, being uppermoſt; upon this pour plaiſter of Paris, made in the uſual manner, and when dry, the caſt figure may be taken out of the box or mold, with the tin-foil ſticking on the plaiſter, the convex ſide being now uppermoſt, in which poſition it is to be kept in the cabinet after it becomes dry. To have an impreſſion very perfect, the thinneſt tin-foil ſhould be made uſe of. The impreſſions taken in this manner almoſt equal ſilver *medals* in beauty, and are very durable. If the box or mould be rather larger than the impreſſion of tin-foil, the plaiſter, when poured on, runs round it edges, and forms a kind of white frame or circular border round the foil, whence the new made *medal* appears more neat and beautiful. If this tin-foil is gilt with gold-leaf, by means of thin iſinglaſs glue, the *medal* will reſemble gold.

We have an eaſy method of procuring the true impreſſion or figure of *medals* and coins, by Mr. Baker in the Philoſ. Tranſ. N° 472. ſect. 13. vol. xliii. p. 77.

Take a perfect and ſharp impreſſion in the fineſt black ſealing-wax, of the coin or *medal* you deſire. Cut away the wax round the edges of the impreſſion; then with a preparation of gum-water, of the colour you would have the picture, ſpread the paint upon the wax-impreſſion with a ſmall hair-pencil, obſerving to work it into all the ſinking or hollow places, theſe being the riſing parts of the *medal*; and the colouring muſt be carefully taken from the other parts with a wet finger. Then take a piece of very thin poſt-paper, a little larger than the *medal*, and moiſten it quite through. Place it on the wax-impreſſion, and on the back of the paper lay three or four pieces of thick woollen cloth or flannel, or about the ſame ſize. The impreſſion, with its coverings, ſhould be placed between two ſmooth iron-plates, about two inches ſquare, and one tenth of an inch thick. Theſe muſt be carefully put into a ſmall preſs, made of two plates of iron, about five inches and a half long, one inch and a half wide, and half an inch in thickneſs, having a couple of long male ſcrews running through them, with a turning female ſcrew on each, to force the plates together. Theſe being brought evenly together, by means of the ſcrews, will take off a true and fair picture of the *medal*; which, if any deficiencies ſhould appear, may eaſily be repaired with a fine pencil or pen, dipped in the colour made uſe of.

If a relievo only be deſired, nothing is neceſſary but to take a piece of card, or white paſte-board, well ſoaked in water, then placing it on the wax-mould, without any colouring, and let it remain in the preſs for a few minutes, a good figure will be obtained.

This method of taking off *medals*, &c. is convenient, and ſeems much more to than the ſeveral inventions uſually practiſed in ſulphur, plaiſter of *Paris*, paper, &c. wherein a mould muſt be formed, either of clay, horn, plaiſter, or other materials, which require time and trouble.

Some take impreſſions on paper from the *medals* themſelves, by paſſing them through the rolling-preſs, and colouring them afterwards; but this is not only more difficult, but does great injury to the *medals*, by impairing the ſharpneſs of their moſt delicate and expreſſive ſtrokes: whereas wax does not hurt the fineſt *medal* in the leaſt degree; and though a brittle ſubſtance, yet it effectually reſiſts the force of a downright preſſure.

Red ſeems the beſt colouring, and therefore black wax directed to be uſed; but if the pictures are to be in black and white, to reſemble copper-plates, the wax ſhould be red; for the wax and paint ought to be of different colours, in order to diſtinguiſh when the colour is laid on properly, or rightly cleared away.

The ſubſtance of *medals*, being metalline, is liable to be corroded; and the figures being raiſed, are alſo liable to be effaced by friction. Hence it is rare to find any perfectly preſerved. Gems are not ſubject to theſe inconveniences. See GEM.

MEDALLION, or MEDALION, *a medal* of extraordinary bigneſs.

The word is formed from the French *Medaillon*, or Italian *Medaglione*, which ſignify the ſame; and which were originally formed from *Metalliones*, a name by which theſe pieces are frequently called in ancient Latin writers.

Medallions are ordinarily a kind of *medals*, which princes uſe to preſent, as a token of honour or eſteem; for which reaſon the Romans call them *miſſilia*.

Medallions were never any current coins, as medals probably were: they were ſtruck purely to ſerve as public monuments, or to make preſents of.

There cannot be any ſet made of them, even though the metals and ſizes ſhould be joined promiſcuouſly. The beſt cabinets do not contain above four or five hundred, though M. Morel judges them to be above a thouſand.

Authors vary about the time when they firſt began to be ſtruck. Some antiquaries will have it under the empire of Theodoſius, but this muſt be a miſtake; for there were ſome ſtruck even in the upper empire: witneſs a Nero, a Trajan, and an Alexander Severus, ſtill extant. *Medallions* of gold are very rare, as alſo thoſe of a large copper.

Medallions are diſtinguiſhed from medals by the volume, that is, by the thickneſs and compaſs, as well as by the largeneſs and relievo of the head.

MEDALLION, in *Architecture*, is any circular tablet on which are imboſſed figures or buſtos: ſuch is L. introduced in the tympanum of the pediment, *Tab. Architecture, fig.* 40.

MEDEA, the name of a ſtone deſcribed by Pliny and the ancients. They ſay it was black, and was variegated with gold-coloured veins; and that when rubbed in water, it yielded a yelloviſh red juice, which had the flavour of wine. We know no ſtone at preſent anſwering theſe characters. Rulandus, indeed, mentions a kind of black hæmatites, or blood-ſtone, which tinges water to a faffron colour. This account he takes from Encelius; but this wants the much greater character, of giving it the taſte of wine.

MEDENA, a word uſed by Paracelſus to expreſs an inveterate kind of ulcer.

MEDEOLA, *climbing aſparagus*, in *Botany*, a genus of the *decandria trigynia* claſs. Its characters are theſe: the flower has no empalement; it has ſix oblong oval petals, and ſix awl-ſhaped ſtamina terminated by incumbent ſummits; and three horned germina terminating the ſtyle; the germina afterward turn to a roundiſh trifid

trifid berry, with three cells, each containing one heart-shaped seed. Miller reckons four, and Linnæus only two.

MEDES, *empire of the.* See EMPIRE.

MEDIALE, in *Botany*, a name given by the ancients to the central part of any tree. It is sometimes used to signify the spungy pith that fills up the young branches of a tree, as in the elder and the like; and sometimes for the firm and hard substance, called the heart of the wood, and found to be much harder than any other part of it. Thus the name of *tree*, to which the word *mediale* is annexed, must be the means of explaining what is meant by the word, whether a spongy pith, or a sound hard wood. The most accurate writers, however, make a distinction which ought to be kept up, that is, the calling the heart, or sound internal part of the wood, only *mediale*, and the spungy part within the elder &c. *medulla.*

MEDIANA, the name of a vein, or little vessel, made by the union of the cephalic and basilic, in the bend of the elbow. It is not a particular vein, or a third vein of the arm, as some authors imagine, but merely a branch of the basilica; which running into the inner part of the elbow, unites with the cephalica, and forms a common vein, called *mediana*, and by the Arabs, the *black vein.* See *Tab. Anat. (Angeiol.) fig.* 6. *lit. p.*

MEDIANA *linea*, a line, or seam, running down the middle of the tongue, and dividing it into two equal parts; though not so effectually, but that the blood-vessels of the one side communicate with those of the other. See TONGUE.

MEDIANÆ, *columnæ*, in Vitruvius, are the columns in the middle of a portico, whose intercolumnation is to be larger than those of the angular columns.

MEDIANTE, in *Music. The mediant of a mode* is that note which is a third higher than the final; or that which divides the fifth of every authentic mode into two thirds. See MODE and THIRD.

This term is chiefly in use among the French.

MEDIASTINA, the name of a vein of the mediastinum.

MEDIASTINUM, in *Anatomy*, a double membrane, formed by a duplicature of the pleura; serving to divide the thorax and the lungs into two parts, and to sustain the viscera, and prevent their falling from one side of the thorax to the other. See THORAX.

It proceeds from the sternum, and passing strait down through the middle of the thorax to the vertebræ, divides its cavity into two. It contains the heart between its two laminæ, and it affords a passage to the vena cava, the œsophagus, and the stomachic nerves. The membranes of the *mediastinum* are finer and thinner than the pleura, and have a little fat. It receives branches of veins and nerves from the mamillary and diaphragmatic, particularly one called *mediastina*; its nerves come from the stomachic; it has also some lymphatics, which open in the thoracic duct.

The *mediastinum* divides the thorax longitudinally into two parts; and, by means of it, one lobe of the lungs may officiate, if the other be hindered by a wound on the other side. Sometimes there is a matter contained betwixt its membranes, immediately under the sternum, which may occasion the tapping of this place.

This membrane is subject to an inflammation, the pain of which strikes obliquely from the sternum through the breast to the back, attended with a difficulty of breathing, cough, and sometimes spitting. The cause, symptoms and cure are much the same with those of the PLEURISY; but suppuration, which is with difficulty avoided, is always fatal.

MEDIASTINUM *cerebri*, the same with SEPTUM *transversum.*

MEDIATE, or INTERMEDIATE, a term of relation to two extremes, applied to a third, which is in the middle between them. See MEAN, and MEDIUM.

Substance is a genus with regard to man; but between the two there are other *mediate* genusses, as body and animal.

Mediate stands opposed to *immediate*: thus when we say, that God and man concur to the production of man; God is the *mediate* cause, man the *immediate.*

MEDIATE *pulse.* See MODE.

MEDIATORS *of questions*, in our old writers, were six persons authorized by statute, who, upon any question arising among merchants, relating to any unmerchable wool, or undue packing, &c. might, before the mayor, or officers of the staple, upon their oath, certify and settle the same; to whose order and determination therein, the parties concerned were to give entire credence, and submit. 27 Edw. III. stat. 2. c. 24.

MEDIATORS, Μεσαζοντες, under the emperors of Constantinople, officers of state, who had the direction of all affairs transacted at court. Their chief, or president, was called *magnus mesazon*, μεγας μεσαζων, and answered to the prime or grand visier of the Turks. Hofm. Lex. in voc.

MEDIC VETCHING. See SAINTFOIN.

MEDICA, in *Botany.* See LUCERNE.

MEDICA, *bastard.* See *Snail* TREFOIL.

MEDICA, *mairi*, in *Botany*, a name given by some authors to the citron-tree.

MEDICAL *stones.* See STONE.

MEDICAGO, in *Botany.* See *Snail* TREFOIL.

MEDICAMENTOSUS *lapis.* See LAPIS.

MEDICINAL *hours* are those parts of the day supposed most proper to take medicines in.

Of which there are usually reckoned four; viz. in the morning fasting, about an hour before dinner, about four hours after dinner, and going to bed; but in acute cases, the times are to be governed by the symptoms and aggravation of the distemper, without regard to any medicinal hours.

MEDICINAL *waters.* See WATER.

MEDICINALIS *succulus.* See SACCULUS.

MEDICINE, MEDICINA, the art of healing.

Medicine popularly called *physic*, consists, according to Boerhaave, in the knowledge of those things by whose application life is either preserved sound and healthy, or when disordered is again restored to its pristine healthiness.

Galen defines *medicine* the art of preserving present health, and of retrieving it when lost: Hippocrates, the addition of what is wanting, and the retrenchment of what is redundant: and Herophilus, the knowledge of things good, indifferent, and ill, with regard to health.

Medicine must have been nearly coeval with the world. The injuries and vicissitudes of the air, the nature and qualities of foods, the violence of external bodies, the actions of life, and, lastly, the fabric of the human compages, must have rendered diseases almost as old as mankind; and the presence of a disease, as it brings with it a painful sensation, or the loss, perhaps, of the use of a limb, does, by a necessary mechanical impulse, both in brutes and men, compel the diseased to seek for help, and to apply remedies, either by mere experiment, or by instinct, and spontaneous appetite: hence arose the art of *medicine*, which, in this sense, has been always, everywhere among mankind.

Ancient histories and fables tell us, that, in a little time from the flood, *medicine* was so well cultivated by the Assyrians, Babylonians, Chaldæans, and magi, that they were able to remove present diseases, and prevent future ones. Hence it passed into Egypt, Libya Cyrenaica, and Crotona; and thence into Greece, where it flourished, principally in the islands of Cnidus, Rhodes, and Cos, and in Epidaurus.

The first foundations of the art were laid by chance, natural instinct, and events unforeseen; these were improved by the memory of the success of former experiments; by writing down diseases, their remedies, and events, on columns, paintings, and the walls of their temples; by exposing the sick in the markets, and public ways, that those who passed by might inquire into the disease, and communicate a remedy, if they knew any; and, lastly, by analogy, or reasoning, from a comparison of things already observed, with things present, and things to come.

The art at length received a much greater degree of perfection, by the appointing of physicians; some for the cure of particular diseases, and others for diseases in general; by an accurate observation of the disease, and its symptoms; and by an exact description of the remedy, and its use: immediately upon which, it got among the priests, and at length was confined to particular families; descending by way of inheritance, from father to son: which again proved a great bar to its progress. The extispicy, or inspecting the entrails of beasts, used by the priests; the custom of embalming dead carcases; and even butchery itself, promoted the knowledge of the human fabric, and of the causes both of health, diseases, and death.

Lastly, the dissecting of live animals for philosophical purposes, distinct narratives of the cause, rise, increase, crisis, declension, end, and effect of diseases; and the application, powers, and events, seemed to have almost brought the art to its perfection.

Hippocrates, who was contemporary with Democritus, and perfectly acquainted with every thing then discovered, and besides furnished with a great number of observations of his own, collecting into one all that was valuable and useful, compiled a body of Greek *medicine*; and was the first who deserves the title of a true *physician*, for being a master of the *theories*, experience, as well as of analogy and reason, and with all well versed in pure philosophy, he first made physic rational; and laid the foundation

foundation of the dogmatical *medicine*, which has ever since obtained. See HIPPOCRATISM.

What Hippocrates had done continued a long time sacred and unaltered, and was the standing practice of many ages; at length Aretæus the Cappadocian digested it into a more orderly body; whence, in various places, at various times, and by various hands, particularly the Alexandrian school, it was farther altered and improved, till at length it came into the hands of Claud. Galen, who, collecting the scattered parts, digesting those which were confused, and explaining every thing by the rigid doctrines of the Peripatetics, did both a great deal of service and a great deal of injury to the noble art; he being the first who introduced the doctrine of the elements, the cardinal qualities, and their degrees, the four humours, &c. into *medicine*; and on these he made the whole art to depend.

After the sixth century, the arts were not only extinguished, but almost all memory of them was lost, till the ninth; from which to the thirteenth, *medicine* was vigorously cultivated by the Arabs in Asia, Africa, and Spain; who applying themselves particularly to the study of the materia medica, and its preparations, and to the operations of surgery, rendered both more just and more copious at the same time; and yet Galen's errors became now more predominant than ever.

At length, however, they were purged out and exploded by two different means; principally indeed by the restoration of the pure discipline of Hippocrates, in France; and then also by the experiments and discoveries of chemists and anatomists; till at length the immortal Harvey, overturning, by his demonstrations, the whole theory of the ancients, laid a new and certain basis of the science. Since his time, *medicine* is become free from the tyranny of any sect; and is improved by sure discoveries in anatomy, chemistry, physics, botany, mechanics, &c.

Hence it appears that the art originally consisted solely in the faithful collecting of observations; and that, a long time after, they began to inquire, and dispute, and form theories: the first part has ever continued the same; but the latter has been always mutable.

For the several sects that have arisen in *medicine*, see DOGMATIC, CHYMISTRY, EMPIRIC, GALENIST, HERMETICAL, and *Paracelsists*, or FIRE-*philosophers*.

Medicine is divided into five principal branches. The first considers the human body, its parts and fabric, life and health, and the effects following from them: this is called *physiology*, the *doctrine of the animal œconomy*, or *of the use of the parts*: and its objects, now enumerated, are called *res naturales*, or things according to nature.

The second branch considers the diseases of the human body, their differences, causes, and effects; and is called *pathology*, as it considers the diseases; *æziology*, as it inquires into their causes; *nosology*, when it examines their differences; and, lastly, *symptomatology*, when it explains their effects. The objects of this part are called *res præternaturales*, or beyond nature. For the modern method of classing diseases, see NOSOLOGY.

The third branch considers the signs or symptoms, and how to apply them to use; so as to judge, both in a sound and a diseased body, what will be the degree, order, and effect, of the health or the disease: this is called *semeiotica*: its objects are things both natural, non-natural, and preternatural.

The fourth branch considers the remedies, and their use, whereby life may be preserved; whence it is called *hygeine*: its objects are what we strictly call *non-naturals*. Lastly, the fifth furnishes the materia medica, its preparation, and manner of exhibition, so as to restore health, and remove diseases: and is called *therapeutica*, comprehending the *dietetica*, *pharmaceutica*, *chirurgica*, and *iatrica*.

MEDICINE, *clinical*, *medicina clinica*. See CLINICA.

MEDICINE, *characters in*. See CHARACTERS.

MEDICINE, *pandects in*. See PANDECT.

MEDICINES, or MEDICAMENTS, denote any natural substance, applied to a human body, in order to answer some intention of cure. So that they differ from aliments, which preserve the body in a sound state, whereas *medicines* restore it when impaired; and from poisons, which tend to destroy the body. All the parts of diet may indeed be termed alimentary *medicines*, inasmuch as they may serve to confirm health, against the first approaches of a disease; as poisons, which are always detrimental to the body, have been called deleterious *medicines*.

Medicines are either simple, or compound: simple *medicines* are those which are formed spontaneously, or by the assistance of nature alone; and those are called compound, which are owing to the art and industry of men, and to the mixtures of various simples put together.

The principal differences of simple *medicines* are taken either from their form and texture, or from their virtues. In respect of their texture, they are divided into minerals, vegetables, and animals; each of which divisions is termed a class, kingdom, or family.

In what the ancients have left us concerning the *medicines* they used, there is the utmost confusion and obscurity; the same substance is frequently called by many different names; some *medicines* are barely mentioned by them, without any account of their nature or description; and in regard to many others, the virtues ascribed by them to one simple, have been, by later writers, attributed to others. To clear up, and set right all those difficulties, at this time, would be a task as difficult as it would be useful. So great and so many virtues are ascribed, by different authors, to particular *medicines*, that, if they could be depended on, each ought to be looked on as an almost universal remedy: but as many of these virtues are merely imaginary, it requires even the greatest caution to distinguish the fictitious from those which truly belong to them; and though the knowledge of the virtues of *medicines* be at this time carried to a very great length, there are nevertheless many things remaining yet to be discovered, and room enough still to enrich the science with new specific remedies; nor will the judicious physician find less worthy employment for his thoughts, in endeavouring to determine the manner in which those *medicines* act, whose effects are already known, and to ascertain the safest and best methods of administering them.

Such *medicines* as are of a terrestrial, or other the like nature, and will not dissolve in water, the new Dispensatory of the college has ordered to be prepared in the following manner: they are first to be pounded in a mortar and then levigated with a little water, upon a hard and smooth marble, into an impalpable powder, and afterwards dried upon a chalk-stone, and then set by for a few days, in a warm, or at least a very dry place. In this manner are to be prepared amber, antimony, bezoar, which should be levigated with spirit of wine instead of water, blood-stone, calamy, first calcined for the use of the makers of brass, chalk, coral, crabs claws, crabs eyes (so called), egg-shells cleansed from the membrane adhering to them by boiling in water, oyster-shells first cleansed, pearls, verdegris, tutty.

In antimony, calamy, and tutty, singular care ought to be taken to reduce them to the most subtile powder that can be. Pemberton's College Disp. p. 145.

Medicines are again distinguished, with regard to the manner of their application, into *internal* and *external*.

MEDICINES, *internal*, are those taken in at the mouth.

MEDICINES, *external* or *topical*, are those applied outwardly to any particular part.

With regard to the different manner of their operation, *medicines* are distinguished into *agglutinant*, *alexant*, *stomachics*, *astringents*, *evacuants*, *incarnatives*, *specifics*, &c.

MEDICINES *from metals*. See METALS.

MEDICINES, *pocket*, in *Surgery*, are such necessary remedies as the surgeon ought never to be without, but always to carry in a convenient case or box about him. These are the common digestive ointment, and the brown or Egyptian ointment, for cleansing and digesting foul ulcers; and some vulnerary balsams, as the *linimentum Arcæi*, or the balsam of Peru, of Gilead, or Capivi, or the Samaritan balsam: to these must also be added a plaster or two, as the diachylon, or stypticum Crollii; since one or other of these is almost constantly wanted. Neither should there be wanting a piece of blue vitriol for the taking down luxuriant flesh, and to stop hæmorrhages; but if vitriol is wanting, burnt alum, red precipitate, the infernal stone, or any other corrosive *medicine*, will supply its place in corrosive intentions, and the last will also serve to open abscesses, to make issues, and perform many other operations of that kind. With these there should always be kept in readiness also a quantity of scraped lint, that the surgeon may be able to give immediate assistance to wounded persons, since, if he is unprepared for this, they may be easily taken off by an hæmorrhage, a circumstance which ought also to prevail with the surgeon never to be wholly unprovided with bandages. Heister's Surg. p. 11.

MEDICINES, *mechanical operation of*. To account for the operations of *medicines* mechanically, seems to have been the favourite scheme of physicians and physiologers of the last and present century. Stahl, and his disciples, reject these accounts, and think them sufficiently refuted by the operation of opium, and of astringents. One grain of opium, properly taken, will for a time assuage pains all over the body. A very few grains of crocus martis astringens sometimes stop an hæmoptysis, before they can be supposed to have entered into the humours

of the body. Is it not past all belief, say they, that so few grains, mixed with so many pounds of fluids, should retain any mechanical force, especially as it is well known that aſtringents loſe their force by dilution? They farther urge, that the various effects of the ſame *medicine* are a refutation of the mechanical hypotheſis; thus emetics ſometimes purge, and *vice verſâ*; aſtringents increaſe hæmorrhages; opium excites alacrity in ſome, inſtead of ſtupefying. Again, the ſight, or even bare imagination of ſome *medicines*, will produce a ſenſible effect on the body, without any contact. Stahl, and his followers, therefore, hold, that *medicines* operate chiefly by exciting the vital ſoule; and that this is the chief effect of *medicines*, even where they ſeem moſt to act mechanically.

Hoffman, Heiſter, and others, have attacked the hypotheſis of Stahl. We ſhall not pretend to give any farther account of the controverſy; perhaps in this, as in others, there may be a good deal of logomachy; ſtrictly ſpeaking, mechanical principles muſt be ſufficient to account for the operation of *medicines*, as this ſometimes undoubtedly depends (in the *prima via* at leaſt) on chemical principles; and nobody has hitherto been able to account mechanically for the phenomena of chemiſtry. The laws of the *minima naturæ* have not hitherto been reduced to thoſe of the preſſure and impulſe of large ſenſible maſſes. And perhaps when the laws, that obtain in the minute parts of matter, have been found, we ſhall ſtill be at a loſs to account for all the phenomena of animated bodies, particularly the human.

Heiſter ſays, Stahl pretends that the rational ſoul and nature are ſynonymous terms; and that it is the rational ſoul which formed the fœtus in the womb, and which [illegible] animal, and natural actions, to the pre[illegible] body; hence ſometimes exciting evacu[illegible] times ſpaſms, to get rid of diſorders.—[illegible]r. de Medecin. Mechan. præſtantia in Com[illegible]n. Practic. where he endeavours to refute the Stahlians.

Juncker, who wrote according to Stahl's principles, does not deny that there is ſomething mechanical in the operation of *medicines* independently of the will or ſpontaneity of nature; but he aſſerts that their chief operation is owing to nature, which makes uſe of the remedy to attain its end. His words are, *Operationem medicamentorum ab ipſa naturâ gubernari innumeris confirmant obſervationes. Licet enim non negamus, ſubeſſe interdum actioni eorum aliquid mechanici, a naturæ arbitrio non pendentis, tamen hoc ita eſt habendum, ut operandi modus iſte maximo adhibito mercatur. Ad potiorem ſe determinatio, & naturæ uſitur remedio ad finem ſuum.* Juncker, Conſpect. Therap. p. 1, 2.

A late author obſerves, as to *medicines*, that let what diſeaſe ſoever be named, and any *medicine* as univerſally uſeful in it, yet he can ſhew circumſtances of patients, or of the diſeaſe, where that *medicine* would be very improper. He mentions ſeveral inſtances of this kind. See Medic. Eſſ. Edinb. vol. i. p. 267, ſeq.

A general idea of the manner wherein *medicines* operate on a human body, as explained by the ſect of mechanical phyſicians, may be conceived from what follows.

A few different ſorts of particles, variouſly combined, will produce a great variety of fluids; ſome may have one ſort, ſome two, ſome three, or more. If we ſuppoſe only five different ſorts of particles in the blood, and call them *a, b, c, d, e*, their ſeveral combinations, without varying the proportions in which they are mixed, will be theſe following; but whether more or leſs, need not be determined.

a b c: a d: a e:
b c: b d: b e: c d:
c e: d e: a b c: a d e:
a b d: a b e: a e c: a d e:
b d e: b d e: b e c: d e:
a b c d: a b e: a d e: a b d e: b d e: a b d e.

No theory of ſecretion has hitherto been able to give any tolerable account of the operation of ſuch *medicines* as promote an evacuation. For if the humours be equally mixed with the blood, that is, if the blood be in every part of the body the ſame, and its particles be not more apt to form certain humours in ſome certain parts of the body than others; or if they be not forced, by the power of ſome *medicine*, to form ſuch humours; then the quantities of humours, ſeparated in equal times, will always be as the velocity of the blood; but the velocity of the blood is ſeldom doubled by any *medicine*, and never tripled by the moſt acute fever. The quantity of the humour, however, drawn off by evacuating *medicines*, is often twenty times greater than the natural quantity; and therefore, upon ſuppoſition that the humours are everywhere equally mixed with the blood, the operation of evacuating *medicines* can never be accounted for.

Though this argument has the ſtrength of a demonſtration, yet there are ſome who explain the operation of purgative, and other evacuating *medicines*, by a ſtimulating faculty; whereby the ſluggiſh juices are not only forced out, but the obſtructed canals opened, and the motion of the blood quickened. But though ſuch a power be allowed, it would remain to be explained, why certain *medicines* do only ſtimulate certain glands? For it is evident, 1. That evacuating *medicines* have ſome other power, beſides the ſqueezing out ſtagnant juices; becauſe, when they are all ſqueezed out, they ſtill evacuate as much, if they be repeated, as they did before: as is plain, by continuing a ſalivation for many days. 2. We cannot ſuppoſe, that all bodies have every where, and at all times, juices ſtagnating; but theſe *medicines* conſtantly produce their effects, more or leſs, at all times. If the veſſels be ſuppoſed to be obſtructed, an evacuating *medicine* could but double the quantity that was evacuated before it was taken. 4. If theſe *medicines* operate only in theſe ways, then in a healthful body, where there were no obſtructions, they would have no effect at all. 5. If the removing obſtructions were the cauſe of a greater quantity evacuated, then the evacuation ſhould ſtill continue in a greater degree than before the obſtruction was removed; whereas, in fact, we conſtantly find it leſs, as the *medicine* works off. 6. Though a *medicine*, by ſtimulating a veſſel, may quicken the motion of the fluid in that veſſel; yet it can never increaſe the quantity of fluid running through it, in equal ſpaces of time; becauſe it quickens the motion of the fluid only by contracting the veſſel; and therefore the ſafter the fluid is made to run through the veſſel, the leſs fluid does the orifice of the veſſel admit; and conſequently, after the veſſel is contracted by the ſtimulating *medicine*, the ſecretion will be leſs, inſtead of being greater.

That a ſtimulus cauſes the part on which it acts to contract, is matter of fact; and alſo that purgative *medicines* do ſtimulate the bowels: but it may perhaps be likewiſe ſaid, they ſtimulate the heart and arteries, and increaſe their force, becauſe they not only quicken, but raiſe the pulſe; ſo that a greater quantity of blood is ſent to the glands of the guts. This may be granted; but not that it is the principal action of purgative *medicines*; becauſe that, by the ſame force, a greater quantity of blood is ſent to all the other glands of the body, whoſe fluids are not, however, ſenſibly increaſed; and the glands of the inteſtines receive a leſs quantity, in proportion, than any others, becauſe they cannot be ſo much dilated by the greater force of the blood, as others, which are not ſo much ſtimulated by the *medicine*.

There are others, who will have evacuating *medicines* endued with an attenuating quality, by which they diſſolve all the coheſions of the particles of the blood, and ſo ſet the ſeveral humours at liberty, to paſs through their proper glands; but if theſe *medicines* have a power univerſally to diſſolve all the coheſions of the blood, then every evacuating *medicine* would equally and indifferently increaſe the quantity of every ſecretion. Mercury would as conſtantly purge as ſalivate, and nitre promote perſpiration as well as urine; but this is repugnant to experience. If they have a power to diſſolve certain coheſions, and not others, this is but ſetting certain particles at liberty to paſs through their proper glands, which were not ſo before; and is a preparing the humours, in order to increaſe the quantity of ſecretion. Evacuating *medicines* muſt therefore have a power to affect ſome particles, and not others; that is, to repel ſome, and attract, retain, and alter others; and this is what may be affirmed to be in all *medicines*, and is what a thouſand chemical experiments demonſtrate.

The ſeveral humours then being formed, by the different coheſion of the particles of blood, the quantity of a humour ſecreted by any gland muſt be in a proportion compounded of the proportion that the number of the particles cohering in ſuch a manner as is proper to conſtitute the humour which paſſes through the gland, bears to the maſs of blood; and of the proportion of the quantity of blood that arrives at the gland. And hence it follows, that where there is a determinate quantity of a certain humour to be ſeparated, the number of particles that are proper to compoſe the ſecreted liquor, muſt be reciprocally proportional to the quantity of the blood that arrives at the gland; and therefore, if the quantity of ſecretion is to be increaſed, the number of particles muſt be increaſed; if the ſecretion is to be leſſened, the number of particles, proper for ſuch a ſecretion, muſt be leſſened in the ſame proportion.

Medicines, therefore, which can alter the coheſions and combinations of the particles, may either increaſe or diminiſh the quantity of any ſecretion. Thus, ſuppoſe a humour, which paſſes through the glands of the inteſtines, to be compoſed of three or four ſeveral ſorts of particles; that *medicine*, which will eaſily cohere to theſe particles

particles, and, by cohering, increaſe their mutual attractions, ſo as they may unite in greater numbers at, or before they arrive at the inteſtines, than they would have done, if the *medicine* had not been given, muſt neceſſarily increaſe the quantity of humour which paſſes through the glands of the inteſtines; if the quantity of blood which arrives at the glands, be not diminiſhed in the ſame proportion, as the number of particles is increaſed. After the ſame manner do diuretics, ſudorifics, and *medicines* which promote all other ſecretions, operate.

Why increaſing the quantity of ſome ſecretions ſhould diminiſh that of others, is not eaſy to explain on any other principle; for if the blood be equally mixed, in every part of the body, with all the humours which are ſeparated from it; that is, if the mixture of the blood be every where alike, ſo that every humour bears the ſame proportion to the reſt of the arterial blood in one part of the body that it does in another; and if every humour has its own proper gland through which it is ſeparated; then what is ſeparated by one gland is not ſubtracted from another, and conſequently does not diminiſh the quantity of humour which flows to this other, but does indeed rather increaſe the quantity of this other ſecretion: for the more any one humour is carried off, the greater proportion any other remaining in the blood, bears to the remaining blood; and therefore the more any one ſecretion is increaſed, the more all the reſt ſhould be increaſed likewiſe. But if all the humours be compoſed by a combination of a few different ſorts of particles, then the more apt theſe particles are to run into any one ſort of combination, the leſs all other combinations muſt be ſo; and conſequently the increaſing any one ſecretion muſt neceſſarily diminiſh the quantity of all others; but more eſpecially of that which has the moſt of the ſame ſort of particles. See SECRETION, HUMOUR, &c.

MEDICINES, *capital*. See CAPITAL.

MEDICINES, *chalaſtic*. See CHALASTIC.

MEDICINES, *hypochondriacal*. See HYPOCHONDRIACAL.

MEDICINES, *hyſteric*. See HYSTERIC.

MEDICINE-*cheſt*, is a portable cheſt, containing all ſorts of *medicines* neceſſary for a campaign or voyage, together with ſuch inſtruments as are moſt neceſſary and uſeful for the purpoſes of ſurgery.

MEDIETAS *Linguæ*, an inqueſt impanelled, whereof the one half conſiſts of natives or denizens, the other of aliens.

It is uſed in pleas, wherein the one party is a ſtranger, and the other a denizen. Solomon de Stanford, a Jew, in the time of Edward I. had a cauſe tried before the ſheriff of Norwich, by a jury of *ſex pecoris & ſeptem burnenſes, & ſex legales Judæos de civitate Norwici*. See JURY.

MEDIMNUM, *Μεδιμνος*, among the Greeks, a meaſure of capacity, holding ſix Roman *modii* or buſhels.

MEDINE, an Egyptian piece of money, of iron ſilvered over, and about the ſize of a ſilver three-pence.

MEDINUS, a name given by ſome to the MEDUS, a ſtone celebrated by the writers of the middle ages for many imaginary virtues.

MEDITATION, an act by which we conſider any thing cloſely, or wherein the ſoul is employed in the ſearch or conſideration of any truth.

In our religion, it is uſed to ſignify a conſideration of the objects and grand truths of the Chriſtian faith.

Myſtic divines make a great difference between *meditation* and *contemplation*: the former conſiſts in diſcurſive acts of the ſoul, conſidering methodically, and with attention, the myſteries of faith, and the precepts of morality; and is performed by reflections and reaſonings, which leave behind them manifeſt impreſſions on the brain. The pure contemplative have no need of *meditation*, as ſeeing all things in God at a glance, and without any reflection.

When a man, therefore, has once quitted *meditation*, and is arrived at contemplation, he returns no more; and, according to Alvarez, never reſumes the car of *meditation*, except when the wind of contemplation is too weak to fill his ſails.

MEDITERRANEAN, ſomething incloſed within land; or that is remote from the ocean.

MEDITERRANEAN is more particularly uſed to ſignify that large *ſea*, which flows between the continents of Europe and Africa, entering by the ſtreights of Gibraltar, and reaching into Aſia, as far as the Euxine Sea, and the Palus Mœotis.

The *Mediterranean* was anciently called the Grecian Sea, and the Great Sea. It is now cantoned out into ſeveral diviſions, which bear ſeveral names. To the weſt of Italy it is called the Ligurian or Tuſcan Sea; near Venice, the Adriatic; towards Greece, the Ionic and Ægean; between the Helleſpont and the Boſphorus, the White Sea, as being very ſafe; and beyond, the Black Sea, its navigation being dangerous.

The Britiſh trade carried on by means of the *Mediterranean* Sea, is of the laſt conſequence to Great Britain; and the permanent preſervation thereof depends on the poſſeſſion of the town and fortifications of Gibraltar.

The counterfeiting of *Mediterranean* paſſes for ſhips to the coaſt of Barbary, &c or the ſeal of the admiralty office to ſuch paſſes, is felony, without benefit of clergy. Stat. 4 Geo. II. c. 18.

MEDITRINALIA, among the Romans, feaſts inſtituted in honour of the goddeſs *Meditrina*, and celebrated on the thirtieth of September. They were ſo called from *medendo*, becauſe the Romans then began to drink new wine, which they mixed with old, and that ſerved them inſtead of phyſic.

MEDITULLIUM is uſed by anatomiſts for that ſpongy ſubſtance between the two plates of the cranium, and in the interſtices of all laminated bones.

MEDIUM, a Latin term, ſignifying *middle*, or MEAN.

MEDIUM, in *Logic*, or *medium of a ſyllogiſm*, called alſo the *mean*, or *middle term*, by the Italians *mezzo termine*, is an argument, reaſon, or conſideration, for which we affirm, or deny any thing: or, it is the cauſe why the greater extreme is attributed to, or denied of the leſs, in the concluſion.

Thus, in the ſyllogiſm, "Every good thing is to be "fired: but all virtue is good; therefore all virtue is to "be deſired:" the term *good* is the *medium*; *virtue* the leſs extreme, and *to be deſired* the greater.

It is called *medium*, as being a kind of mediator between the ſubject and predicate; or becauſe the extremes are ſo diſpoſed as to affirm, or deny, by means hereof. Some call it *argumentum tertium*, a third argument; and others ſimply *argumentum*, as being the cauſe why we aſſent to the concluſion.

Mediums, or *middle terms*, are the things principally ſought for, in diſcourſing; ſo that the invention of *mediums* makes the moſt eſſential part of logic. But the rules commonly given by logicians for that purpoſe, are mere impertinences. In effect, no ſuch rules can be given; nor have we any way of coming at ſuch *mediums* or reaſons, but by a cloſe attention to clear ideas.

MEDIUM, in *arithmetic*, or an *arithmetical medium*, or *mean*, called in the ſchools *medium rei*, is that which is equally diſtant from each extreme; or which exceeds the leſſer extreme, as much as it is exceeded by the greater, in reſpect of quantity, not of proportion.

Thus, nine is a *medium* between ſix and twelve.

MEDIUM, *geometrical*, or *mean*, called in the ſchools *medium perſonæ*, is that where the ſame ratio is preſerved between the firſt and ſecond, as between the ſecond and third terms; or that which exceeds in the ſame ratio, or quota of itſelf, as it is exceeded.

Thus, ſix is a geometrical *medium* between four and nine. See *Geometrical* PROPORTION.

This is a *medium* which virtue is ſuppoſed to obſerve; whence ſome call it *medium quoad nos*, as having a view to circumſtances, times, places, perſons, &c. Diſtributive juſtice obſerves a geometrical *medium*; commutative juſtice, an arithmetical one.

MEDIUM *participationis*, in the *Schools*, is that ſaid to be compounded of the two extremes. Thus, man, who is partly body, partly mind, is a *medium* by participation of the two extremes; ſo is warmth the *medium* of heat and cold, &c.

MEDIUM *negationis*, or *remotionis*, is that from which both extremes are derived; or, it is a ſubject capable of receiving both extremes, and yet not neceſſarily poſſeſſed of either.

In which latter ſenſe, the will is a *mean* with reſpect to virtue and vice; and the underſtanding, with reſpect to knowlege and ignorance.

MEDIUM *quod*, or *medium ſuppoſiti*, is ſomewhat between the agent and patient, which receives the action of the one, before it arrive at the other.

In this ſenſe, air is a *medium* between the fire and the hand heated thereby.

MEDIUM *quo*, is the form, or faculty, whereby an agent produces an effect: in which ſenſe, heat is ſaid to be the *medium* or *mean* whereby fire acts on the hand.

MEDIUM *ſub quo*, is that which renders the power to act complete, in general, without determining it to any particular object: in which ſenſe, light is the *medium* under which the eye perceives any colour.

MEDIUM *in quo*, is that, by inſpection whereof a power is produced in any thing, of knowing or perceiving another: ſuch is a ſpeculum, as it ſhews an object, an image, as it repreſents the reality, &c.

MEDIUM, in *Mechanical Philoſophy*, is that ſpace or region through which a body paſſes in its motion towards any point.

Thus ether is ſuppoſed to be the *medium* wherein the heavenly bodies move. Air the *medium* wherein bodies

move near our earth. And water is the *medium* in which fishes live and move. And glass is also a *medium* of light, as it affords a free passage.

That denſity or conſiſtence in the parts of the *medium*, whereby the motion of bodies in it is retarded, is called *the reſiſtance of the medium*; which, together with the force of gravity, is the cauſe of the ceſſation of the motion of projectiles.

MEDIUM, *ſubtile*, or *æthereal*. Sir Iſaac Newton makes it probable, that, beſide the particular aereal *medium*, wherein we live and breathe, there is another more univerſal one, which he calls an *æthereal medium*; vaſtly more rare, ſubtile, elaſtic, and active, than air; and by that means freely permeating the pores and interſtices of all other *mediums*, and diffuſing itſelf through the whole creation; and by the intervention hereof he thinks it is, that moſt of the great phenomena of nature are effected. See ÆTHER.

This *medium* he ſeems to have recourſe to, as the firſt and moſt remote phyſical ſpring; and the ultimate of all natural cauſes. By the vibrations of this *medium*, he takes heat to be propagated from lucid bodies; and the intenſeneſs of heat increaſed and preſerved in hot bodies, and from them communicated to cold ones.

By this *medium* he takes light to be reflected, inflected, refracted, and put alternately in fits of eaſy reflection and tranſmiſſion; which effects he alſo elſewhere aſcribes to the power of attraction; ſo that this *medium* appears the ſource and cauſe even of attraction.

Again, this *medium* being much rarer within the heavenly bodies than in the heavenly ſpaces, and growing denſer, as it recedes farther from them, he ſuppoſes the cauſe of the gravitation of theſe bodies towards each other, and of [illegible] towards the bodies.

[illegible] from the vibrations of this ſame *medium*, excited [illegible] from the eye by the rays of light, and thence [illegible] through the capillaments of the optic nerves [illegible] tory, he takes viſion to be performed; and ſo [illegible] from the vibrations of this or ſome other *medium*, excited in the auditory nerves by the tremors of the air, and propagated through the capillaments of thoſe nerves into the tenſory; and thus of the other ſenſes.

And again, he conceives muſcular motion to be performed by the vibrations of the ſame *medium*, excited in the brain at the command of the will, and thence propagated through the capillaments of the nerves into the muſcles; and thus contracting and dilating them.

The elaſtic force of this *medium*, he thews, muſt be prodigious. Light moves at the rate of conſiderably more than 70,000,000 miles in about ſeven minutes; yet the vibrations and pulſes of this *medium*, to cauſe the fits of eaſy reflection, and eaſy tranſmiſſion, muſt be ſwifter than light, which is yet 700,000 times ſwifter than ſound. The elaſtic force of this *medium*, therefore, in proportion to its denſity, muſt be above 490,000,000,000 times greater than the elaſtic force of the air, in proportion to its denſity; the velocities and pulſes of the elaſtic *mediums* being in a ſubduplicate ratio of the elaſticities, and the rarities of the *mediums*, taken together. And thus may the vibration of this *medium* be conceived as the cauſe alſo of the elaſticity of bodies.

Farther, the particles of this *medium* being ſuppoſed infinitely ſmall, even ſmaller than thoſe of light; if they be likewiſe ſuppoſed, like our air, to have a repelling power, whereby they recede from each other, the ſmallneſs of the particles may exceedingly contribute to the increaſe of the repelling power, and conſequently to that of the elaſticity and rarity of the *medium*, and ſo fit it for the free tranſmiſſion of light, and the free motions of the heavenly bodies. In this *medium* may the planets and comets roll without any conſiderable reſiſtance. If it be 700,000 times more elaſtic, and as many times rarer, than air, its reſiſtance will be above 600,000,000 times leſs than that of water; a reſiſtance that would make no ſenſible alteration in the motion of the planets in ten thouſand years.

And in not ſuch a *medium* better diſpoſed for the heavenly motions, than that of the Carteſians, which fills all ſpace adequately, and without leaving pores, and is vaſtly denſer than gold, and therefore muſt reſiſt more?

If any aſk how a *medium* can be ſo rare? let him tell how the air, in the upper regions of the atmoſphere, can be above a hundred thouſand times rarer than gold; how an electrical body can, by friction, emit an exhalation ſo rare and ſubtile, yet ſo potent, as though its emiſſion occaſions no ſenſible alteration in the weight of the body, yet it ſhall be diffuſed through a ſphere of two feet in diameter, and carry up leaf-copper, or leaf-gold, at the diſtance of a foot from the electrical body; or how the effluvia of a magnet can be ſo ſubtile, as to paſs a plate of glaſs without any reſiſtance or diminution of force; yet ſo potent, as to turn a magnetic needle beyond the glaſs.

That the heavens are not filled with any other, but ſuch a ſubtile æthereal *medium*, is evident from phenomena: whence elſe are thoſe laſting and regular motions of the planets and comets, in all manner of courſes and directions; and how are ſuch motions conſiſtent with that reſiſtance which muſt reſult from that denſe fluid *medium*, wherewith the Carteſians fill the heavens?

The reſiſtance of fluid *mediums* ariſes partly from the coheſion of the parts of the *medium*, and partly from the vis inertiæ of matter. The firſt, in a ſpherical body, is nearly as the diameter, or, at moſt, as the ſquare of the diameter, and the velocity of the body. The latter is as the ſquare of that factum. Thus are the two kinds of reſiſtance diſtinguiſhed in any *medium*; and, being diſtinguiſhed, it will be found, that almoſt all the [illegible] of bodies, moving in ordinary fluids, ariſes from inertiæ. The part which ariſes from the tenacity of the *medium*, may be diminiſhed, by dividing the matter into ſmaller parts, and making thoſe more ſmooth and slippery; but the other will ſtill be proportional to the denſity of the matter, and cannot be diminiſhed any other way, but by a diminution of the ſame.

Thus the reſiſtance of fluid *mediums* is nearly proportional to their denſities; and thus the air we breathe, being about nine hundred times lighter than water, muſt reſiſt about nine hundred times leſs than water; as, in effect, the ſame author has found it does by experiments on pendulums. Bodies moving in quickſilver, water, or air, do not appear to meet with any other reſiſtance but what ariſes from the denſity and tenacity of thoſe fluids; which they muſt, were their pores filled with a denſe and ſubtile fluid.

Heat, it is found, diminiſhes the tenacity of bodies very much; yet does it not decreaſe the reſiſtance of water, ſenſibly. The reſiſtance of water, therefore, ariſes chiefly from its vis inertiæ; conſequently, if the heavens were as denſe as water, or as quickſilver, they would not reſiſt much leſs: if abſolutely denſe, without any vacuum, be the particles never ſo ſubtile and fluid, they would reſiſt much more than quickſilver. A ſolid globe, in ſuch a *medium*, would loſe above half its motion, while it moves thrice the length of its own diameter; and a globe not perfectly ſolid, ſuch as the planets, would loſe more.

To make way therefore for the laſting motions of the planets and comets, the heavens muſt be empty of all matter, except, perhaps, ſome very fine effluvia, from the atmoſpheres of the earth, planets, and comets; and ſome ſuch æthereal *medium* as we have deſcribed. A denſe fluid can ſerve for no purpoſe, in the heavens, but to diſturb the celeſtial motions, and make the frame of nature languiſh; and in the pores of bodies, it can only ſerve to check the vibrating motion of their parts, wherein their heat and activity conſiſts. Such a *medium*, therefore, unleſs we had ſome evidence of its exiſtence, muſt be given up; and, that given up, the hypotheſis of light's conſiſting in a preſſion falls alſo to the ground.

MEDIUM, in *Botany*, a name given by Dioſcorides to the violet, and by Lobel to the ſea-ſtag-flower, *or lris marittima Narbonenſis*.

MEDIUM *ſeptum*. See SEPTUM.

MEDIUS *venter*, in *Anatomy*, denotes the breaſt or THORAX.

MEDIUS, *Glutæus*. See GLUTÆUS.

MEDLAR, *meſpilus*, in *Botany*, a genus of the *monandria pentagynia* claſs. Its characters are theſe: the empalement of the flower is permanent, of one leaf, cut into five ſpreading concave ſegments; the flower is compoſed of five roundiſh, concave petals, which are inſerted in the empalement; the number of ſtamina is different in the different ſpecies, from ten to twenty or more, which are alſo inſerted in the empalement; the germen is ſituated under the flower, and ſupports an uncertain number of ſtyles, from three to five; it afterward becomes a roundiſh oval berry, carrying the empalement on its top, and incloſing four or five bony ſeeds. Linnæus enumerates ſeven, and Miller twenty-two ſpecies.

We have two kinds of *medlar* propagated very frequently in orchards, for the ſake of their fruit; the one is the common *medlar*, or, as it is called by ſome, the Nottingham *medlar*; the other, the Dutch *medlar*. Miller makes theſe two varieties of the ſame ſpecies. The firſt of theſe was once almoſt the only kind known in England; but ſince the other has been introduced, it is found to much ſuperior in the ſize and flavour of the fruit, that it is now almoſt the only kind thought worth the cultivating. They are propagated by budding or grafting them upon the hawthorn, or the pear-ſtock, upon either of which they take very well, and may be afterwards tranſplanted into the fruit-garden, either as ſtandards, or trained up againſt an eſpalier, in both which methods they will ſucceed very well. If the larger ſort are trained up in an eſpalier, the fruit will be much larger; but great care muſt

must be taken in the pruning, not to shorten the bearing branches, for the fruit is almoſt all produced at the extremities of theſe. The *medlar* will grow on any ſoil; but on a moiſt and ſtrong ſoil the fruit will grow larger, and on a dry one it will, though ſmaller, be much better taſted.

The fruit ſhould be ſuffered to remain on the branches till October, at which time it will begin to fall of itſelf, and it ſhould then be gathered in the middle of a dry day, and laid up in a dry place till ſoft, and beginning to decay, which is uſually about a month after it is gathered; at this time they are fit for eating; for, till they begin to decay, they are too harſh for the palate.

Medlars are cooling, drying, and binding, eſpecially before they are ripe; and are uſeful in all kinds of fluxes. The ripe fruit eaten too freely is ſubject to bind the ſtomach, and cauſe the colic. The lapilli, or hard ſeed, are accounted good for the gravel and ſtone: they are an ingredient in the *ſyrupus myrtinus*. Miller's Bot. Off.

MEDLAR, *paſſion-bramble*. See SERVICE-*tree*.

MEDLEY. See CHANCE-*medley*.

MEDULLA *oſſium*, or *marrow of the bones*, is a ſoft fatty ſubſtance, placed in the cavities or pores of divers bones. See MARROW.

The *medulla* is incloſed in a membrane, and is devoid of ſenſe: it is red in the greater cavities, white in the leſs, and ſoft and ſucculent in ſpongy bones.

From this is ſecreted the MEDULLARY *oil*.

MEDULLA *cerebri* and *cerebelli*, denotes the white ſoft part of the brain and cerebellum, covered on the outſide with the cortical ſubſtance, which is of a more dark or aſhy colour. See the origin, ſtructure, and uſe thereof, under BRAIN, and CEREBELLUM.

MEDULLA *oblongata*, is the *medullary* part of the brain and cerebellum, joined in one; the fore-part of it coming from the brain, and the hind-part from the cerebellum. See *Tab. Anat.* (*Oſteol.*) *fig.* 5. *lit. d. d.*

It lies on the baſis of the ſkull, and is continued through the great perforation thereof into the hollow of the vertebræ of the neck, back, and loins; though only ſo much of it retains the name *oblongata*, as is included within the ſkull. After its exit thence, it is diſtinguiſhed by the name of *medulla ſpinalis*.

The ſubſtance of the *medulla oblongata*, being only an aggregate of thoſe of the brain and cerebellum, muſt, like them, be purely fibrous or nervous, and only an aſſemblage of minute tubes for the conveyance of the animal ſpirits. It ariſes, as it were, from four roots; whereof the two largeſt ſpring from the brain, and are called *crura*; the two leſſer from the cerebellum, which Dr. Willis calls *peduncuſi*.

Upon inverting it, the firſt thing that appears upon its trunk is a protuberance, ſomewhat like a ring, and for that reaſon called *protuberantia annularis*. Then follow ten pair of neſves, which have their origin here, and are hence ſent to the ſeveral parts of the body. Immediately under the firſt pair, or the olfactories, appear two ſmall arteries, or branches, of the carotides. The ſecond pair, or optics, being cut off, there appears the infundibulum, which ends in the glandula pituitaria, and, on each ſide, the carotid arteries enter the ſkull. In the lateral ventricles of the *medulla* are two prominences on each ſide, the one pair called *corpora ſtriata*, from the appearance of ſtripes, or nervous fibres, within them; their outer ſubſtance being cortical or glandulous, like the reſt of the ſurface of the brain, though not ſo deep. Betwixt the *corpora ſtriata* is a broad thin production of the *medulla*, called *fornix*; and underneath them lie two other prominences, called *thalami nervorum opticorum*. On either ſide of theſe is a plexus of blood-veſſels, called *plexus choroides*. And under the fornix a narrow aperture, called the *vimen*, which lets into the infundibulum; which is a paſſage from the third ventricle to the glandula pituitaria, through the *medulla* of the brain; being lined with the pia mater. Under this, in the ſinus called *ſella turcica*, or *turrica*, upon the os cribroſum, is the glandula pituitaria; which is ſurrounded with a plexus of veins, called *rete mirabile*, only viſible in brutes. On the hind-part of the third ventricle is a ſmall foramen, called *anus*, leading to the fourth ventricle of the cerebellum; at the orifice of this is ſeated a ſmall gland, which, from its fancied reſemblance to a pine-apple, is called *cumerium*, or *glandula pinealis*; where Deſcartes and his followers imagine the ſeat of the ſoul to be. On the backſide of the *medulla oblongata*, near the cerebellum, are four protuberances, whereof the upper and larger are called *nates*, the under and leſſer *teſtes*. Between theſe and the proceſſes of the cerebellum, is the fourth ventricle, from its figure called *calamus ſcriptorius*. On the *medulla oblongata*, near its extremity, are four other prominences, two on each ſide, called CORPORA *pyramidalia*, and OLIVARIA.

MEDULLA *ſpinalis*, or the *ſpinal marrow*, is a continuation of the *medulla oblongata*, or *medullary* part of the brain, without the ſkull.

It conſiſts, as the brain does, of two parts, a white or *medullary*, and a cineritious or glandulous one; the former without, and the other within. The ſubſtance of the exterior part is much the ſame with that of the corpus calloſum, only ſomewhat tougher, and more fibrous; which difference becomes the more apparent, as it deſcends the lower, on account of the ſtraightneſs of the cavity, which, growing gradually more narrow, preſſes the *medullary* fibres cloſer together, and renders them more compact, and gathers them into more diſtinct faſciculi, till, having deſcended the whole tract of the ſpina, they end in the cauda equina. It is the origin of moſt of the nerves of the trunk of the body: it ſends out thirty pair on each ſide to the limbs, the great cavities, and other parts; which are nothing but faſciculi of *medullary* fibres, covered with their proper membranes.

The *ſpinal marrow* is generally ſaid to be covered with four coats: the firſt, or external one, is a ſtrong nervous ligament, which ties the vertebræ together, to the inſide of which it firmly adheres. The ſecond is a production of the dura mater; it is exceedingly ſtrong, and ſerves to defend the *ſpinal marrow* from any hurt from the flexures of the vertebræ.

The third is a production of the arytænoides, and is a thin pellucid membrane, lying between the dura and pia mater, or the ſecond and fourth membranes of the *medulla*. This membrane gives a coat to the nerves that go out of the ſpina, which is the inner membrane of the nerves, as the dura mater gives the outer. The fourth coat is a continuation of the pia mater, and is an extremely fine, tranſparent membrane, ſtrictly embracing the whole ſubſtance of the *medulla*, dividing it in the middle into two tracts, and making, as it were, two columns of it. See *Tab. Anat.* (*Oſteol.*) *fig.* 6.

In ſhort, the ſpinal marrow does not run through the middle of the vertebræ, as it does in other animals, but is carried through a whole ſeries of the apophyſes, which ſtand on the upper part of the bone, and are therefore called the *apophyſes ſcandentes*, to diſtinguiſh them from the others, which their ſituation occaſions to be called the lateral and ventral. All theſe dorſal apophyſes of the vertebræ are hollow at their baſe, and by that means afford a continued channel for this marrow. The baſes of the lower apophyſes, reaching from the anus to the tail, have alſo the ſame ſort of hollow at their baſe; but this ſerves only for the paſſage of the larger blood-veſſels.

MEDULLARY *oil* is no more than the finer and more ſubtile parts of the *medulla*, or marrow of the bones. See MARROW and OIL.

This, Dr. Havers obſerves, paſſes not into the bones through ducts, but by ſmall pores formed into veſicles or glandules, which are conglomerated into diſtinct lobules, contained in ſeveral membranes inveſting the whole marrow; all which veſicles or bags are propagated from the outward coat of the arteries; and by theſe it paſſes from one to another, till it arrives at the ſides, or extreme parts, of the bone. That part of it, which is ſupplied to the interſtices of the joints, goes into them by paſſages, penetrating through the bone into thoſe cavities, and formed for that end. The uſe of this oil is either common to all the bones, whoſe temper it preſerves, and keeps from being too brittle; or more peculiarly to the joints, where it is very ſerviceable: 1. To lubricate the bones at their extremities, that they may move more eaſily and free. 2. To keep the ends of the articulated bone from growing hot with motion. 3. To preſerve the joints from wearing by attrition, and rubbing one againſt another. And, 4. To preſerve the ligaments of the joints from dryneſs and rigidity, and to lubricate thoſe parts which ſlide upon the bones, and keep the cartilages, which are joined to them, flexible.

MEDUS, or MEDINUS, a name given by the writers of the middle ages to a ſtone brought from Media, of which they ſay there were two kinds, the one black, and the other green. They attribute many ſtrange virtues to theſe ſtones; the black they ſay was a fatal poiſon when taken inwardly, but that if wetted with milk, and rubbed upon the ſkin of a woman with child, it cauſed her to bring forth a boy. This, and a number of other as probable virtues, did theſe ignorant and fanciful writers beſtow at pleaſure on ſtones never known to the world before, and of which themſelves gave no deſcriptions. This ſeems to be only a falſe hiſtory of the *media* of Pliny.

MEDUSA, in *Natural Hiſtory*, the name of a genus of inſects, of the order of GYMNARTHRIA.

The body of the *meduſa* is of an orbiculated convex figure, of a gelatinous ſubſtance, and not hairy; the tentacula, or the plicæ, which ſerve inſtead of them, are ſituated in the center of the under part of the animal.

Authors have described them under the names *urticæ marinæ*, and *pulmones marini*. See URTICA *marina*.

Mr. Banks, in his passage from Madeira to Rio de Janeiro, discovered a new species of the *medusæ*, which, when brought aboard by the casting net, had the appearance of metal violently heated, and emitted a white light. With these animals were taken small crabs of three different species, altogether new, each of which gave as much light as the glow-worm, though the creature was not so large by nine tenths. These luminous animals gave that appearance to the SEA, which has been mentioned by many navigators, and of which various reasons have been assigned. It appeared to emit flashes of light exactly resembling those of lightning, only not so considerable, but so frequent, that sometimes eight or ten were visible at the same moment.

MEDUSA'S *head*, in *Botany*. See STURDE.

MEDUSÆ *caput*, in *Natural History*, a name given by authors to the *stella marina*, called by some, from its various branchings, *stella arborescens*. Rumphius, Gesner, and many other authors, have described this strange fish in its recent state; and in the Acta Eruditorum, we have an accurate figure, and a very remarkable account of one which was found fossil, and preserved in a remarkably perfect manner in stone.

The stone in which it was found was of the fissile or flaty kind; and it was so large as to extend over a piece of this stone of four feet in length, and between three and four in breadth. The body of the fish, from which all the rest seemed originally to have arisen, lay at one corner of the stone, and the arms extended themselves lengthways in very distinct and natural manner the whole length of the stone; and from these there parted, on every side, other smaller ones, and these were finally divided into parts more minute, in such a manner as to represent the most painting. Act. Erudit. ann. 1725. p. 377.

The study of fossils is more improved by this single specimen than by thousands of others, and by the reasonings of almost as many authors. The fossils called *entrochi*, have always perplexed the writers on these subjects to account for; some having judged them a sort of stony vegetables; some, *lusus naturæ*; and others, as different things; but in this table the whole fish is so perfectly preserved, that there can remain not the least doubt of its being really the *stella arborescens*; and in this both the figure and author's words express, in the plainest manner possible, that the long arms or branches reaching from one end to the other of the stone, are composed of a number of *entrochi* as it were, tied together in the same manner as the single joints of those *entrochi*, which we meet with, are to one another; or, in plain fact, that our *entrochi*, which have perplexed us so much to account for their origin, are in reality the fragments of the arms or branches of this fish. These branches in this famous specimen, were composed of what we call *trochitæ*, and had many rudiments of smaller branches, as well as perfect ones, growing from their sides, and would have been so many common *entrochi*, if broken off.

What was most remarkable in this fossil was, however, the separating of smaller branches which ran entire to their ends, and there terminating in an infinite number of small ramifications, all growing from one head, they formed clusters of four or five inches in diameter, and of an inconceivable beauty, resembling the compound flower of some elegant plant. The matter of the large branches, when examined, appeared to be the same with that of the common *entrochi*, that is, spar. The author calls it *joculites*, but that was a word indeterminately used by authors, till of late, for all plated and bright fossils.

It is plain that this complete fish could have no way come into this stone but at the time when it was yet moist and soft; and the author calls it *novum diluvii monumentum, a new remembrancer of the deluge*.

MEDUSA *caput*, or MEDUSA'S *head*, in *Ancient Mythology*, occurs frequently both on the breast-plates and shield of MINERVA; in some of which it is the most beautiful, and in others the most shocking object. In some figures the face is represented as dead, but with the most perfect features that can be conceived; in others, her face is full of passion, and her eyes convulsed; and in many others, the look is altogether frightful, and formed on purpose to inspire terror. The beauties and horrors of *Medusa*'s face are mentioned by the Roman poets. Ov. Met. iv. ver. 793. Lucan, lib. ix. ver. 680. Virg. Æn. viii ver. 438. Spence's Polymetis, p. 61.

MEEKNESS, in *Ethics*, is a virtue which consists in bearing affronts, reproaches, and injuries, with a due composure of mind. Its opposite vice is *revenge*.

MEER, in *Mining*, a space containing twenty-nine yards in length in any vein.

MEER-*scale*, in *Mining*, is a pin of wood drove into the superficies of the earth, to shew the extent or end of a *meer* of ground.

MEER-*swine*, in *Zoology*, a name given by some to a sea-fish, more usually known by the name of *caprisicus*. See GOAT-*fish*.

MEETER. See METRE.

MEGADOMESTICUS. See DOMESTIC.

MEGÆRA, in *Mythology*, one of the three FURIES. She is represented with serpents on her head, and two distinguished ones over her forehead, as her sisters have, and, like them, with torches. She is not mentioned so frequently by the Roman poets as the others are. Virgil gives us a descriptive picture of her, where he is speaking of the punishment of the Lapithæ; who were said to be always placed round a table very richly and plentifully set out, with a loose piece of rock hanging over their heads, as just ready to fall; and this Fury attending close by, to watch and menace them, the moment they endeavoured to taste any one of the tempting things set before them. Æn. vi. ver. 607.

MEGALARTIA, Μεγαλαρτια, in *Antiquity*, a festival in honour of Ceres, being the same with THESMOPHORIA.

MEGALASCLEPIA, Μεγαλασκληπια, in *Antiquity*, a festival in honour of Æsculapius. See ASCLEPIA.

MEGALENSIA, or MEGALESIA, in *Antiquity*, solemn feasts celebrated among the Romans on the twelfth of April, in honour of the great mother of the gods, that is, Cybele or Rhea; wherein were sports or combats held before the temple of that goddess.

They were called *megalensia*, from the Greek μεγαλη, *great*; Cybele being accounted the great goddess.

MEGAMETER. See MICROMETER.

MEI *missura*. See MISERERE.

MEIDANS, in the *Eastern Nations*, are a sort of country-seats, where the greater people have often summer-houses, to which they retire on the three days of the week in which they do not attend the *pasha*'s divan, and where they divert themselves with seeing their slaves ride, shoot, and throw the dart, while they are regaling with their pipe and coffee.

MEINOR. See MAINOUR.

MEIOSIS, in *Rhetoric*, is a figure, which is a species of the HYPERBOLE.

MEL. See HONEY.

MEL *cedrinum*, in the *Materia Medica of the Ancients*, a term used to express a sort of liquid manna, used rather as a pleasant sweet in foods than as a medicine, and which seems to have been the same with the *mel roscidum* of Galen, and with the liquid manna of mount Sinai; that mountain having been the place where it was annually collected in large quantities, even in Galen's time; and the account Bellonius gives of the manner of collecting it in his time, agreeing very well with what Galen has left about it. It is, however, an error in Bellonius, to suppose this to be the *terenjabin* of the Arabians, that being evidently a solid, not a liquid substance, and being from all accounts the same with what is now called MANNA *Persicum*, or Persian manna.

The *mel cedrinum* is a term used only by Hippocrates for this substance, and seems so odd, that many are apt to believe there is an error in the text, and that the author never meant any such thing. Foesius is of opinion, that these ought to be read as two distinct names, with a comma between them, and that the author only meant by them two substances very well known in his time, which were common honey, and the liquid substance called *cedrinum*, or CEDRIA.

MEL *roscidum*, in the *Materia Medica of the Ancients*, a name given to a kind of liquid manna collected in their time, as it is at present, in considerable quantities, on mount Sinai. The monks who collect it call it *terenjabin*, after the name of a kind of manna, common among the Arabians. But this is an error, the terenjabin of those authors not being a liquid manna, but the small round kind, collected from the *albagi maurorum*, and now called *manna Persicum*. It does not appear that the *mel roscidum*, or any other species of manna, was used in medicine by the ancients; this was esteemed a curiosity, rather than a thing of any use, by Galen; and other authors say, it was sweeter than honey itself, with no farther account; whence it seems rather to have been used as a delicacy than as a medicine. See TERENJABIN, and MANNA *Persicum*.

MELA, a surgeon's instrument, called also SPECULUM, and by the vulgar, a PROBE.

Its use is to probe ulcers, or draw a stone out of the penis: its form is various, according to the use it is intended for.

MELALEUCA, in *Botany*, a genus of the *polyadelphia pentandria* class: the characters of which are, that the empalement is divided into five segments; the flower has five petals, and many filaments joined together in five bodies; the style is single, and the fruit is a three-celled capsule, containing three cells, and half covered with a berried empalement. There is only one species.

MELAM-

MELAMPODIUM, in *Botany*, a genus of the *syngenesia polygamia necessaria* class: its characters are, that the receptacle is chaffy and conical; the down is single-leaved and concave, and the empalement is composed of five leaves. There are two species.

MELAMPYRUM. See *Cow-Wheat*.

MELAN *pharmacon*, a word used by Hippocrates, and by some supposed to mean common writing ink. He orders this to be poured upon the cranium, in case of a fissure, in order to discover how far it has penetrated. Galen seems to refer to this, in some places, and mentions his having treated of it in his book of ulcers; but as no such medicine is found prescribed there, it is probably one of the lost compositions of the ancients. In the spurious edition of Hippocrates his book treating on the diseases of women, there is a black medicine ordered to be made of the squamæ and flos æris.

MELANAETOS, in *Ornithology*. See *Black* EAGLE.

MELANCHOLY, formed from μελας, *black*, and χολη, *bile*, in *Medicine*, a low kind of delirium, without a fever; usually attended with fear, heaviness, and sorrow, without an apparent occasion. Or, as some define it, a disease which consists in the perturbation or injury of the imagination, which prevents it from forming a regular and determinate idea of things, as at other times; so that its due operations are interrupted, and often fecond ideas, having no connection with the first, crowd in, and are succeeded by actions no way analogous to that first idea, and therefore appearing irrational.

The ancients attributed this disease to black and cloudy spirits, arising as vapours from a redundant atrabilary humour.

Some of the moderns ascribe it to the irregular motion of the spirits, and their acid constitution; and others, who seem to know it better, to too heavy and viscid a blood, which permits not a sufficiency of spirits to be separated in the brain, to animate and invigorate the nerves and muscles: lastly, others attribute it to a thinefs of the meninges of the brain.

Some enumerate two species of *melancholy*; the erratic, and the apoplectic.

The erratic *melancholy* is that species of the disorder, which most generally seizes patients in the month of February. It is so called, because those who labour under it cannot remain for an hour in one place, but continually wander about, without knowing where they go. It is by the Arabians called *kunbuth*, from an animal, which, as they inform us, perpetually moves up and down on the surface of stagnant waters.

The opposite of this erratic *melancholy* is the apoplectic *melancholy*; for as in the former the patients are restless, and wander about from one place to another, so in the latter every circumstance is reversed; for the patients appear stupid, and, being apparently destitute of a locomotive faculty, seem to be fixed to a particular place.

Authors distinguish *melancholy* into three kinds; the sad, the merry, and the mixt, partaking of the nature of both; but in all these the cause is the same, and the difference is only owing to the temperament and habit of the patient.

This distemper has, however, its more essential differences, on account of the causes from which it is produced. In some people, it seems wholly to depend upon a false prefiguration and judgment of things in the mind; and in this case it is usually habitual and incurable. In others it arises from injuries of the body; and in these it always is observed to bear a proportion to the injury or debility of the parts. This peculiar species is called hypochondriac *melancholy*; and finally, in others, it seems of a mixt nature; as when it has taken its first origin from distemperatures in the body, but is afterwards so increased by mental disorders, that even after the total removal of the corporeal ones, it still remains in all its force upon the mind. This is a too common, and very unhappy case.

This disease is varied an infinite number of ways, according to the temperament and ideas of the person affected with it. It is a species of madness, and only differs from a downright mania in degree.

Signs of it. These are a perpetual anxiety of mind, without any rational cause; a distaste and dislike to every thing, even before it comes in sight, and often a weariness even of life itself. A frequent weeping for imaginary causes, or for no cause at all. Many people, in this case, seem always to want room; they are for opening all the windows they can, and for running out into the streets or fields, thinking themselves every where imprisoned; others leave their houses, and dread being taken up for capital offences, though never guilty of any; and in others, these distemperatures of the mind are evidently joined with others of the body, such as palpitations of the heart, sighing very deeply, painful respiration, strictures of the tonic motions of the parts, tremblings, paleness of the countenance, and extenuation of the body. Sometimes, instead of these restrictions, there are frequent remissions of the same tonic motions, whence arise sudden flushings of the face, uncertain heats in the body, and a general lassitude and loss of strength. In most cases of this kind, there is an obstinate costiveness of the bowels, and the affections of the mind are increased by terrible watchfulness; and if the persons sleep a little, they are terrified with troublesome dreams all the while; if of sanguine habits, they are continually dreaming of blood, of battles, and of fires; and if of phlegmatic constitutions, of water and drowning. Dreadful apprehensions happen also between sleeping and waking, and they usually awake in agonies, with violent tremblings, and difficulty of respiration. In the merry *melancholy*, the alienations of the patient's mind are employed about chearful, and often obscene ideas; and sometimes their fancy exalts them to the state of kings and princes.

Persons subject to melancholy. These are principally men of great learning, and of sedentary lives, hypochondriac people, and such as are troubled with disorders of the spleen; and to these are to be added women subject to hysteric complaints.

Causes of it. These are principally a spissitude of the blood, and a detention of it about the vena portæ; a bad disposition of the internal parts, as a schirrous or ulcerous constitution in them, or an actually ulcerated state. Persons who are afflicted with *melancholy* from these causes, are usually subject to very unruly passions, and those of various kinds; love, fear, dejection of spirits, despair, and anger, are often very predominant in them.

A suppression of the hæmorrhoidal discharges in men, and of the menstrual ones in women, will also frequently throw them into this distemper; as will also an over-great application to study, especially on abstruse subjects; a conscientious dread from past crimes; continual disappointment in the expectations; and sometimes a timorous disposition, brought on in infancy, by the folly of nurses.

Prognostics in it. That kind of *melancholy* which is brought on by immaterial causes alone, such as that arising from too intense study, or other imaginations or effects of the mind, is always much more obstinate and difficult of cure than that which depends upon material causes, and has its origin in a distempered state of the body. The hypochondriac *melancholy* is the most easy of all to be cured, especially if the hæmorrhoidal discharges can be brought on regularly again; yet even these cases must be taken in time; for when the *melancholy*, even from such causes, is become habitual, it will remain after the cause is removed which gave them origin.

Method of treatment. Melancholy, when it depends on immaterial causes, requires physic for the mind rather than for the body; and the frequent conversation with an ingenious friend, of a calm and quiet disposition, will go farther towards a cure than a thousand medicines. Persons in this state must be as little thwarted or contradicted as possible; and whips and chains are to be avoided, unless in cases of the most extreme necessity: this is also a method equally necessary in those cases where habit has confirmed upon the mind that disorder, which at first arose merely from material causes. But when the disease not only arises, but as yet depends entirely upon material causes, the cure is easy, and is to be performed in the following manner. The primæ viæ are to be cleansed by purges, particularly those made of black hellebore; and after this the patient is to be blooded in the foot, taking away about six ounces; then the blood is to be attempered by giving, three or four times a day, powders composed of purified nitre, and the common abstorients; and after a due use of these, the parts are to be restored to their pristine tone and vigour by the milder chalybeates; the greatest care must also be taken to bring the hæmorrhoidal discharges in men, and the menstrual ones in women, to a natural and proper state; and then a sufficient quantity of weak liquors drank at meals, and a moderate degree of exercise, will bring the patient usually to an absolute state of *health*.

Hypochondriac *melancholy* always is more relieved by bleeding than by any other practice; and indeed all attempts of a cure are vain, if this be not first done; purified nitre, dissolved in small quantities in all the patient's drink, will, *in time*, be found to do great things alone, as to a cure. It is the practice of some persons to give vomits in these cases; but they often turn *melancholy* into a true MANIA.

There is a lower species of *melancholy*, called low spirits, to which persons of weak nerves are more or less subject. Generous diet, the cold bath, exercise, and amusements, are the most likely means to remove this complaint. It is much increased by solitude, and indulging gloomy

ideas, but may often be relieved by chearful company and ſprightly amuſements. When low ſpirits are owing to a weak, relaxed ſtate of the ſtomach and bowels, an infuſion of the Peruvian bark, with cinnamon or nutmeg, will be proper. Steel joined with aromatics may likewiſe be beneficial; but the greateſt advantage is to be expected from riding, and a proper diet. When this diſorder ariſes from a foulneſs of the ſtomach and inteſtines, or obſtructions in the hypochondriac viſcera, aloetic purges will be proper. The Harrowgate ſulphur has been ſometimes ſerviceable in this caſe. When low ſpirits proceed from a ſuppreſſion of the menſtrual or hæmorrhoidal flux, theſe evacuations may be reſtored, or others, as iſſues, ſetons, &c. ſubſtituted in their place. Dr. Whytt obſerves, that nothing has ſuch ſudden good effects in this caſe as bleeding. When low ſpirits have been occaſioned by long continued grief, anxiety, or diſtreſs of mind, relief muſt be ſought from agreeable company, variety of amuſements, and change of place. Perſons afflicted with this diſorder ſhould avoid every kind of exceſs, eſpecially of venery, and ſtrong liquors. Buchan's Dom. Med. p. 485, &c.

MELANCHOLY *thiſtle*. See THISTLE.

MELANCHOLY *tree*, *myſtanthus*. See *Arabian* JESSMIN.

MELANCHORYPHUS, in *Natural Hiſtory*, the name of a bird, in the neſts of which, the ancients tell us they found the caſſais or turquoiſe. This ſeems a very ridiculous ſtory, and the whole to be only founded on the reſemblance of colour between that ſtone and the eggs of this bird. It has been alſo diſputed among authors, what was meant by the *melancoryphos* of the ancients; the general opinion is, that it was that little bird which, from the blackneſs at the top of the head, we call the *black-cap*. But the ancients themſelves ſeem to have meant ſomewhat larger bird by it; for they tell us, that the ſiccdula, at a certain time of the year, changed colour, and became the *melancoryphos*, or black-crown. There is no great foundation for ſuch an opinion as this, but it may, however, ſerve to ſhew, that theſe two birds were much of a ſize.

MELANOCERASUS, a name given by ſome botanical authors to the *ſolanum lethale, or bella-donna*, a poiſonous ſort of nightſhade, with a beautiful berry, reſembling a large black cherry.

MELANOGOGUES, Μελανωγωγα, formed from μελας, *black*, and αγω, *to draw*, are ſuch medicines as are ſuppoſed particularly to purge off atra bilis or black choler. But there is no ſuch ſpecies of choler now regarded; and conſequently this diſtinction of evacuants is but little uſed.

MELANOPIPER, in the *Materia Medica*, a name given by ſome writers to the common black PEPPER.

MELANTERIA, in *Natural Hiſtory*, the name of a foſſil ſubſtance, much talked of by the ancient writers in medicine, and ſuppoſed by moſt of the moderns to have been loſt among the later ages. This, however, is an erroneous opinion; for it is really produced at this time in many parts of the world, though its reſemblance to ſome of the other foſſils, in its external appearance, has made it almoſt univerſally overlooked by the writers on theſe ſubjects. It is, in its moſt perfect ſtate, a very beautiful ſubſtance, of a cloſe, even, and regular texture, moderately heavy, and of a very beautiful yellow, like that of the fineſt gold. It is, in this ſtate, found in looſe irregular lumps, never very large, being uſually only from an ounce to two ounces in weight, and of a ſmooth, even, and poliſhed ſurface. This is the caſe when it is pure and ſolid, and it is then alſo of as bright and fine a colour on the outſide as within.

This is a ſtate, however, in which it is very rarely found; we uſually meet with it either in the form of a downy efflorescence on various ſpecies of vitriolic minerals, particularly on the common marcaſites and pyrites; or elſe in looſe, ſhattery, and friable maſſes, of rough ſurfaces, of a ſpongy texture, and of a coarſe duſky yellow; in either of theſe ſtates, however, it ſo much reſembles a more or leſs pure native ſulphur, that it is generally miſtaken for that body. It makes no effervescence with acid menſtruums; and when put into the fire, is found not to be inflammable, but calcines firſt to a whitiſh, and finally to a ſtrong red colour.

Water diſſolves a part of its ſubſtance, and this may again be procured ſeparate from the liquor, by evaporation and cryſtallization, and then it appears in form of rhomboidal bluiſh-green cryſtals.

It is found in the mines of ſome parts of the Hartz-foreſt in Germany, and is often met with on the ſides of hills in many parts of the Eaſt Indies, and in America; it is uſually miſtaken in all theſe places for a native ſulphur. Hill's Hiſt. of Foſſ. p. 627.

MELANTZANA, in *Botany*, a name given by many authors to the MAD-*apple*, called more uſually *melangena*.

MELANTHIUM, in *Botany*, a genus of the *hexandria trigynia* claſs: its characters are, that the flower has ſix petals, and that the filaments proceed from the elongated claws of the flower.

MELANURUS, in *Ichthyology*, the name of a fiſh caught in the Mediterranean, and ſometimes, though rarely, in the Britiſh ſeas, and called by ſome writers *oculata*, and *ocellata*.

It is of an oblong and rounded body, and its back very little prominent, and of a bluiſh-black; its ſides are of a ſilvery-white, but are variegated with duſky tranſverſe ſtreaks; it ſeldom exceeds five or ſix inches in length; and its tail has a remarkable black ſpot in it, whence it has its name, as it has that of *ocellatus*, from the likeneſs of its eyes.

MELAGNES, a word uſed by certain authors for a black kind of worm found in meadows, in the month of *May*, which, when bruiſed, emits an agreeable ſmell. Some alſo have called a ſmall ſpecies of beetle by the ſame name.

MELAS, μελας, *black*, is an epithet applied by ancient authors in medicine, in a peculiar ſenſe, to the colour of the ſkin; and alſo, to ſome particular remedies. In conformity hereto, in the firſt place, a perſon who has a black or fable colour preternaturally diffuſed over his ſkin, as in the black jaundice, is called *melanchrous*, or *melanchroi*.

MELASMA, a fugillation, or black mark, from a bruiſe.

MELASSES. See MOLOSSES.

MELASTOMA, in *Botany*. See *American* GOOSEBERRY-*tree*.

MELCHITES, in *Eccleſiaſtical Hiſtory*, were thoſe Chriſtians in Syria, Egypt, and the Levant, who, in the ſeventh century, though not Greeks, followed the doctrines and ceremonies of the Greek church. They were called *melchites*, i. e. *Royaliſts*, from the Hebrew *Melech*, *king*, by their adverſaries, by way of reproach, on account of their implicit ſubmiſſion to the edict of the emperor Marcian, in favour of the council of Chalcedon. For the ſame reaſon the emperor Juſtinian had the epithet Chalcedonenſis given him.

MELCHIZEDECHIANS, or MELCHISEDEKIANS, ancient ſectaries, ſo called, becauſe they raiſed *Melchizedec* above all creatures, and even above Jeſus Chriſt.

The author of this ſect was one Theodotus; whence the *Melchizedechians* become more commonly known by the name of Theodotians; all the difference between thoſe and the ſtrict Theodotians, conſiſting in that particular article relating to *Melchizedec*; who, according to them, was the great and ſupreme virtue.

This ſect was revived in Egypt towards the cloſe of the third century by Hierax. See HIERACITES. Thoſe alſo in later times, who have maintained, that *Melchizedech* was the ſon of God in a human form, may be diſtinguiſhed by this appellation. See Cunæus de Rep. Hebræorum.

MELDFEE, in our *Old Writers*, a recompence due and given to him that made the diſcovery of any breach of penal laws, committed by another perſon, called the promoter's or informer's fee.

The word is Saxon, from *meldfeoh*.

MELEAGRIS, in *Ornithology*. See TURKEY.

MELEAGRIS *Nicandri*. See GUINEA-*hen*.

MELECH, a word uſed by ſome of the chemical writers to expreſs SALT.

MELECHIL, a word ſometimes uſed as the name of the gum BDELLIUM, and ſometimes as that of the fruit of a tree of the palm-kind, much uſed by the ancients as a cordial and reſtorative. The word *melech* has the ſame double ſenſe, and both are, by the more accurate writers, determined in their meaning by the epithets annexed to them, the gum *bdellium* being called *melechil*, or *melech Judaicum*, and the fruit *melech methaſe*; yet the conſequence even of this has been more confuſion: for the later writers ſuppoſed, that the fruit was not produced by a palm-tree, but by the ſame tree which produced the gum.

MELEGEION, a word uſed by ſome writers in medicine to expreſs a fetid matter, of the conſiſtence of honey, diſcharged from old ulcers.

MELES, in *Zoology*. See BADGER.

MELET, in *Ichthyology*, a name uſed by ſome for a ſmall tranſparent ſea-fiſh, called by authors, HEPSETUS and *anguilla*, and by ſome ATHERINA.

MELETIANS, in *Eccleſiaſtical Hiſtory*, the name of a conſiderable party, who adhered to the cauſe of *Meletius*, biſhop of Lycopolis, in Upper Egypt, after he was depoſed about the year 306, by Peter, biſhop of Alexandria, upon the charge of his having ſacrificed to the gods, and having been guilty of other heinous crimes; though Epiphanius makes his only failing to have been an exceſſive levity againſt the lapſed. This diſpute, which was at firſt a pet-

personal difference between Meletius and Peter, became a religious controversy; and the *Melitian* party subsisted in the fifth century, but was condemned by the first council of Nice.

MELIA, *Μηλέα*, of the Greek writers, the name of a vegetable that often occurs in the Greek naturalists, and which has so many significations, that it is not easy to understand the authors, without being well acquainted with them. All late writers have perplexed the world by miscalling things, and thence rendering names synonymous and confused, which were at first clear and distinct; but the confusion of the senses of the word *melia* is as old as the earliest writers we are acquainted with: Theophrastus complains of it in his time.

The most common use of the word is for the *fraxinus*, or ash-tree. The ancients used to make the handles of their spears and darts of this, and therefore they sometimes called them *melea*. This word was also used as the name of a seed, called also by some, *meline*. This was of the nature of panic, and by some confounded with the panic. Suidas mentions this as different from the panic; but Diocles seems to have made them the same seed. Pliny has translated the passage from Diocles, and by an unaccountable error, has called the plant *melfrugum*, and says, that it has the same virtues with millet.

MELIA, in *Botany*, the name by which Linnæus calls the AZEDARACH, or BEAD-tree.

MELIA *terra*, in *Natural History*, a name given by some authors to the *melinum*, or white earth of the island of Melos, used among the ancients in painting; but in the works of Dioscorides and Galen signifying a substance of a very different kind; the MELINUM of the painters having been a *marle*, and the *melia terra* of the physicians a tripela.

The *terra melia* of Dioscorides, and the ancient physicians, is a dry loose and harsh earth, found in masses of different size, and lodged among the looser strata of other matter, never making a stratum of itself. It is very firm and hard, of a pale greyish white or light ash-colour, very heavy, of a loose, open, and spungy texture, and of a rough, uneven, and dusty surface. It adheres slightly to the tongue, and does not stain the hands, and leaves a dust after the handling, which is so harsh as to make a grating noise, when the fingers are afterwards rubbed together. It makes no effervescence with acids. It is found in all the islands of the Archipelago, and was used by the ancients for the same purposes with the pumices. Hill's Hist. of Foss. p. 68.

MELIANTHUS, in *Botany*. See HONEY-*Flower*.

MELICA, in *Botany*, a name given by some authors to the plant which produces the *furgum*, or *Indian* MILLET.

MELICA, in the Linnæan system of *Botany*, a genus of the *triandria digynia* class: the characters of which are, that the empalement has two valves, and is composed of two flowers; and that the rudiment of the flower is lodged among the small flowers. There are five species.

MELICA is also a word used by the ancients as the name of a food of a refrigerating and moistening quality. It seems to have been a kind of *ptisana*; for Galen, when he directs persons of a hot habit to use a refrigerating diet, among other aliments of that kind, directs the eating of *melica*, which, he says, is prepared of milk. Constantine, in his book of Agriculture, mentions *melica*, and says it was made by pouring milk into an earthen vessel, first well impregnated with boiling hot vinegar, by means of which there was a separation of the milk into whey and curd.

MELICERIOLA, a diminutive of the word MELICERIS, a small encysted tumour.

MELICERIS, *Μηλίκηρις*, a tumor, or abscess, inclosed in a cystis; consisting of matter not unlike honey: whence its name. The *meliceris* is otherwise called ATHEROMA. It gathers without pain, and gives way upon pressure, but returns again: it is to be cured by warm discutients.

MELICHLORUM, in *Natural History*, a name given by some of the ancient writers to a species of jasper, of a greenish-yellow, usually found variegated with other colours.

MELICOCCA, in *Botany*, a genus of the *octandria monogynia* class: its characters are, that the empalement is divided into four segments; that the four petals are reflexed below the calyx; that the stigma is subpeltated, and the fruit a coriaceous drupe. There is only one species.

MELILOT, in *Botany*, a species of TREFOIL: *melilot* grows naturally among corn in many parts of England, where it is a troublesome weed; and ripening about the same time with the corn, is often ground with it, being difficult to separate from it: in such case it spoils the bread, or whatever the flour is used for, by giving it a strong taste, like the plaster made from it.

Melilot is scarce ever given internally; but used externally, it is a great emollient, resolvent, and digestive. It is a good ingredient in glysters, cataplasms, and fomentations of this intention. The flowers are recommended by some in infusion, in the manner of those of chamomile, as a remedy for the *fluor albus*. It formerly gave the name to one of the officinal plasters, which received from the *melilot* a green colour and an unpleasant smell, without any addition to its efficacy.

MELINTZANIUM, in *Botany*, a name given by the later Greek writers to the plant called *strychnos* by the earlier writers of that nation. Theophrastus and all the old Greeks, use the word *strychnos*, and say there are three kinds, two of which are poisonous, and the other not. The first causing madness, the second causing sleep, and the third bearing an efculent fruit. This last is the plant we call *pomum amoris*, the fruit of which is at this time eaten by many people.

Fuchsius confesses that he does not know what to make of the word; but it is wonderful that the similitude of sound between this and the *melangcana* and *melongena* did not lead him to the knowlege of what it was, as he was acquainted with those words.

MELINUM, in *Natural History*, the name of an earth, famous in the earliest ages of painting, being the only white of the great painters of antiquity; and, according to Pliny's account, one of the colours with which alone they performed all their works.

It is a fine white marly earth, of a very compact texture, yet remarkably light; a sort of texture which must render any earth fit for the painter's use, that is of a proper colour. It is frequently found forming a stratum in the earth, lying immediately under the vegetable mould. It is of a very smooth, but not glossy surface; is very soft to the touch, adheres firmly to the tongue, is easily broken between the fingers, and stains the skin in handling. It melts readily in the mouth, and is perfectly fine, leaving not the least gritiness between the teeth. Thrown into water, it makes a great bubbling and loud hissing noise, and moulders away into a fine powder. It does not ferment with acids, and suffers no change in the fire. These are the characters by which the *melinum* of the ancients is distinguished from all the other white earths. It is still found in the same place from whence the painters of old had it, which is that from whence it has its name, the island of Milo, called Melos by the Greeks, and is common in most of the adjacent islands. It has been of late tried here as a paint, and is found not to make so bright a white as the other substances now in use among the painters, but seems not liable, like them, to turn yellow; and if so, would be worth the consideration of persons in the colour-trade, especially as it may be had in any quantities for carriage. Hill's Hist. of Fossils, p. 45.

MELINUS *color*, *Μήλινος χρώμα*, in *Antiquity*, a colour often mentioned in speaking of the habits of players. It was a reddish yellow, or the colour of ripe apples, in Greek called *μῆλα*, and their colour *μηλινος χρώμα*.

MELISSMATICO *ſpiti*. See SPITE.

MELISSA, in *Botany*. See BALM.

MELITENSIS *terra*, *earth of Malta*, in the *Materia Medica*, an earth of which there are two very different kinds, the one of the genus of the bole, the other of the marles. The latter is that known by medicinal authors under this name: the former is the Malta earth now in use: but both being brought from the same place, are confusedly called by the same name.

The Maltese bole, which is what we use now, is a fine earth, of a close compact texture, and very heavy; when dug, it is of a very pure white, but it is apt to contract a yellowness in drying, and become of a cream colour. It is of a very smooth and shining surface, scarce at all stains the skin in handling, adheres strongly to the tongue, and melts into a butter-like substance in the mouth. It makes no effervescence with aqua fortis, or any other acid menstruums, and suffers no change of colour in the fire. Hill. The Maltese marle, which is the *terra Melitensis* of medicinal authors, is a loose, crumbly, and very light earth, of an unequal and irregular texture, and, when exposed to the weather, soon falls into fine soft powder; but when preserved and dried, it becomes a loose light mass, of a dirty white colour, with a greyish cast: it is rough to the touch, adheres firmly to the tongue, is very easily crumbled to powder between the fingers, and stains the hands. Thrown into water it swells, and afterwards moulders away into a fine powder. It ferments very violently with acid menstruums.

Both kinds are found in great abundance in the island of Malta, and the latter has been much esteemed as a remedy against the bites of venomous animals, but with how much justice we cannot say. The other has supplied its place in the German shops, and is used there as a cordial, a sudorific, and astringent. Hill.

MELITTES, *Μελίτης*, in *Natural History*, an indurated clay, of a yellowish colour, but in many respects approaching to the nature of the moroctbus or French chalk;

which, when pulverized, yields with water a milky liquor, of a taſte ſomewhat like honey: whence it takes its name.

It is a ſmooth ſubſtance, of a compact texture and great weight, of a fine, even, gloſſy ſurface, ſmooth and ſoft to the touch, does not adhere to the tongue, nor ſtain the fingers; but drawn along a rough ſurface, leaves a fine ſlender white line, and ſhaved into very thin pieces, has ſome degree of tranſparence. It does not ferment with acids, and burns to a pure white.

It is found in mines of metals, and ſeems to partake pretty much of the nature of lead; having a ſweetneſs ſomewhat like that of the ſal ſaturni, but much fainter. It only differs from the galactite, in that it is milder to the taſte. See GALACTITES. The ancients uſed it in inflammations of the eyes, and to dry ulcers.

They alſo applied it externally in ulcers, and gave it inwardly as a ſpecific to people who were to ſuffer pain, ſuppoſing it would make them leſs ſenſible of it. It is at preſent very common in Italy, and probably in many other places, but is not known or regarded.

MELILITES *lapis*, a name given by ſome authors to ſome of the rounder ſpecies of *echinitæ*, from their reſembling an apple in their ſhape.

MELILTIS, *baſtard baum*, or *baum-leaved archangel*, in *Botany*, a genus of the *didynamia gymnoſpermia* claſs: its characters are, that the empalement is broader than the tube of the flower; the upper lip of the flower is plane, the lower crenated, and the antheræ cruciated. There is only one ſpecies.

MELITTOMA, a word uſed by the ancients to expreſs a ſort of ſweet-meat, or confection, made with pleaſant ingredients mixed in honey.

MELIUS *inquirendum*, in *Law*, a writ which lieth for a ſecond inquiry to be made of what lands and tenements a man died ſeiſed, where partiality is ſuſpected upon the writ called *diem clauſit extremum*.

MELLAGO, a word uſed by medicinal writers to expreſs any medicine that has the conſiſtence and ſweet taſte of honey. It is often applied to the rob, or inſpiſſated juice of fruits, mixed with ſugar in the making.

MELLE, or MULLI. The Peruvians, by gently rubbing the fruit of this tree between their hands in warm water, deprive it of all its ſweetneſs; after which they ſtrain the liquor, and leaving it a few days to ſubſide, it becomes a very tranſparent drink, and by boiling becomes an excellent kind of honey.

MELLEGUETTA, in the *Materia Medica*, a name uſed by ſome authors for the great cardamom, commonly called grain of paradiſe.

MELLINE, in *Botany*, a name given by many of the ancient writers to the garden-plant we call BAUM. It had the name *melline* from its yielding honey to the bees.

It has many other names, derived from the ſame ſource; ſuch as *apiaſtrum*, from *apis*, the bee, *melliphyllum*, the honey leaf, and from this, *melliſſophyllum*. Many alſo are of opinion, that the *amello* of Virgil is the ſame plant.

MELLISODIUM, a word uſed by ſome chemical writers to expreſs burnt lead.

MELLITTA, in *Natural Hiſtory*, the name of a genus of the *echini marini*, of the general claſs of the placentæ. The characters of the *mellita* are, that they are plain and flatted ſhells, with their edges arched and waved, and have on their ſuperficies two or more oblong apertures, which reach to the baſe. Of this genus there are two known ſpecies: 1. A ſmooth one with a circular vertex. 2. A ſcutellated kind, reſembling the ſhell of the tortoiſe, and with a pentagonal vertex. See *Tab. of Teſtaceous Animals*, N° 9.

MELOCARPUS, a word uſed by ſome of the old authors to expreſs the fruit of the ARISTOLOCHIA, or *birthwort*, uſed in ſome external applications.

MELOCHIA, in *Botany*, a genus of the *monadelphia pentandria* claſs: its characters are, that it is pentagynous, and that the fruit is a five-celled ſingle-ſeeded capſule. Linnæus reckons ſix ſpecies: Miller makes this genus a ſpecies of the corchorus or *Jew's*-MALLOW.

MELODY, *Melodia*, compounded of *μελος*, *honey*, and *ᾠδη*, *ſinging*, in *Muſic*, is the agreeable effect of different muſical ſounds, ranged or diſpoſed in a proper ſucceſſion.

Melody is the effect only of one ſingle part, voice, or inſtrument; by which it is diſtinguiſhed from *harmony*; though in common ſpeech, theſe two are frequently confounded.

Harmony is properly the agreeable reſult of the union of two or more concording muſical ſounds heard in conſonance, i. e. at one and the ſame time; ſo that harmony is the effect of two parts at leaſt: as therefore a continued ſucceſſion of muſical ſounds produces *melody*, ſo does a continued combination of theſe produce harmony.

Though the term melody be chiefly applicable to the treble, as the treble is chiefly diſtinguiſhed by its air; yet ſo far as the baſs may be made *airy*, and to ſing well, it may be alſo properly ſaid to be *melodious*. Of the twelve harmonical intervals of muſical ſounds, diſtinguiſhed by the names of *ſecond leſſer*, *ſecond greater*; *third leſſer*, *third greater*; *fourth*; *falſe fifth*, *fifth*; *ſixth leſſer*; *ſixth greater*; *ſeventh leſſer*, *ſeventh greater*, and *octave*; all *melody*, as well as harmony, are compoſed: for the octaves of each of theſe are but replications of the ſame ſound; and whatever is ſaid of any or all of theſe ſounds, is to be underſtood alſo of their octaves.

MELODY, *for the rules of*. See COMPOSITION.

MELOE, in *Botany*. See *Oil* BEETLE.

MELOLANTHUS, the name of a peculiar ſort of beetle, which is found in all parts of England, and in many other countries among trees and hedges. The French call them *hannetons*, and we *cock-cheſters*, *dorrs*, and by many other names. The name *melolanthus* is as old as Ariſtotle, and is given this creature from its feeding on the bloſſoms of the crab or wild apple. We have, of late years, had great damages done by the grubs of theſe beetles working under ground; but in Ireland they have been uſed to come in ſwarms, in certain years, in the beetle ſtate, and have been ſo terrible to that country, that the people have called them locuſts.

The firſt time they are remembered by authors to have appeared in this vaſt abundance, in that country, was in the year 1683. They then appeared in the ſouth-weſt part of the county of Galway; they appeared firſt upon the coaſt, and were brought by a ſouth weſt wind, a wind ſo common there, that it may almoſt be called the trade-wind of Iceland; from the coaſt they ſoon ſpread over the inland parts of the county, and were ſeen every where in ſuch numbers, as were ſcarce to be conceived. They never ſtirred in the day time, but were ſeen covering the leaves and branches of trees and hedges, and in many places hanging down in prodigious cluſters on one another's backs, in the manner of bees when they ſwarm. As ſoon as the ſun ſet, they uſed to leave the hedges, &c. and take wing, gathering in bodies, and making a humming confuſed noiſe like that of drums at a diſtance. They ſometimes formed bodies together, that darkened the air for three or four miles ſquare. They flew ſo low ſometimes, that it was ſcarce poſſible for a perſon going along, to make his way through them; and by ſtriking againſt the faces and necks of women and children, they did much miſchief, every one leaving a mark behind it; and thoſe of this ſex or age, who had been among them, came home all over bruiſes.

This, however, was little to the miſchief they did the fields; for though the middle of the ſummer was the ſeaſon in which they came, they had, in a few days eaten up all the leaves of the trees ſo completely, that they all looked as bare as in the depth of winter. The noiſe they made, while eating in vaſt numbers together, was like that of ſawing timber. The gardens fared no better than the hedges, for they eat up leaves, young ſtalks, and fruit, and every thing that was green and ſoft there, and left only a parcel of naked ſticks behind them. Many of the trees, thus ſtripped, wholly periſhed. Phil. Tranſ. N° 234.

MELOMELI, a word uſed by the ancients, to expreſs honey impregnated with quinces.

MELON, *melo*, in *Botany*, a ſpecies of the CUCUMBER, the Linnæan ſyſtem. Its characters are theſe: it hath male and female flowers on the ſame plant; the male flowers have a bell-ſhaped empalement of one leaf, whoſe border is terminated by five awl-ſhaped briſtles, and one bell-ſhaped petal, faſtened to the empalement, and cut into five ſegments at the brim; it hath three ſhort ſtamina inſerted in the empale-ment, joined together; two of which have bifid points: the female flowers have no ſtamina or ſummits, but have a very large oval germen, ſituated below the flower, which turns to an oval fruit with ſeveral cells, filled with oval, acute-pointed, compreſſed ſeeds, incloſed in a ſoft pulp. There is a great variety of this fruit cultivated in different parts of the world, many of them of no value, ſize being regarded too much in the markets. That ſort called the Cantaleupe *melon*, ſo called from a place in the neighbourhood of Rome, where this fruit has been long cultivated, and whither it was brought from Armenia, is in the greateſt eſteem among the curious in every part of Europe.

Beſides this, there are alſo the Romana, the Succado, the Zatte, the ſmall Portugal or Dormer, and the black Galloway *melons*, moſt of which are cultivated for an early crop.

The proper management and culture of *melons* are as follow: the ſeeds ſhould be procured from good *melons*, of the ſoundeſt ſort and higheſt flavour, produced, as ſome have adviſed, in a diſtant garden; for if ſowed on the place where it was raiſed and ripened, it is very apt to degenerate. This ſeed ſhould be kept three years before it is ſowed, but not more than ſix, and it ſhould be ſowed at two ſeaſons, or if at three, it will be ſtill better: the firſt for

for the early crop, to be raised under frames, ſhould be ſown about the middle of February; the ſecond to be raiſed in the ſame manner, is to be ſowed about the middle of March; and thoſe which are deſigned for hand or bell-glaſſes, or to be covered with oil-papers, ſhould not be ſown till about a week in April.

For thoſe of the firſt ſeaſon, the ſeeds may be ſown on the upper ſide of a cucumber-bed, if there be any; or, a proper quantity of new looſe dung muſt be provided, and thrown on a heap to ferment, and turned over, that it may acquire an equal heat, and the plants muſt be raiſed and managed like CUCUMBERS, until they are planted where they are to remain. The beds or ridges, where the plants are to remain, ſhould be placed in a warm ſituation, ſo that they may be defended from all cold and ſtrong winds, and incloſed in a good reed fence. In preparing the earth for theſe plants, the Dutch and German gardeners form a mixture of a third part of hazel loam, a third part of the ſcouring of ditches and ponds, and the ſame quantity of very rotten dung; which they mix up at leaſt one, and often two years, before they make uſe of it, frequently turning it over, ſo that the parts may be well incorporated; but the compoſt in which Mr. Miller has found *melon* plants to ſucceed beſt in England is two-thirds of freſh gentle loam, and one-third of rotten neat's dung: if theſe are mixed together one year before it is wanted, ſo as to have the benefit of a winter's froſt and ſummer's heat, obſerving to turn it over often, and never ſuffering weeds to grow upon it, this will be found equal to any compoſt whatever. Before the plants appear, there ſhould be a quantity of new dung thrown in a heap, allowing about fifteen wheelbarrows full to each light; which muſt be turned over two or three times, and in a fortnight it will be fit for uſe; when the trench muſt be dug to receive the dung, where the bed is deſigned to be made, which in a dry ground ſhould not be leſs than a foot, or a foot and a half deep. The frames ſhould then be placed over the bed to keep out the wet; but no earth ſhould be laid upon it for three or four days, till it is found of a proper temperature of heat. When this is the caſe, the earth may be laid upon it, about two inches thick, except in the middle of each light, where the plants are to be pinced, which muſt be raiſed into a hill, fifteen inches high or more, terminating in a flat cone: in two or three days after the earth is put on the bed, it will be of a proper temper to receive the plants; which ſhould be carefully taken up with a trowel, ſo as to preſerve all the fibres of their roots; or, if the beds cannot be ready for them in time, ſoon after the third or rough leaf is put out, it will be a good method to put each plant into a ſmall pot while they are young, and theſe may be plunged into the hot bed where they were raiſed, or in a cucumber-bed, where there is room; and when the bed is ready, the plants may be turned out of the pots, with the whole ball of earth to their roots: and this is the beſt method for the Cantaleupe *melon*. When the plants are placed on the top of the hills, they ſhould be gently watered once or twice, till they have taken good root; and when they are well fixed in the new beds, a greater quantity of earth ſhould be laid on the beds, preſſed down as cloſe as poſſible, and raiſed at leaſt a foot and a half thick upon the dung all over the bed; obſerving alſo to raiſe the frames, that the glaſſes may not be too near the plants, leſt the ſun ſhould ſcorch them. When the plants have four leaves, the top of the plants ſhould be pinched off with the finger and thumb, that they may put out lateral branches for producing the fruit; and when two or more of theſe lateral ſhoots are produced, they muſt alſo be pinched to force out more. The management of theſe beds is much the ſame as that of cucumbers; except that *melons* require more air, and very little water. In five or ſix weeks the plants will ſpread over the bed, and reach to the frames, when the alleys between the beds ſhould be dug out; or in caſe of one bed, a trench ſhould be made on each ſide, about four feet wide, as low as the bottom of the bed; and hot dung wheeled in for a lining, to the ſame height as the dung of the bed; this ſhould be trodden down cloſe, and covered with the ſame earth that was laid on the bed, to the thickneſs of a foot and a half or more, treading it down as cloſe as poſſible. In this way the bed will be extended to the width of twelve feet, that the roots of the plants may ſpread quite through it; and the beds will alſo require a freſh warmth, which will be of great ſervice in ſetting of the fruit. When the vines have extended ſo as to fill the frames, and want more room, the frames ſhould be raiſed up with bricks about three inches high, to admit the ſhoots of the vines to run out under them. When the fruit appears, the vines ſhould be carefully looked over three times a week; and one ſhould be choſen upon each runner, that is ſituated neareſt the ſtem, having the largeſt foot ſtalk, and appearing to be the ſtrongeſt fruit; then pinch off all the other fruit which may appear upon the ſame runner; and pinch off the end of the runner at the third joint above the fruit; and if the runner is gently pinched at the next joint above the fruit, it will ſtop the ſap, and ſet the fruit. There is alſo another method practiſed by ſome gardeners to ſet this fruit, which is the taking off ſome of the male flowers, whoſe farina is juſt ripe and fit for the purpoſe, laying them over the female fruit, and gently ſtriking with the naile the male flowers, to ſhake the farina into the female flowers; whereby they are impregnated, and the fruit will ſoon after ſwell, and manifeſt viſible ſigns of being perfectly ſet; ſo that where the plants are under frames, and the wind excluded from them, which is wanted to convey the farina from the male to the female flowers, this practice may be very neceſſary. The glaſſes of the hot-bed ſhould alſo be raiſed high, to admit a large ſhare of air to the plants, otherwiſe the fruit will not ſet; and if the ſeaſon ſhould prove very warm, the glaſſes may be frequently drawn off, eſpecially in an evening, to receive the dews, provided there is little wind ſtirring: but they ſhould not remain off the whole night, leſt the cold ſhould prove too great. When the plants have extended themſelves from under the frames, in cold weather their extremities ſhould be covered every night with mats, and the plants ſhould be watered once in a week in dry warm weather, in the alleys between the beds.

For thoſe *melons* that are raiſed under bell or hand-glaſſes, the plants ſhould be raiſed in the manner already directed, and about the latter end of April, in a forward ſeaſon, the beds may be made. For this purpoſe, a ſufficient quantity of hot dung ſhould be provided, allowing eight or nine good wheelbarrows of dung to each glaſs. For one bed extended in length, the trench ſhould be dug out three one-half feet wide, and of ſuch a length that the glaſſes may not be placed nearer than four feet to each other: in digging the trench, it ſhould be ſo ſituated, as to allow for the widening of the bed three or four feet on each ſide; the depth muſt depend on the nature of the ſoil, and when there is no danger of the beds being injured by the wet, the lower it is made, the better. When the dung, prepared as before, is laid on the bed, there ſhould be a hill for each plant, one foot and a half high, and the other part need not be covered more than four inches thick; the glaſſes ſhould then be placed over the hills, and in two or three days after the beds are made they will be fit for receiving the plants, which ſhould be removed in the manner already directed. Theſe plants muſt be watered at firſt, to ſettle the earth to their roots, and ſhaded every day, till they have taken new root; and if the nights prove cold, it will be proper to cover the glaſſes with mats, in order to preſerve the warmth of the bed. If ſeveral beds are made, they ſhould be placed at eight feet diſtance from each other. When the plants have taken good root, their tops muſt be pinched off, and the pruning muſt be the ſame as for thoſe under frames. In the day-time, when the weather is warm, the glaſſes ſhould be raiſed on the oppoſite ſide to the wind, to admit freſh air to the plants; and when they reach the ſides of the glaſſes, in favourable weather, the glaſſes muſt be ſet up on three bricks, that the vines may have room to run out under them; but when this is done, the beds ſhould be covered all over with earth to the depth of one foot and a half, and trod down as cloſe as poſſible; and in cold nights, the beds ſhould be covered with mats. And as the vines of the Cantaleupe *melons* cannot bear wet without injury, it will be neceſſary to arch the beds over with props, to ſupport the mats, that they may be ready for covering at all times when they require it. If the weather ſhould prove cold, hot dung may be laid to theſe beds in the manner directed for thoſe under frames. Some have lately raiſed their *melons* with conſiderable ſucceſs, under oiled paper; but great care muſt be taken not to keep theſe coverings too cloſe over them. And Miller adviſes to bring up the plants under hand or bell-glaſſes, till they begin to extend themſelves under the glaſſes, and, then, inſtead of the covering of mats, to put over them the paper, done over with linſeed oil.

The farther management of *melons*, after their fruit is ſet, is to keep pulling off all the ſuperfluous fruit, and to pinch off all weak runners; and alſo to turn the fruit gently twice a week, that each ſide may have equal benefit of the ſun and air. When the fruit is fully grown, care ſhould be taken to cut it at a proper time; for if it is left a few hours upon the vines, it will loſe much of its delicacy; therefore the vines ſhould be looked over at leaſt twice in a day: and if the fruit intended for the table is cut early in the morning, before the ſun has warmed it, it will be much better flavoured. but if it ſhould be neceſſary to cut any afterwards, it ſhould be put into cold ſpring water or ice, to cool it, before it is brought to table; and that cut in the morning ſhould be

kept

kept in the coolest place till it is used. The signs of this fruit's maturity are, its beginning to crack near the foot stalk, and its beginning to smell, which never fail: but the Cantaleupe *melons* seldom change their colour till they are too ripe. Miller.

Mr. Reynolds has communicated to the Society of Arts, the following method of raising *melons*, without earth, dung, or water. About a month before the seeds are sown, he prepares a bed of cast-off tanner's bark, four feet deep, six feet wide, and twelve feet in length: this he covers with four lights, so as not to admit rain or water. Marcl, he says, is a proper season for this purpose. When the bed becomes warm, which generally happens in about twenty days, a few *melon*-seeds are put into warm milk, in an earthen vessel, which is pressed down into the bark-bed, where it remains thirty-six hours, in order to promote the vegetation of the seeds. Then at equal distances he directs to open four holes in the bed, each nine inches in diameter, and five inches deep: having in readiness about a peck of pounded bark, like saw-dust, some of it to be put at the bottom of the holes, to the thickness of three inches: on this bark some of the seeds are to be placed, and pressed down with the fingers; then the seeds are covered with two inches more of the powdered bark, pressing the whole down with the hand. When the plants are advanced to a proper size, the best are chosen, and the others cast away; those that are reserved are ordered to be properly pruned, and to have as much warm air as possible during the summer. In this way, he says, he has raised as good *melons* as can be desired.

When a *melon* is perfectly fine, it is full, without any vacuity: this is known by knocking upon it; and when cut, the flesh must be dry, no water running out, only a little dew, which is to be of a fine red colour. Large *melons* are not to be coveted, but firm and well-flavoured ones. Our gardeners who raise *melons* for sale, sow the seeds of the larger rather than the good kinds, and they increase the size of these by much watering the roots; but this spoils the taste. Some of the French raise at this time particularly fine *melons*, by a method kept as a secret, but which we find, on a strict inquiry, is no other than the ingenious Mr. Quintiny's, of that nation, published near eighty years ago in our Philosophical Transactions.

The *melons* particularly proper to be treated in this manner, are those which have a thin and somewhat embroidered skin, not divided by ribs, and have a red pulp, dry and melting on the tongue, not mealy, and of a high flavour. These are what succeed in the following method, and are greatly improved in size and flavour by it.

When the seeds of this *melon* are placed in the ground, the first thing that appears is a pair of seminal leaves, or ears, as the gardeners call them. Between these two leaves there shoots, some days after, a leaf called the first leaf, or knot; and out of the same place, after some days more, there shoots another leaf, called the second knot. Out of the midst of this stalk of the second knot, there shoots a third knot: this third knot must be cut off at its insertion, without hurting the branch of the second knot from whence it grows. Out of this place there will grow, after this cutting, a branch, which will be what the gardeners call the first arm; and this arm will, in the same manner as the first plant, shoot out, first one, then a second, then a third knot; this third knot must be cut again as before, and thus the third knots are all along to be cut off, and arms or branches will grow up in the places of them, all the way in the same manner as the first; and it is at those arms that the *melons* will be produced; and they will be always good, if the foot or root be well nourished in good earth, and cherished by a good hot bed and the sun. The foot of the *melon* must never be suffered to pass into the dung, and the earth must not be watered but moderately, when it is seen to grow too dry; but in this case, it must be moderately moistened in time, lest the shoot suffer by it. Twice or three times a week is often enough to water in the driest weather, and this must always be done about sunset; and when the heat of the sun is too violent, the *melons* must be covered with straw-mats from eleven in the morning to about two in the afternoon. When it rains much, the *melons* must also be covered, lest it hurt them by too much moisture. Phil. Trans. N° 45.

If the root produce too many branches, the weakest are to be cut off, and only three or four left; and those which are left are to be such as have their knots closest to one another. When the plants are removed from the seed-bed to the place where they are to stand, if they are very strong, they should be planted single; but if otherwise, two are to be set in each hole.

When they are planted single, the two branches, which always grow on each side from the base of the seed-leaves, are to be left on; but when two plants are set together, these branches are to be cut off, otherwise all the branches will be too numerous, and they will entangle and spoil one another.

When the *melons* are knit, two of them only are to be left upon each foot, choosing those which are best placed, and next to the first and principal stalk, that is, to the heart of the foot. None but fair fruits are to be left, and such as have a thick and short tail; and the foot of the *melon* must be short, well trussed, and not far distant from the ground. *Melons* of a long stem, and having the stalk of the leaf too long and slender, are never vigorous.

All the superfluous branches must be cut off from time to time, as they shoot out.

There sometimes shoots out a branch more than is here mentioned, between the two seed-leaves or ears. If this is strong and vigorous it is to be kept on, but if weakly, it is best to take it off, for it will never bear good fruit.

MELON-*seed*. We read of *melon*-seeds thirty-three years old, vegetating and producing a fine number of plants. Phil. Trans. N° 475. sect. 6. and in N° 464. we read of *melon*-seeds forty-three years old, producing fruit.

Melon-seed is cooling and diuretic, and has the same virtues with the other cold seeds, as they are called. See GOURD.

MELONS, *petrified*, a name given by the people who have written books of travels, &c. to certain stones found on mount Carmel. The monks who inhabit that mountain at this time, and who pretend to be the followers of Elias the prophet, tell a legendary story about these stones, which has given occasion to the name. They say, that when Elias lived on that mount, a certain gardener passing by his cave with *melons*, the prophet asked one of them; but the fellow replying, that they were not *melons*, but stones that he carried, the prophet miraculously fulfilled the saying, and converted them into stones. Travellers who are fond of these stories were usually glad to pick up one of these sacred stones as they went on; and the monks have been careful enough to gather all they could find for the better opportunity of obliging their visiters; so that though they were once very common, they are now only to be had by the favour of these people.

Breynius is the only author who has given a good account of them; he says, that they are spheric or spheroidal stones, of various sizes, from that of a hen's egg to that of the largest *melon*, or even more than that. They are generally found bedded in a very hard sand-stone, of a grey-ish or ash-colour; but they come out whole on breaking the stone, and are of a smooth surface; a grey-ish colour, or sometimes a brownish ferruginous hue. When they are broken, there is always a cavity found in them, sometimes regular and even, sometimes very irregular, and generally proportioned to the bigness of the stone. This cavity is lined on both sides with minute crystals, which are very bright and pellucid, and have their points standing toward the centre of the cavity. The substance of the *stone* itself approaches to the nature of marble, of a yellowish colour, and capable of a good polish; when wrought looking very like the Florentine marble. This is a cruft of about half an inch or an inch in thickness, according to the bigness of the stone, and sometimes this is covered with a paler-coloured cruft, of the thickness of a straw, which in some degree resembles the bark or rind of the fruit. These stones are truly a sort of concave natural nodules, of the nature of our hollow flints. They have had no fruit for their matrix, nor have ever had any of the ribs and furrows which the *melon* has, nor any mark of the stalk; and within they have neither the natural divisions of the *melon*, nor any thing resembling the seeds. It is not only the want of many parts absolutely essential to the fruit supposed to be petrified, which shews that opinion to be erroneous; but the course of nature, in petrifactions in general, argues also greatly against it.

The things we meet with, in this state, are all of them such as are naturally hard, dry, and permanent, and none of the tender and succulent bodies, such as the *melon*, and the like fleshy fruits, which must necessarily rot in the water that conveys the stony matter, before it could at all enter their pores. And the stones are certainly analogous to those concave nodules of a ferruginous colour, in the cavities of which amethysts are produced; and to that genus of stones which Woodward calls concave crystalline balls, common in many parts of the world.

The fallacy of an extravagant opinion in regard to fossils of any particular form, is not peculiar to these stones, as witness the fossil shells petrified and found [illegible] which from their flat and roundish shape, are [illegible] the lentiles, which the children of Israel eat [illegible] ing the pyramids: the *cornua Ammonis*, which [illegible] mains of a sea-shell, and yet is supposed to [illegible] serpent; the *autumi miracules*, which are the [illegible] of shell-fish, but are generally supposed by the vulgar, about

about the places where they are found, to be medals and coins petrified with lying in the earth, and many the like follies. Breyn. de Melon. Petr. Mont. Caran.

MELON-*thistle*. See *Melon* THISTLE.

MELON, *water*, or CITRUL, *anguria*, in *Botany*. Its characters are these: it has male and female flowers on the same plant; which are both of them of the open bell-shaped kind, of one leaf; the male flowers have three short stamina joined together; the female flowers rest upon an oval germen, which becomes an oblong fleshy fruit; having five cells filled with compressed seeds, rounded at the extremities. There is one species which is cultivated in warm countries, and is much esteemed for its cooling fruit.

Linnæus has joined the citrul to the GOURD; and the *anguria* to the CUCUMBER, and made a distinct genus of the *anguria*, in the class of *monœcia diandria*, having male and female flowers, the empalement of each being divided into five segments, and the flower bearing five petals; the fruit is a double-celled polyspermous apple. Of this genus he reckons three species.

There is little difference in cultivation required between this and the musk *melon*.

The seeds have the same medicinal qualities ascribed to them, as those of the gourd.

MELONGENA, in *Botany*, a species of the solanum or NIGHT-SHADE. See MAD-*Apple*.

MELOPŒIA, a name given by the ancients to that part of MUSIC, which answers to the HARMONICA.

MELOPEPO, *calabash*, in *Botany*, a species of the *cucurbita* or GOURD. Some make this a distinct genus of plants, of a middle nature, as their name expresses, between the melon and the pompion.

The species of this genus, enumerated by Mr. Tournefort, are fourteen.

MELOTIS, a word used by the chirurgical writers to express a small probe, properly one intended to be used only to the ear.

MELOTHRIA, *small creeping cucumber*, in *Botany*, a genus of the *triandria monogynia* class: its characters are, that the empalement is of one leaf, bell-shaped, and cut slightly at the brim into five parts; the flower is wheel-shaped, having a tube of the length of the empalement; in the centre of the flower is situated the pointal, supporting a cylindrical style, accompanied by three conical stamina, inserted in the tube of the flower, and extended to the same length; the pointal becomes an oval small berry, having three divisions, in which are lodged small flat seeds. There is only one species.

MELPOMENE, the name of one of the nine MUSES; who is represented with a mask to denote her presiding over the stage; and distinguished from THALIA, the comic Muse, by greater dignity in her look, stature, and dress. *Melpomene* was supposed to preside over all melancholy subjects, as well as tragedy. See Horace, lib. i. od. 24. v. 4. lib. iii. od. 30. v. ult.

MELT. See MILT.

MELTING-*cone*, in *Assaying*, is a small vessel made of copper or brass, of a conic figure, and of a nicely polished surface within. Its use is to receive melted metals, and serve for their precipitation, which is effected, when two bodies melted together, and yet not mixing perfectly with one another in the fusion, separate in the cooling into two strata, on account of their different specific gravity. This precipitation might be made in the same vessel in which the fusion is performed; but then the melting-pot or crucible must be broken every time to get it out, whereas the conic shape, and polished surface of this vessel, makes it easily got out without violence. The shape of this vessel is also of another use in the operation; for by means of it, the heavy matter subsiding to a point, is formed into a perfect and separate regulus, even where the whole quantity, as is very frequently the case, has been but very small.

When the quantity of the melted matter is great, it is common to use, instead of this cone, a large brass or iron mortar, or any other conveniently shaped brass or iron vessel. It is necessary, when the cone is of brass, to be cautious that it be not made too hot; for the brittleness of that metal, when hot, makes it easily break on the striking with any force on that occasion, to make the melted mass fall out.

These, and all other moulds for the receiving melted metals, must always be well heated before the mass is poured into them, lest they should have contracted a moisture from the air, or have been wetted by accident; in which case the melted metal will be thrown out of them with great violence and danger. They ought also to be smeared over with tallow on their inside, that the regulus may be the more easily taken out of them, and the surface of the mould not corroded by the melted mass poured in.

If a very large quantity of a metal is, however, to be received into them, and especially if any thing sulphureous have place among it, this caution of tallowing the moulds does not prove sufficient; for the large quantity of the mass makes it continue hot so long, that this becomes but a slight defence to the surface of the mould. In this case the assayer has recourse to a lute, reduced to a thin pap with water, which being applied in form of a very thin crust, all over the inside of the cone, or mould, soon dries up indeed, but always preserves the sides of the vessel from the corrosion of the mass. And this caution is found necessary, even when pure copper is melted alone, without any mixture of sulphur. See *Tab.* II. *of Chemistry*, N° 25.

MELTING *fire*. See FIRE.

MELTING, *surveyor of*. See SURVEYOR.

MEMECYLON, in *Botany*, a name by which some authors have called the *arbutus*, or strawberry-tree, a shrub preserved in the gardens of the curious. Ger. Emac. Ind. 2.

MEMECYLON, in the Linnæan system of *Botany*, is a distinct genus of the *octandria monogynia* class: its characters are, that the empalement has an entire margin, and the flower a single petal; the fruit is a berry crowned with a cylindric empalement. There is only one species.

MEMAICULA, in the *Materia Medica of the Ancients*, a name given to a fruit, ordered in some compositions as an astringent and a cooler. When the Greek writers use this word, their Latin translators usually render it by the word *unedo*. Pliny says, that *unedo* is the name of the fruit of the *arbutus*, or strawberry-tree; but we find the earliest Latin writers do not countenance this. Varro calls the fruit of the *arbutus* by the name *arbutus*, as he does the fruit of the mulberry or morus, by the name *morus*. And it seems to have been contrary to the general custom of the times to have imposed a name upon a fruit, different from that of the tree which bore it. Some of the commentators say that the *memaicula*, or *unedo* was no other than the common wood-strawberry; and Ægineta in one place says, that the fruit of the *camarus*, that is, of the *arbutus*, was called *memaicula*; but in another place he gives a much better explication of the word, saying, that some of the Greeks used it as the name of the fruit of the CORNUS *mas*, or male cornel-tree.

MEMBERS, in *Anatomy*, the exterior parts, arising from the trunk or body of an animal, like the boughs from the trunk of a tree.

In which sense, *members*, *membra*, amount to much the same with *limbs*, *artus*: though some make a difference between the two; restraining *members* more immediately to the fleshy parts which cover the limbs, and artus to the bones and nerves. Physicians divide the body into three regions or venters; the head, the breast, and the lower ventricle; and the extremities, which are the *members*.

MEMBER, in *Architecture*, denotes any part of a building; as a frieze, cornice, or the like.

MEMBER is sometimes also used for MOULDING.

MEMBER, in *Grammar*, is applied to the parts of a period, or sentence.

MEMBER is also used to denote some particular order or rank in a state or government: thus we say, *member* of a corporation, *member* of parliament, *member* of the council, &c.

MEMBERED, or MEMBRED, in *Heraldry*, is when the beak, or legs, or feet of an eagle, griffin, or other bird, are of a different colour from the rest of the body.

MEMBRANA, in *Anatomy*. See MEMBRANE.

MEMBRANA *carnosa*. See PANNICULUS, &c.

MEMBRANA *nictitans*. See NICTITATING.

MEMBRANA *tympani*. See TYMPANUM and FORAMEN.

MEMBRANA *urinaria*. See ALLANTOIS.

MEMBRANE, MEMBRANA, in *Anatomy*, a similar part of an animal body; being a thin, white, flexible, expanded skin, formed of several sorts of fibres interwoven together, and serving to cover, or wrap up, certain parts of the body.

The *membranes* of the body are various; and variously denominated. Such are the periosteum pleura, pericardium, peritonæum, &c. which see under their proper articles. Such also are the *adiposa*, *carnosa*, and *nictitating*.

Those *membranes* which serve as integuments or covers of vessels, are called *coats*, or *tunics*; and those which cover the brain, are, by a peculiar name, called *meninges*. The fibres of *membranes* give them an elasticity, whereby they can contract, and closely grasp the parts they contain; and their nervous fibres give them also an exquisite sense, which is the cause of their contractions. They can therefore scarcely suffer the sharpness of medicines, and they are difficultly united, when wounded. In their texture, there is a number of small glands, which separate

an humour, fit for moiſtening the parts they contain. By reaſon of the fineneſs and tranſparency of the *membranes*, the ramifications of the blood-veſſels are more apparently ſeen in them, than in any other part of the body: here the innumerable diviſions, windings and turnings, ſerpentine progreſſions, and frequent inoculations, not only of veins and arteries together, but alſo of veins with veins, and arteries with arteries, make a moſt agreeable embroidery, and delicate net-work, covering the whole *membrane*.

The uſe of the *membranes* is to cover and wrap up the parts, and ſtrengthen them; to ſave them from external injuries; to preſerve the natural heat; to join one part to another; to ſuſtain ſmall veſſels, and the nerves which run through their duplicatures; to ſtop the returning of the humours in their veſſels, as the valves ſtop the returning of the blood in the veins and heart; of the chyle in the thoracic duct; and of the lympha in the lymphatic veſſels.

Anatomiſts generally aſſert, that there is a *membrana communis muſculorum*, or *membrane* common to all the muſcles; being led into that miſtake by the aponeuroſis of ſeveral; whereas, upon ſtricter obſervation, there is no ſuch thing to be found.

The *membrana propria muſculorum* is that which immediately covers all and every one of the fibres of a muſcle, and is cloſely tacked to them. There is another common *membrane*, called *membrana communis faſciculorum*; which is a thin *membrane*, accompanying almoſt all the veſſels of the body. See MUSCULAR *Membrane*.

All theſe *membranes* receive veins, arteries, and nerves, from the parts which are neareſt to them.

Mr. Leewenhoeck has been at the pains of examining with great nicety, the fine *membranes* which incloſe the faſciculi or ſmall bundles of fibres of which a muſcle is compoſed. Between theſe faſciculi the *membrane* is of a conſiderable thickneſs, but it divides itſelf every way into very fine and ſmall branches. This *membrane* is evidently compoſed of a number of ſmall veſſels, and theſe may be diſtinguiſhed not only in its thick parts, but even where it is ever ſo ſmall and fine, ſo far as the microſcope can trace it; but this is not ſo far as might be wiſhed; for the *membrane* ſtill divides itſelf in its progreſs into more and more ramifications, and where it envelopes only a ſingle fibre, is not to be diſtinguiſhed with any degree of preciſion, even with the beſt microſcopes. The ſmall veſſels extended through this *membrane*, are doubtleſs intended to convey nouriſhment to it; but it is very certain that the globules of blood can never paſs into ſuch ſmall canals. Phil. Tranſ. N° 322. p. 140.

MEMBRANE, *adipoſe*, in *Anatomy*, denotes a membrane inveſting the body, immediately under the cutis; ſuppoſed to be the baſis of the fat, which is lodged in the ſpaces between its fibres, and in peculiar cells formed herein.

Anatomiſts are divided as to the reality of this *membrane*; moſt of the later writers taking it to be no other than the exterior *membrane* of the membrana carnoſa, or muſculorum communis.

It was the opinion of Boerhaave, that the ſeat of the *lues venerea*, or pox, was in the *membrana adipoſa*. There are many ſeeming difficulties which have prevented the generality of the learned world from giving into this; but there have been ſeveral particular caſes, the ſymptoms of which ſeem to prove it really to be ſo.

Of theſe Dr. Huxham gives one, which alone may ſeem ſufficient to prove the reality of it. This is of a gentleman of about twenty-ſeven years of age, and of a hot bilious conſtitution, who ſome years before his death had got a gonorrhœa, and before that was cured, a ſecond, and after that a third; and after all theſe, had frequent impure converſations with the negro women in the Weſt Indies, who probably had that worſt ſpecies of pox, the yaws. He had, after this, a terrible itching under his ſkin, and a very ſtinking breath, and ſpit corrupt matter, but had no running ulcer, bubo, node, or other of the common ſymptoms of a confirmed pox; but after repeating his raſh conduct with ſome women in England, he had a gonorrhœa, of which he could not get cured, for a bubo appeared in the groin, and verrucoſe ſwellings about the anus.

One of theſe breaking diſcharged a great quantity of matter, and after that others appeared, the bubo would not ſuppurate, and ſcabs appeared in ſeveral parts of his body. He was fumigated with cinnabar, and a ſalivation propoſed; but after taking at three ſive drams of calomel, he had not the leaſt ſoreneſs of the gums, though that medicine had not purged nor vomited him. At length turbith vomits, and large doſes of mercurials, to which he had been much accuſtomed before, brought on a ſoreneſs of the mouth; but the ſpitting was tough, and did not amount to a pint a day. During this courſe the ſcaly eruptions increaſed, and he was at length covered with them all over, and his limbs ſwelled, and even burſt in many places, the fiſſures diſcharging a ſtinking ichorous matter.

Hot baths and mercurial ointments were uſed on this, but the diſeaſe ſtill increaſed under theſe means; the ſcales grew ſo ſtiff, that he could not move his limbs, and ulcers appeared in many parts, particularly a large tumor on each breaſt, which diſcharged vaſt quantities of an oily ſtinking matter. It was obſervable, that where theſe tumors and ulcers appeared, they only ran under the ſkin, being entirely ſeated in and feeding on the *membrana adipoſa*, ſo that the muſcles and tendons underneath appeared as fair and florid as in the moſt healthy conſtitution.

It was now plain, that mercury could do nothing toward a cure in any form, and the old method of ſweating was attempted with warm baths, to looſen the ſcales; by this means they came off apace in the manner of thoſe of the confluent ſmall-pox, but larger, ſome of theſe being four or five inches over. In a week's time, the coat of mail was cleared off, and his breath became ſweet; but the ulcers ſtill diſcharging great quantities, and notwithſtanding all that had been done, two large ſhankers appeared on the glans, and a bubo in each groin: he was alſo ſeized with a cough, and ſpit purulent and bloody matter. It was evident that the whole *membrana adipoſa* had been conſumed from the external part of the body, and the diſeaſe now began to ſeize on that part of it which inveſted the more vital parts; but nature could ſupport it no longer, and he died in the moſt extreme degree of a pocky conſumption. It is obſervable that not one bone in the whole body appeared to be touched, though he died with more than forty ulcers upon him. Phil. Tranſ. N° 460. p. 671.

MEMBRANES *of the eye*. See EYE.

MEMBRANE, *nictitating*. See NICTITATING.

MEMBRANACEOUS *leaf*. See LEAF.

MEMBRANOSA *armilla*. See ARMILLA.

MEMBRANOSUS, or *muſculus faſciæ latæ*, in *Anatomy*, is a ſmall and pretty long muſcle, ſituated a little obliquely upward and downward on the fore part of the hip. It is fixed above to the outſide of the anterior ſuperior ſpine of the os ilium, between the inſertions of the glutæus medius, and ſartorius. From thence its fleſhy fibres run down a little obliquely backward, forming a very flat body, four fingers breadth in length, and two in breadth, which lies between two lamine of the FASCIA *lata*, and is inſerted therein by ſhort tendinous fibres. Winſlow. See *Tab. Anat. Muſcul. fig.* 2. *n.* 34. *fig.* 1. *n.* 48. *fig.* 6. *n.* 34.

MEMBRAS, in *Ichthyology*, a name given by Rondeletius, Aldrovand, and other writers, to the HERRING.

MEMBRED. See MENBRED.

MEME. *Queſt of* MEME. See QUE.

MEMIREN, in the *Materia Medica*, the name by which Scraphion and ſome other authors have called the pilewort, or ſmall celandine.

MEMITHA, in the *Materia Medica of the Ancients*, the name of a plant which ſome have ſuppoſed to be our cerinthe, but others the glaucium, or yellow-horned poppy.

MEMOIRS, or MEMORIALS, a term now much in uſe for hiſtories compoſed by perſons who had ſome ſhare or concern in the tranſactions they relate, or who were eye-witneſſes of them; anſwering to what the Latins called *commentarii*.

The French are great dealers in this way of writing, and have an infinite number of books of *memoirs*, containing, for the generality, the lives, actions, intrigues, amours, &c. of the writers.

MEMOIRS is alſo uſed for a journal of the acts and proceedings of a ſociety; or a collection of the matters debated, tranſacted, &c. therein. Such are the *Memoirs* of the Royal Academy of Sciences, &c.

MEMORY, *ſubſt.* a power or faculty of the mind, which receives, retains, and exhibits again, as occaſion requires, all ſorts of ideas preſented to the underſtanding.

Of all the faculties, there is none harder to account for, or that has perplexed philoſophers more, than the *memory*. Some will have it a mere organ, as the eye, ear, &c. Dr. Hook, in an *Eſſay towards a mechanical Account of Memory*, makes it to conſiſt in a ſtock of ideas or images, formed occaſionally by the mind, out of the fine parts of the brain, and diſpoſed or laid by in order.

Deſcartes, and his followers, maintain, that the animal ſpirits, exciting a motion in the moſt delicate fibres of the brain, leave a kind of traces or footſteps, which they call *reverberance*. Hence it happens, that by paſſing ſeveral times over the ſame things, the ſpirits, becoming accuſtomed to the ſame paſſages, leave them open, ſo as to make their way without any effort or labour; and in this conſiſts the eaſe wherewith we recollect ſuch things. Thus when it is found to ſharpen the *memory*, it regard the ſpirits

spirits of the wine put the animal spirits in motion, and agitate the fibres of the brain more briskly.

Father Malebranche expresses his notion of *memory* thus: "It being granted, that all our different perceptions are "owing to changes happening in the fibres of the prin- "cipal part of the brain, wherein the soul more imme- "diately resides, the nature of the *memory* is obvious: "for as the leaves of a tree, that have been folded for "some time in a certain manner, preserve a facility or "disposition to be folded again in the same manner; so "the fibres of the brain, having once received certain "impressions by the courses of the animal spirits, and "by the action of objects, preserve, for some time, a "facility to receive the same disposition. Now it is in "this facility that *memory* consists; for we think the same "things, when the brain receives the same disposi- "tions.

"Further, as the animal spirits act sometimes more briskly, and sometimes more languidly, on the sub- "stance of the brain; and as sensible objects make much "deeper, and more lasting impressions, than the imagi- "nation alone; it is easy, on this scheme, to conceive "why we do not remember all things alike: why a "thing, for instance, seen twice, is represented more "vividly to the mind, than another seen but once: and "why things that have been seen, are usually remem- "bered more distinctly, than those that have been only "imagined, &c.

"Old men are defective in *memory*, and cannot learn any "thing without much difficulty, because they want ani- "mal spirits to make new traces, and because the fibres "of the brain are become too hard to receive, or too "moist to retain, such impressions. For the same rea- "son, those who learn with the greatest ease, forget "the soonest: in regard when the fibres are soft and "flexible, objects make a slight impression, which the "continual course of animal spirits easily wears off. On "the contrary, the fibres of those who learn slowly, "being less flexible, and less subject to be broken, the "traces are more deeply engraven, and last the longer. "From all which observations it follows, that the *memory* "is absolutely dependent on the body; being impaired "or strengthened, according to the changes that befal "the body; a fall, the transports of a fever, &c. being "frequently found to erase or blot out all the traces, to "bear away all the ideas, and to cause an universal for- "getfulness."

The chief difficulty that clogs this doctrine of *memory* is, to conceive how such an infinite number of things, as the head is stored with, should be ranged in so much order in the *memory*, as that the one should not efface the other; and how, in such a prodigious assemblage of traces im- pressed on the brain, the animal spirits should awake pre- cisely those which the mind has occasion for.

Memory, according to Mr. Locke, is, as it were, the store- house of our ideas. For the narrow mind of man not being capable of having many ideas under view and con- sideration at once, it was necessary to have a repository, in which to lay up those ideas which it may afterwards have use of. But our ideas being nothing but actual per- ceptions in the mind, which cease to be any thing when there is no perception of them; this laying up of our ideas in the repository of the *memory*, signifies no more than this; that the mind has a power, in many cases, to revive perceptions it has once had, with this additional perception annexed to them, that it has had them before. And it is by the assistance of this faculty, that we are said to have all those ideas in our understandings, which we can bring to sight, and make the objects of our thoughts, without the help of those sensible qualities which first imprinted them there.

Attention and repetition help much to the fixing ideas in our *memories*: but those which make the deepest and most lasting impressions, are those which are accompanied with pleasure and pain. Ideas but once taken in and never again repeated, are soon lost; as those of colours in such as lost their sight when very young.

The *memory* of some men is tenacious even to a miracle; but yet there seems to be a constant decay of all our ideas, even of those which are struck deepest; and in minds the most retentive; so that if they be not sometimes re- newed, the print wears out, and at last there remains nothing to be seen.

Those ideas that are often refreshed by a frequent return of the objects or actions that produce them, fix them- selves best in the *memory*, and remain longest there: such are the original qualities of bodies, viz. solidity, extension, figure, motion, &c. and those that almost constantly affect us, as heat and cold.

In *memory*, the mind is oftentimes more than barely passive; for it often sets itself on work to search some hidden ideas; sometimes they start of their own accord; and sometimes tempestuous passions tumble them out of their cells. This faculty other animals seem to have to a great degree, as well as men, as appears by birds learn- ing of tunes, and their endeavours to hit the notes right. For it seems impossible that they should endeavour to conform their voices (as it is plain they do) to notes where- of they have no idea. Essay concerning Hum. Und. book ii. chap. 10.

Dr. Hartley, agreeably to his mechanical theory of the human mind, defines *memory* to be that faculty, by which traces of sensations and ideas recur, or are recalled, in the same order and proportion, accurately or nearly, as they were once presented: and he observes, that *memory* depends entirely or chiefly on the state of the brain, which is peculiarly conformable to his notion of VIBRATIONS. The rudiments of *memory*, he says, are laid in the per- petual recurrency of the same impressions, and clusters of impressions: and thus he endeavours to account for the peculiar imperfection of the *memory* in children and aged persons, as well as for other facts pertaining to the exer- cise of this faculty. Obs. on Man, vol. i. p. 374, &c.

For the difference between *memory* and imagination, see IMAGINATION.

Seneca says of himself, that, by the mere effort of his na- tural *memory*, he was able to repeat two thousand words upon once hearing them, each in its order; though they had no dependence or connexion on each other. After which he mentions a friend of his, Portius Latro, who retained in his *memory* all the declamations he had ever spoken, and never found his *memory* fail him, even in a single word. He also mentions Cyneas, ambassador to the Romans from king Pyrrhus, who, in one day, had so well learnt the names of his spectators, that the next he saluted the whole senate, and all the populace assem- bled, each by his name. Pliny says, that Cyrus knew every soldier in his army by name; and L. Scipio, all the people of Rome. Charmipas, or rather Carneades, when required, it is said, would repeat any volume found in the libraries as readily as if he were reading. Dr. Wallis tells us, that without the assistance of pen and ink, or any thing equivalent, he was able in the dark, by mere force of *memory*, to perform arithmetical operations, as multiplication, division, extraction of roots, &c. to forty places. Particularly, that, in February 1671-2, at the request of a foreigner (by night, in bed) he proposed to himself a number of fifty-three places, and found its square root to twenty-seven places; and, without ever writing down the number, dictated it from his *memory*, at his next visit, twenty days afterwards.

The perfection of *memory* consists in two things; readily to admit the impressions or images of things; and to preserve them from oblivion, that the understanding may have recourse to them, and employ them for such pur- poses, as reason shall direct. In order to assist and im- prove this faculty, every kind of intemperance and excess must be carefully avoided; and when we would commit any thing to *memory*, our first concern should be to un- derstand it thoroughly; writing down any thing is like- wise a great advantage towards remembering it; care should likewise be taken not to overburden the *memory*: such seasons should be made choice of as are most proper for the exercise of this faculty, such are the evening and morning; and the most effectual way of gaining a good *memory*, is its constant and moderate exercise. Ward's Or. vol. ii. sect. 51.

MEMORY, *local*, or *artificial*, is an art or invention, by means whereof the *memory* is supposed to be aided, strengthened, and enlarged.

This art seems to consist in nothing else but a certain method of coupling or associating the ideas of things to be remembered, with the ideas of other things, already disposed orderly in the mind, or that are before the eyes. It is of an old standing, having been practised by many of the ancient orators; some whereof are said to have made use of paintings, images, and emblems, on this occasion; though others contented themselves with the parts, members, ornaments, furniture, and other cir- cumstances of the place where they were to speak. Muretus tells us, that a young man of Corsica pretend- ing to do wonders this way, Muretus put him to the trial: and upon dictating to him two or three thousand words, some Greek, some Latin, some Barbarous; all without any relation to each other, and the greatest part without any meaning at all; the artist immediately, and without any hesitation, or the least stumbling or displacing, re- peated them all, from first to last, in the same order wherein they had been dictated; and this done, begin- ning where he ended, he repeated them all backwards, from last to first. Adding, that this was but a slight essay of his *memory*; and that he would undertake to repeat thirty-six thousand words in the same manner.

The truth is, this art seems better calculated for retain-

ing

ing things without any coherence or dependence on one another, as mere words or sounds, &c. than for things where reason or judgment are any way required.

Raim. Lully took so much pains with it, that it now goes by his name, being called *Lully's art*.

Many have been the attempts, in all ages, to assist the *memory*. Some have had recourse to medicine, such as Horstius, Marsilius, Ficinus, Johnllon, and others. That good health, a good digestion, and a mind free from care, are helps in this respect, is an old observation. That attention, application, frequent recapitulation, are necessary, is known to every one. But whether, besides natural health and parts, and the exercise of our faculties, art may not give a farther assistance to *memory*, has been a question. Simonides is said to have been the first who found out the art of *memory*. His method was by a choice of *places* and *images*, as a repository of ideas; such, for instance, as a large house divided into several apartments, rooms, closets, &c. All these, and their order, were to be rendered extremely familiar to the imagination and *memory*. Then, whatever was to be remembered, was by some symbolical representation or another, as an anchor for navigation, to be connected with some part of the house, or other artificial repository, in a regular manner. Cicero, and Quintilian give us some account of this method, and speak of it with respect. Several moderns have attempted improvements of artificial *memory*. There was a collection of various treatises of this kind published at Leipzig; this and Bruuius's Simonides Redivivus, are commended by Morhof. Paschius gives us some account also of several authors who have treated of this art. It is certainly of use in history and chronology. The chief artifice, in this respect, is to form an artificial word, the letters of which shall signify numbers. Hence a date or *æra* may more easily be recapitulated and remembered than without such a contrivance. This invention is mentioned as a secret known to few, by Paschius. It has been prosecuted lately in England, by Dr. Grey.

The method is this: to remember any thing in history, chronology, geography, &c. a word is formed, the beginning whereof being the first syllable or syllables of the thing to be remembered, does, by frequent repetition, of course draw after it the latter parts, which is so contrived as to give the answer. Thus, in history, the deluge happened in the year before Christ 2348. This may be signified by the word *Del ecet*; Del standing for deluge, and *ecet* for 2348. How these words come to signify these things, or contribute to the remembering them, is now to be shewn.

The first thing to be done, is to learn exactly the following series of vowels and consonants, which are to represent the numerical figures, so as to be able at pleasure to form a technical word, which shall stand for any number, or to resolve a word already formed into the number it stands for.

a	*e*	*i*	*o*	*u*	*ai*	*ei*	*au*	*y*
1	2	3	4	5	6	7	8	9	0
b	*d*	*t*	*f*	*l*	*i*	*p*	*k*	*n*	*s*

Here *a* and *b* stand for 1, *e* and *d* for 2, *i* and *t* for 3, and so on. These letters are assigned arbitrarily to the respective figures, and may very easily be remembered. The first five vowels in order naturally represent 1, 2, 3, 4, 5. The diphthong *ai*, being composed of *a*, 1, and *u*, 5, stands for 6; *ei* for 7, being composed of *e*, 2 and *i*, 3; *au* for 8, being composed of *o*, 4 and *u*, 5: The diphthong *ei* will easily be remembered for 8, being the initials of the word. In like manner for the consonants, where the initials could conveniently be remined, they are made use of to signify the number, as *f* for 4, *s* for 6, and *n* for 9. The rest were assigned without any particular reason, unless that possibly *p* may be more easily remembered for 7, or *septem*, *k* for 8, or *octo*, *d* for 2, or *duo*; *b* for 1, as being the first consonant, and *l* for 5, being the Roman letter for 50, than any others that could have been put in their places. Mem. Techn. p. 2, 3. It is farther to be observed, that *s* and *y* being made use of to represent the cypher, where many cyphers meet together, as 1000, 1000000, &c. instead of a repetition of *a* or *y*, *s*, *y*, &c. let *s* stand for 100, *sh* for a thousand, and *m* for a million. Thus *ag* will be 100, *if* 300; *sug* 900, &c. *with* 1000, *um* 1000000, *fourm* 90000000, &c. Ib. p. 5. Fractions may be set down in the following manner: let *r* signify the line separating the numerator and denominator, the first coming *before*, the other *after* it; as *ire* ⅓, *urp* ¼, *pourgr* ⅑, &c. When the numerator is 1 or unit, it need not be expressed, but begin the fraction with *r*; as *re* ½, *ri* ⅓, *ro* ¼, &c. So in decimals, *roy* ·12, *roth* ·108. Ibid.

This is the principal part of the method, which consists in expressing numbers by artificial words. The application to history and chronology is also performed by artificial words. The art herein consists in making such a change in the ending of the name of a place, person, planet, coin, &c. without altering the beginning of it, as shall readily suggest the thing sought, at the same time that the beginning of the word, being preserved, shall be a leading or prompting syllable to the ending of it so changed. Thus in order to remember the years in which Cyrus, Alexander, and Julius Cæsar, founded their respective monarchies, the following words may be formed; for Cyrus, *Ceruis*; for Alexander, *Alexita*; for Julius Cæsar, *Julice*. *Uis* signifies, according to the powers assigned to the letters before mentioned, 536; *ice* is 331, and *as* is 46. Hence it will be easy to remember, that the empire of Cyrus was founded 536 years before Christ, that of Alexander 331, and that of Julius Cæsar, 46. Mem. Techn. Introd. p. viii. and ix.

For the farther application of this method, we refer to the ingenious author of the last cited book. We shall only add, that *technical verses* contribute much to the assistance of the *memory*, both as they generally contain a great deal in a little compass, and also because, being once learned, they are seldom or never forgot. The author before quoted has given us several specimens of such verses in history, chronology, geography, and astronomy, as also the Jewish, Grecian and Roman coins, weights and measures, &c. He advises his reader to form the words and verses for his own use himself; as he perhaps will better remember them than those formed by the author. Lib. citat. Introduct. p. xi.

As to Simonides' method, Quintilian says he will not deny it to be of some use; for instance, in repeating a multitude of words in the order they occur, and in things of this nature: but he thinks it of less use in getting by heart a continued oration, and in this respect rather an incumbrance. He himself advises, if the speech to be remembered be long, to get it by heart in parts, and those not very small. The partition ought chiefly to be made according to the different topics. He thinks it best to get things by heart tacitly, and if, the better to fix the attention, the words be pronounced, yet it should be in a low voice. Apt divisions help the *memory* greatly. But after all, the great art of *memory* is exercise; to get many things by heart, and daily, if possible. Nothing increases more by use, or suffers more by neglect, than the *memory*. At whatever age a man aims at the improvement of this faculty, he should patiently submit to the uneasy labour of repeating what he has read or written. Here, as in other cases, where habits are to be acquired, exercise should be increased by degrees. Quint. Inst. Orat. lib. xi. cap. 2. p. 989.

Lord Bacon enumerates several helps to *memory*, as order, artificial place, verse, whatever brings an intellectual thing to strike the senses, and those things which make an impression by means of a strong passion, as fear, surprize, &c. Those things also sink deepest, and dwell longest in the *memory*, which are impressed upon a clear mind unprejudiced either before or after the impression, as the things we learn in childhood, or think of just before going to sleep; as likewise the first times things are taken notice of.

A multitude of circumstances also, or, as it were, handles or holds to be taken, help the *memory*; as the making many breaks in writing, reading or repeating aloud: but as to this last, see Quintilian's opinion before mentioned. Those things which are expected, and raise the attention, stick better than such as pass slightly over the mind; who sees if a man reads any writing twenty times over, he will not remember it so well, as if he read it but ten times with trying between whiles to repeat it, and consulting the copy where his *memory* failed. Bacon's Works abr. vol. ii. p. 275. See also vol. i. p. 128, 136. vol. iii. p. 176. and the article MNEMONIC *Tables*.

MEMORY, *weakness of*, in many cases, is to be considered as a disease, and is looked on in that light by the medical writers, who have prescribed various remedies for it. The principal causes of this debility, are a too frequent and constrained use, or rather abuse of it, in the getting by rote numbers of words and syllables, particularly in the learning different languages; a paralytic affection in the head; violent external injuries in the same part; violent pains in the head attended with delirium's, or attending a PHRENITIS. And to these are to be added drunkenness, and an abuse of venery.

Prognostics. All debilities of *memory* are cured with great difficulty by medicines alone; and indeed this complaint is seldom removed, unless the whole frame of mind and course of life be altered; all passions avoided, and excess of every kind left off. But of all other kinds, that debility of *memory* which proceeds from a paralytic disorder of the head, particularly when that disorder affects the tongue, is found to be the most obstinate and difficult of

cure. Much sleep, or excessive waking, are equally hurtful to the *memory*, and frequently bring on an almost total loss of it.

Method of treatment. All such medicines as are of an agreeable taste or odour, are generally supposed to be of service in strengthening the *memory*; and *lignum aloes*, ambergris, and some other of the fragrant drugs, have been known to do great good. The aromatic, volatile, and spirituous medicines, also all help in this case, if taken in small doses, and continued for a long time together. The analeptics and nervine medicines are also greatly recommended, but they are seldom found of use; for among people afflicted with a debility of *memory*, many are those of robust constitutions and strong appetites, who eat already more than nature requires, and have therefore very little use for analeptics or nutritive things. Bleeding in small quantities frequently repeated, in cases where there is no contrary indication, frequently proves of great service in this case; but the *primæ viæ* are first to be cleansed before such a course is entered upon. Many greatly recommend bags of aromatics to the head, and to be constantly worn in caps; but it is much to be feared these can have but very little effect. Junck. Consp. Med. p. 682.

MEMPHITES, or *lapis* MEMPHITICUS, a sort of stone mentioned by Dioscorides, Pliny, and other natural historians, supposed to be found in Egypt, not far from the city of Cairo, the ancient Memphis, whence its name.

The property it is famed for is, that being pulverized and sneezed on any part of the body to be cut off, it deadens it so, as that the patient shall perceive no pain, they say, from the operation.

MEN.—*Adelphipæus, Mens, Pars, Quæst, Sides, Twelve, Votary* MEN. See the adjectives.

MEN *allegro*, in the *Italian Musick*, is used to denote a movement not so brisk and lively as ALLEGRO.

MEN *forte*, in the *Italian Musick*, intimates that the part to which it is added ought to be played or sung not so strong or so loud as the *tutti*.

MEN *presto*, in the *Italian Musick*, signifies less quick. See PRESTO.

MENAGE, Fr. denotes a collection of animals; whence we have derived the word *menagery*.

MENAIS, in *Botany*, a genus of the *pentandria monogynia* class. Its characters are, that it has an hypocrateriform flower, a three-leaved empalement, and that the fruit is a four-celled berry, containing a single seed. There is only one species.

MENALD *deer*, a species of the common fallow-DEER, beautifully variegated.

MENANDRIANS, the most ancient branch of Gnostics; thus called from Menander their chief, said by some, without sufficient foundation, to have been a disciple of Simon Magus, and himself a reputed magician.

He taught, that no person could be saved, unless he were baptized in his name: and he conferred a peculiar sort of baptism, which would render those who received it immortal in the next world: exhibiting himself to the world, with the phrenzy of a lunatic more than the founder of a sect, as a promised saviour. For it appears by the testimonies of Irenæus, Justin, and Tertullian, that he pretended to be one of the ÆONS sent from the pleroma, or ecclesiastical regions, to succour the souls that lay groaning under bodily oppression and servitude; and to maintain them against the violence and stratagems of the demons that hold the reins of empire in this sublunary world. As this doctrine was built upon the same foundation with that of Simon Magus, the ancient writers looked upon him as the instructor of *Menander*. See SIMONIANS.

MENDÆANS, in *Ecclesiastical History*. See HEMEROBAPTISTS.

MENDICANTS, *beggars*, a term applied to several orders of religious, who live on alms, and go a-begging from door to door.

The religious society distinguished by this appellation surpassed all the rest in the purity of its manners, the extent of its fame, the number of its privileges, and the multitude of its members. Its order was first established in the 13th century, and the members of it, by the tenor of their institution, were to remain entirely destitute of all fixed revenues and possessions; though in process of time their number became a heavy tax upon the people. Innocent III. was the first of the popes who perceived the necessity of instituting such an order, and accordingly he gave such monastic societies, as made a profession of poverty, the most distinguishing marks of his protection and favour. They were also encouraged and patronized by the succeeding pontiffs, when experience had demonstrated their public and extensive usefulness. But when it became generally known, that they had such a peculiar place in the esteem and protection of the rulers of the church, their number grew to such an enormous and unwieldy multitude, and swarmed so prodigiously in all the European provinces, that they became a burthen, not only to the people, but to the church itself. The great inconveniences that arose from the excessive multiplication of the *mendicant* orders was remedied by Gregory X. in a general council, which he assembled at Lyons, in 1272. For here all the religious orders that had sprung up after the council held at Rome, in 1215, under the pontificate of Innocent III. were suppressed; and the extravagant multitude of *mendicants*, as Gregory called them, were reduced to a smaller number, and confined to the four following societies or denominations, viz. the DOMINICANS, the FRANCISCANS, the CARMELITES, and the AUGUSTINS, or hermits of St. Augustin.

As the pontiffs allowed these four *mendicant* orders the liberty of travelling wherever they thought proper, of conversing with persons of every rank, of instructing the youth and multitude wherever they went; and as these monks exhibited, in their outward appearance and manner of life more striking marks of gravity and holiness, than were observable in the other monastic societies, they arose all at once to the very summit of fame, and were regarded with the utmost esteem and veneration through all the countries of Europe. The enthusiastic attachment to these sanctimonious beggars went so far, that, as we learn from the most authentic records, several cities were divided, or cantoned out into four parts, with a view to these four orders; the first part being assigned to the Dominicans, the second to the Franciscans, the third to the Carmelites, and the fourth to the Augustinians. The people were unwilling to receive the sacraments from any other hands than those of the *mendicants*, to whose churches they crowded to perform their devotions, while living, and were extremely desirous to deposit there also their remains, after death; nor did the influence and credit of the *mendicants* end here; for we find in the history of this, and of the succeeding ages, that they were employed, not only in spiritual matters, but also in temporal and political affairs of the greatest consequence, in composing the differences of princes, concluding treaties of peace, concerting alliances, presiding in cabinet councils, governing courts, levying taxes, and other occupations, not only remote from, but absolutely inconsistent with, the monastic character and profession. However the power of the Dominicans and Franciscans greatly surpassed that of the other two orders: insomuch that these two orders were, before the Reformation, what the JESUITS have been since that happy and glorious period, the very soul of the hierarchy, the engines of the state, the secret springs of all the motions of the one and the other, and the authors and directors of every great and important event, both in the religious and political world. By very quick progression their pride and confidence arrived at such a pitch, that they had the presumption to declare publicly, that they had a divine impulse and commission to illustrate and maintain the religion of Jesus; they treated with the utmost insolence and contempt all the different orders of the priesthood; they affirmed, without a blush, that the true method of obtaining salvation was revealed to them alone; proclaimed, with ostentation, the superior efficacy and virtue of their indulgences; and vaunted, beyond measure, their interest at the court of heaven, and their familiar connections with the Supreme Being, the Virgin Mary, and the saints in glory. By these impious wiles, they so deluded and captivated the miserable and blinded multitude, that they would not entrust any other but the *mendicants* with the care of their souls. They retained their credit and influence to such a degree, towards the close of the fourteenth century, that great numbers of both sexes, some in health, others in a state of infirmity, and others at the point of death, earnestly desired to be admitted into the *mendicant* order, which they looked upon as a sure and infallible method of rendering heaven propitious. Many made it an essential part of their last wills, that their bodies, after death, should be wrapped in old ragged Dominican or Franciscan habits, and interred among the *mendicants*. For such was the barbarous superstition and wretched ignorance of this age, that people universally believed they should readily obtain mercy from Christ, at the day of judgment, if they appeared before his tribunal associated with the *mendicant* friars.

About this time, however, they fell under an universal odium; but being resolutely protected against all opposition, whether open or secret, by the popes, who regarded them as their best friends, and most effectual supports, they suffered little or nothing from the efforts of their numerous adversaries. In the fifteenth century, besides their arrogance, which was excessive, a quarrel-

some and turbulent spirit prevailed among them, and drew upon them justly the displeasure and indignation of many. By affording refuge, at this time, to the BEGUINS in their order, they became obnoxious to the bishops, and were hereby involved in difficulties and perplexities of various kinds. They lost their credit in the sixteenth century, by their rustic impudence, their ridiculous superstitions, their ignorance, cruelty, and brutish manners. They discovered the most barbarous aversion to the arts and sciences, and expressed a like abhorrence of certain eminent and learned men, who endeavoured to open the paths of science to the pursuits of the studious youth, recommended the culture of the mind, and attacked the barbarism of the age in their writings and discourse. Their general character, together with other circumstances concurred to render a reformation desirable, and to accomplish this happy event. Mosheim's Eccl. Hist. vol. iii. passim.

Among the number of *mendicants* are also ranked the Capuchins, Recollects, Minims, and others, who are branches or derivations from the former.

MENENCHYTA, in *Medicine*, certain compositions of medicinal ingredients made for injecting into the womb, in the cure of several diseases of that part.

MENIAN *column*. See COLUMN.

MENING, in *Botany*, a name given by the people of Guinea to a plant of the *ricinus* or *palma Christi* kind, which they use in medicine: they dry and powder the leaves, and then give them to be snuffed up the nostrils, to cure all sorts of swellings or stoppages in the head. Its leaves resemble those of the finch and ivy, and are hairy; whence Petiver has named it *ricinus Guineensis hederæ quinquefoliæ Virginianæ facie foliis hirsutis*. It is not known to grow any where in America. Philos. Transf. N° 232.

MENINGES, Μηνιγγες, in *Anatomy*, the coats, or membranes, wherewith the BRAIN is invested.

The Arabs call them *mothers*; whence we usually call them in Latin the PIA and DURA MATER.

There are two *meninges*, external and internal, called *meninx crassa*, and *tenuis*.

Between the two, lies another fine transparent membrane, called *arachnoides*; but the best anatomists take this for no more than the external lamina of the pia mater.

MENINGOPHYLAX, a word used by Celsus as the name of a chirurgical instrument, contrived for guarding the membranes of the brain while the bone of the cranium is rasped or cut, after the operation of the trepan.

MENIPPEAN, *satire* MENIPPEA, a kind of satire consisting of prose and verse intermixed.

It is thus called from Menippus, a Cynic philosopher, who delighted in composing satirical letters, &c. In imitation of him, Varro also wrote satires under the title of *Satiræ Menippææ*: whence this sort of composition is also denominated *Varronian satire*.

Among the moderns, there is a famous piece under this title, first published in 1594, against the chiefs of the league, called also the *Catholicon* of Spain. It is esteemed a master-piece for the time.

MENISCUS, in *Optics*, a glass or lens, concave on one side, and convex on the other; sometimes also called *lunula*. See LENS, and OPTIC *glass*.

In a *meniscus*, if the diameter of the convexity be equal to that of the concavity, a ray, falling parallel to the axis, will continue parallel thereto after refraction.

Such a *meniscus*, therefore, will neither collect nor disperse the rays; and is therefore of no use in dioptrics.

To find the focus of a *meniscus*, the rule is, as the difference of the semidiameters of the convexity and concavity is to the semidiameter of the convexity, so is the diameter of the concavity to the distance of the focus from the *meniscus*. Hence, if the semidiameter of the concavity be triple the semidiameter of the convexity, the distance of the focus from the *meniscus* will be equal to the semidiameter; and therefore the *meniscus* will be equivalent to a lens equally convex on either side.

Again, if the semidiameter of the concavity be double that of the convexity, the distance of the focus will be equal to the diameter; and therefore the *meniscus* will be equivalent to a plano-convex lens.

If the semidiameter of the concavity be quintuple that of the concavity, the *meniscus* will be equivalent to a sphere. The semidiameter, therefore, of the concavity being given, that of the concavity required to remove the focus to any given distance from the *meniscus*, is easily found.

MENISPERMUM, in *Botany*. See MOON *seed*.

MENNONITES, a sect in the United Provinces, in most respects the same with those in other places called ANABAPTISTS.

They had their rise in 1536, when *Menno Simon*, a native of Friesland, who had been a Romish priest, and a notorious profligate, resigned his rank and office in the Romish church, and publicly embraced the communion of the Anabaptists.

Menno was born at Witmarsum, a village in the neighbourhood of Bolswert, in Friesland, in the year 1505, and died, in 1561, in the duchy of Holstein, at the country seat of a certain nobleman not far from the city of Oldesloe, who, moved with compassion by a view of the perils to which *Menno* was exposed, and the snares that were daily laid for his ruin, took him, with certain of his associates, into his protection, and gave him an asylum. The writings of *Menno*, which are almost all composed in the Dutch language, were published in folio, at Amsterdam, in the year 1651. About the year 1537, *Menno* was earnestly solicited by many of the sect with which he connected himself, to assume, among them, the rank and functions of a public teacher; and as he looked upon the persons, who made this proposal, to be exempt from the fanatical phrenzy of their brethren at Munster, (though, according to other accounts, they were originally of the same stamp, only rendered somewhat wiser by their sufferings,) he yielded to their intreaties. From this period to the end of his life, he travelled from one country to another, with his wife and children, exercising his ministry, under pressures and calamities of various kinds, that succeeded each other without interruption, and constantly exposed to the danger of falling a victim to the severity of the laws. East and West Friesland, together with the province of Groningen, were first visited by this zealous apostle of the Anabaptists; from thence he directed his course into Holland, Gelderland, Brabant, and Westphalia, continued it through the German provinces that lie on the coasts of the Baltic sea, and penetrated so far as Livonia. In all these places his ministerial labours were attended with remarkable success, and added to his sect a prodigious number of followers. Hence he is deservedly considered as the common chief of almost all the anabaptists, and the parent of the sect that still subsists under that denomination. *Menno* was a man of genius, undirected by a very sound judgment; he possessed a natural and persuasive eloquence, and such a degree of learning as made him pass for an oracle in the estimation of the multitude. He appears, moreover, to have been a man of probity, of a meek and tractable spirit, gentle in his manners, pliable and obsequious in his commerce with persons of all ranks and characters, and extremely zealous in promoting practical religion and virtue, which he recommended by his example, as well as by his precepts. The plan of doctrine and discipline drawn up by *Menno* was of a much more mild and moderate nature than that of the furious and fanatical ANABAPTISTS, whose tumultuous proceedings have been recited under that article, but somewhat more severe, though more clear and consistent than the doctrine of the wiser branches of that sect, who aimed at nothing more than the restoration of the Christian church to its primitive purity. Accordingly, he condemned the plan of ecclesiastical discipline, that was founded on the prospect of a new kingdom, to be miraculously established by Jesus Christ on the ruins of civil government and the destruction of human rulers, and which had been the fatal and pestilential source of such dreadful commotions, such execrable rebellions, and such enormous crimes. He declared, publicly, his dislike of that doctrine, which pointed out the approach of a marvellous reformation in the church by the means of a new and extraordinary effusion of the Holy Spirit. He expressed his abhorrence of the licentious tenets, which several of the anabaptists had maintained, with respect to the lawfulness of polygamy and divorce; and, finally, considered as unworthy of toleration those fanatics who were of opinion that the Holy Ghost continued to descend into the minds of many chosen believers, in an extraordinary manner as he did at the first establishment of the Christian church, and that he testified this peculiar presence to several of the faithful, by miracles, predictions, dreams, and visions of various kinds. He retained, indeed, the doctrines commonly received among the Anabaptists, in relation to the baptism of infants, the millennium, or thousand years reign of Christ upon earth, the exclusion of magistrates from the Christian church, the abolition of war, and the prohibition of oaths enjoined by our Saviour, and the unity, as well as the pernicious effects, of human science. But while *Menno* retained these doctrines in a general sense, he explained and modified them in such a manner, as made them resemble the religious tenets that were universally received in the protestant churches; and this rendered them agreeable to many, and made them appear inoffensive even to numbers who had no inclination to embrace them. It however so happened, that the nature of the doctrines

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considered in themselves, the eloquence of *Menno*, which set them off to such advantage, and the circumstances of the times, gave a high degree of credit to the religious system of this famous teacher among the Anabaptists, so that it made a rapid progress in that sect. And thus it was in consequence of the ministry of *Menno*, that the different sorts of Anabaptists agreed together in excluding from their communion the fanatics that dishonoured it, and in renouncing all tenets that were detrimental to the authority of civil government, and, by an unexpected coalition, formed themselves into one community.

Though the *Mennonites* usually pass for a sect of Anabaptists, yet M. Herman Schyn, a *Mennonite* minister, who has published their history and apology, maintains, that they are not Anabaptists, either in principle or by origin. However, nothing can be more certain than this fact, viz. that the first *Mennonite* congregations were composed of the different sorts of Anabaptists, of those who had been always inoffensive and upright, and of those who, before their conversion by the ministry of *Menno*, had been seditious fanatics: besides it is alledged, that the *Mennonites* do actually retain, at this day, some of those opinions and doctrines, which led the seditious and turbulent Anabaptists of old to the commission of so many and such enormous crimes: such particularly is the doctrine concerning the nature of Christ's kingdom, or of the church of the New Testament, though modified in such a manner as to have lost its noxious qualities, and to be no longer pernicious in its influence.

The *Mennonites* are subdivided into several sects; whereof the two principal are the *Rhinsburgers*, or FLEMINGIANS, and the WATERLANDIANS. The opinions, says Mosheim, that are held in common by the *Mennonites* seem to be all derived from this fundamental principle, that the kingdom which Christ established upon earth is a visible church or community, into which the holy and just alone are to be admitted, and which is consequently exempt from all those institutions and rules of discipline, that have been invented by human wisdom, for the correction and reformation of the wicked. This principle, indeed, was avowed by the ancient *Mennonites*, but it is now almost wholly renounced: nevertheless, from this ancient doctrine, many of the religious opinions, that distinguish the *Mennonites* from all other Christian communities, seem to be derived: in consequence of this doctrine, they admit none to the sacrament of baptism, but persons that are come to the full use of their reason, they neither admit civil rulers into their communion, nor allow any of their members to perform the functions of magistracy; they deny the lawfulness of repelling force by force, and consider war, in all its shapes, as unchristian and unjust; they entertain the utmost aversion to the execution of justice, and more especially to capital punishments; and they also refuse to confirm their testimony by an oath. The particular sentiments that divided the more considerable societies of the *Mennonites* are the following: the rigid *Mennonites*, called the FLEMINGIANS, maintain, with various degrees of rigour, the opinions of their founder *Menno*, as to the human nature of Christ, alledging that it was produced in the womb of the Virgin, by the creating power of the Holy Ghost; the obligation that binds us to wash the feet of strangers, in consequence of our Saviour's command; the necessity of excommunicating and avoiding, as one would do the plague, not only avowed sinners, but also all those who depart, even in some light instances pertaining to dress, &c. from the simplicity of their ancestors; the contempt due to human learning, and other matters of less moment. However this austere system declines, and the rigid *Mennonites* are gradually approaching towards the opinions and discipline of the more moderate, or WATERLANDIANS.

The first settlement of the *Mennonites*, in the United Provinces, was granted them by William, prince of Orange, towards the close of the fifteenth century; but it was not before the following century, that their liberty and tranquility were fixed upon solid foundations, when, by a confession of faith, published in the year 1626, they cleared themselves from the imputation of those pernicious and detestable errors that had been laid to their charge. In order to appease their intestine discords, a considerable part of the Anabaptists of Flanders, Germany, and Friesland, concluded their debates in a conference held at Amsterdam, in the year 1630, and entered into the bonds of fraternal communion, each referring to themselves a liberty of retaining certain opinions. This association was renewed and confirmed by new resolutions, in the year 1649; in consequence of which the rigorous laws of *Menno* and his successors were, in various respects, mitigated and corrected. Mosheim's Eccl. Hist. vol. iv. p. 141, &c. vol. v. p. 46. 8vo.

MENOGENIEN, in *Botany*, a name by which some authors have called the *paonia*, or common garden piony.

MENOLOGY, MENOLOGIUM, from *μην*, *month*, and *λογ*, *discourse*, in the Greek church, is much the same with MARTYROLOGY, or CALENDAR, in the Latin.

The Greek *menologium* is divided into the several months in the year; and contains an abridgment of the lives of the saints, with a bare commemoration of the names of such whose lives were never written. The Greeks have various *menologia*; and the Romans tax them with inserting divers heretics, in their *menologia*, as saints.—Baillet treats of them at large.

MENSÆ *domesticæ*. See DOMESTICUS.

MENSALIA, MENSALS, such parsonages, or livings, as were formerly united to the tables of religious houses; and therefore by canonists called *mensal* benefices. See PARSONAGE and BENEFICE.

MENSARII, among the ROMANS, officers appointed to manage the public treasury, being sometimes three, and sometimes five in number.

MENSES, CATAMENIA, in *Medicine*, the monthly evacuations from the uterus of women not with child, or not giving suck.

They are so called from *month*, *mouth*, the period wherein they return. They are also called *flowers*, *courses*, &c. By the Jewish law, a woman was unclean while the *menstrual* blood flowed; and the man who touched her, or the moveables she had touched, was declared unclean. Levit. xv.

The *menses* make one of the most curious and difficult phenomena in the whole human body; for the explanation whereof, many *hypotheses* have been framed, though the matter is yet scarcely ascertained.

It is generally agreed by all, that the necessity women are under for some extraordinary supply to compensate the expence, and support them during the time of gestation, was the final reason why this redundance at other times was given them, which continues whilst this necessity subsists, and ceases when, according to the constitution of the female frame, it is no longer required: but this is all they agree in. Some, not content with this occasion alone, will have the *menstrual* blood offend in quality more than quantity; which they argue from the pain it gives many women in the evacuation; with many other idle notions.

Others ascribe this effect to an imaginary dominion of the moon over the bodies of women. This was formerly the prevailing opinion; though the smallest reflection would have shewn the weakness of it: for, had this purgation been owing to the influence of the moon, all women, of the same age and temperament, would have found it at the same periods and revolutions of the moon, &c. at the same time; which all experience shews to be false.

There are two other opinions, which carry with them great probability, and are argued with a great deal of strength and reason; in both which, the quality of the blood is allowed to be innocent, but they still differ about the reason of its issue. The former is that of Dr. Bohn and Dr. Freind, who maintain this flux to be the *result* of a *plethora*, or plenitude; and to be evacuated only for relief against the quantity.

Dr. Freind, who has maintained the cause of a *plethora* with the greatest strength and clearness, supposes, that this *plethora* arises from a concretation in the blood-vessels of a superfluity of aliment, which, he thinks, remains over and above what is expended by the ordinary ways; and that women have this *plethora*, and not men, because their bodies are more humid, and their vessels, especially the extremities of them, more tender, and their manner of living generally more inactive, than that of men; and that these things concurring, are the occasion that women do not perspire sufficiently to carry off the superfluous alimentary parts, till they be accumulated in such quantity as to distend the vessels, and force their way through the capillary arteries of the *uterus*. It is supposed to happen to women more than the females of other species, which have the same parts, because of the *erect* posture of the former, and the *worms*, and other canals, being perpendicular to the horizon; so that the pressure of the blood is directed towards their orifices: whereas in brutes they are parallel to the horizon, and the pressure wholly is on the sides of those vessels. The *discharge*, he thinks, happens in this part rather than in any other, as being more favoured by the structure of the vessels; the arteries being very numerous, and the veins sinuous and winding, and therefore more apt to retard the impetus of the blood; and consequently, in a plethoric case, to occasion the rupture of the extremities of the vessels, which may last, till, by a sufficient discharge, the vessels are eased of their overload.

This is the substance of Dr. Freind's theory; from whence he

he very mechanically and very philosophically accounts for the symptoms.

To his argument, why women have *menses* rather than men, we may add from Boerhaave, that, in the former, the *os sacrum* is wider, and ſtands farther out, and the *os coccygis* farther in; the *ossa innominata* wider, and farther apart, and the loweſt of them, as well as the lower eminences of the *os pubes*, farther outwards than in the latter. Hence, in women, the latitude or expanſion about thoſe bones, and the capacity of the *pelvis*, is vaſtly great in proportion to thoſe of men; and yet, in a woman not pregnant, there is not much to fill this expanſe. Again, the foreſide of the thorax is ſmoother in women than in men, and the blood veſſels, lymphaties, adipoſe and nervous veſſels, membranes, and fibres, are much laxer in women than in men: wherefore all their cavities, cells, veſſels, &c. are more eaſily repleniſhed, and the humours aggregated in them; beſides, that they are found to perſpire leſs than men, and to arrive much ſooner at their maturity, or *ætas* of increaſe. To which he adds the conſideration of the ſoft pulpous texture of the uterus, and the vaſt number of veins and arteries with which it is liſted.

Hence, a healthy maid, being arrived at her growth, begins to prepare more nutriment than is required for the ſupport of the body; which, as there is not to be any farther accretion, muſt of neceſſity fill the veſſels, and eſpecially thoſe of the uterus and breaſts, they being the leaſt compreſſed. Theſe will be dilated more than the others; whence the lateral veſcules evacuating their humour into the cavity of the uterus, it will be filled and extended. Hence a pain, heat, and heavineſs, will be felt about the loins, pubes, &c. the veſſels of the uterus, at the ſame time, will be ſo dilated, as to emit blood into the cavity of the uterus, and its mouth will be lubricated and ſoftened, and blood iſſue out. As the quantity of blood is diminiſhed, the veſſels will be leſs preſſed, and will contract themſelves again cloſer, ſo as again to retain the blood, and let paſs the groſſer part of the ſerum; till at length only the uſual ſerum paſſes. Again, there are more humours prepared, which are more eaſily lodged in veſſels once dilated; and hence the *menſes* go and return at various periods in various perſons.

This hypotheſis, however plauſible, is oppoſed by Dr. Drake, who maintains, that there is no ſuch repletion, or, at leaſt that it is not neceſſary to menſtruation; arguing, that, if the *menſes* were owing to a plethora ſo accumulated, the ſymptoms would ariſe gradually, and the heavineſs, ſtiffneſs, and inactivity, neceſſary ſymptoms of a plethora, would be felt long before the period were completed, and women would begin to be heavy and indiſpoſed ſoon after evacuation, and the ſymptoms would increaſe daily; which is contrary to all experience; many women, who have them regularly and eaſily, having no warning, nor any other rule to prevent an indecent ſurprize, than the meaſure of the time; in which, ſome that have ſlipped, have been put to confuſion and ſhifts, no ways conſiſtent with the notice a plethoric body would give. He adds, that, even in thoſe who are difficultly purged this way, the ſymptoms, though very vexatious and tedious, do not make ſuch regular approaches, as a gradual accumulation neceſſarily requires. If we conſider what violent ſymptoms come on in an hour, we ſhall be extremely puzzled to find the mighty acceſſion of matter, which ſhould, in an hour or a day's time, make ſuch great alterations. According to the hypotheſis, the laſt hour contributes no more than the firſt, and of conſequence the alteration ſhould not be greater in the one than in the other, ſetting aſide the bare eruption.

This is the ſubſtance of what is argued againſt Dr. Freind's theory; which, it muſt be owned, notwithſtanding theſe objections, is ſtill the moſt rational and conſiſtent that has yet been advanced.

Thoſe who oppoſe it, give into the doctrine of fermentation, and maintain the evacuation of blood in thoſe parts to be the effect of an effervescence or ebullition of the blood. This opinion has been maintained by many, particularly by Dr. Charleton, Bale, De Graaf, and Drake; the two firſt of whom ſuppoſe a ferment peculiar to the women, which produces this flux, and affects that part only, or at leaſt principally. Dr. *Graaf*, leſs particular in his notion, only ſuppoſes an effervescence of the blood, raiſed by ſome ferment, without aſſigning how it acts, or what it is. The ſudden turgeſcence of the blood occaſioned them all to think, that it aroſe from ſomething till then extraneous to the blood, and led them to the parts principally affected to ſeek for an imaginary ferment, which no anatomical inquiry could ever ſhew, or find any receptacle for, nor any reaſoning neceſſarily infer. Again, that heat, which frequently accompanies this turgeſcence, led them to think the caſe more than a plethora, and that there was ſome extraordinary inteſtine motion at that time.

Dr. Drake improves on the doctrine of a ferment; and contends, not only that it is neceſſary there ſhould be a ferment, but a receptacle alſo for this ferment; concluding, from the ſuddenneſs and violence of the ſymptoms, that a great quantity muſt be conveyed into the blood in a ſhort time, and conſequently, that it muſt have been ready gathered in ſome receptacle, where, while it was lodged, its action was reſtrained. But he goes farther ſtill, and pretends to aſcertain the place, &c. both of the one and the other, making the gall-bladder to be the receptacle, and the bile the ferment. This liquor he thinks well adapted to raiſe a fermentation in the blood, when diſcharged into it in a quantity; and, as it is contained in a receptacle that does not admit of a continual iſſue, it may be there reſerved, till, in a certain period of time, the bladder becoming turgid and full, through the compreſſion of the incumbent viſcera, it emits the gall; which, by the way of the lacteals, inſinuating itſelf into the blood, may raiſe that effervescence, which occaſions the aperture of the uterine arteries.

To confirm this, he alledges, that perſons of a bilious conſtitution have the *menſes* either more plentifully, or more frequently, than others; and that diſtempers, manifeſtly bilious, are attended with ſymptoms reſembling thoſe of women labouring under difficult menſtruation. If it be objected, that, on this principle, men ſhould have *menſes* as well as women, he anſwers, that men do not abound in bile ſo much as women, the pores of the former being more open, and carrying off more of the ſerous part of the blood, which is the vehicle of all the other humours; and, conſequently, a greater part of each is diſcharged through them than in women, wherein the ſuperfluity muſt either continue to circulate with the blood, or be gathered into proper receptacles; which is the caſe in the bile. The ſame reaſon he gives why menſtruation ſhould not be in brutes; the pores of theſe being manifeſtly more open than thoſe of women, as appears from the quantity of hair which they bear; for the vegetation whereof, a large cavity, and a wider aperture of the glands, is neceſſary, than where no ſuch thing is produced; yet there is ſome difference between the males and females even among theſe, ſome of the latter having their *menſes*, though not ſo often, nor in the ſame form and quantity, as women.

He adds, that the ſeveral phenomena of the *menſes*, whether in a natural, a regular, or diſeaſed caſe, flow naturally and readily from this hypotheſis; and that whatever may be accounted for from a plethora, or from any particular ferment, may, without any ſtraining, be applied to this.

Females generally begin to menſtruate about the age of fourteen or fifteen, and ceaſe about fifty; though inſtances have occurred of their commencing ſooner and continuing longer. There are, therefore, two critical periods in the lives of females, which require their particular attention. In order to eſcape the CHLOROSIS, and other ſimilar diſeaſes, incident to that period of life when the *menſes* commence, they ſhould avoid indolence and inactivity, and accuſtom themſelves to exerciſe in the open air, as much as poſſible. Unwholeſome food, dulneſs of diſpoſition, and ſtrait cloaths are very injurious to females at this ſeaſon. The diſcharge in the beginning is ſeldom ſo inſtantaneous as to ſurpriſe them unawares. The eruption is generally preceded by ſymptoms that indicate its approach; ſuch as a ſenſe of heat, weight, and dull pain in the loins; diſtenſion and hardneſs of the breaſts; head ach; loſs of appetite; laſſitude; paleneſs of the countenance; and ſometimes a ſlight degree of fever. When theſe ſymptoms occur, every thing ſhould be carefully avoided which may obſtruct the menſtrual flux, and all means uſed to promote it: as ſitting frequently over the fleams of warm water, drinking warm diluting liquors, &c. When the *menſes* have begun to flow, great care ſhould be taken to avoid every thing that tends to obſtruct them; ſuch as filth, and all kinds of food that are hard of digeſtion, and cold, acid liquors. Cold is likewiſe hurtful at this period, as alſo anger, fear, grief, and other affections of the mind: from whatever cauſe this flux is obſtructed, except in the ſtate of pregnancy, proper means ſhould be uſed to reſtore it: and if exerciſe in a dry, open, and rather cool air, wholeſome diet, generous liquors in a weak and languid ſtate of the body, cheerful company, and amuſement fail, recourſe muſt be had to medicine. When obſtructions proceed from a weak relaxed ſtate of the ſolids, ſuch medicines as tend to promote digeſtion, to brace the ſolids, and aſſiſt the body in preparing good blood, ought to be uſed. The principal of theſe are iron and Peruvian bark, with other bitter and aſtringent medicines. Filings of iron may be infuſed in wine or ale, two or three ounces to a

quart; and after it has ſtood for two or three weeks, it may be filtered, and about half a wine glaſs of it taken twice a day: or, prepared ſteel may be taken in the doſe of half a dram, mixed with a little honey or treacle, three or four times a day. As the breathing of ſome patients is affected by the uſe of iron, the following form of adminiſtering it will generally ſucceed: ℞ lim. mart. ʒvi. gum. ammon. ſapon. Venet. ad ʒſi. ſpec. arom. ʒi. aloes ʒß. ſyrup. q. ſ. f. pil. mediocr. The bark and other bitters may be taken in ſubſtance or infuſion, as is moſt agreeable to the patient. When obſtructions proceed from a viſcid ſtate of the blood, and for women of a groſs or full habit, evacuations, and ſuch medicines as attenuate the humours, are neceſſary. The patient in this caſe ought to be bled, to bathe her feet frequently in warm water, to take now and then a cooling purge, and to live upon a ſpare thin diet. Her drink ſhould be whey, water, or ſmall beer, and ſhe ought to take ſufficient exerciſe. A tea-ſpoonful of the tincture of black hellebore may alſo be taken twice a day in a cup of warm water. The ſal diureticus may be given from ʒß to ʒji, three times a day. A ſtuggiſh, viſcid ſerum, may alſo be corrected by repeated doſes of tinctura ſacra, or of the pil. Ruſſ. adminiſtered ſo as to keep the bowels from coſtiveneſs. When the head-ach and ſickneſs in the ſtomach affect the patients, Dr. Aſton extols the uſe of borax, given in a fluid ſtate. Opiates are often very uſeful for removing thoſe ſpaſms which are excited by a painful approach of the *menſes*, and which frequently retard or obſtruct their courſe. This caſe of painful menſtruation deſerves particular attention; becauſe it impairs the health of patients by its preſent effects, and ſeems to render them leſs prolific in future. Dr. Fothergill has afforded relief to ſeveral by the following proceſs: let the patient have by her a few pills, conſiſting of extr. theb. gr. i. each, made ſoft with a little of any kind of conſerve. She is to take one of theſe pills the moment ſhe finds the pain attending this diſcharge coming on. A pill may be taken every hour till the pain goes off; and more than two of theſe pills will ſeldom be required; but it muſt be taken in ſuch a quantity as to mitigate the pain. Let the patient keep either in or upon the bed, at leaſt in a recumbent poſture; drinking moderately of any diluting liquor, as the herb teas, weak whey, or thin broth. When the time is paſt, a coarſe of chalybeate bitters, in ſmall doſes, may be continued, till within a few days of the return; and the belly ſhould be kept open by ſome proper laxative; two or three grains of cathart. extract. with half the quantity of calx antimonii illota, taken every night, will often ſucceed perfectly well. This excruciating pain ſeems to be ſpaſmodic, and to proceed from the extreme irritability of the uterine ſyſtem. In caſes, both of the retention and ſuppreſſion of the *menſes*, i. e. when they do not begin to flow at the period of life in which they may be expected, and when they ceaſe, from other cauſes beſides conception, to return at their uſual and proper periods, the application of electricity is a very efficacious and certain remedy. Mr. Birch, in his Conſiderations on the Efficacy of Electricity for removing Female Obſtructions, 1779, has enumerated ſeven caſes, in which the electrical power has been very ſucceſsfully employed. With reſpect to the mode of applying this remedy, Mr. Cavallo, in his Eſſay on the Theory and Practice of Medical Electricity, 1780, p. 63, ſays, that ſmall ſhocks, i. e. of about one-twentieth of an inch, may be ſent through the pelvis; ſparks may be taken through the cloaths from the parts adjacent to the ſeat of the diſeaſe; and alſo the electric fluid may be tranſmitted, by applying the metallic or wooden extremities of two directors (ſee ELECTRICITY) to the hips, in contact with the cloaths, part of which may be removed, in caſe they are too thick. The number of ſhocks may be about twelve or fourteen; the other applications may be continued for two or three minutes. But either ſtrong ſhocks, or a ſtronger application of electricity than the patient can conveniently bear, ſhould be carefully avoided; for by thoſe means, ſometimes more than a ſufficient diſcharge is occaſioned, which is not eaſily cured.

Mr. Birch adviſes one of the directors to be introduced through the pocket, or down the back of the ſtays, ſo as to reach to the lower part of the ſpine, nearly upon the os ſacrum, while the other is placed below the peak of the ſtays. When the directors are thus ſituated, the ſhock is expected to paſs immediately through that part of the pelvis which is included between the directors. One of them is then removed from under the peak of the ſtays, and placed under one foot, and afterwards under the other. Some lateral ſtrokes are afterwards tranſmitted acroſs the pelvis, after having introduced a director through each pocket hole.

When the obſtruction of the *menſes* is the effect of other maladies, inſtead of giving medicines to force that diſcharge, which might be dangerous, endeavours ſhould be uſed to reſtore the patient's health and ſtrength. When that is effected, the other will return of courſe.

When the menſtrual flux is too great, the patient becomes weak, the colour pale, the appetite and digeſtion are bad, and oedematous ſwellings of the feet, dropſies, and conſumptions, often enſue. This frequently happens to women about the age of forty-five or fifty, and is very difficult of cure. It may proceed from a ſedentary life; a full diet, conſiſting chiefly of ſalted, high ſeaſoned, or acrid food; the uſe of ſpirituous liquors; exceſſive fatigue; relaxation; a diſſolved ſtate of the blood; violent paſſions of the mind, &c. In order to reſtrain the flux, the patient ſhould be kept eaſy both in body and mind. If it be very violent, ſhe ought to lie in bed with her head low; to live upon a cool and ſlender diet, as veal or chicken broths, with bread, and to drink decoctions of nettle roots, or the greater comfrey. If theſe fail, ſtronger aſtringents may be uſed, as Japan-earth, alum, elixir of vitriol, the Peruvian bark, &c. Dr. Buchan directs two drams of alum, and one of Japan-earth, to be pounded together, and divided into eight or nine doſes, one of which may be taken three times a day. Perſons whoſe ſtomachs cannot bear the alum, may take two ſpoonfuls of the tincture of roſes three or four times a day, to each doſe of which ten drops of laudanum may be added. If theſe ſhould fail, half a dram of the Peruvian bark, in powder, with ten drops of the elixir of vitriol, may be taken in a glaſs of red wine four times a day.

The diſcharge of the *menſes* is interrupted naturally during pregnancy; but this is not always the caſe, becauſe ſome have them three months, ſome ſix months, and ſome during the whole time of geſtation, though in leſs quantity than at other times. The *menſes* are moſtly interrupted during the time of giving ſuck; though many women have a return about the third or fourth month after delivery, and almoſt all have them again in the ninth or tenth month. In caſes of obſtruction, the menſtrual blood hath diſcharged itſelf by other outlets.

It uſually happens that this periodical diſcharge ceaſes between the age of forty and fifty; and the ſeaſon in which this takes place, is critical to the ſex. However, thoſe who ſurvive this period, without contracting any chronical diſeaſe, become more healthy and vigorous than they were before. About this time, ſome are afflicted with the well-known ſymptoms of plethora, heat, ſhuſhings, reſtleſs nights, troubleſome dreams, and unequal ſpirits; others are attacked with inflammations of the bowels, or other internal parts; ſpaſmodic affections of various parts, ſtiffneſs in the limbs, ſwelled ancles, with pain and inflammation, the piles, and other effects of plenitude. Thoſe of full plethoric habits, accuſtomed to copious evacuations, will find great relief by bleeding frequently in moderate quantities, keeping the bowels lax, moderating their diet, and uſing ſufficient exerciſe, that is not too heating. If an immoderate flux of the *menſes* happens at this period, it ſhould be reſtrained by gentle laxatives, cooling medicines, reſt, anodynes, a moſt ſparing not too liquid diet, rather than by very copious bleedings and aſtringents of any kind. Dr. Fothergill obſerves, that various purgations of aloes, the tinctura ſacra, pil. Ruſſ. elixir proprietatis, and other compoſitions of this kind, are recommended, as proper purgatives to be uſed on the ceſſation of the *menſes*. But many inconveniences have ariſen from theſe heating medicines; as the piles, ſtrangury, immoderate diſcharges of the *menſes*, racking pains in the loins, and other ſimilar complaints. Rhubarb, ſena, magneſia, ſulphur medicines, ſmall doſes of jalap, and various combinations of theſe, may be ſubſtituted in the room of the others, and will ſupply ſufficient variety to the preſcriber and patient. When the *menſes* are about to go off, they appear for the moſt part irregularly both in time and quantity; once in a fortnight, three, five, or ſix weeks; ſometimes very ſparingly, at other times in immoderate quantities. Great loſſes of this kind are often prevented by taking away four or five ounces of blood, a few days after the firſt menſtrual ſuppreſſion. If a patient has in early life been ſubject to cutaneous eruptions, ſore eyes, glandular ſwellings, or other obvious marks of morbid humours ſubſiſting in the conſtitution, and all which may have diſappeared about the time the *menſes* became regular, an iſſue is an adviſeable drain, and may prevent many inconveniences. If at this time ulcerous ſores break out about the ancles, or in other parts of the body, they ought to be continued open, or artificial drains ſubſtituted in their ſtead; for thoſe who will have them dried up are ſoon after carried off by acute diſeaſes, or fall into thoſe of a chronic nature. Buchan's Dom. Med. chap. xlviii. London. Med. Obſ. art. 17.

MENSIS. See MONTH.

MENSIS *chymicus*. See MENSTRUUM.

MENSIS *veterus*. See FENCE *month*.

MENSORES, among the Romans, harbingers or officers, whose business it was to go and fix upon lodgings for the emperor, when he took a journey to any of the provinces. Their office was also to mark out encampents, and assign every regiment its post.

MENSORES also signified land-surveyors, architects, or appraisers of houses and public buildings. Those likewise who distributed the provisions in the army, were called *mensores frumentarii*; and servants who waited at table had the appellation of *mensores*.

MENSORES was likewise the title of officers among the Romans appointed to receive the provisions brought to the city by sea, and to see them carefully laid up and preserved in public granaries, of which there were great numbers.

MENSTRUAL, or MENSTRUOUS, a term in *Medicine*, applied to the blood which flows from women in their ordinary monthly purgations. See MENSES.

MENSTRUAL *epacts*. See EPACT.

MENSTRUAL *longitude of the moon*. See ARGUMENT.

MENSTRUUM, SOLVENT, or DISSOLVENT, in *Chemistry*, any liquor that will dissolve, that is, separate the parts of hard bodies.

The term takes its rise from this, that some chemists pretend, the complete dissolution of a mixed body cannot be effected in less than forty days; which period they call a *philosophical month*.

Aqua regalis is a *menstruum* for gold; aqua fortis, and spirit of nitre, for most other metals; and common water for salts, &c.

Menstruum is properly defined a body, which, being applied to, or intermixed with another, does so dissolve it, as that all the dissolving parts float among the parts dissolved, and so divides it into its minutest parts, as that the parts of the dissolvent are intermixed with those of the body dissolved. Whence it appears, that every *menstruum*, in dissolving a body, is likewise dissolved itself; so as, with the body it dissolves, to make up one body.

MENSTRUUMS may be divided into two classes: the first consists of such as are fluid; the second of such as are solid; that is, they are either actually divided, or they must be so before they act.

MENSTRUUMS, *fluid*, are, water, dew, oils, saline and acid spirits, alkalies, salts, &c.

MENSTRUUMS, *solid*, are such as must be made fluid before they will dissolve: such are most salts, nitre, vitriol, &c.

All *menstruums*, at the time they act as such, that is, at the time they are dissolving, act as fluids; whether such *menstruum* be a fluid, or a solid. Thus, e. g. silver is a *menstruum* with regard to gold; for if you take an ounce of silver, melt it in the fire, and add a grain of gold, all the parts of the silver will intermix themselves with the parts of the gold; so as that the gold and silver, which before were separate, now make but one mass. But gold and silver are only *menstruums* as they are dissolved by the fire; i. e. as they are rendered fluid.

As many more things might be done in chemistry than we now find practicable if we had more *menstruums* than are at present known, it must be a subject of infinite use in chemistry to discover new ones. To this purpose let it be considered, that in whatever way salts are united with other salts, new *menstruums* are produced by the mixture.

Thus if pure alkali be added to a solution of sea-salt, earthy matter is precipitated, and the salt afterwards obtained by crystallization, from the clear liquor, will be a sea-salt much purer than before, and capable of acting on bodies in a different manner.

The same fixed alkali being added to the brine of nitre, makes the liquor thick and milky, and precipitates an earthy matter; after which the nitre, obtained by crystallization, is much purer than before.

When fixed alkali is added to the brine of sal ammoniac, it lays hold of the acid of that salt, and sets the volatile alkali of the composition free, and suffers it to fly off in the air, leaving only a very pure and fixed sea-salt at the bottom of the vessel. If a pure volatile alkali be added to the brine of sea-salt, it makes the liquor thick, then purifies it, and flies off; and it does the same when added to a solution of nitre; and when added to a solution of sal ammoniac, it, in like manner, purifies the salt without altering its nature, and flies off as it was poured on. Vegetable acids produce but little alteration on being mixed with sea-salt, nitre, and sal ammoniac. Fermented vegetable acids, even after being purified by distillation, produce no great alteration when mixed with the same salts. If calcined vitriol, or alum, be mixed with nitre and distilled, they yield aqua fortis, which contains nothing of the acid of vitriol, or alum, but is a mere spirit of nitre; and if mixed with sea-salt, and treated in the same manner, the produce is a spirit of salt; and if with nitre and sea-salt together, they make an aqua regia. So if nitre and calcined vitriol be melted together in an open fire, the acid of the nitre is discharged, and a kind of tartarum vitriolatum is left behind. Sea-salt, treated in the same manner, leaves a sort of Glauber's salt behind; and, in general, what way soever it be by which salts are joined with salts, new saline productions, and new *menstruums* will arise; whence the art of chemistry may be perpetually improved, and new *menstruums* will give new phenomena on different bodies. New *menstruums* of particular virtues may also be made, by variously combining the known *menstruums* together; and this may be done by an almost infinite variety of ways: much may be also done by reducing every known *menstruum* to its utmost degree of purity. And, lastly, by reducing some of them into the minutest particles they can be reduced to, whether by art or nature; for upon these three particulars the extraordinary skill of the chief chemists seems principally to depend. For instance, suppose an extremely pure, strong, and subtle fermented vegetable acid was wanting: take fine verdigrise prepared from copper corroded by the subtile vapour of a fermenting acid; add to it twenty times its weight of the strongest distilled vinegar that can be made; digest them together, till the verdigrise is thoroughly dissolved, and the whole become a deep green liquor; purify this by filtration, and inspissate it over a gentle fire to a pellicle; set it in a quiet place, where it will shoot into crystals like emeralds, consisting of an acid vinegar and dissolved copper; pour off the liquor, collect the crystals, and evaporate as before; and by this means collect all the crystals that can be obtained; then dry these, and distil them in a retort, and the produce will be a most pure and strong vegetable acid, not in the least partaking of the nature of copper. But this experiment will not succeed with lead, tin, or any other of the metals soluble in vinegar; for the copper attracts the acid from of its water, and again restores it unaltered; but the others, though they equally attract and separate it, yet always yield it mixed and impure. Zwelfer imagined this acid to be the alkahest, or universal dissolvent; but Tachenius soon proved that it was no other than distilled vinegar of a much greater purity than usual.

To shew that by the compounding one *menstruum* with another, new, and often excellent salts may be produced, let it be considered, that the regenerated tartar, properly prepared, may be intimately united to a pure alcohol, and thus produce a vegetable *menstruum*, composed by the most close union of the most subtile vegetable particles, viz. alkali, acid, and sulphur; whence the effect of such a liquor cannot but be extremely great, both as a *menstruum* and a medicine. So again, if a pure strong alkaline spirit be united with pure alcohol, it produces an admirable *menstruum*, called the ossa Helmontii, which intimately dissolves distilled vegetable oils, and thus makes a *menstruum* compounded of the genuine vegetable sulphur, and an alkali, and is perhaps one of the best medicines, as well as the best *menstruums*, hitherto known.

In like manner pure spirit of nitre saturated with the alkaline spirit of sal ammoniac, makes a kind of volatile nitre, and thus affords an opportunity of examining, by experiments, whether the great things expected from a volatile nitre, by the chemists, will be performed by it or not. Experiments of this kind are extremely worth prosecuting. It is not certain whether any *menstruum* will dissolve any substance without the assistance of fire, as no experiment could ever be made in any place destitute of all fire; there being evidently fire in our utmost known degree of cold; and we all know that *menstruums*, of whatever kind, act greatly the better for being assisted by heat.

Menstruums can scarce act as such, unless reduced to a fluid form, or at least approaching thereto; this is chiefly given them by means of fire, air, water, and trituration. These are the four causes which usually excite the latent powers of *menstruums*. Certain *menstruums* contain a cause within themselves apparently capable of exciting motion, though in reality it depends upon the near approach of some other body. Thus, strong spirit of nitre confined in a close vessel, yields an acid fume constantly playing about the surface of the liquor, and issuing out whenever the vessel is unstopped. So also the alkaline spirit of sal ammoniac yields a fume never observed to be at rest; and the spirit of this salt, made with lime, yields a fume much more volatile and moveable: all the bodies of this kind therefore strangely retain, and strangely excite motion. We are always to remember also that air, even in the coldest places, has always a strong vibratory motion,

motion, and therefore may often excite thefe motions in thefe bodies; as on the other hand folutions are often immediately performed by means of the motion peculiar to the *menftruum* arifing from it; while another motion of a different kind, and proceeding from a different caufe, would not produce the effect. Thus, for inftance, if a fine piece of Engliſh chalk be calcined in a ſtrong fire, or even in the focus of a burning-glaſs, it will ſcarce alter its nature by this violent motion, nor again by being expoſed to a hot or cold air, either at reſt, or agitated by winds; and though if long boiled in water, or a brine of ſalt of tartar, it will not diſſolve; yet if immediately melts and diſappears when put into cold vinegar; whence we ſee there is a very great difference between the motion excited by the reciprocal force of the ſolvent and ſolvend, and the motion excited by fire, air, water, and impulſe. The acrimony of a *menftruum*, with reſpect to a human body, ſo as to excite pain, corrode or conſume the parts thereof, is no ſign that ſuch a *menftruum* is fuited to diſſolve other bodies, as appears from oil of vitriol, ſpirit of nitre, ſpirit of ſalt, and aqua regia, which though they readily conſume flefh, yet do not conſume or diſſolve wax and ſulphur, though theſe two may be eaſily diſſolved in the body. Many bodies incapable of ſolution in certain *menftruums*, may be fuited for diſſolving therein, by being previouſly diſſolved in other *menftruums*. Thus if common ſulphur be boiled ever ſo long in alcohol, it diſſolves no more than a ſtone in water; but if the ſulphur be firſt melted with ſalt of tartar into a ſhiky maſs, the alcohol will then diſſolve it: ſo alſo powdered antimony remains untouched after boiling in alcohol; but if firſt boiled to a dry maſs in an alkaline lixivium, this maſs preſently yields a golden tincture to alcohol. Some chemiſts have conceived ſo highly of this regular and ſucceſſive application of different *menftruums*, particularly Mr. Boyle and Mr. Homberg, that they ſay even metals may by this means be reſolved into their component running mercury and fixing ſulphur. Thus they aſſert, that if ſilver be firſt diſſolved in ſpirit of nitre, and then long digeſted with pure fixed alkali, and afterwards ſeveral times ſublimed with ſal ammoniac, it will at length, by means of theſe reſuſcitating ſalts, afford a true running mercury; in which operation the acids procure an entrance for the alkalies into the ſubſtance of the metal; as the fixed alkalies procure admiſſion to the volatile ones, which elſe could not enter. Boerhaave waves diſputing upon the point, whether the metals can be thus reſolved into their running mercuries, and only affirms, that after many trials, he was never able to effect it. Boerh. Chem. part i. p. 362, ſeq.

It is an error to think a *menftruum* cannot be too ſtrong. Oil of vitriol diluted with ſeveral times its weight of water, diſſolves iron beſt. So aqua fortis diluted, works beſt in lead. And Mr. Boyle makes the like obſervation as to the ſolution of ſilver.

MENSTRUUM, *animal*. There are of the animal *menftruums* very many both of the natural and artificial kind; the natural are blood, ſerum, gall, urine, ſaliva, rennet, whey, butter-milk, &c. moſt of which, being properly employed, will either produce or diſcharge colours, and might be made ſerviceable in the painting and dying trades. Thus recent urine diſcharges the common ink out of linen, &c. Blood affords, by proper management, the noble Pruſſian blue; and gall is a natural yellow, well deſerving to be treated in the manner of blood in that preparation. Of the artificial kind are the ſpirit of urine produced by chemiſtry, which ſerves to produce, alter, and deſtroy a vaſt number of colours. The liquors diſtilled from recent, or fermented whey, butter-milk, &c. might be alſo found of great value; and variouſly compounding theſe ſeveral animal ſubſtances, even by random trials, or chance experiments, new diſcoveries in colours might be made; though much more, probably, by a right reaſoning and analogy. As, for inſtance, the common bones burnt to a blackneſs, being found to afford the bone black, the experiment was eaſily tranſferred to ivory, and ſo the ivory black was diſcovered: and ſo of the reſt. Shaw's Lectures, p. 183.

MENSTRUUM *peracutum*. Mr. Boyle gives the name of *menſtruum peracutum* to a *menſtruum* made by pouring on the rectified oil of butter of antimony as much ſtrong ſpirit of nitre as would ſerve to precipitate out of it all the bezoarticum minerale; and then with a ſmart fire diſtilling off the liquor which would come over, and cohobating it upon the antimonial powder. Works Abr. vol. i. p. 260. 377.

He put ſome highly refined gold into a large proportion of this *menſtruum peracutum*, where it diſſolved ſlowly and quietly; and he found at the bottom of the glaſs a conſiderable quantity of a white powder, which the *menſtruum* would not touch, and which was alſo indiſſoluble in aqua regia. The ſolution of gold being abſtracted, and the gold again reduced into a body, yielded, upon a ſecond ſolution, more of the white powder. This powder he melted down into a metal, anſwering in colour, malleability, ſolubility in aqua fortis, and in bitterneſs to the taſte of that ſolution, to ſilver. Hence he infers, that notwithſtanding the ſuppoſed unchangeableneſs of gold, this experiment ſhews it to be really changeable into ſilver, or at leaſt into a new kind of metal very different from gold. And he therefore concludes, that there is no impoſſibility in the nature of the thing, that one metal ſhould be tranſmuted into another. Ibid. p. 260. 262.

By diſſolving gold in this *menſtruum peracutum*, Mr. Boyle alſo tells us, he made the gold riſe in the retort, in the top and neck of which it was found in the form of yellow and reddiſh ſublimate. Works Abr. vol. i. p. 263. 377. See PHILOSOPHER's *ſtone*.

MENSTRUUM, *univerſal*. See ALKAHEST.

MENSTRUUMS, *as to the action of*, Sir Iſaac Newton accounts for it from the acids wherewith they are impregnated. The particles of acids are found to be endued with a ſtrong attractive force, wherein their activity conſiſts, and by virtue whereof they diſſolve bodies. Theſe acids he ſuppoſes of a middle nature between water and hard bodies, and to attract both. By this attraction they gather together about the particles of bodies, whether metallic, ſtony, or the like, and adhere to them very cloſe, ſo as ſcarce to be ſeparable from them by diſtillation, or ſublimation. Thus ſtrongly attracted, and gathered together on all ſides, they raiſe, diſjoin, and ſhake aſunder, the particles of bodies, i. e. they diſſolve them; and by the attractive power whereby they ruſh againſt the particles of the bodies, they move the fluid, and ſo excite heat, ſhaking ſome of the particles to that degree, as to convert them into air, and ſo generating bubbles. See ACID.

Dr. Keil gives us the theory or foundation of the action of *menſtruums*, in ſeveral propoſitions; which the reader may find recited under the article ATTRACTION. See alſo FERMENTATION.

From thoſe propoſitions we ſee the reaſons of the different effects of different *menſtruums*; why ſome bodies, for inſtance, metals, diſſolve in a ſaline *menſtruum*: others again, as reſins, in a ſulphureous one, &c. particularly why ſilver diſſolves in aqua fortis, and gold only in aqua regalis; all the varieties whereof are accountable for, from the different degrees of cohæſion, i. e. of attraction in the parts of the body to be diſſolved, the different diameters and figures of its pores, the different degrees of attraction in the *menſtruum*, and the different diameters and figures of its parts.

Suppoſe, e. gr. the attraction of gold to that of ſilver to be as a to b; and of ſilver to aqua fortis as b to d; but that of aqua fortis to aqua regia as d to e; let f ſignify the magnitude of particles in aqua fortis, and r thoſe in aqua regia; c the cohæſion of gold, and g the cohæſion of ſilver: if the diameters of the particles f be greater than the diameters of the pores of gold, they can never diſſolve the gold, let their attractive force be ever ſo ſtrong. But if $b-f\times d$ be greater than g, then the ſilver will yield to the *menſtruum* whoſe particles are f, and leſs than the pores of ſilver; and if $b-e\times r$ be leſs than g, the ſilver will never diſſolve in the *menſtruum*, the particles whereof are r, and the attractive force e. But if $a-c\times r$ be greater than c, the *menſtruum* made up of the particles r, and whoſe attractive force is e, will be able to penetrate and diſſolve the gold.

How a *menſtruum* may ſuſpend bodies much heavier than itſelf, which very often happens, may be conceived by conſidering, that the parts of no fluid can be ſo eaſily ſeparated, but they will a little reſiſt, or retard the deſcent of any heavy bodies through them; and that this reſiſtance is, *ceteris paribus*, ſtill proportionable to the ſurface of the deſcending bodies; but the ſurfaces of the bodies do by no means increaſe, or decreaſe, in the ſame proportion as their ſolidities do; for the ſolidity increaſes as the cube, but the ſurface only as the ſquare of the diameter. Small bodies, therefore, will have much larger ſurfaces, in proportion to their ſolid contents, than larger bodies will; and conſequently, when exceedingly diminiſhed, may eaſily be buoyed up in the liquor.

For a fuller account of the nature and operation of different *menſtrua*, ſee DISSOLVENT, DISSOLUTION, SOLVENT, and SOLUTION.

MENSTRUUM, in *Pharmacy*, chiefly denotes a body that will extract the virtues of ingredients by infuſion, decoction, or the like. See EXTRACT, INFUSION, and DECOCTION.

MENSURATION, the act, or art, of MEASURING.

MENTAL, ſomething that relates, or is reſtrained, to the operation of the underſtanding.

Thus,

Thus, a *mental* prayer is ſuch a one as is made merely in the mind, without pronouncing one word of it.

Mental reſervations are the refuge of hypocrites. See RESERVATION.

MENTHA, in *Botany*. See MINT.

MENTUM, in *Anatomy*, the lower part of the FACE, beneath the mouth; which we otherwiſe diſtinguiſh by the name of *chin*.

MENTZELIA, in *Botany*, a genus of the *polyandria monogynia* claſs. Its characters are theſe: the flower has five petals, ſomewhat longer than the five-leaved ſpreading empalement, and many erect briſtly ſtamina; from the long cylindrical germen, which is ſituated under the flower, ariſes a briſtly ſtyle; the germen turns to a cylindrical long capſule, with one cell, containing many ſmall ſeeds. There is one ſpecies, a native of La Vera Cruz.

MENYANTHES, in *Botany*. See *Bog*-BEAN.

MEPHITIS, or MEPHITICAL *exhalation*, denotes a poiſonous and noxious ſteam iſſuing out of the earth. See DAMP and *Mephitic* AIR. See alſo EFFLUVIA, and GROTTO *del Cane*.

MEPHITIS, in *Mythology*, is a name given to Juno, becauſe ſhe is ſuppoſed to preſide over ſtinking exhalations, or corrupted and noxious air; and hence it was uſed to ſignify ſuch noxious air itſelf. According to Scaliger, the word is Etruſcan, and derived from the Syrians, with whom it ſignified any ſtinking ſmell. Juno had a temple among the Hirpines under this appellation.

MER.—*Outre le* MER. See OUTRE.

MERCATOR's *chart*, or *projection*, is a ſea-chart, or projection of the ſurface of the earth in plano.

For the conſtruction, uſe, advantages, &c. of which, ſee *Mercator's* CHART.

MERCATOR's *ſailing*, is that performed loxodromically, by means of *Mercator's* charts. See *Mercator's* SAILING.

MERCATORUM *feſtum*, among the Romans, a feſtival kept by the mercantile people on the ides or 15th of May, in honour of Mercury, to whom they ſacrificed a ſow; then ſprinkling themſelves with the water of a fountain called *aqua Mercurii*, they prayed the God to proſper their trade.

MERCHANT, *mercator*, is one who buys and trades in any things: and as merchandize includes all goods and wares expoſed to ſale in fairs or markets; ſo the word *merchant* formerly extended to all ſorts of traders, buyers, and ſellers. But every one that buys and ſells is not at this day under the denomination of a *merchant*; only thoſe who traffick in the way of commerce, by importation or exportation, or carry on buſineſs by way of barter or exchange, and who make it their living to buy and ſell, by a continued aſſiduity, or frequent negociation in the myſtery of merchandizing, are eſteemed *merchants*. Thoſe who buy goods, to reduce them by their own art or induſtry, into other forms than they are of, and then to ſell them, are artificers and not *merchants*. Bankers, and ſuch as deal by exchange, are properly called *merchants*. Lex. Mercat. or Merch. Com. 23.

The *mercantile* profeſſion is eſteemed noble, and independent. In France, by two arrets of Louis XIV. the one of 1669, the other of 1701, the nobility are allowed to trade, both by land and ſea, without derogating from their nobility: and we have frequent inſtances of merchants ennobled in that country, in regard of the utility of their commerce, and the manufactures they have ſet up. In Bretagne, even a retail trade does not derogate from nobility.

When the nobles of that province are diſpoſed for commerce, they let their nobility ſleep; that is, they do not loſe it, but only ceaſe to enjoy the privileges of their nobleſſe while their commerce continues; and re-aſſume it, on their giving over trade, without any letters or inſtrument of re-habilitation.

In republics trading is ſtill more valued; but no where more than in England, where the younger ſons and brothers of the beſt families are frequently bred up to *merchandize*. Add to this, that many of the Italian princes are the principal merchants of their ſtates; and think it no diſcredit to make their palaces ſerve as warehouſes: and that many of the kings of Aſia, and moſt of thoſe of the coaſt of Africa and Guinea, traffick with the Europeans, ſometimes by their miniſters, and ſometimes in perſon.

There are companies of *merchants* in London for carrying on conſiderable joint trade to foreign parts. See COMPANY.

Beſides theſe companies, there are other *merchants*, who are diſtinguiſhed by the country to which they trade; as Dutch *merchants*, who trade to the Weſt Indies; Canary and Portugal *merchants*; Italian *merchants*, who trade to Legborn, Venice, &c. French, and Spaniſh *merchants*.

The law of England, as a commercial country, pays a very particular regard to foreign *merchants*, in innumerable inſtances. Thus it is provided by Magna Charta, c. 30. that all *merchants*, unleſs before hand publicly prohibited, ſhall have ſafe-conduct to depart from, to come into, or tarry in, and to go through England, for the exerciſe of *merchandize*, without any unreaſonable impoſts, except in time of war: and if a war breaks out between us and their country, they ſhall be attached, if in England, without harm of body or goods, till the king, or his chief juſticiary, be informed how our *merchants* are treated in the land with which we are at war; and if our's are ſecure in that land, they ſhall be ſecure in our's. Upon which Monteſquieu remarks, with admiration, that the Engliſh have made the protection of foreign *merchants* one of the articles of their national liberty: and alſo, that the Engliſh know better than any other people upon earth, how to value at the ſame time theſe three great advantages, religion, liberty, and commerce. In this reſpect their diſpoſition is very different from the genius of the Roman people; who, in their manners, their conſtitution, and even in their laws, treated commerce as a diſhonourable employment, and prohibited the exerciſe of it to perſons of birth, rank, or fortune; and equally different from the bigotry of the canoniſts, who looked on trade as inconſiſtent with Chriſtianity, and determined at the council of Melfi, under pope Urban II. A. D. 1090, that it was impoſſible with a ſafe conſcience to exerciſe any traffick, or follow the profeſſion of the law. See COMMERCE.

If a difference ariſe between the king and any foreign ſtate, alien *merchants* are to have forty days notice, or longer time, to ſell their effects and leave the kingdom. 27 Ed. III. cap. 17.

The principal qualifications requiſite for the profeſſion of a *merchant*, are, 1. To know how to keep books ſingle or double, viz. journals, ledgers, and others. 2. To draw invoices, contracts, charter-parties, policies of aſſurance, bills of exchange, letters miſſive, &c. 3. To know the relation between the money, weights, and meaſures, of ſeveral countries. 4. To know the places where the ſeveral kinds of *merchandize* are manufactured, in what manner made, what the materials compoſed of, and whence; the preparation the materials require before they are wrought; and the *merchandizes* afterwards. 5. The lengths and breadths of ſtuffs, as ſilks, wools, hairs, linens, &c. the regulations of the places where they are manufactured; and their different prices at different ſeaſons. 6. The dying; and the ingredients for the formation of the different colours. 7. The *merchandizes* that abound, or are more rare, in one country than another; their kinds and qualities; and the manner of trafficking in them to the beſt advantage, whether by land, by ſea, or rivers. 8. The commodities permitted or prohibited, both for the import and export of a ſtate. 9. The price of exchange, according to the courſe of ſeveral places, and what it is that raiſes or lowers it. 10. The duties to be paid, both at the import and export of wares, according to the uſage of the place, the tariffs, regulations, &c. 11. The manner of packing, bailing, and tunning *merchandizes*, to keep them either in magazines, or in voyages, &c. 12. On what terms a merchant-veſſel may be freighted and inſured. 13. The goodneſs and value of every thing requiſite for the conſtruction or reſitting of veſſels, the prices of woods, cordage, maſts, anchors, ſails, and other neceſſaries. 14. The wages ordinarily given captains, officers, and ſailors; and the manner of contracting with them. 15. The foreign languages, which may be reduced to four principal ones; viz. the Spaniſh, uſed almoſt through all the Eaſt, particularly on the coaſt of Africa, from the Canaries to the Cape of Good Hope; the Italian, uſed throughout the coaſts of the Mediterranean, and many places of the Levant; the Teutonic or German, uſed throughout moſt countries of the North; and the French, which is now become almoſt univerſally current. 16. The conſular juriſprudence, the laws, cuſtoms, companies, colonies, chambers of inſurance, conſulates in the ſeveral countries; and, in general, all the ordinances, regulations, and policies, relating to commerce.

MERCHANT *court*, or *Court* MERCHANT, a kind of judicatory power, inveſted in *merchants*, choſen for that purpoſe, in ſeveral parts of Europe; in order to decide and determine in a ſummary way, all differences and litigations, among themſelves and their dependents.

The affairs of *merchants* are accompanied with ſuch variety of circumſtances, ſuch new and unuſual contingencies, which change and differ in every age, with a multitude of nicetics and punctilios; and theſe again altering, as the cuſtoms and uſages of countries and ſtates do alter, that it has been found impracticable to make any laws that could extend to all caſes: and our law itſelf does tacitly acknowlege its own imperfection in this caſe,

by allowing the CUSTOM of *merchants* to pass as a kind of law in cases of difficulty.

MERCHANT-*ship*. See SHIP.

MERCHANT-*law*. See LAW.

MERCHANT-*flatute*. See STATUTE.

MERCHANT, *tenant per flatute*. See TENANT.

MERCHENEAGE, *Merchenagium*, was the law of the people here called the Mercians. Camden, in his Britannia, fays, that in the year 1016, this kingdom was divided into three parts; whereof the Weft Saxons had one, governing it by the laws called Weft Saxonlage, which contained thefe nine fhires, viz. Kent, Suffex, Surrey, Berks, Hampfhire, Wilts, Somerfet, Dorfet, and Devon: the Danes had the fecond, containing fifteen fhires, i.e. York, Derby, Nottingham, Leicefter, Lincoln, Northampton, Bedford, Bucks, Hertford, Effex, Middlefex, Norfolk, Suffolk, Cambridge, and Huntingdon, which was governed by the laws called Danelage: and the third part was in poffeffion of the *Mercians*, whofe laws were called *Merchenlage*, and contained eight fhires, Gloucefter, Worcefter, Hereford, Warwick, Oxford, Chefter, Salop, Stafford, from which three, king William I. chofe the beft, and with other laws ordained them to be the laws of the kingdom. Camd. Brit. p. 94. See COMMON *Law*.

MERCHET. See MARCHET.

MERCURIAL, fomething that conſiſts of, or bears a relation to *mercury*, or quick-filver.

We fay alſo, a *mercurial* perſon, to denote a perſon of a briſk, volatile complexion; ſuch perſons being ſuppoſed by aſtrologers to be under the more immediate influence of the planet *Mercury*. We ſay, *mercurial* fumes, *mercurial* ſpirits, &c. with reference to the mineral *mercury*.

MERCURIAL *medicines*. See MEDICINALS.

MERCURIAL *phoſphorus*, *ſalivation*, *thermometer*. See the ſubſtantives.

MERCURIAL *ointments*, *frictions*, &c. See SALIVATION.

MERCURIAL *waters*. See WATER.

MERCURIALS, medicines compoſed, or prepared of MERCURY, or quick-ſilver.

The principal of the claſs of *mercurials* are, mercurius album, or white precipitate of mercury; ſweet and corroſive ſublimate of mercury; calomel; artificial cinnabar; turbith mineral; prince's powder; æthiops mineral, &c. See each under its proper article.

The medicinal efficacy of mercury depends on its extreme diviſibility, and the ſmoothneſs of its particles, and on their gravity or weight. By means of the firſt, it finds a paſſage into the inmoſt receſſes of the animal ſtructure, and, when properly guarded, does not exert itſelf till it comes into the remoteſt ſcenes of action; where moſt other medicines either do not arrive, or at leaſt not till their force is abated. This property it has in common with camphor.

By the latter, it is enabled to make ſtill more conſiderable alterations in the animal economy, by rendering the fluids thinner, and breaking open the ſecretory paſſages; and this effect it has in common with chalybeats.

It may be added, that the ſame property whereby it becomes ſo powerful a deobſtruent, indicates, that it is to be avoided in hectics, and all caſes where the conſtitution is drawn low by too profuſe evacuations; in regard *mercurials* tend to keep up or increaſe the exceſs of impetus in the fluids, and that over-capacity in the ſecretory orifices, wherein the defect of ſuch a conſtitution conſiſts to conſiſt.

MERCURIALIS, in *Botany*. See MERCURY.

MERCURIFICATION, in *Metallurgic Chemiſtry*, the obtaining the *mercury* from metallic minerals in its fluid form. For the effecting this, thoſe who have been engaged in theſe reſearches have propoſed three methods. The firſt is by means of a certain mercury, ſo prepared as to have a diſſolving power, by which it could take up the mercuries of metals in the ſame manner as water diſſolves ſalt from aſhes. The ſecond is by means of certain regenerating ſalts, ſuch as tal ammoniac, which are to detain the more earthy parts of metals, and leave their mercuries ſeparate or ſeparable from them by ſublimation or otherwiſe; and the third method is by means of a large lens or burning glaſs, in the focus whereof if any metal be expoſed, its mercurial part is ſaid to ſeparate and go off in fume, which when collected and condenſed, appears to be running mercury.

The firſt of theſe methods would be very eaſy, if the proper menſtrue were to be readily produced; the ſecond is extremely laborious, and requires much patience and reiteration. But the third ſeems eaſy enough, and practicable to advantage, when a glaſs of three or four feet in diameter is at hand, the ſky ſerene, and the ſun ſhines ſtrong.

For other proceſſes, the reader may conſult Junker's Conſpectus Chemiæ. But theſe mercurified metals, or their mercurial principle rendered ſenſible, are a kind of philoſophical mercury, which, although they reſemble ordinary mercury, are nevertheleſs ſaid, by perſons exerciſed in ſuch ſtudies, to differ from it conſiderably, by having a greater ſpecific gravity, by more effectually penetrating and diſſolving metals, by a ſtronger adheſion to them, and by a leſs volatility.

MERCURY, ☿, in *Aſtronomy*, the ſmalleſt of the inferior planets, and the neareſt to the ſun.

The mean diſtance of *Mercury* from the ſun is to that of our earth from the ſun as 387 to 1000: and his real diſtance from the ſun 36,843,468 miles. The inclination of its orbit, that is, the angle formed by the plane of its orbit with the plane of the ecliptic, is 6 degrees 54 minutes; its diameter to that of the earth, is nearly as 1 to 3, or 2660 miles; and therefore the globe of *Mercury* will be to that of the earth as 1 to 27. See DIAMETER, DISTANCE, EXCENTRICITY, and PLANET.

According to Sir Iſaac Newton, the heat and light of the ſun on the ſurface of *Mercury*, are almoſt ſeven times as intenſe as on the ſurface of the earth in the middle of ſummer: which, as he found by experiments made for that purpoſe by a thermometer, is ſufficient to make water boil. Such a degree of heat therefore muſt render *Mercury* uninhabitable to creatures of our conſtitution. And if bodies on its ſurface be not inflamed, and fet on fire, it muſt be becauſe their degree of denſity is proportionably greater than that of ſuch bodies is with us. The revolution of *Mercury* round the ſun, or his year, is performed in eighty-ſeven days, twenty-three hours; his diurnal revolution, or the length of his day, is not yet determined; nor is it certain whether he has ſuch a motion round his own axis or not.

What variety of weather or ſeaſons it may be liable to, we are ſtill alſo at a loſs to determine; as not knowing the inclination of his axis to the plane of his orbit. The force of gravity on the ſurface of *Mercury* is unknown. Its denſity, and conſequently the gravitation of bodies towards the centre, cannot be accurately determined; but no doubt it muſt exceed that of our earth, by reaſon of the exceſs of heat there.

Mercury changes its phaſes, like the moon, according to its ſeveral poſitions with regard to the ſun and earth; except only that he never appears quite full, becauſe his enlightened ſide is never turned directly towards us, but when he is ſo near the ſun as to be loſt to our ſight in his beams. And as his enlightened ſide is always towards the ſun, it is plain that he ſhines not by any light of his own; for if he did, he would conſtantly appear round.

The ſituation of this planet proves evidently, that the hypotheſis of Ptolemy is falſe: for *Mercury* is ſometimes obſerved betwixt the earth and ſun; and ſometimes beyond the ſun. But the earth is never found between *Mercury* and the ſun; which however muſt happen, if the ſpheres of all the planets encompaſſed the earth, as a centre, according to the Ptolemaic ſcheme.

The diameter of the ſun, viewed from *Mercury*, would appear almoſt three times as big as it appears on our earth; that planet being nearly thrice as near him as we are; and therefore the ſun's diſc would appear ſeven times as large as to us. *Mercury*'s greateſt diſtance from the ſun, with regard to us, never exceeds twenty-eight degrees (ſee ELONGATION); whence it is ſeldom viſible, being commonly either loſt in the ſun's light, or, when the moſt remote from the ſun, in the crepuſculums. The beſt obſervations of this planet are thoſe made when it is ſeen on the ſun's diſk; for, in its lower conjunction, it paſſes before the ſun like a little ſpot, eclipſing a ſmall part of his body, only obſervable with a teleſcope.

That node from which *Mercury* aſcends northward above the ecliptic is in the fourteenth degree of Taurus, the oppoſite in the fourteenth degree of Scorpio. The earth is in theſe points on the 6th of November, and 4th of May, new ſtyle; and when *Mercury* comes to either of his nodes at his inferior conjunction about theſe times, he will appear in this manner to paſs over the diſc of the ſun. But in all other parts of his orbit, his conjunctions are inviſible, becauſe he either goes above or below the ſun. The firſt obſervation of this kind was that of Gaſſendi, in November, 1631. Several ſubſequent obſervations of the like tranſits are collected in Du Hamel's Hiſt. of the Royal Acad. of Sciences, p. 470. ed. 2. Mr. Whiſton has given us an account of ſeveral periods at which *Mercury* may be ſeen on the ſun's diſc, viz. in 1782, Nov. 12th at 3ʰ 44ᵐ in the afternoon; in 1786, May 4th, at 6ʰ 57ᵐ in the forenoon; in 1789, Dec. 6th, at 3ʰ 55ᵐ in the afternoon; and in 1799, May 7th, at 2ʰ 34ᵐ in the afternoon. There will be ſeveral intermediate tranſits, but none of them viſible at London. See Dr. Halley's Account of the Tranſits of *Mercury* and Venus, in Phil. Tranſ. N° 193.

To an inhabitant of *Mercury*, the ſolar ſpots will appear

to traverse his disk sometimes in a right line from east to west, and sometimes elliptically. As the other five planets are above *Mercury*, their phenomena will be nearly the same there, as with us. Venus and the earth, when in opposition to the sun, will shine with full orbs, and afford a noble light to that planet.

MERCURY, *mercurialis*, in *Botany*, a genus of the *dioecia enneandria* class. Its characters are these: it has male and female flowers in different plants; the male flowers have a spreading empalement, cut into three concave segments, but have no petals; they have nine or twelve erect hairy stamina; the female flowers have no petals, but have two awl-shaped acute-pointed nectariums, to each of which there is a single broad germen, supporting two reflexed styles, which turn to a twin capsule, shaped like a scrotum, having two cells, each containing one roundish seed. Linnæus enumerates four, and Miller three species.

The species called French *mercury*, with branched stalks, and smooth glossy leaves, grows wild in gardens and dung-hills. It is of an emollient nature, and eaten in the manner of spinach, which, when cultivated in a garden, it greatly excels. If eaten largely, it opens the bowels. A cataplasm of the leaves is much recommended in pains of the limbs, in tumors, and even in ulcers, which it cleanses and disposes to heal. Poor people in country places use it as a cataplasm for the rheumatism, and even for the gout, with success. In the shops, it is chiefly kept as an ingredient in decoctions for clysters. There is another species, called cynocrambe, and dog's *mercury*, with rough leaves and unbranched stalks, which grows wild in woods and hedges: this, though more acceptable to the palate, as an oleraceous herb, than the foregoing, has lately been found to possess noxious qualities, and to act as a violent narcotic. See Phil. Transf. N° 203.

MERCURY, *English*, in *Botany*. See GOOSE *Foot*.

MERCURY, in *Chemistry*, and *Natural History*, denotes a fluid, MINERAL matter perfectly resembling silver in fusion.

Mercury is known under a great number of denominations: the common name among the ancients was *hydrargyrum*, q. d. water of silver. The moderns commonly call it *mercury*, from some supposed relation it bears to the planet of that name. In English it is popularly called *quick-silver*, from its appearance. Many of the chemists call it *Proteus*, from the variety of forms, colours, &c. it passes through in their preparations.

Naturalists are divided what class of fossils to range *mercury* under: some make it a metal; others a semi-metal; and others an imperfect metal.

Boerhaave observes, that it is very improperly called a *metal*, inasmuch as it has not all the characters of such a body; nor scarce any thing in common with the other metals, except weight, and similarity of parts: thus, for example, it is neither dissolvable by fire, nor malleable, nor fixed, in effect, it seems to constitute a peculiar class of fossils; and is rather the mother or basis of all metals than a metal itself.

However, it appears from the experiments of Professor Braun, at Peterborgh, recited under the article FREEZING, which ascertain the fixation of *mercury* by cold, that this, like other metals, is fluid or solid, according to the greater or less quantity of fire with which it is penetrated: and if we only see it in a fluid state, it is because it is so fusible that so small a degree of heat can keep it fluid, that even in the greatest natural colds, a sufficient quantity of heat always remains for that purpose. Besides, *mercury* agrees likewise with other metals, as their parts, when in fusion, attract one another, and run into globules, and, from a state of fluidity, pass into a solid state, not all at once, but successively, and vice versâ.

Perfect metals, according to M. Homberg, &c. are nothing but pure *mercury*, whose little particles are penetrated on all sides, and filled with the matter of light, which unites and binds them together into a mass, so that the parts of fluid *mercury*, which are supposed to be little solid globes, in their metallification are rendered rough and uneven, being pierced on all sides, and having their pores or perforations filled with the matter of light. By such means they lose their first conformation, and the polisure or smoothness of their surfaces, which is one of the principal causes of the fluidity of *mercury*.

The chemists make *mercury* one of their hypostatical principles: not, as M. Homberg observes, that it answers the character of a principle, which is that whose substance cannot be analysed, or reduced into matters more simple; but because the analysis has not yet been discovered; though it is possible it may hereafter, there being little doubt but that *mercury* is a compound. This is the more probable, because *mercury* may be destroyed; which never happens to simple bodies. The manner of destroying *mercury* is, first, by changing it into a perfect metal, by introducing a sufficient quantity of light within its substance; and then exposing this metal to a burning glass, where, in a little time, it evaporates almost wholly into smoke, leaving nothing behind but a light earthy dust.

MERCURY, *characters or properties of*, are, first, that of all bodies it is the heaviest, after gold and platina; and still the purer it is, the heavier: nay, some of the philosophers even hold, that *mercury*, well purged of all its sulphur, would be heavier than gold itself. The ordinary proportion between them is that of fourteen to nineteen. If any *mercury* be found to weigh more than according to this ratio, it may be safely concluded to have gold in it. See *Specific* GRAVITY.

The second character of *mercury* is, to be of all bodies the most fluid; that is, its parts separate, and recede from each other by the smallest force. Consequently, of all bodies it is that whose parts cohere the least, or are the least tenacious; and therefore of all others is the least ductile and malleable. The parts of water do not divide so readily as those of quick-silver; and the parts of oil much less: there is a certain tenacity even in the parts of spirit of wine, which resists separation; but there is scarce any cohesion at all in the parts of *mercury*. Nevertheless, the integrant parts of *mercury*, like those of melted metals, do really attract each other, and always acquire a convex or spherical form, when they touch bodies with which they have no tendency to unite.

The third property of *mercury*, which, indeed, depends on the second is, that of all bodies it is divisible into the minutest parts. Thus, being exposed to the fire, it resolves into a fume scarce perceivable to the eye; but, in whatever manner it be divided, it still retains its nature, and is the same specific fluid. For the vapours of distilled or volatilized *mercury*, received in water, or on moist leather, or the like, become pure *mercury*; and if *mercury* be mixed with other bodies, in order to fix it, it is easily separable from them again by fire, and reducible into pure *mercury* as before.

The fourth character is, to be extremely volatile, being convertible into a fume even by a sand-heat. In effect it does not sustain the fire long enough either to boil, or to ignite: though it must be added, if the fire be at first very gentle, and increase by easy degrees, it may be retained therein a pretty long time, and be fixed to at length as to become ignited in the crucible, as we learn from some very tedious experiments made at Paris.

That *mercury* is volatile, even in the temperature of the atmosphere, when its surface is exposed to a vacuum, has been long evident from observations on the barometer, in some of which, exposed in the sun, a perfect distillation is perpetually going on; the invisible mercurial vapour always rising on the warmer side of the tube, and then forming into globules, and running down on the opposite side, in the form of dense fluid *mercury*. But Dr. Priestley found, that this heavy substance is not less volatile, when confined by nitrific acid air, though pressed with the weight of the atmosphere, and that it is in some measure volatile, even when exposed to common air. Exp. and Obs. on Air, vol. v. sect. 23.

The gilders are but too well acquainted with the vapours of *mercury*, which frequently render them epileptic and paralytic, and sometimes salivate them; being of so penetrating a nature as to take away any scirrous tumors, though very apt to reach and destroy the noble parts.

It may here be observed that *mercury* seems to suffer no change from a heat that is not superior to that of boiling water. With a greater heat it is entirely dissipated in vapours, like other volatile bodies. But it undergoes no alteration by having been thus reduced into vapour; for if the evaporation be made in close vessels, that is, if the *mercury* be distilled, its vapours when condensed, will form the same *mercury* as before the operation. *Mercury* remains unchangeable by repeated distillations. Boerhaave distilled eighteen ounces of *mercury* five hundred times, without perceiving any other change than that its fluidity and specific gravity were a little increased, and that some grains of a fixed matter remained; which small changes were probably produced by a purification of the *mercury*, rather than by any real alteration of it. The vapours of *mercury*, like those of all other volatile bodies, if they cannot escape, or be condensed, cause violent explosions. By digestion in a strong heat, continued for several months, the surface of *mercury* is gradually changed into a reddish earthy powder, without any metallic lustre, which floats upon the surface of the fluid *mercury*, without incorporating with it. Thus any quantity of *mercury* may be entirely converted into a red powder. Boerhaave kept *mercury* in digestion for fifteen years, without observing any change, unless that upon its surface a little black powder had been formed, which by trituration was easily reducible into fluid *mercury*.

Dr. Prieſtley has ſhewn, by paſſing the electric exploſion over the ſurface of *mercury*, that this black matter conſiſts of *mercury* ſuperphlogiſticated; the phlogiſton coming from the electric matter when the exploſions are taken in common air, but chiefly from the vitriolic acid air, which abounds with it when they are taken in that air.

If *mercury* be expoſed to the focus of a burning glaſs on a piece of charcoal, on a tile, or in a coppel it is very ſoon wholly diſſipated in form of a thick ſmoke: but if precipitate per ſe be placed in the focus, it ſeems at firſt to melt and run, but immediately after is diſſipated in a thick ſmoke, leaving a ſmall quantity of an extremely fine powder upon the tile, in form of a ſhort down. This powder, on being continued in the focus, finally runs together into a yellowiſh glaſs; in ſeveral parts of which there may be diſtinguiſhed ſmall white, ſhining, metalline particles, which ſeem to be ſilver. If the precipitate per ſe be expoſed to the focus on a piece of charcoal, it is ſeen to melt and run into ſmall globules of pure *mercury*, which ſoon after begin to fume, and are diſſipated entirely. It appears, therefore, upon the whole, that there is in *mercury* an oil, as ſome have called it, or inflammable principle, which may be ſeparated by long digeſtion over a low fire; and that the matter diveſted of that, is no longer *mercury*, but a mere calx or red earth, which is properly the baſis of this metal: that this calx does not vitrify in the manner of the other calxes of the metals, being too volatile, and flying off eaſily in the fire; and, finally, that this oil of *mercury* is not different from the other oils, even thoſe of the vegetable kind, ſince common charcoal could ſupply its place by means of its oil or PHLOGISTON, and reſtore the calx to running *mercury* again. As to the ſmall remainder of earth, after the diſſipation of the calx of *mercury*, which run into glaſs with metalline ſpecks, it is much to be queſtioned whether it be not owing to ſome impurity in the *mercury*. Mem. Acad. Par. 1709.

The extreme denſity and gravity of *mercury* ſeem to prove that much of the earthy element, the eſſential properties of which are ſolidity and fixity, enters into its compoſition. On the other hand, its exceeding great volatility and fuſibility muſt proceed from the preſence of ſome other principle which is eminently volatile and fuſible. Is this principle PHLOGISTON? or is it Becher's mercurial earth? Is it the union of this inflammable principle, and of this mercurial earth? Theſe are objects worthy the curioſity of thoſe who have taſte and talents for the ſublimeſt reſearches in chemiſtry. Macquer.

The volatility of *mercury* may be diminiſhed by ſeveral methods, ſome of which we ſhall mention. 1. *Mercury* calcined by heat, called the precipitate per ſe, ſuſtains during ſome time a red heat, and by expoſure to the heat of a burning glaſs is vitrifiable. 2. Dr. Brandt relates a curious experiment, from which *mercury* appears capable of being ſo detained and fixed by digeſtion with gold, that a conſiderable part of it cannot be ſeparated from this metal by the moſt intenſe heat. 3. *Mercury* may be rendered conſiderably leſs volatile by being combined with vitriolic acid, but eſpecially with the vitriol of ſilver, or the ſalt formed by ſilver and vitriolic acid. This ſalt may be united with a conſiderable portion of *mercury*, with which it forms a concrete ſubſtance, fuſible by fire, but capable of ſuſtaining, according to Dr. Lewis, the greateſt heat that can be applied to glaſs veſſels, without diſſipation of the *mercury*. 4. Neumann ſays, that if *mercury* ſublimate be frequently ſublimed with ſal ammoniac, and each time the ſublimed matter mixed with the reſiduum, the whole becomes at laſt ſo fixed in the fire, that it cannot be any more ſublimed. *Mercury* expoſed to the vapour of melted lead, or thrown into boiling linſeed oil, loſes its fluidity, and becomes ſo ſolid, that it may be formed into toys and ſmall utenſils: this, indeed, properly ſpeaking, is only an apparent fixation of *mercury*, ſince all its fluidity is reſtored to it by a little heat; nevertheleſs this experiment proves, that ſome principle in theſe ſubſtances, probably their phlogiſton, is capable of acting ſenſibly on *mercury*.

The fifth property of *mercury*, is, that it eaſily enters, and intimately adheres to gold, leſs eaſily to other metals, with difficulty to copper, and ſcarce at all to iron.

Mercury may very well be alloyed and united with all metallic ſubſtances, excepting iron, arſenic, and the ſemimetal called nickel, in the following order: gold, ſilver, lead, tin, copper, zinc, and regulus of antimony.

The union of *mercury* with antimony is very difficult, but has been effected by Monſ. Malouin. See Hiſt. Acad. Science. 1740.

The ſame gentleman ſucceeded alſo in uniting *mercury* with tin and lead, ſo as to improve theſe metals in ſome reſpects, rendering them harder, whiter, and more ſonorous. Hiſt. Acad. ibid.

Biſmuth unites with it more intimately than any other metallic body, and remarkably promotes the union of lead with it: *mercury*, impregnated with a little biſmuth, was found to diſſolve conſiderable maſſes of lead in a heat no greater than that of the human body. Hence with theſe metals *mercury* has been frequently adulterated. This abuſe may be diſcovered by the *mercury* contracting a dull-coloured ſkin upon the ſurface, or ſtaining paper blackiſh, by its not running freely into round globules, but forming tears or vermicular ſtreaks by its leaving, on evaporating a little of it, a powdery matter, or coloured ſpot on the bottom of the veſſel; and by its producing a turbed milkineſs during its diſſolution in aqua fortis.

If *mercury* be diſſolved in aqua fortis, ſo that the ſolution be clear and total, and if, whilſt it is yet warm, ſome lead filings be poured in by degrees, the lead will be precipitated into a white powder, and the *mercury* reduced into a maſs of running quickſilver. Boyle's Works Abr. vol. i. p. 318.

All fat and oily matters, vegetable and animal, act upon *mercury*, ſo as to divide its parts and perfectly extinguiſh it. Mr. Plenck, of Vienna, having tried ſeveral ſubſtances, both animal and vegetable, for the extinction of *mercury*, found none that anſwered equally with gum arabic. He has therefore lately recommended a mixture of quickſilver and gum arabic, as preferable to all the mercurial preparations hitherto known; being in all caſes ſafe, rarely or never producing a ſalivation, and acting ſoon on the venereal virus. He directs one dram of purified quickſilver and two drams of the gum to be ground together in a ſtone mortar, adding by degrees half a ſpoonful of water, till the quickſilver diſappears, and the whole becomes a viſcid grey mucilage, in a ſhort time; half an ounce of ſyrup, and eight ounces of a ſimple water are then gradually added, and two ſpoonfuls of the mixture given every morning and evening; but the experience of other eminent phyſicians has not ſufficiently confirmed the ſuperior excellence of this mercurial preparation. See AMALGAMATION, ALLAY, and AFFINITY.

Indeed we have heard much among the adepts about making an amalgama with *mercury* and iron; but the experiment would never ſucceed with that ingenious chemiſt Dr. Boerhaave. If it poſſible there may be ſome way of binding thoſe two bodies together; and no doubt an amalgama might be made, if a large quantity of gold were added to the iron: but then, if the compound were beaten into duſt in water, the iron would waſh away, and the gold remain. On this account it is, that ſuch as have occaſion to handle quick-ſilver, always make choice of iron inſtruments for that purpoſe. We have known women, in a ſalivation, to have their ear-rings grow white and ſoft with the effluvia of the *mercury*; and hence the gilders, to lay gold on any other body, diſſolve it in hot *mercury*; which done, they apply the ſolution on the body to be gilt, ſuppoſe ſilver; then ſetting it over the coals, the *mercury* flies away, and leaves the gold adhering like a cruſt to the ſilver. Laſtly, rubbing this cruſt with lapis hæmatites, the ſilver is gilt.

The ſixth character is, that of all fluids, it is the coldeſt, and the hotteſt, ſuppoſing the circumſtances the ſame. Boerhaave ſhews, that fire is equally diffuſed through all bodies; and that there is in reality the ſame degree thereof in *mercury*, as in ſpirit of wine; and yet if you try with your finger, *mercury* in the cold is much colder, and over the ſame fire conſiderably hotter, than this ſpirit. This property depends on the great weight of *mercury*: for the heat and cold of all bodies is, *cæteris paribus*, as their weights. Now *mercury* being fourteen times heavier than water; if both of them be expoſed in a winter's night to the ſame cold, the mercury muſt be ſo much colder than water, as it is heavier. So alſo, if they be both applied to the ſame degree of heat, while the water becomes warm, the *mercury* will be hot enough to burn the hands.

The ſeventh property is, that it is diſſolvable by almoſt all acids, and unites itſelf with them at leaſt with all ſolible acids. This it is diſſolved in oil of vitriol, ſpirit of ſulphur per campanam, ſpirit of nitre, and aqua regia.

It is prepared with oil of vitriol, into turbith mineral; with ſpirit of ſulphur, into cinnabar; and with aqua regia, or ſpirit of ſea-ſalt, or ſal gemma, into corroſive ſublimate. Vitriolic acid in its original ſtate does not act, or but very weakly, upon *mercury*. Theſe two ſubſtances cannot be united together, unleſs the acid be very highly concentrated, and a very ſtrong heat applied; both which conditions concur in diſtillation. Nitrous acid diſſolves *mercury* very readily; and this ſolution preſents phenomena very ſimilar to thoſe of the ſolution of ſilver by the ſame acid. The acid ſhould be very pure, and the ſolution may be made without heat. Marine acid, when liquid does not act ſenſibly upon *mercury* in its ordinary ſtate,

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even when assisted with a boiling heat. But when this acid, very concentrated and reduced into vapours, meets *mercury* also in vapours, these two bodies easily unite together, and even intimately. The several combinations of *mercury* with the vitriolic, nitrous, and marine acids, may be decomposed by all intermediate substances, which, having in general a stronger affinity with acids than metallic substances, decompose all metallic solutions by acids: these intermediate substances are absorbent earths, and alkaline salts, both fixed and volatile. They may be decomposed also, and particularly corrosive sublimate, by several metallic substances, such as tin, regulus of antimony, and copper.

Vinegar and vegetable acids have scarcely any action upon ordinary *mercury*, otherwise than by dividing it, with a little agitation, into very small globules; and hence we are furnished with a method of detecting the frauds of druggists, &c. who make a practice of sophisticating quick-silver with lead. Take a mortar, and rub the *mercury*, with vinegar therein; if the vinegar grow sweetish, it is a proof there is a mixture of lead; if copper have been mixed with the *mercury*, it will turn greenish, or bluish; if there be no adulteration, the *mercury* and vinegar will both remain as before.

However *mercury* may be dissolved in vegetable acids. This is done by reducing it to a calx by a long digestion. A scruple of this calx may be dissolved in an ounce of distilled vinegar, in a boiling heat. The solution being filtred and exposed to the cold, will in part be changed into fine crystals. This calx dissolves likewise in the juice of lemons, Rhenish wine, and other vegetable acids.

But a precipitate of *mercury* made from its solution in aqua fortis, by means of oil of tartar *per deliquium*, and well edulcorated by boiling water, is more easily dissolved in distilled vinegar. It may even be dissolved cold without digestion; and the acid of vinegar, as well as all other vegetable acids, are capable of contracting a very intimate union with *mercury*.

The eighth property is, that it is the most simple of all bodies, next after gold: accordingly, we find it the same in all its parts, so far as our observation goes. If a single grain of *mercury* be dissolved in spirit of nitre, a proportionable part of the grain will be distributed into every minute particle of the menstruum; and by diluting the whole with an ounce of aqua fygia, the whole grain of *mercury* will be revived. Had we the *mercury* of the philosophers, called also *vital mercury*, *mercury of metals*, &c. so much talked of, it is asserted, it would be still much more simple than gold: for from gold we can sometimes separate *mercury*, and sometimes sulphur; but, from pure *mercury*, nothing beside itself can be obtained.

Nevertheless *mercury* very powerfully attracts moisture from the air, and to this circumstance some have ascribed its fixation by cold, in the Peterburgh experiments; but this will not account for its malleability in that hardened state.

The ninth property of *mercury* is, not to be in any measure acrid in its native state; for it shews no acrimony to the taste, nor does it corrode any body: and if a carcase were to be buried in quick-silver, it might doubtless remain there without being any way hurt.

The extraordinary effects, however, it produces in the body, have given people a notion of its being acrid. But the case is, that, when received into the blood, it acts by its weight and velocity; whence it tears and destroys the solids, and thus occasions those great alterations, which lead the chemists into their mistakes.

In effect, all its medicinal operations are to be accounted for from the properties already enumerated.

Beside the numerous other phenomena attending this remarkable mineral, the light it gives when shaken in a glass tube, which proceeds from electricity, is not to be omitted. See *Barometrical* PHOSPHORUS.

If *mercury* be put into large exhausted tubes, and these afterwards rubbed to excite their electricity, it is observed that they give on all sides, rays of a bright and very lively light. See ELECTRICITY.

MERCURY, *mines of*. The chief are those of Hungary, Spain, Friuli, in the Venetian territories, and Peru. Considerable quantities are also brought from the East Indies. The greater part of our quick-silver is brought us from Friuli, where there are abundance of mines belonging to the emperor, though now mortgaged to the Dutch. It is found under three several forms: 1. In ruddy globes or clods, called *cinnabar*. 2. In hard stony globes, or a mineral substance of a saffron, and sometimes a blackish colour. 3. It is also found pure; for, upon opening holes in the beds of stones, &c. there sometimes gushes a vein or stream of pure *mercury*, called *virgin mercury*.

This last sort is most valued: Paracelsus and Basil Valentine prefer it far to any other sort, for chemical operations. Dr. Brown assures us, in his travels, that inquiring of one of the directors of the quick-silver mines, wherein the difference between this and common *mercury* consisted; he was answered, that virgin *mercury*, mixed and amalgamated with gold, renders the sulphur of the gold volatile; but this has been several times tried without success.

This *virgin mercury*, called *jungfrau* by the German miners, is used for that which discovers itself without the assistance of fire. This is sometimes seen in drops, globules, or large masses in the ore, or falls in drops from the crevices in the roof or walls of the mine, or finally, is found in large quantities in the hollows of the rocks. Its more common appearance is in small parcels, and often in single globules, scarce large enough to be discerned by the naked eye, lodged in great abundance in the pores of a soft solide stone, of a pale bluish colour, from which it is easily separated by pounding and washing. It is also found in some places lodged in the same manner, on some of the harder stones, and in various species of earths. These large collections of pure virgin quick-silver often discover themselves by bursting out in small streams in the mines of Friuli. They sometimes are spirted with a stream of it like a thread, which gradually increasing to the thickness of a packthread, continues to run three or four days, and discharges in that time a vast quantity of the quick-silver; if the miners can follow this spring to the head, they generally obtain a large quantity more; and often this sort of springing up of it leads them to very rich veins of the mine which they did not before know of. They give the same name of *jungfrau* or virgin quick-silver also to that *mercury* which has no need of fire for the separation, but is washed out of its ores by a sieve and large quantities of water, continually and forcibly running on it.

The ores of quick-silver often contain a large quantity of that mineral imbedded in them in this form, and often is mixed in other parts with sulphurs, as to be diffused into cinnabar; in this case a great deal is separated by this washing, which at the same time frees the ore from dirt, and renders it surer for the operation of the fire, by which a great deal more is then extracted.

However, though *mercury* be often found native, yet it is much more frequently found in the form of an ore; its particles being penetrated by, and intimately mixed with sulphur; and the concrete being by no means to be known for quick-silver to the naked eye, but being a red mass of a stony hardness, called *cinnabar*: and we are very sure that it is quick-silver penetrated by sulphur, that makes this ore, because we are not only able to separate quick-silver from it, but by a mixture of quick-silver and sulphur, we are able to make a red stony mass, perfectly the same with this. The cinnabar is of a different form and appearance, according to the quantity of sulphur it contains, being usually striated, sometimes with finer lines, and the quality of *mercury* in this is very great, the richest masses containing six parts of *mercury* to one of sulphur, and the poorer usually half. It is sometimes found in large and pure nodules, and sometimes in smaller particles, lodged in different earths and stones: these are sometimes few in number, and placed separately, so as to be of little value; but in other masses they are placed very thick in congeries, and are then separated by pounding and washing, and worked for *mercury*. Beside this pure ore of *mercury*, there is another much less rich, but which is worked in some places to considerable advantage: as the former is a mixture of *mercury* and sulphur alone, this is a mixture of these two, and of many other substances, and appears in form of a moderately hard stone, usually of a dusky orange colour, but not rarely of a greenish brown, and sometimes blackish. This has very little brightness, and nothing of the striated texture of the cinnabar.

Kircher, in his Mundus Subterraneus, gives a very terrifying description of the quick-silver mine of Friuli. It is remarkable, that the entrance into it is not high up in the hills, as is usually the case; but upon level ground, and in the streets of the town. This subjects the miners to great inconveniences from water, though they have excellent machines for draining the mines. The descent is by ladders near ninety fathoms deep. There are no damps in these mines, but the mischiefs arising from the *mercury* itself getting into the bodies of the workmen, are much greater and more general, though not so sudden, as the effects of the damps in our lead and coal mines, and such places. The elaboratory belonging to these mines has furnaces capable of working fifty retorts at a time. There are generally fifteen of these furnaces at work at once, so that eight hundred retorts are the usual number in constant use. The retorts stand in double rows on each side of the furnace, a row of thirteen below, and a row of twelve above.

Method

Method of procuring or separating MERCURY *from the ore or earth.*—They firſt grind the mineral glebe into powder; this done, they pour a great quantity of water upon it, ſtirring and working the whole briſkly about till the water become exceeding thick and turbid. This water having ſtood till it be ſettled, they pour it off, and ſupply its place with freſh, which they ſtir and work as before. This they repeat, and continue to do, till the water at length comes away perfectly clear; then, all remaining at the bottom of the veſſel is *mercury*, and other metalline matter.

To this *mercury*, &c. they add the ſcoriæ or filings of iron, putting the whole in large iron retorts, and ſo diſtilling it; by which means all the heterogeneous, metallic, and ſtony part, is ſeparated therefrom; and the *mercury* procured pure.

In ſome places where the ore is very rich, they only powder it and put it into long-necked earthen veſſels, which they ſtop with bundles of moſs: theſe they invert into other veſſels buried in the ground, and then making a fire about them, the *mercury* ſeparates and drains through the moſs into the under-pots.

As to the *mercury* in cinnabar, they do not find it worth while to diſtil, and get it out; cinnabar ſelling at too high a price alone.

The miſerable people, condemned or hired to work in theſe mines, all die in a little time. They are firſt affected with tremors, and proceed to ſalivation; then their teeth drop out; and they are ſeized with pains all over, eſpecially in their bones, which the *mercury* penetrates: and thus they die.

A common precaution they uſe, is to hold a piece of gold in the mouth, to imbibe the effluvia, and intercept their paſſage into the body. Dr. Pope tells us of one he ſaw in the mines of Friuli, who, in half a year's time, was ſo impregnated with the metal, that on putting a piece of braſs in his mouth, or even rubbing it in his fingers, it would turn white as ſilver.

In Spain, the ſmoking and exhaling of the mineral is performed with more care, and with an engine contrived for that purpoſe.

The manner of ſeparating *mercury* from its ore, when not ſulphureous, is this: take a pound of the ore beat to powder; this with the allayer muſt ſtand for one-tenth; put this into a glaſs retort coated half way to its neck, which muſt be long, and turned back with ſuch declivity, that a glaſs recipient may be applied perpendicularly to it. The retort muſt be of ſuch a ſize, that the belly of it may be filled nearly two thirds with the ore; and muſt be placed ſo that nothing of the fluid, adherent to the neck of it, may fall into the cavity of the belly, but that the whole may run forward into the recipient, which muſt be filled with cold water: this muſt be ſo placed as to receive the noſe of the retort about one half inch into the water. The joints need not be luted. Cramer's Art of Aſſaying, p. 350.

Let the retort be ſurrounded with burning coals, placed at a diſtance, leſt it burſt; by degrees bring the coals nearer, and at length cloſe to the retort; add freſh charcoal, and make it ſlightly red hot. When this fire has been continued an hour, take off the recipient, firſt ſtriking the neck of the retort to throw off the looſe drops that may hang there; and in the bottom of the water you will find the *mercury*. This proceſs may be alſo performed in a ſand heat; but the bottom of the retort muſt touch the bottom of the veſſel that contains the ſand, and that be made red hot. The *mercury* is to be ſeparated from the water by filtration.

The ore of the mine of Juan Cabelaca, in Peru, which is conſiderable, is of a whitiſh red, like bricks half-burnt; it is firſt broken, then expoſed to the fire, by ſpreading it on a layer of common earth, wherewith the grate of an earthen furnace is covered; under which is lighted a little fire of an herb, called by the Spaniards *ichu*; which is of that neceſſity in theſe works, that the cutting of it is prohibited for the ſpace of twenty leagues round. In proportion as the mineral heats, the *mercury* riſes volatilized into ſmoke; which ſmoke, finding no vent through the capital of the furnace, which is exactly luted, eſcapes through an hole made for that purpoſe, communicating with ſeveral earthen cucurbits fitted within one another. The water at the bottom of each cucurbit condenſing the ſmoke, the quick-ſilver precipitates, and is taken out, when the operation is over. In this proceſs, there are three things remarkable: the firſt, that the farther the cucurbits are from the furnace, the more they are filled with quick-ſilver; the ſecond, that they all grow ſo hot, that they would break, were they not ſprinkled from time to time with water; thirdly, that the workmen employed never hold it long, but become paralytic, and die hectic.

MERCURY, *the method of purifying*, from extraneous ſubſtances is important for the purpoſes of medicine and of the arts, and eſpecially for ſome nice chemical operations. *Mercury* may be cleanſed from duſt, by ſtraining it through ſhamoy leather; from greaſe, by waſhing it with an alkaline lixivium; from any alkaline matter, by vinegar; from lead or biſmuth, with which it is frequently adulterated, by diſtillation; from ſulphur, by mixing it with quick-lime or with filings of iron, and then diſtilling the mixture. Sometimes ſulphur is added to the *mercury*, and both are ſublimed together into cinnabar; then iron filings are added to this compound to abſorb the ſulphur, and the pure *mercury* is diſtilled off. Mr. Malouin recommends uniting the quick-ſilver with antimony inſtead of ſulphur. The beſt method of purifying *mercury* is by reducing it into Æthiops mineral, with which twice the quantity of quick-lime or filings of iron is to be mixed, and by diſtilling it from this mixture. In all diſtillations of *mercury*, the addition of filings of iron ſeems to render the *mercury* more fluid and bright. Its purity may be known, by obſerving that it does not ſoil clean white paper; that it has no pellicle on its ſurface; that when triturated with water, it does not ſoil the water; that when expoſed to fire, in an iron ſpoon or ladle, it does not crackle; and, laſtly, that it is perfectly and entirely ſoluble in pure ſpirit of nitre, without any depoſition. See BAROMETER.

MERCURY, *the uſes of*, are very conſiderable, as in gilding, making looking-glaſſes, in refining gold, &c. See each in its head.

But eſpecially in medicine, and particularly for the cure of the venereal diſeaſe, raiſing ſalivations, and on other occaſions.

This fluid, ſuppoſed by the Greeks to be poiſonous and corroſive, was introduced into medicine by the Arabians, as an ingredient in external applications, againſt different cutaneous maladies. The practice was followed by ſome phyſicians in Europe towards the end of the thirteenth century; but was not eſtabliſhed or looked upon in general to be ſafe, till about the beginning of the ſixteenth, when the venereal diſtemper, then lately received from America, was found to yield to mercurial applications alone: and now alſo the uſe of internal *mercury* began to be ventured on, in this and in other diſeaſes. Crude and fluid *mercury* taken internally, produces no effect on the body; becauſe the adheſion of its integrant parts to each other, hinders their diviſion and diſtribution, or ſolution, without which it cannot have any effect. In its crude ſtate, therefore, it does nothing but load the ſtomach and inteſtines. It falls downwards by its weight, and goes out of the body with the faeces, in the ſame ſtate in which it entered. Hence ſome have been induced to give a pound or more in violent conſtipations, in order to open obſtructions that had reſiſted the common methods of cure by purgatives, relaxants, and emollients. But the practice has been attended with no remarkable ſucceſs.

Dr. Dover, in his Phyſician's Legacy to his country, having recommended crude *mercury* or quick-ſilver as a moſt beneficial medicine for ſeveral diſeaſes, it had for ſome time a great run at London, which occaſioned the writing a great many pamphlets for and againſt it. Dr. Cheyne alſo greatly recommends this medicine in his treatiſe, intitled, the Rational Method of curing Diſeaſes.

The authors of the Medical Eſſays of Edinburgh aſſure us, that though ſome they knew had taken an ounce or two of crude *mercury* each morning for ſeveral weeks, yet they knew no inſtance of its increaſing any of the ſenſible evacuations; but they have been told, that ſome who uſed it thus, had paſſed ſome of it with their urine, and that the hands of others, taking this medicine, had tinged their ſnuff-boxes, &c.

But we have an account of the effects of crude *mercury* on a perſon who had the advice of his phyſician for the taking it, in a remarkable caſe recorded in the Philoſophical Tranſactions, about the time when Dr. Dover had brought it into ſuch general uſe; and as the effects of it, in this caſe, may ſerve to caution people as to the uſe of it, it may be proper to give the ſubſtance of it, which is this: a perſon had long been ſubject to great difficulty in going to ſtool, for which he at length took ſeveral ounces of crude *mercury* at different times, but without relief. Upon the opening of the abdomen there iſſued out a great quantity of wind, before the ſtomach or guts were wounded. The ſtomach was empty, and its inner coat violently inflamed. The ſmall guts were, in many places, fouled with a black powder, reſembling Æthiops mineral, and in ſeveral parts of them were found ſmall globules of quick-ſilver. The black powder was doubtleſs the quick-ſilver altered into a ſort of æthiops in the body. The colon was inflamed and diſtended, and contained ſix quarts of liquid excrement, among which was a great deal of crude *mercury*, and of the ſame black powder. This gut alſo was inflamed on the outſide, and had formed an abſceſs where

it adhered to the omentum; the other guts in contact with this part also shared this disorder. In the lower part of the colon the coats became schirrous, and the passage was very small. Some of the valves were also become schirrous, and obstructed the passage, and a small plum-stone was found buried in the villous coat of this intestine. This had also formed a small abscess, which discharged itself into the pelvis. What part of these symptoms was owing to the taking the quick-silver is easily seen, and such effects may be guarded against for the future, by observing the state of the patient before it is given. Phil. Trans. N° 442. p. 295.

But when *mercury* is much divided, so that its molecules cannot again unite and form fluid *mercury* by the interposition of proper substances, it operates with great power, and extends its action through the whole habit. In these forms, whether taken internally, or introduced into the blood from external applications, it seems to liquify all the juices of the body, and may be so managed as to promote excretion through all the emunctories. The salutary effects of mercurials have, in many cases, very little dependance on the quantity of sensible evacuation. Venereal maladies and chronical distempers proceeding from a viscidity of the humours and obstructions of the small vessels, are often successfully cured by mercurials taken in such doses as not to produce any remarkable discharge; especially if assisted by diaphoretics, and a warm diluting regimen. In this view, camphor, and the resin or extract of guaiacum, are frequently joined to the *mercury*, and to the more active preparations, a little opium: which not only promotes the diaphoresis, but prevents the *mercury* from irritating the first passages, and running off by the grosser emunctories. Mercurials are always pernicious in the true scurvy, and in constitutions inclined to this disease, whose humours are disposed to a putrescent state; and a long continued use of *mercury* colliquates the whole mass of blood, and tends to weaken the nerves, so as to bring on tremors and paralyses. Mercurials are destructive to insects, perhaps of every kind: they are sometimes given internally against worms, and Van Helmont says, that water in which *mercury* has lain some time, though infused, will destroy worms; and Mr. Boyle seems to recommend it as an innocent and useful cosmetic. Works Abr. vol. iii. p. 345.

Mercurials are also applied externally, in unguents, for destroying cutaneous animalcula. See Itch. *Mercury* has of late been recommended as an effectual antidote against the poison of the mad dog. See Madness.

Mercury dissolved by rubbing it strongly with any chemical oil, or with Venice turpentine, has been given to the quantity of a scruple, half a dram, or two scruples in a day. Such pills keep some people's bellies open, others they purge, and a gentle ptyalism has sometimes been occasioned, nay, a high salivation has been raised by them. See Medic. Ess. Edinb.

Chemists having observed that some simple preparations of antimony and *mercury* had surprising effects in the cure of obstinate distempers, employed their art to change these Herculean medicines into various shapes, to separate their noxious and useless parts, and to combine their active principles. To these labours are owing the butter and cinnabar of antimony, *mercurius vitæ*, bezoard mineral, solar, lunar, jovial, and several other preparations, on which the most exorbitant encomiums have been lavished. But with all this care, many of these remained inactive, and others incorrigible, and unfit for use. However, it is certain that these two minerals, properly combined, have wonderful effects. We have, in the Medical Essays of Edinburgh, a preparation of Dr. Plummer, which is much recommended from the experience of its effects. See Plummer's *Æthiops*.

Mercury is often used in anatomical preparations, especially for such parts that do not easily retain air, as the lungs, or spleen, and glans penis. See Monro, in Med. Ess. Edinb. vol. iii. art. 16. But it is to be observed, that the quick-silver does considerable damage to the small cells of the lungs and glans.

Mercury is divided with different materials for internal use, and given as an alterative and as an alexipharmic, from two or three grains to eight or more. Half a dram of quick-silver is ground with two scruples and a half of prepared crabs eyes, and called *alkalizate mercury*, or with half a dram of brown sugar-candy, and two drops of oil of juniper berries, which last ingredient renders the union of the *mercury* with the sugar more perfect, and called *mercurius saccharatus*. See Pills.

Mercury, *the preparations of*, are very various; this metal making one of the most considerable articles in the chemical pharmacy. The most common preparations now in use, are, *Æthiops mineral*, æthiops cum igne, differing from the other only in the more intimate coalition of the *mercury* and sulphur, by melting the latter over a gentle fire, and gradually stirring into it the quick-silver; care being taken to cover the vessel when it seems disposed to catch flame: *factitious* cinnabar; *corrosive sublimate of* mercury, *mercurius dulcis*, *calcined* mercury, or *precipitate per se*, *white precipitate of* mercury, red precipitate or red corrosive *mercury*, *coralline* mercury, and turbith *mineral*.

Mercury, *calcined*, *mercurius calcinatus*, a new and more expressive name for the preparation of *mercury*, commonly called *precipitate per se*. It is made by setting purified quick-silver for several months in a sand heat, in a glass vessel with a broad bottom, and opening it to the air by a small hole, till it is reduced to a red powder.

The quick-silver must have a communication with the external air, as is necessary to the calcining of all the metals. This opening is best made, not as in the common bolt-heads, but at the lower end of a flask, going into the body of the glass; that if the quick-silver rise with the heat, it may not, by ascending into the flask, be removed out of the heat that is to calcine it.

A greater heat, sufficient to make the *mercury* freely distil, not only does not promote the calcination, but revives such part, as has been already calcined into *mercury* again. See Mercury *supra*. This red powder has been by some greatly esteemed in venereal cases, as the most effectual and certain of the mercurials. Mindabin's pills are supposed to be of this kind: but as it is disposed to occasion gripes, it has been usual to join with it a small quantity of opium, and some warm aromatic material. The dose is from half a grain to two grains; five or six grains are said to vomit and purge violently.

Mercury, *corralline*, *mercurius corallinus*, the name given in the London Dispensatory to a preparation of *mercury*, commonly known by the name of Arcanum *corallinum*. It is prepared in this manner: pour upon the red corrosive *mercury*, commonly called *red precipitate*, thrice its weight of rectified spirit of wine, digest them together in a gentle heat for two or three days, often shaking the phial, then set fire to the spirit, and continue stirring the powder till the spirit is burnt away.

This operation proceeds upon the principle of spirit of wine dulcifying acid spirits.

This medicine, notwithstanding this preparation, is a very rough one, operating, generally, in doses of a few grains, both upwards and downwards.

Mercury, *incalescent*. See Incalescent.

Mercury, *oil of*, the name given by the chemists to a preparation of *mercury* in a fluid form, by means of a strong acid. The preparation is this: calcine *mercury* with oil of vitriol to a dry (mowy) calx; suffer it to cool, then put it into a glass, and pour upon it an equal quantity of oil of vitriol; let this boil away almost to a dryness, carefully avoiding the poisonous fumes; then increase the fire, and by degrees reduce it to a dryness again; which is, in this state, a very difficult and tedious task. When the powder is dry, put the same quantity of oil of vitriol again to it, and proceed as before: at length it will scarce dry by means of ever so long or strong a fire, but only cease flowing freely, and become somewhat rigid like a fixed oil. It is then highly sharp, caustic, and not to be touched, like the *ignis gehennæ* of Paracelsus. By this means the *mercury* is so fixed with the oil of vitriol, as not to be evaporated, or fly off, by the action of a very violent fire.

By this process we see the method of impregnating, saturating, and incrusting metals by acids to any degree, and also of fixing, in a great degree, volatile *mercury* by them; but no metal is hence to be expected, for in whatever manner *mercury* is fixed with acids, it is always recoverable again in its pristine state, by grinding it with twice its weight of iron filings, and distilling in a glass retort, with the greatest degree of sand heat. Boerhaave.

Mercury, *ointment of*. See Unguent.

Mercury, *pills of*. See Pills.

Mercury, *plaster of*. See Emplastrum and Plaster.

Mercury, *red precipitate of*, is prepared by inspissating the solution of *mercury* in aqua fortis, over a gentle fire; when there remains a white mass highly caustic called *calx of mercury*: this calx is then calcined with a gradual heat, and becomes first brown, then yellow, and at length, on increasing the heat, of a deep red colour. It is called *red precipitate*, but improperly, for it is not a precipitate. If the aqua fortis used for the dissolution has been previously drawn over from a small proportion, on the one hundred and twenty-eighth part of its own weight, of sea-salt, the red mass is supposed more readily to assume the sparkling appearance which is looked upon as the characteristic of its goodness. This preparation is employed, as an escharotic, and mixed with ointments and cerates, as a digestive; in which intention, Mr. Sharp observes, that it is very effectual.

Mercury, *white precipitate of*, Mercurius *precipitatus albus*.

alba. This is compounded of crude *mercury* driven over from sea-salt in a retort, or revived from common cinnabar, and dissolved in aqua fortis; then a brine prepared of spring-water and sea-salt is filtred through a cap-paper, and the solution of *mercury* dropped gradually into this brine; whence there is a white powder precipitated, which is to be washed from all its acrimony with some simple distilled water, or warm spring-water, and afterwards dried.

This is the common precipitate of the shops, usually called *white precipitate*. Its operation is mostly by stool, sometimes by vomit; and it will salivate, if ordered accordingly. It is recommended by Boerhaave as one of the best of the mercurials, and said, in doses of three grains, to purge and vomit gently. It appears, however, too corrosive for internal use; and it is indeed corrosive to such a degree, as to be employed by the farriers for an escharotic. Spirit of sal ammoniac, or other volatile alkalies, drops into a filtered solution of sublimate, absorb a part of the acid, and the *mercury*, retaining so little as to be insoluble, renders the liquor milky, and subsides, on standing, in form of a fine white powder, which washed by repeated affusions of hot water, becomes insipid, and is the *white mercurial precipitate*, of the Edinburgh Pharmacopœia. If an equal weight of crude sal ammoniac be dissolved along with the sublimate, fixed alkalis added to this solution, extricate the volatile alkali of the sal ammoniac, and the precipitate, which is that of the London Pharmacopœia, proves the same, as if the volatile alkali alone had been added in its pure state. This *white precipitate* is frequently mixed with pomatums for the itch, and other foulnesses of the skin; for which purpose, it is necessary at the same time to keep the body laxative, and to take something inwardly to take hold of the mercurial principles, and prevent their raising salivation, which they may otherwise do.

MERCURY, *corrosive sublimate of*, MERCURIUS *sublimatus corrosivus*, is a compound of forty parts of quick-silver, rubbed with one part or more of sublimate already made, till it is divided into minute grains, then ground with twenty-eight parts of nitre, then with thirty-three of common salt, and afterwards, for a little time longer, with three-fifths of calcined green vitriol: the mixture is then put into a matrass, and that set in a furnace with a sand-heat, under which a fire being kept to its greatest height for twelve or fifteen hours, the *mercury* will be sublimed, and stick to the top of the vessel.

Mr. Boulduc describes an easy manner of making corrosive sublimate. He pours equal quantities of quick-silver and dephlegmated oil of vitriol into a retort, then draws off part of the acid, which does not incorporate with the quick-silver; the fire is continued till the white mass of dissolved *mercury* is dry, when he speedily mixes it with equal parts of dried sea-salt, and sublimes it in the common way.

If the mass obtained by inspissating a solution of *mercury* in aqua fortis, be powdered and mixed with equal its weight of dried sea-salt, and the mixture put into a matrass, of which it may fill nearly one half, and set in a sand-heat gradually increased, almost all the *mercury* will be saturated with the marine acid, and form with it a saline compound, which being sublimed, concretes into a white mass called *corrosive sublimate*. If the vitriolic acid be used instead of the nitrous, the event will be the same: in the one case a *sal cathareticus* will be formed; in the other a *nitrum calcinans*.

This sublimate is a violent escharotic, and eats away proud flesh; half a dram of it dissolved in a pint of lime-water, turns it yellow, which is then called *phagedenic* water; it is used to wash ulcers, and tetterous eruptions. A stronger solution, made by boiling the same quantity of powdered sublimate, with equal its weight of alum, in a pint of common water, till half the liquor is wasted, is the ALUMINOUS *water* applied to the same purpose. Small doses of this corrosive preparation, properly diluted, have been ventured on internally. Boerhaave relates, that if a grain be dissolved in an ounce of water, and a dram of this solution softened with syrup of violets, taken twice or thrice a day, it will perform wonders in many distempers reputed incurable. Van Swieten brought it into more general use, for the cure of venereal maladies: he dissolves a grain of the sublimate in two ounces of proof spirit, but rectified spirit dissolves it more perfectly, and gives of this solution from one to two spoonfuls twice a day, continuing the medicine so long as any of the symptoms remain, with a low diet, and plentiful dilution. There are many instances in the London Medical Obs. and Inq. of the success of this method.

MERCURY, *sweet sublimate of*. MERCURIUS *sublimatus dulcis*, or *aquila alba*, is a composition of the preceding corrosive sublimate with crude *mercury*, ground together till no *mercury* appear, and then put into a bolt-head, well stopped, and set in a sand-heat, with a gentle fire, for the space of two hours; which heat is to be then increased for three hours longer, and, lastly, made very strong, for an hour more. When this is cold, the glass is broken, and the sublimate separated from the light flowers at top, and the dust at bottom. This is then powdered afresh, and the operation repeated in the same manner three times. If it be farther repeated, to a fixth time, it is called CALOMEL.

The college of Edinburgh directs the sublimation to be repeated three or four times; that of London, six times. *Mercurius dulcis* in large doses, with cinnabar of antimony, is recommended in nervous diseases, palsy, hemiplegia, epilepsy, and apoplexy. Med. Ess. Edinb.

Mr. Dictericus gives us these rules for knowing whether sublimate is sufficiently edulcorated in making *mercurius dulcis*. If after rubbing the *mercury* on gold, the gold becomes only pale, and not white, the *mercury* is dulcified enough; or if sweet *mercury* becomes black when mixed with lime-water, it is fit for use; but if either the gold becomes white, or the *mercury* is of a brown or yellow colour, after mixing with lime-water, it is not sufficiently dulcified. Commerc. Norem. 1737, hebd. 29. sect. 3.

Mercurius dulcis appears to be the best and safest of the mercurial preparations that can be taken in a solid form: as a salagogue, five, ten, and sometimes fifteen grains, made into a bolus or pills, are repeated every night or oftener, till the ptyalism begins: as an alterative, it is given from one to two or three grains. It generally answers best in small doses, which may be repeated with due caution, every evening, for a considerable time without inconvenience.

MERCURY, *emetic yellow*, *mercurius emeticus flavus*, a name given in the late London Dispensatory to the mercurial preparation commonly known by the name of TURBITH *mineral*.

MERCURY, *fixing of*. The supposition of a sympathy between *mercury* and gold has been the great basis of the attempts of the alchemists of all times, toward the making gold of it. But if they mean that the common *mercury* has this sympathy with gold, the contrary is proved by that remarkable process, in which it appears that *mercury* will incalesce with that metal. If they mean that *mercury* which they call the seed of metals, it is hard to offer any thing in argument against it, this being a sort of ideal subsistance which nobody has yet seen. It is much disputed by the alchemists, whether there be or be not any such thing as *mercury* that will heat or incalesce with gold, or produce a sensible heat in the mass, on being only simply mixed with that metal reduced to fine parts. It has been said by some, that those *mercuries* which they call *mercuries corporum*, that is, such as have been extracted from the complete metals by certain processes, which they keep as invisable secrets, will incalesce on the mixture with gold; and on this they build their processes. But the negative part of the question is more generally maintained, the famous *mercuries* of metals being held as non-entities with them; and even the searchers after transmutation of metals have in general acknowledged, that they themselves never saw any such incalescence of *mercury* with gold, though they had heard others speak of it as a thing they had seen. A *mercury*, however, was some years ago produced before the Royal Society, which in the hands of the president himself, on the fairest trial, did incalesce with that metal. Phil. Trans. N° 122.

Among the several methods recommended for the fixing this fluid metal into solid silver, oil of talc, and oil of the human fæces, are the most strongly affirmed to be the infallible mediums. The first of these which has been so much misunderstood, by reason of its name, as to be searched for in the stone talc, is truly an oil prepared from the flowers of zink. See *Oil of* TALC.

The other is required to be clear and colourless as water, and without any ill smell. These were qualities so difficultly to be found in an oil of that fœtid matter, that both the one and the other of these oils were looked upon by many as impracticable processes. But after the first had been made by two or three chemists, Mr. Homberg at length hit upon the last, but without finding any the least tendency to such an effect in it, or any change at all produced by it on *mercury*, after ever so long digestion, or ever so many processes. Ment. Acad. Par. 1711. See PHILOSOPHER'S *Stone*.

MERCURY, *animated*, is quick-silver impregnated with some subtile and spirituous particles; so as to render it capable of growing hot when mingled with gold.

MERCURY, or MERCURY *of bodies*, is also used by chemists to denote the thirds of the principles or elements of natural bodies, called also spirit.

In this sense, *mercury* is defined the most subtile, light, volatile,

volatile, penetrating, and active part of all bodies. See SPIRIT.

MERCURY *of life*, *mercurius vitæ*, may according to Mr. Boyle, be moderated in its evacuating quality, by continually ſtirring it in a flat glazed earthen veſſel, over a fire, till it emits no fumes, and turns of a grey colour; and he thinks this is the *mercurius vitæ purgans* ſo often mentioned by Riverius. Boyle, Works abr. vol. i. p. 74. Mr. Godfrey obſerves that what is called *mercurius vitæ*, prepared of ſublimate *mercury* and antimony, has no *mercury* in it, but is the reguline part of the antimony, with the acid of the ſublimate; and what remains is the *mercury* formed into cinnabar by the ſulphur of the antimony. See ALGAROT.

MERCURY *of metals*, or of the *philoſophers*, is a pure fluid ſubſtance in form of common running *mercury*, ſaid to be found in all *mercury*, and capable of being extracted from the ſame.

The notion of *mercury* of metals is founded on the common ſyſtem of the chemiſts, that *mercury* or quickſilver is the baſis or matter of all metals; and that metals are only *mercury* fixed by a certain ſulphur.

Mr. Boyle aſſures us, he had a way of drawing a true running *mercury*, or quickſilver, from antimony.

MERCURY alſo ſerves as a title for books, and papers of news; ſo called from the heathen deity Mercury, ſuppoſed the meſſenger of the gods.

Thus we have monthly *mercuries*; and the French have a gallant *mercury*, &c.

In the like ſenſe, *mercury* is alſo figuratively applied to perſons who make it their buſineſs to collect news, or to run about and diſtribute it.

MERCURY, in *Heraldry*, denotes the purple colour in the coats of ſovereign princes.

MERCURY, in *Mythology*, the ſon of Jupiter and Maia. He was the god of merchandize, and therefore was ſometimes painted with a wand in his left hand, and a bag of money in his right. He was alſo the god of eloquence, and the meſſenger of the gods; he is pictured therefore with a herald's ſtaff in his hand, entwined with two ſnakes; wings on his feet, to ſhew his ſpeed; and a broad-brimmed beaver with wings. He had a general power delegated to him, by Jupiter, of conducting the ſouls of men to their proper place, after their parting from the body; and reconducting them to our world again, when there was any particular occaſion for it. He was, moreover, the god of all gainful arts; whence the proverb, *ξυρὸς ἰχθὺς*, i. e. *commune lucrum*; eſpecially of things found by chance: the inventor of the lyre, and of the exerciſe of wreſtling. He was the patron of thieves, having himſelf been expert that way; and the guide of travellers, for which reaſon he had ſtatues four ſquare ſet up to him in croſs roads. See TERMINUS. There are ſeveral marks whereby *Mercury* may be known; among which we may reckon the ſightneſs and agility of his perſon as the chief; but the moſt remarkable of his diſtinguiſhing attributes are his petaſus, or winged cap; the talaria, or wings to his feet; and his wand, with two ſerpents about it, which they call his caduceus. Sometimes he is alſo repreſented with the chlamys, faſtened over his ſhoulders on his breaſt, and floating behind him in the air. He is likewiſe diſtinguiſhed by his ſword, with which he killed Argus, called Harpe. As the make of *Mercury* ſeems to be all intended for lightneſs and diſpatch, the ancients might borrow this idea of him from his planetary character: thus Lucan. Pharſal. i. v. 663. in ſpeaking of *Mercury*, as the guiding intelligence of a planet, marks the ſwiftneſs of his motion.

MERCURY is ſometimes alſo uſed for the Torricellian experiment, or BAROMETER.

Though *mercury* be not ordinarily ſuſtained in a tube above the height of twenty-eight or twenty-nine inches; yet M. Huygens has found, that *mercury* well purged, and in a cloſe ſtill place, will be ſuſtained to the height of ſeventy-two inches. See TORRICELLIAN.

MERCY, in *Law*. See MISERICORDIA.

MERDESENGI, in the *Materia Medica of the Arabians*, a name given by Serapio to litharge. Avicenna calls this ſubſtance MARDAC, and it has been erroneouſly ſuppoſed from this, that *mardac* and *mardeſengi* were not the ſame ſubſtance; but this is a falſe conjecture.

MERDIVORÆ, from *merda*, *dung*, and *voro*, *I devour*, the *dung-eaters*, in *Natural Hiſtory*, the name given by authors to ſeveral flies which feed on excrements of different animals. Of theſe there are three kinds very common among us: 1. the COPROPHAGUS, which is of a dun colour, with a reddiſh head, and a white ſtreak along the middle of it; 2. the red *dung-fly*, which has ſilvery wings, a red body, and black ſhoulders; and, 3. the green one, which is of a very glittering hue, and has ſilvery wings.

MERGANSER, in *Ornithology*, the name of a large water-fowl, called in Engliſh, the *gooſander*, and by ſome authors, the *burle*.

This is the MERGUS *merganſer* in the Linnæan ſyſtem: the bill of the male of this ſpecies is about three inches long, narrow, and finely ſerrated; the colour of the bill as well as of the irides is red; the head is large, and the feathers on the hind part long and looſe; the colour black, finely gloſſed with green; the upper part of the neck the ſame; the lower part and under ſide of the body of a fine pale yellow; the upper part of the back and inner ſcapulars are black; the lower part of the back and tail are aſh-coloured; the tail conſiſts of eighteen feathers; the greater quill-feathers are black, the leſſer white, ſome of which are edged with black; the coverts at the ſetting on of the wings are black; the reſt white; and the legs of a deep orange colour. The female of this ſpecies is called DUNDIVER. Theſe birds frequent our rivers and freſh waters, eſpecially in hard winters; they are never ſeen in the ſouthern parts of Great Britain during ſummer, when they retire far north to breed. They are great divers, and live on fiſh. Their fleſh is extremely rank, and ſcarce eatable. Pennant.

MERETRIX, among the Romans. The *meretrices* were the better ſort of courtezans, and differed much from the *proſtibulæ*, or common proſtitutes, who had bills or inſcriptions, *tituli*, over their doors, and were ready at all times to entertain their cuſtomers; whereas the *meretrices* entertained none but at night.

The *meretrices* were diſtinguiſhed from the matrons by their dreſs, being obliged to wear the *toga* and ſhort tunics, like thoſe of the men; whereas the matrons wore the *ſtola*, which was a garment that reached down to their feet, as did likewiſe their *palla*, or outer robe.

MERGEN, a word uſed by ſome of the chemical writers to expreſs CORAL.

MERGER, in *Law*, is where a leſſer eſtate in lands, &c. is drowned in the greater; as, if the fee comes to tenant for years or life, the particular eſtate is *merged* in the fee: but an eſtate tail cannot be *merged* in an eſtate fee; for no eſtate in tail can be extinct by the acceſſion of a greater eſtate to it. If a leſſor, who had the fee, marries with the leſſee for years, this is no *merger*, becauſe he hath the inheritance in his own, and the leaſe in right of his wife. And where a man hath a term in his own right, and the inheritance deſcends to his wife, ſo that he hath a freehold in her right, the term is not *merged* or drowned.

MERGUS, in the Linnæan ſyſtem of *Ornithology*, the name of a diſtinct genus of birds, of the order of the *anſeres*. The diſtinguiſhing characteriſtic of this genus is, that the beak is ſomewhat cylindric, and has a crooked point. The characters of this genus, according to Mr. Ray, are theſe: the feet are webbed, the three fore-toes being connected by a membrane, but the hinder-toe is left looſe; the beak is narrow, hooked at the end, and ſerrated.

Of this genus are the MERGANSER, the *mergus cucullatus*, with a globoſe creſt, white on the ſides, with a black margin, the body blackiſh on the upper part and whitiſh on the lower; the feet and beak are black: this is alſo called *anas criſtata*, and bird of the wind: it is found in America: the *albellus*, or Aldrovand, called *mergus ſerratus major*, the greater creſted diver, and *mergus Rhenanus*, the diver of the Rhine, and commonly known in England by the name of the SMEW: the head is adorned with a long creſt, white above and black beneath; the forehead is marked with a large ovil black ſpot; the body is white, the back and temples black, and the wings are variegated with black and white; it feeds on fiſh, and is very common on our coaſts: the *mergus ſerrator*, or *ſerrulo* of the Venetians: the *mergus coſtor*, with an aſh-coloured creſt, the lower part of the body ſerruginous, white throat, and beak and feet blackiſh: and the *mergus minutus*, with the head of a light grey colour, and an oval black ſpot from beyond the eyes to the bill, and a white ſpot under the eye. Ray makes this to be the female of the *albellus*, which it greatly reſembles, though it is diſtinguiſhed by the name of *lough diver*.

MERGUS *cirratus minor*, in *Ornithology*, a name by which Geſner calls the *capo negro*, a ſpecies of duck, called in Engliſh the *tufted* DUCK.

MERIDIAN, in *Aſtronomy*, a great circle of the ſphere, paſſing through the zenith, nadir, and poles of the world, croſſing the equinoctial at right angles, and dividing the ſphere into two hemiſpheres, the one eaſtern and the other weſtern.

Or, the *meridian* is a vertical circle, as A Z B N (*Tab. Aſtron. fig.* 6.) paſſing through the poles of the world, P and Q.

It is called *meridian*, from the Latin *meridies*, *noon*, or *mid-day*, becauſe when the ſun is in this circle, it is noon in thoſe places ſituate under it.

MERIDIAN, in *Geography*, is a great circle, as P A Q D (*Tab. Geography, fig.* 7.) paſſing through the poles of the

earth P and Q; and any given place at Z. So that the plane of the terreſtrial *meridian* is in the plane of the celeſtial one.

Hence, 1. as the *meridian* inveſts the whole earth, there are ſeveral places ſituated under the ſame *meridian*. And 2. as it is noon-tide whenever the centre of the ſun is in the *meridian* of the heavens; and as the *meridian* of the earth is in the plane of the former; it follows, that it is noon at the ſame time, in all places ſituate under the ſame *meridian*. 3. There are as many *meridians* on the earth, as there are points conceived in the equator. In effect, the *meridians* always change, as you change the longitude of the place; and may be ſaid to be infinite; each reſpective place from eaſt to weſt having its reſpective *meridian*.

MERIDIAN, *firſt*, is that from which the reſt are accounted, reckoning from weſt to eaſt. The firſt *meridian* is the beginning of longitude.

The fixing of the firſt *meridian* is a matter merely arbitrary; and hence different perſons, nations, and ages, have fixed it differently; whence ſome confuſion has ariſen in geography. The rule among the ancients was, to make it paſs through the place fartheſt to the weſt that was known. But the moderns knowing, that there is no ſuch place in the earth as can be eſteemed the moſt weſterly, the way of computing the longitudes of places from one fixed point is much laid aſide.

Ptolemy aſſumed the *meridian* that paſſes through the fartheſt of the Canary Iſlands as his firſt *meridian*; that being the moſt weſtern place of the world then known. After him, as more countries were diſcovered in that quarter, the firſt *meridian* was removed farther off. The Arabian geographers chooſe to fix the firſt *meridian* upon the utmoſt ſhore of the weſtern ocean. Some fixed it to the iſland of St. Nicholas near Cape Verd; Hondius to the iſle of St. James; others to the iſland of Del Corvo, one of the Azores; becauſe on that iſland the magnetic needle, at that time, pointed directly north, without any variation; and it was not then known that the variation of the needle is itſelf ſubject to variation. The lateſt geographers, particularly the Dutch, have pitched on the Pike of Teneriffe; others on the iſle of Palm, another of the Canaries; and, laſtly, the French, by command of their king, on the iſland of Fero, another of the Canaries.

But, without much regard to any of theſe rules, our geographers and map-makers frequently aſſume the *meridian* of the place where they live, or the capital of their country for a firſt *meridian*; and thence reckon the longitudes of their places.

The aſtronomers in their calculations uſually chooſe the *meridian* of the place where their obſervations are made, for their firſt *meridian*; as Ptolemy at Alexandria; Tycho Brahe at Uranibourg; Riccioli at Bologna; Mr. Flamſteed at the royal obſervatory at Greenwich; and the French at the obſervatory at Paris.

In the Philoſophical Tranſactions, there is a ſuggeſtion, that the *meridians* vary in time. This ſeems very probable, from the old *meridian line* in the church of St. Petronio at Bologna, which is found to vary no leſs than eight degrees from the true *meridian* of the place at this time; and from that of Tycho at Uranibourg, which M. Picart obſerves, varies eighteen minutes from the modern *meridian*. If there be any thing of truth in this hint, Dr. Wallis ſays, the change muſt ariſe from a change of the terreſtrial poles (here on earth, of the earth's diurnal motion), not of their pointing to this or that of the fixed ſtars: for if the poles of the diurnal motion remain fixed to the ſame place on the earth, the *meridians*, which paſs through theſe poles, muſt remain the ſame.

But the notion of the changes of the *meridian* ſeems overthrown by an obſervation of M. Chazelles, of the French Academy of Sciences, who, when in Egypt, found that the four ſides of a pyramid built three thouſand years ago ſtill looked very exactly to the four cardinal points. A poſition which can never be looked upon as fortuitous!

MERIDIAN *of a globe*, or *ſphere*, is the brazen circle, in which the GLOBE hangs and turns.

It is divided into four nineties, or three hundred and ſixty degrees, beginning at the equinoctial: on it, each way, from the equinoctial, on the celeſtial globes, is counted the ſouth and north declination of the ſun or ſtars; and on the terreſtrial globe, the latitude of places north and ſouth. There are two points on this circle, called the *poles*; and a diameter, continued from thence through the centre of either globe, is called the axis of the earth, or heavens, on which they are ſuppoſed to turn round.

On the terreſtrial globes there are uſually thirty-ſix *meridians* drawn, one through every tenth degree of the equator, or through every tenth degree of longitude.

The uſes of this circle are, to ſet the globes to any particular latitude, to ſhew the ſun's or a ſtar's declination, right aſcenſion, greateſt altitude, &c.

MERIDIAN *line*, an arch, or part, of the *meridian* of the place, terminated each way by the horizon.

Or, a *meridian line* is the interſection of the plane of the *meridian* of the place with the plane of the horizon, vulgarly called a *north and ſouth line*, becauſe its direction is from one pole towards the other.

The uſe of a *meridian line* in aſtronomy, geography, dialling, &c. is very great, and on its exactneſs all depends; whence infinite pains have been taken by divers aſtronomers to fix it to the utmoſt preciſion. M. Caſſini has diſtinguiſhed himſelf by a *meridian line* drawn on the pavement of the church of S. Petronio, at Bologna, the largeſt and moſt accurate in the world; being 120 feet in length. In the roof of this church, a thouſand inches above the pavement, is a little hole, through which the ſun's image, when in the *meridian*, falling upon the line, marks his progreſs all the year. When finiſhed, M. Caſſini, by a public writing, informed the mathematicians of Europe, of a new oracle of Apollo, or the ſun, eſtabliſhed in a temple, which might be conſulted, with entire confidence, as to all difficulties in aſtronomy. See GNOMON.

To draw a MERIDIAN *line*. Knowing the ſouth quarter pretty nearly, obſerve the altitude F E (*Tab. Aſtronomy, fig.* 8.) of ſome ſtar on the eaſtern ſide thereof, not far from the *meridian* H Z R N: then, keeping the quadrant firm on its axis, ſo as the plummet may ſtill cut the ſame degree, only directing it to the weſtern ſide of the *meridian*, wait till you find the ſtar has the ſame altitude as before, *f e*. Laſtly, biſect the angle E C *e*, formed by the interſection of the two planes wherein the quadrant is placed at the time of the two obſervations, by the right line H R. This H R is a *meridian line*.

Or thus: on an horizontal plane, from the ſame centre C (*fig.* 9.) deſcribe ſeveral arches of circles B A, *b a*, &c. and on the ſame center C erect a ſtyle, or gnomon, perpendicular to the plane A C B, a foot or half a foot long. About the twenty-firſt of June, between the hours of nine and eleven in the morning, and between one and three in the afternoon, obſerve the points B, *b*, &c. A, *a*, wherein the ſhadow of the ſtyle terminates. Biſect the arches A B, *a b*, &c. in D, *d*, &c. If then the ſame right line D E biſect all the arches A B, *a b*, &c. it will be the *meridian line* ſought.

In regard the extremity of the ſhadow is ſomewhat hard to determine, it is beſt to have the ſtyle flat at top, and to drill a little hole, noting the lucid ſpot projected by it on the arches A B and *a b*, inſtead of the extremity of the ſhadow. Otherwiſe the circles may be made with yellow, inſtead of black, &c.

A good *meridian line* for regulating clocks and watches may be had by the following method: make a round hole, almoſt a quarter of an inch in diameter, in a thin plate of metal; and fix the plate in the top of a ſouth window, in ſuch a manner, that it may recline from the zenith at an angle equal to the co-latitude of your place, as nearly as you can gueſs; for then the plate will face the ſun directly at noon, on the equinoctial days. Let the ſun ſhine freely through the hole into the room, previouſly darkened; and hang a plumb-line to the ceiling of the room, at leaſt five or ſix feet from the window, in ſuch a place as that the ſun's rays, tranſmitted through the hole, may fall upon the line when it is noon by the clock; and having marked the ſaid place on the ceiling, take away the line. Having adjuſted a ſliding-bar to a dove-tail groove, in a piece of wood about eighteen inches long, and fixed a hook into the middle of the bar, nail the wood to the above mentioned place in the ceiling, parallel to the ſide of the room in which the window is; the groove and bar being towards the floor. Then hang the plumb-line upon the hook in the bar, the weight or plummet reaching almoſt to the floor: when this is done, find the true ſolar time, and thereby regulate your clock or watch. Then, at the moment of next noon by the clock, when the ſun ſhines, move the ſliding-bar in the groove until the ſhadow of the plumb-line biſects the image of the ſun on the floor, wall, or on a white ſcreen placed on the north ſide of the line; the plummet or weight at the end of the line hanging freely in a pail of water, placed below it on the floor. By repeated corrections, on the following days, with the ſun and clock, this method may be brought to a very great exactneſs. This *meridian line* will not only be ſufficient for the regulation of clocks and watches, to the true mean time, by equation tables, but alſo for moſt aſtronomical purpoſes. Ferguſon's Lect. on ſelect Subjects, &c. lect. x.

Several authors have invented particular inſtruments and methods for the deſcribing of *meridian lines*, or rather

for determining equal altitudes of the ſun in the eaſtern and weſtern parts of the heavens; as Mr. Grey, Dr. Derham, &c. in the Philoſophical Tranſactions. But as the former of the methods above delivered ſuffices for aſtronomical obſervations, and the latter for more ordinary occaſions, we ſhall forbear to give any deſcriptions thereof.

From what has been ſhewn it is evident, that whenever the ſhadow of the ſtyle covers the *meridian line*, the centre of the ſun is in the *meridian*; and therefore it is then noon. And hence the uſe of a *meridian line* in adjuſting the motion of clocks, &c. to the ſun.

Hence alſo, if the *meridian line* be biſected by a right line O V, drawn perpendicularly through the point C, O V will be the interſection of the *meridian*, and firſt vertical; and, conſequently, O will ſhew the eaſt point, and V the weſt.

Laſtly, if a ſtyle be erected perpendicularly in any other horizontal plane, and a ſignal be given when the ſhadow of the ſtyle covers the *meridian line* drawn in another plane, noting the apex, or extremity, of the ſhadow projected by the ſtyle, a line drawn from that point through that wherein the ſtyle is raiſed, will be a *meridian line*.

One *meridian line* being given, another may be drawn upon another horizontal plane by the following method: hang a thread with a plummet exactly over the ſouth end of the *meridian line* given, and another thread with a plummet over the ſouth end of the plane upon which the *meridian line* is to be drawn; let one perſon obſerve at noon the moment when the ſhadow of the firſt thread falls exactly upon the *meridian* given, and let another obſerver, at the ſame time, mark two diſtant points in the ſhadow of the ſecond thread: a line drawn through thoſe points is the *meridian line* required. By the ſame method may a *meridian line* be found upon a ſouth wall, by marking two points in the ſhadow of a thread hung at a little diſtance from it: if the *meridians* are near, he that obſerves the ſhadow of the firſt thread may let the other know the moment it falls upon the *meridian line* by ſaying *now*: if they are far diſtant, it ſhould be done by the motion of the hand, becauſe ſound takes ſome time to paſs from one place to another. The *meridian line* is the baſis of aſtronomical obſervations: a *meridian line* being found, there may be placed over it a quadrant or ſextant in ſuch a manner, that though it be moved up or down to give it different elevations, in order to view through the ſights of it the celeſtial bodies at their different altitudes; yet the plane of that ſide of the inſtrument upon which the degrees are marked ſhall continue all the while in the plane of the *meridian*. Of this kind is the MURAL *arc* in the royal OBSERVATORY at Greenwich. See MERIDIAN *altitude*.

MERIDIAN *line*, on a dial, is a right line ariſing from the interſection of the *meridian* of the place with the plane of the dial.

This is the line of twelve o'clock, and from hence the diviſion of the hour-line begins.

MERIDIAN, *magnetical*, is a great circle, paſſing through or by the magnetical poles; to which the magnetic needle or needle of the mariners compaſs, if not otherwiſe hindered, conforms itſelf.

MERIDIAN *altitude* of the ſun or ſtars is, their altitude when in the *meridian* of the place where they are obſerved. See ALTITUDE.

To take the MERIDIAN *altitude of the ſtars.* Aſtronomers make two principal kinds of obſervations of the ſtars, the one when they are in the *meridian*, and the other when in vertical circles.

For *meridian* obſervations there are two inſtruments principally uſed, the quadrant and gnomon.

To take the MERIDIAN *altitude with a quadrant.* If the poſition of the *meridian* be known, and the plane of an aſtronomical quadrant be placed in the *meridian* line, by means of the plumb-line ſuſpended at the centre, the *meridian* altitudes of the ſtars, which are the principal obſervations whereon the whole art of aſtronomy is founded, may eaſily be determined.

The *meridian* altitude of a ſtar may likewiſe be had by means of a pendulum-clock, if the exact time of the ſtar's paſſage by the *meridian* be known. Now it muſt be obſerved, that ſtars have the ſame altitude for a minute before and after their paſſage by the *meridian*, if they be not in or near the zenith; but if they be, their altitudes muſt be taken every minute when they are near the *meridian*; and then their greateſt altitudes will be the *meridian* altitudes ſought.

As to the manner of obſerving, it is found very difficult to place the vane of the quadrant in the *meridian* exactly enough to take the *meridian* altitude of a ſtar; for, unleſs there be a convenient place, and a wall, where the quadrant may be firmly faſtened in the plane of the *meridian*, which is not eaſily had, we ſhall not have the true poſition of the *meridian* proper to obſerve the ſtars. It will be much eaſier, therefore, on ſeveral accounts, to uſe the portable quadrant, by which the altitude of the ſtar may be obſerved a little before its paſſage over the *meridian*, every minute, till its greateſt altitude be found. Here, though we have not the true poſition of the *meridian* by this means, yet we have the apparent *meridian* altitude of the ſtar.

Though this method, in the general be very good, and free of any ſenſible error; yet, in caſe a ſtar paſſes by the *meridian* near the zenith, it proves ſomewhat defective; for in theſe kinds of obſervations, the inconvenient ſituation of the obſerver, the variation of the ſtar's azimuth ſeveral degrees in a little time, the alteration of the inſtrument, and the difficulty of replacing it vertically, will prevent the obſervations from being made oftener than in every four minutes; but in each minute the altitude varies about fifteen minutes of a degree, ſo that there will be the difference of a degree in the ſtar's altitude between each obſervation. In ſuch caſes, therefore, it will be better to have the true poſition of the *meridian*, or the exact time wherein the ſtar paſſes the *meridian*, in order either to place the inſtrument in the *meridian*, or to obſerve the altitude of the ſtar the moment it paſſes the *meridian*.

To find the MERIDIAN *altitude of the ſun, &c. by a gnomon*, ſee GNOMON. By other means, ſee ALTITUDE.

MERIDIAN *teleſcope*. See TELESCOPE.

To meaſure the degrees of the MERIDIAN. See DEGREE.

To obſerve the tranſits, or paſſages of the heavenly bodies acroſs the plane of the MERIDIAN. A *meridian* line being found, hang two threads with plummets exactly over it, at a little diſtance from one another, and they will be in the plane of the *meridian*: if you place your eye cloſe to one of the threads, in ſuch a manner that you make it cover the other, and both appear as one thread; when a ſtar is behind the threads, it is in the *meridian*. By the ſame method the ſun may be viewed, through a ſmoaked glaſs; when the threads paſs through his center, he is in the *meridian*: but the beſt way of obſerving the ſun, moon, ſtars, or planets, is through a teleſcope placed in the *meridian*, with two croſs hairs, one of which is in a vertical, the other in a horizontal poſition; when the vertical hair paſſes through the center of the ſun he is in the *meridian*.

MERIDIANI, in *Antiquity*, is a name which the Romans gave to a kind of gladiators, who entered the arena about noon, after the beſtiarii (who fought in the morning againſt beaſts) had finiſhed. See GLADIATOR.

They were thus called from *meridies*, i. e. *noon*, the time when they exhibited their ſhews.

The *meridiani* were a ſort of arileſs combatants, who fought man with man, ſword in hand: hence Seneca takes occaſion to obſerve, that the combats of the morning were full of humanity, compared with thoſe which followed.

MERIDIONAL *diſtance*, in *Navigation*, the ſame with departure, or eaſting and weſting, being the difference of longitude between the meridian, under which the ſhip now is, and any other meridian, which ſhe was under before.

MERIDIONAL *parts*, *miles*, or *minutes*, in *Navigation*, are the parts by which the meridians in a *Mercator's* CHART do increaſe, as the parallels of latitude decreaſe.

The co-ſine of the latitude of any place being equal to the radius, or ſemidiameter, of that parallel; therefore, in the true ſea-chart, or nautical planiſphere, this radius being the radius of the equinoctial, or whole line, of ninety degrees, the *meridional* parts at each degree of latitude muſt increaſe, as the ſecants of the arch contained between that latitude, and the equinoctial, do decreaſe.

In order to underſtand this, it is neceſſary to conſider, 1. that the diſtance between any two meridians at the equator is to their diſtance in any parallel of latitude as *radius* is to the co-ſine of that latitude. Let P D F E, *Tab. Navigation, fig.* 13. repreſent the fourth part of a ſphere; E being the center, P the pole, E D the radius of the equator, A B the radius of a parallel of latitude: then each of the arcs P B D, P C *d*, will repreſent a quadrant of a meridian; D *d* an arc of the equator; and B C an arc of a parallel of latitude: D B expreſſes the latitude, and P B the complement of the latitude, whoſe right line is B A. But the circumference of a circle, whoſe radius is E D, is to the circumference of a circle, whoſe radius is A B, and conſequently like arcs D *d*, B C, intercepted between the ſame two meridians, as E D is to A B, i. e. as radius to the co-ſine of the latitude. Whence it is eaſy to conſtruct a table ſhewing

in

in what proportion the degrees of longitude diminish in every latitude. See such a table under article DEGREE *of latitude*.

2. Any part of a parallel of latitude is to a like part of a meridian, as radius to the secant of the latitude to that parallel. Let P D E, *Tab. Navigation, fig.* 14. represent a quadrant of a meridian, where P is the pole, and D E the arch of the equator; A B is the radius of a parallel of latitude, or the co-sine of the latitude, whose sine is B F, and secant E C. Then E F : E B :: E D : E C; or co-sin. latitude : rad. :: rad. : secant of the latitude, in that parallel. Therefore, part of a parallel of latitude is to a like part of the equator as the radius is to the secant of the latitude to that parallel: consequently, since like parts of the meridian and equator are equal, as great circles, any part of a parallel of latitude is to a like part of a meridian, as radius to the secant of the latitude to that parallel.

3. The distance of any parallel of latitude, A, from the equator is expressed by the sum of the secants of all the arcs between the equator and that parallel. For, as radius to the secant of the latitude A, so is a diminithed degree of longitude in the latitude A, or a degree of that parallel to a degree of the meridian: but the degrees of latitude, or of the meridian, are to be lengthened in proportion as the degrees of longitude decrease: therefore, as radius to the secant of the latitude A, so is a natural degree of the meridian to a lengthened degree in the latitude A; radius being here as unity, and one natural degree as unity also: therefore, the length of a degree in any latitude is as the secant of that latitude, or may be expressed by that secant: but the distance of any parallel from the equator is the sum of all the successive arcs between the equator and that parallel: consequently, the distance of that parallel is expressed by the sum of the secants of all these arcs between the equator and that parallel of latitude: and, therefore, by the addition of the secants of small arcs, the distances of the parallels of latitude from the equator are obtained.

The tables, therefore, of *meridional* parts, in books of navigation, are to be made by a continual addition of secants, calculated in some books, as in sir Jonas Moor's Tables, Robertson's Navigation, &c. for every degree and minute of latitude; and these will serve either to make or graduate a Mercator's chart, or to work the Mercator's sailing.

Mr. Wright, to whom we are indebted for this excellent discovery, made his table for the division of the nautical meridian, or the table of *meridional* parts, as follows: the *meridional* parts for 1 minute he made equal to the secant of 1 minute; those of 2′ equal to the sum of the secants of 1′ and 2′; those of 3′ equal to the sum of the secants of 1′, 2′, and 3′; those of 4′ equal to the sum of the *meridional* parts of 3′ and the secant of 4′; and so on by a constant addition of the secants: Mr. Oughtred, sir Jonas Moor, Dr. Wallis, Dr. Halley, and others, have endeavoured to find methods of constructing these tables with greater accuracy than by the addition of the secants to every minute.

To use them you must enter the table with a degree of latitude at the head, and with the minute on the first column towards the left hand; and in the angle meeting you will have the *meridional* parts.

Having the latitude of two places, to find the *meridional* miles, or minutes, between them; consider whether the places be, one under the equinoctial, and the other wide thereof, or the one on the one side of the equinoctial, and the other on the other; or whether they both lie on the same side.

If one place lie under the equator, the *meridional* minute next under the degree of latitude of the other place, is the *meridional* difference of latitude, or latitude inlarged.

If one be in north, and the other in south latitude, the *meridional* minutes, corresponding to the two latitudes, added together, give the *meridional* minutes between them.

Both places lying towards the same pole, subtract the *meridional* parts answering to the less latitude, from those of the greater, the remainder gives the *meridional* minutes.

In the Philosophical Transactions, N° 219. Dr. Halley has given a very curious paper relating to the division of the nautical meridian, by a quite different method from Mr. Wright's, and containing a method of performing the problems of sailing according to the true chart, by the help of Brigge's, or the common table of logarithmic tangents, without a table of *meridional* parts. Dr. Halley avails himself of a principle, first accidentally discovered by Mr. Henry Bond, and published about the year 1645, that the meridian line was analogous to a scale of logarithmic tangents of half the complements of the latitude. This analogy was first demonstrated by Mr. James Gregory, in his Exercitationes Geometricæ, published in 1668, and more elegantly and concisely by Dr. Halley himself; who has also shewn *(ubi supra)* how to apply this analogy, by means of any system of logarithms, for computing the interval of the *meridional* parts answering to any two given latitudes. The reader may find this subject well illustrated by Dr. Robertson, in his Elements of Navigation, book viii. p. 142, &c. See also Phil. Trans. vol. xlvi. p. 550, &c.

To find the *meridional* parts to any spheroid, with the same exactness as in a sphere.

Let the semi-diameter of the equator be to the distance of the focus of the generating ellipse, from the center as m to 1. Let A represent the latitude for which the *meridional* parts are required, s the sine of the latitude, the radius being unity; find the arc B, whose sine is $\frac{s}{m}$; take the logarithmic tangent of half the complement of B, from the common tables; subtract this logarithmic tangent from 10.0000000, or the logarithmic tangent of 45°; multiply the remainder by $7915.7044078 \frac{s}{m}$, &c. and the product subtracted from the *meridional* parts in the sphere, computed in the usual manner for the latitude A, will give the *meridional* parts expressed in minutes for the same latitude in the spheroid, provided it be oblate.

Example: if $m : 1 :: 100 : 99$, then the greatest difference of the *meridional* parts in the sphere and spheroid is 76.6929 minutes: in other cases it is found by multiplying the remainder above mentioned by 1174.078.

When the spheroid is oblong, the difference of the *meridional* parts in the sphere and spheroid, for the same latitude, is then determined by a circular arc. Phil. Trans. N° 462. sect. 14. See also Maclaurin's Fluxions, art. 895—899.

Mr. Murdoch has solved this problem by infinite series, and has computed a table of *meridional* parts for an oblate spheroid, such as is mentioned in the foregoing example. See his Treatise, intituled, Mercator's Sailing applied to the true Figure of the Earth. Lond. 1741. 4to.

MERIS, *μερις*, *a part*, in *Music*, an appellation given by Mr. Sauveur to the forty-third part of an octave. See Mem. Acad. Scienc. 1701.

MERIT, in *Theology*, is used to signify the moral goodness of the actions of men, and the reward due to them.

The Romish schoolmen distinguish two kinds of *merit* towards God: the one of *congruity*, the other of *condignity*.

MERIT *of congruity* is when there is no just proportion between the action and the reward; but he who bestows the reward supplies, by his goodness or liberality, what was wanting in the action. Such is the *merit* of a son towards his father: but this is only *merit* in an improper sense.

MERIT *of condignity* is when there is an absolute equality and a just estimation between the action and the reward: as in the wages of a workman.

Those of the reformed religion disclaim all *merit of condignity* towards God; even their best works, they own, do not *merit* at his hands. Hence the doctrine of *condign-merit* makes one of the great articles of controversy between the Romish and reformed churches.

MERIT, *order of*. See ORDER.

MERLANGUS, in *Ichthyography*, a name given by Bellonius, and some other authors, to a small species of whiting, or *asellus mollis*, called by the Venetians *molla*, and by some other nations the *capelan*.

MERLANUS, a name given by some writers in ichthyography to the common WHITING, or *asellus mollis sive albus*.

MERLIN, in *Ornithology*, the name of the yellow-legged FALCON.

The *merlin* does not breed in England, but migrates here in October, about the time when the booby disappears. It flies low, and is often seen along the sides of roads, skimming from one side of the hedges to the other, in search of prey. See ÆSALON, and HAWK, and *Tab.* III. *Birds.* N° 32.

MERLON, in *Fortification*, that part of the parapet, from fifteen to eighteen feet in length, which lies between two EMBRASURES.

The word comes from *merula*, or *merla*, which, in the corrupt Latin, was used for *a battlement*.

To take out the *merlons*, measure from each end of the wall twelve feet, there stick a stake, and plant other stakes at every intermediate eighteen feet: when this is done on the inside of the wall, let other stakes be planted on the outside, either directly opposite to the former, or in the line towards the place where the gun

is more particularly intended to deſſect its ſhot. Plant other ſtakes on the inſide, one a foot diſtant on each ſide of the former, and this will leave ſpaces of two feet each for the inner opening of embraſures; then, on the outſide, plant other ſtakes at five or ſix feet diſtance from the former ones, one on each ſide, and the ſpaces of ten or twelve feet will be marked out for the outſide openings of the embraſures. In the direction of the pickets, which limit the inner and outer openings of the embraſures, let ſingle rows of faſcines be ſtaked down across the wall, and theſe will be the ſides of the embraſures: fill the intermediate ſpaces, or *merlons*, with rows of faſcines laid lengthwiſe to the wall, and this will be the firſt floor of the *merlon*, which is to be picketted down, and the hollows filled with earth. Let other floors be raiſed in like manner, until the *merlons* are carried up to about five or ſix feet, or more if neceſſary; and on the top of each let a bed or floor of earth be laid of about eight or twelve inches thick.

MERLUCIUS, *gadus merluccius* of Linnæus, in *Ichthyology*, the name of a fiſh commonly called the HAKE, and by ſome authors the *aſellus alter*.

It is a moderately large fiſh, growing to two feet or more in length, and reſembling the common pike in figure, from whence it has its name, *merluccius, quaſi maris lucius, the ſea pike*. It in ſome meaſure reſembles the common whiting in colour, the back being of a pale greyiſh hue, and the belly of a dirty white; the head is flat and broad; the mouth very wide; and the teeth very long and ſharp, particularly thoſe of the lower jaw. It is covered with ſmall ſcales. Its tail is not forked. It is caught in the Engliſh and other ſeas, and being a coarſe fiſh is ſeldom admitted to table, either freſh or ſalted: when cured it is known by the name of *Poor John*. *Tab.* III. *Piſc.* N° 26.

There was formerly a large ſtationary fiſhery of hake on the Nymph bank off the coaſt of Waterford: two ſhoals of theſe fiſh appeared there twice in the year; and they were ſalted and ſent to Spain, particularly to Bilboa.

MERMAID, or MERMAN, a ſea-creature, frequently talked of, and ſuppoſed half human and half a fiſh.

However naturaliſts may doubt of the reality of *mermen* or *mermaids*, if we might believe particular writers, there ſeems teſtimony enough to eſtabliſh it. In the year 1187, as Lavrey informs us, ſuch a monſter was fiſhed up in the county of Suffolk, and kept by the governor for ſix months. It bore ſo near a conformity with man, that nothing ſeemed wanting to it beſides ſpeech. One day it took the opportunity of making its eſcape, and plunging into the ſea, and was never more heard of. Hiſt. d'Angleterre, p. i. p. 403.

In the year 1430, we are told, that, after an huge tempeſt, which broke down the dykes in Holland, and made way for the ſea into the meadows, &c. ſome girls of the town of Edam, in Weſt-Friezland, going in a boat to milk their cows, perceived a *mermaid* embarraſſed in the mud with a very little water. They took it into their boat, and brought it with them to Edam, dreſſed it in women's apparel, and taught it to ſpin. It fed like one of them, but could never be brought to offer at ſpeech. Some time after it was brought to Haerlem, where it lived for ſome years, though ſtill ſhewing an inclination to the water. Parival relates that they had given it ſome notionsof a Deity, and that it made its reverences very devoutly whenever it paſſed by a crucifix. Delices d'Hollande.

In the year 1560, near the iſland of Manar, on the weſtern coaſt of the iſland of Ceylon, ſome fiſhermen are ſaid to have brought up, at one draught of a net, ſeven *mermen* and *mantæ*; of which ſeveral Jeſuits, and among the reſt F. Hen. Henriques, and Dimas Boſquez, phyſician to the viceroy of Goa, are ſaid to have been witneſſes. And it is added, that the phyſician, who examined them with a great deal of care, and made diſſections thereof, aſſerted that all the parts, both internal and external, were found perfectly conformable to thoſe of men. See the Hiſt. de la Compagnie de Jeſus, p. ii. tom. iv. N° 276, where the relation is given at length.

We have another account, as well atteſted, of a *merman*, near the great rock called Diamond, on the coaſt of Martinico. The perſons who ſaw it gave in a preciſe deſcription of it before a notary; they affirmed, that they ſaw it wipe its hand over its face, and even heard it blow its noſe.

Another creature of the ſame ſpecies, was caught in the Baltic, in the year 1531, and ſent as a preſent to Sigiſmund king of Poland, with whom it lived three days, and was ſeen by all the court. And another very young one was taken near Rocca de Sintra, as related by Damian Goes.

The king of Portugal, and the grand maſter of the order of St. James, are ſaid to have had a ſuit at law, to determine which party theſe monſters belonged to. See SEA-*cow*, and SIREN. See Pontoppiddan's Nat. Hiſt. of Norway, vol. ii. p. 186, &c.

MERO *natu*. See EX *mero*.

MEROPS, in *Ornithology*, the name of a bird called alſo *apiaſter*, and in Engliſh the *bee-eater*.

It reſembles the king fiſher in ſhape, and is of the ſize of a black-bird. Its beak is long, black, and a little crooked, and the irides of its eyes are a fine red; its head is long and large; the feathers growing at the inſertion of the upper chap are of a bluiſh green, but thoſe in the middle of the head are white; the crown, however, a little more backward, is of a reddiſh brown, ſometimes with a ſlight admixture of green; and there runs on each ſide a black line from the angle of the beak through the orbit of the eyes; its neck and ſhoulders are green, but with a caſt of redneſs; and its belly and breaſt are blue; the tips of the long wing-feathers are blackiſh, and the reſt are variegated with a bright green and a fine orange-colour; its tail is of a fine blue, and the two middle feathers of it are longer than any of the others. Its legs are very ſhort and thick, and are of the ſame form with the king-fiſher's. It is very common in Italy, and extremely ſo in the iſland of Crete; but it is not known in England. It feeds on bees and other inſects, and ſometimes on ſeeds. Ray. See *Tab.* III. *of Birds*, N° 33.

The entire bird, and its heart, are recommended in cardiac, ictherical, and ſtomachic diſorders: the gall mixed with honey and the juice of rue is ſaid to cure ſuffuſions of the eyes.

In the Linnæan ſyſtem, *merops* forms a genus of *pica*, characteriſed by a bent, compreſſed, carinated beak; a tongue fringed at the apex; and feet formed for walking; and comprehending ſix other ſpecies, beſides the bee-eater above deſcribed. *Tab.* III. *Piſc.* N° 24.

MEROS, in *Ichthyology*, the name of a very large American fiſh, growing to five or ſix feet long, and called by the Braſilians, *cuyapu-guacu*. Its head is very large, and its mouth wide and toothleſs; its eyes have a black pupil and a yellow iris; it hath five fins, one running the whole length of the back and reaching nearly to the tail, the anterior part of this is narrow, and armed with ſmall but ſharp ſpines; the other part is broader, and ſuſtained by ſofter rays; behind the anus is one like the hinder part of that on the back, and two others behind the gills, which are large and broad; the tail-fin is very large and broad, and much more ſo at its extremity than at its origin; the ſcales are ſmall; the *head*, back, and ſides are of a browniſh grey; and its belly white. It is accounted a well-taſted fiſh. Ray. *Tab.* III. *Piſc.* N° 24.

MEROVINGIAN *character* derives its name from Merouée, the firſt king of France of that race, which reigned 333 years, from Pharamond to Charles Martel. This race is ſaid by ſome to have terminated in Childeric III. A. D. 751. There are many MSS in the French libraries ſtill extant in this character. See Spect. de la Nat. vol. vii. p. 192.

MERSION. See IMMERSION, and EMERSION.

MERUIT. *Quantum* MERUIT. See QUANTUM.

MERULA, in *Ornithology*. See BLACK-*bird*, and AMZELL; and *Tab.* III. *Birds*, N° 29 and N° 30.

MERULA, in *Ichthyology*, the name of a ſea fiſh of the turdus or waſſe kind, of a ſhort and flat figure, and all over of a dull and dead bluiſh black. The back, ſides, and belly are all of this colour, as are alſo even the fins and tail. It is a fiſh not much eſteemed, being of an inſipid watery taſte, but is ſold among the poorer ſort in the Italian markets. Rondelet.

MERULA *aquatica*, the name of a bird, called the *water*-OUZEL in Engliſh.

MERULA *fluviatilis*, in *Ichthyology*, a name given by Schoneveldt, and ſome other writers, to the common tench. Theſe are whimſical and arbitrary names, and expreſs nothing. Artedi has much better diſtinguiſhed the fiſh, having taken away even its generical name, and reduced it to the *cyprini*, of which genus it is evidently a ſpecies: he has called it the *black mucous cyprinus*, with an even not forked or invected tail. This is a name by which it can never be miſtaken.

MERULA *ſanatilis*, a name given by ſome to the TORDO *marina*.

MERZENIUS, in *Botany*, a name uſed by ſome authors for MARJORAM.

MES-AIR, or MEZAIR, in the *Manege*, is a manege half TERRE *à terre*, and half COURVET: ſo that the *mezair* is higher than the action of the former, and lower than that of the latter. In this action uſe the ſame AIDS as in working upon *curvets*. Give the aids of the leg with delicacy, and no ſtronger than is juſt neceſſary to carry your horſe forward. Remember when you cloſe your legs to make him go forward, to puſh with the outward in ſuch a degree as to keep your horſe confined, and to aſſiſt

assist the other in driving him forward; as it is not necessary to lay so much stress on the inner leg, because that serves only to guide the horse, and make him cover and embrace the ground that lies before him. Berenger's Horsemanship, vol. ii. p. 116.

MESANGIA, in *Natural History*, the name of a bird common in France and Italy; it is of the size and shape of the ficedula, and differs from it very little, except the having a black spot upon the head. This seems to be the *melanocephas* of the ancients, who supposed, as many do at this time, that the ficedula changed into this bird. The ficedula, or fig-eater, comes into the gardens in France only at the time when the figs, which are its proper food, are ripe: these it devours in an insatiable manner, and, as soon as it has done with them, goes away again. Soon after this the *motacilla* or black-cap appears, and is supposed to be the same bird, with the addition of this beautiful ornament. The ancients were very fond of this imaginary change of one bird into another; and Aristotle tells us, that the upupa is the same bird with the cuckow, only changed in the colour and disposition of its feathers. Æschylus tells us in the same manner, according to the opinion of his times, that the cuckow sings all the summer, and after that disappears; and that soon afterwards it comes again in a new form, with a plume upon its head, and is called the *upupa*.

MESARÆUM, *παραορτιον*, in *Anatomy*, the same with MESENTERY.

MESARÆUM is also used in a more restrained sense, for a part or division of the MESENTERY, being that fastened to the small guts.

That part of the mesentery which is fastened to the thick guts is called MESOCOLON.

MESARAIC *vessels*, in the general sense, are the same with MESENTERIC.

In common use *mesaraic* is more frequently applied to the veins and mesenteric to the arteries of the mesentery.

MESAZONTES, *μεσαζοντες*, officers under the emperors of Constantinople. See MEDIATOR.

MESE, in the *Greek Music*, was the ultimate note of the meson tetrachord, and answers to Guido's *a la mi re*. See DIAGRAM.

MESEMBRYANTHEMUM, in *Botany*, the name by which Dillenius, Linnæus, and others, have called the plants usually named *ficoides*, or *fig-marygold*, a genus of the *icosandria pentagynia* class. Its characters are these: the flower hath a permanent spreading empalement of one leaf, which is cut at the top into five acute parts; it hath one petal, which is cut into many linear segments almost to the bottom, and ranged in several series, but joined together at their base; within these are ranged a great number of hairy stamina; under the flower is situated an obtuse five-cornered germen, supporting sometimes five, and often ten or more styles; the germen afterwards becomes a roundish fleshy fruit, having as many cells as there are styles, filled with small seeds.—Linnæus enumerates forty-five, and Miller forty-seven species.

These plants are most of them natives of the Cape of Good Hope, from whence these seeds were first brought to Holland, and the plants raised in many curious gardens, and have since been communicated to most parts of Europe. Most plants of this genus have beautiful flowers, which appear at different seasons of the year.

All the sorts are perennial plants, except two, which are annual. The perennial sorts are easily propagated by cuttings during any of the summer months; such of them as have thrubby stalks and branches do very readily take root, when planted in a bed of light soil, and covered either with mats or glasses; but when they are covered with the latter, they must be shaded every day when the sun is warm.

When the cuttings are planted, it will be necessary to give them a little water to settle the ground about them, but it should be done with caution, for it is to be observed in general, that too much wet will spoil them.

Those whole stalks and leaves are very succulent, should have their cuttings taken from the plants ten days or a fortnight before they are planted, that their wounded part may heal and dry. They should be guarded from wet by glasses, and require less watering than the others.

The first sort called the Egyptian kali, grows naturally in Egypt, and is burnt for pot-ash: and is esteemed the best sort for making hard sope and the best glass. The second sort is the Ice-*plant*. Miller.

MESENTERIC, or MESARAIC, an epithet given to two arteries arising from the descending aorta, and proceeding to the mesentery.

There is an upper, or superior *mesenteric*, which goes to the upper part of the mesentery; and a lower, or inferior *mesenteric*, which distributes itself through the lower part. See *Tab. Anat. (Angeiol.) fig.* 1. *n.* 43. 45.

We have also a *mesenteric vein*, composed of an infinity of veins, proceeding from the mesentery; which, with the vena splenica, arising from the spleen, forms the vena porta.

Ruysch painted the *mesaraic* arteries and veins as having different courses in the distribution of their branches in the intestines. Albinus attributes this mistake to Ruysch's having injected the arteries at one part of the intestines, and the veins at another; and by a single figure representing the internal cellular membrane of the ilium, with both arteries and veins injected, shows their courses to be the same.

Anatomists also reckon a *mesenteric nerve*, which arises from the intercostal, and sends several branches to the mesentery.

MESENTERIC *plexus*, a plexus, or piece of net-work, formed by the branches or ramifications of the par vagum.

The *plexus mesentericus magnus*, or *great mesenteric plexus*, is formed out of the concurrent branches of several other plexuses, and sends its nervous fibres through the whole mesentery, along with the mesaraic vessels, which, with various circumligations, they accompany to the intestines.

MESENTERIC, *emplast.* See OMPHALO *mesenteric*.

MESENTERICA *febris*. See *Intestinal* FEVER.

MESENTERY, MESENTERIUM, formed of *μεσος*, *middle*, and *εντερον*, *intestine*, or MESARÆUM, in *Anatomy*, a fatty membranous body; thus called as being placed in the middle of the intestines, which it connects to one another.

The *mesentery* is almost of a circular figure, with a narrow production; to which the end of the colon, and the beginning of the rectum, are tied.

It is about four fingers and a half in diameter; its circumference, being full of plaits and foldings, is about three ells in length. The intestines are tied like a border on this circumference of the *mesentery*: there are three inches of the intestines thus fastened.

The *mesentery* itself is strongly tied to the three first vertebræ of the loins. It is composed of three lamina; the inner, upon which the glands and fat lie, and the veins and arteries run, is its own proper membrane; and the other two, which cover each side of the proper membrane, come from the peritonæum. Between the two external lamina of the *mesentery* run the branches of the arteria mesenterica, superior and inferior, which bring the blood to the intestines; and the vena mesaica, which, being branches of the porta, carry the blood back to the liver. Here the large branches of both arteries and veins, communicating with one another, march directly to the guts; where, with the nerves that form the plexus mesentericus, they divide into an infinite number of small branches, which spread themselves extremely fine upon the coats of the intestines. The vena lactea, and lymphatic vessels, run likewise upon the *mesentery*, in which there are also several vesicular glands; the biggest of which, in the middle of the *mesentery*, is called *pancreas Asellii*; these glands receive the lympha and chyle from the lacteal veins.

The *mesentery* has been ordinarily divided into two parts, the mesaræum, and mesocolon: the first appended to the intestina tenuia, and the latter to the crassa: but this is a division of no great moment.

The use of the *mesentery* is, first, to gather the intestines into a narrow compass, that the courses of the chyliferous vessels toward their common receptacle may be but short; next, to cover and protect them and the blood-vessels, and to correct and dispose the intestines, so as to secure them from any entanglement that might hinder their peristaltic motion.

The *mesentery* is subject to inflammation, which is attended with a languid slow fever, without any thirst or other violent symptom, a loss of appetite, a sense of tension and weight below the stomach, with much hardness, and only discoverable by pressing upon it. Inflammations of the *mesentery* generally terminate in abscesses, and bring on a corruption of the membrane; the morbific matter is sometimes translated to other parts, without being removed from the habit; so that the disorder often recurs. The method of cure is the same as that for an inflamed LIVER or SPLEEN.

MESERA, a name given by some medical writers to the Alexandrian tutty.

MESHES *of nets*, the openings or interstices between the threads.

MESIRE, a name given by Avicenna to a distemperature of the liver, attended with a sense of heaviness, rumor, inflammation, and pungent pain, and always with thirst, a dry mouth, and a parched black tongue.

MESTICUM, among the Romans, a toll paid for a place to sell goods in the forum.

MESMARCHURES, in the *Manege*. See PASTERN.

MESN, or MESNE, a term in *Law*, fignifying him who is lord of a manor, and fo hath tenants holding of him; yet he himfelf holds of a fuperior lord.

The word is properly derived from *maifne, quaſi minor natu*; becaufe his tenure is derived from another, from whom he holds.

MESNE alſo denotes a writ, which lieth where there is lord *meſne* and tenant; and the tenant is diſtrained for ſervices due from the *meſne* to the fuperior lord.

This is in the nature of a writ of right; and in this caſe the tenant ſhall have judgment to be acquitted or indemnified by the *meſne* lord; and if he makes default therein, or does not appear originally to the tenant's writ, he ſhall be forejudged of his *meſnalty*, and the tenant ſhall hold immediately of the lord paramount himſelf.

MESNE *proceſs*. See PROCESS.

MESOCHOROS, μεσοχορος, among the ancients. The *meſochori* were muſicians who preſided in concerts, and by beating a deſk in a regular manner with their feet, directed the meaſure of the muſic. For this purpoſe in the theatre they wore wooden clogs on their feet, that they might be better heard, which were called by the Greeks, *cruperia*.

MESOCHORUS, among the Romans, was alſo uſed for a perſon in public aſſemblies, appointed to give the ſignal for ACCLAMATION at the proper time, that all might join in it at once.

MESOCOLON, μεσοκολον, in *Anatomy*, that part of the MESENTERY, which, having reached the extremity of the ileum, contracts and changes its name. At this place the particular lamina, which is turned to the right ſide, forms a ſmall tranſverſe fold, called ligamentum coli dextrum. Afterwards the *meſocolon* aſcends towards the right kidney, where it ſeems to be loſt by the immediate adheſion of the colon to that kidney, and to the firſt incurvation of the duodenum. Then it appears again, and increaſing in breadth, continues its courſe almoſt tranſverſely under the liver, ſtomach, and ſpleen, where it begins to turn downward, under the left hypochondrium, towards the kidney on the ſame ſide. Through the whole courſe the *meſocolon* extends in breadth, and forms nearly a tranſverſe ſemicircular plane, very little plaited at its great circumference. By this circumference or edge, it is connected to the colon, and hides that ligamentary band of this inteſtine, which runs along its ſmall curvature. By its ſhort or ſmall edge, it forms the triangular caſe of the duodenum, and by its great edge, the external coat of the colon, in the ſame manner as the meſentery does that of the ſmall inteſtines. As it paſſes under the large extremity of the ſtomach, it adheres a little to the lower portion of that extremity, as the diaphragm does to the upper. Having got below the left kidney, it contracts and forms another tranſverſe fold, called ligamentum coli ſiniſtrum. Afterwards it expands again, and runs down on the left pſoas muſcle, towards the laſt vertebra of the loins. This deſcending portion is fixed to the convolutions of the colon in the ſame manner as the ſuperior portion is to the arch of that inteſtine. The *meſocolon* by its adheſion to the colon forms a kind of ſeptum tranſverſum, between the ſmall inteſtines and the viſcera contained in the epigaſtrium; and this ſeptum ſupports the liver and ſtomach under the arch of the diaphragm, juſt as much as it is ſuſtained by the inteſtines. Winſlow.

MESOCURUS, μεσοκουρος, in *Antiquity*, an actreſs in tragedies, who had the middle part of her head ſhaven: but others think that *meſocuros* ſignifies a girl or very young woman.

MESOGLOSSI, a name given by ſome writers to the muſcles of the tongue, more uſually called by anatomiſts, the GENIOGLOSSI.

MESOLABE, MESOLABIUM, a mathematical inſtrument, invented by the ancients for finding two mean proportionals mechanically, which they could not come at geometrically. See PROPORTIONAL.

It conſiſts of three parallelograms, moving in a groove to certain interſections. Its figure is deſcribed by Eutocius, in his commentary on Archimedes.

MESO-LOGARITHM, a term uſed by Kepler to ſignify the logarithms of the co-ſines and co-tangents; the former of which lord Neper calls *antilogarithms*, and the latter *differentiales*.

Theſe are alſo called *artificial ſigns and tangents*.

MESO-PLEURII, derived from μεσος, *middle*, and πλευρα, *rib*, in *Anatomy*, the intercoſtal muſcles.

MESO-PLEURII is ſometimes alſo uſed for the intermediate ſpaces between the coſtæ, or RIBS.

MESOPYCNI, μεσοπυκνοι, in the *Ancient Muſic*, was an appellation given to ſuch chords as formed the middle notes of the ſyſtà. There were five *meſopycni* in the ſcale. See PYCNI and SPISSUM.

MESO-RECTUM, in *Anatomy*, is a particular production of the peritonæum, inveſting the inteſtinum rectum.

This production is very narrow, and about the middle of the foreſide of the rectum; it forms a tranſverſe ſemicircular fold, which appears when the inteſtine is empty, but is loſt when it is filled. Winſlow.

MESORO, in *Ichthyology*, a name given by Salvian to that fiſh which we call the butterfly-fiſh, the blennus or BLENNIUS of other authors.

MESORO is alſo uſed by the Italians for the fiſh commonly called the URANOSCOPE, or *ſtar-gazer*.

MESOTHENAR, in *Anatomy*, a flat and nearly triangular muſcle, lying between the firſt phalanx of the thumb and the bottom of the palm of the hand. It is inſerted by a very broad baſis in the ligament which connects the os magnum to that which ſupports the thumb. It is likewiſe inſerted along the internal or angular part of that bone of the metacarpus which ſupports the middle finger, and in the ſmall extremity of that which anſwers to the index; from thence the fibres contracting to an angle, terminate in a flat tendon of different breadths, which is inſerted in that ſide of the head of the firſt phalanx of the thumb, which is turned to the hollow of the hand, and in the neighbouring part of the baſis of the ſecond phalanx, by means of the ſecond ſeſamoide bone belonging to that joint. Winſlow.

MESPILEUS *lapis*, in *Natural Hiſtory*, a name given to ſome ſpecies of the echinitæ, from their reſemblance to the ripe fruit of a medlar. This was a name given them before they were much known, and they were ſome time afterwards called, from their five lines on the ſurface, *pentaenchi*.

MESPILUS, in *Botany*. See MEDLAR.

MESS, in *Sea-Language*, denotes a particular company of the officers or crew of a ſhip, who eat, drink, and aſſociate together, whence *meſs-mate*, denoting one of theſe, with reſpect to another.

MESSALIANS. See EUCHITES.

MESSE, or MASS, *miſſa*. See MASS.

MESSA *baſſa*, ſilent maſs whiſpered by the prieſt during a muſical performance.

MESSE *de capella*, in the *Italian Muſic*, is uſed for maſſes ſung by the grand chorus. In theſe various fugues, double counterpoints, and other ornaments are uſed.

MESSE *concertate*, in the *Italian Muſic*, maſſes wherein the parts reciting are interwoven with choruſes.

MESSENGERS, in the *Engliſh Polity*, are carriers of letters and meſſages; or, more particularly, certain officers, chiefly employed under the direction of the ſecretaries of ſtate, and always in readineſs to be ſent with all manner of diſpatches, foreign and domeſtic.

They are always employed with the ſecretaries warrants, to take up perſons for high treaſon, or other offences againſt the ſtate, which do not ſo properly fall under the cognizance of the common law; and, perhaps, are not proper to be divulged in the ordinary courſe of juſtice. The priſoners they apprehend are uſually kept at their own houſes, for each of which they are allowed by the government 6*s*. 8*d*. per day. When they are diſpatched abroad, they have an allowance for their journey, as ſtated; viz. to Paris, 30*l*. to Holland, 25*l*. to Edinburgh, 30*l*. to Ireland, 30*l*. and ſo to other places in proportion. Part of which money is advanced to them for their journey.

Of theſe *meſſengers* in ordinary there are forty, at 45*l*. a year, beſides daily pay when employed. Their poſts, if purchaſed, are eſteemed worth 300*l*.

MESSENGERS *of the exchequer*, are officers attending the exchequer, in the nature of purſuivants: they are four in number: their buſineſs is to attend the chancellor and auditor, and to carry their letters, preceipts, &c.

MESSENGER *of the preſs*, a perſon, who, by order of the court, ſearches printing-houſes, bookſellers ſhops, &c. in order to diſcover ſeditious books, &c.

There are alſo other officers diſtinguiſhed by this appellation; as the *meſſenger* of the lord chancellor, of the great wardrobe, the two *meſſengers* of the yeomen of the guards, *meſſenger* to the gentlemen penſioners, nine *meſſengers* to the commiſſioners of bankruptcy, &c.

MESSERSMIDIA, in *Botany*, a genus of the *pentandria monogynia* claſs: the corolla of which is infundibuliform, and the fruit a ſubroſe berry, ſeparating into two parts, each of which contains a double ſeed. There is only one ſpecies.

MESSIAH, a term ſignifying *anointed*, or *ſacred*; and, in that ſenſe, applied to kings and prieſts; but, particularly, by way of eminence, to JESUS CHRIST, the Saviour promiſed by the prophets of the old Jewiſh law.

The word comes from the Hebrew מָשִׁיחַ, *maſſiach*, *anointed*, of the verb מָשַׁח, *maſſach*, *to anoint*; whence Jeſus Chriſt claims the title on a manifold account: 1.

As having been anointed king of kings from all ages. 2. As chief of the prophets. 3. As high priest of the law of grace, or priest for ever after the order of Melchizedek.

The prophecies in the Old Testament, which relate to the coming of the *Messiah*, are very numerous: some of which may be found in Gen. iii. 15. xlix. 10. Isaiah, vii. 14. c. xi. c. lii. liii. which the Targum of Jonathan interprets of the *Messiah*, Dan. ix. 25. Micah, iv. 1—5. c. v. 2—4. Haggai, ii. 6, 9. Zech. iii. 8—10. vi. 12, 13. ix. 9—12. Mal. iii. 1—4. iv. 2—6. &c.

It has been also urged, that there are some remarkable passages in Josephus, Philo, Tacitus, Suetonius, and Celsus, which shew that the expectation of the *Messiah*, agreeable to the scripture prophecies, prevailed in some degree among the heathen nations; and many have supposed that there is some reference of this kind in the fourth eclogue of Virgil. We shall only add farther, that the best Christian writers lay little stress on the prophecy of Christ cited by Abulpharagius, out of the books of Zerdusht or Zoroaster, nor on the pretended prophecy of Confucius, among the Chinese; nor on those of the SIBYLLINE oracles, among the Romans.

The Jews still wait for the coming of the *Messiah*, being infatuated with the notion of a temporal *Messiah*, that is to be a mighty conqueror, and to subdue all the world. Most of the modern rabbins, according to Buxtorf, believe that the *Messiah* is already come, but that he keeps himself concealed, and will not manifest himself because of the sins of the Jews. Some of the Jews, however, in order to reconcile those prophecies that seem to contradict each other, as to the character and condition of the *Messiah*, have had recourse to the hypothesis of two *Messiahs*, who are yet to succeed each other; one in a state of humiliation and suffering; the other of glory, splendor, and power. The first, they say, is to proceed from the tribe of Ephraim, who is to fight against Gog, and to be slain by Ammilus, Zech. xii. 10. The second is to be of the tribe of Judah, and lineage of David, who is to conquer and kill Ammilus, and restore the kingdom of Israel, reigning over it in the highest glory and felicity.

Jesus Christ asserts himself the *Messiah*: In St. John iv. 25, the Samaritan woman says to Jesus, *I know that when* Messiah *comes, who is called the* Christ, *he will tell us all things. Jesus answered her, I that speak to thee am he.*

There are several impostors, who have endeavoured to pass for *Messiahs*, as Christ himself predicted. J. Leut, a Dutchman, has written a history of *false Messiahs, De Pseudomessiis*. The first he mentions was one Barcochab, who appeared under the empire of Adrian. The last was rabbi Mordecai, who began to be talked of in 1682. A little before him; viz. in 1666, appeared Sabbethai Sebi, who was taken by the Turks, and turned Mahometan.

MESSIEURS, a French title of honour, or civility, lately introduced into our language; being the plural of *monsieur*, and equivalent to the English sirs, or gentlemen.

The French lawyers always begin their pleadings and harangues with *messieurs*; which word is also frequently repeated in the course of their speeches; on which occasion it answers to our English word *gentlemen*.

The French say, *Messieurs du parlement; du conseil; des comptes*, &c.

MESSUAGE, MESSUAGIUM, in *Law*, a dwelling-house with some land adjoining, assigned for its use.

By the name of *messuage* may a garden, shop, mill, cottage, chamber, cellar, or the like, pass.

In Scotland, *messuage* denotes what we call the *manor-house*; viz. the principal dwelling-house within the barony.

MESUA, called by some *India rose chesnut*, in *Botany*, the name of a genus of plants of the *monadelphia polyandria* class; the characters of which are these: the perianthium is permanent, and consists of four small oval leaves; the flower consists of four large hollow and rounded petals; the stamina are numerous filaments, of the length of the cup; the antheræ are simple; the germen of the pistil is roundish; the style is simple; and the stigma indented in four places. The fruit is a four-cornered single-seeded nut. There is only one species.

MESYMNIUM, a name which the ancients gave to a part of their tragedy, or to certain verses in their tragedies.

The *mesymnium* was a kind of burden, as *Io Paean*; *O Dithyrambe*; *Hymen, O Hymenæe*; or the like; which, when placed at the end of a strophe, was called *ephymnium*; and when inserted in the middle of a strophe, *mesymnium*. See STROPHE, and CHORUS.

METACAL, an Ægyptian weight, used in the weighing of pearls, and consisting either of a carrat and a half, or of two carrats. Sixteen of these carrats make a dram, each of the carrats weighing four grains, and twelve drams an ounce.

METACARPIUS, a small very fleshy muscle, situated obliquely between the large internal annular or transverse ligament of the carpus, and the whole inside of the fourth metacarpal bone.

It is fixed by a small short tendon to the os orbiculare, and to the neighbouring part of the large ligament of the carpus; from thence its fibres run more or less obliquely toward the inside of the fourth metacarpal bone, in the outer edge of which they are inserted. The fibres of this muscle are of unequal lengths, and extend all the way to the articulation of the first phalanx of the little finger, with the fourth metacarpal bone; but they have no manner of relation to that finger. Winslow.

METACARPUS, or METACARPIUM, from μετα, *behind*, and καρπος, *hand*, in *Anatomy*, that part of the hand between the wrist and the fingers. See *Tab. Anat. (Osteol.) fig. 3. n. 10. 10. fig. 7. n. 13.* See CARPUS.

The *metacarpus* consists of four bones, which answer to the four fingers; whereof that which sustains the fore-finger is the biggest and longest. They are all round and oblong, a little convex towards the back of the hand, and concave and plain towards the palm; they are hollow in the middle, and full of marrow; they touch one another only at their extremities, leaving spaces in their middle, in which lie the musculi interossei.

In their upper end there is a sinus, which receives the bones of the wrist; their lower extremity is round, and is received into the sinus of the first bones of the fingers.

The inner part of the *metacarpus* is called the palm, and the outer the back of the hand.

The ancient anatomists reckoned five bones in the *metacarpus*, including that bone which is now looked upon to be the first phalanx of the thumb. These bones are all long, thicker at their extremities than in the middle, and of unequal length and bigness: the two first are sometimes, though very rarely, equal, and the others lessen by degrees from them. Anatomists, in their descriptions, divide each of these bones into a middle and two extremities, or into a basis, body, and head. The bases of them all are angular, and turned toward the carpus, and their head rounded like condyles, and turned towards the fingers. Both extremities are covered with cartilages, and the heads remain for a long time very distinct epiphyses.

The metacarpal bones are moved on the carpus by the muscles called ulnares and radiales, and by all the muscles in general that go to the fingers, as by so many auxiliaries. The number of metacarpal muscles would be increased, if the first phalanx of the thumb were considered as a metacarpial bone. Winslow. See METACARPIUS.

METACARPUS, *fractures of the*. In fractures of the hand or *metacarpus*, the best method of reducing or replacing the bone, is to extend the hand upon a smooth table, and while an assistant holds the whole hand evenly in that posture, the surgeon is to replace the bones; and, when that is carefully and perfectly done, to secure them with a proper bandage. Heister.

METACARPUS, *luxation of the*. The four small bones in the palm of the hand are sometimes luxated from the carpus to which their upper parts are connected; this happens from external violences, not unfrequently, notwithstanding that these bones naturally must much resist such a luxation; for the two carpal bones, which are seated in the middle between the two external ones, cannot be dislocated to either side, as the two external ones, which sustain the first and little fingers, cannot be luxated inwardly, but are very easily driven outward; and each of them may be luxated on the fore or back part of the hand; but whichever of these happens, the particular disorder may be discovered and examined by feeling and inspecting, and the cure may be performed by extending the hand on a flat board or table, and replacing with the thumb whatever of the bones have started from their natural situation. Heister.

METACHORESIS, a word used by Galen to express a recess of a morbid humour from one part of the body to another, a thing very common in many distempers.

METACHRONISM, formed of μετα, and χρονος, *time*, in *Chronology*, an error in computation of time, either on the side of defect or excess.

METACISM, METACISMUS, in *Grammar*, a defect in the pronunciation of the letter *M*.

Isidore represents the *metacism* as a final *m*, followed by a vowel, as *bonum aurum, Bethlehem erat*, &c.

METACOE, in *Botany*, a name given by the people of Guinea to a plant, of which they are very fond, because of its virtues as a balsamic and vulnerary. Its leaves, being bruised and applied to a fresh wound, cure it. They have also another use for it, twisting the dried leaves into a sort of match for their muskets. Phil. Trans. N° 232.

METACONDYLI is used by some authors for the outmost bones, or joints of the fingers, next the nails.

METAGITNION, μετάγειτνιον, in *Chronology*, the second month of the Athenian year. It contained twenty-nine days, and answered to the latter part of our July and beginning of August. The Boeotians called it *Panemus*, and the people of Syracuse, *Carneus*.

It is so called from *Metagitnia*, one of Apollo's festivals kept in it.

METAL, μέταλλον, in *Natural History*, a simple, ponderous, shining, fixed, opake body, that fuses, and becomes fluid, by fire, and by cold coagulates and hardens into a solid mass, capable of being distended under the hammer.

Metal is said to be simple; as it may be affirmed of every the minutest particle of a *metal*, e. g. a grain of gold, that it is gold, or has all the properties of GOLD. *Fusible* by fire; that is, when exposed to a great fire, it dissolves into parts which are easily moveable among themselves, or are in actual motion. See FUSION. *Fixt*, i. e. bearing the fire without flying off in vapours; though it is only up to a certain degree that *metals* are fixed; for, by the large burning-glasses of Meff. Tschirnhausen and Villette, all *metals* are found to evaporate.

Such is the proper idea of *metals*, which is not applicable to any other body in nature; for a diamond, or other stone, though a simple body, is not fusible to the fire, nor capable of being stretched under the hammer. And salt, though dissolvable by fire, is not malleable, but breaks under the hammer.

There are, indeed, certain woods, which yield, in some measure, to the hammer; but then they fall to dust in the fire: and so of the rest.

Authors have commonly reckoned six *metals* in all nature; viz. gold, lead, silver, copper, iron, and tin; to which we may also add a seventh, viz. platina. See the nature, characters, productions, uses, &c. of each, under its proper article.

To these *mercury*, or *quicksilver*, is usually added; but some have objected to the metallic character of MERCURY; though, in reality, it is possessed of the distinguishing properties of *metals*.

The common radical character of *metals* is, that of all known bodies they are the heaviest. By Dr. Halley's experiments, the weight of gold to that of glass is determined to be as 9 to 1; and the weight of tin, the lightest of all *metals*, to that of gold, as 7 to 19; which considerably surpasses the weight of all stones, marbles, gems, and other the most solid bodies, as appears from the tables of specific gravities. Nor is there any body in nature but a *metal* that is one third of the weight of gold: and, therefore, though the natural bodies, from which *metals* differ the least, are earthy and pyritous matters, on account of their solidity and density; yet *metals* and stones are very different; the heaviest stones which are unmetallic being much lighter than the lightest *metals*. A cubic foot of marble weighs 152 pounds, and an equal bulk of tin, the lightest of *metals*, weighs 516 pounds: the difference is much greater when the weight of such a stone is compared with that of gold, a cubic foot of which is 1326 pounds.

The Royal Society furnish us with various experiments of this kind. The weights of the several *metals*, and other solids, they have examined hydrostatically, by weighing them in air, and in water; and the weights of the fluids, by weighing an equal portion of each. By such experiments they find, that taking the same weights of water and gold, the bulk or magnitude of the former, is to the latter, as 1963610 to 100051; consequently, that the weight of gold is to water, nearly, as 19 to 1. See GOLD and *Specific* GRAVITY.

The specific gravity of *metals* can, however, never be very exactly determined, as it varies a little from many causes; first, according to the different heat of the atmosphere, which expands water, and other fluids, infinitely more than it does solid bodies, which it also expands in different degrees; and that unequal diminution of the weight, makes it impossible to assign them a constant proportion, unless the heat be determined with the greatest exactness. Secondly, according to the several degrees of purity in the water, which difference is sometimes found not inconsiderable. Thirdly, according to the different purity of the *metals*; for there is hardly any *metal* found to very pure, but that it may be easily demonstrated to be mixed with some others. Fourthly, according to the different weight of the atmosphere itself; though the effects of its variations be not so considerable as of the rest.

Hence it is that there are, in a manner, as many different accounts of the specific gravities of *metals* as there are authors who have given an account of their experiments on the subject. However, except the *metals* be of a very great impurity, the sum of all the variations, resulting from all these causes, is not sufficient to hinder any *metal* from being certainly distinguished from any other *metal*, by its specific gravity.

Slight variations in hydrostatical experiments are indeed neither few things, nor are they by any means avoidable, either in making these or other experiments of affinity to them. By way of proof to such as may distrust this, from their never having made such experiments themselves, two very eminent testimonies may be produced. That most industrious and diligent mathematician Merfennus candidly acknowledges, that when he has occasion to mention the experiments of the learned Ghetaldus, and of the accurate French engineer Monsieur Petit, with his own, there will be often a variety of weight of some few grains; but he says, it is only like the variety of astronomical observations, which do almost always differ also by a few minutes or seconds; and to this he afterwards adds, that he expected not an exact uniformity between the observations of Ghetaldus, &c. already made, and the trials of any new experimenter, who would go through the work again. And our famous experimenter the lord Verulam confesses, that it is not to be doubted, but that many of the bodies which he has set down in the table he has given, of their dimensions and weights, differ in the same species or denomination, some being heavier than others, and that therefore there is some contingency in the affair; so that it is not necessary that the individuals he made his trials upon should be exact standards of the weight of their respective species, or should, which makes directly to our present purpose, agree altogether to a tittle with the experiments of other men. Boyle, Hydrost. Experim. in Prof. But this scarce evitable imperfection of hydrostatical experiments does not hinder, but that by their help we may make good estimates of the weights and bulks of very many bodies; and these estimates will be found not only preferable to those that can be made of the same bodies by geometrical instruments, but accurate enough to be very useful on a great number and variety of occasions.

Besides the fusibility, malleability, fixedness in the fire, and gravity pertaining to *metals*, in a peculiar degree, as such, and distinguishing them from other substances, they possess also other properties, which we shall here enumerate. Thus, the opacity of *metals* is much greater than that of any unmetallic substances: this results from their density: and these two properties produce a third, peculiar also to *metals*, viz. a capacity of reflecting infinitely more light than any other body, to which they owe their distinguishing lustre, called the metallic lustre: hence *metals*, whose surfaces are polished, form mirrors, representing the images of bodies more clearly than any other matter. It is observed also, that although the several metallic substances differ considerably in hardness and fusibility, yet, in general, they are less hard and less fusible than some earths. Further, *metals* cannot unite with any earthy substance, not even with their own earths, when these are deprived of their metallic flux: hence, when they are melted, they run, as much as possible, into globes; and a *metal*, in a state of fusion, always endeavours to acquire a convex or spherical form. Moreover, all *metals* are, in general, soluble by all acids; and form neutral salts with metallic bases: but the affinity of *metals* to acids is less than that of absorbent earths and alkaline salts; and, therefore, any *metal* may be separated from any acid by these earthy and saline alkalies.

Alkaline salts are also capable of acting upon all metallic substances, and of keeping them dissolved by proper management. *Metals* may, in general, be united with sulphur and liver of sulphur; but they have less affinity with sulphur than with acids, so that sulphur may be separated from them by acids. All *metals* may, under certain restrictions, be united with each other, by which means they form different alloys, possessing peculiar properties. See ALLAY and AMALGAMATION. They have also a strong affinity with the inflammable principles, and are capable of receiving it superabundantly. Lastly, oily substances seem to be capable of acting upon all *metals*.

These several properties agree, in general, to all metallic substances: but, besides the properties peculiar to each *metal*, some properties are common to a certain number of them: and hence they have been divided into several classes. See *Species of* METALS.

However, though all *metals* possess the properties above enumerated, we are by no means to conclude, that they possess them in the same degree. The order, says the ingenious author of the Dictionary of Chemistry, in which *metals*, compared with each other, possess most eminently their principal properties, is as follows, beginning always with that *metal* in which the property is most considerable. 1. Specific gravity and density. Gold, platina,

platina, mercury, lead, silver, copper, iron, and tin. 2. Opacity. If *metals* differ in this reſpect, the ſame order will ſerve for opacity as for denſity. 3. *Metallic* luſtre or brilliancy. Platina, iron, or rather ſteel, ſilver, gold, copper, tin, lead. It is obſerved, however, by the tranſlator, that, if platina, the reflecting power of which cannot eaſily be determined, be excluded, their reflecting powers will be more nearly in the following order: ſilver, quickſilver, tin, gold, iron, copper, lead. 4. Ductility. Gold, ſilver, copper, iron, tin, lead. The ductility of mercury and platina are not yet determined. 5. Hardneſs. Iron, platina, copper, ſilver, gold, tin, and lead. 6. Tenacity. Gold, iron, copper, ſilver, tin, lead. The tenacity of mercury is not known, and that of platina, though probably very conſiderable, not determined. 7. Fuſibility. Mercury, tin, lead, ſilver, gold, copper, iron, and laſtly platina. See *Table of* AFFINITY.

METALS, *as to the origin and formation of*, various are the ſentiments of philoſophers, ancient and modern. M. Tournefort is of opinion, that *metals*, as well as all other minerals, have their origin from ſeeds, like plants; and that they have veſſels with juices circulating in them, &c. See STONE.

Plato will have the cauſe of *metals* to be a humid vapour, incloſed in the bowels of the earth, which, being variouſly intermixed with parts of the earth, produces various metals. Plotin maintains ſulphur to be the father of *metals*; and an oleaginous viſcous humour, the mother. Lidgat endeavours to prove all *metals* generated by a ſubterranean fire; urging, among other reaſons, that many *metals*, when taken out of the earth, are exceedingly hot. Du Hamel ſhews, that *metals* do not take their riſe either from any vaporous exhalation, or from water, or from earth; but are generated of mercury, ſulphur, and ſalt. He adds, that *metals* take their matter and weight from the mercury they contain, and their tincture and form from the ſulphur.

The ſame author owns the firſt rudiment of a *metal* to be a ſaline ſubſtance ſwimming in water, which water is by little and little carried off. By how much the terreſtrial parts are more exquiſitely mixed with the aqueous or humid, by ſo much is the *metal* more heavy and firm, as having fewer and ſmaller pores. Hence its ductility; for its parts being extremely ſmall, denſe, and complicated, may be drawn out into a very ſpacious ſurface: on which account it is, that gold exceeds all other *metals* both in weight and ductility. Hence alſo its fixity, its parts being too cloſe and denſe to be exhaled. The water defends the earth from being burnt, and the earth the water from flying off; neither forſakes the other, but each is bound in an indiſſoluble knot. The moiſture gives ductility, the earth ſolidity. Where the mixture is leſs perfect, whether the earth or the water prevail, the *metal* will neither have ſo much weight, as having larger pores; nor will it bear the fire ſo well. For if the earth prevail, as in iron, or the water, as in lead; heat will ſet the one at liberty from the other; the moiſture evaporates, and the earth is reduced into ſcoria, &c.

Dr. Woodward maintains, that all *metals*, now found in the ſtrata of the earth, owe their preſent condition to the deluge; when he alſo imagines the preſent ſtrata of ſtone, earth, marble, &c. were formed.

The *metallic* and mineral matter, now found in the perpendicular intervals or fiſſures of the ſeveral ſtrata, whereof the earth is compoſed, was, according to him, at the time of the deluge, lodged in the bodies of thoſe ſtrata; and has been brought thence, and tranſmitted into theſe intervals ſince that time; the intervals themſelves not exiſting till the ſtrata were formed, and broken again, to let the water from the earth.

Now the water, which he imagines is conſtantly aſcending from the great abyſs towards the ſurface of the earth, continually pervading the ſtrata, detaches out of their pores and interſtices ſuch *metallic* and mineral corpuſcles as it finds looſe in its way, carrying them along with it to the perpendicular intervals, where having a freer paſſage than before, it deſerts them, and leaves them in thoſe intervals. And this he takes to be the way in which all *metals*, now found in thoſe places, were brought thither, and ſtill continue to increaſe.

Thoſe in the ſtrata, however, he obſerves, do not, nor can increaſe; but, on the contrary, are continually leſſened and diminiſhed, by ſo much as has been conveyed into the perpendicular intervals, and brought forth of the ſurface of the earth by ſprings and exhalations from the abyſs, &c.

The ſame ingenious author complains of the great uncertainty and inconſtancy in the mineral and *metallic* kingdom; neither colour, figure, nor ſituation in the earth, being to be depended on, ſo as to allow any poſitive judgment to be formed from them. A pyrites or mareaſite, for inſtance, ſhall have the colour and brightneſs of gold or ſilver, and yet afford nothing but a little vitriol and ſulphur; while what is but a pebble in appearance ſhall have a mixture of a valuable *metal* in it. It is common too to find the ſame *metal* ſhot into a great number of different forms, as well as to find different kinds of *metal* of the ſame form. And as to their place in the earth, there is the ſame uncertainty; they being ſometimes found in the perpendicular fiſſures or intervals of the ſtrata, ſometimes interſperſed in the bodies of the ſtrata, and ſometimes in both. The ſame *metals* are alſo placed indifferently in all kinds of terreſtrial matter, or in ſtrata of very different natures. They are frequently intermixed with each other, ſo that it is a rare thing to find any of them pure and ſimple; but copper and iron ſhall often be in the ſame maſs, as alſo gold and copper, ſilver and lead, tin and lead; nay, ſometimes all ſix together in the ſame lump.

The French chemiſts have been very curious in their enquiries into the nature and production of *metals*. M. Geoffroy, from a mixture of ſulphur with a vitriolic ſalt, and an argillous earth, brought an iron, which he maintained to be a new production, or a compoſition reſulting from the aſſemblage of certain principles which exiſted ſeparately in the ingredients that formed the *metal*; in a word, that it was an artificial iron. And obſerving that there were parcels of this *metal* in the coloured aſhes of plants, and of moſt other inflammable ſubſtances, he concluded that it might be formed there alſo by the union of the ſame three principles.

This was oppoſed by M. Lemery the younger, who maintained that the iron contained in the aſhes of plants was not formed there by calcination, but was really exiſtent in the plants themſelves; being raiſed in their veſſels along with the juices of the earth; and further, that all the ingredients whereof M. Geoffroy's artificial iron was formed, do really contain iron in themſelves, either in ſmaller or larger quantities; not the argilla only, where the iron is eaſily diſcovered by an animated knife; nor the oil of vitriol, which is drawn from a mineral, the ground whereof is iron; but alſo linſeed-oil, whereof M. Geoffroy's ſulphur was made; and even that of turpentine, ſweet almonds, &c. relating withal the operations whereby each of thoſe oils may be reduced to an earth wherein is iron.

To this it was anſwered, that in what manner ſoever iron be procured from the ſeveral ingredients ſeparately, there will be ſtill found infinitely leſs in them, than when mixed; and that, of conſequence, the mixture produces iron; that as for oils, it is evident they are not ſimple ſubſtances, but are compoſed of an earth, an acid, and a ſulphureous or inflammable part; which are the three preciſe principles required for the formation of iron: ſo that, according to all appearance, it is of an aſſemblage of thoſe ſulphurs, ſalts, and earth, in the oil, that the iron is formed by calcination; and therefore that the means uſed to the iron in the ingredients, are the very ſame with thoſe by which it is compoſed. See IRON.

Hence alſo appears, that vegetable matters contain the principles of minerals. But M. Geoffroy goes farther; and to ſupport his doctrine of the production of *metals*, he undertakes to prove, that the principles of vegetables, and thoſe of minerals, are eſſentially the ſame; and that one may reſolve, and with eaſe, decompound minerals by ſeparating their principles, and compound them again by ſubſtituting principles taken from vegetables in lieu of thoſe taken away.

To clear this point, he examines and compares the principles of mineral and vegetable ſalts. The principal in the mineral claſs are nitre, ſea-ſalt, and vitriol; all which ſalts we find in plants. The eſſential ſalt of the parietaria is wholly nitrous, and melts on the coals like ſalt-petre. The fixt ſalts of the cardous benedictus, abſinthium, kali, &c. contain a great deal of ſea-ſalt, which cryſtallizes in cubes, and decrepitates on the coals. Add, that the greateſt part of the fixt ſalts of plants, calcined to a certain degree, yield a ſtrong ſmell of ſulphur; which can proceed from nothing but a vitriolic ſalt, rarefied and volatilized by the oil of the plant. By theſe ſalts we may be able to judge of all the other ſalts of plants; for the volatile ſalts are nothing elſe but fixt ſalts diſengaged from the groſſeſt part of their earth, and joined with parts of oil.

Farther, there is ſcarce any reaſon to doubt, that the acid juices, drawn from vegetables, are of the ſame nature with the mineral acids; with this only difference, that the acids of plants have been extremely rarefied by fermentation, and united ſo cloſely with ſulphurs, that it is not without a great deal of difficulty that they are ſeparated.

Thus, diſtilled vinegar, which we make no ſcruple of ranking among the vitriolic acids, does only differ from ſpirit of ſulphur, ſpirit of vitriol, or even the cauſtic oil

of vitriol, in that the acids in the vinegar are diffused among a great deal of phlegm, and ſtrongly united to a great deal of oil, which yet may be ſeparated. By diſſolving copper in the acid of vinegar, ſeparated as much as poſſible from its oil, there are formed cryſtals, like in figure to thoſe of blue vitriol. From all which it appears, that the ſalts of plants do not differ eſſentially from thoſe of minerals.

As for ſulphurs, the inflammable or ſulphureous principle is the ſame in vegetables as in minerals. And M. Geoffroy even ſhews, that the principle of inflammability in common ſulphur is the ſame with that which renders the fat of animals, the oils and reſins of plants, and the bitumens of the earth, inflammable. To which he adds, that this ſame ſulphureous principle is not only likewiſe found in metallic ſubſtances, but that it is this which gives them their fuſibility, ductility, and metalline forms. Thus antimony, which is a ſubſtance approaching the neareſt of any to a *metal*, is little elſe but a burning ſulphur. By exhaling this, it loſes its *metallic* form, and turns to a kind of grey aſhes, which, being melted, inſtead of *metal*, becomes glaſs; and by melting this over again, and adding to it ſome inflammable matter, again it returns into a regulus. See the ſequel of this article, and MINERAL.

Stahl maintains, that *metals* have the ſame origin with the earth itſelf, and that theſe and the *metallic* veins that contain them, were formed at the firſt creation of the earth. However, there is reaſon to believe, that *metals* and their mines are continually formed in the bowels of the earth by various proceſſes, ſuch as earthquakes, according to the ſyſtem of Lomonoſow, &c. adapted to this purpoſe.

METALS, *as to the ſpecies of*, there are four which the chemiſts call *imperfect*, becauſe their principles are not bound ſo faſt together, but that the force of a common fire deſtroys them; ſo that by its continued action they are changed into an earth deprived of all the characteriſtic properties of *metals*: theſe are, iron, copper, lead, and tin; the others, which are ductile or malleable, and which alſo remain fixed in the moſt violent and long continued fire, without diminution of weight, or other ſenſible alteration, are gold, ſilver, and platina: theſe, therefore, are called *perfect metals*.

The *metallic* ſubſtances, which, as well as the imperfect *metals*, loſe their *metallic* properties by expoſure to fire, but which alſo have no ductility, or fixity, are diſtinguiſhed from the others by the name of *ſemi-metals*. Of this claſs are five; regulus of antimony, biſmuth, zinc, regulus of cobalt, and regulus of arſenic; to which ſome have added nickel. Laſtly, mercury, which has all the general properties of *metals*, makes a claſs ſeparate from the others; becauſe in purity and gravity it is ſimilar to the perfect *metals*, and in volatility to the *ſemi-metals*. Its fuſibility alſo ſo far ſurpaſſes that of any other *metallic* matter, that it is ſufficient to diſtinguiſh it from all, and to give it a diſtinct claſs. Of the fourteen *metallic* ſubſtances above enumerated, three were unknown to the ancients, viz. platina, regulus of cobalt, and nickel.

In the firſt four, it is eaſy to ſee the principle of inflammability: they become all fuſible by the addition of ſaltpetre, either in a greater or leſs degree. But the principle is more conſpicuous ſtill in the duſt or ſmall filings of the *metals* let fall in the flame of a candle, than in the lump.

In gold and ſilver, the ſulphureous principle is not ſo obvious. No heat, but that of the ſun collected into a focus, is able to decompound them; but, no doubt, even theſe have the ſame principles with the other *metals*, though they are not ſo eaſily ſeen. In gold, as well as in the imperfect *metals*, the baſis is an earth capable of vitrification, as appears by the glaſs remaining after the calcination of gold in a burning-glaſs: and there is reaſon to believe, that the greateſt part of what is exhaled in ſmoke during the operation, is the ſulphureous principle mixed with ſalts.

As to ſilver, there is ſomething in it extremely various. When purified with antimony, it vitrifies by the burning-glaſs; but if purified with lead, it leaves nothing behind it but grey aſhes. The baſis of this *metal* is doubtleſs an earth capable of vitrification; and what exhales in ſmoke, is apparently a mixture of ſulphur, ſalts, and a little earth, volatilized by the fire.

From all theſe, and many more obſervations of the ſame kind, M. Geoffroy ventures to draw the following concluſions; that the ſubſtances whereof *metals* are compoſed, do not differ eſſentially from thoſe which compoſe vegetables: that the imperfect *metals* are compoſed of a ſulphur, vitriolic ſalt, and vitrifiable earth: that this ſulphureous principle is more or leſs ſtrongly joined with the other principles; very ſtrongly in gold and in ſilver, leſs in antimony, and very little in mineral ſulphur; that the principle of inflammability may be ſeparated from *metallic* ſubſtances, either by culinary fire, or by the ſun: that the *metal*, thus deſpoiled of its principle, is converted into aſhes; and that theſe aſhes, purſued farther with a violent fire, vitrify; and that ſuch aſhes or glaſſes, by the application of ſome inflammable matter, again reſume the *metallic* form they had loſt: that it is by theſe means fluxed-oil turns clay into iron: that, if we knew all the other *metallic* earths, they might likewiſe be immediately converted into *metals*, by the projection of ſome proper inflammable matter: that the ſaline and earthy parts, found in proper vitriol, furniſh the earthy vitrifiable part, which makes the baſis or ground of iron; and that it receives the *metallic* form from the ſulphureous principle of the oil: that the iron, found in the aſhes of plants, was produced there in the ſame manner; and that it is a compoſition of the vitrifiable earth of the plants, the acid of thoſe plants, and their oily or inflammable principle. But it has been ſufficiently proved by many writers, that by Mr. Geoffroy's experiments, iron is only reduced or revived, but is not produced.

The ſame author, the better to aſcertain the conſtituent parts of *metals*, made a great number of experiments on them with the duke of Orleans's large burning-glaſs: the reſult whereof ſalls in with, and confirms, the doctrine laid down above. From thoſe experiments, he gathers, that the four *metals*, which we call *imperfect*; viz. iron, copper, tin, and lead, are compoſed of a ſulphur, or oily ſubſtance, capable of burning, and a *metallic* earth, capable of vitrification. That from this ſulphur proceed the opacity, brightneſs, and malleability of a *metal*. That this *metallic* ſulphur does not appear at all different from the oil or ſulphur of vegetables, or even that of animals; and that it is the ſame in mercury, as in the four imperfect *metals*. That theſe four *metals* have for their baſis an earth ſuſceptible of vitrification; that this earth is different in each of the four *metals*, in that it vitrifies differently in each; and that on this difference in vitrifying, depends the difference of *metals*.

The learned Boerhaave, after an accurate ſurvey of the ſeveral *metals*, their characters, properties, preparations, uſes, &c. draws the following concluſions concerning the general nature of *metals*. 1. That which diſtinguiſhes *metals* from all other bodies, as well as from each other, is their heavineſs; though every *metal* has its peculiar weight, which no art is able to imitate, and which depends, as Helmont and the chemiſts expreſs it, on the ſtraiter homogenity of their parts. Now, the later philoſophers have proved, that all corporeal magnitude has juſt ſo much reality in it, as it has weight; and therefore, if you have found the heavineſs of any *metal*, you have, at the ſame time, found its corporeity. Sir Iſaac Newton, treating of gravity, and Huygens of the pendulum, ſhew, that weight and reality are correſpondent. 2. The *metals* appear to be ſimple, yet they are really compounds. Their component principles, according to the ancients, are ſulphur and mercury; to which ſome of the moderns have added ſalt; but it is certain, ſalt is no conſtituent part, or ingredient, of *metals*, but rather ſomething external adhering to them. All *metals* conſiſt of two parts or principles; mercury, as the baſis, or matter; and ſulphur, as the binder, or cement; the firſt, the ſubſtratum, or *metallic* matter; and the ſecond, that which renders it fixed and malleable. The mercury, it is to be noted, is the ſame with our quickſilver, only defecate, and clear of any heterogeneous matter; whereas the common quickſilver is always mixed. As to the ſulphur, it is not the vulgar foſſile ſulphur, but a peculiar ſort of matter ſpecifically denominated *ſulphur of metals*, concluded by ſome of our lateſt and beſt chemiſts, particularly M. Homberg, to be fire; which, being mixed with the mercury, fixes it, and, according to the different degrees of its union and cohеſion therewith, produces different *metals*.

This doctrine of the compoſition of *metals* is confirmed by an experiment of Mr. Boyle, who tells us, that, after having retained mercury a long time in a moderate fire, he took a piece of gold out of it, which, it was apparent, was not in the mercury before it was expoſed to the fire. M. Homberg alſo has an experiment to the ſame effect; from which he concludes, that gold conſiſts of a ſulphureous igneous part, and a heavy mercurial part fixed thereby; and that, upon taking away the ſulphureous or fiery part, the gold muſt be converted into fluid mercury.

3. All *metals* muſt firſt be mercury, before they be gold; and the thing ſuperadded to common mercury, whereby it is prevented from becoming gold, is a ſharp volatile body, which, when heated, becomes corroſive, and emits fumes; which are the true properties of the foſſile ſulphur.

4. If any *metal*, or other body, could be found, that only differed from gold in its wanting weight, it were impoſſible ever to make gold of it; and, on the contrary, if a

body could be had, that is as heavy as gold, all the other properties, as colour, fixity, ductility, &c. might eaſily be added. And hence the more knowing among the alchemiſts hold the primary matter of gold to be quickſilver; which, ſay they, is gold at heart, as coming neareſt to gold in point of ſpecific gravity. Only there is a corroſive body, i. e. ſulphur, adhering to it, which if it were ſeparated, you would have gold; or, if it were only inverted, ſilver.

And accordingly, on ſuch principles, whoever would make gold out of any other foreign matter, muſt remember, that the more his matter differs from mercury in weight, &c. the leſs gold it will make. See PHILOSOPHER's *ſtone*.

5. Therefore *metals* are tranſmutable into one another: for, if mercury be the common matter of all *metals*, and if all the difference lie in the fixing ſpirit or ſulphur, which, as it is leſs or more ſubtile or pure, conſtitutes this or that *metal*, it is no way improbable that they ſhould be tranſmuted by a purer fixing ſulphur taking place of a corroſive one, and fixing the matter into a more perfect *metal*.

6. The pureſt *metals* reſult from the pureſt and moſt defecate mercury, and the ſmalleſt quantity of the ſubtileſt ſulphur. Hence, mercury of gold is heavier than common mercury, and has always ſome impure part that is lighter than gold; and could that be taken away, and the fixing ſpirit be added, it would become heavier than gold.

7. The imperfect *metals* conſiſt of impure mercury, and imperfect ſulphur, with ſome other valuable heterogeneous matter in it: this, fuſed by the fire, emits a fume, which whitens copper; after which, the ſulphur exhales yet farther. The reality of ſuch a third matter is evinced by this circumſtance, that all the baſer *metals* are reſolvable not only into mercury and ſulphur, but alſo into feces or fordes, which are lighter and more earthy than either of the other, and accordingly ſwim therein.

8. Upon the whole, it appears, that in the three nobler *metals*, gold, mercury, and ſilver, it is principally the greater or leſs proportion of the ſulphur to the mercury that determines them to be gold, mercury, or ſilver; that it is by this proportion thoſe ſeveral *metals* are defined and denominated; and that, from this difference of proportion, flow all the ſpecific differences of colour, weight, fixity, ductility, volatility, fuſibility, ſolubility, falubrity, &c.

9. That in the other baſer *metals*, beſides this different proportion of the two principles, there intervenes another cauſe of diverſity; viz. a third principle, or matter of an earthy kind, and very different from either of the reſt; which, adhering to the pure elemental ſulphur, corrupts and adulterates, and variouſly modifies it; and from the different circumſtances of this third principle, conſidered along with thoſe of the ſulphur itſelf, reſult the ſpecific differences of the more imperfect *metals*, as to weight, colour, and their other qualities.

The ſyſtem of *metallization*, which ſuppoſed ſalt, ſulphur, and mercury, to be the conſtituent elements of *metals*, ſubſiſted under various modifications, till Beecher evinced, that theſe three principles are in themſelves compound bodies, and, therefore, could not be properly elements of bodies; and, purſuing his reflexions on this ſubject, he was led to conſider *metals*, and all bodies of the ſame nature, as compounded of three ſubſtances, which he called earths. The firſt is the ſaline or vitrifiable earth; the ſecond is the fat or inflammable earth; and the third the mercurial or volatile earth. According to his theory, theſe three earths enter into the compoſition of all *metals*; the perfection of which depends on their more perfect combination, and their difference on the degree in which one of theſe principles prevails over the others, and the various proportions in which they are combined in various *metals*. Beecher has endeavoured to demonſtrate the exiſtence of theſe three principles by reaſoning and experiment. In proof of the exiſtence of a vitrifiable earth in *metals*, he alleges their calcination by fire, gold and ſilver excepted, or their tranſmutation into an earth or aſhes, which farther urged by fire is changed into glaſs. The inflammable principle or phlogiſton of *metals*, is neceſſary to correct and temper the dryneſs of the former, and is generally admitted. The mercurial earth, according to him, is the moſt eſſential principle of *metals*, and ſerves to give them their *metallic* form. The other two, *metals* poſſeſs in common with ſtones, vegetables, &c. but this mercurial earth, joined to the two others, gives *metals* that ductility which is peculiar to them, and which conſtitutes their *metallic* nature. This theory has been adopted and illuſtrated by Stahl, and many other chemiſts; who maintain, that the mercurial principle above mentioned exiſts copiouſly in mercury; that it alſo exiſts in marine acid, to which it gives its ſpecific character; and that by extracting it from this acid, or from any other body containing it copiouſly, and *combining it with ſimple earths, theſe may acquire a metallic* character, and be rendered capable of receiving phlogiſton, and of being completely *metallized*. Thoſe *metals*, in which the mercurial earth exiſts moſt copiouſly and ſenſibly, are mercury, ſilver, lead, and arſenic. It has been urged as a ſtrong preſumption in favour of the exiſtence of this third principle in *metals*, that no method has yet been diſcovered of producing *metals*, by merely combining phlogiſton with ſome matter which is certainly known to be ſimple earth. Beſides, it is not eaſy to conceive, how from only two certain principles ſo many very different compounds, as the ſeveral *metallic* ſubſtances are, ſhould reſult. On the other hand, the exiſtence of this mercurial principle is only probable, and there are many reaſons to doubt of it. It is agreed, that marine acid, mercury, arſenic, and the other ſubſtances in which the mercurial earth is ſuppoſed to abound, are very volatile; and therefore, that this principle muſt likewiſe be volatile: conſequently, when *metals* are decompoſed by combuſtion, or by detonation with nitre, a conſiderable part of this volatile principle muſt be diſſipated. Hence it muſt be impoſſible to reſtabliſh the calxes of *metals*, without recombining not only their loſt phlogiſton, but alſo their loſt mercurial earth. But it is well known, that by addition of phlogiſton alone theſe calxes may be metallified, and that no mercurial principle is neceſſary. Henkel maintains, that the mercurial earth is not a diſtinct ſubſtance, but conſiſts only in a beginning of union of phlogiſton with earth, or in a diſpoſition which an earth has of uniting intimately with the inflammable principle. Other very conſiderable chemiſts have alſo been of opinion, that two principles, viz. earth and phlogiſton, are ſufficient to form a *metal*, and have rejected the mercurial principle of Beecher. The ſolidity, the conſiſtence, and eſpecially the gravity, which *metals* poſſeſs in a degree ſuperior to all other bodies, will not allow us to doubt, that the earthy element, of which theſe are the characteriſtic properties, enters largely into their compoſition, and makes their baſis. And the facility with which they combine with almoſt all inflammable matters, and with all thoſe which have great affinity with phlogiſton, ſuch as acids, joined to their incapacity of being allayed with meagre matters that are purely earthy or watery, which have no diſpoſition to unite with phlogiſton, furniſh alſo very ſtrong reaſons for believing, that the inflammable principle enters largely into the compoſition of *metals*. But the cleareſt and moſt ſatisfactory demonſtration of the exiſtence of this principle, is the combuſtibility of all *metals* capable of decompoſition in this way, and their ſubſequent reduction with all their properties, by the re-union of the inflammable principle. Beſides, the deſtructible *metals* perfectly reſemble, in the ſtate of COMBUSTION, all bodies containing phlogiſton. When expoſed to fire in cloſe veſſels, they become red-hot, melt or ſublime, according to their nature, but undergo no other alteration. But imperfect *metals*, expoſed to fire, with acceſs of air, burn more or leſs ſenſibly, as their inflammable principle is more or leſs abundant, or more or leſs combined. Beſides, the phlogiſton of *metals* is conſumed by DEFLAGRATION with nitre more quickly and more completely than by ordinary calcination or combuſtion; and nitre is alkaliſed by theſe *metallic* detonations in the ſame manner as in its detonation by coals: and farther, imperfect *metals*, treated with the vitriolic and nitrous acids, which have an affinity with phlogiſton, are more or leſs deprived of their inflammable principle. It is alſo evident, that phlogiſton is one of the conſtituent parts of *metals*, becauſe their eſſential properties are altered in proportion to the quantity of it taken from them: thus, the reſiduum of *metallic* matters, after calcination, departs from the *metallic* character, and approaches to the nature of mere earth. The opacity, brilliancy, ductility, gravity, fuſibility, volatility, and all the properties by which *metallic* ſubſtances differ from ſimple earths, are diminiſhed, or entirely diſappear, by taking from them their inflammable principle; ſo that after the utmoſt calcination they reſemble mere earth: which can no longer be combined with acids or with *metals*, but are capable of uniting with purer earths. In this ſtate they are called calces, or *metallic* earths. See CALX.

Another proof of the exiſtence of the inflammable principle in *metals*, is deduced from the reduction of *metallic* calces into *metal*, by the addition of phlogiſton alone. Thus, if the earth of a *metal* be mixed with any inflammable matter, which either is, or can be changed into the ſtate of coal, together with ſome ſalt capable of facilitating fuſion, but which, from its quantity or quality, is incapable of receiving the inflammable principle; and if the whole be put into a crucible, and the fuſion promoted by a fire gradually raiſed, then an effervescence will happen, accompanied with a hiſſing noiſe, which continues for a certain time, during which the fire is not to be increaſed: afterwards, when the whole has been well fuſed, and the crucible taken from the fire and cooled,

we shall find at the bottom, upon breaking it, the *metal*, the earth of which was employed for the operation, poſſeſſed of all the properties which it had before CALCINATION and REDUCTION. This tranſformation of an earthy ſubſtance into a *metal*, is ſolely cauſed by the phlogiſton paſſing from the inflammable matter to the *metallic* earth; becauſe, in whatever manner, and with whatever ſubſtance, *metallic* earths be treated, they cannot ever be reduced into *metals* without a concurrence of ſome ſubſtance containing phlogiſton; and the nature of this ſubſtance is indifferent, becauſe the inflammable principle is the ſame in all bodies containing it; and farther, if, after the operation, the ſubſtance furniſhing the phlogiſton be examined, we ſhall find that it has loſt as much of that principle as the *metallic* earth has received. Theſe and other facts that might be recited concerning the decompoſition and the recompoſition, or REVIVIFICATION of *metals*, prove inconteſtibly, that they are all compoſed of EARTH and PHLOGISTON. And, in general, if we reflect on the eſſential properties of the earthy and inflammable principles, we ſhall eaſily perceive that theſe properties, being combined and modified by each other, without the ſaline principle of ſome chemiſts, perhaps without the mercurial principle of Beecher, ought to produce the properties of *metals*. Dict. Chem. art. *Metals*. Mem. Acad. Par. 1709. See MINERAL.

The principle which is combined with *metals*, during their CALCINATION, and which augments their weight, ſeems to be nothing more than the pureſt portion of the air we breathe, which, in this operation, paſſes from a ſtate of expanſibility to a ſtate of ſolidity.

METALS *for ſpeculæ*. See SPECULUM.

METALS, *colours from*. As metals have a ſtrong texture in their metalline form, ſo they preſerve their natural colours durably, unleſs corroded or diſſolved by particular menſtruums, after which their ſolutions ſtrike particular durable colours, or afford the ſtrongeſt ſtains.

Iron diſſolved in ſtale ſmall beer gives the beautiful yellow and different ſhades of buff-colour, uſed in printing linens and cottons, &c. When ſublimed with ſal ammoniac it alſo affords a yellow; and the common iron-moulds made by ink are owing to the iron diſſolved in the copperas of which ink is made.

Copper melted with zinc appears of a gold-colour; diſſolved in aqua fortis, it affords a beautiful green; and in any alkali, a beautiful blue. And theſe ſolutions may be reduced to dry colours by cryſtallization or evaporation; and the ſame *metal*, precipitated out of aqua fortis with common ſalts, gives the turquoiſe-colour to white glaſs.

Tin, a white or colourleſs *metal*, affords a light blue colour, when fluxed with antimony and nitre. The ſame *metal* is neceſſary in ſtriking the ſcarlet-dye, with aqua fortis and cochineal; and its calx, by ſtrong infuſion, turns to a glaſs of an opal colour.

Lead, corroded by the fumes of vinegar, gives the fine white cerus; burnt in a ſtrong naked fire, it becomes the ſtrong red-lead or minium; and melted into a glaſs with ſand, is of the hyacinth-colour. Shaw's Lectures, p. 171.

Silver being diſſolved in aqua fortis, if chalk be put to the ſolution, turns of a beautiful purple or amethyſt-colour; and its own ſolution, though pale as water, durably ſtains the nails, ſkin, or hair, brown or black.

Quickſilver mixed with brimſtone makes a black maſs, and thus, by ſublimation, affords the beautiful red pigment, called cinnabar, or vermilion; and the ſolution of quickſilver being precipitated with common ſalt, yields a ſnow-white powder, which alſo turns black by being mixed with ſulphur.

Gold, diſſolved in aqua regia, affords a fine yellow liquor, which ſtains animal ſubſtances beautifully purple; and if the ſolution be ſufficiently weakened with water, and mixed with a ſolution of tin, a fine red or purple powder may be procured, very uſeful for ſtaining of glaſs and paſtes to a beautiful red.

It appears from the experiments of Sir Iſaac Newton, relating to the changes of colour that take place in pellucid colourleſs ſubſtances, that the leſs refrangible COLOURS are exhibited by the greater thickneſs of air, water, and glaſs; and that as the thickneſs of thoſe ſubſtances is diminiſhed, they reflect the more refrangible colours. Hence he infers, that nothing more is requiſite for producing all the colours of natural bodies, than the ſeveral ſizes and denſities of their particles. Accordingly he attributes the colours of permanently coloured bodies to the ſame cauſe by which they were produced in colourleſs ſubſtances, viz. to the various thickneſſes of their component particles. But no experiments were made on permanently coloured bodies, in order to eſtabliſh the truth of Sir Iſaac Newton's opinion, till the ingenious Mr. Delaval directed his attention to this ſubject. From obſerving the circumſtances above recited, and more largely illuſtrated under the article COLOURS, it appeared to him, that, if permanently coloured bodies are ſubject to the ſame laws as tranſparent colourleſs ſubſtances are, all ſuch permanently coloured bodies, whenever the ſize of their particles is diminiſhed, ſhould undergo a change of colour, by aſcending from the leſs refrangible to the more refrangible colours; and that ſuch bodies, when the ſize of their particles is augmented, ſhould undergo a contrary change, their colours in this caſe deſcending from the more refrangible to the leſs refrangible colours. In order to confirm this concluſion, he made a great variety of experiments with vegetable, animal, and mineral ſubjects, whereby the ſize of their particles, upon which their colours depend, might be diminiſhed or increaſed. The methods which he uſed, in order to diminiſh the ſize of the particles of thoſe bodies which were the ſubject of enquiry, were by diſſolving, attenuating, &c. by means of chemical ſolvents, heat, putrefaction, dilution, &c. The contrary effects were brought about by ſuch means as are known to condenſe, incraſſate, or unite the particles of bodies into larger maſſes, as by coagulation, precipitation, evaporation, by diminiſhing the force of the ſolvents, &c. The *metals* afforded him numerous inſtances in confirmation of the doctrine above explained; for almoſt every operation, to which they are ſubject, exhibits a change of colour correſponding to this doctrine. This is particularly the caſe with regard to the imperfect *metals*; for every change of their texture is accompanied by a correſpondent change of colour. We can only enumerate ſome of the principal reſults which Mr. Delaval obtained from a great number of well conducted experiments. Thus, the green vitriol of iron is changed, in proportion as it is deprived of its ſolvent part, by expoſing it to a ſtrong heat, &c. to yellow, orange, red, and purple; and by a contrary proceſs, viz. by a farther attenuation, by means of the phlogiſticated lixivium, in the proceſs of *Pruſſian* BLUE, &c. the colour of the iron aſcends from green to blue; ſo that all the primary colours are produced from the ſame metal, in proportion as its particles are attenuated or incraſſated. It appears likewiſe, that when iron is divided into very ſmall parts by means of a large quantity of glaſs, and by a violent heat, its colour is blue; but in proportion as it is leſs divided, by the mixture of a ſmaller quantity of glaſs, or the application of leſs heat, its colours are green, yellow, and red. From iron diſſolved in its ſeveral menſtrua, colours are produced in proportion as the ſolvent power of thoſe menſtrua is greater or leſs. Thus, iron diſſolved in its ſtrongeſt acid ſolvent, the vitriolic acid, gives green; in its weaker acid ſolvents, the marine and nitrous acids, yellow and orange; and in its weakeſt acid ſolvents, the vegetable acids, red. The colours of the calces of iron precipitated from its ſolution in the vitriolic and nitrous acid, deſcend from green to yellow, and from yellow to red; whereas the changes of colour ariſing from the ſolution of theſe calces, proceed in a contrary order, and aſcend. Mineral ſubſtances are alſo frequently impregnated with iron, and their colours correſpond with the ſtate of the iron contained in them.

In the ſame manner the colours of the ſolution of mercury in the nitrous acid vary, in proportion as the ſolvent is extricated from it, from yellow to orange, and then to red. Thus alſo, thoſe ſubſtances which have the greateſt affinity with the acid of the corroſive ſublimate produced by the ſolution of mercury in the marine acid, diſengage from its ſolution a red precipitate; and thoſe, whoſe affinity with it is leſs, produce a yellow one. But theſe colours are liable to ſome variation, according to the greater or leſs quantity of acid in the ſolution. Mercury diſſolved in the vitriolic and in the vegetable acids, exhibits, in proportion as its ſolvent is taken from it, the ſame colours which, under ſimilar circumſtances, are afforded by that metal diſſolved in the other acids. All theſe mercurial preparations become red, when they are deprived of the principal part of their menſtruum; and mercury calcined by heat, without the addition of any acid, acquires the ſame colour. Its colour, however, is ſubject to variation, from the action of its ſolvents; and thus the phoſphoric acid changes the red to yellow and white. The ſame law obtains in the changes of colour to which the mineral manganeſe is ſubject; for Mr. Delaval found, that by means of the different degrees of power in the ſeveral ſolvents, theſe colours were produced in their regular priſmatic order, viz. yellow, green, blue, purple, and red. The various phenomena of the *ſympathetic* INK of M. Hellot conform to the ſame law, and are urged by Mr. Delaval as arguments to eſtabliſh it. Heat and cold, he obſerves, are not neceſſary agents in the production or ſuppreſſion of the colour. But it appears, that the alterations are effected by the moiſture of the air, attracted by the ſaline matter when cold, and expelled from it when heated. When this ink is expoſed

to a moderate heat, in a white china cup, and when the greater part of the water is evaporated, the faline matter becomes green. This colour arifes from a fuperfluous quantity of the marine acid, which foon flies off, and leaves the remaining part blue, flightly inclining to green. It alfo forms a hard, dry mafs, which, in a few minutes after its removal from the fire, grows moift, and aflumes a light red colour. Thefe alterations may be often renewed, by alternately heating and cooling the colqured matter; which does not again become green, after the fuperfluous marine acid is once evaporated. But a drop of fpirit of falt, added to the red or blue mafs, immediately renders it green. When preparations of cobalt are acted upon merely by heat, the order of the changes of colour effected in them, is fuch as, in other inftances, conftantly arifes from that means of attenuation. Thus, when the yellow folution of this mineral, in the marine acid, is heated, it aflumes a green colour, paffing from a lefs to a more refrangible colour. When this folution is cooled, the yellow is reftored.

Mr. Delaval obferves, that, as the inflammable matter, in the entire *metals*, acts ftrongly on the rays of light, it is neceffary to calcine or to divide them into extremely minute particles, in order to examine feparately the action of the calx, or fixed matter, on the rays of light. In order, therefore, to examine all the *metals* in the like circumftances, by reducing them into the fmalleft particles, and depriving them of their phlogifton as much as poffible, he expofed each of them, united with a proper quantity of the pureft glafs, without any additional ingredient, to the greateft degree of fire which they are capable of bearing, without having all colour whatever deftroyed. In this ftate it appears, from a variety of experiments and facts, that they actually do, without any exception, exhibit colours in the order of their denfities, as follow: gold, red; lead, orange; filver, yellow; copper, green; and iron, blue. He has alfo fhewn, that the other preparations of the *metals*, viz. their folutions, precipitates, cryftals, &c. do for the moft part exhibit the fame colour, in the order of their denfities, though not fo invariably as their glaffes; fome fmall variation of colour happening in the more imperfect *metals*, probably from a change of denfity in their different preparations. Thus, gold acquires a red colour, by a minute divifion of its particles, without any addition. In the procefs of calcining lead in the furnace, the firft of the primary colours which it acquires is yellow; the calx paffing from that colour through orange into red. This variety of colours proceeds from the imperfection of the *metal*; which, probably, during its calcination, receives a fmall portion of phlogifton, as well as air; for the effect of fuch an union muft, probably, be a change of colour from orange to red: as Sir Ifaac Newton has fhewn, that bodies reflect more ftrongly in proportion as they poffefs more phlogifton; and that the lefs refrangible colours require a greater power to reflect them. The preparations of filver are yellow: the two moft imperfect metals, copper and iron, being very eafily acted upon by almoft all menftrua, the colours of their folutions, &c. viz. green and blue, are apt to change into each other's order; the copper in fome folvents becoming blue, and the iron green, and in other folvents *vice verfâ*; which probably depends on the increafe or diminution of their denfities. The preparations, &c. of mercury have been already examined. The fpecific gravity of platina being nearly equal to that of gold, it is found, agreeably to the Newtonian doctrine, confirmed by Mr. Delaval, that the precipitates and cryftals obtained from folutions of this *metal* are red; and that a folution of it in aqua regia to perfect faturation is of a dark red, though when diluted, yellow. Delaval's Experimental Inquiry into the Caufe of the Changes of Colours in opake and coloured Bodies, &c. 1777, paffim. Phil. Tranf. vol. lv. art. 3. p. 10, &c.

METALS, *fluxes of.* See FLUXES.

METALS, *granulation of.* See GRANULATION.

METALS, *medicines from.* All medicines that have LEAD in their compofition, are fcarce to be trufted for internal ufe; for we have numerous inftances of the poifonous nature of this *metal*, in the workers at the white lead or cerufs-houfes, and indeed in all who work on that *metal*; and it were enough to banifh the internal ufe of *faccharum faturni*, and the *tinctura antiphthifica*, to read in the Mifcellanea Curiofa, Decad. 3. Obf. 30. how many men were poifoned at a time by drinking of pricked wine, which had been rendered fweet by litharge.

Metals, however, do not act in the body, unlefs diffolved; whence large quantities of crude mercury being fwallowed, prove harmlefs for want of a proper menftruum to diffolve it in the ftomach; but when crude mercury is diffolved in its proper menftruum, as in the making corrofive fublimate, we fee it becomes one of the ftrongeft poifons. Lead, iron, and copper, being much more eafily diffolved than quickfilver, are feldom taken without fome remarkable effect, which muft always prove the greater, the more of an acid humour, or in cafe of copper, even an alkaline is lodged in the ftomach or inteftines. The internal ufe of the cryftals of filver, though fometimes fucceefully given in dropfical cafes, fhould hardly be trufted, on account of their corrofive acrimony, which has fometimes occafioned bloody ftools, and extreme weaknefs. The common tinctures of copper, and folutions of blue vitriol, can fcarce be taken internally with fafety; as being not only emetic, but in fome degree corrofive and poifonous. Even the *aurum fulminans* cannot be fafely given till thoroughly waflied from its falts; and even then if it meet with an acid folvent in the ftomach, it may do very great mifchief. Iron and tin have not been found fo pernicious in the body, but rather beneficial, efpecially iron, when properly prepared and ufed.

Metallic bodies corroded by acids, generally erode when applied to fores. Some of thefe, fublimate mercury for inftance, and particularly arfenic, have fhaken the whole frame of the body, when applied externally; and mercurial preparations do fometimes enter the blood, and produce a falivation. Med. Eff. Edinb. vol. v. art. 24.

METALS, *falts of.* The falts of the feveral *metals* have been medicines long known in the world, and are of excellent ufe in the cure of many diftafes; but they might be of yet infinitely more fervice to the world, if a happier way of extracting them could be found than the general one now in ufe, of doing it by acids, and fuch ftrong and corrofive menftruums. Befide the mifchiefs thefe menftruums bring as corrofives, which is affuredly much lefs than is vulgarly fuppofed, becaufe they lofe the greater part of this in acting on the *metal*, they produce a great number of bad effects, and render the falts unfit for a great number of ufes, by making them all vitriols, that is, by converting them into falts, which, like the common native vitriols, have a feptic and violently acrimonious quality. The cryftals, or falt of filver, called by the chemifts lunar vitriol, are a plain inftance of this. Borrichius and Kunkel devifed another method to be ufed for obtaining the falts of *metals*. This was the ufe of fire inftead of acids, as the menftruum that fhould prey upon the *metal*, and feeking the falts of all *metals* from the mere action of a reverberatory furnace; but this method, though a very laudable attempt, yet is by no means calculated to be of general ufe, becaufe the quantity of falts thus obtained is very fmall, and that obtained with great pains and expence. Kunkel has given the world an account of the effects of another method of treating *metals*, of which he relates wonders; but he conceals the method. The folemn manner in which he declares the fact, however, feems to imply, that what he relates is truth; and he every where fpeaks from his own perfonal knowlege, and the work of his own hands. The menftruum he ufed was known by himfelf and many others, at Hall in Saxony, under the name of *effentia dulcis*; he facredly affirms, that this was neither acid nor corrofive, even in the flighteft degree; that it left behind it no feces, no faline nor earthy matter on evaporation alone; and that it more approached to the nature of fpirit of wine, than to any other known liquid. He fays, that this liquor diffolved even gold, and that fo perfectly, that it would all rife with the liquor in diftillation. Mercury being diffolved in it, and the folution diftilled in a retort, he fays, that only a fmall quantity of earthy matter remained in the retort, which was white, of a fpongy texture, and fixed in the fire; and that the reft of the body of the quickfilver was converted into a thin colourlefs and pellucid fpirit in the receiver; and that gold, treated in the fame manner, and diftilled with a very gentle heat, was left at the bottom of the retort in form of a refin; and that this refin was foluble in common rectified fpirit of wine, as was alfo the earth of the mercury; and that fome days after the folution of this laft earth, the falt with which this fubftance abounded, would feparate itfelf from the menftruum, and form regular cryftals at the fide of the glafs. This, he fays, is the true falt of mercury, containing all the virtues of that *metal*, and not converted into a vitriol or corrofive fubftance, by means of the menftruum ufed to extract it. When the falt has thus formed as many fhoots as it will yield by this procefs, the remaining liquor is to be evaporated gently, and there will be found a like falt at the bottom of the veffel, of a white colour, an agreeable fmell, and infipid to the taffe: this, he fays, is fo fixed in the fire, that it is no more to be deftroyed or altered by it, like the *metal* from which it is obtained. It readily melts into a mafs in the fire; but if it be not immediately after that taken off from the fire, it will run through whatever veffel it is melted in.

The author attributes to this falt all the wonderful vir-

tues that the *metal* it is made from is known to poſſeſs; and gives inſtances of cures performed by it, which are ſo well atteſted, as ſcarce to leave any doubt of his veracity. He ſays, it works mildly by ſtool, urine, and ſweat. The caſes he gives of cures performed by it, are theſe; two women, who were very bad with the venereal diſeaſe, two men in the laſt ſtages of hectic fevers, ſeveral perſons in bad kinds of the ſmall-pox, and ſome in peripneumonies. The reſin-like ſubſtance into which gold is converted by the ſame operation, he ſays alſo may be tranſformed in the ſame manner into a white and ſubtile ſalt, of a very penetrating taſte; and to this he attributes great virtues in the cure of hæmorrhages and epileptic caſes, and adds, that it is an ingredient of the black compound powder, ſo famed for epileptic caſes, prepared at the public orphan hoſpital at Hall. Kunkel's Diſſert. de Sal. Met.

METAL, *prince's*. Copper, though one of the leſs precious *metals*, has yet been found of ſo great uſe in the common affairs of life, that ſcarce any other has been ſubject to ſo many trials for its improvement, or the rendering it either more beautiful or more fit for certain purpoſes.

One of the firſt diſcoveries in theſe attempts was the making it into braſs, by means of an addition of lapis calaminaris; and though it was not at that time known to be a ſtone which contained any *metal*, yet the braſs was always found to weigh one third more than the copper which had been uſed in the proceſs.

This yellow *metal* gave many people hopes of making copper approach yet nearer to gold, and without knowing that zinc was the ſeparated *metalline* part of lapis calaminaris, the experimenters ſoon found, by happy accident, or repeated chance mixtures, that it would give copper a yet finer and purer yellow; but it was alſo found, that this mixed *metal* was much more brittle than braſs made in the common way. This, however, did not prevent the world from ſtill valuing it for ſuch works as were to be finiſhed by caſting, and did not require the hammer; and we, who firſt had it in perfection, called it *prince's metal*, from prince Rupert, whom ſome ſuppoſed to have been the inventor of it, in 1680. But the greateſt perfection this *metal* was ever brought to, was by two Frenchmen, Mr. La Croix, and Mr. Le Blanc. Their methods of making the compoſition, though both beautiful, were very different. Mr. Le Blanc's was the brighteſt, and of the moſt elegant and lively colour; but Mr. La Croix's was greatly ſuperior to that in ductility and ſoftneſs, ſo that it was very eaſily malleable.

Mr. La Croix invented a ſort of varniſh or lacquer for his *metal*, which added a ſomewhat deeper tinge to it, as it was naturally rather too pale; and had this farther advantage, that while it remained on the *metal*, it preſerved it from ruſt or decay. This is a very material point in regard to a *metal* of which copper is the baſis, ſince that is, of all *metals*, moſt ſubject to be injured by the air, or by the contact of liquids of almoſt any kind. Mr. Le Blanc's *metal* is of a deeper, yet equally lively colour, and remarkably bright; and is of ſuch a temper as to be admirably fitted for working. The whole hiſtory of theſe *metals* is certainly, that they are compoſed of zinc and copper in different proportions the one to the other; but it is not eaſy, without the help of numerous experiments, to determine what is to be the true proportion for either.

The microſcope, however, ſhews a manifeſt difference, which may lead ſomewhat towards it; for the *metal* of La Croix is ſeen to be compoſed merely of a number of irregular ſtrix, while the other is diſcovered to conſiſt of always two regular beds of them, which meet in the center of the piece; hence it is that this is always brittle, and will not well poliſh. The fabric of theſe *metals* was long kept a ſecret; but it was always to be diſcovered by melting it in a crucible in a ſtrong fire, when it always ſent up plain flowers of zinc, and the remaining *metal* appeared no other than copper altered by calamine; that is, common braſs. Mem. Acad. Par. 1732. See GOLD-*coloured metal*.

METAL, *bell*, is a compoſition of copper and tin melted together. See BELL.

METALS, *blowing of*. See BLOWING *of iron*.

METALS, *painting on*. See PAINTING.

METALS, *ruſt of*. See RUST.

METALS, *line of*. On Gunter's ſector are ſometimes two lines thus called, and noted with the characters of the ſeven *metals*, ☉, ☾, ☿, ♄, ♀, ♂, and ♃; their uſe is, to give the proportions between the ſeveral *metals*, as to their magnitudes and weights.

METALS, *tincture of*. See TINCTURE.

METAL, *to be laid under*, in *Gunnery*, is when the mouth of a gun lies lower than her breech.

METAL, in *Heraldry*. There are two *metals* uſed in heraldry, by way of colours, viz. gold and ſilver; in blazon called *or*, and *argent*.

In the common painting of arms, theſe *metals* are repreſented by white and yellow, which are the natural colour of thoſe *metals*.

In engraving, gold is expreſſed by dotting the coat, &c. all over; and ſilver, by leaving it quite blank.

It is a general rule in heraldry, never to place *metal* upon *metal*, nor colour on colour; ſo that, if the field be of one of the *metals*, the bearing muſt be of ſome colour, and *vice verſâ*; otherwiſe the arms are falſe: though this rule admits of ſome exceptions.

METALEPSIS, in *Rhetoric*, is a figure in which two or more tropes, and thoſe of a different kind, are contained under one word; ſo that ſeveral gradations, or intervening ſenſes, come between the word that is expreſſed, and the thing deſigned by it. Thus, when Sylla ſays of Julius Cæſar, *In one Cæſar there are many Marius's*. Suet. in Vit. c. 1. This is a *metalepſis*. So when Virgil, deſcribing that part of the African coaſt, where Æneas arrived with his ſhips, ſays, *a dark wood hung over it*. Æn. lib. i. ver. 165; and in the words of Dido, Æn. lib. iv. ver. 664, the ſame figure is uſed.

METALLIC, or METALLINE, an adjective applied to any thing that bears a relation to *metals*.

METALLIC *germination, mines, vegetation*, and *vitriols*. See the reſpective ſubſtantives.

METALLORUM *ovum, water*, and *ſulphur*. See the reſpective articles.

METALLURGY, the art of *metals*, that is, of preparing and working *metals*, from the globe or ore, to the uteníil. See MINERALOGY.

Metallurgy includes what relates to the finding of the metallic globe or ore in the mine; the judging of its kind and richneſs, or the proportion of metal therein; the digging or ſeparating it from the earth, and other matters; and the purifying and diſpoſing it into a complete, pure, malleable metal.

Boerhaave divides *metallurgy* into four parts. The firſt teaches how metals grow in the mines, how they are diſcovered, and how procured out of the ſame; the ſecond, how to ſeparate the metallic from the other matter of the ore; the third, how to reduce the ſeparated matter to its ſimplicity and ductility; the fourth, to work, gild, poliſh, and imitate the finer metals in the coarſer.

Dr. Shaw, however, reſtrains *metallurgy* to thoſe operations required to ſeparate metals from their ores, for the uſes of life. Theſe operations are of two kinds, or ſmaller and large; with regard to which the whole art of *metallurgy* may be divided into two parts, ASSAYING and SMELTING.

Dr. Cramer obſerves, that the art of aſſaying conſiſts in a well-made ſeparation of minerals, eſpecially metals, and in a diviſion of the ſeveral conſtituent parts of them from each other, in order that the quantity and quality of each in particular may be known: it is plain that thoſe operations which belong to the general claſs of ſolution, appertain ſtrictly and primarily to this; and that the others which are performed by the aſſayer, are only ſecondary or auxiliary operations. But there is hardly any chemical operation which is not ſometimes neceſſary to be performed in the art of aſſaying: there are many, on the contrary, which are peculiar to aſſaying alone; therefore we ſhall here give a general view of thoſe which properly belong to it; or of thoſe which, though taken from chemiſtry at large, are nevertheleſs uſed by aſſayers; only firſt obſerving that every primary docimaſtical operation may, on account of its effects, be called ſolution; ſince, in every operation, the menſtrua, among which the air and fire have a right to be claſſed, effect a ſolution, by interpoſing themſelves between the parts of the objects to be changed. See MENSTRUUM and FLUX.

Now a docimaſtical ſolution is either

- Dry
  - Fuſion.
  - Vitrification.
  - Scorification.
  - Cupelling.
  - Reduction. } Theſe may be called almoſt univerſal, becauſe they diſſolve either the whole metals, or, at leaſt, by much the greateſt part of the ſubject in hand.
  - Amalgamation.
  - Sublimation.
  - Cementation.
  - Roaſting.
  - Calcination. } We may call theſe partial, as they all diſſolve but one part of the ſubject in hand.
  - Liquation by fuſion.
- or
- Moiſt
  - Elutriation.
  - Edulcoration.
  - Quartation.
  - Moiſt precipitation. } All theſe are partial, and ſeparate ſome parts from the others.

An account of each of theſe may be found under their proper heads.

Dr. Shaw, after mentioning the manner of extracting metal from the ore, by aſſaying and ſmelting, gives ſeveral axioms and canons of *metallurgy*, among which are the following: that the art of aſſaying is hitherto imperfect, but capable of receiving conſiderable improvement from chemical and mechanical knowledge; that the troubleſome and expenſive method of ſeparating gold from ſilver by quartation, may be advantageouſly ſuperſeded,

or

or ſet aſide, by means of fuſion, or a dexterous management of the fire; that gold and ſilver are ſeldom rendered abſolutely pure, or ſeparated from all other kinds of metallic or mineral matters; and that to purify them in this manner requires the uſe of better methods than thoſe commonly uſed for that purpoſe; though the thing itſelf is ſtill performable by art and a ſuitable proceſs; that ſulphur has different effects upon different metals; which effects being well noted, rules of practice might thence be derived, for the farther improvement of *metallurgy*; that the ignobler metals are ſeparable from each other by the application of proper degrees of heat, ſo as to make the more fuſible melt away from the leſs fuſible, at leaſt with the aſſiſtance of lead; that all metals are reducible by burning or calcination, to terreſtrial powders, which, by being melted with any inflammable matter, aſſume their metallique form; that the great enemies to ductility, or the true metallic nature, are ſulphur, cobalt, and things compounded thereof; but that all unctuous or inflammable bodies are friendly to metals, and promote or reſtore their ductility, when melted therewith; that copper may be made to approach to the colour of gold, and at the ſame time not loſe, but increaſe its ductility, by being amalgamated with, and diſtilled from quickſilver; and that probably many artificial or compound metals are diſcoverable by mixing various metalline and mineral bodies together, ſo as greatly to enrich and improve the art of *metallurgy*; that, in general, ores are no more than a natural looſe mixture of metallic matter with earthy and ſulphureous ones; whence artificial ores may be readily made by calcining a metal with ſulphur, and mixing it with earth, ſo as with heat to form ſolid lumps of ore, reſembling thoſe dug out of the mines; and that numerous experiments remain to be made, and facts of nature or obſervations to be regiſtered, or the relations of bodies to be found, before this uſeful ſubject of *metallurgy* can be brought to perfection.

METAMORPHISTS, a ſect of heretics in the ſixteenth century, whoſe diſtinguiſhing tenet was, that the body of Jeſus Chriſt was, upon his aſcenſion into heaven, changed, and metamorphoſed into God.

METAMORPHOSIS, *Μεταμορφωσις*, formed of *μετα*, *change*, or removal from one place or ſtate to another, and *μορφη*, *form*, or *figure*, *transformation*; the change of a perſon or thing into another form.

The ancients held two kinds of *metamorphoſes*; the one real, the other apparent. The *metamorphoſis* of Jupiter into a bull, and of Minerva into an old woman, were only apparent. That of Lycaon into a wolf, and of Arachne into a ſpider, and the like, they ſay, were of the real kind.

Moſt of the ancient *metamorphoſes* include ſome allegorical meaning, relating either to phyſics or morality. Ovid's *Metamorphoſes* is a collection of hiſtories of ſuch transformations, poetically related. Some authors are of opinion, that a great part of the ancient philoſophy is couched under them; and Dr. Hook has made an attempt to unriddle and lay open the hidden meanings of ſeveral of them.

METAPEDIUM, in *Natural Hiſtory*, a name given by ſome authors to a kind of ſtone, called by others *metatarſum*, and ſuppoſed to imitate a human foot. It is only a *luſus naturæ* in the formation of a common pebble.

METAPHOR, Μεταφορα, *μεταφορα*, *tranſlation*, or *diſplacing*; of *μετα*, *trans*, and *φερω*, *I bear*, or *carry*, in *Rhetoric*, a figure of ſpeech, or a ſpecies of TROPE, whereby a word is transferred from its proper ſignification to another, different from it, by reaſon of ſome ſimilitude between them; or whereby the proper denomination of one thing is applied to another; which other thing is more elegantly explained by this tralatitious or foreign name, than by that which naturally belongs to it. As, when we ſay, the light of the underſtanding; to burn with zeal; to float between hope and deſpair, &c.

The *metaphor* is the moſt common of all the figures of ſpeech; and is that uſually meant, when we ſay a thing is ſpoken figuratively.

The *metaphor* is a ſhort ſimile; or, as Cicero calls it, a ſimilitude reduced to a ſingle word; an image being thereby called from its proper ſubject to give the reſemblance of another. An ALLEGORY is no more than a continued *metaphor*.

Quintilian ſays, that a *metaphor* is a ſhort ſimilitude, and differs from it only in this, that the former is compared to the thing we deſign to expreſs, and the latter is put for it. It is a ſimilitude, when I ſay of a man, he has acted like a lion; and a *metaphor*, when I ſay, he is a lion. But though *metaphors* are uſually taken from a ſimilitude between two things; yet ſometimes they are founded in the ſimilitude which two things bear to each other, in ſome particular reſpect, by means of which, what properly belongs to one of them is transferred to the other: the former of which are called ſimple *metaphors*, and the latter analogous. Hence the rudder of a ſhip may be called its reins; for what the reins are to a horſe, that the rudder is to a ſhip, in guiding and directing it. Again, ſome *metaphors* are reciprocal, in which the ſimilitude holds either way. Thus to ſteer and govern are uſed reciprocally, both of a ſhip and a ſtate; the proper expreſſions being to ſteer a ſhip, and govern a ſtate, and the contrary *metaphorical*. From this account, therefore, of the nature of *metaphors*, it may be defined, the application of a word by way of ſimilitude to ſome other thing than what it properly ſignifies.

Quintilian diſtinguiſhes *metaphors* into four kinds: the firſt, when a word is transferred from one animal to another; as when Livy ſays, that Cato uſed to *bark* at Scipio; or, when our Saviour calls Herod, *fox*. The ſecond, when the word is transferred from one inanimate to another; as *bridle*, for *tower*. The third, when inanimates are applied to animates; as the *flower* of youth. And the laſt, when animates are applied to inanimates; as the river *diſdaining* its bounds. And *metaphors* of this kind, which give life and action to inanimate things, are eſteemed the fineſt and ſtrongeſt.

As the *metaphor* is intended to ſet things before the eyes, it becomes ſo much the more perfect, as it ſhews them the more vividly, by repreſenting them in motion and action. Cicero, ſpeaking of a *metaphor*, calls it, the moſt florid manner of expreſſion, and brighteſt ornament of language, that conſiſts in ſingle words. A *metaphor* ſhould have nothing in it either courſe or ſhocking, or that may raiſe it above the ſimplicity of nature, ſo as to be forced and harſh; nor ſhould it appear a *metaphor* to any, but thoſe who view it very cloſely. A *metaphor* ſhould never be carried too far; for, in that caſe, it degenerates into puerility. *Metaphors* ſhould always be followed in the ſame kind; they become unnatural, when different images are introduced. In all *metaphorical* diction, there ſhould be a kind of ſuitableneſs to each other: different ideas are always abſurd; as in this inſtance, the church was beſieged with a deluge of troubles, where the two images, *ſiege* and *deluge*, have no relation.

There is nothing young writers are more faulty in, than the indiſcreet uſe of *metaphors*: thoſe who affect the marvellous, are eternally on the *metaphorical* ſtrain; nor know any bounds or reſtraint. They, who underſtand them beſt, uſe them with the greateſt reſerve. Mr. Addiſon propoſes it as a rule for writers, to imagine their *metaphors* actually painted before them, and to view and examine the juſtneſs of their application and aſſemblage under thoſe circumſtances; throwing every thing out of the writing, but what might be retained in the picture. Card. Perron preſcribes this general rule for *metaphors*, that they muſt always deſcend from the genus to the ſpecies; and never go backwards from the ſpecies to the genus: thus, we ſay figuratively, the *bonds of ſociety*, and not the *human cords* which tie us together; *bond* being a genus, and *cord* a ſpecies.

METAPHRAST, Μεταφραστης, a tranſlator, or perſon who renders an author in another form, or another language, word for word.

A *metaphraſe*, *μεταφρασις*, uſually ſignifies ſomething more than either a paraphraſe, or a tranſlation: according to Baillet, a *metaphraſt* implies a tranſlator, gloſſator, and interpolator, all at once.

METAPHYSICS, Μεταφυσικα, *tranſnaturalis*; a branch of ſcience, about whoſe nature and idea there is ſome difference among authors.

The word is formed from the prepoſition *μετα*, *trans*, *beyond* or *above*; and *φυσις*, *nature*, or *φυσικος*, *natural*.

Some define *metaphyſics*, that part of ſcience which conſiders ſpirits and immaterial beings; which others chooſe to diſtinguiſh by the name of PNEUMATICS.

Others, keeping cloſer to the etymology of the word, explain *metaphyſics* by *trans-natural*, or *præter-natural*, or even *poſt-natural philoſophy*: becauſe it is ſubſequent in contemplation to the phyſical, though prior to it in the real order of beings.

Others, with more propriety, conceive *metaphyſics* to be what ſome others call ONTOLOGY, or *ontoſophy*, i. e. the doctrine *de ente*, or of being, *quatenus* being.

In the ſame view, ſome philoſophers call this ſcience by the name *philoſophia*, or *ſcientia generalis*, as being the foundation, or, as it were, the ſtamen or root from whence all the other parts of philoſophy ariſe, and wherein they all meet; its object being *being* in the abſtract, or general, not reſtrained to this or that ſpecies of beings; not to ſpirit any more than body: ſo that the doctrines of *metaphyſics* are applicable to all beings whatever.

Philoſophers, again, are divided as to the notion of a ſcience *de ente* in general. Some hold it real, preciſe, and ſolid enough to be demonſtrated; but others judge it too

obſcure, faint, and confuſed, to be admitted into philoſophy.

Being, abſtracted from every ſort or ſpecies of being, is certainly a very vague term, and does not ſeem to give ſcope enough for a ſcience: we do not ſee how it can affect the mind as an object. Add, that the common *metaphyſics* cannot demonſtrate any part of its ſubject, but aſſume the whole: there are no principles or axioms, wherein to demonſtrate *metaphyſics*, which contain the principles of all other ſciences.

The firſt, who wrote profeſſedly on the ſubject of *metaphyſics*, is Ariſtotle. Indeed, he is the firſt who uſes the word: Μεταφυσικα, is the title of one of his books; but this ſome of his commentators will have to ſignify no more than *after the books of phyſics*. M. du Hamel, taking the prepoſition μετα in the ſenſe of *poſt*, is even of opinion, that the word was coined by Ariſtotle's followers; and that it was unknown to Ariſtotle himſelf.

Ariſtotle's *metaphyſics* ſeem to have been intended for a kind of natural theology. The *metaphyſics* of Ariſtotle have been lately illuſtrated by the ingenious Mr. Harris, in his treatiſe intitled, Philoſophical Arrangements, 8vo. 1775. F. Malebranche and Mr. Locke have written much more clearly, and conſiſtently of *metaphyſics*, than any of the ancients.

METAPHYSICAL, ſomething belonging to METAPHYSICS.

The word is alſo uſed to denote ſomething ſubtile, abſtract, and refined. In which ſenſe we ſay, Such a reaſoning, ſuch a proof, is too *metaphyſical*, &c.

A *metaphyſical* caſe is an imaginary or chimerical caſe, which can ſcarce ever happen, or not without much difficulty; and which ought not be laid down as a rule for common occaſions.

METAPHYSICAL *certitude, diſtinction, evidence, form, perfection, univerſality.* See the reſpective ſubſtantives.

METAPHYSICAL *ſect*, in the *Hiſtory of Learning*, is one of the two great ſects into which the philoſophical world was divided about the beginning of the ſeventeenth century. This ſect followed the ſyſtem of Des Cartes, and conſidered truth as attainable by abſtract reaſoning; and from a ſmall number of abſtract truths, deduced a long ſeries of propoſitions in order to arrive at a preciſe and accurate knowledge of God and nature, of body and ſpirit. The *metaphyſical* philoſophers, ſuppoſing that many things are known by man with the utmoſt certainty, diſcovered an undue propenſity to form their opinions and doctrines into a regular ſyſtem. The other ſect was the MATHEMATICAL. See CARTESIANS.

METAPLASM, METAPLASMUS, compounded of μετα, and πλασσω, *fingo*, in *Grammar*, a tranſmutation, or change, made in a word, by adding, retrenching, or altering, a letter or ſyllable thereof.

METAPTOSIS, a word uſed by many phyſical writers to expreſs a change of one diſtemper into another, whether it be by *diadoche* or *diadoxis*, as it is called; when the change is for the better, and the morbid matter removes from a more noble to an ignoble part: or by *metaſtaſis*, when the change is for the worſe, and the morbid matter removes from an ignoble to a more noble part.

METASTASIS, Μεταστασις, in *Medicine*, the removal of a morbid humour from one part to another; frequently obſerved in nervous caſes.

A *metaſtaſis*, or tranſlation, is ſometimes alſo found in the groſſer humours; the refluent blood taking up digeſted matter from one part, and diſpoſing it upon another.

METASTASIS, Μεταστασις, *remotio*, in *Rhetoric*, is uſed for the removing the blame from the perſon accuſed to another perſon, or laying it upon ſomething as a cauſe. Thus Adam's excuſing himſelf by blaming Eve, is an example of the former; and the laying the crime of drunkenneſs upon the wine, is an inſtance of the latter.

METATARSIUS, a fleſhy maſs lying under the ſole of the foot, fixed by one end in the fore-part of the great tuberoſity of the os calcis, and that, running forward from thence, terminates in a kind of ſhort tendon, which is fixed in the tuberoſity, and poſterior part of the lower ſide of the fifth bone of the *metatarſus*. It may move this bone, much after the ſame manner as the metacarpius moves the fourth bone of the metacarpus. Winſlow.

METATARSUM, in *Natural Hiſtory*, a name given by authors to a ſort of ſtone, ſuppoſed to repreſent a human foot. See METAPEDIUM.

METATARSUS, from μετα, *beyond*, and ταρσος, *the inſtep*, in *Anatomy*, that part of the human ſkeleton, containing the middle of the foot. See *Tab. Anat. (Oſteol.) fig.* 3. *n.* 30. *fig.* 7. *lit. e.*

The *metatarſus* conſiſts of five bones, reaching from the heel to the toes; whereof that, which ſuſtains the great toe, is the thickeſt; and that, which ſuſtains the next toe, the longeſt: the reſt grow each ſhorter than the other. They are longer than the bones of the metacarpus; in other things they are like them, and are articulated to the toes, as theſe are to the fingers.

METATHESIS, Μεταθεσις, formed of μετα, *trans*, and θεσις, *poſition*, *tranſpoſition*, a grammatical figure, whereby letters or ſyllables of a word are tranſpoſed, or ſhifted out of their natural ſituation; as *Evander* for *Evander*; *I præ* for *præ*.

METATHESIS, a word uſed by medical writers for a change of place in ſuch humours, or other diſeaſed parts, as cannot be abſolutely removed or ſent off. Thus a *metatheſis* of a cataract is a depreſſion thereof, ſo that it no longer ſhuts out the light.

METATOR, among the Romans, a quarter-maſter. Out of every legion a tribune, and ſome centurions, were appointed to go before the army, in order to chooſe a place for a camp, and aſſign and mark out quarters to each legion.

METAXA, a word uſed by ſome medical writers to expreſs ſilk.

METEGAVEL, in our *Old Writers*, a tribute or rent paid in victuals; which was a thing uſual in this kingdom, as well with the king's tenants as others, till the reign of king Henry the Firſt.

The word is Saxon, *metegavel*, i. e. *cibi gabulum, ſeu vectigal.*

METEL, in *Natural Hiſtory*, the name of a ſort of *nux vomica*, of the ſame ſhape with the common kind, but ſomewhat larger.

METEMPSYCHI, in *Church Hiſtory*, heretics, who, in imitation of the Pythagoreans, maintained the tranſmigration of ſouls. See METEMPSYCHOSIS.

METEMPSYCHOSIS, Μετεμψυχωσις, formed of μετα, *beyond*, and ψυχωσις, *animation*, or *enlivening*, in the *Ancient Philoſophy*, the paſſage or tranſmigration of the ſoul of a man, after death, into the body of ſome other animal.

Pythagoras and his followers held, that, after death, men's ſouls paſſed into other bodies, of this or that kind, according to the manner of life they had led. If they had been vicious, they were impriſoned in the bodies of miſerable beaſts, there to do penance for ſeveral ages; at the expiration whereof, they returned afreſh to animate men. But, if they had lived virtuouſly, ſome happier brute, or even a human creature, was to be their lot.

What led Pythagoras into this opinion was, the perſuaſion he had, that the ſoul was not of a periſhable nature: whence he concluded, that it muſt remove into ſome other body, upon its abandoning this. Lucan treats this doctrine as a kind of officious lye, contrived to mitigate the apprehenſion of death, by perſuading men, that they only changed their lodging; and only ceaſed to live, to begin a new life.

Reuchlin denies this doctrine; and maintains, that the *metempſychoſis* of Pythagoras implied nothing more than a ſimilitude of manners, deſires, and ſtudies, formerly exiſting in ſome perſon deceaſed, and now revived in another alive. Thus, when it was ſaid, that Euphorbus was revived in Pythagoras, no more was meant than that the martial virtue, which had ſhone in Euphorbus at the time of the Trojan war, was now, in ſome meaſure, revived in Pythagoras, by reaſon of the great reſpect he bore the athletæ. For thoſe people wondering how a philoſopher ſhould be ſo much taken with men of the ſword, he palliated the matter, by ſaying, that the ſoul of Euphorbus, i. e. his genius, diſpoſition, and inclinations, were revived in him. And this gave occaſion to the report, that Euphorbus's ſoul, who periſhed in the Trojan war, had tranſmigrated into Pythagoras.

Ficinus aſſerts, that what Plato ſpeaks of the migration of a human ſoul into a brute, is intended allegorically, and is to be underſtood only of the manners, affections, and habits, degenerated into a beaſtly nature by vice. Serranus, though he allows ſome force to this interpretation, yet inclines rather to underſtand the *metempſychoſis* of a reſurrection.

Pythagoras is ſaid to have borrowed the notion of a *metempſychoſis* from the Egyptians; others ſay, from the ancient Brachmans. It is ſtill retained among the BANIANS, and other idolaters, of India and China; and makes the principal foundation of their religion. So extremely are they bigotted to it, that they not only forbear eating any thing that has life, but many of them even refuſe to defend themſelves from wild beaſts. They burn no wood, leſt ſome little animalcule ſhould be in it; and are ſo very charitable, that they will redeem, from the hands of ſtrangers, any animals that they find ready to be killed. See PYTHAGOREANS.

METEMPTOSIS, from μετα, *poſt*, and πιπτω, *to fall*, a term in *Chronology*, expreſſing the ſolar equation, neceſſary to prevent the new moon from happening a day too late.

By which it ſtands contradiſtinguiſhed from *præmptoſis*, which ſignifies the lunar equation, neceſſary to prevent the new moon from happening a day too ſoon.

The

The new moons running a little backwards, that is, coming a day too soon at the end of three hundred and twelve years and a half; by the *proemptosis*, a day is added every three hundred years, and in three every two thousand four hundred years; on the other hand, by the *metemptosis*, a biſſextile is ſuppreſſed each one hundred thirty-four years: that is, three times in four hundred years. Theſe alterations are never made but at the end of each century; that period being very remarkable, and rendering the practice of the calendar eaſy.

There are three rules for making this addition, or ſuppreſſion, of the biſſextile-day, and, by conſequence, for changing the index of the epacts. 1. When there is a *metemptosis* without a *proemptosis*, the next following, or lower index, muſt be taken. 2. When there is a *proemptosis* without a *metemptosis*, the next preceding or ſuperior index is to be taken. 3. When there are both a *metemptosis* and a *proemptosis*, or when there is neither the one nor the other, the ſame index is preſerved. Thus, in 1600, we had D; in 1700, by reaſon of the *metemptosis*, C was taken; in 1800, there will be both a *proemptosis* and a *metemptosis*; ſo the ſame index will be retained. In 1900, there will be a *metemptosis* again, when B will be taken, which will be preſerved in 2000, becauſe there will then be neither the one nor the other. This is as far as we need compute for it: but Clavius has calculated a cycle of 301800 years; at the end of which period, the ſame indices return in the ſame order. See EPACT.

METEOR, in *Phyſiology*, a changeable, moveable, imperfect mixt body, or reſemblance of a body, appearing in the atmoſphere, formed out of the matter that floats there, and exhibiting various appearances.

The Greeks call them, μετεωρα, q. d. *ſublimia*, or *highraiſed*, from μετα, and αειρω, *pro* αιωρω, from αειρω *tollo*; the Latins, *impreſſiones*, as making ſigns or impreſſions in the air.

Meteors are of three kinds:

METEORS, *igneous* or *fiery*; ſuch are lightning, thunder, the Aurora borealis, ignis fatuus, draco volans, falling ſtars, and other fiery phenomena, appearing in the air.

METEORS, *aerial*, or *airy*, conſiſt of flatulent and ſpirituous EXHALATIONS; ſuch are winds, whirlwinds, and hurricanes.

METEORS, *aqueous*, or *watery*, are compoſed of vapours, or watery particles variouſly ſeparated, and condenſed by heat and cold; ſuch are clouds, rainbows, hail, ſnow, rain, dew, and the like. See each in its proper place.

The formation of *meteors* is explained pretty largely by Deſcartes, in a treatiſe expreſs. Ariſtotle and Gaſſendus have alſo handled the ſame ſubject. Dr. Woodward's opinion is, that the matter of many *meteors* is, in great meaſure, of a mineral nature; that the mineral particles, contained in the ſtrata of the earth, are raiſed by the ſubterraneous heat, together with the vapours aſcending from the abyſs, and pervading thoſe ſtrata; eſpecially at ſuch times as the ſun's heat is ſufficient to penetrate the exterior parts of the earth, and to make room for their eſcape into the atmoſphere. Theſe ſulphureous, nitrous, and other active and volatile mineral particles, form various *meteors*, according to the various circumſtances attending their combination. The nature, cauſes, &c. of each are explained under its diſtinct article.

METEOROLOGICAL *journal*, is a table recording the daily ſtate of the air, exhibited by the barometer, thermometer, hygrometer, anemometer, and other *meteorological* inſtruments. We have many journals of this kind, kept at the houſe of the Royal Society, and by different obſervers in other places, in the Philoſophical Tranſactions, the Memoirs of the Academy of Sciences, and ſimilar publications.

METEOROLOGY, the doctrine of meteors; explaining their origin, formation, kinds, phenomena, &c.

METEOROMANCY, a ſpecies of divination by meteors, principally by lightning and thunder: this method of divination paſſed from the Tuſcans to the Romans, with whom, as Seneca informs us, it was held in high eſteem.

METEOROS, μετεωρος, from μετα, and αειρω, *to elevate*, in *Medicine*, elevated, ſuſpended, ſublime, erect, tumid. Thus μετεωρα πλευμαθα, are expounded by Galen, Com. ad Aph. 7. lib. vi. ſublime pains: thoſe which are above the peritonæum, or affect the ſuperficial and external parts of the body. Theſe pains are oppoſed to ſuch as are deeply ſeated, and called τα μη μετεωρα, not ſublime, but deep, and ſeated within the peritonæum.

METEOROSCOPE, from μετεωρος, *high*, and σκοπεω, of σκοπομαι, *I view, obſerve*, a name which the ancient mathematicians gave to ſuch inſtruments as they uſed for obſerving and determining the diſtances, magnitudes, and places of the heavenly bodies; many of which they regarded as meteors.

The name, however, may much more properly be applied to METEOROLOGICAL inſtruments.

METESSIL, an officer of the eaſtern nations, who has the care and overſight of all the public weights and meaſures, and fees that things are made juſtly according to them.

METHEGLIN, a drink prepared of honey; one of the moſt pleaſant and general drinks in the northern parts of Europe afford; and much uſed among the ancient inhabitants.

The word is Welſh, *meddyglin*, where it ſignifies the ſame. There are divers ways of making it; one of the beſt whereof follows: put as much new honey, naturally running from the comb, into ſpring-water, as that, when the honey is throughly diſſolved, an egg will not ſink to the bottom, but be juſt ſuſpended in it; boil this liquor for an hour, or more, till ſuch time as the egg ſwim above the liquor about the breadth of a groat; when very cool, next morning, it may be barrelled up, adding to each fifteen gallons an ounce of ginger, as much of mace and cloves, and half as much cinnamon, all groſly pounded; a ſpoonful of yeaſt may be alſo added at the bung-hole, to promote the fermentation. When it has done working, it may be cloſely ſtopped up; and, after it has ſtood a month, it ſhould be drawn off into bottles.

The duty on *metheglin*, ſold by retail or otherwiſe, is 11*d.* a gallon. See MEAD.

METHOD, METHODUS, from μεθοδος, in *Logic* and *Rhetoric*, the art or rule of diſpoſing things in ſuch a manner, as that they may be eaſily comprehended; either in order to diſcover the truth, which we ourſelves are ignorant of; or to ſhew and demonſtrate it to others when known, or to fix it in the memory. See DISPOSITION.

Gaſſendus diſtributes *method*, with regard to its object, into three kinds, or branches, viz. inventionis, *the method of invention*, or diſcovering a truth unknown.

Methodus judicii, the method of judging or determining of a truth, or propoſition, propoſed.

And *methodus demonſtrationis*, or method of demonſtration; that is, of exhibiting it to another.

Method is diſtributed by others into two general kinds, viz. *natural* and *arbitrary*. *Natural method* is that which obſerves the order of nature, and proceeds in ſuch a manner, as that the knowledge of things which follow depends in a great meaſure on the things which go before. *Arbitrary method* leaves the order of nature, and accommodates itſelf to many purpoſes: as to treaſure up things, and retain them in the MEMORY; to harangue and perſuade mankind to any practice in the religious or civil life; or to delight, amuſe, or entertain the mind. This kind of *method* is chiefly purſued in poetry and oratory.

Natural method is again ſubdivided into two kinds; the one of *reſolution*, which is that we generally uſe in our enquiry after truth. The other of *compoſition*, by which the truth, once found, is taught or imparted to others.

In the *method of reſolution*, called alſo by geometers the *analytic method*, we proceed from ſome general known truths to others, which belong to ſome particular or ſingular thing.

In the *method of compoſition*, called alſo the *ſynthetic method*, we propoſe ſome certain general truths, from which we produce particular truths.

If, in the *method* of reſolution, we lay down any axioms, it is not immediately in the beginning, and all together, but as they are found neceſſary in the diſquiſition: on the contrary, in the *method* of compoſition, they are propoſed all together in the beginning, before there is any abſolute need of them.

The two *methods* differ from each other, as the *methods* of ſearching out a genealogy, either by deſcending from the anceſtors to their poſterity, or by aſcending from the poſterity to the anceſtors: both of them have this in common, that their progreſſion is from a thing known to another unknown. Thoſe things, that are known in each, are ſet in the front, or firſt place, that by them we may be able to arrive at thoſe which are not known.

Dr. Watts, in his excellent Treatiſe on Logic, has compriſed the general requiſites of true *method* in the purſuit or communication of knowledge, under the following heads. It muſt be 1. Safe or ſecure from error: in order to which great care ſhould be uſed in laying the foundations of a diſcourſe, or the ſcheme of our thoughts, on any ſubject; the primary and fundamental propoſitions ſhould not only be evident and true, but made familiar to the mind by dwelling on them before we proceed farther; our ground ſhould be made firm in every ſtep; and we ſhould draw up all our propoſitions and arguments with ſo much caution, and expreſs our ideas with ſuch a juſt limitation, as may preclude or anticipate any objections. 2. Plain and eaſy: for which purpoſe, we ſhould begin always with thoſe things that are beſt known and moſt obvious, and proceed by regular and eaſy ſteps to

things that are more difficult; nor should we affect excessive haste in learning or teaching any science, nor hurry at once into the midst of it; nor again crowd too many thoughts and reasonings into one sentence or paragraph, beyond the apprehension or capacity of our readers or hearers; we should also avoid too many subdivisions; and acquire in early life, a clear and easy way of expressing our conceptions. 3. Distinct: in order to which no needless heterogeneous matter should be introduced; every complicated theme or idea should be divided into its distinct single parts, as far as the nature of the subject, and our present design require; we should call every idea, proposition, and argument, to its proper class, and keep each part of the subject in its own place; and in the partition of our discourse into distinct heads, take heed that particulars do not interfere with the general, nor with each other. 4. Full, or without defect: and this is necessary in explaining a subject; in enumerating its parts or properties; in asserting or proving any truth; in illustrating or arguing a point of difficulty; in drawing up a narrative; and in solving any difficulty. 5. Short, or without superfluity: for this purpose, all needless repetitions, tedious prolixity, long parenthesis, useless explications, proofs, and refutations, and all scholastic forms, should be carefully avoided. 6. Proper to the subject, the design, and the age and place in which we dwell. 7. Connected: in order to this, we should keep our main design always in view, and preserve an apparent tendency in all the parts of our discourse towards it; the mutual relation and dependence of the several branches of our discourse should be so just and evident, that every part may lead onward to the next; and we should acquaint ourselves with all the proper and decent forms of transition from one part of a discourse to another, and practise them as occasion offers.

The *synthetic method* is only practicable in things, whose principles we perfectly know; as in geometry, which is wholly employed in the consideration of abstract modes, of which our mind has clear and adequate ideas. When the inquiry is into substances, as in physics, we cannot make use of the *method of composition*, because their kinds and intimate essences are unknown to us.

This *method* has not been by any so justly and accurately observed, as by the mathematicians, whose principles are perfectly known; its laws, therefore, will be best drawn from their practice: for which, see COMPOSITION.

The supreme law of the philosophical *method* is, to premise that which is necessary towards the understanding or establishing what follows.

The mathematical and philosophical *methods* are the same, as may be seen by the practice of the geometers of antiquity, who constantly observe the law here mentioned.

Several authors, as Ramus, Messrs. de Port-Royal, &c. have accused Euclid of want of *method*. Had these gentlemen attended to the supreme law of all true *method*, they would have been more cautious in their censures.

METHOD, *methodus*, is more particularly used, in *Mathematics*, for divers particular processes for solving problems. In this sense we say

METHOD *of exhaustions*. See EXHAUSTIONS.

METHOD *of fluxions*. See FLUXIONS.

METHOD *de maximis & minimis*, &c. See MAXIMUM.

METHOD *of tangents*. See TANGENTS.

METHOD, *differential*, &c. See DIFFERENTIAL.

METHOD, *exponential*, &c. See EXPONENTIAL.

METHOD, *peristic*. See PORISTIC.

METHODISTS, in *Botany*, persons who have attempted that study upon certain principles, and have bestowed their labours upon the disposition and arrangement of plants, and allotting them proper and distinctive names. See BOTANY.

METHODISTS, in *Ecclesiastical History*, is a denomination applied to different sects, both papists and protestants. The popish *Methodists* were those polemical doctors, of whom the most eminent arose in France towards the middle of the seventeenth century, in opposition to the Huguenots or protestants. The *Methodists*, from their different manner of treating the controversy with their opponents, may be divided into two classes. The one may comprehend those doctors, whose method of disputing with the protestants was disingenuous and unreasonable, and who followed the examples of those military chiefs, who shut up their troops in intrenchments and strong holds, in order to cover them from the attacks of the enemy. Of this number were the Jesuit Veron, who required the protestants to prove the tenets of their church by plain passages of scripture, without being allowed the liberty of illustrating those passages, reasoning upon them, or drawing any conclusions from them; Nihusius, an apostate from the protestant religion; the two Walenburgs, and others, who confined themselves to the business of answering objections and repelling attacks; and cardinal Richelieu, who confined the whole controversy to the single article of the divine institution and authority of the church. The *Methodists* of the second class were of opinion, that the most expedient manner of reducing the protestants to silence, was not to attack them by piecemeal, but to overwhelm them at once, by the weight of some general principle or presumption, some universal argument, which comprehended, or might be applied to all the points contested between the two churches: thus imitating the conduct of those military leaders, who, instead of spending their time and strength in sieges and skirmishes, endeavoured to put an end to the war by a general and decisive action. These polemics rested the defence of popery upon prescription; the wicked lives of protestant princes who had left the church of Rome; the crime of religious schism; the variety of opinions among protestants, with regard to doctrine and discipline; and the uniformity of the tenets and worship of the church of Rome. To this class belong Nicolle, the Jansenist doctor, the famous Bossuet, &c. Moth. Eccl. Hist. vol. iv p. 307, &c. 8vo.

The protestant *Methodists* form a very considerable class, principally of the lower people in this country. They sprung up about fifty years ago, at Oxford, and were soon divided into two parties, the one under the direction of Mr. George Whitefield, and the other under that of the two brothers, John and Charles Wesley. These leaders, and, if we except Mr. William Law, founders of *Methodism*, were educated at Oxford, and received episcopal ordination; and always professed themselves advocates for the articles and liturgy of the established church: though they more commonly practised the dissenting mode of worship. But conceiving a design of forming separate communities, superior in sanctity and perfection to all other Christian churches, and impelled to a very considerable degree by a zeal of an enthusiastic and extravagant kind, they became itinerant preachers, and, being excluded from most of our churches, exercised their ministry in private houses, fields, &c. not only in Great Britain and Ireland, but also in America: thus collecting a very considerable number of hearers and proselytes, both amongst the members of the established church and the dissenters. The theological system of Mr. Whitefield and his followers is Calvinistic: that of Mr. Wesley and his disciples Arminian; and the latter maintains the possibility of attaining sinless perfection in the present state. The subordinate teachers of both these classes of *Methodists* are generally men of no liberal education, and they pretend to derive their ministerial abilities from special communications of the spirit. The *Methodists* of both parties, like other enthusiasts, make true religion to consist principally in certain affections and inward feelings, which it is impossible to explain, but which, when analysed, seem to be mechanical in their spring and operation, and they generally maintain, that Christians will be most likely to succeed in the pursuit of truth, not by the dictates of reason, or by the aids of learning, but by laying their minds open to the direction and influence of divine illumination: and their conduct has been directed by impulse.

METHODISTS, METHODICI, in the *History of Medicine*, a sect of ancient physicians, who reduced the whole art of healing to a few common principles or appearances.

The *Methodists* were the followers of Thessalus; whence they were also called *Thessalici*. They were strenuously opposed by Galen in several of his writings; who scrupled not to assert, that the *methodical sect* ruined every thing that was good in the art.

Quincy mistakenly uses *Methodists*, *Methodici*, for those physicians, who adhere to the doctrine of Galen, and the schools; and who cure with bleedings, purges, &c. duly applied according to the symptoms, circumstances, &c. in opposition to empirics and chemists, who use violent medicines, and pretended secrets or nostrums.

METHONICA, in *Botany*. See *Superb* LILY.

METOCHE, *Μετοχη*, in the *Ancient Architecture*, a term used by Vitruvius, to signify the space or interval between the dentils. See *Tab. Archit. fig.* 28. See DENTICLES.

Baldus observes, that, in an ancient MS. copy of that author, the word *metatome* is found for *metoche*. Hence Daviler takes occasion to suspect, that the common text of Vitruvius is corrupted: and concludes, that it should not be *metoche*, but *metatome*, q. d. section.

METONIC *cycle*, in *Chronology*. See CYCLE, and *Golden* NUMBER.

METONYMY, *Μετωνυμια*, from *μετα*, *trans*, and *ονομα*, *nomen*, *name*; a rhetorical trope, consisting in a transmutation or change of names; or a putting of the effect for the cause, or the subject for the adjunct; and *vice versâ*. The *metonymy* is the most considerable of all the tropes, next

next to a METAPHOR, whether we conſider its force and elegancy, or the frequent uſe of it both in ſpeaking and writing. It is ſometimes alſo called *tranſnominatio*, and differs not much from the HYPALLAGE.

There are four kinds of *metonymies* in principal uſe: the firſt, when we put the inventor for the thing invented; as Bacchus for wine, Ceres for bread. The ſecond, when the effect is put for the cauſe, whether the agent, or only the means and inſtrument: thus Virgil, Æn. vi. v. 844. calls the two Scipios, the deſtruction of Libya, becauſe they were the agents who effected it; and Horace, Carm. i. 1. 2. compliments Mæcenas with the titles of being his guard and honour, that is, his guardian and the author of his honour: and the author is put for his works. The third, when the ſubject is put for the adjunct. By ſubject here in a large ſenſe of the word, may be underſtood that, wherein ſome other thing is contained, or about which it is converſant; as likewiſe the poſſeſſor with reſpect to the thing he poſſeſſes, and the thing ſignified when put for the ſign of it: thus, in the firſt of theſe ways, the ſeat of any faculty or affection is put for the faculty or affection itſelf; as in the phraſes, a man of a clear head or of a warm heart: the place, where any actions are performed, is put for the actions done in it; the country or place of reſidence for the inhabitants; the time for the perſons living in it: in the ſecond way, the object is uſed for the perſon, or thing employed about it: as when Cicero, pro Mil. cap. 4. ſays, in time of battle, the laws, i. e. the judges, are ſilent. By the third way, we ſay to deſtroy or ruin a man, meaning not his perſon but his eſtate. In the laſt way, ſtatues and pictures are called by the names of the perſons which they repreſent.

The fourth kind of *metonymy* is that in which the adjunct is put for the ſubject, which is done in the ſame variety of ways as the former.

Voſſius adds two other ſpecies of *metonymy*, viz. of the antecedent and the conſequent, which bear ſome analogy to the cauſe and effect, as the one does at leaſt give occaſion to the other. By the former, to hear, when ſpoken of a ſuperior, ſometimes ſignifies to grant or comply with: by the latter, it is not unuſual to ſay, I ſubſcribe, or ſet my hand to ſuch a thing, meaning that we aſſent or agree to it, &c.

METOPE, or METOPA, in *Architecture*, the ſquare ſpace or interval between the triglyphs, in the Doric frieze. See *Tab. Archit. fig.* 25. N° 9.

The word, in the original Greek, ſignifies the diſtance between one aperture, or hole, and another, or between one triglyph and another; the triglyphs being ſuppoſed to be ſolives or joiſts that fill the apertures. It is derived from μετὰ, *inter*, *between*, and ὀπὴ, *foramen*.

The ancients uſed to adorn theſe parts with carved works, or paintings, repreſenting the heads of oxen, veſſels, baſons, and other utenſils of the heathen ſacrifices.

As there is found ſome difficulty in diſpoſing the triglyphs and *metopes* in that juſt ſymmetry which the Doric order requires; ſome architects make it a rule, never to uſe this order but in temples.

METOPE, *ſemi*, is a ſpace ſomewhat leſs than half a *metope*, in the corner of a Doric frieze.

Le Clerc obſerves, that the beauty of *metopes* conſiſts in their regularity, on appearing to be perfect ſquares; and yet when they are equally ſquare, they appear to be leſs in height than in breadth, on account of the projecture of the little bandelet; for which reaſon they ſhould be made a minute or two more in height than in breadth, in order to make their appearance uniform.

He alſo obſerves, that when the triglyphs and *metopes* follow each other regularly, the columns muſt only ſtand one by one; excepting thoſe of the inner angles, which ought always to be accompanied by two others, one on each ſide; and here it is worth remarking, that theſe two columns which accompany that of the angle, are not leſs neceſſary on account of the ſolidity of the building, than of the regularity of the intercolumniations.

METOPIUM, in *Botany*, a name given by Pliny to the plant which produces the gum ammoniacum. He ſays that the ancient Greeks called it alſo by this name, but in that he errs. See AMMONIAC.

METOPOSCOPY, Μετωποσκοπία, from μέτωπον, *frons*, *forehead*, and σκοπία, *inſpection*, of σκοπέω, *I view*, the art of diſcovering the temperament, inclinations, and manners of perſons, by inſpecting their features, and the lines in their faces, and eſpecially of their foreheads.

Metopoſcopy, is no more than a branch of phyſiognomy; the latter taking its conjectures from all parts of the body: but both the body and the branch are extremely precarious, not to ſay vain.

Ciro Spontoni, who has written on the ſubject of *metopoſcopy*, obſerves, that there are ſeven principal lines to be conſidered in the forehead; each of which has its peculiar planet. The firſt is the line of Saturn, the ſecond of Jupiter, &c.

METRE, or METER, *Metre*, in *Poetry*, denotes a ſyſtem of feet of a juſt length. Ariſtides defines *metre*, a ſyſtem of feet compoſed of diſſimilar ſyllables, of a juſt extent. In which ſenſe *metre* amounts to much the ſame with genus carminis, or the ſort of verſe, and differs from rhythm.

METRENCHYTES, a name given by chirurgical writers to a ſort of ſyringe, contrived on purpoſe for injecting medicinal ſubſtances into the womb.

METRETES, the name of a meaſure uſed among the ancients, containing ſomewhat more than nine gallons.

METRICAL *verſes* are thoſe conſiſting of a determinate number of long and ſhort ſyllables; as thoſe of the Greek and Latin poets.

Capellus obſerves, that the genius of the Hebrew language is incompatible with *metrical* poetry.

METRICE, or METRICA, among the *Ancients*, was that part of poetry employed about the quantities of ſyllables, feet, ſorts of metre, or verſe, &c.

METROCOMIA, from μήτηρ, *mother*, and κώμη, *town*, or *village*, a term in the *Ancient Church Hiſtory*, ſignifying a borough, or village, that had other villages under its juriſdiction.

What a metropolis was among cities, a *metrocomia* was among country towns. The ancient *metrocomiæ* had each its chorepiſcopus or rural dean, and here was his ſee or reſidence. See METROPOLIS and CHOREPISCOPUS.

METRONOMI, Μέτρονομοι, among the Athenians, officers that inſpected all ſorts of meaſures, except thoſe of corn; there were five of them in the city, and double that number in the Pyræus, in which the greateſt mart in Attica was kept.

METROPOLIS, Μητρόπολις, from μήτηρ, *mother*, and πόλις, *city*; the *mother-city*, &c. the capital of a country, or province: or the principal city, and, as it were, mother of all the reſt.

METROPOLIS is alſo applied to archiepiſcopal churches, and ſometimes to the principal or mother-church of a city.

The Roman empire having been divided into thirteen dioceſes, and one hundred and twenty provinces, each dioceſe, and each province, had its metropolis, or capital city, where the proconſul, or the vicar of the empire, had his reſidence.

To this civil diviſion the eccleſiaſtical was afterwards adapted, and the biſhop of the capital city had the direction of affairs, and the pre-eminence over all the biſhops of the province. His reſidence in the *metropolis* gave him the title of *metropolitan*.

This erection of *metropolitans* is referred to the end of the third century, and was confirmed by the council of Nice. Indeed archbiſhop Uſher, and De Marca, maintain it to be an eſtabliſhment of the apoſtles; but in vain: for it is next to certain, that the eccleſiaſtical government was regulated on the plan of the civil; and that it was hence the name and authority of *metropolitans* were given to the biſhops of the capital cities of the empire, or the provinces that compoſed it. This is ſo true, that, in the conteſt between the biſhop of Arles and the biſhop of Vienne, each of whom laid claim to the *metropolitanſhip* of the province of Vienne, the council of Turin appointed, that whichever of them could prove his city to be the civil metropolis, ſhould enjoy the title and rights of eccleſiaſtical *metropolitan*.

Nothing is more evident than the perfect equality that reigned among the primitive churches; nor does there even appear, in the firſt century, the ſmalleſt trace of that aſſociation of provincial churches, from which, ſays Moſheim, councils and *metropolitans* derive their origin. The order and decency of thoſe aſſemblies which were called councils, and introduced towards the cloſe of the ſecond century, required, ſays this author, that ſome one of the provincial biſhops met in council, ſhould be inveſted with a ſuperior degree of power and authority; and hence, he adds, the rights of *metropolitans* were derived. See PATRIARCHS.

Though the eccleſiaſtical government, however, was modelled on the political, yet, in Gaul, and ſome other countries, the diſtinctions of *metropolitan* and primate were not obſerved till very late. As the præfectus Galliæ reſided by turns at Trevoux, Vienne, Arles, and Lyons, he communicated the rank and dignity of *metropolitan* and primate to each of them in their turn; and yet none of the Gallican biſhops aſſumed to themſelves the rights, nor even the precedence, of *metropolitans*. The epiſcopate levelled them all, and they had no regard but to the privileges of ſeniority. This equality laſted till the fifth century, when the conteſt between the biſhops of Vienne and Arles was ſet on foot.

M. Du

M. Du Pin obſerves, that, in the provinces of Africa, excepting thoſe whereof Carthage was the *metropolis*, the place where the moſt aged biſhop reſided became the *metropolis*: the reaſon of which, without doubt, was this, that neither the proconſul, nor præfectus, ever fixed their reſidence any where.

The ſame author obſerves, alſo, that, in Aſia, there were *metropoliſes* merely nominal; that is, which had no ſuffragan, nor any rights of *metropolitans*. The biſhops of Nice, Chalcedon, and Berytus, had the precedence of the other biſhops, and the title of *metropolitans*, but this without any other prerogative beſides the honour of the appellation; they themſelves being ſubject to their *metropolitans*.

A *metropolitan* has the privilege of ordaining his ſuffragans; and appeals from ſentences paſſed by the ſuffragans are preferred to the *metropolitan*. See ARCHBISHOP.

METROPTOSIS, a word uſed by ſome medical authors to expreſs a falling down of the womb, or prolapſus uteri. There is a plaſter calculated to be of ſervice againſt this caſe, and called, hence, *emplaſtrum metroptoticum*.

METTESHEP, or METTENSCHEP, in our old writers, an acknowledgment paid in a certain meaſure of corn; or a fine or penalty impoſed on tenants, for defaults in not doing their cuſtomary ſervices of cutting the lord's corn.

METUPORANGA, in *Ornithology*, the name of a Braſilian bird, called by ſome *tapetotil*, and by Aldrovand by the too general name *gallus Indicus*.

It much approaches to the gallinaceous fowls, called *mitu* and *pauxi*, of the ſame country, but differs from them in having no tail, if the deſcriptions of authors are accurate, and from the *mitu* in having a protuberance of the ſize of a cherry over the top of its beak. Margrave.

METYS, a word uſed by many of the ancient writers to expreſs a ſubſtance collected by bees, in order to the ſtopping up cracks and crevices in their hives.

The old authors mention three kinds of ſubſtances uſed by the bees on this occaſion, the *metys*, *piſſiceros*, and *propolis*. The moderns uſe only the latter term to expreſs every thing of this kind. The *metys* and *piſſoceros* ſeeming to have been only the ſame PROPOLIS, more or leſs mixed with wax. This ſubſtance is a reſin, of a middle conſiſtence between the hard and the fluid ones. It is uſually of a reddiſh brown on the ſurface, and yellow within, and is collected from ſeveral trees, of which the poplar ſeems to be the principal, and the willow the next.

MEU, in *Botany*. See SPIGNEL.

MEVELEVITES, in *Modern Hiſtory*, a ſort of derviſes, or religious, among the Turks, ſo called from Mevelevia, their founder. They affect to be very patient, humble, modeſt, and charitable; but in reality are very debauched and diſhoneſt.

MEVIUM, a name mentioned by Fallopius and others, as given by ſome medical writers to the venereal diſeaſe.

MEUM, in *Botany*. See SPIGNEL.

MEUTANG, in *Botany*, the name of a flower much eſteemed by the Chineſe, which, on that account, they call the king of flowers. It is larger than our roſe, and imitates its figure, only its leaves are more expanded. As its ſmell comes ſhort of that of the roſe, ſo in beauty the roſe is outdone by it. It has no prickles, and its colour is a mixture of white with purple, but ſo as to incline moſt to white; yet ſometimes there are found reddiſh and yellow ones. The tree it grows on is not unlike our alder-tree, and is cultivated throughout that large empire with great care, being covered in the ſummer time with a ſhade to defend it from the ſcorching heat of the ſun.

MEWING, a diſorder incident to all kinds of birds; being the caſting of their feathers.

MEZAIR, in the *Manege*. See MEZAIR.

MEZANINE, or MEZZANINE, a term uſed by ſome architects to ſignify an Attic, or little ſtory contrived occaſionally over the firſt ſtory, for the conveniency of a wardrobe, or the like.

The word is borrowed from the Italians, who call *mezzanini* thoſe little windows, leſs in height than breadth, which ſerve to illuminate an Attic, or entreſole.

MEZEREAN, in *Botany*. See SPURGE *Laurel*.

MEZUZOTH, in the *Jewiſh Cuſtoms*, certain pieces of parchment, which the Jews fix to the door-poſts of their houſes, taking that literally which Moſes commands them, ſaying, "Thou ſhalt never forget the laws of thy "God, but thou ſhalt write them upon the poſts of thy "houſe, and on thy gates." This expreſſion means nothing elſe, but that thou ſhalt always remember them, whether thou comeſt into thy houſe, or goeſt out. But the Hebrew doctors imagined, that the law-giver meant ſomething more than this. They pretended that, to avoid making themſelves ridiculous, by writing the commandments of God without their doors, or rather to avoid expoſing themſelves to the profanation of the wicked, they ought, at leaſt, to write them on a parchment, and to incloſe it in ſomething. Therefore they wrote theſe words upon a ſquare piece of parchment, prepared on purpoſe with a particular ink, and a ſquare kind of character. Deut. vi. 4, 5, 6, 7, 8, 9. "Hear O Iſrael, "the Lord our God is one Lord, &c." Then they left a little ſpace, and afterwards went on, Deut. xi. 13. "And it ſhall come to paſs, if thou ſhalt hearken dili-"gently to my commandments, &c." as far as. "Thou "ſhalt write them upon the door-poſts of thy houſe, &c." After this they rolled up the parchment, and put it into a caſe of reeds, or other matter; they wrote on the end of the caſe the word *Shadai*, which is one of the names of God; and they put it at the doors of their houſes, chambers, and all places moſt frequented; they fixed it to the knockers of the door, on the right ſide; and as often as they entered in, or went out, they touched it in this place, with the end of their finger, which they afterwards kiſſed out of devotion. The Hebrew word *mezuza* properly ſignifies the door-poſts of a houſe; but it is alſo given to this roll of parchment now mentioned. Leo of Modena may be here conſulted.

MEZZA *pauſa*, in the *Italian Muſic*, *half a pauſe*, intimates that the part wherein it is found muſt lie ſtill the time of a ſemibreve in common time. See PAUSE.

MEZZA *tinta*. See TINTA.

MEZZO *ſoprano*, in the *Italian Muſic*, is the high tenor, which has the cleff C on the ſecond line.

MEZZO-TINTO, in *Sculpture*, a particular manner of engraving figures on copper.

Mezzo-tinto is ſaid to have been firſt invented by prince Rupert, about the year 1649; and Mr. Evelyn, in his Hiſtory of Chalcography, gives us a head, performed by that prince, in this way; though Mr. Le Blond is ſaid to have introduced it into practice, with the greateſt ſucceſs.

The prince laid his grounds on the plate with a channelled roller; but one Sherwin, about the ſame time, laid his grounds with a half-round file, which was preſſed down with a heavy piece of lead. Both theſe grounding tools have been laid aſide, for many years; and a hand-tool, reſembling a ſhoemaker's cutting-board-knife, with a fine erenelling on the edge, was introduced by one Edlin, a ſmith by trade, who afterwards became a *mezzo-tinto* painter.

It is very different from the common way of engraving. To perform it, they rake, hatch, or punch the ſurface of the plate all over with a knife, or inſtrument made for the purpoſe, firſt one way, then the other, acroſs, &c. till the face of the plate be thus entirely furrowed with lines or furrows, cloſe and as it were contiguous to each other; ſo that, if an impreſſion was then taken from it, it would be one uniform blot, or ſmut.

This done, the deſign is drawn, or marked, on the ſame face; after which, they proceed with burniſhers, ſcrapers, &c. to expunge and take out the dents, or furrows, in all the parts where the lights of the piece are to be; and that more or leſs, as the lights are to be ſtronger or fainter; leaving thoſe parts black, which are to repreſent the ſhadows, or deepenings of the draught.

As it is much eaſier to ſcrape or burniſh away parts of a dark ground correſponding with the outline of any deſign ſketched upon it, than to form ſhades upon a light ground, by an infinite number of hatches, ſtrokes, and points, which muſt all terminate with exactneſs on the outline, as well as differ in their force and manner, the method of ſcraping, as it is called, in *mezzo-tinto*, conſequently becomes much more eaſy and expeditious, than any other method of ENGRAVING. The inſtruments uſed in this kind of engraving are CRADLES, SCRAPERS, and BURNISHERS.

In this engraving, the plate muſt be prepared and poliſhed in the ſame manner as for other ENGRAVING (ſee alſo COPPER-*plates*); and afterwards divided equally by lines, parallel to each other, and traced out with very ſoft chalk. The diſtance of theſe lines ſhould be about one third of the length of the face of the CRADLE, which is to be uſed, and theſe lines ſhould be marked with capital letters, or ſtrokes of the chalk. The cradle is then to be placed exactly betwixt the two firſt lines, and paſſed forwards in the ſame direction; being kept as ſteady as poſſible and preſſed upon with a moderate force. The ſame operation muſt be repeated with reſpect to all the other lines; till the inſtrument has thus paſſed over the whole ſurface of the plate. Other lines muſt be drawn then from the extremities of the other two ſides, in the ſame manner; which, interſecting the firſt

at right angles, will with them form ſquares; and the ſame operation muſt be repeated, with the cradle, as in the caſe of the firſt. New lines muſt then be drawn diagonally, and the cradle paſſed betwixt them as before; and when the firſt diagonal operation is performed, the lines muſt be croſſed at right angles as the former, and the cradles paſſed betwixt them in the ſame manner. The plate having undergone the action of the cradle, according to the diſpoſition of the firſt order of lines, a ſecond ſet muſt be formed, having the ſame diſtances from each other as the firſt. But they muſt be ſo placed as to divide thoſe already made into ſpaces one third leſs than their whole extent; i. e. every one after the firſt on each ſide will take in one third of that before it, e. g. beginning at A, of which the firſt third muſt be left out; a third of B will conſequently be taken in; and ſo of the reſt. Theſe lines of the ſecond order muſt be marked with ſmall letters, or leſſer ſtrokes, to diſtinguiſh them from the firſt: and the ſame treatment of the plate muſt be purſued, with reſpect to them, as was practiſed for the others. When this ſecond operation is finiſhed, a third order of lines muſt be made; the firſt of which, e. g. in A, muſt omit two thirds of it, and conſequently take in two thirds of B, &c. By theſe means the original ſpaces will be exactly divided into equal thirds; and the cradle muſt be again employed betwixt theſe lines as before. When the whole of this operation is finiſhed, it is called *one turn*; but, in order to produce a very dark and uniform ground, the plate muſt undergo the repetition of all theſe ſeveral operations, for above twenty times; beginning to paſs the cradle again betwixt the firſt lines, and proceeding in the ſame manner through all the reſt. When the plate is prepared with a proper ground, the ſketch muſt be called on it, by rubbing the paper on the backſide with chalk. It is alſo proper to overtrace it afterwards with black-lead or Indian ink. The ſcraping is then performed, by paring or cutting away the grain of the ground in various degrees; ſo that none of it is left in the original ſtate, except in the touches of the ſtrongeſt ſhade. The general manner of proceeding is the ſame as drawing with white upon black paper. The maſſes of light are firſt begun with; and thoſe parts, which go off into light in their upper part, but are brown below, the reflections are then entered upon; after which the plate is blackened with a printer's blacking-ball made of felt, in order to diſcover the effect; and then the work is proceeded with; obſerving always to begin every part in the places where the ſtrongeſt lights are to be.

The art of ſcraping *mezzo-tinto* has been applied to the printing with a variety of colours, in order to produce the reſemblance of paintings. The inventor of the method of doing this was J. C. Le Blon, a native of Frankfort, and pupil of Carlo Maratta, between the years 1720 and 1730. It was eſtabliſhed by the inventor on this principle, that there are three primitive colours, of which all the reſt may be compoſed, by mixing them in various proportions: that any two of theſe colours being mixed together, preſerve their original power, and only produce a third colour, ſuch as their compound muſt neceſſarily give; but if tranſparent colours be mixed, and three primitive kinds compounded together, they deſtroy each other, and produce black, or a tendency to it, in proportion to the equality or inequality of the mixture; and that, if, therefore, theſe three colours be laid, either ſeparately, or upon each other, by three plates, engraved correſpondently, on theſe principles, to the colouring of the deſign, the whole variety of tints neceſſary may be produced. The requiſites, therefore, to the execution of any deſign in this method of printing, are as follow. 1. To ſettle a plan of the colouring to be imitated; ſhewing where the preſence of each of the three ſimple colours is neceſſary, either in its pure ſtate, or combined with ſome other, to produce the effect required; and to reduce this plan to a painted ſketch of each, in which not only the proper outlines, but the degree of ſtrength ſhould be expreſſed. 2. To engrave three plates according to this plan, which may print each of the colours exactly, in the places where, and proportion in which they are wanted. 3. To find three tranſparent ſubſtances, proper for printing with theſe three primitive colours. The manner in which Mr. Le Blon prepared the plates was as follows: the three plates of copper were firſt well fitted with reſpect to ſize and figure to each other, and grounded in the ſame manner as thoſe deſigned for *mezzo-tinto* prints: and the exact place and boundary of each of the three primitive colours, conformably to the deſign, were ſketched out on three papers, anſwering in dimenſions to the plate. Theſe ſketches were then called on the plates; and all the parts of each plate, that were not to convey the colour, to which it was appropriated, to the print, were entirely ſcraped away, as in forming the light of *mezzo-tinto* prints. The parts that were to convey the colour were then worked upon; and where the moſt light or diluted teints of the colour were to be, the grain in the ground was proportionably taken off; but where the full colour was required, it was left entire. In this regard was had, not only to the effects of the colour in its ſimple ſtate, but to its combined operation, either in producing orange-colour, green, or purple, by its admixture with one alone; and likewiſe to its forming brown, grey, and ſhades of different degree, by its co-operation with both the others. But though the greateſt part of the engraving was performed in the *mezzo-tinto* manner, yet the graver was employed occaſionally for ſtrengthening the ſhades; and for correcting the outline, where it required great accuracy and ſteadineſs. It was found neceſſary ſometimes to have two ſeparate plates for printing the ſame colour, in order to produce a ſtronger effect: but the ſecond plate, which was uſed to print upon the firſt, was intended only to glaze and ſoften the colours in particular parts that might require it. With reſpect to the black and brown teints, which could not be ſo conveniently produced, in a due degree, by the mixture of the colours, umber and black were likewiſe uſed.

With reſpect to the order in which the plates are to be applied, it may be proper to obſerve, that the colour which is leaſt apparent in the picture ſhould be laid on firſt; that which is betwixt the moſt and leaſt apparent, next; and that which predominates, laſt; except where there may be occaſion for two plates, for the ſame colour, as was before mentioned; or where there is any required for adding browns and ſhades.

Mr. Le Blon applied this art to portraits, and ſhewed, by the ſpecimens he produced, the poſſibility of its being brought, by farther improvements, to afford imitations of painting, which might have ſome value. It is nevertheleſs much better adapted to the ſimpler ſubjects, where there are fewer intermixtures of colours; and where the accuracy of the reflections, and demi-teints, are not ſo eſſentially neceſſary to the truth of the deſign, from the greater latitude of form, and diſpoſition of the colour, as in plants, anatomical figures, and ſome ſubjects of architecture. But perhaps plates engraved, or rather finiſhed, with the tool, particularly with reſpect to the outline, would be better accommodated in ſome of theſe caſes, than thoſe prepared only by ſcraping.

Mr. Cochin remarks, at the end of an account he has given of Mr. Le Blon's manner, that though this ingenious artiſt confined his method principally to the uſe of three colours; yet ſhould this invention be again taken up and cultivated, there would be more probability of ſucceſs in uſing a greater variety: and that ſeveral different kinds might be printed by one plate; provided they were laid on in their reſpectively proper places, by printing balls, which ſhould be uſed for that colour only. His hint might however be very greatly improved, by the further aſſiſtance of pencils, accommodated to the plates, for laying on the colours in the proper parts.—Handmaid to the Arts, vol. ii. p. 182, &c. Encyclopedie, Art. GRAVURE *en Couleurs*, &c.

For the method of taking off *mezzo-tinto* prints on glaſs, ſee BACK-*painting*.

MIASMA, *miaſmata*, is uſed to ſignify ſuch particles, or atoms, as are ſuppoſed to ariſe from diſtempered, putrefying, or poiſonous bodies; and to affect people at a diſtance.

MICA, in *Natural Hiſtory*, a name given by authors who have written of foſſils to many of the bractearia, or ſmall ſmall-ſpangled TALCS, whether in pure maſſes of themſelves, or immerſed in the matter of other foſſils. It conſiſts of thin, flexible, ſhining plates; which by expoſure to fire become brittle and crumble, and by violent heat are vitrifiable. *Mica* is either colourleſs and tranſparent, or it is coloured, red, brown, green, or black, and ſemi-tranſparent.

The principal kinds of theſe are the white and the yellow, from their colour and ſplendid appearance, called the ſilver and gold glimmer, or *mica aurea* and *mica argentea*.

Theſe have frequently led people of ſanguine imaginations, who have met with them in different places, to ſuppoſe they had found ores of gold and ſilver, but they in reality contain not the leaſt grain of either of thoſe metals, and are mere talc in ſmall flakes, accidentally coloured. The yellow kind is found in many parts of the world, but no where ſo plentifully as in Arabia and Ægypt. In Germany and France there is alſo conſiderable plenty of it, and in our American plantations it is found in great abundance; nor is England without it even in various forms.

We have some of it in pure homogeneous masses; some mixed among stony matter, and some among sand. The white is very plentiful in Silesia and Bohemia, and also in France, Italy, and England. It is like the former; found either pure, or mixed among the matter of stone, and makes a very glittering and beautiful appearance. The coloured *micæ* generally contain some metallic matters, chiefly iron, and are much more fusible than these which are pure and colourless: and Mr. Justi pretends that he has discovered a new metallic substance in yellow *micæ*, which was of a blackish grey colour, but when mixed with gold heightened the lustre, without destroying the malleability of that metal, though itself is brittle.

The *micæ* have a soft touch resembling that of unctuous substances; they are not soluble by acids; they are incapable of yielding sparks, when struck by steel, as flints do; or of forming a tenacious paste, with water, as clay does; or of hardening, when calcined and mixed with water, as gypsum does. *Micæ* is, therefore, neither a calcareous, siliceous, argillaceous, nor gypseous earth. The colourless transparent *micæ* called Muscovite glass, is used as panes for windows. Dr. Hooke has described the beautiful colours that appear in thin plates of Muscovy glass, in his Micrographia, p. 48.

In Jemptland, a crumpled kind of *micæ* is manufactured into kettles and other vessels, and also for hearths. The powder of this stone is mixed with sea-salt, and from the mixture a marine acid is obtained by distillation.

MICAH, in *Scripture History*, one of the minor prophets, who was contemporary with Isaiah, and whose prophecy, foretelling the captivity of the ten tribes, and the advancement and establishment of the Christian church, very much resembles his.

MICARAGUÆ *pomum*, a name given by some authors to the Spanish pear.

MICHAELMAS, the feast of St. Michael the archangel; held on the 29th of September.

MICHAEL's *wing*. See WING.

MICHAH, a word used by some of the chemical writers to express copper.

MICHALALATLI, in *Ornithology*, a name by which Nieremberg informs us some of the Mexicans call the ACHALALACTLI.

MICHELIA, in *Botany*, the name of a genus of plants, of the *polyandria polyginia* class, the characters of which are these: that the calyx is composed of three leaves; that the flowers have fifteen petals; and that the fruit are berries containing four seeds.

MICROCOSM, μικροκοσμος, formed from μικρος, *little*, and κοσμος, *world*, a Greek term, literally signifying *little world*; chiefly understood of *man*, who is so called by way of eminence, as being an epitome of all that is wonderful, in the great world or microcosm.

MICROCOSMETER, a name given by Dolœus to an imaginary being, which he supposes to reside in the brain, and direct all the actions.

MICROCOUSTICS, the same with MICROPHONES.

MICROGRAPHIA, MICROGRAPHY, compounded of μικρος, *small*, and γραφη, *description*, a description of the parts and proportions of objects that are too small to be viewed without the assistance of a microscope.

MICROMETER, an astronomical machine, which, by means of a very fine screw, serves to measure extremely small distances in the heavens; as the apparent diameters of the planets, to a great degree of accuracy.

The word comes from the Greek, μικρος, *parvus*, and μετρον, *mensura*: in regard a small length, e. g. an inch is hereby divided into vast numbers of parts, e. g. in some, 2800, and in others, more.

This instrument is so contrived as to move a fine wire parallel to itself, in the plane of the picture of an object, formed in the focus of a telescope, and with great exactness to measure its perpendicular distance from a fixed wire in the same plane; and thus are measured small angles, subtended by remote objects at the naked eye. E. g. Let a planet be viewed through the telescope; and when the parallel wires are opened to such a distance as to appear exactly to touch two opposite points in the circumference of the planet, it is evident, that the perpendicular distance between the wires is then equal to the diameter of the picture of the planet, formed in the focus of the object-glass. Let this distance, whose measure is given by the mechanism of the *micrometer* hereafter described, be represented by the line $p\,q$, *Tab. III. Optics, fig.* 44. then since the measure of the focal distance $q\,L$ may be also known, the ratio of $q\,L$ to $p\,q$, that is, of the radius to the tangent of the angle $q\,L\,p$, will give the angle itself by a table of lines and tangents; and this angle is equal to the opposite angle P L Q, which the real diameter of the planet subtends at L, or at the naked eye. There is some controversy about the invention of the *micrometer*. Mess. Auzout and Picard have the credit of it in common fame, as being the first who published it, in the year 1666; but Mr. Townley, in the Philosophical Transactions, reclaims it for one of our own countrymen, Mr. Gascoigne. He relates, that, from some scattered papers and letters of this gentleman, he had learnt, that, before our civil wars, he had invented a *micrometer*, of as much effect as that since made by M. Auzout, and had made use of it for some years, not only in taking the diameters of the planets, and distances upon land, but in determining other matters of nice importance in the heavens; as the moon's distance, &c.

Mr. Gascoigne's instrument fell into the hands of Mr. Townley, who says, that by the help of it, he could make above forty thousand divisions in a foot. This instrument being shewn to Dr. Hooke, he gave a drawing and description of it, and proposed several improvements in it, which may be seen in the Philosophical Transactions Abr. vol. i. p. 227. Mr. Gascoigne divided the image of an object, in the focus of the object-glass, by the approach of two pieces of metal, ground to a very fine edge, in the place of which, Dr. Hooke would substitute two fine hairs, stretched parallel to one another. Two other methods of Dr. Hooke, different from this, are described in his Posthumous Works, p. 497, &c. An account of several curious observations which Mr. Gascoigne made by the help of his *micrometer*, particularly in the mensuration of the diameter of the moon and other planets, may be seen in the Phil. Trans. vol. xlviii. p. 190. where Dr. Bevis refers to an original letter of Mr. Gascoigne, to Mr. Oughtred, written in 1640-1. for an account given by the author of his own invention, &c.

Mons. de la Hire, in a discourse on the æra of the inventions of the *micrometer*, pendulum clock, and telescope, read before the Royal Academy of Sciences in 1717, makes M. Huygens the inventor of the *micrometer*. That author, he observes, in his Observations on Saturn's Ring, &c. published in 1659, gives a method of finding the diameters of the planets by means of a telescope; viz. by putting an object, which he calls *virgula*, of a proper bigness to take in the distance to be measured, in the focus of the convex object-glass: in this case, says he, the smallest object will be seen very distinctly, in that place of the glass. By such means, he adds, he measured the diameters of the planets, as he there delivers them.

This *micrometer*, M. De la Hire observes, is so very little different from that published by the marquis De Malvasia, in his Ephemerides, three years after, that they ought to be esteemed the same: and the *micrometer* of the marquis differed yet less from that published four years after by Auzout and Picard. Hence, M. De la Hire concludes, that it is to M. Huygens the world is indebted for the invention of the *micrometer*; without taking any notice of the claim of our countryman Mr. Gascoigne, which, however, is prior by many years to any of them.

M. De la Hire says, that there is no method more simple or commodious for observing the digits of an eclipse, than a net in the focus of the telescope. These, he says, were generally made of silken threads, and for this particular purpose six concentric circles had also been made use of, drawn upon oiled paper; but he advises to draw the circles on very thin pieces of glass, with the point of a diamond. He also gives several particular directions to assist persons in using them. In another memoir he shews a method of making use of the same net for all eclipses, by using a telescope with two object-glasses, and placing them at different distances from one another. Ac. Par. 1701, and 1717.

MICROMETER, *construction and use of the*. Wolfius describes a *micrometer* of a very easy and simple structure, first contrived by Kirchius, thus:

In the focus of a telescope fit a brass or iron ring A B (*Tab. Astron. fig.* 11.) with female screws diametrically opposite to each other; into these insert male screws C E and F B, of such length, as that they may be turned in the tube, so as to touch each other: and with this instrument very small spaces in the heavens may be accurately measured.

For when any objects, viewed through a tube, appear contiguous to the screws, if these be turned till they just touch two opposite points, whose distance is to be measured, it will be evident how many threads of the screw they are apart. To determine how many seconds answer to each thread, applying the tube towards the heavens, turn the screws, till they touch two points, whose distance is already accurately known; and observe the number of threads corresponding to that interval; thus, by the rule of three, a table may be made of the seconds corresponding to the several threads; by means whereof, without greater labour, the distances of any points may be determined.

The

The ſtructure of another *micrometer*, with the manner of fitting it to the teleſcope, and applying it, is as follows: A B C *(Tab. Aſtron. fig. 12.)* is a rectangular braſs frame, the ſide A B being about three inches long, and the ſide B C, as likewiſe the oppoſite ſide A *g*, about ſix inches; and each of the three ſides about eight tenths of an inch deep: the two oppoſite ſides of this frame are ſcrewed to the circular plate, to be mentioned hereafter.

The ſcrew P, which has exactly forty threads in an inch, being turned round, moves the plate G D E F, along two grooves made near the tops of the two oppoſite ſides of the frame; and the ſcrew Q, having the ſame number of threads in an inch as P, moves the plate R N M Y along two grooves, made near the bottom of the ſaid frame, in the ſame direction as the former plate moves, but with only half the velocity of that other: theſe ſcrews are turned both at once, and ſo the plates are moved along the ſame way, by means of a handle turning the endleſs ſcrew S, whoſe threads fall in between the teeth of the pinions on the ſcrews P and Q. And note, that two half revolutions of the endleſs ſcrew S carry the ſcrew P exactly once round.

The ſcrew P turns the hand *a*, faſtened thereto, over a hundred equal diviſions, made round the limb of a circular plate, to which the above named two oppoſite ſides of the frame are ſcrewed at right angles: the teeth of the pinion on the ſcrew P, whoſe number is 5, take into the teeth of a wheel on the backſide of the circular plate, whoſe number is 25. Again, on the axis of this wheel is a pinion of two, which takes into the teeth of another wheel, moving about the centre of the circular plate, on the outſide thereof, and having fifty teeth; this laſt wheel moves the leſſer hand *b* once round the above mentioned circular plate, in the $\frac{1}{25}$th part of the time the hand *a* is moving round: for becauſe the number of teeth in the pinion of the ſcrew P are 5, and the number of teeth of the wheel this pinion moves, are 20; therefore the ſcrew P moves four times round in the time that wheel is moving once round. Farther, ſince there is a pinion of two which takes into the teeth of a wheel, whoſe number is 50; therefore this wheel with 50 teeth will move once round in the time that the wheel of 20 teeth moves 25 times round; and, conſequently, the ſcrew P, or hand *a*, muſt move a hundred times round in the ſame time as the wheel of 50 teeth, or the hand *b*, has moved once round.

Hence it follows, that if the circular plate W, which is faſtened at right angles to the other circular plate, be divided into two hundred equal parts, the index *x*, to which the handle is faſtened, will move five of thoſe parts in the ſame time in which the hand *a* moves one of the hundred diviſions round the limb of the other circular plate. Thus, by means of an index *x*, and plate W, every fifth part of each of the diviſions round the other plate may be known.

Farther, ſince each of the ſcrews P and Q have exactly forty threads in an inch; therefore the upper plate G D E F will move one inch while the hand *a* moves forty times round: the four thouſandth part of an inch while the hand moves over one of the diviſions round the limb; and the twenty thouſandth part of an inch while the index *x* moves one part of the two hundred round the limb of the circular plate W: and the under plate R N M Y will move half an inch, the two thouſandth part of an inch, and the ten thouſandth part of an inch, the ſame way, in the ſaid reſpective times.

Hence, if the under plate, having a large round hole therein, be fixed to a teleſcope, ſo that the frame is moveable, together with the whole inſtrument, except the ſaid lower plate; and the ſtrait ſmooth edge H I, of the fixed plate A B I H; as likewiſe the ſtrait ſmooth edge D E, of the moveable plate G D E F, be perceivable through the round hole in the under plate, in the focus of the object-glaſs; then, when the handle of the *micrometer* is turned, the edge H I, of the narrow plate A B I H, fixed to the frame, and D E, of the moveable plate, will appear through the teleſcope equally to approach to, or recede from, each other.

By theſe edges we ſhall be able to meaſure the apparent diameters of the ſun, moon, &c. the manner of doing which take as follows:

Suppoſe, in looking at the moon through the teleſcope, you have turned the handle till the two edges D E and H I are opened, ſo as juſt to touch or claſp the moon's edges; and that there were twenty-one revolutions of the hand *a*, to complete that opening: firſt ſay, as the focal length of the object-glaſs, which ſuppoſe ten feet, is to radius, ſo is one inch to the tangent of an angle ſubtended by one inch in the focus of the object-glaſs; which will be found twenty-eight minutes thirty ſeconds: again, becauſe there are exactly forty threads of the ſcrews in one inch; ſay, if forty revolutions of the hand *a* give an angle of 28′ 30″, what angle will twenty-one revolutions give? The anſwer will be, fifteen minutes eight ſeconds; and ſuch was the moon's apparent diameter. And ſo may the apparent diameters of any other objects be taken. It muſt be here obſerved, that the diviſions on the top of the plate G D E F are diagonal diviſions of the revolutions of the ſcrews, with diagonal diviſions of inches againſt them: thus, as the ſaid plate ſlides along, theſe diagonals are cut by diviſions made on the edge of the narrow plate K L, fixed to the oppoſite ſides of the frame by means of two ſcrews. Theſe diagonal diviſions ſerve for a regiſter to count the revolutions of the ſcrews, and to ſhew how many there are in an inch, or the parts of an inch.

Dr. Derham tells us, that his *micrometer* is not, as uſually, to be put into a tube, but to meaſure the ſpectres of the ſun on paper (of any radius), or to meaſure any part of them. By this means he can eaſily, and very exactly, with the help of a fine thread, take the declination of a ſolar ſpot at any time of the day; and, by his half-ſeconds watch, meaſure the diſtance of the ſpot from the ſun's eaſtern and weſtern limb.

A *micrometer* of the beſt ſort is made in this manner: in the middle of an oblong plate of braſs, A B, *Tab. III. Optics, fig. 45*, there is cut an oblong hole, *a b c d e f*, (to be placed in the focus of a teleſcope,) having a fine wire *b e* extended lengthways over the middle of it, at right angles to two ſlender braſs bars or ſights *g h*, *i k* lying croſs the hole; of which *g h* is fixt to the plate A B by ſcrews at *g* and *h*, but *i k* is moved parallel to *g h* by twiſting a round knob C fixt upon one end of a long iron ſcrew D E, which turns upon a tapering point at its end D, while its other end turns round in a hole at E in the centre of an index-plate E F, fixt at right angles to the main plate A B. The long ſcrew D E works through two hollow ſcrews in two cubical blocks of braſs fixt behind the plate *l m*, bent ſquare to the plate *n s*, that ſlides upon the main plate A B, either backward or forward, and carries a perpendicular arm *o p* extended over the hole *b e*; while *p* the extremity of the arm *o p* ſlides under a braſs ledge *q r*, ſcrewed to the main plate A B, along the ſide of the hole. One ſide *i t*, of the moveable ſight-plate *i k t*, lies over the arm *o p*, being fixt to it by the flat-headed ſcrews at *t* and *t*, the holes in the plate *i t* being oblong or larger than the ſhanks of the ſcrews, to give liberty for placing the edge *i k* coincident with *g h*, when carried up to it by turning the ſcrew D E by the knob C; the part *i k*, which projects over the arm *o p*, being hammered down to lie flat upon the main plate A B. The edge *i k*, after this adjuſtment, will always move parallel to the edge *g h*; its inclination to the ſcrew D E being every where the ſame, provided the ſcrew be ſtraight, and the interval of the concave ſcrews behind *l m* be ſufficiently great and their motion ſteady. For this purpoſe about a quarter-round of a third concave ſcrew preſſes upon the long ſcrew D E at *v*, the block of it being fixt to the middle of a ſpringing plate *w x y*, whoſe extremities lying behind the blocks at *l*, *m*, not ſo near as to touch them, are preſſed towards them with ſcrews at *w* and *x*; which occaſions the block at *v* to ſpring upon the ſcrew D E, and to hold it right to the oppoſite ſides of the concave ſcrews at *l*, *m*. To prevent any motion lengthways in the ſcrew D E, its tapering point D turns in a hollow point at the end of an oppoſite ſcrew *z*, which working through a fixt block at *z*, holds up the ſhoulder of the long ſcrew D E, againſt the back of the index-plate, where its neck is inſerted.

The two indexes upon the plate E F ſhew the number of revolutions and parts of a revolution of the ſcrew D E, anſwering to the interval of the ſights *g h*, *i k*. In the outward plate there is a circular ſlit *α β γ*, which diſcovers part of the diviſions upon the circumference of an inner plate, turned about a centre by two wheels and pinions within: ſo that for every revolution of the ſcrew and index E F, which ſhews the parts of it, one diviſion upon the plate *α β γ*, paſſes by a fixt pointer at *β*; which ſhews the number of revolutions anſwering to the interval of the ſights *g h*, *i k*.

This *micrometer* has lately received a very great improvement by an ingenious contrivance of the reverend Mr. James Bradley, profeſſor of Aſtronomy, at Oxford, for turning it in its own plane about the interſection *δ* of the fixt ſight *g h* and of the tranſverſe wire *b e*, without ſtirring the teleſcope: which is thus executed. Upon the backſide of the main-plate turned upwards, and here repreſented by the parallelogram G H I K, *fig. 46.* there is laid ſuch another plate L M N O, of the ſame breadth and thickneſs but ſomewhat ſhorter; in the middle of which there is an oblong hole, anſwering to that other in the lower plate, but ſomewhat larger; being terminated at its ſides by the ſtraight lines *ε ζ*, *π ϱ*, and at its ends by the concave arches *ε π*, *ζ ϱ*, whoſe common centre is the

the point δ abovementioned. The concave arch $\iota\theta$ slides round this centre againſt a concentric convex arch of an annular plate $\lambda\mu\nu$; ſomewhat longer than the concave arch, of the ſame thickneſs as the upper parallelogram, and ſtrongly ſcrewed to the under one, round that end of the hole which is neareſt to the centre δ: and at the ſame time the other concave arch $\xi\kappa\eta$ ſlides alſo againſt another concentric convex arch $\circ\pi$, of another annular plate juſt as thick as the upper parallelogram, and ſtrongly ſcrewed to the under one. This convex arch $\circ\pi$ is ſhorter than the contiguous concave one $\xi\kappa\eta$, to give room for the circular motion of the plates; which are held together by two annular plates ſimilar to $\lambda\mu\nu$ and $\circ\pi$, but ſomewhat broader, to cover the coincident arches, when laid over them, and ſcrewed down to the reſpective annular plates underneath. The circular motion upon theſe arches about their centre δ, is gradually given to the upper parallelogram by an endleſs ſcrew $\rho\sigma$, having an axis $\sigma\tau$ laid croſs the end of the under parallelogram, and turning upon a point at one end, and in a collar at the other, both fixt to the under plate; while the ſpiral thread ρ, moves the teeth of a braſs arch fixt at τ, to the end of the upper parallelogram.

To hold the micrometer in the tube of a teleſcope, along each ſide of the upper parallelogram there is fixt a long braſs plate about an inch broad; having its oppoſite ſides bent contrary ways, ſo as to form two oppoſite ledges, about one-eighth of an inch broad, at right angles to the intermediate part of the plate, as repreſented in the figure. One of the ledges of each plate is placed inwards along the ſides of the upper parallelogram, and is firmly fixt to it by ſeveral ſcrews. The figure $\phi\chi\psi\omega$ repreſents one of the equal and oppoſite holes cut in the ſides of a ſquare tube, through which the *micrometer* is put; the notches $\phi\chi$ being made to receive the ledges of the ſide-plates, to keep the plane of the *micrometer* perpendicular to the tube at a juſt diſtance from the object-glaſs. Which diſtance being once determined by trials, as above explained, muſt be kept invariable in all obſervations, by ſtops or pins, if the tube conſiſts of two or more joints that draw in and out.

The meaſures of the *micrometer*.

	Inches.
The length of the plate AB	8,0
Its breadth MN	3,9
Its thickneſs	0,$\frac{1}{4}$
Length of the hole be	3,5
Its breadth $gh=\delta\varepsilon$	2,2
Breadth of the hole in the other plate at $\xi\kappa$	2,6
Length of the ſcrew DE	5,5
Its thickneſs	0,3
The line Ab	1,0
The interval $lm=wx$	3,0
Length of the ſide cheeks	4,5
Their breadth	0,8
Their ledges	0,2
Diameter of the index-plate	3,1
Its thickneſs (being double with two wheels within)	0,3
The greateſt opening of the ſights gh, $ik=\delta\varepsilon$	2,2

Threads of the ſcrew in an inch, 40

The inch is divided by the index-plates into 40 times 40, or 1600 equal parts. Inſtead of the braſs ſights gh, ik, two others, with parallel wires may be ſcrewed on at pleaſure.

When the ſight-plates are made to coincide, the two indexes of the revolutions and their parts muſt be ſet to the beginning of the numerations upon the index-plates. Then as the ſights are opened, it is evident from the make of a ſcrew, that the numbers of revolutions will be as the intervals of the ſights, and conſequently as the angles ſubtended by them at the centre of the object-glaſs; the intervals being inſenſibly different from the arches that meaſure theſe ſmall angles. Therefore, when any one angle correſponding to a given number of revolutions, is determined by experiment, an angle correſponding to any other number of revolutions may be found by the rule of three. And thus may tables be made to ſhew by inſpection the number of minutes and ſeconds in an angle anſwering to any given number of revolutions and parts.

To determine ſome one angle, the larger the better, becauſe the ſame error in the determination will be proportionably ſmaller in a given angle deduced from it; fix the teleſcope upon any known ſtar in the equator, or very near it, and open their ſights to their utmoſt limit and note the number of revolutions of the ſcrew. Then by a pendulum-clock obſerve the interval of time in the ſtar's tranſit over the given interval of the ſights, and having turned it into minutes and ſeconds of an arch, they are the meaſure of the angle required. But if the ſtar be remote from the equator, the number of minutes and ſeconds thus found, muſt be diminiſhed in the ratio of the radius to the ſine of the ſtar's diſtance from the pole. To this *micrometer* Dr. Bradley applied an ingenious contrivance, whereby it is adapted for taking the difference of right aſcenſion and declination of ſuch objects as are at a greater diſtance than the teleſcope will take in at once, but which paſs through the aperture of it at different times. Let ABC, *fig.* 47. repreſent a flat ring of braſs, fixed in the focus of the teleſcope; and *abc* a ſmaller concentric ring lodged in a circular groove turned within the larger, and kept in the groove by three ſmall plates of braſs fixed to the outward ring, and extended over the edge of the inner one. Upon the inner ring is fixt a concentric arch of a wheel *de*, having teeth cut in its convexity, which are driven round by the threads of an endleſs ſcrew, whoſe axis DEF turns in a collar at E and upon a point at F, both fixt to the outward ring. The hairs gh, ik croſs at right angles in f the centre of the rings; and when the teleſcope is ſo fixt that the image of the ſtar falls upon f, let it move along any line fg, and by turning the ſcrew DEF, and by conſequence the hair fk, about the fixt point f till it touches the ſtar at g, it will then coincide with the tract of the ſtar's motion; and then all other ſtars will move parallel to it as was required. To find the difference of declination of two ſtars, he obſerves the times of their appulſes to the edges of two ſlender braſs bars gio, gkp, fixt to the inner ring, and equally inclined to its diameter gb in ſuch angles that the perpendiculars fi, fk, on each ſide of fg, ſhall be ſeverally equal to half fg; and conſequently that the whole baſe ik, of the equicrural triangle igk, ſhall be equal to its perpendicular height fg; and by conſequence that the difference of any two baſes if, km ſhall be equal to fm, the difference of their heights; ſo that the difference of the times of the tranſits of two ſtars over theſe baſes, may give the difference of their declinations. Smith's Optics, art. 876, &c.

Mr. Caſſini firſt made uſe of four croſs hairs or threads, interſecting one another at half right angles, for determining the difference of right aſcenſions and declinations of objects near the ſame parallel: but the *micrometer*, according to its later improvements, will anſwer this purpoſe with greater exactneſs. Mr. Maſkelyne has publiſhed directions for the uſe of it, extracted from Dr. Bradley's papers, in the Philoſ. Tranſ. vol. lxii. art. 6. p. 46, &c.

A conſiderable improvement with regard to the *micrometer*, was communicated to the Royal Society, in 1743, by Mr. Servington Savery, an account of which, extracted from the minutes by Mr. Short, was publiſhed in the Phil. Tranſ. for 1753, vol. xlviii. art. 26. The firſt hint of ſuch a *micrometer* was ſuggeſted by M. Roemer, in 1675: and M. Bouguer propoſed a ſimilar conſtruction to that of Mr. Savery, in 1748, for which ſee HELIOMETER. The late Mr. Dollond made a farther improvement in this kind of *micrometer*, an account of which was given to the Royal Society by Mr. Short, and publiſhed in the Phil. Tranſ. vol. xlviii. art. 27. Inſtead of two object-glaſſes, he uſed only one, which he neatly cut into two ſemi-circles, and fitted each ſemi-circle in a metal frame, ſo that their diameters ſliding in one another, by means of a ſcrew, may have their centers ſo brought together as to appear like one glaſs, and ſo form one image; or by their centers receding, may form two images of the ſame object: it being a property of ſuch glaſſes, for any ſegment to exhibit a perfect image of an object, although not ſo bright as the whole glaſs would give it. If proper ſcales are fitted to this inſtrument, ſhewing how far the centers recede, relative to the focal length of the glaſs, they will alſo ſhew how far the two parts of the ſame object are aſunder, relative to its diſtance from the object-glaſs; and conſequently give the angle under which the diſtance of the parts of that object are ſeen. This divided object-glaſs *micrometer*, which was applied by the late Mr. Dollond to the object end of a reflecting teleſcope has been with equal advantage adapted by his ſon to the end of an achromatic teleſcope, is ſo eaſy of uſe, and affords ſo large a ſcale, that it is generally looked upon by aſtronomers as the moſt convenient and exact inſtrument for meaſuring ſmall diſtances in the heavens. However, the common *micrometer* is peculiarly adapted for meaſuring differences of right aſcenſion, and declination of celeſtial objects, but leſs convenient and exact for meaſuring their abſolute diſtances; whereas the object-glaſs *micrometer* is peculiarly fitted for meaſuring diſtances, but has been generally ſuppoſed improper for meaſuring differences of right aſcenſion and declination. But Mr. Maſkelyne has found that the latter may be applied with very little trouble, and ſmall additional expence, to this other purpoſe as well as the former; and he has furniſhed the directions neceſſary to be followed when it is uſed in this manner. The addition

requiſite

requiſite for this purpoſe is a cell, containing two wires, interſecting each other at right angles, placed in the focus of the eye-glaſs of the teleſcope, and moveable round about, by the turning of a button. For the deſcription of this apparatus, together with the method of applying and uſing it, we ſhall refer to Mr. Maſkelyne's paper on the ſubject, in the Phil. Tranſ. vol. lxi. part ii. art. 49, p. 536, &c.

After all, the uſe of the object-glaſs *micrometer* is attended with difficulties, ariſing from the alterations in the ſocus of the eye, which are apt to cauſe it to give different meaſures of the ſame angle at different times. In order to obviate theſe difficulties, Mr. Maſkelyne, in 1776, contrived a priſmatic *micrometer*, or a *micrometer* conſiſting of two achromatic priſms, or wedges, applied between the object-glaſs and eye-glaſs of an achromatic teleſcope, by moving of which wedges nearer to or farther from the object-glaſs, the two images of an object produced by them appeared to approach to or recede from each other, ſo that the focal length of the object-glaſs becomes a ſcale for meaſuring the angular diſtance of the two images. The rationale and uſe of this *micrometer* are explained in the Phil. Tranſ. vol. lxvii. part ii. art. 36. p. 799, &c. A ſimilar invention by the abbé Rochon, and improved by the abbé Boſcovich, was alſo communicated to the Royal Society, and publiſhed in the ſame volume of the Tranſactions, art. 35, p. 789, &c. Mr. Ramſden, an ingenious optician, has lately deſcribed two new *micrometers*, which he has contrived with a view of remedying the defects of the object-glaſs *micrometer*. One of theſe is a catoptric *micrometer*, which, beſide the advantage it derives from the principle of reflection, of not being diſturbed by the heterogeneity of light, avoids every defect of other *micrometers*, and can have no aberration, not any defect ariſing from the imperfection of materials, or of execution; as the extreme ſimplicity of its conſtruction requires no additional mirrors or glaſſes to thoſe required for the teleſcope; and the ſeparation of the image being effected by the inclination of the two ſpecula, and not depending on the ſocus of any lens or mirror, any alteration in the eye of an obſerver cannot affect the angle meaſured. It has peculiar to itſelf the advantages of an adjuſtment, to make the images coincide in a direction perpendicular to that of their motion; and alſo of meaſuring the diameter of a planet on both ſides of the zero, which will appear no inconſiderable advantage to obſervers who know how much eaſier it is to aſcertain the contact of the external edges of two images than their perfect coincidence. A (*Tab.* III. *Optics*, *fig.* 48.) repreſents the ſmall ſpeculum of a reflecting teleſcope of Caſſegrain's conſtruction, to which this *micrometer* is adapted, divided into two equal parts; one of which is fixed on the end of the arm B; the other end of the arm is fixed on a ſteel axis X, which croſſes the end of the teleſcope C. The other half of the mirror A is fixed on the arm D, which arm at the other end terminates in a ſocket *y*, that turns on the axis X; both arms are prevented from bending by the braces *aa*. G repreſents a double ſcrew, having one part *e* cut into double the number of threads in an inch to that of the part *g*; the part *e* having a hundred threads in one inch, and the part *g* fifty only. The ſcrew *e* works in a nut F in the ſide of the teleſcope, while the part *g* turns in a nut H, which is attached to the arm B; the ends of the arms B and D, to which the mirrors are fixed, are ſeparated from each other by the point of the double ſcrew preſſing againſt the ſtud *b*, fixed to the arm D, and turning in the nut H on the arm B. The two arms B and D are preſſed againſt the direction of the double ſcrew *e g* by a ſpiral ſpring within the part *m*, by which means all ſhake or play in the nut H, on which the meaſure depends, is entirely prevented.

From the difference of the threads on the ſcrew at *e* and *g* it is evident, that the progreſſive motion of the ſcrew through the nut will be half the diſtance of the ſeparation of the two halves of the mirror, and conſequently the half mirrors will be moved equally in contrary directions from the axis of the teleſcope C.

The wheel V fixed on the end of the double ſcrew has its circumference divided into 100 equal parts, and numbered at every fifth diviſion with 5, 10, &c. to 100, and the index I ſhews the motion of the ſcrew with the wheel round its axis, while the number of revolutions of the ſcrew is ſhewn by the diviſions on the ſame index. The ſteel ſcrew R may be turned by the key S, and ſerves to incline the ſmall mirror at right angles to the direction of its motion.

The other *micrometer* invented and deſcribed by Mr. Ramſden, is ſuited to the principle of refraction. This *micrometer* is applied to the erect eye-tube of a refracting teleſcope, and is placed in the conjugate ſocus of the firſt eye-glaſs; in which poſition, as the image is conſiderably magnified before it comes to the *micrometer*, any imperfection in its glaſs will be magnified only by the remaining eye-glaſſes, which in any teleſcope ſeldom exceeds five or ſix times; and beſides, the ſize of the *micrometer* glaſs will not be the $\frac{1}{1000}$th part of the area which would be required, if it were placed at the object-glaſs; and yet the ſame extent of ſcale is preſerved, and the images are uniformly bright in every part of the field of the teleſcope. This *micrometer* is repreſented *Tab.* III. *Optics*, *fig.* 49. A is a convex or concave lens divided into two equal parts by a plane acroſs its center; one of theſe ſemi-lenſes is fixed in a frame B, and the other in the frame E, which two frames ſlide on a plate H, and are preſſed againſt it by thin plates *a a*: the frames B and E are moved in contrary directions by turning the button D; L is a ſcale of equal parts on the frame B; it is numbered from each end towards the middle with 10, 20, &c. There are two verniers on the frame E, one at M, and the other at N, for the conveniency of meaſuring the diameter of a planet, &c. on both ſides of the zero. The firſt diviſion on both theſe verniers coincides at the ſame time with the two zeros on the ſcale L, and, if the frame is moved towards the right, the relative motion of the two frames is ſhewn on the ſcale L by the vernier M; but if the frame B be moved towards the left, the relative motion is ſhewn by the vernier N. This *micrometer* has a motion round the axis of viſion, for the conveniency of meaſuring the diameter of a planet, &c. in any direction, by turning an endleſs ſcrew F, and the inclination of the diameter meaſured with the horizon is ſhewn on the circle *g* by a vernier on the plate V. The teleſcope may be adjuſted to diſtinct viſion by means of an adjuſting ſcrew, which moves the whole eye-tube with the *micrometer* nearer or farther from the object-glaſs, as teleſcopes are generally made; or the ſame effect may be produced in a better manner, without moving the *micrometer*, by ſliding the part of the eye-tube *m* on the part *n*, by help of a ſcrew or pinion. The *micrometer* is made to take off occaſionally from the eye-tube, that the teleſcope may be uſed without it. Phil. Tranſ. vol. lxix. part ii. art. 27.

The *micrometer* has not only been applied to teleſcopes, and employed for aſtronomical purpoſes; but there have been various contrivances for adapting it to microſcopical obſervations. Mr. Leeuwenhoek's method of eſtimating the ſize of ſmall objects was by comparing them with grains of ſand, of which a hundred in a line took up an inch. Theſe grains he laid upon the ſame plate with his objects, and viewed them at the ſame time. Dr. Jurin's method was ſimilar to this; for he found the diameter of a piece of fine ſilver wire, by wrapping it as cloſe as he could about a pin, and obſerving how many rings made an inch; and he uſed this wire in the ſame manner as Leeuwenhoek uſed his ſand. Dr. Hooke uſed to look upon the magnified object with one eye, while, at the ſame time, he viewed other objects, placed at the ſame diſtance, with the other eye. In this manner he was able, by the help of a ruler, divided into inches and ſmall parts, and laid on the pedeſtal of the microſcope to caſt, as it were, the magnified appearance of the object upon the ruler, and thus exactly to meaſure the diameter which it appeared to have through the glaſs; which being compared with the diameter as it appeared to the naked eye, eaſily ſhewed the degree in which it was magnified. A little practice, ſays Mr. Baker, will render this method exceedingly eaſy and pleaſant.

Mr. Martin, in his Optics, recommends ſuch a *micrometer* for a microſcope as had been applied to teleſcopes; for he adviſes to draw a number of parallel lines on a piece of glaſs, with the fine point of a diamond, at the diſtance of $\frac{1}{20}$ of an inch from one another, and to place it in the focus of the eye-glaſs. By this method, Dr. Smith contrived to take the exact draught of objects viewed by a double microſcope; for he adviſes to get a lattice, made with ſmall ſilver wires or ſquares, drawn upon a plain glaſs by the ſtrokes of a diamond, and to put it into the place of the image, formed by the object-glaſs. Then by tranſferring the parts of the object, ſeen in the ſquares of the glaſs or lattice upon ſimilar correſponding ſquares drawn on paper, the picture may be exactly taken. Mr. Martin alſo introduced into compound microſcopes another *micrometer*, conſiſting of a ſcrew. See both theſe methods deſcribed in his Optics, p. 277.

The moſt minute and accurate diviſion of any ſcale which the editor has ever ſeen, is performed by Mr. Coventry of Southwark. The *micrometers* of his conſtruction are parallel lines drawn on glaſs, ivory, or metal, from the 10th to the 100th of an inch. Theſe may be applied to microſcopes, for meaſuring the ſize of minute objects, and the magnifying power of the glaſſes; and to teleſcopes, for meaſuring the ſize and diſtance of objects,

and the magnifying power of the inſtrument. For meaſuring the ſize of an object in a ſingle microſcope, lay it on a *micrometer*, whoſe lines are ſeen magnified in the ſame proportion with it, and give at one view the real ſize of the object. For meaſuring the magnifying power of the compound microſcope, the beſt and moſt ready method is the following. On the ſtage in the focus of the object glaſs, lay a *micrometer*, conſiſting of an inch divided into one hundred equal parts; count how many diviſions of the *micrometer* are taken into the field of view; then lay a two-foot rule parallel to the *micrometer*: fix one eye on the edge of the field of light, and the other eye on the end of the rule, which move, till the edge of the field of light and the end of the rule correſpond; then the diſtance from the end of the rule to the middle of the ſtage will be the half of the diameter of the field: e. gr. if the diſtance be ten inches, the whole of the diameter will be twenty, and the number of the diviſions of the *micrometer* contained in the diameter of the field, is the magnifying power of the microſcope. Thus, ſuppoſe the number of diviſions ſeen in the *micrometer* to be $\frac{1}{40}$ths, and that the diameter of the field meaſures with the rule twenty inches; the $\frac{1}{40}$th of 20 inches is 40, which is the diameter of the field; $40 \times 40 = 1600$ the ſuperficies, and $1600 \times 40 = 64000$, the magnified cube of the object: in like manner each object-glaſs or magniſier muſt be proved, and a table kept of their ſeveral magnifying powers. For meaſuring the height and diſtance of objects by a *micrometer* in the teleſcope, ſee TELESCOPE.

Mr. Adams has applied a *micrometer*, which inſtantly ſhews the magnifying power of any teleſcope.

MICROPHONES, inſtruments contrived to magnify ſmall ſounds, as *microſcopes* do ſmall objects.

MICROPUS, in *Botany*. See *Baſtard* CUDWEED.

MICROSCOPE, *Μικροσκοπιον*, formed of *μικρος*, *ſmall*, and *σκεπτομαι*, *I conſider*; an optical inſtrument, by means whereof very minute objects are repreſented exceedingly large, and viewed very diſtinctly, according to the laws of refraction or reflection.

Microſcopes are properly diſtinguiſhed into ſimple, or *ſingle*; and compound, or *double*.

MICROSCOPES, *ſingle*, are thoſe which conſiſt of a ſingle lens, or a ſingle ſpherule.

MICROSCOPES, *compound*, conſiſt of ſeveral lenſes duly combined. As optics have been improved, other varieties have been contrived, in the ſorts of *microſcopes*: hence *reflecting microſcopes*, *water microſcopes*, &c.

When, and by whom, *microſcopes* were firſt invented, is not certainly known. Huygens tells us, that one Drebbell, a Dutchman, had the firſt *microſcope*, in the year 1621, and that he was reputed the inventor of it: though F. Fontana, a Neapolitan, in 1646, claims the invention to himſelf, but dates it from the year 1618. As a teleſcope inverted is a *microſcope*, the diſcovery might eaſily enough have ariſen from thence.

Nothing more is certain concerning *microſcopes*, than that they were firſt uſed in Germany about the year 1621. According to Borellus, they were invented by Zacharias Janſen, in conjunction with his ſon, who preſented the firſt *microſcopes* they had conſtructed to prince Maurice, and Albert, archduke of Auſtria. William Borell, who gives this account in a letter to his brother Peter, ſays, that when he was ambaſſador in England, in 1619, Cornelius Drebell ſhewed him a *microſcope*, which he ſaid, was the ſame that the archduke had given him, and had been made by Janſen himſelf. Borellus de vero Teleſcopii inventore. p. 35. See LENS.

MICROSCOPES, *foundation and theory of ſingle*. If an object AB (*Tab.* IV. *Optics*, *fig.* 50.) be placed in the focus of a ſmall convex lens, or a ſimple *microſcope* DE, and the eye be applied cloſe to the other ſide of the *microſcope*, *the object will be ſeen diſtinct, in an erect ſituation, and magnified in the ratio of the diſtance of the focus to the diſtance wherein objects are to be placed to be ſeen diſtinctly by the naked eye.*

For the object AB being placed in the focus of the convex lens DE, the rays iſſuing from the ſeveral points thereof, after refraction, will be parallel to each other: conſequently, the eye will ſee it *diſtinctly*, by virtue of what is proved under the word TELESCOPE.

Farther, ſince one of the rays AF, proceeding from the point A, after refraction, becomes parallel to the incident ray; and therefore, ſetting aſide the thickneſs of the lens, is found directly againſt it; and the ſame holds true of all the other rays carried to the eye; the rays AF and BF, to which the reſt coming from A and B are parallel, will enter the eye in the ſame manner as if they entered without paſſing through the lens; and will therefore appear erect, as if the lens were away.

Laſtly, it is manifeſt, that the object AB will be ſeen under the ſame angle as if viewed by the naked eye: but ſince it appears very diſtinct, whereas to the naked eye, at the ſame diſtance, it would appear extremely confuſed; it is the ſame thing as if the object ſhould ſeem removed to the diſtance FH, wherein it is viewed with equal diſtinctneſs, and under the ſame angle: the diameter of the object AB, therefore, will be to the apparent diameter IK, as FC to FH, i. e. as the diſtance of the focus of the lens to the diſtance wherein an object is to be placed, in order to view it diſtinctly. Since, therefore, the interpoſition of the glaſs has no other effect than to render the appearance diſtinct, by helping the eye to increaſe the refraction of the rays in each pencil, it is plain that the greater apparent magnitude is entirely owing to a nearer view than could be taken by the naked eye.

Huygens, in Dioptrics, prop. lix. p. 222, takes it for granted, that an object, ſeen with the naked eye, is then in its utmoſt diſtinctneſs when ſeen at the diſtance of eight digits, or tenths of a foot; which agrees pretty near with the obſervations of others; who make the neareſt limit of diſtinct viſion to be eight inches. So that if the glaſs be a ſmall round globule, whoſe focal diſtance is $\frac{1}{20}$ of an inch, this globule will magnify as 8 to $\frac{1}{20}$, or as 160 to 1.

MICROSCOPES, *laws of ſingle*. 1. Simple *microſcopes* magnify the diameter of the object AB in the ratio of the diſtance of the focus FC to an interval of eight digits: v. gr. if the ſemidiameter of a lens, equally convex on both ſides, be half a digit, and conſequently its focal diſtance the ſame: AB : IK :: $\frac{1}{2}$: 8 :: 1 : 16; that is, the diameter of the object will be increaſed in a ſedecuple proportion, or as ſixteen to one. 2. Since the diſtance FH is conſtant, viz. eight digits; by how much the diſtance of the focus FC is ſmaller, ſo much the ſmaller ratio will it have to FH; conſequently, the diameter of the object will be ſo much the more magnified. 3. Since, in plano-convex lenſes, the diſtance of the focus is equal to the diameter; and, in lenſes equally convex on both ſides, to the ſemidiameter: ſimple *microſcopes* will enlarge the diameter ſo much the more, as they are ſegments of ſmaller ſpheres. 4. If the diameter of the convexities of a plano-convex lens, and a lens convex on both ſides, be the ſame, viz. = 1; the diſtance of the focus of the firſt will be 1, of the ſecond $\frac{2}{3}$: conſequently, the ſemidiameter of the object AB will be to the apparent one, in the firſt caſe, as 1 to 8; in the latter, as $\frac{2}{3}$ to 8; i. e. as 1 to 16. A lens, therefore, convex on both ſides, magniſies twice as much as a plano-convex lens.

As the whole depends on the juſt and ſteady ſituation of objects with regard to the lens, various methods have been contrived to that end; whence we have ſeveral different kinds of ſingle *microſcopes*. The moſt ſimple is as follows.

1. AB (*fig.* 51.) is a little tube, to one of whoſe baſes, BC, is fitted a plain glaſs, to which an object, viz. a gnat, wing of an inſect, down, or the like, is applied; to the other baſe, AD, at a proper diſtance from the object, is applied a lens convex on both ſides, whoſe ſemidiameter is about half an inch; the plain glaſs is turned to the ſun, or the light of a candle, and the object is ſeen magnified; and, if the tube be made to draw out, lenſes of different ſpheres may be uſed.

Again, a lens, convex on both ſides, is incloſed in a cell AC, (*fig.* 52.) and by a ſcrew H is there faſtened through the pedeſtal CD paſſes a long ſcrew, by means whereof, and the female ſcrew I, a ſtyle or needle, fixed perpendicular to its extreme, is kept firm at any diſtance from the lens: in E is a little tube, on which, and on the point G, the various objects are to be diſpoſed: thus there may be lenſes of various ſpheres applied.

2. But the *microſcope* which is found to anſwer the end beſt, is Mr. Wiſſon's pocket *microſcope*, which has nine different magnifying glaſſes, eight of which may be uſed with two different inſtruments, for better applying them to various objects. One of theſe inſtruments is repreſented at AABB (*fig.* 53.) and is made of ivory or braſs; it has three thin braſs plates at E, and a ſpiral ſpring of ſteel-wire H within it; to one of the thin plates of braſs is fixed a piece of leather F, with a ſmall furrow, G, both in the leather and braſs to which it is fixed: in one end of this inſtrument there is a long ſcrew D, with a convex glaſs C, placed in the end of it: in the other end of the inſtrument there is a hollow ſcrew *e o*; wherein any of the magnifying glaſſes, M, are ſcrewed, when they are to be made uſe of. The nine different magnifying glaſſes are all ſet in ivory, eight of which are ſet in the manner expreſſed at M. The greateſt magniſier is marked upon the ivory, wherein it is ſet, with N° 1, the next N° 2, and ſo on to N° 8; the ninth glaſs is not marked, but is ſet in the manner of a little barrel box of ivory, as at *b*. At *ee* is a flat piece of ivory, whereof there are eight belonging to this ſet of microſcopes (though any one

who has a mind to keep a regiſter of objects may have as many of them as he pleaſes; in each of them there are three holes *fff*, wherein three or more objects are placed between two thin glaſſes, or talcs, when they are to be uſed with the greater magnifiers.

The uſe of this inſtrument AABB is this. Having taken the handle W from the inſtrument in *fig.* 54. and ſcrewed it upon the button S, take one of your flat pieces of ivory *ee*, or fliders (if you pleaſe to call them ſo), and ſlide it betwixt the two thin plates of braſs at E, through the body of the *microſcope*, ſo that the object you intend to look upon be juſt in the middle; remarking that you put that ſide of the plate *ee*, where the braſs rings are, fartheſt from the end AA; then you are to ſcrew into *oo* (the hollow ſcrew in the end of the body of your *microſcope*) the 3d, 4th, 5th, 6th, or 7th magnifying glaſs M; which being done, put the end AA cloſe to your eye, and while you are looking through your magnifying glaſs upon the object, you are to ſcrew in or out the long ſcrew D, which moving round upon the leather F, held tight to it by the ſpiral wire H, will bring your object to the true diſtance; which you will know by ſeeing it clearly and diſtinctly: but ſince in the greater magnifiers you can ſee but a ſmall part of the object, viz. the legs or claws of a flea; while you are looking upon any part of the object, if you take hold of the end of the plate or ſlider *ee*, whereon the object lies, and move it gently, you may ſee the whole object ſucceſſively, or any part of the object you pleaſe; and if that part of the object you deſign to look upon be out of the true diſtance, remember your end ſcrew D, can always bring it in, by ſcrewing it one way or the other.

After this manner may be ſeen all tranſparent objects, duſts, liquids, chryſtals of ſalts, ſmall inſects, ſuch as fleas, mites, &c. If they be inſects that will creep away, or ſuch objects as one intends to keep, they may be placed between the two regiſter glaſſes *ff*. For by taking out (with the point of a pen-knife or ſmall plyers) the ring that keeps in the glaſſes *ff*, where the object lies, they will fall out of themſelves; ſo you may lay the object between the two hollow ſides of them, and put the ring in as it was before; but if the objects be duſts or liquids, a ſmall drop of the liquid, or a little of the duſt laid on the outſide of the glaſs *ff*, and applied as before, will be ſeen very eaſily.

As to the firſt, ſecond, and third magnifying glaſſes, being marked with a + upon the ivory wherein they are ſet, they are only to be uſed with thoſe plates or fliders that are alſo marked with a +, wherein the objects are placed between two thin tales; becauſe the thickneſs of the glaſſes in the other plates or fliders, hinder the object from approaching to the true diſtance from theſe greater magnifiers. But the manner of uſing them is the ſame with the former; only remember to be careful when you put in or pull out the plate or ſlider *ee*, whereon the object lies, or move it from one object to another, not to let it rub your magnifying glaſs; which is done by unſcrewing a little the end ſcrew D, when you put in or pull out your plate, or move it from one object to another.

For ſeeing the circulation of the blood at the extremities of the arteries and veins, in the tranſparent parts of fiſhes tails, &c. there are two glaſs tubes, the one bigger and the other leſſer, as expreſſed at *g g*, wherein the fiſh is to be put; when theſe tubes are to be uſed, you are to unſcrew the end ſcrew D in the body of the *microſcope*, until the tube *g g* can be received eaſily into that little cavity G of the braſs plate faſtened to the leather F, under the other two thin plates of braſs at E. When the tail of your fiſh lies flat to the glaſs tube, ſet it oppoſite to your magnifying-glaſs, and by ſcrewing in or out your end ſcrew D, as is ſaid before, you may eaſily bring it to the true diſtance, and ſee the blood circulate with great pleaſure.

If you would ſee the blood circulate in a frog's foot, chooſe ſuch a frog as will juſt go into your tube; then with a little ſtick expand the hinder foot of the frog, and apply it cloſe to the ſide of the tube, obſerving that no part of the frog hinders the light from coming on its foot; and when you have it at the juſt diſtance, by means of the ſcrew D, as aboveſaid, you will ſee the rapid motion of the blood in its veſſels, which are very numerous, in the tranſparent thin membrane that is between the frog's toes. For this object the 4th and 5th magnifiers will do very well; but you may ſee the circulation in the tails of water-newts with the 6th and 7th glaſſes, becauſe the globules of the blood of thoſe newts are as big again as the globules of the blood of frogs or ſmall fiſh, as has been taken notice of in N° 280 of the Philoſophical Tranſactions, p. 1184.

The circulation cannot ſo well be ſeen by the firſt, ſecond, and third magnifiers, becauſe the thickneſs of the glaſs tube wherein the fiſh lies, hinders the approach of the object to the focus of the magnifying glaſs.

The other inſtrument (*fig.* 54.) is made of braſs or prince's metal, with joints PPP to turn eaſily any way, and with a ſmall pair of tongs G G, which open at the points K, by preſſing together the two heads of the pins II, for taking up of objects. At the other end of theſe tongs G G, is ſcrewed on a round piece of black wood H, with a piece of ivory let into it, for placing opake objects on, according to their difference of colour. Upon the end L there is a ſcrew, upon which the glaſs *b* ſet in the barrel-box may be ſcrewed. When the other glaſſes are to be uſed, there is a ring R of braſs to be ſcrewed on the end L, into which ring all the other glaſſes M, may be ſcrewed. So when any object is taken up in the points of the tongs K, or laid upon the other end H, it may very eaſily (as one who ſees the inſtrument will perceive) be applied to the true focal diſtance of any of the glaſſes M, by the help of the joints PPP, and by means of the ſcrew C, with the wheel D, which being regulated by a ſpring N, will bring the object to the exact diſtance for diſtinct viſion.

The glaſs placed in the manner of a barrel-box at *b*, is only to be uſed with the braſs inſtrument (or in your hand) being the leaſt magnifier for greater objects, ſuch as flies and common inſects, &c. remembering to put the hole *b* next to your eye.

In the viewing objects, one ought to be careful not to hinder the light from falling upon them, by the hat, peruke, or any other thing, eſpecially in looking at opake objects; for nothing can be ſeen with the beſt of glaſſes, unleſs the object be at a due diſtance, with a ſufficient light. The beſt lights for the plates or fliders, where the object lies between the two glaſſes, is a clear ſky-light, or where the ſun ſhines on any white thing, or the reflection of the light from a looking-glaſs. The light of a candle is likewiſe good for the viewing of very ſmall objects, though it be a little uneaſy to thoſe who are not practiſed in *microſcopes* to find it out. The only uſe of the convex lens at C is to collect the light into a narrower compaſs where it falls upon the object, after it has paſſed through a moderate hole in the leather F.

For the convenience of thoſe who would draw, or make any ſketches or deſigns of *microſcopical* objects, they may alſo have a pedeſtal to fix the two inſtruments above deſcribed, and make them ſtationary to any convenient light. This pedeſtal may be placed on a table, and after the object and light are fixed, as many perſons as pleaſe may view the object, without any trouble or difficulty in finding the light. Phil. Tranſ. abr. vol. iv. p. 199, &c. What has been ſaid hitherto, is to be underſtood of *lenticular microſcopes*; for *ſpherical* ones, their doctrine will be underſtood from what follows.

If an object AB (*fig.* 55.) be placed in the focus of a glaſs ſpherule F, and the eye be behind it, v. gr. in the focus G; the object will be ſeen diſtinct, in an erect ſituation, and magnified, as to its diameter, in a ratio of $\frac{1}{4}$ of the diameter EI, to the diſtance at which objects are to be placed to be ſeen diſtinctly with the naked eye.

The firſt part of the propoſition is proved in the ſame manner of ſpheres, as of lenſes. As, then, a good eye ſees an object diſtinctly at the diſtance of eight digits, a glaſs ſpherule will enlarge the diameter of an object in a ratio of $\frac{1}{4}$ of the diameter to 8 digits. Suppoſe, then, the diameter of the ſpherule EI $= \frac{1}{20}$ of a digit, CE will be $= \frac{1}{20}$, and FE $= \frac{1}{16}$; and therefore FC $= \frac{1}{16} + \frac{1}{16} = \frac{1}{8}$. Conſequently, the true diameter of an object to its apparent one is in the ratio of $\frac{1}{20}$ to 8; i. e. as 3 to 320, or as 1 to 106 nearly.

Now a lens, convex on both ſides, increaſes the diameter in a ratio of the ſemidiameter to the ſpace of eight digits; wherefore $\frac{1}{4}$ having a leſs ratio to 8 than $\frac{1}{3}$, if a lens and a ſphere have the ſame diameter, the former will magnify more than the latter; and, pretty much after the ſame manner, it may be ſhewn, that a ſphere, of a leſs diameter, magnifies more than another of a large one.

For the methods of caſting little glaſs ſpherules for MICROSCOPES, there are various. The firſt perſon who improved ſingle *microſcopes* by uſing ſmall globules of glaſs, made by melting them in the flame of a candle, was Hartſocker, who thus diſcovered the animalcula in ſemine maſculino, and laid the foundation of a new ſyſtem of GENERATION. Wolfius deſcribes the following method of making globules of this kind: a ſmall piece of very fine glaſs, ſticking to the wet point of a ſteel needle, is to be applied to the extreme bluiſh part of the flame of a lamp, or, which is better, to the flame of ſpirit of wine, to prevent its being blackened: being there melted, and run into a little round drop, it is to be removed from the flame, upon which it inſtantly ceaſes to be fluid; folding, then, a thin plate of braſs, and making very ſmall

ſmooth

smooth perforations, ſo as not to leave any roughneſs on the ſurfaces; and, farther, ſmoothing them over, to prevent any glaring, fit the ſpherule between the plates againſt the apertures, and put the whole in a frame, with objects convenient for obſervation.

Mr. Adams gives another method, thus: take a piece of fine window-glaſs, and raiſe it, with a diamond, into as many lengths as you think needful, not exceeding an eighth of an inch in breadth; then holding one of theſe lengths between the fore-finger and thumb of each hand, over a very fine flame, till the glaſs begins to ſoften, draw it out till it be as fine as a hair, and break; then, applying each of the ends into the pureſt part of the flame, you have two ſpheres preſently, which you may make larger, or leſs, at pleaſure: if they ſtay long in the flame, they will have ſpots; ſo they muſt be drawn out immediately after they are turned round. As to the ſtem, break it off as near the ball as poſſible; and, lodging the remainder of the ſtem between the plates, by drilling the hole exactly round, all the protuberances are buried between the plates: and the *microſcope* performs to admiration.

Mr. Butterfield, in the Phil. Tranſ. N° 141, recommends, for making glaſs globules clear and without ſpecks, the flame of a lamp, made with rectified ſpirit of wine, and inſtead of a cotton wick fine ſilver-wire, doubled like a ſkain of thread; then having beaten ſome fine glaſs to powder, and waſhed it clean, he directs to take a little of it upon the ſharp point of a ſilver needle, wetted with ſpittle, and to hold it in the flame, turning it about till it melts, and becomes quite round. When many globules are thus formed, he rubs them with ſoft leather; and having ſeveral ſmall pieces of thin braſs plates, twice as long as they are broad, he doubles them up into the form of a ſquare, and puſhes a fine hole through the middle of them; and having rubbed off the burr about the holes with a whetſtone, and blackened the inſide of the plates with the ſmoke of a candle, he places a globule between the two holes, and tacks the plates together with two or three rivets.

After theſe manners may ſpheres be made much ſmaller than any lens; ſo that the beſt ſingle *microſcopes*, or thoſe which magnify the moſt, are made thereof. For ſuppoſe the diameter of a ſpherule to be $\frac{1}{72}$ of a digit, the diſtance of its focus will be $\frac{1}{144}$; and therefore its real diameter to its apparent one, as $\frac{1}{144} + \frac{1}{144}$ that is, as $\frac{1}{144}$ to 8, or as 3 to 512; or, laſtly, as 1 to 170. The ſurface of an object, therefore, will be increaſed by it in the proportion of 1 to 28900, and its bulk in a ratio of 1 to 4913000.

M. Leeuwenhoeck and M. Muſchenbroeck have ſucceeded very well in ſpherical *microſcopes*; and the apparatus of the latter is much commended: but we forbear any deſcriptions thereof; it being eaſy for any, who conſiders the ſtructure of thoſe conſiſting of lenſes, to conceive how thoſe of ſpheres may be contrived.

M. Leeuwenhoeck's *microſcopes* were all ſingle ones; each of them conſiſting of a ſmall double convex glaſs ſet in a ſocket, between two ſilver plates, rivetted together, and pierced with a ſmall hole; and the object was placed on the point of a needle, ſo contrived, as to be placed at any diſtance from the lens. If the objects were ſolid, he faſtened them with glue; and if they were fluid, or, on other accounts, required to be ſpread on glaſs, he placed them on a ſmall piece of Muſcovy tale, or glaſs blown very thin, which he afterwards glued to his needle. He had, however, a different apparatus for viewing the circulation of the blood, which he could fix to the ſame *microſcopes*. Thoſe which he bequeathed to the Royal Society were contained in a ſmall Indian cabinet, in the drawers of which were thirteen little boxes or caſes, in each of which were two *microſcopes*, neatly fitted up in ſilver; and both the glaſs and the apparatus were made with his own hands. The greateſt magnifier among theſe enlarged the diameter of an object about 160 times. Phil. Tranſ. abr. vol. vi. p. 129, &c. Id. vol. viii. p. 121, &c.

The ſmalleſt globules, and conſequently the greateſt magnifiers for *microſcopes* that have yet been executed, were made by P. Di Torre of Naples, who, in 1765, ſent four of them to the Royal Society. The largeſt of them was only two Paris points in diameter, and is ſaid to magnify the diameter of an object 640 times; the ſecond was the ſize of one Paris point, magnifying the diameter 1280 times, and the third no more than one half of a Paris point, or the 144th part of an inch in diameter, and was ſaid to magnify the diameter of an object 2560 times, and conſequently the ſquare of ſuch diameter 6,553,600 times. But ſince the focus of a glaſs globule is at the diſtance of one-fourth of its diameter, and, therefore, that of the third globule of Di Torre, above mentioned, only the 576th part of an inch diſtant from the object, it muſt be with the utmoſt difficulty that globules ſo minute as theſe can be employed to any purpoſe: and Mr. Baker, to whoſe examination they were referred, conſiders them as matters of curioſity rather than of real uſe. Phil. Tranſ. vol. lv. p. 240. vol. lvi. p. 67, &c. For an account of obſervations made with theſe globules on the blood, ſee BLOOD.

MICROSCOPE, *water*. Mr. S. Gray, and, after him, Wolfius, and others, have contrived *water-microſcopes*, conſiſting of ſpherules, or lenſes of water, inſtead of glaſs, fitted up ſomewhat after the manner of thoſe above mentioned (as ſpheres of water may be likewiſe uſed inſtead of glaſs in any of the common *microſcopes*.) But ſince the diſtance of the focus of a lens or ſphere of water is greater than that of one of glaſs, (the ſpheres whereof they are ſegments being the ſame), *water-microſcopes* magnify leſs, and are therefore leſs eſteemed than thoſe of glaſs. The ſame Mr. Gray firſt obſerved, that a ſmall drop or hemiſpherule of water, held to the eye by candle-light or moonlight, without any other apparatus, magnified the animalcule contained in it, vaſtly more than any other *microſcope*. The reaſon is, that the rays, coming from the interior ſurface of the firſt hemiſphere, are reflected ſo as to fall under the ſame angle on the ſurface of the hind hemiſphere, to which the eye is applied, as if they came from the focus of the ſpherule; whence they are propagated to the eye in the ſame manner as if the objects were placed without the ſpherule in its focus.

Hollow glaſs ſpheres, of the diameter of about half a digit, filled with ſpirit of wine, are frequently uſed for *microſcopes*; but they do not magnify near ſo much.

MICROSCOPES, *theory of compound, or double*. Suppoſe an object glaſs ED, *fig.* 56. N° 1.) the ſegment of a very ſmall ſphere, and the object AB placed without the focus F.

Suppoſe an eye-glaſs GH, convex on both ſides, and the ſegment of a ſphere greater (though not too great) than that of DE; and ſet it be ſo diſpoſed behind the object, as that if CF : CL :: CL : CK; the focus of the eye-glaſs may be in K.

Laſtly, ſuppoſe LK : LM :: LM : LI.

If, then, O be the place wherein an object is ſeen diſtinct with the naked eye; the eye, in this caſe, being placed in I, will ſee the object AB diſtinctly, in an inverted ſituation, and magnified in a compound ratio of MK to LK, and LC to CO; as is proved from the laws of dioptrics; i. e. the image itſelf is larger than the object, and we are able to view it diſtinctly at a leſs diſtance. E. gr. If the image be twenty times larger than the object, and by the help of the eye-glaſs we are able to view it five times nearer than we could have done with the naked eye, it will, on both theſe accounts, be magnified 5 times 20, or 100 times.

MICROSCOPES, *laws of double*. 1. The more an object is magnified by the *microſcope*, the leſs is its *field*, i. e. the leſs of it it takes in at one view.

2. To the ſame eye-glaſs may be ſucceſſively applied object-glaſſes of various ſpheres, ſo as that both the entire objects, but leſs magnified, and their ſeveral parts, much more magnified, may be viewed through the ſame *microſcope*. In which caſe, on account of the different diſtance of the image, the tube LK, in which the lenſes are fitted, ſhould be made to draw out. For the proportion of the object-glaſs to the eye-glaſs, ſome commend the ſubduple ratio, and ſome the ſubſeſquitertile. De Chales will have the ſemidiameter of the convexity of the object-glaſs to be $\frac{1}{4}$ of a digit, or, at moſt, $\frac{1}{3}$; in the eye-glaſs an entire digit, or even $1\frac{1}{4}$. Cherubin makes the ſemidiameter of the object-glaſs $\frac{1}{2}$, $\frac{1}{3}$, or $\frac{1}{4}$ of a digit; the ſemidiameter of the eye-glaſs $1\frac{1}{2}$, or $1\frac{1}{3}$ of a digit.

3. Since it is proved, that the diſtance of the image LK from the object-glaſs DE will be greater, if another lens, concave on both ſides, be placed before its focus; it follows, that the object will be magnified the more, if ſuch a lens be here placed between the object-glaſs DE, and the eye-glaſs GH. Such a *microſcope* is much commended by Conradi, who uſed an object-lens, convex on both ſides, whoſe ſemidiameter was two digits, its aperture equal to a muſtard-ſeed; a lens, concave on both ſides, 12, or at moſt 16 digits; and an eye-glaſs, convex on both ſides, of 6 digits.

4. Since the image is projected to the greater diſtance, the nearer another lens, of a ſegment of a larger ſphere, is brought to the object-glaſs; a *microſcope* may be compoſed of three lenſes, which will magnify prodigiouſly.

5. From theſe conſiderations it follows, that the object will be magnified the more, as the eye-glaſs is the ſegment of a ſmaller ſphere; but the field of viſion will be the greater, as the ſame is a ſegment of a larger ſphere. If, then, two eye-glaſſes, the one a ſegment of a larger, the other of a ſmaller ſphere, be ſo combined, as that the object appearing very near through them, i. e. not

farther diſtant than the focus of the firſt, be yet diſtinct; the object, at the ſame time, will be exceedingly magnified, and the field of viſion much greater than if only one lens was uſed; and the object will be ſtill more magnified, and the field enlarged, if both the object and eye-glaſs be double. But in regard an object appears dim, when viewed through ſo many glaſſes, part of the rays being reflected in paſſing through each, the multiplying of lenſes is not adviſeable; and the beſt, among compound *microſcopes*, are thoſe which conſiſt of one object-glaſs, and two eye-glaſſes.

Dr. Hooke tells us, in the preface to his Micrography, that in moſt of his obſervations he uſed a *microſcope* of this kind, with a middle eye-glaſs of a conſiderable diameter, when he wanted to ſee much of the object at one view, and took it out when he would examine the ſmall parts of an object more accurately; for the fewer refractions there are, the more light and clear the object appears.

For a *microſcope* of three lenſes, De Chales commends an object-glaſs of $\frac{1}{3}$ or $\frac{1}{4}$ of a digit; and the firſt eye-glaſs he makes 2, or $2\frac{1}{2}$ digits; the diſtance between the object-glaſs and eye-glaſs about twenty lines. Conradi had an excellent *microſcope*, the object-glaſs whereof was half a digit, and the two eye-glaſſes (which were placed very near) four digits; but it anſwered beſt, when, in lieu of the object-glaſs, he uſed two glaſſes, convex on both ſides, their ſphere about a digit and a half, or at moſt two, and their convexities touching each other within the ſpace of half a line. Euſtachius de Divinis, inſtead of an object-glaſs, convex on both ſides, uſed two plano-convex lenſes, whoſe convexities touched; Grindelius did the ſame, only that the convexities did not quite touch. Zalmius made a binocular *microſcope*, wherein both eyes were uſed.

It is obſerved, that compound *microſcopes* ſometimes exhibit a fallacious appearance, by repreſenting convex objects concave, and *vice verſâ*. See Phil. Tranſ. N° 476, p. 387.

MICROSCOPE, *ſtructure or mechaniſm of a double.* The induſtry and addreſs of our countryman, Mr. Marſhal, here deſerves to be remembered: the moſt commodious *double microſcope* is of his contrivance. In this, the eye-glaſs is at W (*fig.* 57.) the object-glaſs at C, the middle glaſs at A 1; B is the cover or lid, to keep out the duſt from the eye-glaſs W; X is the place of the eye, W a ſcrew where the eye-glaſs lies; A a ſcrew where the middle glaſs lies; A the draw, where the outermoſt tube A 1 A 2 is diſjoined from the inner one, of the ſame length; Z the frame or baſis on which the *microſcope* ſtands firm; T a ſmall drawer in the frame or baſis, with a ledge or till in it, having ſix partitions to hold ſo many ſeveral object-glaſſes, one magnifying more than another, and fixed in braſs cells ready to ſcrew on at C, and marked 1, 2, 3, 4, 5, 6; theſe partitions are alſo marked 1, 2, 3, 4, 5, 6; the other part of the drawer ſerves to hold the object-plate *a*; a pair of ſmall nippers *b*, to take up, or handle any object conveniently; another object-plate *d*, having one ſide white and the other black, to fix your objects upon, as black upon white, and white objects on black. L, M, is a braſs ball and ſocket, on which the whole body of the *microſcope* is moveable, ſo as to lie in any poſition for the light. K, O, a ſquare braſs pillar, on which the *microſcope* is moveable up and down, by means of the collar E, into which the arm D (holding the *microſcope*) is continued. G another braſs collar ſliding up and down on the pillar KO, having a ſmall ſcrew H, by which it is, as occaſion ſerves, fixed faſt to the ſaid pillar, at any height. I a large braſs nut, in whoſe center is a female ſcrew, fitted to the male ſcrew F, which is fixed in the collar E; by the turning of which nut I (the collar G being firſt fixed to the pillar by the ſcrew H) the *microſcope* is raiſed up or down on the pillar, and made to come nearer or go farther from the object P *c*; and, which is alſo a very great advantage, the axis of the *microſcope* is always kept perpendicular to that point of the object, over which it was firſt placed; ſo that here is not the inconvenience which occurs in other glaſſes, of often loſing the ſight of the object, by ſcrewing the glaſs C higher or lower. PQ is a glaſs object-plate fixed in a braſs frame, whoſe arm NN is fixed to the pillar by means of the nut O. The arm NN hath in it a ſlit, by which it is eaſily put on, or taken off the pillar, and by which it may be fixed upon it at any diſtance. P a ſmall diſh lying on the glaſs-plate, that the circulation of the blood may be ſeen in the end of the tail-fiſh at *c*. R a convex glaſs, by whoſe help a bright ſpot of light is brought from a candle at S, ſtanding on the ground, while the *microſcope* ſtands on the edge of a table or ſtool, which ſpot of light *c* ſerves to render the circulation more conſpicuous. V a lead coffin to be put on the fiſh, to hinder it from ſpringing away, and moving his tail out of the light. 1, 2, 3, 4, 5, 6, are marks on the pillar KO, to ſhew the reſpective diſtances of the object-glaſs from the object you look upon, according as the object-glaſſes you make uſe of magnify more or leſs: Thus, for inſtance, if you uſe the object-glaſs 5 or 6 (either of which will ſhew the circulation of the blood) you muſt fix the upper edge of the collar E, at the mark 5 or 6 on the pillar. And then the *microſcope* will be very near its exact diſtance from the object; ſo that by a ſmall turn or two of the nut I one way or the other, to be found by trial, you may ſoon fit it exactly to your own eye.

By this *microſcope* liquors alſo may be very commodiouſly examined; for if you place a ſmall drop of any liquor on the glaſs-plate juſt in the middle of the ſpot of light *c*, the parts of it will become very viſible, and its animalcula, if it have any, will be diſcovered. And thus may the eels in vinegar, the ſmall creatures in black-pepper water, or in waters where wheat, barley, &c. has been infuſed, the eels and other ſmall living creatures in puddle-water, be as plainly ſeen as by almoſt any other *microſcope*.

In the *microſcope*, in which the objects are illuminated by reflection, made by Mr. Culpeper and Mr. Scarlet, as an improvement of Mr. Marſhal's, the inner tube *ab*, (*fig.* 58.) which ſlides in the outer *cd*, holds all the glaſſes. The eye-glaſs is at *a a*, the broad middle glaſs at *bb*, and the object-glaſs, being fixt in a button at *e*, is ſcrewed upon the end of a narrower tube *fg*; which being fixed in the baſe of the inner tube, paſſes freely through a hole in the baſe of the outer. The buttons that contain the ſeveral object-glaſſes are marked 1, 2, 3, &c. and the convexity of the inner tube is alſo marked with dotted circles, numbered 1, 2, 3, &c. in order to bring that circle to coincide with the mouth *ee* of the outer tube, whoſe number is the ſame as that of the object-glaſs then made uſe of. But if the object does not yet appear quite diſtinct, the button *e* upon the ſnout *fg* muſt be gradually unſcrewed, to bring the glaſs nearer to the object placed below it. Of theſe glaſſes the greater magnifiers are known by their having ſmaller apertures.

The baſe *dd* of the outer tube is ſupported by three braſs pillars, fixed into a wooden pedeſtal *hh*; and a little below the object-glaſs *f*, a circular plate *iii* is lodged like a ſtage between the pillars, three ſemicircular notches being cut in its circumference to receive the pillars, and to reſt upon three rings that ſurround them. Three ſmall braſs circles *mm*, with holes through the middle of them, are to be placed over the hole *k* in the middle of the ſtage; and then the ivory plate *o* may be put between the two uppermoſt of theſe circles, which are preſſed together by a ſpiral ſpringing wire lodged between the two undermoſt; the two outermoſt being held together by three ſmall pillars paſſing through three holes in the circumference of the middle circle. For viewing the circulation of the blood, the button *p*, on the under ſide of the frame of a broad plane glaſs *qr*, being put through a ſlit *i*, made in the ſtage, a ſmall braſs plate *s*, under the ſtage, muſt be moved inwards, till a ſmaller ſlit in it embraces the neck of the ſaid button; and then the fiſh being laid upon this glaſs, and covered with the coffin *t*, its tail may be brought exactly under the object-glaſs by turning the glaſs *pq* about the button, or by ſhoving it inwards or outwards along the ſlit *i* in the ſtage. The circular object-plate *uu* has a like button in its center, to be put into the ſame ſlit as before; and then the different objects, placed between two tales in the holes made round the circumference of the plate, may be viewed ſucceſſively by turning the plate about its center.

All theſe tranſparent objects are illuminated extremely well in this *microſcope*, either by candle-light or ſky-light reflected upwards from a concave looking-glaſs *vz*, placed in a frame upon the center *b* of the pedeſtal. While you are viewing the object through the *microſcope*, turn this concave upon its horizontal poles *y*, *z*, and you will ſoon find out that poſition of it wherein it reflects the moſt light through the hole *k* upon the object; and this happens when it reflects the rays very obliquely. Opake objects, when laid upon a black ebony or a white ivory plate, put into the hole *k* upon the ſtage, may be illuminated by candle-light tranſmitted through a double convex lens *aa*; the foot *y*, of the frame *ay*, in which it turns, being put into the hole *l* in the ſtage. The candle muſt be placed in a line drawn from the object through the middle of this lens, at ſuch a diſtance from it as ſhall cauſe the ſpot of light upon the object-plate to be the narroweſt. By day-light this lens gives little or no advantage to the direct ſky-light.

To fit *microſcopes*, as well as TELESCOPES, to ſhort-ſighted eyes, the object-glaſs and the eye-glaſs muſt be placed a little nearer together, ſo that the rays of each pencil may not emerge parallel, but may fall diverging upon the eye.

MICROSCOPE, *reflecting*, is, properly, that which magnifies by reflection, as the above mentioned ones do by refraction.

The ſtructure of ſuch a *microſcope* may be conceived thus: near the focus of a concave ſpeculum, AB (*fig.* 59.) place a minute object C, that its image may be formed larger than itſelf in D; to the ſpeculum join a lens, convex on both ſides, EF, ſo as the image D may be in its focus.

The eye will here ſee the image inverted, but diſtinct, and enlarged; conſequently, the object will be larger than if viewed through the lens alone.

The inventor of this *microſcope* is the great Sir I. Newton; but the objects appear dim in it.

Any teleſcope is converted into a *microſcope*, by removing the object-glaſs to a greater diſtance from the eye-glaſs. And ſince the diſtance of the image is various, according to the diſtance of the object from the focus; and it is magnified the more, as its diſtance from the object-glaſs is greater; the ſame teleſcope may be ſucceſſively converted into *microſcopes*, which magnify the object in different degrees.

The conſtruction of this *microſcope* is more particularly explained in *fig.* 60. in which, inſtead of the lens d e f, there is placed a ſmall ſpeculum *d e f*; ſo that the object *a c b* being placed above it, at a little greater diſtance from the focus *g*, has its image ACB, formed by reflexion, as in the other caſe it was by refraction, through the lens d f. Now if we ſuppoſe the focal diſtance of the object ſpeculum *d e f*, and lens d e f the ſame, the effect of the *microſcope* will, in other reſpects, be the ſame alſo.

For the diſtance of the object *a b* above the ſpeculum, will be equal to the diſtance of the object a b below the lens, in order that the image may be formed at the ſame diſtance C*c*. The poſition of the object will be inverted; for all the rays flowing from the point *a*, will be reflected by the ſpeculum to the point A, in the ſame manner as if they came by refraction through the lens from the point *a*. Thus the part *b* in the object will be reflected to the focus B in the image, which, therefore, is inverted. The power of magnifying will alſo be the ſame in this and in the reflecting TELESCOPE of a ſimilar conſtruction. For ſince the image AB and the object *a b* are ſeen under equal angles from the vertex *e* of the ſpeculum, the triangles *a e b*, and A*e* B will be ſimilar, and therefore A B : *a b* :: C*e* : *e e*; but in the other it is AB : a b :: C*e* : *e e*. But the latter ratio of theſe analogies is the ſame in both, and conſequently the firſt is ſo too. This *microſcope* is not ſo eaſy to manage as the common ſort. For viſion by reflexion, as it is much more perfect, ſo it is far more difficult than that by refraction. Nor is this *microſcope* ſo uſeful for any but very ſmall, or tranſparent objects. For the object, being between the ſpeculum and image, would, if it were large and opake, prevent a due reflexion.

In Dr. Smith's reflecting *microſcope* there are two reflecting mirrors, one concave and the other convex, and the image is viewed by a lens. To explain it, let AD, (*fig.* 61.) be a large concave ſpeculum, and *a d* a ſmall convex one, each perforated in the middle with the holes BC, *b c*. Both theſe are ſegments of the ſame ſphere, or ground on tools of an equal radius, viz. of two inches, that ſo the focal diſtance of each ſpeculum may be juſt one inch.

Theſe two ſpeculums are placed at the diſtance of about 1⅝ inch from each other, that ſo an object OPQ, being placed a little below the ſmaller ſpeculum, might be between the focus F and center E of the larger ſpeculum. Things thus circumſtanced, the rays PA, PD, which flow from the point P in the object, on the ſpeculum AD, will be reflected towards a focus *p*, where an image *o p q* would be formed, if the rays were not intercepted by the convex ſpeculum *a d*; and the point *p* being nearer than its focus *f*, the rays A*o*, D*d*, which tend or converge towards it, will be reflected to a focus *P*, where the laſt image, *OPQ*, will be formed, to be viewed through the eye-glaſs G, by the eye at I.

This *microſcope*, though far from being executed in the beſt manner, performed, Dr. Smith ſays, nearly as well as the very beſt refracting *microſcopes*; ſo that he did not doubt but that it would have excelled them, if it had been executed properly. Dr. Smith's own account of this inſtrument may be ſeen in his Opticks Remarks, p. 94.

MICROSCOPE, *ſolar*, called alſo the camera obſcura *microſcope*, was invented by Mr. Lieberkuhn in 1738 or 1739, and is compoſed of a tube, a looking-glaſs, a convex lens, and a Wilſon's *microſcope*. The tube (*fig.* 62.) is braſs, near two inches in diameter, fixed in a circular collar of mahogany, with a groove on its periphery on the outſide, denoted by 2, 3, and connected by a cat-gut to the pulley 4 on the upper part; which turning round at pleaſure, by the pin 5 within, in a ſquare frame, may be adjuſted eaſily to a hole in the ſhutter of a window, by the ſcrews 1, 1, in ſuch a manner that no light can paſs into the room but through the aforeſaid tube. Fattened to the frame by hinges, on the ſide that goes without the window, is a looking-glaſs G, which, by means of a jointed braſs-wire, 6, 7, and the ſcrew H 8, coming through the frame, may be moved either vertically or horizontally, to throw the ſun's rays through the braſs tube into the darkened room. The end of the braſs tube without the ſhutter has a convex lens, 5, to collect the rays, thrown on it by the glaſs G, and bring them to a focus in the other part, where D is a tube ſliding in and out, to adjuſt the object to a due diſtance from the focus; and to the end G of another tube F, is ſcrewed one of Wilſon's ſimple pocket *microſcopes*, containing the object to be magnified in a ſlider; and by the tube F, ſliding on the ſmall end E of the other tube D, it is brought to a true focal diſtance.

The ſolar *microſcope* has been introduced into the ſmall and portable, as well as the large CAMERA *obſcura*; and if the image be received upon a piece of half-ground glaſs, ſhaded from the light of the ſun, it will be ſufficiently viſible. M. Lieberkuhn made conſiderable improvements in his ſolar *microſcope*, particularly in adapting it to the view of opake objects; and M. Æpinus, Nov. Com. Petrop. vol. ix. p. 326, has contrived, by throwing the light upon the foreſide of any object, before it is tranſmitted through the object lens, to repreſent with equal advantage all kinds of objects by it. In this improvement, the body of the common ſolar *microſcope* is retained, and only an addition made of two braſs plates, C A and B A (*fig.* 63.) joined by a hinge, and kept at a proper diſtance by a ſcrew. A ſection of theſe plates, and of all the neceſſary parts of the inſtrument, may be ſeen in *fig.* 64. where *r*, *a*, repreſent rays of the ſun converging from the illuminating lens, and falling upon the mirror *d b*, which is fixed to the nearer of the braſs plates. From this they are thrown upon the object at *e f*, and thence are tranſmitted through the object lens at *k*, and a perforation in the farther plate, upon a ſcreen, as uſual. The uſe of the ſcrew *n* is to vary the diſtance of the two plates, and thereby to adjuſt the mirror to the object with the greateſt exactneſs. For Mr. Euler's method of introducing viſion by reflected light into this *microſcope*, ſee MAGIC *lantern*.

The MICROSCOPE *for opake objects* was alſo invented by M. Lieberkuhn about the ſame time with the former, and remedies the inconvenience of having the dark ſide of an object next the eye; for by means of a concave ſpeculum of ſilver, highly poliſhed, in whoſe center a magnifying lens is placed, the object is ſo ſtrongly illuminated, that it may be examined with eaſe. A convenient apparatus of this kind, with four different ſpeculums and magnifiers of different powers, was brought to perfection by Mr. Cuſſ. Phil. Trans. N° 458. § 9.

MICROSCOPIC *objects*. All things too minute to be viewed diſtinctly by the naked eye, are proper objects for the *microſcope*. Dr. Hooke has diſtinguiſhed them to be exceeding ſmall bodies, exceeding ſmall pores, or exceeding ſmall motions.

Exceeding ſmall bodies muſt either be the parts of larger bodies, or things, the whole of which is exceedingly minute, ſuch as ſmall ſeeds, inſects, ſands, ſalts, &c.

Exceeding ſmall pores are the interſtices between the ſolid parts of bodies, as in ſtones, minerals, ſhells, &c. or the mouths of minute veſſels in vegetables, or the pores in the ſkin, bones, and other parts of animals.

Exceeding ſmall motions are the movements of the ſeveral parts or members of minute animals, or the motion of the fluids, contained either in animal or vegetable bodies. Under one or other of theſe three heads, almoſt every thing about us affords us matter of obſervation, and may conduce both to our amuſement and inſtruction.

An examination of theſe objects, however, ſo as to diſcover truth, requires a great deal of attention, care, and patience, with ſome ſkill and dexterity, to be acquired chiefly by practice, in the preparing, managing, and applying them to the *microſcope*.

Whatever object offers itſelf as the ſubject of our examination, the ſize, contexture, and nature of it, are firſt to be conſidered, in order to apply it to ſuch glaſſes, and in ſuch a manner as may ſhew it beſt. The firſt ſtep ſhould always be to view the whole together, with ſuch a magnifier as can take it in all at once; and after this the ſeveral parts of it may the more fitly be examined, whether remaining on the object, or ſeparated from it. The ſmaller the parts are which are to be examined, the more powerful ſhould be the magnifiers employed; the tranſparency or opacity of the object muſt alſo be conſidered, and the glaſſes employed accordingly ſuited thereto; for a tranſparent object will bear a much greater magnifier than one which is opake, ſince the nearneſs

that

that a glass must be placed at, unavoidably darkens an object if in its own nature opake, and renders it very difficult to be seen, unless by the help of the apparatus contrived for that purpose, which has a silver speculum. Most objects however become transparent by being divided into extremely thin parts.

The nature of the object also, whether it be alive or dead, solid or a fluid, an animal, a vegetable, or a mineral substance, must likewise be considered, and all the circumstances of it attended to, that we may apply it in the most advantageous manner. If it be a living object, care must be taken not to squeeze or injure it, that we may see it in its natural state and full perfection. If it be a fluid, and that too thick, it must be diluted with water; and if too thin, we should let some of its watery parts evaporate. Some substances are fitteſt for observation when dry, others when moiſtened; ſome when freſh, and others after they have been kept ſome time.

Light is the next thing to be taken care of; for on this the truth of all our obſervations depends; and a very little obſervation will ſhew how very different objects appear in one degree of it to what they do in another; ſo that every new object ſhould be viewed in all degrees of light, from the greateſt glare of brightneſs to perfect obſcurity, and that in all poſitions to each degree, till we hit upon the certain form and figure of it. In many objects it is very difficult to diſtinguiſh between a prominency and a depreſſion, a black ſhadow and a black ſtain, and in colour between a bright reflection and whiteneſs. The eye of a fly in one kind of light appears like a lattice drilled full of holes, in the ſun-ſhine like a ſolid ſubſtance covered with golden nails; in one poſition like a ſurface covered with pyramids, in another with cones, and in others with ſtill different ſhapes.

The degree of light muſt always be ſuited to the object; if that be dark, it muſt be ſeen in a full and ſtrong light; but if tranſparent, the light ſhould be proportionably weak; for which reaſon there is a contrivance both in the ſingle and double microſcope to cut off abundance of the rays, when ſuch tranſparent objects are to be examined by the largeſt magnifiers. The light of a candle for many objects, and eſpecially for ſuch as are very bright and tranſparent, and very minute, is preferable to day-light; for others a ſerene day-light is beſt; but ſun-ſhine is the worſt light of all, for it is reflected from objects with ſo much glare, and exhibits ſuch gaudy colours, that nothing can be determined from it with any certainty. This, however, is not to be extended to the ſolar, or *camera obſcura microſcope*; for in that nothing but ſun-ſhine can do, and the brighter that is the better; but in that way we do not ſee the object itſelf on which the ſun-ſhine is caſt, but only the image or ſhadow of it exhibited on a ſcreen; and therefore no confuſion can ariſe from the glaring reflection of the ſun's rays from the object to the eye, which is the caſe in other *microſcopes*. But then in that ſolar way we muſt reſt contented with viewing the true form and ſhape of an object, without expecting to find its natural colour; ſince no ſhadow can poſſibly wear the colour of the body it repreſents.

Moſt objects require alſo ſome management, in order to bring them properly before the glaſſes. If they are flat and tranſparent, and ſuch as will not be injured by preſſure, the beſt way is to incloſe them in ſliders between two Muſcovy tales or iſinglaſſes. In this way the feathers of butterflies, the ſcales of fiſhes, and the farinæ of flowers, may be very conveniently preſerved, as alſo the parts of inſects, the whole bodies of minute ones, and a great number of other things. Theſe are to be kept in ſliders, each containing three, four, or more holes, and theſe muſt not be filled promiſcuouſly; but all the things preſerved in one ſlider ſhould be ſuch as require one and the ſame magnifying power to view them, that there may not be a neceſſity of changing the glaſſes for every object; and the ſliders ſhould be marked with the number of the magnifier it is proper to be viewed with. In placing the objects in the ſliders, it is always proper to have a ſmall magnifier, of about an inch focus, in your hand, to examine and adjuſt them by, before they are fixed down with the rings.

Small living objects, ſuch as lice, fleas, bugs, mites, minute ſpiders, &c. may be placed between theſe tales without injuring them, if care be taken to lay on the braſs rings without preſſing them down, and they will remain alive many weeks in this manner; but if they are too large to be treated thus, they ſhould be either preſerved between two concave glaſſes, or elſe viewed immediately, by holding them in the pliers, or ſticking them on the point at the other end of that inſtrument.

If fluids come under examination, to diſcover the animalcules in them, a ſmall drop is to be taken with a hair-pencil, or on the nib of a clean pen, and placed on a plate of glaſs; and if they are too numerous to be thus ſeen diſtinctly, ſome water warmed, by holding it in the mouth, muſt be added to the drop, and they will then ſeparate, and be ſeen diſtinctly. This is particularly neceſſary in viewing the animalcules in the *ſemen maſculinum* of all creatures; which, though extremely minute, are always ſo numerous, that without this caution their true form can ſeldom be ſeen. But if we are to ſee the ſalts in a fluid, the contrary method muſt be obſerved, and the plate of glaſs muſt be held gently over the fire, till part of the liquor is evaporated.

The diſſection of minute animals, as lice, fleas, &c. requires patience and care; but it may be done very accurately by means of a needle and a fine lancet, placing the creature in a drop of water, for then the parts will readily unfold themſelves, and the ſtomach, guts, &c. be very diſtinctly ſeen.

Theſe ſeem the beſt ways of preſerving tranſparent objects; but the opake ones, ſuch as ſeeds, woods, &c. require a very different treatment, and are beſt preſerved and viewed in the following manner.

Cut cards into ſmall ſlips about half an inch long, and a tenth of an inch broad; wet theſe half way of their length in gum-water, and with that faſten on ſeveral parcels of the object, and as the ſpots of cards are of different colours, ſuch ſhould be choſen for every object as are the moſt different from its own colours. Theſe are very convenient for viewing by the *microſcope* made for opake objects with the ſilvered ſpeculum; but they are proper for any *microſcope* that can view opake bodies.

A ſmall box ſhould be contrived for theſe ſlips, with little ſhallow holes for the reception of each; and this is conveniently done, by cutting pieces of paſte-board, ſuch as the covers of books are made of, to the ſize of the box, ſo that they will juſt go into it, and then cutting holes through them with a ſmall chiſſel, of the ſhape of the ſlips of card, theſe paſte-boards having then a paper paſted over their bottom, are cells very proper for the reception of theſe ſlips, which may be taken out by means of a pair of plyers, and will be always ready for uſe.

Great caution is to be uſed in forming a judgment on what is ſeen by the *microſcope*, if the objects are extended or contracted by force or drineſs.

Nothing can be determined about them, without making the proper allowances; and different lights and poſitions will often ſhew the ſame object as very different from itſelf. There is no advantage in any greater magnifier than ſuch as is capable of ſhewing the object in view diſtinctly; and the leſs the glaſs magnifies, the more pleaſantly the object is always ſeen.

The colours of objects are very little to be depended on, as ſeen by the *microſcope*; for their ſeveral component particles being by this means removed to great diſtances from one another, may give reflections very different from what they would, if ſeen by the naked eye.

The motions of living creatures alſo, or of the fluids contained in their bodies, are by no means to be haſtily judged of, from what we ſee by the *microſcope*, without due conſideration; for as the moving body, and the ſpace wherein it moves, are magnified, the motion muſt be ſo too; and therefore that rapidity with which the blood ſeems to paſs through the veſſels of ſmall animals muſt be judged of accordingly. Suppoſe, for inſtance, that a horſe and a mouſe move their limbs exactly at the ſame time, if the horſe runs a mile while the mouſe runs fifty yards; though the number of ſteps are the ſame in both, the motion of the horſe muſt notwithſtanding be allowed the ſwifteſt; and the motion of a mite, as viewed by the naked eye, or through the *microſcope*, is perhaps not leſs different. Baker's Microſcope, p. 52. 62. See *Table of* MICROSCOPIC *objects*.

MICTUS *cruentus*. See *Bloody* URINE.

MID, or MIDDLE, in *Philoſophy* and *Mathematics*. See MEAN, and MEDIUM.

MIDDLE *latitude*, in *Navigation*, is half the ſum of two given latitudes.

MIDDLE *latitude ſailing*, is uſed for a method of working the ſeveral caſes in ſailing, nearly agreeing with Mercator's way, but without the help of meridional parts. See SAILING.

MIDDLE *region*. See REGION.

MID-*feather*, in the Engliſh *Salt-Works*, the name given to a ſort of partition placed in the middle of the furnace, over which the pan is ſet for boiling the ſea-water or brine into ſalt.

This partition divides the body of the furnace into two chambers. See SALT.

MID-HEAVEN, *medium cœli*, in *Aſtronomy*, is that point of the ecliptic which culminates, or is in the meridian. See CULMINATION.

MIDA, in *Natural Hiſtory*, the name of a worm or maggot,

got, of which is produced the purple-fly, found on bean-flowers, and thence called the bean-fly.

MIDAD *nlbendi*, in the *Materia Medica of the Arabians*, a name given to the common indigo blue.

The express meaning of the words is India ink; but this is an erroneous name, founded on Pliny's misunderstanding the words of Dioscorides. The Greeks in general have called the common writing ink *melan*; but they have also used this word *melen* as an adjective, expressive not only of black, but of deep blue. Thus Theophrastus has called both the violet flowers and the fine deep blue sapphires, *melanes*. Pliny, finding him call the indigo when of a very fine and deep colour, *melan Indicon*, thought it to be different from the common indigo, and thence supposed it a sort of Indian ink. Thus Indian ink has become a sort of name for this blue.

MIDAS's *ear-shell*, in *Conchyliology*. See TRUMPET-*shell*.

MIDDLING-*teeth*, in the *Manage*, are the four teeth of a horse that come out at three years and a half, in the room of other four foal-teeth, seated between the nippers and the corner-teeth; from which situation they derive the title of *middling*. There is one of them above, and one below, on each side of the jaws. See TEETH.

MIDRIFF, in *Anatomy*. See DIAPHRAGM.

MIDSHIP, is a term of distinction, applied by shipwrights to several pieces of timber which lie in the broadest part of the vessel.

MIDSHIP-*beam*, is the beam upon which the extreme breadth of the ship is formed, and which is situated in the *midship* frame, nearly in the middle of her length, serving as a standard from whence the dimensions and proportions of the masts and yards are to be taken. See BEAM.

MIDSHIP-*frame*, is a name given to that timber, or combination of pieces, formed into one timber, which determines the extreme breadth of the ship, as well as the figure and dimension of all the inferior timbers.

MIDSHIP-*men*, are officers on board a ship of war, whose station, when they are on duty, is, some on the quarter-deck, others on the poop, &c.

Their business is, to mind the braces, to look out, and to give about the word of command from the captain, and other superior officers. They all assist, on occasion, both in sailing the ship, and in stowing and rummaging the hold; and in performing the necessary business of the vessel, either aboard or ashore. The number of *midshipmen*, like that of all other officers, is always in proportion to the size of the ship to which they belong. Thus, a first-rate man of war has twenty-four, and the inferior rates a suitable number in proportion. No person can be appointed a LIEUTENANT, without having previously served two years in the royal navy in this capacity, or in that of MATE, besides having been at least four years in actual service at sea, either in merchant-ships, or in the royal navy.

MIDSUMMER-*day*, is the festival of St. John the Baptist, held on the 24th of June. See QUARTER-*day*.

MIDYON, a word used by Theophrastus, as the name of a species of oak. It is prescribed by some of the old physicians, in their compositions; but is usually supposed to stand there by an error of the copies; the word meant being *misy*.

MIERES, a name by which some writers have called ASPHALTUM.

MIGRATION, or TRANSMIGRATION, the passage or removal of any thing out of one state, or place, into another; particularly of colonies of people, birds, &c. into other countries.

The *migration of the souls of men* into other animals after death, is the great doctrine of the Pythagoreans, called the METEMPSYCHOSIS.

The *migration of birds*, as the swallow, quail, stork, crane, fieldfare, woodcock, nightingale, and other birds of PASSAGE, is a very curious article in natural history, and furnishes a notable instance of the powerful instinct impressed by the Creator. Dr. Derham observes two things remarkable therein; the first, that these untaught, unthinking creatures, should know the proper times for their passage, when to come, and when to go; as also, that some should come when others go. No doubt, the temperature of the air, as to heat and cold, and their natural propensity to breed their young, are the great incentives to those creatures to change their habitation. But why should they at all shift their habitation? and why is not some certain place to be found, in all the terraqueous globe, affording them convenient food and habitation all the year round?

The second, that they should know what way to steer their course, and whither to go? What instinct is it, that moves a poor foolish bird to venture over vast tracts of land and sea? if it be said, that, by their high ascents up into the air, they can see across the seas; yet what should teach or persuade them, that another land is more proper for the purpose than this? that Britain, for instance, should afford them better accommodation than Egypt? than the Canaries? than Spain? or any other of the intermediate countries? Physico-Theol. p. 234.

Lud. de Beaufort remarks, that birds, in their *migrations*, observe a wonderful order and polity: they fly in troops, and steer their course through vast unknown regions without the compass. Cosmol. Divin. It is to be added, that the birds of passage are all peculiarly accommodated, by the structure of their parts, for long flights.

Naturalists are divided as to the places whither birds of passage retire when they leave us. Mr. Willughby thinks the swallows fly into Egypt and Ethiopia.

Olaus Magnus says, they lurk in holes, or under water; which is confirmed by Bemuller, who assures us, that he saw a bushel of them taken out of a frozen fish-pond, all hanging together, head to head, feet to feet, &c. in one cluster. Disert. n. c. 10. Olaus adds, that this is a common thing in the northern countries; and that such a cluster being carried accidentally by some boys into a stove, the swallows, after thawing, began to fly about, but weakly, and only for a very little time.

A farther confirmation of this account was given by Dr. Colas, a person very curious in such things, to the Royal Society. Speaking of the way of fishing in the northern parts, by breaking holes, and drawing their nets under the ice, he related, that he saw fifteen swallows so drawn out of the lake of Samrodt, and about thirty out of the king's great pond in Rofnellen; and that at Schlebitten, near a house of the earl of Dohna, he saw two swallows just come out of the waters that could scarce stand, being very wet and weak, with their wings hanging on the ground. He added, that he had often observed the swallows to be weak, for some days, after their first appearance.

Some of our own countrymen have given credit to the submersion of swallows; and Klein patronizes this doctrine in his Hist. Av. 205, 206. But they assign no reason, why these birds are capable of enduring so long a submersion without being suffocated, or without decaying in an element so unnatural to them; when we know that the otter, the cormorant, and the grebes, soon perish, if caught under ice, or entangled in nets; and it is well known, that these animals will continue much longer under water than any others to whom nature hath denied that particular structure of heart, necessary for a long residence beneath that element. Mr. John Hunter, having dissected many swallows, found nothing in them different from other birds as to the organs of respiration; whereas all those animals which he had dissected, of the class that sleep during winter, such as lizards, frogs, &c. had a very different conformation in those organs. He farther adds his opinion, that these animals breathe in their torpid state; and, as far as his experience reaches, he knows they do; and he, therefore, esteems it a very wild opinion, that terrestrial animals can remain any long time under water without drowning.

There is another more probable opinion, with respect to the disappearance of swallows, which has high antiquity to support it. Aristotle and Pliny assert, that these birds do not remove very far from their summer habitation, but winter in the hollows of rocks, and during that time lose their feathers. We have had many late instances of some species of swallows having been discovered in a torpid state, on the cliffs of the Rhine, in old dry walls and sand-hills in Scotland, in the chalky cliffs of Sussex, in hollow trees, and lead mines, &c. These several places are supposed to be the lurking habitations of later hatches, or of those young birds that are incapable of distant *migrations*; where they generally continue insensible and rigid, though, like bats, they may sometimes be re-animated by an unseasonable hot day in the midst of winter. From these facts, it is reasonable to conclude, that, though one part of the swallow tribe migrates, others may have their winter-quarters nearer home. If it should be asked, why swallows alone are found in a torpid state, and not the many other species of soft-billed birds, which likewise disappear about the same time? the following reason, says Mr. Pennant, may be assigned. No birds are so much on the wing as swallows; none fly with so much rapidity and swiftness; none are obliged to such sudden and various evolutions in their flight; none are at such pains to take their prey; and none exert their voice more incessantly; whence they suffer a great expence of strength and spirits, and require such a texture of blood, as other animals do not experience; and become thus disposed to a more lasting repose than other birds. But notwithstanding this conclusion, it is most probable, that swallows in general, as well as other birds, migrate from colder into warmer climates, in search of proper food, a secure asylum from man during the time

of courtſhip, incubation, and nutrition, and a temperature of air ſuiting their conſtitutions.

The generality of birds that remain the winter with us, have ſtrong bills, or are enabled to feed on what they can find at that ſeaſon; thoſe which leave us, have uſually very ſlender bills, and their food is the inſects of the fly kind; which diſappearing towards the approach of winter, compel them to ſeek them in regions where they may be found; and the length of the wings of the generality of theſe birds, enables them to prey flying, if there be food for them in their way, and to continue a long time on the wing without reſt.

The various conjectures about the places to which they retire, are owing to want of ocular teſtimony; but if we conſider the vaſt tracts of land yet unknown to us, we cannot doubt but there may be many places for them, in which we can have had no opportunities of finding them. But the moſt probable conjecture ſeems, that the places to which they retire lie probably in the ſame latitude in the ſouthern hemiſphere, as the places from whence they depart; where, the ſeaſons reverſing, they may enjoy the like agreeable temperature of the air. And, if theſe places are ſuppoſed to be divided from them by two large ſeas, why may not ſome other parts of the ſouthern hemiſphere, which are leſs diſtant, ſerve their turn?

This, certainly, ſeems much more reaſonable than that they ſhould remain on our ſide of the northern tropic, within a few degrees of which, at the winter ſolſtice, it is ſo cold as frequently to produce ſnow; which, by diſperſing ſuch inſects as birds that feed upon the wing ſubſiſt on, muſt make them periſh, were they not to remove to thoſe warmer climates where they may ſtill find food. The ſwallows, as they cannot ſubſiſt ſo long in cold ſeaſons as ſome other birds of paſſage, which feed after the diſappearance of flies in the air, on what inſects they find in their receſſes, viſit us later, and depart from us ſooner, than the reſt. The nightingales, and ſome other birds, which leave us for the winter, are ſeen, ſometimes, a month after the ſwallows; and from the whole it ſeems natural to infer, that the ſwallows paſs the tropic of Cancer, though it is not yet known to what place they at length retire.

The manner of the birds of paſſage journeying to their ſouthern abode may vary, according to the different ſtructure of their bodies, and their power of ſupporting themſelves in the air. Thoſe birds with ſhort wings, ſuch as the redſtart, blackcap, &c. though they are incapable of ſuch long flights as the ſwallow, or of flying with ſo much celerity, yet may paſs to leſs diſtant places, and by ſlower movements. Swallows and cuckows may perform their paſſage in a very ſhort time; but there is for them no neceſſity for ſpeed, ſince every day's paſſage affords them an increaſe of warmth, and a continuance of food.

Providence, which has guided the defenceleſs animals in many other inſtances to the ſafeſt methods of performing their neceſſary works, may have inſtructed many of theſe birds which have ſhorter paſſages to make, or places to ſtop at by the way, to fly only in the night, that they may be ſecure from the birds of prey; and Mr. Cateſby gives a proof that ſome ſpecies do ſo, from his own obſervation; for, lying on the deck of a ſloop on the north ſide of Cuba, himſelf and the whole company heard, ſucceſſively, for three nights, flights of rice birds, which are eaſily diſtinguiſhed from all other birds by their notes, and which were paſſing over their heads northerly; which is their direct way from Cuba, and the ſouthern continent of America, from whence they got to Carolina, annually, about the time that rice begins to ripen, and from whence they return ſouthward again, when it is gathered, and they are become fat.

That this is the caſe alſo with ſome ſpecies of ſwallows, has been proved beyond contradiction by M. Adanſon, Hiſt. de Senegal, p. 67. We often obſerve them collected in innumerable flocks on churches, on rocks, and on trees, previous to their departure hence; and Mr. Colliſſon proves their return here, perhaps, in equal numbers, by two curious relations of undoubted credit; the one communicated to him by Mr. Wright, maſter of a ſhip, and the other by the late Sir Charles Wager; who both deſcribed to the ſame purpoſe what happened to each of them in their voyages. "Returning home," ſays Sir Charles, in the ſpring of the year, in I came "into ſoundings in our channel, a great flock of ſwallows came and ſettled upon my rigging; every rope "was covered; they hung on one another like a ſwarm "of bees; the decks and carving were fill'd with them. "They ſeemed almoſt famiſhed and ſpent, and were only "feathers and bones; but being recruited with a night's "reſt, took their flight in the morning." This apparent fatigue proves that they muſt have had a long journey, conſidering the amazing ſwiftneſs of theſe birds; ſo that in all probability they had croſſed the Atlantic ocean, and were returning from the ſhores of Senegal, or other parts of Africa.

The ſhort-winged birds are ſuppoſed little qualified for long flights, particularly the quail, which is a bird never ſeen long together on the wing, or making any long flights; as not doing this frequently is, however, no proof that it is not able to do it; nor does the ſtructure of its body at all beſpeak its inability; and Bellonius affirms, that he ſaw them in great flights paſſing over, and repaſſing, the Mediterranean ſea, at the very ſeaſons when they leave us, and they return again. The ſame inſtinct that directs theſe birds to depart to diſtant countries, doubtleſs alſo directs them to the ſhorteſt way, and ſends them to the narroweſt cuts, not the wider ſeas, to croſs.

Among the birds of paſſage, we have ſome alſo which come to us in the autumn, at the time when the ſummer birds are leaving us; and go from us again in the ſpring at the times when theſe return: theſe, however, are only four kinds; the fieldfare, the redwing, the woodcock, and the ſnipe; and of theſe the two laſt often continue with us through the ſummer, and breed; ſo that the two firſt ſeem the only kinds that certainly leave us at the approach of ſpring, retiring to more northern parts of the continent, where they live the ſummer, and breed; and, at the return of winter, are driven ſoutherly from thoſe frigid climes, in ſearch of food, which there the ice and ſnow muſt deprive them of. There are many others alſo, particularly of the duck or wading kind, that breed and make their ſummer abode in the deſolate ſenny parts of our iſland; and when the ſeverity of our winters deprives them of their food, neceſſity forces them to retire toward the ſea in numerous flights; where they find water unfrozen, and where they remain till the return of ſummer; but theſe cannot properly be called birds of paſſage.

It ſeems pretty evident from the whole, that the ſummer birds of paſſage leave us only in ſearch of a more warm climate, and a greater plenty of food; both which advantages they procure to themſelves by their alternate change of climate; but the *migration* of the winter birds of paſſage is not ſo eaſily accounted for, ſince there is no ſuch apparent neceſſity of their leaving us, either on the ſcore of food, or climate. The place of the ſummer retirement of theſe birds is Sweden, and ſome other countries in that latitude; but as they would find thoſe places too cold and deſtitute of proviſion, were they to ſettle immediately to them on their departure from us, they journey along gradually, and prolong their paſſage through the more moderate countries of Germany and Poland; by which means they do not arrive at their northern habitations, where they are to paſs their ſummer, and where they breed, till the ſeverity of the cold is ſo far abated as to render it pleaſing to them, and there is proper food there for them; and when they reviſit us the following winter, their journey is performed in the ſame leiſurely manner.

Sweden, and the other countries whence they come to us, ſeem the proper home of theſe birds; ſince there they were bred; and the journey they take to us being only for a warmer climate, and a plenty of food, it is no wonder that, when theſe benefits are to be expected again in their native place, they return to it.

The principal food of theſe birds, while with us, is the fruit of the white-thorn, or haws, which hang on our hedges, in winter, in prodigious plenty; but where they breed, and ſeem to live moſt at eaſe, as in Sweden, &c. there are no haws, nor indeed in many of the countries through which they journey in their way; ſo that it is evident they change their food in their paſſage. And upon the whole it appears, that Providence has created birds, &c. with conſtitutions and inclinations adapted to their different degrees of heat and cold; which, to them, are moſt agreeable, and to which they will travel from places which to other animals might ſeem more agreeable: by this means no part of the globe is without its inhabitants. Phil. Tranſ. vol. xliv. p. 435, &c. vol. ii. p. 459, &c. Pennant's Britiſh Zoology, vol. i. p. 406, &c. vol. ii. p. 709, &c.

MIGNONETTE, in *Botany*. See *Reſe*-ROCKET.

MIHA, in the *Materia Medica*, a name uſed by ſome authors for ſtyrax.

MILAX, a name by which *ſmilax* is often meant by the Greek writers.

MILDEW, *rubigo*, a diſeaſe happening to plants, cauſed by a dewy moiſture, which falling on them, and continuing, for want of the ſun's heat to draw it up, by its acrimony corrodes, gnaws, and ſpoils, the inmoſt ſubſtance of the plant, and hinders the circulation of the nutritive ſap: upon which the leaves begin to fade, and the bloſſoms and fruit are much prejudiced.

According to Cook and Mortimer, *mildew* is a thick, clammy

clammy vapour, exhaled in the spring and summer from plants, blossoms, and even from the earth itself, in close still weather, when there is neither sun enough to draw it on high, nor wind enough to disperse it. Hanging thus in the lower regions, when the evening's cold comes on, it condenses, and falls on the plants; by its thick clammy substance stops up their pores, and thus prevents perspiration, and hinders the sap from ascending to nourish the flowers, shoots, &c.

It is added, that this dew, falling on the top of a shoot of a cherry-tree about midsummer, has been found to stop the shoot; so that the tree has shot forth in other places. On plants which have smooth leaves, as the oak, &c. the dew hangs, and may be seen, tasted, &c. others, whose leaves are rougher, imbibe it. When it falls on wheat, &c. it spots the stems with a colour different from the natural one.

These dews, Mr. Mortimer takes to be the principal food of bees; being sweet, and easily convertible into honey. Some have supposed the blight and *mildew* to be both the same thing, but very erroneously. The *mildew*, properly so called, sometimes rests upon the leaves of trees in form of a fatty juice, and sometimes on the ears of corn; it is tough and viscous to the touch, and the sun's heat drying it up, it becomes yet more viscous and hard, and so daubs over the young grains in the ear, that they can never after expand themselves properly, nor grow to their due size or weight. Bearded wheat is less subject to the *mildew*, than the common sort; and it is observed, that newly dunged lands are more subject to the *mildew* than others. The most happy remedy for this is out of the farmer's power, but often happens naturally; this is a smart shower of rain, and immediately afterwards a brisk wind: this wholly disperses it. If the *mildew* is seen before the sun has any power, it has been recommended by many, to send two men into the field with a long cord, each holding one end, and drawing this along through the ears, the dew will be dislodged from them before the sun's heat is able to dry it to that viscous state in which it does the mischief. Some also say, that lands which have for many years been subject to *mildews*, have been cured of it by sowing soot with the corn, or immediately after it. See BLIGHT, DEW, HONEY-*Dew*, and *Perspiration of* PLANTS.

MILE, in *Geography*, a long measure, whereby the English, Italians, and some other nations, use to express the distance between places. See MEASURE.

In which sense *mile* is used to the same purpose with *league*, used by the French and other nations.

The *mile* is of different extent in different countries. The geographical or Italian *mile* contains a thousand geometrical paces, mille passus, whence the term *mile* is derived. The English *mile* consists of eight furlongs, each furlong of forty poles, and each pole of sixteen feet and a half: so that it is equal to one thousand seven hundred and fifty yards, or five thousand two hundred and eighty feet.

Cassinir has made a curious reduction of the *miles*, or leagues, of the several countries in Europe into Roman feet, which are equal to the Rhineland feet generally used throughout the North.

		Feet
The mile of Italy	——	5000
of England	——	5454
of Scotland	——	6000
of Sweden	——	30000
of Muscovy	——	3750
of Lithuania	——	18500
of Poland	——	19850
of Germany, the small		20000
The middle	——	22500
The largest	——	25000
of France	——	13750
of Spain	——	22970
of Burgundy	——	18000
of Flanders	——	20000
of Holland	——	21000
of Persia, called also parasanga		18750
of Egypt	——	25000

MILES, a Latin term, which, in its general import, signifies *soldier*.

In our English laws and customs, *miles* is peculiarly appropriated to a knight, called also *eques*.

MILIARENSIS, in *Antiquity*, a silver coin of the empire, substituted by Constantine in the room of the DENARIUS; and so called because he fixed the price of the pound of gold at 1000 pieces of this new silver. But as he divided the pound of gold also into 72 solidi, each solidus really contained 138 *miliarenses*, though it passed for 144; which difference between the real and current value of the SOLIDUS, in relation to the *miliarensis*, must have occasioned disputes in the payment of small sums. To remedy this inconvenience, it was thought proper to alter the weight of the silver money, and having fixed the price of the pound of silver at five solidi, to coin sixty pieces out of it, which retained the name *miliarensis*, though the pound of gold was worth but 864. It does not appear how many *miliarenses* Constantine coined of the pound of silver: but if the piece of gold was equally the same in his reign, as when five solidi were worth a pound of silver, the pound must have been worth 864 pounds of silver; and 1000 divided by 14¼ gives 69⅔ for the number of *miliarenses* coined out of the pound. Therefore it is probable, that Constantine's number was either 69 or 70. If the former, each piece should weigh 73⅔ Troy grains; if the latter 72,3. According to the former estimate, the proportion of gold to silver was almost 14½ to 1; according to the latter, 14 to 1. Phil. Trans. vol. lxi. part ii. p. 513. See FOLLIS.

MILFOIL. See YARROW.

MILFOIL, *water*. See *Water* VIOLET, MYRIOPHYLLUM, and UTRICULARIA.

MILIARIUM, the name of a tall and narrow vessel, used in the bathing of the ancients, for heating water to any degree, to give warmth to the rest. See Mem. Acad. Inscript. vol. i. p. 127.

MILIARY *fever*. See FEVER.

MILIARY *glands, vesicular* MILIARES, in *Anatomy*, a great number of small glands interspersed throughout the substance of the CUTIS, or skin.

The *miliary glands* are the organs whereby the matter of sweat, and insensible perspiration, is secreted from the blood.

They are interwoven with the pyramidal papillæ of the skin, and are each served with a branch of an artery, vein, and nerve; as also with a proper excretory duct, through which the fluid matter secreted from the blood in the substance of the gland, is excreted, and sent forth at the pores, or perforations, of the cuticle.

MILIARY *herpes*. See HERPES.

MILIOLUM, a word used by some medical writers to express a small tumor in the eye-lid, of the size and shape of the seed of a common millet.

MILITANT, a term understood of the body of Christians, while here on earth.

The Romanists divide the church into *militant*, patient, and triumphant: the *militant* is on earth; the patient, or passive, they place in purgatory; and the triumphant in heaven.

MILITARE *ærarium*. See ÆRARIUM.

MILITARIS *toga*. See TOGA.

MILITARIS *via*. See VIA.

MILITARY, something belonging to the *militia*, or soldiery. Thus,

MILITARY *architecture* denotes the art of fortification. See ARCHITECTURE, and FORTIFICATION.

MILITARY *art*, is the art or science of making or sustaining war to advantage. See WAR.

MILITARY *column*. See COLUMN.

MILITARY *court*. See COURT *of Chivalry*.

MILITARY *state* includes the whole of the soldiery; or such persons as are peculiarly appointed among the rest of the people for the safeguard and defence of the realm. See SOLDIER.

MILITARY *execution*, the delivery of a city or country up to be ravaged and destroyed by the soldiers, upon its refusing to pay contribution money. See EXECUTION.

MILITARY *exercises* are the evolutions or various manners of ranging and exercising soldiers. See EXERCISE.

MILITARY *feuds*. See FEUD.

MILITARY *fever*, a kind of malignant fever frequent in armies, by reason of the ill food, &c. of the soldiers. See FEVER, and HOSPITAL *Fever*.

MILITARY *government* is the supreme command and disposal of all the *military* power of a nation, by land and sea.

MILITARY *laws*. See LAW *of arms*, and MARTIAL.

MILITARY *machines*. See MACHINE.

MILITARY *order*. See ORDER, and KNIGHTHOOD.

MILITARY *pyrotechny*. See PYROTECHNY.

MILITARY *rewards*. See REWARDS.

MILITARY *tenures*. See TENURE.

MILITARY *testament*, among the Romans, was what we call a nuncupative will; or a testament made only by word of mouth, in the presence of two witnesses.

This was a privilege peculiar to the soldiery, and to them only when in the field; for at other times they were subject to the common laws in this respect. See SOLDIER.

MILITARY *ways*, *viæ militares*, are the large Roman roads, which Agrippa procured to be made through the empire, in the time of Augustus, for the more convenient marching of troops, and conveyance of carriages.

N. Bergier has wrote the history of the origin, progress, and

and amazing extent, of these *military roads*; which were paved from the gates of Rome to the extreme parts of the empire. See WAY.

MILITES *candidati*. See CANDIDATI.

MILITIA, a collective term, underſtood of the body of ſoldiers, or perſons who make profeſſion of arms.

The word comes from the Latin *miles*, *a ſoldier*; and *miles* from *mille*, which was anciently wrote *mile*. For in levying ſoldiers at Rome, as each tribe furniſhed a thouſand, *mille*, or *pile*, *men*; whoever was of that number, was called *miles*.

MILITIA, in its proper and more reſtrained ſenſe with us, is uſed to ſignify the inhabitants, or, as we call them, the *trained-bands*, of a town, or country; who arm themſelves, on a ſhort warning, for their own defence. In which ſenſe *militia* is oppoſed to regular ſtated forces. Soon after the reſtoration of king Charles II. when the military tenures were aboliſhed, it was thought proper to aſcertain the power of the *militia*, to recognize the ſole right of the crown to govern and command them, and to put the whole into a more regular method of military ſubordination; and the order in which the *militia* now ſtands by law, is principally built upon the ſtatutes which were then enacted, viz. 13 Car. II. cap. 6. 14 Car. II. cap. 3. 15 Car. II. cap. 4.

It is true the two laſt of them are apparently repealed; but many of their proviſions are re-enacted, with the addition of ſome new regulations, by the preſent *militia* laws; the general ſcheme of which is to diſcipline a certain number of the inhabitants of every county, choſen by lot, for three years, and officered by the LORD *lieutenant*, the deputy lieutenants, and other principal landholders, under a commiſſion from the crown. They are not compellable to march out of their counties, unleſs in caſe of invaſion or actual rebellion, nor in any caſe compellable to march out of the kingdom. They are to be exerciſed at ſtated times; and their diſcipline in general is liberal and eaſy; but when drawn out in actual ſervice, they are ſubject to the rigour of martial law, as neceſſary to keep them in order. This is the conſtitutional ſecurity, which our laws have provided for the public peace, and for protecting the realm againſt foreign or domeſtic violence, and which the ſtatutes 2 Geo. III. cap. 20. &c. 2 Geo. III. cap. 42. declare is eſſentially neceſſary to the ſafety and proſperity of the kingdom. Blackſt. Com. book i. p. 411, &c.

By the 2 Geo. III. cap. 20. all former acts relating to the raiſing of the *militia* are repealed, except in ſuch caſes as are therein ſpecially directed to be ſubject to the proviſions of the former acts, or any of them; particularly with regard to the city of London, the Tower Hamlets, and the Cinque Ports. The ſtatutes now in force, relating to the *militia*, excluſive of the annual acts concerning their cloathing and pay, are the following: 2 Geo. III. cap. 20. 3 Geo. III. cap. 10. 4 Geo. III. cap. 17. 5 Geo. III. cap. 34. 5 Geo. III. cap. 36. 6 Geo. III. cap. 20. 7 Geo. III. cap. 17. 9 Geo. III. cap. 42. 10 Geo. III. cap. 9. 11 Geo. III. cap. 32. 16 Geo. III. cap. 9. 18 Geo. III. cap. 59. 19 Geo. III. cap. 44. 19 Geo. III. cap. 72. 19 Geo. III. cap. 76.

The whole number of private men to be raiſed, excluſive of certain places that are excepted, is 30,740; in various proportions for the ſeveral counties. The perſons exempted from ſerving in the *militia*, or providing ſubſtitutes, are peers of this realm; commiſſioned officers in his majeſty's other forces, or in any of his caſtles or forts; non-commiſſioned officers and private men ſerving in any of his majeſty's other forces; commiſſioned officers ſerving, or who have ſerved four years in the *militia*; members of either of the univerſities; clergymen; licenſed teachers of any ſeparate congregations; conſtables, or other ſuch peace officers; articled clerks, apprentices, ſeamen, or ſea-faring men; perſons muſtering and doing duty in any of his majeſty's dock-yards; perſons free of the company of watermen of the river Thames; perſons employed and muſtered at the Tower of London, Woolwich Warren, the ſeveral gun-wharfs at Portſmouth, Chatham, Sheerneſs, and Plymouth, or at the powder mills, magazines, or the houſes under the direction of the board of ordnance; and poor men who have three children born in wedlock. Perſons balloted, that refuſe to ſerve or provide a ſubſtitute, ſhall forfeit 10*l.* and at the expiration of three years, be liable to ſerve again, in perſon or by ſubſtitute. Thoſe who have ſerved are to be returned home in due time, ſo that they may reach the county to which they belong, if abſent from it, by the expiration of their term; unleſs they ſhall conſent to ſerve again. The enliſting of perſons enrolled to ſerve in the *militia*, for ſervice in his majeſty's other forces, ſhall be deemed null and void. The *militia* are required to be trained and exerciſed by regiment or battalion, twice in a year, fourteen days at each time, or once in a year, for twenty-eight days together: and the penalty of not appearing, or deſerting, is the immediate payment of 20*l.* or impriſonment for ſix months, or till the money is paid. In caſe of actual invaſion or immediate danger of it, or rebellion in this kingdom, his majeſty, communicating the occaſion to parliament, if ſitting, or declared in council, and notified by proclamation, if parliament be not ſitting, may order the *militia* to be embodied, put under the command of general officers, and led to any part of the kingdom, but not to go out of it; and they ſhall be ſubject to the acts againſt mutiny and deſertion. And any perſon not appearing, ſhall forfeit 40*l.* or be impriſoned for twelve months. Officers of the *militia*, during the time of ſervice, are exempted from the office of ſheriff; and private men from highway duty, from pariſh offices, and ſerving in his majeſty's other forces by ſea or land. *Militia* men, when ſick, are entitled to relief; and their deſtitute families to a weekly allowance out of the poor rates of the pariſh, &c. to which they belong. If they are maimed or wounded in actual ſervice, they are intitled to the benefit of Cheſſea-hoſpital: they may ſet up trades in any part of the kingdom.

MILITUM *curia*. See CURIA.

MILITUM *expenſa levandis*. See EXPENSÆ.

MILIUM, in *Botany*. See MILLET.

MILIUM *ſaxatile*, in *Botany*, a name by which ſome authors call the lacryma Jobi, or Job's tears.

MILIUM *Indicum*, in *Botany*, a name by which ſome authors call the maize, or Indian wheat.

MILK, *lac*, a white juice, or humour, which nature prepares in the breaſts of women, and in the udders of other animals; for the nouriſhment of their young.

Milk is thicker, ſweeter, and whiter, than the chyle itſelf, from which it is derived; and that, probably, without much more artifice or alteration than the leaving behind ſome of its aqueous parts.

The ancients held it formed from the blood; but the moderns are of opinion it comes from the pure chyle, conveyed by the arteries to the breaſts, and without any other coction filtrated through the glands whereof they are compoſed, like urine through the reins; without undergoing any conſiderable change.

According to M. Leeuwenhoeck's obſervations, *milk* conſiſts of little globules ſwimming in a clear tranſparent liquor, called *ſerum*, or *whey*.

Milk is a compoſition of three different kinds of parts; butyrous, caſeous, and ſerous. The *butyrous* parts are the cream and oil that ſwim at the top, and give it an opake white colour; the *caſeous* are the groſſer parts, which ſerve as a mucilage to keep the oily part ſuſpended, and thoſe that coagulate, and are made into cheeſe; the *ſerous* are properly a lympha, and theſe make what we call a *whey*, ſerving as a vehicle for the other two. So that *milk* may be juſtly called an animal emulſion. In its pure ſtate, it diſcovers no marks of any acid or alkaline quality: its taſte is agreeable and ſweet; it contains none or very few parts, that are volatile with the heat of boiling water: and its ſmell is very weak. It is eaſily acted upon and coagulated by the ſmalleſt quantity of acid, and alſo by the mixture of an alkali, which gives it a ſponeceous quality. *Milk* is alſo ſuſceptible of a ſpontaneous fermentation, by which it becomes acid, and is coagulated. But this ſpontaneous curdling and acidity are avoided, in the making of cheeſe for aliment, or whey for medicine, by mixing with the *milk*, before it has become too old, the ſmalleſt quantity of acid neceſſary for coagulation, and by accelerating this coagulation with a convenient heat.

Dr. Drake ſays, that *milk* is nothing but oil and water united by the artifice of nature, perhaps by the intervention of ſome peculiar ſalts, which *milk* itſelf, however ſweet at firſt, does, after a little ſtanding, diſcover to be pretty plentifully therein.

The whey of *milk* contains, beſides a ſaccharine fermentable ſubſtance, ſeveral kinds of ſalts, which may be obtained by cryſtallization. If three-fourths of clarified whey be evaporated, and the remainder ſet in a cool place, a certain quantity of reddiſh cryſtals will be formed: this is the eſſential *ſalt of milk*. It is called the *ſugar of milk* from its taſte, which is manifeſtly ſaccharine. If the cryſtals are well drained, diſſolved in pure water, and cryſtallized, they will be much whiter and leſs ſaccharine. By repeating the operation, the cryſtals may be rendered perfectly white and almoſt taſteleſs.

Or, the ſalt of *milk*, may be prepared by boiling whey to one half, then filtrating it; the coction and filtration are to be continued, till the liquor becomes of the conſiſtence of a ſyrup. This being put into a cellar to cryſtallize, the ſalt will be formed into a cake of a ſaccharine taſte, reſembling manna.

This preparation is Dr. Gaubius's, and is ſomewhat different from that which Valentini, in his Medicina Nov. Antiq.

Antiq. alledges to be the famous facchiarum laëtis, fo much cried up by Lodovicus Feſti, and recommended by others as an infallible cure for the gout. Med. Eſſ. Edinb.

Milk is found in the breaſts of women after they have been pregnant about four months. The fermentation of the *milk* in the breaſts, the firſt day after a woman is delivered, often occaſions a fever, which takes its name therefrom.

The colour of ſaffron, the bitterneſs of wormwood, and the ſmell of garlic are given to the *milk* of a woman who eats theſe plants; and alſo the purgative and inebriating efforts of certain ſubſtances are communicated from a nurſe to the child. See *Women's* MILK.

Ariſtotle ſays, there are ſome men who have *milk* in their breaſts. Cardan tells us, he ſaw one that had enough to ſuckle a child.

In the Philoſophical Tranſactions, we have an account of a wether brought to *milk* by the ſucking of a lamb; which lamb was maintained by it all the ſummer, till it was weaned.

Milk, corrupted in the ſtomachs of children, occaſions moſt of the diſeaſes incident to that age. Dobel, a Daniſh phyſician, who has wrote expreſly on this ſubject, tells us, an excellent remedy in ſuch caſe is, a glaſs of water with a little ſalt diſſolved in it: this acts as an emetic, and throws up the matter that occaſioned the diſorder. Celſus alſo mentions this remedy.

Galen obſerves, that, in animals fed with *milk*, the greateſt part of the food of the mother is, for that time, converted into that humour.

Hoffman found, by experiments, that the *milk* of cows and of goats contained more of the butyraceous and caſeous, and leſs of the ſerous and of the ſaccharine particles, than human *milk*, and the *milk* of aſſes.

There are ſeveral kinds of *milk*, uſed not only as food, but as phyſic: as cows *milk*, aſſes *milk*, mares *milk*, sheeps *milk*, and goats *milk*. Theſe are preſcribed as proper to alter a ſtrong thin blood into a craſis more ſoft, balſamic, and nutritive; and in conſtitutions where they ſit the firſt paſſages, they muſt be very good for that end, as being ready prepared into nutriment, ſo far as is required for their admiſſion into the blood: but where the juices of the ſtomach are ſharp, theſe liquors are apt to be turned into curd. Whenever *milk*, therefore, of what kind ſoever, is ordered in conſumptions, and as a reſtorative, it is with good reaſon joined with the teſtaceous powders, and ſuch things as are proper to deſtroy thoſe acidities.

Aſſes *milk* is ſaid to be a great beautifier and preſerver of the ſkin. Poppæa, wife of the emperor Nero, uſed it for that purpoſe; having four or five hundred aſſes conſtantly in her retinue, to furniſh her every morning with a freſh bath.

Milk is evidently one of the beſt nouriſhments of the body; and it is not wonderful that it ſhould prove ſo, when we conſider that in all caſes of nouriſhment the proximate matter taken to nouriſh ought to be as like as may be to the body to be nouriſhed by it. We ſubſiſt by the ſame things by which we are generated, and even while in the ſtate of a fœtus in the womb, we are nouriſhed not by blood, as ſome ſuppoſe, but by a lacteous juice, which is ſeparated from the blood in the uterus by means of the placenta, as it is in the breaſts of women who give ſuck, by glandules and tubuli deſtined for that purpoſe. Meats which we daily feed upon paſs down into the ſtomach indeed in their own form, but they do not nouriſh us till they are changed into chyle, or a milky liquor.

Milk being analyſed is found to be compoſed of fatty, ſerous, and terreſtrial parts; and theſe its conſtituent principles being eaſily mixed and ſeparated again, are made of it matter for the nouriſhment of the different parts of the body. The ſerous part, which is alſo nitrous, being a proper vehicle to convey through the veſſels the fatty parts, which are as well adapted to all the offices of nutrition as any ſubſtance can be.

It is eaſy to infer from this account of *milk* that it is not only a proper food for children, but for grown people alſo; but proper regulations are to be obſerved as to its uſe in particular caſes; no aliment any more than this being capable of ſuiting all conſtitutions and circumſtances. Meat in the ſtomach is converted into chyle, or a ſubſtance like *milk*; this chyle paſſes into the heart through the blood-veſſels, and its fineſt and moſt ſpirituous parts are there tranſmuted into the red part of the blood; and after this the groſſer parts of it are by different elaborations tranſformed into bile, and the ſeveral other humours in the body. It is evident that theſe humours, as well as the blood itſelf, muſt all have a ſupply; and that meat cannot give this ſupply, till it is converted into chyle or *milk*; how much labour then is ſaved the animal functions by giving at once into the ſtomach chyle ready formed, that is *milk*; and in caſes where the action or juices of that organ are ſo debilitated as not to be of power to convert the meat into chyle, what remains but that the perſon muſt die ſlowly, by want of the ſupplies of the ſeveral fluids of the body, if ſomething be not given that is capable of paſſing into the blood with leſs preparation than meats are; and what is ſo proper on ſuch an occaſion as *milk*, which is already ſo much allied to the nature of the fluid that ſhould have been chiefly ſeparated from meat, that it will readily ſupply all other?

Milk is apt to occaſion one or two very oppoſite diſorders, fluxes and coſtiveneſs. This is remedied by diluting it with water, or by proper correctives, or by chuſing that kind of *milk* which beſt ſuits the conſtitution, and the diſeaſes to be treated. E. gr. The *milk* of goats has been found to ſuit better than cow's *milk* with thoſe perſons, whoſe conſtitutions diſpoſe them to diarrhœas.

Milk-diet is uſeful in the GOUT and STONE.

Dr. Cheyne recommends *milk* and ſeed diet with water for drink, as the ſureſt preſervative againſt diſeaſes, and cure of them. See CANCER, PALSY, FITS, GOUT, and STONE.

Upon opening a vein, eſpecially after meals, *milk* is ſometimes found inſtead of blood. See Phil. Tranſ. N° 6. p. 100.

We have ſeveral mineral *milks*, and ſome artificial ones, ſo called from their reſemblance of the natural. As,

MILK *of the moon, lac lunæ*, a name given by naturaliſts to ſoſſil agaric, a white light marle. See LAC *lunæ*.

Some ſay, it is chiefly found in ſilver mines, and that it is a flower ſublimed from the ore of that metal; whence its denomination, *flower of ſilver*.

MILK *of ſulphur, lac ſulphuris*, a preparation of flowers of ſulphur, and ſalt of tartar; preſcribed by phyſicians, as a ſudorific. See SULPHUR *præcipitatum*.

MILK-*water*. See WATER.

MILK, *virgin's, lac virginale*, compoſed of roch alum, ſpring-water, litharge, and vinegar; uſed as a coſmetic, to drive in pimples, and check any cutaneous eruptions, by its cooling, reſtringent quality.

MILK, in the *Wine Trade*. The coopers know very well the uſe of ſkimmed *milk*, which makes an innocent and efficacious forcing for the fining down of all white wines, ſtracks, and ſmall ſpirits; but is by no means to be uſed for red wines, becauſe it diſcharges their colour. Thus, if a few quarts of well-ſkimmed *milk* be put to a hogſhead of red wine, it will ſoon precipitate the greater part of the colour, and leave the whole nearly white; and this is of known uſe in the turning red wines, when pricked, into white; in which a ſmall degree of acidity is not ſo much perceived.

Milk is, from this quality of diſcharging colour from wines of uſe alſo to the wine-coopers, for the whitening of wines that have acquired a brown colour from the caſk, or from having been haſtily boiled before fermenting; for the addition of a little ſkimmed milk in theſe caſes, precipitates the brown colour, and leaves the wines almoſt limpid, or of what they call a water whiteneſs, which is much coveted abroad in wines, as well as in brandies.

MILK, *women's*. The *milk* is often a very troubleſome and dangerous thing to women in their lyings-in, and ſubjects them to many painful diſorders. About the third or fourth day after delivery they are uſually affected with chilneſſes and ſhiverings, which are well known to be owing to that cauſe, and are therefore not to be treated as a diſeaſe, nor any medicines to be given in them; only it is proper to keep the perſon warm, and promote perſpiration, eſpecially in the breaſts. Sometimes indeed this ſymptom is joined with a febrile heat, or a real *inflammatory* FEVER, which is then to be taken off by the proper means.

The *milk*-fever, to which women are ſometimes ſubject after delivery, is partly owing to the abſurd cuſtom that prevails, of not putting the child to the breaſt for the firſt two or three days, till the *milk* flows freely of itſelf. The more immediate cauſes of this diſorder are a diſtention of the nerves in the breaſt, and an abſorption of the *milk* which hath become acrid by ſtagnating in the breaſts for want of being drawn either by the child or from the perſon. In this caſe, the fafeſt courſe is plentiful [illegible] gentle evacuations, and fomentations of [illegible] ed: a thin cooling diet ſhould be uſed, till the violence of the ſymptoms is abated. See *Miſbirth* FEVER.

Hoffman obſerves, that this fever of child-bed women might be prevented, if they, during their pregnancy, were regular in their diet, uſed moderate exerciſe, took now and then a gentle laxative of manna, rhubarb, or cream of tartar, not forgetting to bleed in the firſt months, and avoid all ſharp air. When the labour is coming on, it is not to be haſtened with forcing medicines, which inflame the blood and humours, or put them into unnatural commotions. Care ſhould alſo be taken, after the

the birth, that the natural excretions proceed regularly, and, if the pulſe be quick, a little nitrous powder or ſome other cooling medicines ſhould be adminiſtered.

Very frequently there come on inflammations of the breaſts, of the eryſipelous kind; theſe are uſually taken off by the external uſe of ſpirit of wine and camphor with a little ſaffron in it, by embrocating them with a little warm linſeed oil, or applying to them the leaves of red cabbage, and by carefully keeping the parts warm. See TUMORS *of the Breaſts*.

The *milk* often proves very difficult to be drawn out; this is to be helped by keeping the body carefully open by carminative and emollient clyſters, by keeping up a gentle diaphoreſis, and by attemperating medicines mixed with the milder alexipharmics. The breaſts are all the time to be kept carefully covered with flannel, and gently preſſed and rubbed at times; and finally they are to be drawn by means of a pipe, or by the mouth of an experienced perſon.

Every mother who has *milk* in her breaſts, ought either to ſuckle her own child, or to have her breaſts frequently drawn, at leaſt for the firſt month; this would prevent many of the diſeaſes which prove fatal to women in child-bed.

MILK, *deficiency of*, is alſo a very common complaint, and it is in ſome caſes abſolute, there being no *milk* at all derived into the breaſts; in others, it is only a partial one, there being ſome *milk*, though not enough to ſupply the child with nouriſhment. A total deficiency of *milk* moſt frequently happens to perſons who have their firſt child when ſomewhat advanced in years, and to ſuch as are of a choleric diſpoſition; but a partial deficiency of it is often owing to a faltneſs of the ſerum, and ſometimes to the want of nouriſhment, and often is brought on by ſorrow.

When ſaline and bilious humours are in fault, then lac lunæ, calcined cryſtal, and other abſorbent powders, become of great uſe: ſome alſo preferibe the powder of earth-worms carefully dried, and the voiding the humours by ſtool, by means of gentle purges: when a want of nouriſhment is the only occaſion of it, the *milk* may always be recovered in a proper quantity by means of good foods, with *milk* and other nouriſhing fluids.

MILK, *an over-abundance of*, is as common a complaint, as a deficiency of it, and requires as much care in the treatment, otherwiſe the perſon is frequently ſubject to nodes and abſceſſes in the breaſt. The proper remedies are the eating and drinking more ſparingly, and the letting two children ſuck inſtead of one.

Many people do not ſuckle their children, and therefore find it neceſſary to drive away their *milk* abſolutely. This is beſt done by taking internally the digeſtive ſalts, with diaphoretic and diuretic medicines. Externally, it is proper to apply to the breaſts bags of the dried leaves of parſley, mint, cherril, &c. with the ſeeds of coriander and parſley, and a little camphor; and ſpirit of wine with camphor, and a little ſaffron is to be rubbed in, or linen rags wetted in it and applied. Cerates may alſo be made of white wax melted in oil of almonds, with a little camphor, and applied to the breaſts freſh every morning and evening, or oftener, if neceſſary.

MILK, *a too great thinneſs of the*, is another common complaint with nurſes; this is to be laid ſometimes to the diet, ſometimes to the concoction, and ſometimes to the unnatural tenuity of the humours; in this caſe the *milk* is often perfectly watery, and the child is thrown into an atrophy by it. The remedies for this are, change of diet, and a purging of the primæ viæ by ſome gentle cathartic, and afterwards a ſtrengthening of them by bitters, and ſtomachic medicines. Sometimes alſo it is neceſſary to evacuate the ſerous humours by the common phlegmagogues, ſuch as jalap in proper doſes, mixed with a little powdered ginger, which is an excellent corrective for it.

The *milk* is ſometimes ſalt to the taſte, and ſometimes of a bilious yellow colour; and theſe diſtemperatures of it uſually throw the child into colics, diarrhœas, vomitings, cutaneous eruptions, with ſcabs, and ſometimes abſolute ulcerations, and ſometimes into fevers. In this caſe the nurſe or parent is to take the abſorbents and nitrous medicines, with intermediate purges; thus, powders of crabs-eyes, oyſter-ſhells, and purified nitre, with ſmall doſes of rhubarb occaſionally taken, often perfect a cure: but during the courſe of taking theſe remedies, and for ſome time afterwards, the diet muſt be under ſome regulation, particularly ſalt foods are to be avoided; and all acids, aromatics, and ſtrong liquors, either wholly let alone, or taken very ſparingly. The perſon muſt alſo carefully avoid all violent paſſions of the mind, as anger, fear, and the like; and abſtain from all violent emotions of the body.

A contrary extreme to the thinneſs and watery appearance of the *milk* before deſcribed, is, a *morbid thickneſs of it*. This is principally troubleſome and dangerous to the parent, as it is apt to bring on tumors and nodes in the breaſt. The method of treatment in this caſe, is to give gentle alexipharmics for ſome days, then the gentle laxative medicines in ſmall doſes, and finally to allow a moderate uſe of wine.

MILK, *ſtagnations of the*. Theſe are very frequent in lyings-in, and are to be diſcuſſed by the ſame method as was before ordered for the ſending it back, in caſes where perſons do not chooſe to give ſuck; and, to the things there directed, may be added, the internal uſe of ſperma-ceti, and of calcined mountain-cryſtals, in powder; and externally, cataplaſms of ſperma-ceti with ſome volatile urinous ſalt, and the gentle compreſſions of the breaſts by wearing ſtreight cloths about the part.

Nodes of the breaſts often ariſe from the abundance and the mucous nature of the *milk*. They are to be diſcuſſed by plaiſters of ſperma-ceti, with aniſe, parſley, and coriander ſeeds; and by gently rubbing with a ſoft fleſh-brush, as alſo by wearing ſome animal's ſkin that has a thick fur on it, which at once ſerves the double office of warmth and a gentle friction. See TUMORS *of the Breaſts*.

Abſceſſes of the breaſts very often happen alſo from the ſame cauſes; and theſe when there appear no hopes of diſcuſſing them are always to be brought to ſuppuration as quick as poſſible. A maturating plaiſter is to be laid on the parts that are to be broke, and the other parts are to be rubbed with ſpirit of wine and camphor, and laſtly infuſed in it. When the matter in the abſceſs is ripe, if the ſkin do not burſt of *itſelf* it is to be immediately opened with a lancet; after this a plaiſter of equal parts of diachylon ſimplex and that with the gums, with a little camphor mixed in it, is to be applied; and afterwards digeſtives are to be wholly avoided, and no dreſſings but balſamics allowed. The liquor of myrrh, or a mixture of eſſence of myrrh, and amber, and ſpirits of turpentine, make an admirable dreſſing; and internally, gentle purges are to be given, and the milder diuretics with the nitrous and ſaline medicines.

Cracks and fiſſures of the nipples are another very troubleſome complaint with thoſe who give ſuck. The beſt applications to theſe, are the oil of eggs with the liquamen of the buds of the poplar, oil of wax, linſeed oil ſhook together with the whites and yolks of eggs, a liniment made of marygold flowers and freſh butter, an ointment of liquorice and the liquor produced from the flowers of mullein and marygolds, heated together in an oven; or they may be anointed with a mixture of oil and bees wax; or a little powdered gum arabic may be ſprinkled on them. Hungary water applied to the nipples has ſometimes a good effect. The ſucking out the *milk*, by means of a glaſs-pipe, is very neceſſary during the continuance of this complaint; but the beſt method of preventing it, is the applying white wax to the nipples for ſome time before, as well as after the time of the labour. If the complaint ſhould prove obſtinate, a cooling purge may be given, which generally removes it.

The ſmallneſs of the nipples is a trouble to many nurſes; when the complaint is only owing to their lying-in, the breaſts are to be forced out by the ſucking of a robuſt child of ſix or more months old, by the application of the common glaſs-pipe, firſt made warm, and by the ſucking of a grown perſon, experienced in ſuch caſes: all natural accidents of this kind may be cured by this means; but often the nipples have been ſo forced in by the ſtays, at the very time of their growth in young girls, and this force continued ſo long, that no art is able to recall them to their natural ſtate, or make them fit for an infant to ſuck from.

The miſchiefs that ſometimes attend perſons who have given ſuck, in the weaning of children, or on the death of a child, and the *milk* being left undrawn out, are to be avoided, by letting ſome other child ſuck a little at a time, and that leſs and leſs every day, and by drawing afterwards a little every day with a pipe.

It is very common among nurſes to be extremely ſcrupulous about diet, and to require the niceſt foods for the creating good *milk*; but it is evident, that though ſome care is neceſſary to this purpoſe, yet it is not this; for the poorer people, who live on the coarſeſt food, often have the richeſt *milk*. The whole neceſſary caution ſeems to conſiſt in avoiding exceſs, and feeding as much as poſſible on ſimple foods, without too many vegetables, and not to lead too ſedentary a life.

Things hard of digeſtion are to be abſtained from, as alſo acids; too fat meats, and all flatulent things, and the acrid and aromatic things are to be very carefully meddled with; ſince, though they do not affect the mother, they ſeldom fail to bring diſtempers upon the child. There is no better drink for thoſe who give ſuck than malt-liquors, when they are well ſettled and clear. Stronger

things, even wine in those who are habituated to it; though it do not hurt them, are to be refrained from, since they subject the child to convulsions and many other disorders.

Over large draughts of cold liquors, and the exposing the breasts too much to the cold, are often the causes of very great disorders both in the mother and the child. Gentle exercise, and motion of the body in general, is highly serviceable to nurses; as is also that of the breasts in particular, by gently shaking and pressing them for throwing off the aqueous part of the *milk*, and filling the lactiferous ducts more freely and copiously than would otherwise be done. The improper methods of dress in some places, and squeezing the girls into slenderness by strait stays, often occasion the lactiferous ducts to be so contracted, and the nipple so depressed, that no art can afterwards bring the person to be properly qualified for suckling a child. Junker's Conf. Med. p. 732, *seq.*

Violent passions of the mind are extremely injurious to those who give suck. It is very common to see nodes and abscesses of the breasts brought on by these alone, and erysipelatous inflammations are as frequent in persons of other habits, from the same causes. The child also is often thrown into diarrhœas, by these means; and in general, it is a very necessary rule to squeeze and shake the breasts to discharge the *milk* after a great fright, or a violent fit of passion, before the child is suffered to suck. If the menses appear at the time of giving suck, the child is usually greatly injured by the alteration the *milk* suffers.

When women are newly laid in, if the breasts become turgid, and there is danger of the *milk*'s coagulating in them, the child if it be strong, should be immediately put to suck; but if otherwise, the breasts are to be gently shaken and pressed to discharge the redundancy, or another child, or grown person, put to suck them.

MILK, *extract of*, a sweet dry extract of cow's milk made by evaporation.

Fred. Hoffman recommends this extract boiled with pure water to the quantity of what is exhaled of the *milk*, as an excellent drink in many disorders, where *milk* itself is not proper.

Milk is often thought improper with purgatives, and it certainly does render some persons costive; but this does not hold generally, nor perhaps for a long time, even in those whom it may so affect at first. Hoffman recommends an ounce of *manna* dissolved in a pint of *milk* as a good laxative.

MILK *vetch*. See ASTRAGALUS.

MILK *vetch, baſtard*. See VETCH.

MILK-*wood*. See TRUMPET-*flower*.

MILK-*wort, polygala*, in *Botany*, a genus of the *diadelphia octandria* claſs. Its characters are these: the flower has a small permanent empalement, and is shaped like those of the butterfly kind; the number of petals indeterminate; the wings are large, plain, and extend beyond the other petals; the ſtandard is rubulous, ſhort, and reflexed at the brim, where it is bifid; the keel is concave, compreſſed, and bellied toward the top; it has eight ſtamina in two bodies, included in the keel, terminated by ſingle ſummits; and an oblong germen ſupporting an erect ſtyle, terminated by a thick bifid *ſtigma*; the germen becomes a heart-ſhaped capſule, having two cells, each containing one ſeed. Miller enumerates only ſeven ſpecies, ſome of them natives of Europe, others of America; but Linnæus reckons twenty-ſix ſpecies.

The common *milk-wort* is frequently found in dry meadows, and flowers in July; the herb itſelf is only uſed; its bitter taſte proves it to be of a hot and drying quality. The leaves, boiled in wine, purge bile by ſtool. The roots have been found to produce the ſame effects in pleuriſies, as the SENEKA in a lower degree.

MILK-WORT, or *worm-wort*. See SURGE.

MILK-WORT, *ſea*. See GLAUX.

MILKY *geniſta*. See GROTTO.

MILKY *way, via lactea*, or *galaxy*. See GALAXY.

MILL, in propriety, denotes a machine for grinding corn, &c. but, in a more general ſignification, is applied to all machines whoſe action depends on a circular motion.

Of theſe there are ſeveral kinds, according to the various methods of applying the moving power; as water-*mills*, wind-*mills*, *mills* worked by horſes, &c.

Few people are ignorant, that corn is ground by two *mill*-ſtones, placed one above the other, without touching. The lower *mill*-ſtone is immoveable, but the upper one turns upon a ſpindle. The oppoſite ſurfaces of the two ſtones, which act to grind the corn, are not plane or flat; but the upper one is hollow, and the under one ſwells up; each of them being of a conic figure, whoſe *axis* indeed is very ſhort, in proportion to the diameter of its baſe: for the upper one, being ſix feet in diameter, is hollowed but about one inch at its centre; and the lower one riſes but about three-fourths of an inch. Theſe two *mill*-ſtones come nearer and nearer towards their circumference, whereby the corn that falls from the hopper has room to inſinuate between them as far as two-thirds of the radius, which is the place where it begins to be ground, and where it makes the greateſt reſiſtance that it is capable of; the ſpace between the two ſtones being in that place about but two-thirds or three-fourths of a thickneſs of a grain of corn. But as the millers have a liberty of raiſing or ſinking the upper ſtone a little, to gain proportion its diſtance from the lower one, according as they would have the flour finer or coarſer.

In order to cut and grind the corn, both the upper and under *mill*-ſtones have channels or furrows cut in them, proceeding obliquely from the centre towards the circumference. And theſe furrows are each cut perpendicularly on one ſide, and obliquely on the other, into the ſtone; which gives each furrow a ſharp edge, and in the two ſtones, they come, as it were, againſt one another, like the edges of a pair of ſciſſars; and ſo cut the corn to make it grind the eaſier, when it falls upon the places between the furrows. Theſe are cut the ſame way in both ſtones when they lie upon their backs, which makes them run croſs-ways to each other, when the upper ſtone is inverted by turning its furrowed ſurface towards that of the lower. For if the furrows of both ſtones lay the ſame way, a great deal of the corn would be drove onward in the lower furrows, and ſo come out from between the ſtones without ever being cut. When the furrows become blunt and ſhallow by wearing, the running ſtone muſt be taken up, and both ſtones new dreſt with a chiſſel and hammer. But by this repeated operation, their thickneſſes, and conſequently their weights diminiſh; and it is obſerved, that when they come to have but three quarters, or half of the thickneſs which they had when new, they produce but three quarters or half the flour which they yielded at the beginning.

The circular motion of the upper *mill*-ſtone brings the corn out of the hopper by jerks, and cauſes it to recede from the centre towards the circumference, where being quite reduced to flour, it is thrown out of the *mill*, by the centrifugal force of the ſtone, through a hole provided on purpoſe.

The diameter of common *mill*-ſtones, according to Dr. Deſaguliers, is from five to ſeven feet, and their thickneſs, twelve, fifteen, or eighteen inches: they laſt thirty-five or forty years; and when they have been long uſed, ſo that their thickneſs is conſiderably diminiſhed, they are cut anew, to give their ſurface a contrary figure to what they had before: ſo that the upper *mill*-ſtone is made the lower.

In water-*mills*, the momentum of the water is the moving power, and the attrition of the two ſtones in grinding, is the force to be overcome. Of theſe there are two kinds, viz. thoſe where the force of the water is applied above the wheel, and thoſe where it is applied below the wheel; the former being called over-ſhot, and the latter under-ſhot *mills*: and to theſe we may add a breaſt-*mill*, where the water ſtrikes againſt the middle of the wheel.

In a common breaſt *mill*, where the fall of water may be about ten feet, AA, *Tab.* V. *Mechanics, fig.* 65, N° 2. is the great wheel, which is generally about ſeventeen or eighteen feet diameter, from *a* the outermoſt edge of any float board, to *b* that of its oppoſite float. To this wheel the water is conveyed through a channel, and falling upon the wheel, turns it round. On the axis BB, of this wheel, and within the *mill*-houſe, is a wheel D, about eight or nine feet diameter, having ſixty-one cogs, which turn a trundle, E, containing ten upright ſtaves or rounds; and when this is the number of cogs and rounds, the trundle will make 6 ½ revolutions for one revolution of the wheel. The reaſon of adding an odd cog, called the hunting cog, to the wheel, is this; that, as every cog comes to the trundle, it may take the next ſtaff or round behind the one which it took in the former revolution, and thus it will wear all the parts of the cogs and rounds which work upon one another equally, and to equal diſtances from one another in a little time; and make a true uniform motion throughout the whole work. The trundle is fixed upon an iron axis called the ſpindle, the lower end of which turns in a braſs foot, *fig.* [illegible] in the horizontal beam ST, called the bridge-tree, and the upper part of the ſpindle turns in a wooden [illegible] fixed into the lower *mill*-ſtone, which lies upon beams in the floor YY. The top part of the ſpindle above the [illegible] is ſquare, and goes into a ſquare hole in a ſtrong iron croſs, *abcd*, *fig.* 66. N° 2. called the rynd; under which, and cloſe to the buſh, is a round piece of thick leather upon the ſpindle, which it turns round at the ſame time as it does the rynd. The rynd is ſet into grooves in the under ſurface of the running *mill*-ſtone G, *fig.* 65. N° 2. and ſo turns it round in the ſame time that the trundle E is turned round by the cog-wheel D. This *mill*-ſtone has a large hole quite through its middle, called the eye of the ſtone, through which the middle part of the rynd and upper end of the ſpindle may be ſeen; whilſt

whilſt the four ends of the rynd lie hid below the ſtone in their grooves.

The end T of the bridge-tree T S (which ſupports the upper *mill*-ſtone G upon the ſpindle) is fixed into a hole in the wall; and the end S is let into a beam Q R called the brayer, whoſe end R remains fixt in a mortiſe: and its other end Q hangs by a ſtrong iron rod P, which goes through the floor Y Y, and has a ſcrew-nut on its top at O; by the turning of which nut, the end Q of the brayer is raiſed or depreſſed at pleaſure; and conſequently the bridge-tree T S and upper *mill*-ſtone. By this means, the upper *mill*-ſtone may be ſet as cloſe to the under one, or raiſed as high from it, as the miller pleaſes. The nearer the *mill*-ſtones are to one another, the finer they grind the corn; and the more remote from one another, the coarſer.

The upper *mill*-ſtone G is incloſed in a round box H, which does not touch it any where; and is about an inch diſtant from its edge all around. On the top of this box ſtands a frame for holding the hopper *k k*, to which is hung the ſhoe I, by two lines faſtened to the hind-part of it, fixed upon hooks in the hopper, and by one end of the crook-ſtring K faſtened to the fore-part of it at *i*; the other end being twiſted round the pin L. As the pin is turned one way, the ſtring draws up the ſhoe cloſer to the hopper, and ſo leſſens the aperture between them; and as the pin is turned the other way, it lets down the ſhoe, and enlarges the aperture.

If the ſhoe be drawn up quite to the hopper, no corn can fall from the hopper into the *mill*; if it be let a little down, ſome will fall: and the quantity will be more or leſs, according as the ſhoe is more or leſs let down. For the hopper is open at bottom, and there is a hole in the bottom of the ſhoe, not directly under the bottom of the hopper, but forwarder towards the end *i*, over the middle of the eye of the *mill*-ſtone.

There is a ſquare hole in the top of the ſpindle, in which is put the feeder *e* (*fig.* 66. N° 2.) this feeder (as the ſpindle turns round) jogs the ſhoe three times in each revolution, and ſo cauſes the corn to run conſtantly down from the hopper, through the ſhoe, into the eye of the *mill*-ſtone, where it falls upon the top of the rynd, and is, by the motion of the rynd and the leather under it, thrown below the upper ſtone, and ground between it and the lower one. The violent motion of the ſtone creates a centrifugal force in the corn going round with it, by which means it gets farther and farther from the centre, as in a ſpiral, in every revolution, until it be thrown quite out; and, being then ground, it falls through a ſpout M, called the *mill*-eye, into the trough N. When the *mill* is fed too faſt, the corn bears up the ſtone, and is ground too coarſe; and beſides, it clogs the *mill* ſo as to make it go too ſlow. When the *mill* is too ſlowly fed, it goes too faſt, and the ſtones by their attrition are apt to ſtrike fire againſt one another. Both which inconveniencies are avoided by turning the pin L backwards or forwards, which draws up or lets down the ſhoe; and ſo regulates the feeding as the miller ſees convenient.

Sometimes, where there is a ſufficient quantity of water, the cog-wheel in *fig.* 65. turns a large trundle, on whoſe axis is fixed a horizontal wheel, with cogs all around its edge, turning two trundles at the ſame time; whoſe axes or ſpindles turn two *mill*-ſtones. When there is not work for them both, either may be made to lie quiet, by taking out one of the ſtaves of its trundle, and turning the vacant place towards the horizontal cog-wheel. And there may be a wheel fixed on the upper end of the great upright axle of this wheel for turning a couple of bolting-*mills*; and other work for drawing up the ſacks, fanning and cleaning the corn, ſharpening of tools, &c.

As the water acts upon an over-ſhot *mill* both by impulſe and weight, ſo does it likewiſe upon a breaſt-*mill*, or that where the water comes upon the breaſt or middle-part of the wheel: and here, though the weight of the water is not ſo great as in the overſhot *mill*, being contained in the buckets of the lower quarter only; yet the impulſe of the water is much greater, the height of the water being increaſed nearly the ſemi-diameter of the great wheel, all other things being equal. If the height of the water remain the ſame, the aperture of the penſtock muſt be enlarged to nearly twice the area, that the force may be the ſame; ſo that to produce the ſame effect, twice as much water is neceſſary for a breaſt-*mill* as for an overſhot one, every thing elſe being the ſame.

Mr. Ferguſon obſerves, that where there is but a ſmall quantity of water, and a fall great enough for the wheel to lie under it, the bucket or overſhot wheel is always uſed. But where there is a large body of water, with a little fall, the breaſt or ſtoat-board wheel muſt take place. As to the under-ſhot *mill*, it is evident there can be only the impulſe from the water; and therefore, the height of the water remaining the ſame, there muſt be a larger aperture of the penſtock for the diſcharge of a greater quantity of water in the ſame time, in order to produce the ſame effect as the over-ſhot or breaſt-*mill*; whence a greater expence of water will be made here than in any other *mill*, and can only be ſupplied for a conſiderable time by a river; and where this can be had, the under-ſhot is the eaſieſt, cheapeſt, and moſt ſimple ſtructure, a *mill* is capable of.

Dr. Deſaguliers, having had occaſion to examine many under-ſhot and over-ſhot *mills*, generally found that a well made over-ſhot *mill*, ground as much corn, in the ſame time, as an under-ſhot *mill*, with ten times leſs water; ſuppoſing the fall of water at the over-ſhot, to be twenty-feet, and at the under-ſhot to be about ſix or ſeven feet: and he generally obſerved, that the wheel of the overſhot-*mill* was of fifteen or ſixteen feet diameter, with a head of water of four or five feet, to drive the water into the buckets with ſome momentum.

Mr. Ferguſon has given the following directions how to conſtruct water-*mills*, ſo as to be in the greateſt degree of perfection; and alſo a Table calculated from his rules, for the eaſe of thoſe mill-wrights who either cannot calculate or do not like to take the trouble.

When the float-boards of the water-wheel move with a third part of the velocity of the water that acts upon them, the water has the greateſt power to turn the *mill*: and when the *mill*-ſtone makes about ſixty revolutions in a minute, it is found to do its work the beſt. For, when it makes but about forty or fifty, it grinds too ſlowly; and when it makes more than ſeventy, it heats the meal too much, and cuts the bran ſo ſmall that a great part thereof mixes with the meal, and cannot be ſeparated therefrom by ſifting or bolting. Conſequently, the utmoſt perfection of *mill*-work lies in making the train ſo, as that the *mill*-ſtone ſhall make about ſixty turns in a minute when the water-wheel moves with a third part of the velocity of the water. To have it ſo, obſerve the following rules:

1. Meaſure the perpendicular height of the fall of water, in feet, above the middle of the aperture, where it is let out to act by impulſe againſt the float-boards on the loweſt ſide of the under-ſhot wheel.

2. Multiply this conſtant number 64.2882, by the height of the fall in feet, and extract the ſquare root of the product, which ſhall be the velocity of the water at the bottom of the fall; or the number of feet the water moves *per* ſecond.

3. Divide the velocity of the water by 3; and the quotient ſhall be the velocity of the floats of the wheel in feet *per* ſecond.

4. Divide the circumference of the wheel in feet, by the velocity of its floats; and the quotient ſhall be the number of ſeconds in one turn or revolution of the great water wheel, on whoſe axis the cog wheel that turns the trundle is fixed.

5. Divide 60 by the number of ſeconds in a turn of the water-wheel or cog-wheel; and the quotient ſhall be the number of turns of either of theſe wheels in a minute.

6. By this number of turns divide 60 (the number of turns the *mill*-ſtone ought to have in a minute) and the quotient ſhall be the number of turns the *mill*-ſtone ought to have for one turn of the water or cog-wheel. Then,

7. As the required number of turns of the *mill*-ſtone in a minute is to the number of turns of the cog-wheel in a minute, ſo muſt the number of cogs in the wheel be to the number of ſtaves in the trundle on the axis of the *mill*-ſtone, in the neareſt whole number that can be found.

By theſe rules the following table is calculated; to which, the diameter of the water-wheel is ſuppoſed to be 18 feet, (and conſequently its circumference 56.5 feet) and the diameter of the *mill*-ſtone to be 5 feet.

Ferguſon's height of the fall of water in feet.	Velocity of the water per ſecond.	Velocity of the floats.	Seconds in which the wheel turns round.	Number of cogs in the wheel.	Number of turns of the wheel in a minute.	Number of the mill-ſtone turns for one of the wheel.	Number of turns by the thirſh-cloſe cogs ſpindle.	Number of ſtaves in the trundle.
1	8.02	2.67	21.15	21.50	2.7	21.17	53.21	
2	11.40	3.78	14.95	15.00	4.5	14.00	60.00	
3	13.89	4.63	12.21	12.50	5.8	12.23	60.19	
4	16.04	5.35	10.63	10.50	6.8	10.38	59.13	
5	17.93	5.98	9.51	9.50	7.8	9.28	60.84	
6	19.64	6.55	8.64	8.63	8.9	8.60	60.20	
7	21.21	7.07	8.00	8.00	7.9	8.00	60.00	
8	22.68	7.56	7.48	7.48	8.3	7.49	59.87	
9	24.04	8.01	7.05	7.05	8.5	7.00	59.57	
10	25.32	8.44	6.69	6.69	9.0	6.70	60.29	
11	26.52	8.84	6.40	6.38	9.4	6.40	60.18	
12	27.67	9.22	6.12	6.12	9.8	6.10	59.90	
13	28.77	9.59	5.89	5.87	10.2	5.90	60.18	
14	29.82	9.94	5.68	5.68	10.6	5.66	59.98	
15	30.80	10.26	5.50	5.50	10.9	5.50	59.95	
16	31.81	10.60	5.32	5.33	11.3	5.30	59.89	
17	32.76	10.92	5.17	5.17	11.6	5.20	60.32	
18	33.68	11.23	5.03	5.00	12.0	5.00	60.00	
19	34.55	11.52	4.90	4.88	12.3	4.90	60.27	
20	35.38	11.79	4.78	4.77	12.6	4.80	60.48	
1	2	3	4	5	6	7	8	

Example. Suppose an under-shot *mill* is to be built where the perpendicular height of the fall of water is 9 feet: it is required to find how many cogs must be in the wheel, and how many staves in the trundle, to make the *mill*-stone go about 60 times round in a minute, while the water wheel-floats move with a third part of the velocity with which the water spouts against them from the aperture at the bottom of the fall.

Find 9 (the height of the fall) in the first column of the table; then, against that number, in the sixth column, is 70, for the number of cogs in the wheel, and 10 for the number of staves in the trundle: and by these numbers, we find in the eighth column that the *mill*-stone will make $59\frac{1}{2}$ turns in a minute, which is within half a turn of 60, and near enough for the purpose; so it is not absolutely requisite that there should be just 60 without any fraction: and throughout the whole table the number of turns is not quite one more or less than 60.

The diameter of the wheel being eighteen feet, and the fall of water 9 feet, the second column shews the velocity of the water, at the bottom of the fall, to be 24,25 feet per second; the third column, the velocity of the float-boards of the wheel to be $8\frac{1}{12}$ feet per second; the fourth column shews that the wheel will make $8\frac{1}{12}$ turns in a minute; and the sixth column shews, that for the *mill*-stone to make exactly 60 turns in a minute, it ought to make 7,82 (or seven turns and five hundred parts of a turn) for one turn of the wheel.

Dr. Barker has invented a water-*mill*, that has neither wheel nor trundle: this is represented in *fig.* 72. in which A is a pipe or channel that brings water to the upright tube B. The water runs down the tube, and thence into the horizontal trunk C, and runs out through holes at *d* and *e* near the ends of the trunk on the contrary sides thereof.

The upright spindle D is fixt in the bottom of the trunk, and screwed to it below by the nut *g*; and is fixt into the trunk by two cross bars at *f*: so that, if the tube B and trunk C be turned round, the spindle D will be turned also.

The top of the spindle goes square into the rynd of the upper *mill*-stone H, as in common *mills*; and as the trunk, tube, and spindle turn round, the *mill*-stone is turned round thereby. The lower, or quiescent *mill*-stone is represented by I; and K is the floor on which it rests, and wherein is the hole L for letting the meal run through, and fall down into a trough which may be about M. The hoop or case that goes round the *mill*-stone rests on the floor K, and supports the hopper, in the common way. The lower end of the spindle turns in a hole in the bridge-tree G F, which supports the *mill*-stone, tube, spindle, and trunk. This tree is moveable on a pin at *b*, and its other end is supported by an iron-rod N fixt into it, the top of the rod going through the fixt bracket O, and having a screw-nut *a* upon it, above the bracket. By turning this nut forward or backward, the *mill*-stone is raised or lowered at pleasure.

Whilst the tube B is kept full of water from the pipe A, and the water continues to run out from the ends of the trunk; the upper *mill*-stone H, together with the trunk, tube, and spindle, turns round. But if the holes in the trunk were stopt, no motion would ensue; even though the tube and trunk were full of water. For,

If there were no hole in the trunk, the pressure of the water would be equal against all parts of its sides within. But, when the water has free egress through the holes, its pressure there is entirely removed: and the pressure against the parts of the sides which are opposite to the holes, turns the machine. See Desaguliers's Exp. Phil. vol. ii. p. 417, &c. p. 431, &c. p. 450, &c. Ferguson's Mechanics, p. 45. &c. 420. ed. and supp. p. 10. * See also, on this subject, an elaborate paper of Mr. Smeaton, containing an account of a number of experiments, in order to estimate the natural powers of water and wind to turn *mills* in the Phil. Trans. vol. li. art. 18. p. 100, &c.

Persons riotously assembling and destroying, or maliciously burning, any wind-saw-*mill*, wind-*mill*, or water-*mill*, &c. shall be guilty of felony, without benefit of clergy, by 9 Geo. III. c. 29.

MILLS, *wind*, are, with respect to their working parts, little different from those of water-*mills*; but they are turned by the force of wind gathered in their sails.

Of these, some are called *vertical*, others *horizontal*, according to the position of the sails; or, rather, according to the direction of their motion, with regard to the horizon.

For the best form of horizontal sails, and also for determining the position of the axis of *wind-mills*, see WIND-*mill* and MECHANICS.

MILLS, *portative* or *hand*, are those kept in motion by the hand; or else whose *mill*-stones are turned, or pistons driven, by the force of horses, or other beasts. Thus, if the cog-wheel D, *fig.* 65, N° 2, be made about eighteen inches diameter, with thirty cogs, the trundle as small in proportion, with ten staves, and the *mill*-stones be each about two feet in diameter, and the whole work be put into a strong frame of wood, as represented in the figure, the engine will be a *hand-mill* for grinding corn or malt in private families. And then, it may be turned by a winch instead of the wheel A A; the *mill*-stone making three revolutions for every one of the winch. If a heavy fly be put upon the axle B, near the winch, it will assist greatly in regulating the motion.

If the cog-wheel that turns the trundle or trundles of a *mill* be placed horizontally, horizontal levers may be fixed into its vertical axis, and horses applied to these for turning the *mill*: which is often done where water cannot be had for that purpose.

The use of *mills* and *mill*-stones, according to Pausanias, was first invented by Myla, son of Melegus, first king of Sparta; though Pliny attributes the invention of every thing belonging to bread and baking, to Ceres: Polydore Virgil was not able to discover the author of so useful a machine. It is doubted, whether or no water-*mills* were known to the Romans, there being no mention made, in the Digest, but of *mills* turned by slaves and asses. Salmasius, however, and Gothofred, will not allow water-*mills* to have been unknown to the ancient Romans, though they were not in ordinary use. Wind-*mills* are of much more modern invention: the first model of these was brought from Asia into Europe, in the time of the holy wars.

MILL is also used for any machine, which, being moved by some external force, serves to give a violent impression on things applied to it.

Mills in this sense, are machines of vast use in the manufactures, arts, and trades; for the making and preparing divers kinds of merchandizes. The principal are those which follow.

MILLS, *forge*, turned by water, serve to raise and let fall one or more huge hammers, to beat and form the iron into bars, anchors, and other massive works.

MILL, *fulling*, is a *water-mill* which raises and beats down large wooden pistons in proper vessels called *pools*, or *troughs*; in order to full, scour, and cleanse woollen stuffs.

MILL, *gunpowder*, is that used to pound and beat together the ingredients whereof gunpowder is composed.

This is done, in a kind of iron or brass mortar, by means of iron pestles wrought by a wheel without-side the *mill*, turned by the water falling on it.

MILLS, *leather*, are used to scour, and prepare with oil, the skins of stags, buffaloes, elks, bullocks, &c. to make what they call *buff-leather*, for the use of the soldiery.

This is effected by means of several large pistons, rising and falling on the skins, in large wooden troughs, by means of a wheel without-side, turned by the force of water.

MILLS, *linen*, do not differ much from *fulling-mills*. Their use is, to scour linens, after their having been first cleansed when taken out of the lixivium, or ley. Some of these go by water, and the generality by horses.

MILLS, *oil*, whether turned by men, water, hand, or horse, serve to bruise or break the nuts, olives, and other fruits and grains, whose juice is to be drawn, by expression, to make oil.

MILL, *paper*, a *water-mill* furnished with several large hammers, which beat or pound the rags or cloth in a kind of wooden troughs; and thus, by reducing them to little pieces, turn them into a kind of pulp, by means of water conveyed into the troughs by a pipe for that purpose.

MILL, *sawing*, is a *water-mill*, serving to saw several planks or boards, at the same time.

These are frequent in France, especially in Dauphiné. They were lately prohibited in England, where they were begun to be introduced, from a view to the ruin of the sawyers, which must have ensued.

There are also *Silk*-MILLS, for spinning, throwing, and twisting silks; which are large round machines in form of turrets, five or six feet high, and six yards in diameter; which, being turned, either by the force of water, or that of men, work at the same time an infinity of bobbins fastened thereto, whereon the silk had been wound to be here spun and twisted.

There are abundance of *mills* of this kind in France, especially about Lyons and Tours, some of which are so disposed, as that three of them will go at the same time, and by the same wheel wrought by water, or by strength of hand. That in the Hôpital de la Charité at Lyons, is wonderful, a single man working no less than forty-eight of these *mills*. See SILK, and WINDING *of Silk*.

MILL, *stamping*. See STAMPING.

MILL, *sugar*, is a machine that ſerves to bruiſe the ſugar-canes, and expreſs the liquor or juice contained therein. The *ſugar-mills* are very curious contrivances. Of theſe there are four kinds, being turned either by water, wind, men, or horſes.

Thoſe turned by the hand were firſt in uſe; but they are now laid aſide, as being an intolerable hardſhip on the poor negroes, who were doomed thereto, beſides the ſlowneſs of their progreſs.

Wind-mills are the moſt modern: but they are yet ſomewhat rare, excepting in St. Chriſtopher's and Barbadoes, and among the Portugueſe. Theſe make good diſpatch, but have this inconvenience, that they are not eaſily ſtopped; which proves frequently fatal to the negroes who feed them.

MILLS, *tan* or *bark*, wrought by water or horſes, ſerve to cut certain barks into a coarſer ſort of powder, proper for the tanning of hides, &c.

MILLS *for ſword-blades* are likewiſe moved by water. They are frequent at Vienne in Dauphiné. By working heavy hammers they forge thoſe excellent ſword-blades, called *blades of Vienne*.

The uſes and operations of theſe ſeveral mills, more at large, ſee under PAPER, FULLING, SUGARS, &c.

MILL, in *Coinage*, is a machine uſed to prepare the lamin\æ, or plates of metal, and to give them proper thickneſs, hardneſs, and conſiſtence, before they be ſtruck, or ſtamped.

This machine has not been long known among us; but is of ſome ſtanding in Germany. It conſiſts of ſeveral wheels dented like thoſe of clocks, &c. which move two cylinders of ſteel, between which the metal is paſſed to be brought to its proper thickneſs. It was firſt turned with water, ſince with horſes. See COINAGE.

MILL, among *Gold Wire-Drawers*, is a little machine conſiſting of two cylinders of ſteel, ſerving to flatten the gold or ſilver wire, and reduce it into lamin\æ, or plates. See GOLD WIRE.

They have alſo *mills* to wind the gold wire or thread on the ſilk: theſe are compoſed of ſeveral rows of bobbins all turned at the ſame time.

MILL-*dams*. A very firm way of making theſe in a quick or running ſand, which is uſually found a very troubleſome circumſtance in the making them, is by laying the foundation with unſlacked lime; which, by ſlacking among the ſand, runs together into a hard ſtone, which gives a very firm and ſure foundation. Plot's Staffordſhire, p. 336.

MILL-*pool*, a ſtock or pond of water, by the force of which the motion of a *water-mill* is effected.

The dam of a *mill-pool* is raiſed much in the ſame manner as directed for FISH-PONDS.

MILL-*ſtones*. The *mill-ſtones* which we find preſerved from ancient times, are all ſmall, and very different from thoſe in uſe at preſent. Thoreſby mentions two or three ſuch found in England, among other Roman antiquities, which were but twenty inches broad; and there is great reaſon to believe that the Romans, as well as the Egyptians of old, and the ancient Jews, did not employ horſes, or wind, or water, as we do, to turn their *mills*, but made their ſlaves and captives of war do this laborious work; they were in this ſervice placed behind theſe *mill-ſtones*, and puſhed them on with all their force.—Sampſon, when a priſoner to the Philiſtines, was treated no better, but was condemned to the *mill-ſtone* in his priſon. The runner or looſe *mill-ſtone*, in this ſort of grinding, was uſually very heavy for its ſize, being as thick as broad. This is the *mill-ſtone* which it is expreſsly prohibited in Scripture to take in pledge, as lying looſe it was more eaſily removed. The Talmudiſts have a ſtory, that the Chaldæans made the young men of the captivity carry *mill-ſtones* with them to Babylon, where there ſeems to have been a ſcarcity at that time; and hence, probably, their paraphraſe renders the text "have "borne the *mills*, or *mill-ſtones*;" which might thus be true in a literal ſenſe. They have alſo a proverbial expreſſion of a man with a *mill-ſtone* about his neck; which they uſe to expreſs a man under the ſevereſt weight of affliction. This alſo plainly refers to this ſmall ſort of ſtones.

MILLAINS, according to Mr. Wingate, are the third ſubdiviſion of the primes in Gunter's line; and expreſs the thouſandth parts of ſuch primes.

MILLEFOLIUM, in *Botany*. See YARROW.

MILLEMORBIA, in *Botany*, a name given by ſome authors to the ſcrophularia, or figwort, from its ſuppoſed virtues in many diſeaſes.

MILLENARII, MILLENARIANS, in *Eccleſiaſtical Hiſtory*, a ſect among Chriſtians, chiefly in the primitive church; who hold that Jeſus Chriſt is to come again, and reign on earth for the ſpace of a thouſand years; during which time, the faithful are to enjoy all manner of temporal bleſſings; and at the expiration of this term, the day of judgment is to take place.

The *Millenarii* are alſo called *Chiliaſti*, *Chiliaſtæ*, from the Greek χιλιας, *mille*, *a thouſand*.

This opinion of the *Millenarii* is very ancient, and may be traced back almoſt as far as the time of the apoſtles. It had its origin from a paſſage in the Apocalypſe too literally underſtood, wherein mention is made of Chriſt's reign on earth, &c.

The opinion of S. Papias, in the ſecond century, to whom Euſebius aſcribes the origin of this notion of a *millenium*, ſays Mr. Launoy, touching the new kingdom of Jeſus Chriſt on earth, after the reſurrection, was held for near three centuries, before it was charged as erroneous; as appears from eccleſiaſtical hiſtory. It was allowed of, and followed, under various interpretations, by ſeveral of the greateſt men among the primitive fathers, as Irenæus, Juſtin Martyr, Lactantius, Tertullian, &c. Towards the cloſe of the ſecond century, the credit of this opinion began to decline, principally through the influence and authority of Origen, who oppoſed it with the greateſt warmth, becauſe it was incompatible with ſome of his favourite ſentiments.

Nepos, an Egyptian biſhop, endeavoured to reſtore this opinion to its former credit, in a book written *againſt the Allegoriſts*, for ſo he called by way of contempt the adverſaries of the *millenarian* ſyſtem. But Dionyſius of Alexandria, a diſciple of Origen, ſtopped the growing progreſs of this doctrine by his private diſcourſe, and alſo by two learned and judicious diſſertations concerning the *divine promiſes*. Jerome is alſo ſaid to have oppoſed this *millenary* reign of Chriſt. The ancient *Millenarians* generally held, according to the account of the learned Dr. Whitby, that the temple, or the city of Jeruſalem, ſhould be rebuilt, and that the land of Judæa ſhould be the habitation of thoſe riſen ſaints, who were to reign on earth a thouſand years; that this reſurrection was not to be confined to the martyrs only, but that all the juſt were then to riſe and reign with Chriſt; and that this reign ſhould alſo extend to the juſt who were found alive at this firſt reſurrection; that Jeſus Chriſt ſhall then come down from heaven, and be ſeen on earth, and there reign with his ſervants; and that they ſhall then fare deliciouſly, and enjoy the richeſt wines and moſt delicious fruits, build houſes, plant vineyards and eat the fruits of them, and propagate their ſpecies. The *millennium*, according to this writer, is a glorious ſtate of the church, commencing after the fall of antichriſt; and the ſubſequence converſion of the Jews to the Chriſtian faith, in which it ſhall flouriſh in peace and plenty, in righteouſneſs and holineſs, and in a pious offspring, for a thouſand years, under the undiſturbed, though not perſonal government of Chriſt, over both Jews and Gentiles, which ſhall then be united in one church.

MILLENNIUM, compounded of *mille*, a *thouſand*, and *annus*, *a year*, a term literally ſignifying a *thouſand years*; chiefly uſed for the time of our Saviour's expected ſecond appearance, and reign on earth.

Mr. Whiſton, in ſeveral of his writings, has endeavoured to ſupport the notion of a *millennium*. According to his computation it was to have commenced about the year 1720.

MILLEPEDA, in *Conchyliology*, the name given by authors to a ſpecies of MUREX of the ſpider-ſhell kind, ſo called from the great number of prominences in the ſhape of points called feet in this ſeries of ſhells, which ariſe from its lip which is greatly extended. The body of the ſhell is full of bumps and tubercles, and the tail is long and crooked.

MILLEPEDES, in *Zoology*, well-known inſects, uſed on many occaſions in medicine. This inſect is otherwiſe called *aſellus*, being a ſpecies of ONISCUS, in Engliſh the *wood-louſe*. Mr. Ray deſcribes ſeven different ſpecies of this inſect, ſome of which we ſee every day, others are more rare. The blue kind, which rolls itſelf up into a ball, is the proper medicinal kind, though there is another ſort of a pale browniſh grey, ſmaller, flatter, and thinner than the former, and having the laſt diviſion of the body not annular but pointed, and a forked tail, which is of the ſame quality. They are found in cellars, and under ſtones and logs of wood in cold moiſt places.

Millepedes are ſo generally known, that moſt perſons ſeem to be maſters of their medicinal uſes, and take them in many caſes without any other direction. They are, by all experience, found to be very diuretic and abſterſive, which makes them not only frequent in preſcriptions for diſorders in the kidneys, but alſo in obſtructions of the viſcera, and particularly in the jaundice.

They abound with a nitrous ſalt, which they ſeem to derive from the earthy diet they live on. This is ſome-

what volatilized by its digeſtion and circulation in the inſect; as ſuch ſalt always is more or leſs, in proportion to the digeſtive powers of the animal, into whoſe blood it enters; yet not ſo much but that it is brackiſh and pungent upon the palate. This makes their deterſive qualities extend farther than the larger glands, and enables them to ſcour even the minuteſt paſſages, and keep the nerves clear from viſcidities, and ſuch things as would clog their ſprings; whence they are reckoned good in palſies, epilepſies, and all nervous diſtempers.

As they open and cleanſe away viſcoſities, and by their minuteneſs and aſperities cut their way through any obſtructions, they are good in ſtrumas, and all inveterate tumors or ulcers. Remarkable cures have been performed in each way by a long uſe of them. But it is much to be doubted, whether their virtues are ſo conſiderable as they are generally ſuppoſed to be, at leaſt when given in the cuſtomary doſes. They are beſt adminiſtered in ſubſtance, or bruiſed in white wine, the liquor being taken without ſettling.

The *millepedes præparatæ* of the ſhops are reduced to powder, either by incloſing them in a thin canvaſs cloth, and ſuſpending them over hot ſpirit of wine in a cloſe veſſel, till they are killed by the ſteam and rendered friable; or by incloſing them in a proper veſſel and drying them with a very gentle heat.

There are alſo ſeveral chemical preparations of *millepedes*, as ſpirit, volatile ſalt, oil, and wine of *millepedes*.

The college of Edinburgh directs two ounces of live *millepedes* to be ſlightly bruiſed, and digeſted for a night in a pint of Rheniſh wine, after which the liquor is to be preſſed through a ſtrainer.

Beſide theſe proper *aſelli*, there are ſome other ſpecies commonly called *pulices marini*, which ſeem greatly to approach to their nature. Theſe are, 1. the horned ſea *pulex*; its body is compoſed of twelve joints; it has ſeven pair of legs, and the hinder ones are longer than the others; the antennæ are a pair of very large horns, and at the baſe of theſe there ſtand two other very ſhort and ſlender ones; it has fins to ſwim with, and it is of a whitiſh colour, and very ſlender body. 2. The *pulex marinus* of Bellonius; this is of the ſhape of the common *aſelli*, but ſomewhat ſlenderer and rounder bodied, and its legs are much longer; its back is brown; its eyes are large and black, and the antennæ are articulated and have two ſmall ones growing from their roots; its body is pellucid, and it moves very ſwiftly in the water; the tail is compoſed of a large bundle of hairs. This is found in great plenty under ſtones, by the ſides of rivers, near the ſea. 3. The freſh-water *pulex*; this differs very little from the laſt ſpecies, but is ſingular in the places it inhabits, which are the banks and mud of hot ſprings, in which no other animal can live. Ray.

MILLEPORA, in *Natural Hiſtory*, a name by which Linnæus diſtinguiſhes that genus of *lithophytes*, of a hard ſtructure and full of holes, which are not ſtellate or radiated, and whoſe animal is the hydra, in which it differs from the MADREPORA, and comprehending fourteen different ſpecies.

In the *millepora*, the animal which forms and inhabits it occupies the ſubſtance: and it is obſerved, that the *milleporæ* grow upon one another: their little animals produce their ſpawn, which attaching itſelf either to the extremity of the body already formed, or underneath it, gives a different form to this production. Hence the various ſhapes of the *millepora*, which is compoſed of an infinite number of the cells of thoſe little inſects, which all together exhibit different figures, though every particular cellula has its eſſential form, and the ſame dimenſions, according to its own ſpecies. Philoſ. Tranſ. vol. xviii. p. 467.

MILLERIA, in *Botany*, a genus of the *ſyngeneſia polygamia neceſſaria* claſs: the characters of which are, that it hath no receptacle nor down; that the calyx has three valves; and that the radius is half the corolla. There are two ſpecies.

MILLERS-*thumb*, in *Ichthyology*, an Engliſh name for the fiſh called alſo the bull-head, and by authors the cottus; being the COTTUS *gobio* of Linnæus. It is common in all our clear brooks; lying generally at the bottom, and depoſiting its ſpawn in a hole formed by it in the gravel. It ſeldom exceeds three inches and a half in length; its head is large, broad, thin at its circumference, and on the middle part of the covers of the gills is a ſmall crooked ſpine, turning inwards; the eyes and teeth are ſmall; the body grows ſlender towards the tail; the colour is duſky mixed with yellow; and the belly whitiſh.

MILLET, *milium*, in *Botany*, a genus of the *triandria digynia* claſs. Its characters are theſe: it is of the corn or graſs tribe, with one flower in each chaff; the petal of the flower is bivalve, and ſmaller than the empalement; it hath three very ſhort hairy ſtamina, and a roundiſh germen with two hairy ſtyles; the germen turns to a roundiſh ſeed, covered by the petal of the flower. Miller reckons four, and Linnæus five ſpecies.

The firſt ſort grows naturally in India, but is now cultivated in many parts of Europe, as an eſculent grian. The ſecond grows naturally at la Vera Cruz.

The common *millet* was originally brought from the eaſtern countries, where it is ſtill greatly cultivated; from whence we are furniſhed annually with this grain, which is by many perſons greatly eſteemed for puddings, &c. This is ſeldom cultivated in England, but as a curioſity in ſmall gardens, or for poultry, as its ſeeds generally ripen well.

It muſt be ſown in the beginning of April, upon a warm dry ſoil, but not too thick, becauſe theſe plants, dividing into ſeveral branches, ſhould have much room. When they come up they ſhould be cleared from weeds; after which they will, in a ſhort time, get the better of them. In Auguſt they will ripen, when they muſt be cut down, and the ſeeds beat out, as is practiſed for other grain; but when it begins to ripen, if it be not protected from birds, they will ſoon devour it. Miller.

Millet is reckoned by Pliny the moſt fertile of all grain; one grain of it producing three Roman ſextaries.

Millet is cooling, drying, and binding, ſomewhat windy, and not eaſily digeſted; a ſtrong decoction of it with figs and raiſins, mixed with wine, and drank warm in bed, is a very good ſudorific, though it is ſeldom uſed.

Millet, by conſent of authors both ancient and modern, is refrigerating and drying; it is of bad juice, difficult of digeſtion, binds the belly, and generates flatulencies; it is however well known to be a very grateful food to many nations at preſent. In former times it ſerved to make bread, under a dearth of better corn, as we are aſſured by Dioſcorides, Pliny, Galen, and others of the ancients. Among the Italians, ſays C. Bauhine, loaves are made of *millet*, which are yellow, and eaten hot by many, not out of neceſſity, but for their ſweetneſs; but, when this bread is grown hard, it is quite black. Of the flour of *millet* and milk, the Italians make fine cakes, which muſt be eaten as ſoon as dreſſed, or elſe they become glutinous, and ungrateful to the taſte.

A pudding prepared of *millet*, boiled in milk with an addition of butter, and ſugar ſprinkled over it, is much in requeſt among the Germans at preſent; and theſe puddings have been long ago introduced into England, and are ſtill in faſhion.

The flour of *millet* was formerly uſed in fomentations, for the gripes, and for pains of the head and nerves; it was applied externally in bags, becauſe the uſe of it in cataplaſms was difficult, on account of its friability. If the membrane of the brain happens to be wounded, it is excellently conglutinated, ſays Archigenes, by infuſing thereon the juice of calaminth, and ſprinkling it with dry flour of *millet*. A decoction of *millet*, with figs and raiſins is called, by Heurnius, a noble ſudorific and diuretic. Or, take of a decoction of *millet*, boiled till it burſts, four ounces; white wine, two ounces: let the patient take it hot. Chefneau.

Millet is diuretic and aſtringent; the ſeeds are of extraordinary ſervice in diſeaſes of the lungs, and exulcerations of the kidneys: made into a cataplaſm, they are anodyne and reſolvent. Hiſt. Plant. adſcript. Boerhaave.

MILLET, *Indian*, *holcus*, in *Botany*, a genus of the *polygamia monoecia* claſs. The characters are, that it hath male and hermaphrodite flowers on the ſame plant; the male flowers are ſmall, and have a bivalve chaff; they have neither petals, nor any proper empalement, but have three hairy ſtamina, terminated by oblong ſummits; the hermaphrodite flowers are ſingle, in a thin bivalve chaff; they have three hairy ſtamina, terminated by oblong ſummits, with a roundiſh germen, ſupporting two hairy ſtyles, crowned with plumoſe ſummits; the germen becomes an oval ſingle ſeed, wrapped up in the chaff. There are ſeveral ſpecies of graſs that belong to this genus.

The African *millet* has been lately recommended by M. Tſchiffeli, of Switzerland, to the attention of the European farmers, as a very uſeful plant; becauſe it thrives in all ſorts of ſoils; it requires neither much dung nor great tillage; it is not ſubject to the depredations of birds, which are very fond of panic and common *millet*; it yields very large returns, and does not exhauſt the land in proportion to the largeneſs of the crops.

MILLIARE, or MILLIARIUM, among the Romans, *denoted a mile*, conſiſting of a thouſand paces, *mille paſſus*; whence the name.

In the Roman empire, the *milliaria*, in all the great roads, were marked with ſtones, or columns erected for that purpoſe; commencing from a columu in the heart of the city, called *milliare aureum*.

Thoſe

Thoſe columns were alſo hence denominated *milliary columns*.

MILLIARIA *robora*. See CONORS *equitata*.

MILLIARY *fevers*, *glands*, *herpes*, *terms*. See the ſeveral ſubſtantives.

MILLING, in the *Manufactories*, an operation called alſo FULLING.

MILLING, or *throwing of ſilk*, is the laſt preparation of ſilk before dyeing; ſerving to twiſt it, more or leſs, according to the work for which it is intended.

To prepare the ſilk for *milling*, they firſt put it in boiling water, incloſed between two linen cloths. The mill is a ſquare machine, compoſed of ſeveral pieces of wood, mortiſed in each other, ſo as to form a kind of large cage, in the centre whereof are two wheels placed parallel over each other, whoſe axis bears on two poſts. When the machine is ſimple, a ſingle man turns theſe wheels by means of a little cog in which they catch, and a large handle.

The wheels, put in motion by the handle, communicate their motion to eight windles, or reels, or even more, according to the largeneſs of the machine; on the ſlights or arms whereof the ſilk is wound from off two rows of bobbins placed on each ſide the machine, each row at the height of one of the two wheels in the centre. Theſe bobbins have their motion by means of leathern thongs, which bear on little cylinders of wood that ſupport them, and turn at length on the two wheels at the centre; ſo that the ſilk on each bobbin twiſts as it winds, and forms its ſeparate ſkein.

The ſmalleſt wheel moves two hundred of theſe bobbins, over which a ſingle perſon is ſufficient to inſpect, to put new bobbins or ſpools in lieu of thoſe diſcharged of their ſilk, and to knot the ends when they break. See WINDING *of ſilk*.

MILLION, in *Arithmetic*, the number of ten hundred thouſand; or a thouſand times a thouſand.

A *million of* GOLD, or *million of money*, is ſometimes underſtood of a *million* of pounds; and ſometimes of a *million* of crowns.

MILLION *bonds*. See BANK.

MILLMOTH, in *Natural Hiſtory*, the name of an inſect approaching to the nature of the beetle, but having no heath wings. It is common in the abodes of millers and bakers, and other perſons who deal in meal.

MILPHOSIS, *μιλφωσις*, a Greek word uſed by the ancient medical writers, as a name of the diſeaſe of the eyelids, by which the hairs fall off from them, and the edges become red and tumid.

MILL-REE, or MILLE-RAY, a Portugueſe gold coin, current for ſomewhat more than the Spaniſh piſtole.

The *millree* is thus called, as conſiſting of a thouſand REES. It is alſo called a *St. Stephen*, from the figure of that martyr impreſſed thereon.

They have alſo a *millree* of the little croſs, which in reality is only half the former; and whoſe value is that chiefly uſed in computations. See COIN.

MILOHYOIDÆUS. See MYLOHYOIDÆUS.

MILT, in *Anatomy*, a popular name for the SPLEEN.

MILT, or MELT, in *Natural Hiſtory*, the ſoft ROE in fiſhes; thus called becauſe it yields, by expreſſion, a whitiſh juice reſembling milk.

The *milt* is properly the ſeed, or ſpermatic part of the male fiſh.

The *milt* of a carp is reckoned a choice bit.

It conſiſts of two long whitiſh irregular bodies, each included in a very thin fine membrane. M. Petit conſiders theſe as the teſticles of the fiſh wherein the ſeed is preſerved: the lower part, next the anus, he takes for the veſiculæ ſeminales. Vide Mem. Acad. R. Scien. anno 1733. p. 291.

In the *milt* of a living cod-fiſh there are ſuch incredible numbers of thoſe ſmall animalcules found in the male-ſeed of all animals, that in a drop of the juice of it, no more in quantity than a ſmall grain of ſand, there are contained more than ten thouſand of them; and, conſidering how many ſuch quantities there are in the whole *milt* of one ſuch fiſh, it is not exceeding the bounds of truth to affirm, that there are more animals in one *milt* of it, than there are living men at one time upon the whole face of the earth. However ſtrange and romantic ſuch a conjecture may appear at firſt ſight, a ſerious conſideration, and calculation, will make it appear very plain. An hundred ſuch grains of ſand as here mentioned, will make about an inch in length; therefore in a cubic inch there will be a million of ſuch ſands.

The *milt* of one of theſe fiſhes is frequently about the quantity of fifteen cubic inches, it muſt therefore contain fifteen millions of quantities as big as one of theſe ſands; and if there be ten thouſand animals in each of thoſe quantities, there muſt be, in the whole, a hundred and fifty thouſand millions: which is a number vaſtly exceeding the number of mankind, even though we were to ſuppoſe the whole earth as populous as Holland. See Philoſophical Collections, p. 4. See *Fecundity of Fish*.

MILT *worſle*, or CETERACH *aſplenium*, in *Botany*, a plant nearly allied to the fern; being, in the Linnæan ſyſtem, a genus of the *cryptogamia filices* claſs. The leaves are ſtotched toward the ſide and downy; having a ſquamous duſt, in which, by the help of a microſcope, membranous capſulæ, or ſeed pods, lying cloſe to one another, are perceived; every one furniſhed with a little round rope, which, by its conſtruction, opening the fruit into two parts, pours forth certain very ſmall ſeeds; the root is fibrous. It grows upon old, ſhady, moiſt walls, in many parts of England; but it is rarely cultivated.—Linnæus reckons twenty ſpecies.

The leaves are recommended as a pectoral ſimilar to maidenhair; to which they have been frequently joined in infuſions and apozems; and likewiſe as an aperient in obſtructions of the viſcera. They poſſeſs likewiſe a diuretic virtue, and appear to gently carry off ſand, cleanſe the kidneys, and allay pains in the urinary paſſages. The way of uſing them is to drink infuſions of them in the morning, as tea, with the addition of ſuch other medicines as particular caſes may require. See CETERACH.

MILTOS, in the *Natural Hiſtory of the Ancients*, the name of what we call reddle, a red earth of the ochreous kind, uſed in painting. The Greeks uſed the word in a leſs determinate ſenſe, and called all the red earths by this name, with adjectives derived from the names of the places where they were found, &c. to denote their differences. See REDDLE.

MILVAGO, in *Ichthyology*, a name given by Geſner and ſome others, to a fiſh called by authors in general *milvus* and *cuculus*, and by ſome *lucerna*, and the FLYING *fiſh*. It is a ſpecies of the TRIGLA, and is called, by Ariſtot. the trigla with a ſnout biſid at the extremity, and the ſidelines forked near the tail.

MILUS, *μιλος*, a name given by the Greek writers to a plant uſed in garlands, and ſometimes to a tree. Theophraſtus evidently uſes it as the name of a tree, and Crato as that of a garland-herb.

MILVUS, in *Ichthyology*. See FLYING *fiſh*.

MILVUS, in *Ornithology*. See KITE, and BUZZARD.

MIME, MIMUS, a term in the ancient comedy, ſignifying a BUFFOON, or *mimic*, who acted by poſtures ſuitable to the perſon or ſubject he repreſented.

The word comes from the Greek *μιμεῖσθαι*, *imitator*, formed of *μιμέομαι*, *I imitate*. The ſame comedians were alſo ſometimes called *pantomimes*, becauſe of their counterfeiting all manner of poſtures and geſtures.

MIMESIS, *μιμησις*, in *Rhetoric*, a figure, whereby the words, geſtures, ſpeech, actions, &c. of another perſon are imitated. See IMITATION.

MIMOSA, in *Botany*. See SENSITIVE *plant*.

MIMULUS, in *Botany*, CYNOPHYNEUM, or MONKEY FLOWER, a genus of the *didynamia angioſpermia* claſs. It characters are theſe: the flower has a quadridentated, priſmatic, permanent empalement; it is of the lip or ringent kind, whoſe brim is divided into two lips; the upper lip is erect, divided at the top into two parts; the lower lip is broad and trifid, the middle ſegment being the leaſt, the palate convex and biſid; it has four ſlender ſtamina, two longer than the other, terminated by biſid kidney-ſhaped ſummits; and a conical germen, which turns to an oval capſule, with two cells, filled with ſmall ſeeds. Miller mentions only one ſpecies, which grows naturally in moiſt grounds in North America.—Linnæus enumerates two ſpecies.

MIMUSOPS, in *Botany*, a genus of the *octandria monogynia* claſs. Its characters are, that the empalement is compoſed of eight leaves; that the flower has fifteen petals; and that the fruit is an acuminated drupe.—There are two ſpecies.

MINA, *μνα*. The Attic *mina* was either ſummary or ponderal; in the firſt acceptation it was the ſixtieth part of a talent, and contained a hundred drachmæ, or denarii, amounting in our coin to three pounds four ſhillings and ſeven pence. *Mina*, conſidered as a weight, was alſo divided into a hundred drachmæ. See DRACHMA, and DENARIUS.

Mina was alſo a medicinal weight, conſiſting of ſixteen Roman ounces, anſwering to our avoirdupois pound, as appears by Dioſcorides and Galen, and Cleopatra in Coſmeticis.

There was alſo another *mina* more lately introduced, which conſiſted of 125 ounces. See COIN and WEIGHT.

MINAGNGHINIM, a pſaltatile inſtrument of muſic, among the Hebrews, which was a ſquare table of wood, fitted with a handle; over this table was ſtretched an iron chain, or hempen cord, paſſing through balls of wood or braſs, which ſtruck againſt the table, when the inſtrument was ſhook, and occaſioned a clear ſound,

which might be heard at a great diſtance. See Kircher's figure of it, in *Tab. Muſic. fig.* 9.

MINCA, a name given by the ancients to a very coarſe and bad kind of myrrh.

MINCHA, in the *Jewiſh Cuſtoms*, offerings of meal, cakes, or biſcuits, made in the temple of the Lord. The Seventy have ſometimes preſerved this word in their tranſlation; but inſtead of *mincha* they read *manna*, which doubtleſs was the received pronunciation in their time. We find *manna* in the ſame ſenſe, in Baruch i. 10. Levit. ii. 3 &c. See the Greek of Jerem. xvii. 26. Dan. ii. 46. 2 Kings viii. 5, 9. xvii. 7. xx. 12. 2 Chron. vii. 7. Nehem. xiii. 5, 9. &c. Calmet. Dict. Bibl.

MIND, *mens*, denotes a thinking or underſtanding being. See SPIRIT.

Philoſophers generally allow three kinds of *minds*, viz. *God*, *angels*, and the human *ſoul*. For a thinking being muſt either be finite or infinite: if infinite, it is *God*; and if finite, it is either joined with a human body, or not; if the latter, it is an *angel*; if the former, a *ſoul*.

The *human mind* is properly defined a thinking rational ſubſtance: by *thinking*, it is diſtinguiſhed from body; and by *reaſoning*, from God and angels, who are ſuppoſed to ſee and know things intuitively, without the help of deduction and diſcourſe.

MIND, *affection of the*. See AFFECTION.

MINDERERI *portus*. See VINEGAR.

MINE, in *Natural Hiſtory*, a place under ground, where metals, minerals, or even precious ſtones, are dug up.

As, therefore, the matter dug out of *mines* is various; the *mines* themſelves acquire various denominations; as *gold-mines*, *ſilver-mines*, *copper-mines*, *iron-mines*, *diamond-mines*, *ſalt-mines*, *mines of antimony*, *of alum*, &c.

For *gold* and *ſilver-mines*, the richeſt and moſt celebrated are thoſe of Peru and Chili, in America. *Iron-mines* are more abundant in Europe than elſewhere. *Copper-mines* are chiefly found in Sweden, Denmark, and England. *Lead* and *tin-mines* abound moſt in England and Wales. *Quickſilver-mines* in Hungary and Spain. *Diamond-mines* in the Eaſt Indies, and in the Braſils. *Salt-mines* in Poland, &c.

Metallic mines are chiefly found in mountains; though the reaſon thereof does not appear. It is probable, plains may abound as much therewith, would people dig deep enough. But plains are commonly cultivated; and beſide, the water will ſcarce allow them to be dug. Add, that the metallic veins always run either horizontal or oblique; and for that reaſon are eaſieſt found on the ſides of eminences. See LOAD, TRAINING, &c.

There are ſome *mines* wherein the metals are found at their firſt opening very crude and imperfect; which yet, in time, grow ripe and rich. Alonſo Barba relates, that in Potoſi, ſtones have frequently been at firſt thrown aſide, as not containing any thing conſiderable of metal; and yet have been found many years afterwards exceeding full thereof. Caeſalpinus aſſures us, that earths, which before yielded no metal at all, ſometimes became very fertile veins. In an iſland of the Tyrrhene ſea, after the *iron-mines* have been exhauſted, they ſtop them up about ten years; at the end whereof, it is ſaid, they find them as rich as before: many of theſe facts, however, are but ſlightly atteſted. *For the formation of mineral and metallic matters in mines*, ſee MINERAL.

The king by his prerogative hath all *mines* of gold and ſilver to make money; and where gold and ſilver in *mines* is of greater value, which are called royal mines. But by ſtatute no mines of copper or tin ſhall be adjudged a royal *mine*, though ſilver be extracted. 1 W. & M. c. 30. And perſons having *mines* of copper, tin, lead, &c. ſhall enjoy the ſame, although claimed to be royal *mines*; but the king may have the ore (except in Devon and Cornwall) paying to the owners of the *mines*, within thirty days after it ſhall be raiſed, and before removed, 16*d.* per ton for copper-ore waſhed, and made merchantable; for lead-ore 9*s.* per ton; tin or iron, 40*s.* &c. Stat. 5 W. & M. c. 6. If any perſon maliciouſly ſet on fire any *mine*, or pit of coal, he ſhall ſuffer death as a felon, by ſtat. 10 Geo. II. c. 32. Stealing ore out of *mines* is no larceny, except only thoſe of black-lead, the ſtealing ore out of which is felony without benefit of clergy, by 25 Geo. II. c. 10.

MINE-*adventurers*, *company of*, had its firſt riſe about the year 1690, when certain *mines* of lead and copper were found in South Wales, which were divided by the proprietors into twenty-four ſhares; and in 1693 ſubdivided into four thouſand and eight ſhares, for the term of twenty-two years and a half; to which term five years more were added in 1698, and the affairs of the company regulated by a new conſtitution. In 1704, queen Anne granted a charter of incorporation to this company, in conſequence of which ſeveral new ſhares were added, ſo that the whole number amounted to ſix thouſand and twelve. However, the intereſts of this corporation were ſo ill managed, that the proprietors and creditors petitioned parliament in 1710, and a committee of the houſe of commons was appointed to enquire into its ſtate. The reſult of the enquiry was a cenſure on the principal managers; and though, in 1711, a law was paſſed for the better regulation of the company, and the relief of the creditors and proprietors, nothing could preſerve it from ſinking.

MINE, in the *Art of War*, denotes a ſubterraneous canal or paſſage dug under the wall or rampart of a fortification intended to be blown up by gunpowder.

The paſſage of a *mine* leading to the powder is called the GALLERY. Theſe paſſages or galleries made within the fortification, before the place is attacked, and from which ſeveral branches are carried to different places, are generally four feet wide, and five feet high, and the earth is ſupported from falling in by arches and walls, as they are to ſerve for a conſiderable time; but when *mines* are to be uſed in a ſhort time, the galleries are only about three feet wide and five high, and the earth is ſupported with wooden frames or props. When the gallery is carried on to the place where the powder is to be lodged, called the CHAMBER, the miners make this generally of a cubical form, large enough to hold the wooden box, which contains the powder neceſſary for the charge: this box is lined with ſtraw and ſand-bags, to prevent the powder from contracting any dampneſs. The chamber is ſunk ſomewhat lower than the gallery, unleſs the beſieged can raiſe the water in the ditch, and incommode the gallery; in which caſe the chamber is made higher than the gallery, that the water may not be let in and ſpoil the *mine*. The line, drawn from the center of the ſpace containing the powder, perpendicular to the neareſt ſurface, is called the *line of leaſt reſiſtance*; the pit or hole, made by a *mine* when ſprung, is called the *excavation*. The fire is conveyed to the *mines* by a pipe or boſe, made of coarſe cloth, whoſe diameter is about an inch and a half, called *fauciſſon*, extending from the chamber to the entrance of the gallery, to the end of which is fixed a match, that the miner who ſets fire to it may have time to retire before it reaches the chamber. In order to prevent the powder from becoming damp, the fauciſſon is laid in a ſmall trough, called *auget*, with ſtraw in it, and round the fauciſſon, with a wooden cover nailed upon it. There are various kinds of *mines*, which acquire different names; as royal *mines*, ſerpentine *mines*, forked *mines*, as their paſſages are ſtrait, oblique, winding, &c. The *mines* made by the beſiegers in the attack of a place are ſimply called *mines*, and thoſe made by the beſieged COUNTER-*mines*. They are both made in the ſame manner, and for the like purpoſes, viz. to blow up their enemies and their works; only the principal galleries and *mines* of the beſieged are uſually made before the town is beſieged. The beſieged generally make a great many ſmall *mines* under the glacis, of about ſix, ſeven, or eight feet deep under ground, which are called *fougaſſes* or *fougades*. They make likewiſe another ſort, called *coffers* or *caiſſons*, which are a kind of wooden boxes three or four feet long, and a foot or eighteen inches wide, which they bury four, five, or ſix feet under the glacis, and about four yards diſtant from each other.

MINES, *hiſtory of*. It is obſerved by writers on this ſubject, that *mines* were in uſe long before the invention of gunpowder; for the ancients made galleries or ſubterraneous paſſages under the walls of places, and ſupported them with ſtrong props; filling the interval with all kinds of combuſtibles, which being ſet on fire burnt their props, and, the walls being no longer ſupported, fell, whereby a breach was made. The beſieged alſo made uſe of ſimilar paſſages from the town under the beſiegers machines, with which they battered the walls, in order to deſtroy them. But the art of mining has received great improvements ſince the invention of gunpowder. The firſt *mines* which we read of, ſince the diſcovery of gunpowder, were uſed, in 1487, by the Genoeſe, in the attack of Serezanella, a town belonging to Florence; however, as theſe failed, they were neglected for a conſiderable time. The firſt ſucceſsful application of the blowing of *mines* in ſieges was in the kingdom of Naples, in the year 1503, when Pietro de Navarre by this means poſſeſſed himſelf of a fort garriſoned by the French. The firſt celebrated uſe of theſe *mines* in open war, the progreſs of the beſiegers was in the years 1667, 1668, 1678, at the ſiege of Candia; though they had been often practiſed in the defence of places before, in a leſs memorable manner; for by the aſſiſtance of this invention principally, the city of Candia kept the whole power of the Ottoman empire at bay for three years ſucceſſively. Since that time the advantage of *counter-mines* have been better underſtood. The laſt eminent inſtance

of

of their great utility was in the defence of Turin, in 1706; for so effectually were the besiegers travelled thereby, that, after near four months of open trenches, they were not in the possession of more than the counterscarp, and even then, seleven pieces of their cannon were blown up by the defendants but three or four days before the place was relieved.

The first publisher writer on *mines* was the celebrated M. Vauban: he was succeeded by M. de Valliere, one of the greatest masters in the art of mining; who, uniting theory with experiment, discovered, by measuring several excavations, that the pit or hole made in the earth, when the *mine* is sprung, was not an inverted cone (*Tab.* VIII. *Fortification, fig.* 49) nor a frustum of a cone (*fig.* 50.) as Vauban and others had supposed, but nearly a parabolid (*fig.* 51.); and his tables were computed according to that figure. It has been generally admitted by miners, that the diameter of the pit or hole made by the *mine* was always twice the line of the least resistance, and that this diameter should never exceed this proportion. But M. Belidor undertook to remove this prejudice; and however generally it may still prevail, he seems to have proved by many experiments, which have since been repeated by others, that the diameter of the hole made by a *mine* may be increased to any length in regard to the depth of the *mine*.

MINES, *theory of.* The estimation of the proper quantity of powder with which a *mine* is to be loaded in any kind of soil, or at any depth under ground, in order to produce any proposed effect, is the most difficult part of the whole art of mining. This depends not only on the quantity of earth to be blown up, but likewise on the tenacity of the different soils in which the *mines* are made. The quantity of earth to be raised depends on the figure of the excavation; for if this is known, the solid content may be determined by geometry; and by weighing exactly a cubic foot of that soil, we can easily discover what weight is to be raised; and by knowing what quantity of powder is required to raise a certain weight, the tenacity of the parts may also be had, by making a *mine* so as to produce a good effect; and subtracting the quantity of powder, necessary to raise the weight of the solid from the charge of the *mine*, the remainder would be the quantity necessary to overcome the tenacity. It is, however, disputed, as we have already observed, what the figure of the excavation is: it was at first imagined to be an inverted cone, as ACB (*fig.* 49.) whose vertex is in the center of the chamber, and the radius of its base AD equal to its axis CD; but this being found to allow too small a charge, it was next supposed to be a frustum of a cone, as AEFB (*fig.* 50.) whose lesser base EF is equal to the line CD of least resistance, and the greater AB equal to twice that line. On this last supposition, said to be confirmed by the experiments of M. Maigrigny, under M. Vauban, near Tournay, miners have computed their tables of the quantities of powder necessary for charging *mines* at different depths.

However, M. Belidor disputed the conclusions of Maigrigny: whose experiments were examined by direction of the chief commander of the artillery of La Fere, in the construction of more than a hundred and fifty *mines* between the years 1725 and 1730. In the course of this enquiry, seven *mines* were made, whose line of least resistance was ten feet, and loaded with the following quantities of powder, viz. the first with 120 lb; the second with 160 lb; the third with 200 lb; the fourth with 240 lb; the fifth with 280 lb; the sixth with 320 lb; and the seventh with 360 lb. These *mines* being sprung one after another, and their excavations examined, the diameters of their bases were found to be as follow: that of the first 22 feet; the second, 26 feet; the third, 29 feet; the fourth, 31½ feet; the fifth, 33½ feet; the sixth, 36 feet; and the seventh, 38 feet. These experiments invalidated the principles of Maigrigny; nevertheless miners have still doubted, whether the diameter of the excavation can be made greater than double the line of least resistance, or whether the excavation itself will not become like a well or pit when overcharged. As to the true figure of the excavation, this was discovered by M. de Valliere, and ascertained by others after him, to be very nearly a paraboloid, as AEB (*fig.* 51.) having the center of the powder or charge in the focus C, CD the line of least resistance, AB the diameter, and CA the radius. Mr. Muller, however, observes, that, though the figure of the excavation is a paraboloid, the quantity of the earth to be blown up should be estimated by the part ALMB, cut off by a plane LM, passing through the focus or center C of the chamber, parallel to the horizon AB; the other part LEM being occasioned by the force of the powder pressing downwards; because, he says, the explosion of gunpowder, acting on all sides alike, must condense the solid under the chamber from L to M, by its pressure downwards, so long as it presses the earth above LM upwards; and it cannot be said, that any particle of earth under the horizontal line LM can be drove upwards. In order to find the content of this solid, let $EK=EC=\frac{1}{2}P$, or the parameter; and it appears from the well known properties of the PARABOLA, that $AD^2=ED\times P$; $LM=P$, and $CA=KD$. And in the right-angled triangle CDA, $CD^2+DA^2=CA^2=KD^2$; and, therefore, $\sqrt{CD^2+DA^2}=KD$; whence, if CD and DA are given, the line KD, and consequently CK, or its equal CL, will be known; and, therefore, if the line of least resistance CD, and the radius DA of the base are given, the parameter may be found. Moreover, the solid content of the PARABOLOID is equal to half the cylinder of the same base and altitude; if r expresses half the circumference, whose radius is unity; i. e. if $r=1.57$; then, because $1:2r$, or the radius to the circumference as the squares of the radii CL, DA, are to the areas of their circles; we have $r\,ED\times AD^2-r\,EC\times CL^2$, will express the solid required. But if P expresses the parameter LM, then will $P\times ED=AD^2$, and $P\times CE=CL^2$, and these values substituted in the expression of the solid, give $r\,P\times ED^2-r\,P\times EC^2$: or, because $ED=EC+CD$, and $KD=CD+2\,EC$, we shall have this expression reduced to $r\,P\times CD\times KD$. But as r is a constant number, it may be neglected in comparing the solids; and then $P\times CD\times KD$, will be the expression of the solid. And when two excavations are compared together, which have the same line of least resistance CD, the solid will be expressed by the rectangle $P\times KD$. Hence if the solid, or the quantity of earth to be raised, and the line CD of the least resistance be given, the parameter P may be found; and having the parameter and the line CD, the equation $P\times ED=AD^2$, will give the radius AD of the base. For if $CD=c$, and the given solid $ALMB=a$, then, because $CE=\frac{1}{2}P$, the expression $P\times CD\times KD$, will give $Pc\times\frac{1}{2}P+cc=a$, or $PP+2Pcc=2a$, and $PP+2Pc=\frac{2a}{c}$, to which adding cc, we shall have $PP+2Pc+cc=\frac{2a}{c}+cc$; and $P+c=\sqrt{\frac{2a}{c}+cc}$.

In comparing *mines* together, which have the same line of least resistance, the rectangle $P\times KD$, gives $PP+2Pc=2a$, to which adding cc, we shall have $PP+2Pc+cc=2a+cc$, whose square root is $P+c=\sqrt{2a+cc}$. By means of these equations, all the different problems relating to *mines* are easily solved, on the supposition, that the forces of powder are proportional to their quantities, and, therefore, the charges also proportional to the quantities of earth to be raised in the same sort of soil, i. e. in soil of the same density and tenacity. Some writers, however, assert, that the elastic force of powder is greater, in proportion, in larger quantities than in small ones, which Mr. Muller denies; and M. Belidor gives another reason for diminishing the charges of *mines*, as the earth to be raised increases; which is, that not only the weight of the earth to be raised is to be considered, but likewise the pressure of the atmosphere over the surface of the excavation, which pressure is as the bases of the excavation, and these as the squares of the diameters; whereas the weights of similar solids are as the cubes of these diameters; and, therefore, this pressure being less, in proportion, in larger bodies than in smaller, the charges ought rather to be lessened in large *mines* than in the small. But this reasoning seems to be contradicted by experiments.

In order to know the quantity of powder necessary for blowing up a *mine* in a particular soil, several *mines* are to be made in it, having their lines of least resistance equal, but loaded with different quantities of powder, till one is found to have the desired effect. When this is found, the diameter of its base must be measured with the greatest accuracy, and likewise the line of least resistance; and when these lines are determined, the parameter P of the parabola is found by the equation $KD=\sqrt{AD^2+CD^2}$; and, having the parameter given, the quantity of earth or solid is found by the solid $P\times CD\times KD$, or by the rectangle $P\times KD$, as the lines of least resistance are different or the same. This solid, and the charge of the *mine*, will serve to find the effect of any other *mine* made in the same soil when the charge is given, or to determine the charge, so that the diameter of the base shall be of any given length, by means of the equation $P\times ED=AD^2$. The same being performed in all the different soils, which generally occur in making *mines*, will serve to make *mines* of any depth, or placed in any soil.

The miners divide the different soil into five species.

1. loose earth or sand.
2. common middling light soil.
3. loom or strong soil.
4. potters clay, or stiff soil.
5. clay mixt with stones.
6. all kind of masonry.

into

It has been found, that a cubic foot of the first weighs 95lb; of the second, 124; of the third, 126; of the fourth, 135; and 160 of the fifth. But as to masonry, it cannot be determined to any degree of exactness, as depending on the different kinds of stones or bricks of which they are made.

It is pretended, that there are nine pounds of powder required to raise a cubic toise of the first kind; 11 of the second; 13 of the third; 15 of the fourth; 18 of the fifth; and 20 or 25 to raise a cubic toise of masonry above ground; and 35 or 40 for raising the same quantity under ground.

These are the French weights and measures, which being reduced into English, give 8lb of powder for the first kind of soil; 9.8 for the second; 11.6 for the third; 13.4 for the fourth; 16 for the fifth; 18 or 22.3 for the masonry above ground; and 31 or 35 for raising the same quantity under ground.

In the second volume of M. Vauban's Attack and Defence of Places, he says, that the following rules never fail.

A cubic toise of common earth requires 14 pounds of powder to be raised.

Stiff sand or loom, which may be dug without being supported, requires 17 pounds per toise.

Mixt earth requires 18 pounds per toise.

Potters clay or stiff soil, 19 pounds per toise.

Fat or stiff earth mixt with pebble stone, 22lb.

Wet sand, which cannot be dug without being supported, 15lb.

These rules of Mr. Vauban make therefore the charges greater than those of later miners.

But this is a matter which must be decided by experiments; and when these are made with sufficient exactness, it will be easy to find the proper charge of a *mine*, for as the diameter of its base be of any given length; or when that length is given, to determine the charge required. E. g. Let it be required to find the diameter of a *mine* made in the second sort of soil; which being loaded with 100lb of powder, say, if 11 pounds raise a cubic toise, or 216 cubic feet of earth, how much will raise 100lb; the fourth term, which is 1964, will be $=a$; and $2a=3928$: and supposing the line of least resistance CD to be 10 feet, then will $c=10$; hence the equation $c+P=\sqrt{\frac{2a}{a}+cc}$, will give $c+P=\sqrt{402.8}$ $=20$; or $P=10$, and $EC=\frac{1}{2}P=2.5$: $ED=12.5$; whence the equation $P\times ED=AD^2$, gives 10×12.5 $=125=AD^2$, or $AD=11.2$ nearly.

But to shew how far this theory agrees with the experiments mentioned before, we may suppose the first to be true, and from thence proceed to find what the diameters of the bases of the others will be. All the lines of least resistances of these *mines* were ten feet each; the diameter of the base of the first *mine* was found to be 22½ feet; so that $AD=11.33$, or $=11.4$. $CD=10$; these values being substituted in the equation $KD=\sqrt{CD^2+AD^2}$, will give $KD=\sqrt{229.96}=15.16$; and $2KC=P=10.32$; hence these values being substituted in the rectangle $P\times KD$, because the line of least resistance is here always the same, gives $10.32\times 15.16=$ 156.5, for the solid, which must be remembered, because it is the standard number whereby the other solids are determined.

Now if 120lb gives 156.5, how much gives the charge 160lb of the second for its solid, the fourth term gives $208.^1=a$, and $2a=417.^2$; this value, as well as that of $c=10$, being substituted in $P+c=\sqrt{2a+cc}$, gives $P+c=\sqrt{517.4}=22.7$; hence $P=12.7$, $EC=\frac{1}{2}P=3.2$, and $ED=12.2$. Now these values being substituted in $P\times ED=AD^2$, give $AD^2=167.64$, and $AD=13$ nearly; and as AB has been found by measurement to be about 26, it shews that this computation answers very nearly the experiment.

If as the charge 120 of the fifth is to the charge 200 of the third, so is the solid 156.5 of the first to the solid of the third; we shall have $a=260.84$, or $2a=521.68$; and as $c=10$, the equation $P+c=\sqrt{2a+cc}$ gives $P+c$ $=\sqrt{621.68}=24.93$ nearly; hence $P=14.93$, $\frac{1}{2}P=$ $EC=3.73$, and $ED=13.73$; these values being substituted in $P\times ED=AD^2$, give $AD=14.32$, and $AB=28.64$; which answers nearly the experiment; it was found that $AB=29$ nearly.

If we proceed thus with regard to the 4th, 5th, 6th, and 7th experiments, we shall find the diameters of the base to be as follows: that of the 4th, 31.2; that of the 5th, 33.2; the 6th, 35.3; and 10ft of the [illegible] answers pretty near the experiments.

In this method of constructing *mines*, [illegible] be made, whatever be the line of [illegible] making this line small, and loading the powder, the inconvenience of a large [illegible] affords lodgment to the besiegers, [illegible] the shafts and galleries are blown made. [illegible] may be placed under one another, by [illegible] same spot of ground may be blown up several times.

If it were required to make a *mine* in the same sort of soil as that in which the seven experiments mentioned before were made, so that the line of the least resistance shall be equal to the radius of the base, and each of ten feet, and to find the quantity of powder necessary for its charge.

Because $AD=CD=10$, the equation $KD=\sqrt{AD^2+CD^2}$, will give $KD=\sqrt{200}=14.14$; hence $P=8.28$; these values being substituted in $P\times KD$, will give 117 nearly, for the solid; then if we say, as the solid 156.5, of the first experiment, is to the solid 117, so is the charge 120 to the charge required, it will be 90lb nearly. But if it was required to find the quantity of powder necessary to raise a cubic fathom, or 216 cubic feet of this soil; then because $CD=10$ has been neglected in the solid 156.5, of the first experiment, as likewise the ratio r, therefore the quantity must be multiplied by $r\times 10$; or because $r=1.57$ by 15.7, which will give 2457; then if we say, as 2457 requires 120lb of powder, how much will 216 require; and the fourth term, which is 10.5lb, will be the number sought. From whence it appears, that the soil, in which these experiments were made, was a light sort of soil, somewhat lighter than that which is taken by the miners for the second sort.

M. De Valliere supposes, in his table, inserted below, that a *mine*, whose line of least resistance and radius of the base are each ten feet, requires 93⅓lb for its charge. Now, if it be required to find what kind of soil these mines are made in, by substituting the number for CD, AD, in the equation $KD=\sqrt{AD^2+CD^2}$, we shall have $KD=\sqrt{200}=14.14$, and $P=8.28$; now these values being substituted in $r\times P\times CD\times KD$, we shall have $15.7\times 8.28\times 14.12=1838$; then if we say, as 1838 is to 93⅓, so is 216 to 11. This fourth term will express the number of pounds of powder required to raise a cubic fathom of the same sort of soil, which therefore is the second sort.

The preceding computations have been made of French weights and measures, to shew how nearly the foregoing theory agrees with the experiments made at La Fere. It remains now to apply it to our own weights and measures; because eight pounds of powder will raise a cubic fathom of earth of the first sort; if we say a cubic fathom, or 216 cubic feet is to eight pounds, as 1838 cubic feet is to 68.074 pounds, this fourth term will be the charge of a *mine*, whose line of resistance is ten feet as well as the radius of the base: in the same manner are found the charges of the same *mine* in the rest of the soils. But the shortest way of computing tables is to subtract the logarithm of 216 from that of 1838, which gives 0.928917; now if to this logarithm we add those of 8, 9.8, 11.6, 13.4, 16; the weight of the powder required to raise a cubic fathom of the different soils, found before; we shall have 1^0 8.3208, 2^0 0.2112, 3^0 9.9435, 4^0 0.0699, 5^0 1.4301, for the logarithms of the charges of a *mine* whose line of least resistance is 10 feet, and the diameter of the base 20.

Valliere's TABLE for the Charges of *Mines*.

Diameters of the Chambers	Charges of Powder	Diameters of the Chambers	Charges of Powder	Diameters of the Chambers	Charges of Powder	Diameters of the Chambers	Charges of Powder
Feet.	lb. oz.	Feet.	lb. oz.	Feet.	lb. oz.	Feet.	lb. oz.
1	0 5	11	123 12	21	868 5	31	
2	0 11	12	164 -	22	908 4	32	
3	2 2	13	205 13	23	1140 10	33	
4	4 6	14	257 4	24	1296 0	34	1680 12
5	11 11	15	316 4	25	1518 9	35	2029 8
6	20 4	16	384 -	26	1647 12	36	2376 0
7	32 7	17	460 9	27	1815 4	37	2748 12
8	48 -	18	516 12	28	2138 0	38	3144 -
9	68 1	19	643 9	29	2286 7	39	3568 4
10	93 12	20	760 -	30	2520 4	40	4000 -

By this conſtruction the radii of the baſes being always equal to the lines of leaſt reſiſtances, the ſolids are ſimilar, and therefore are to one another as the cubes of their axes; that is, as the cubes of the lines of leaſt reſiſtances. So that taking any one of the charges to be true, the others will be found by ſaying, as the cube of the axis whoſe charge is given is to its charge, ſo is the cube of the axis of any other *mine* to its charge.

For example, let the charge 93¾ of the *mine*, whoſe line of leaſt reſiſtance is 10 feet, be given; and it be required to find the charge of any other *mine* whoſe line of leaſt reſiſtance is given, ſuppoſe 15: then ſay, as the cube 1000 of 10 is to the cube 3375 of 15, ſo is the charge 93¾ to the charge required, which is 316-4, or 316 pounds, 6 ounces, which is 2 ounces more than in the table. In the ſame manner is found the charge of a mine whoſe line of leaſt reſiſtance is 20; or becauſe 20 is double of 10, the cube of 20 will be octuple the cube of 10; and therefore 8×93¾, or 750 pounds, will be the charge for that mine.

A TABLE of the Charges of *Mines* according to Muller's Theory.

Diameter	Charge	Diameter	Charge	Diameter	Charge
Feet 22	lb 150	Feet 42	lb 639	Feet 62	lb 1518
24	181	44	711	64	1621
26	217	46	773	66	1741
28	255	48	857	68	1842
30	297	50	946	70	1980
32	344	52	1020	72	2098
34	396	54	1115	74	2243
36	452	56	1205	76	2372
38	502	58	1309	78	2501
40	560	60	1406	80	2648

In this table the line of leaſt reſiſtance is ſuppoſed to be always 10 feet, and the charges producing the openings at the ſides of them from 22 feet to 80. It is ſuppoſed that the charge 93¾ of a *mine*, whoſe line of leaſt reſiſtance and radius of the baſe are each 10 feet, is given, and from thence all the reſt are computed by means of theſe equations, $KD=\sqrt{AD^2+CD^2}$, and $P\times KD^3=a$; and by comparing the diameters of the baſes found by means of theſe equations, to be rather leſs than thoſe found by experiments, it is preſumed that the diameters marked in this table will not be found leſs, but rather greater in practice.

In order to find the ſize of the boxes, generally made cubical, in which the powder is lodged; as a cubic foot of common powder weighs about 55 pounds, if we ſay as 55 is to unity, ſo is any other quantity to its cube; i. e. if the given quantity of powder be divided by 55, the quotient will be the cube required, and its cube root will be the length of the ſide of the box. The box muſt always be made a fourth bigger than it ſhould be, on account of the ſtraw and ſand-bags put in it, for keeping the powder free from wet; ſo that if the quantity of powder be 360 pounds, the fourth part of it, or 90, muſt be added, and the ſum 450 divided by 55, whoſe quotient is 8.1818, and the ſquare root of this, or 2.86 feet, or 34 inches, will be the ſize required. If the chamber happens to be placed on a rock, or any other hard ſubſtance, the force or action of the powder downwards, meeting with a great reſiſtance, will be employed in raiſing the earth upwards; and, conſequently, the effect of the *mine* will be much greater than that produced by the ſame quantity of powder, placed on a ſofter ſubſtance. On which account, if a platform of ſtrong planks were made under the chambers, there would be a leſs quantity of powder required for the charge of the *mine*. When the *mine* is properly loaded, the gallery is ſtopped up with ſtones, caſks, and dung, well rammed, five or ſix feet farther from the chamber than the length of the line of leaſt reſiſtance. And for preventing the *mine* from burſting through the gallery, and to make it have its effect upwards, the gallery is made with one or two turnings, at right angles to each other, and ſtrongly ſecured with buttreſſes and planks, and the intervals rammed with ſtones and earth.

Many writers have eſtimated the operation of *mines* on the falſe ſuppoſition, that their entonnoir, or excavation, is the fruſtum of a cone; and therefore, in order to eſtimate the weight of the matter to be blown up, they have only to compute the ſolidity of ſuch a fruſtum in cubic fathoms, and to multiply the number of fathoms by the number of pounds of powder neceſſary for raiſing the matter it contains; and if this cone contains matters of different weights, to take a mean between them all; always having a regard to their degree of coheſion. As to the diſpoſition of *mines*, there is one general rule, which is, that the ſide towards which one would determine the effect, be the weakeſt; but this varies according to occaſions and circumſtances.

MINES, *different ſorts of*. A *mine* which has only one chamber is called a *ſingle mine*, as A, *fig.* 52. If it has two chambers, it is called double, as *fig.* 53. and if it has three, triple, as *fig.* 54. &c. the names being taken from the number of chambers. If a ſingle *mine* is made under the rampart, to make breach, the entrance O, *fig.* 52. muſt not be oppoſite to the place where the chamber is deſigned to be, but on one ſide or other; and the gallery with two turnings, that it may be ſtopped with greater ſecurity, and that the diſtance of the entrance O to the chamber A may be greater than the length of the line of leaſt reſiſtance; otherwiſe the *mine* would have its effect that way. It muſt alſo be obſerved, that the chamber is placed in the middle of a counterſcarp, by which means it will make a greater breach than if it were placed in the earth behind the wall. When a double *mine* is made under the rampart for making breach, the entrance O, *fig.* 53. is made, as nearly as can be gueſſed, in the middle, between two counter-forts; the gallery being carried quite through the wall in a direct line, turns afterwards to the right and left, in the form of a T; from whence it is alſo called a T *mine*; and the chambers are alſo placed in the next counter-forts, but exactly at equal diſtances from the direct gallery: this double *mine* will make a much larger breach than the ſingle one, and it is for that reaſon preferred to any other.

But when a triple *mine* is to be made under the rampart, the opening O, *fig.* 54. is to be made directly oppoſite to the counter-fort, if poſſible, and carried directly through the wall, and turned to the right and left in the ſame manner as the former; and the chambers A, B, at both ends, are placed in the two adjacent counter-forts. As to the gallery of the third, C, it is carried round the middle counter-fort, and the chamber placed under its extremity; this laſt is generally charged with fifty pounds of powder more than either of the others; but great care muſt be taken to carry the aogee of this laſt chamber in zig-zags, ſo as to be equal in length to that of the chamber B, otherwiſe the fire would not reach them all three at the ſame time, and thereby the chamber C not take fire, which ſometimes happens, and then the effect does not anſwer the expectation.

There are ſeldom or ever more made than a triple under the ramparts in ſieges; but when a work is to be demoliſhed, they make then as many as will demoliſh a whole face at once; which is done by giving the fire to all at the ſame time; that is, all the laucilions are brought into one, and ſo contrived, as that their parts from the chambers to the common junction may be exactly equal. Muller's Syſtem of Artillery, &c. vol. ii. part iii. p. 206, &c.

MINE, *chamber of a*. See CHAMBER and MINE.

MINE, *counter*. See COUNTER-*mine*, and MINE.

MINE, *gallery of a*. See GALLERY and MINE.

MINE, *knight of the*, is a military honour, anciently conferred on perſons who had diſtinguiſhed themſelves in engagements in *mines*.

MINE-*ſhips*, are ſhips filled with gunpowder, incloſed in ſtrong vaults of brick or ſtone, to be fired in the midſt of an enemy's fleet. See FIRE-*ſhip*.

MINE is alſo a French MEASURE.

MINE-*dial* is a box and needle, with a braſs-ring divided into 360 degrees, with ſeveral dials graduated thereon; generally thus made for the uſe of *miners*.

MINERA, in *Medicine*, the ſeat, or rather matter of a DISEASE.

The term is applied by ſome authors to thoſe parts of the body wherein there are collections and concervations of humours made; which, hardening, form obſtructions, and produce diſeaſes.

In this ſenſe we ſay, the *minera morbi*, &c.

MINERAL, in *Natural Hiſtory*, is ſometimes uſed in the general for FOSSIL; and applied to any body, ſimple or compound, dug out of a ſubterraneous place or *mine*, from which it takes the denomination.

In this ſenſe, metals, ſulphurs, foſſil ſalts, ſemi-metals, &c. are *minerals*.

On this principle, they divide *minerals* into two claſſes; the one *fuſible*, and *malleable*; i. e. which melt with fire, and ſtretch on the anvil; which are what we properly

call METALS. The others want those two properties; and are what in the ſtricteſt ſenſe we call *minerals*.

Some divide *minerals* into *ſimple* and *compound*. To the firſt belong *ſtones*; *ſalts*, as alum, nitre, &c. *inflammable minerals*, as ſulphur and bitumen; and *metals*, as gold, &c. Other more accurate writers refrain the word *miner al* to what we otherwiſe call *ſemi-metal*; as antimony, cobalt, &c.

MINERAL, in this ſenſe, may be defined a compound foſſil, wherein there is ſomething diſcovered, in all reſpects like metal, only that it is not malleable; joined or compounded with ſome other foſſil, as ſalt, ſulphur, ſtone, or earth.

Such are *antimony*, *cinnabar*, *biſmuth*, *calaminaris*, *vitriol*, *pyrites*, *marcaſſite*, *cobalt*, *zaffer*, the *magnet*, *lapis hæmatites*, and *armenus*. See each under its proper article.

Some attribute the formation of *minerals* to the action of the ſun without; ſome to the central fire within; and ſome think the cold does all by uniting, condenſing, and congealing certain juices of the earth.

Deſcartes takes metals to have been formed from the beginning of the world; and to have ranged themſelves, by the laws of gravity, about the centre. In proceſs of time, he ſuppoſes theſe to have been corroded by the acid ſalts, &c. and abundance of the parts thereof carried up along with thoſe ſalts by the ſubterranean heat, and depoſited in divers parts of the earth.

Mont Tournefort ſuppoſes ſeeds of *minerals*, as of animals and vegetables. Every thing, according to him, comes from eggs, even ſtones; and the largeſt rocks, he thinks, were originally no more than grains of ſand. See his ſyſtem more at length under the article STONE.

The alchemiſts maintain, that metals proceed from a certain primum ens, or firſt ſeed of metals, which, they ſay, is a kind of moiſt vapour, or gas, that changes the earth and juice it meets with in a vein into a *mineral* body or ſubſtance; and thence converts the *minerals* into ores or metals, by a continued fermentation or elaboration in the mines, cauſed by the archeus, or heat that acts in the veins, as it proceeds from the centre of the earth. But this doctrine of *mineral* fermentation is poſitively denied by the celebrated Boerhaave, who, in his Hiſtory of Fermentation, aſſerts, that it belongs only to the vegetable kingdom. Others maintain, that all metals and *minerals* were at firſt created in the very ſame ſtate and nature, in which they are always found, without undergoing any kind of alteration. The moſt common opinion, among the miners in Cornwall, is, that crude immature *minerals* nouriſh and feed the ores, with which they are intermixed in the mines; and that the *minerals* themſelves, will, in proceſs of time, be converted into ores productive of thoſe metals, to which they have the neareſt affinity, and with which they have the greateſt intercourſe. Others, as M. Geoffroy, contend that METALS, &c. may be the reſult of a mixture of certain matters, which had nothing metallic in them. Thus, in the aſhes of all vegetables we find a ſurfuginous matter, which the loadſtone attracts; and yet it will hardly be ſaid, that iron exiſted in the plants. We ſee no ſigns of iron in clay, work it in what manner you will; and yet add to it linſeed-oil, and by fire you will procure IRON: the like may be ſaid of divers other matters.

Hence it is probable, metals may be formed by a mere combination of different ingredients; much like ſulphur, which we all know is made by adding an inflammable principle to a vitriolic ſalt. The earth may every where abound with theſe matters, which are continually circulating through its pores and canals, and which, meeting with an earth homogenous to them, fix thereto; and commence *minerals*.

Mr. Price, in his Mineralogia Cornubienſis, p. iv. ſuppoſes it moſt reaſonable to conclude, that metals were made and implanted in veins at or very ſoon after the creations of the world: but that they are ſubject to a degree of fluctuation in common with all matter; approaching to, or receding from their ultimate degree of perfection, either quicker or ſlower, as they are of greater or leſs ſolid and durable frame and conſtitution. He ſuppoſes, that in every metal there is a peculiar magnetiſm, and an approximation of particles, ſui generis, by which its component principles are drawn and united together; particularly the matters left by the decompoſition of the waters paſſing through the contiguous earth or ſtrata, and depoſited in their proper *nidus*; till by the accretion of more or leſs of its homogeneous particles, it may be denominated either rich or barren.

The *minerals*, metals, and ſtones, lie in beds; and have done ſo ever ſince the flood, if not from the creation; yet it is highly probable they have a faculty of growing in their reſpective beds; and that, as their beds are robbed and emptied by miners, ſo after a while they recruit again. Thus vitriol, Mr. Boyle thinks, may grow by the help of the air, and that alum does the ſame. We are aſſured (ſays that author) by the experienced Agricola, that the earth or ore of alum, being robbed of its ſalts, will, in tract of time, recover them again, if expoſed to the air.

As for metals, there is good reaſon to [illegible] likewiſe, from what has been alledged [illegible] his obſervations about the growth of [illegible] cularly as to the growth of iron. To [illegible] brings from Pliny, Falloppius, Cæſalpinus, [illegible] others, we may add, that in the foreſt of Dean, in Glouceſterſhire, the beſt iron, and in the greateſt quantities, is found in the old cinders, which they melt over again. This ſome impute to the negligence of the former maſters in not exhauſting the ore. And Dr. Derham thinks it rather owing to the new impregnations of the old ore, or cinders, from the air, than to any ſeminal principle in the ore itſelf.

The chemiſts generally take *minerals* to be nothing elſe but imperfect metals, and imperfect metals to be perfect ores, which, not having arrived at maturity, may be perfected by chemical operations, and raiſed to perfection. This agreeable, but fatal deluſion, has given riſe to the ſect of philoſophers who ſtudy the philoſopher's ſtone.

In the Engliſh tranſlation of the Dictionary of Chemiſtry, art. *ores*, we have ſome ingenious conjectural remarks, concerning the formation of *minerals*. Theſe ores, it is ſaid, which are found under water, upon the ſurface of the earth, in fiſſures of mountains and ſubterranean cavities, accumulated, but not accreted to the contiguous rocks, ſeem from their looſe, unconnected, broken appearances to have been conveyed by alluvion.

All martial ochres have probably been ſeparated from vitriolic ferruginous waters, either ſpontaneouſly or by calcareous earth; and theſe waters ſeem to have acquired their metallic contents by diſſolving the vitriol which is produced by the ſpontaneous decompoſition of martial pyrites. The ochres of copper, zinc, and perhaps of ſeveral other metals, have probably been precipitated from vitriolic waters by ſome ſubſtance, as calcareous earth more diſpoſed to combine with acids; and theſe vitriolic waters have probably been rendered metalliferous, by diſſolving the vitriols produced by accompoſition of cupreous pyrites, and of the ore of zinc called blend; for theſe *minerals* are not, as martial pyrites is, ſuſceptible of decompoſition ſpontaneouſly, that is, by air and moiſture.

The metalliferous nodules and ſpots ſeem to have been inſtilled in ſtones while theſe were yet ſoft. Perhaps the metalliferous and lapideous particles were at once diſſolved and ſuſpended in the ſame aqueous menſtruum, and during their concretion, cryſtallized diſtinctly, as different ſalts do, when diſſolved in the ſame fluid.

The earths and ſtones uniformly coloured by metals, were alſo probably in a ſoft ſtate while they received theſe tinges. The ſnake-coloured ſtones ſeem to have received their colour from metallic calces mixed and diffuſed through the ſoft lapideous ſubſtance; and the tranſparent coloured ſtones have probably received their colours from vitriolic ſalts, or from metallic particles diſſolved in the ſame water which ſoftened or liquefied the ſtoney ſubſtance; which metallic ſalts and particles were ſo much diffuſed, that they could not be diſtinctly cryſtallized. That all ſtones have been once liquid and diſſolved in water, appears probable not only from their regular cryſtallized forms, but alſo from the ſolubility of ſome ſtone, as of gypſeous and calcareous earths, in water; and from the water which we know is contained in the harder marbles, as well as in alabaſters; to which water theſe ſtones owe the cryſtallization of their particles.

The veins called cumulated, and the entire metalliferous mountains, are believed by Wallerius to be analogous to the nodules. Theſe metalliferous ſubſtances ſeem to have been originally formed or concreted in the places where they are found.

The metalliferous ſtrata have probably been inſinuated between the lapideous ſtrata, after the ſeparation of theſe from each other by ſome violent cauſe, in [illegible] manner in which we ſuppoſe that the cla[illegible] have been inſinuated between the ſeveral [illegible] ſtone in Derbyſhire. The matters thus [illegible] have been either fluid, which would after[illegible] lize, and form entire regular maſſes; or [illegible] been the ruins of ſhattered ſtrata and veins [illegible] waters, and there depoſited; in which caſe they will appear broken and irregular. The metalliferous ſtrata, although frequently confounded with the horizontal or dilated veins, may be diſtinguiſhed, according to Wallerius, from theſe, by the following properties: 1. They are generally thinner and much broader than the veins called dilated. 2. They are ſeldom found at [illegible] depth than a hundred perches, and generally [illegible] neighbourhood of veins, from which they [illegible] have received their contents. 3. From ſi[illegible] the thin incruſtations called fimbriæ, w[illegible]

quently interpoſed betwixt the rock and the ore or its matrix; and from their want of the other properties of veins.

But in veins, properly ſo called, the ſtrongeſt marks exiſt of ores having been there concreted, and not carried thither and depoſited in their preſent ſtate. Their regular unbroken appearance, their accretion to the contiguous rock, either immediately or by invention of a matrix, the regular appearance of this matrix intervelopingthe ore, the frequent cryſtallization of the ore and of the other contents of the vein, indicate that ores, as well as the other ſolid contents, have been there concreted from a fluid to a ſolid ſtate.

Moſt authors believe, that veins, and the perpendicular cleſts in the ſtony ſtrata of mountains, called fiſſures, have been produced by the ſame cauſe; or rather, they conſider veins only as fiſſures filled with metalliferous matters. They farther believe, that fiſſures have been occaſioned by the exſiccation of ſtrata, while theſe were paſſing from a fluid to a ſolid ſtate. Wallerius thinks, that fiſſures have been formed from exſiccation, but that veins were channels made through the ſtrata, while yet ſoft and fluid, by water, or by the more fluid parts of the ſtrata penetrating and forcing a paſſage through the more ſolid parts. He thinks, that theſe fluid parts conveyed thither their metalliferous and ſtony contents, which were there coagulated or concreted. He ſupports his opinion by obſerving, that all the veins of the ſame ſtratum generally run parallel to each other; that they frequently bend in their courſe; that the ſame vein is ſometimes contracted and ſometimes dilated; that veins are frequently terminated by being ſplit or divided into inferior veins; that veins are frequently wider at bottom than at top, whereas fiſſures are always wideſt at top, and are very narrow below: all which appearances, he thinks, could not have been produced by exſiccation. From theſe reaſons, fiſſures appear to have had a different, and from the diſjunction and rupture of veins croſſed by fiſſures, they ſeem to have had a later origin than veins. Whether fiſſures could have been produced by the very gradual exſiccation of theſe large maſſes or ſtrongly coherent matter; or whether they have been produced by the ſame violent cauſes, namely, earthquakes, by which the ſtrata in which fiſſures are generally found, have been broken and deranged, and by which metalliferous mountains themſelves have been formed, or their ſtrata raiſed above their original level; as ſome others have, with great probability, conjectured; it is not eaſy to determine.

Veins are ſeldom, if ever, found but in mountains; the reaſon of which may not improbably be, that in metalliferous mountains we have acceſs to the more ancient ſtrata of the earth, which in plains are covered with ſo many depoſited, alluvial, and other later ſtrata, that we can ſeldom, if ever, reach the former. That theſe mountains conſiſt of ſtrata which have been originally lower than the upper ſtrata of adjacent plains, appears from an obſervation which has been made, that the ſtrata of mountainous countries dip with more or leſs declivity as they approach the plains, till they gradually ſink under the ſeveral ſtrata of thoſe plains, and are at laſt immerſed beyond the reach of miners. This leading fact in the natural hiſtory of the earth has been obſerved by a ſagacious philoſopher, Mr. Mitchell, in his Conjectures concerning Earthquakes, &c. Philoſ. Tranſ. 1760.

That the inferior ſtrata of the earth contain large quantities of pyritous, ſulphureous, and metalliferous matters, appears, 1. From the ſubterranean fires in thoſe inferior ſtrata, which produce volcanos, and probably earthquakes (as Mr. Mitchell ingeniouſly conjectures). 2. From the obſervation, that all kinds of mountains are not equally metalliferous; but that veins, eſpecially, are only found in thoſe mountains, which, being compoſed of very ancient ſtrata, are called primæval, which form the chains and extenſive ridges on the ſurface of the earth, which direct the courſe of the waters, and which conſiſt of certain ſtrata, the thickneſs of each of which, its generic qualities, and its poſition relatively to the other ſtrata, are, in different parts of the chain of mountains where that ſtratum is found, nearly uniform and alike, notwithſtanding that the numbers, and the inclinations of the ſtrata compoſing contiguous mountains, or even different parts of the ſame mountain, are often very various; and therefore that veins are ſeldom, if ever, found in the mountains called by authors diluvial and temporary, which are ſingle, or detached, which conſiſt not of ſtrata uniformly diſpoſed, but of alluvial maſſes, in which fragments of ores may be ſometimes, but veins never, found. Neverthelefs, ſingle, and ſeemingly detached, mountains in ſmall iſlands have ſometimes been found to be metalliferous. But we muſt obſerve, that theſe mountains conſiſt of uniform ſtrata; that iſlands themſelves, eſpecially ſmall iſlands, may be conſidered as eminent parts of ſubmarine ranges of mountains; and that the mountains of ſuch iſlands may be conſidered as apices or tops only of inferior mountains.

Thoſe mountains are ſaid to be moſt metalliferous which have a gentle aſcent, a moderate height, and a broad baſis, the ſtrata of which are nearly horizontal, and not much broken and diſjoined. In theſe mountains, at leaſt, the veins are leſs interrupted, more extended, and conſequently more valuable to miners, than the veins in lofty, craggy, irregular, and ſhattered mountains.

Authors diſpute concerning the time in which ores have been formed, ſome referring it to the creation of the world, or to the firſt ſubſequent ages; and others believing, that they have been gradually from all times, and are now daily formed. From the accretion of ores and of their matrices to their proper rocks, and from the inſertion of metalliferous nodules and ſtrize in the hardeſt ſtones, we are inclined to believe, that the matter of theſe veins and nodules are nearly coeval with the rocks and ſtones in which they are inveloped. Neverthelefs, we cannot doubt that ſmall quantities, at leaſt, of ores, are ſtill daily formed in veins, fiſſures, and other ſubterraneau cavities. Several well attefted inſtances confirming this opinion are adduced by authors: Cronſtedt mentions an incruſtation of ſilver-ore that was found adhering to a thin coat of lamp-black, or of ſoot, with which the ſmoke of a torch had ſulled a rock in a mine at Koningſberg, in Norway; and that this incruſtation of ſilver-ore had been formed by a metalliferous water paſſing over the rock. Lehmann affirms, that he poſſeſſes ſome ſilver-ore attached to the ſtep of a ladder, found in a mine in Hartz, which had been abandoned two hundred years ago; and that ſeveral ſteps of ladders ſimilarly incruſted had been found. Many other inſtances are mentioned by authors, of galena, pyrites, ſilver-ores, and other metalliferous ſubſtances having been found adhering to wood, to foſſil-coal, to ſtalactitical incruſtations, to muſſel-ſhells, and other recent ſubſtances. From theſe, and from ſimilar inſtances which have occurred there is reaſon to believe, that not only ochres and fragments of ores may, with other alluvial matters, be now daily depoſited, but alſo that ſmall quantities of mineralized ores are recently formed; although many hiſtories mentioned by Becher, Barba, Henckel, and other authors, of the entire renovation of exhauſted veins, and eſpecially thoſe of the growth and vegetation of metals and of ores, appear to be at leaſt doubtful.

Various opinions have been publiſhed concerning the formation of mineralized ores. According to ſome, theſe ores were formed by congelation of the fluid maſſes found in mines, called *fubri*. See GUHR.

Other authors believe, that ores have been formed by the condenſation of certain *mineral*, metallic, ſulphureous, and arſenical vapors, with which they ſuppoſe that mines abound. Some have even affirmed, that they have ſeen this vapour condenſe, and become in a few days changed into gold, ſilver, and other metallic matters. It has been above obſerved, that from ſeveral appearances which occur in veins, there is great reaſon to believe, that ores have not been carried thither and depoſited in their preſent ſtate, but have been there concreted and cryſtallized, that is, changed from a fluid to a ſolid ſtate. But the fluidity of the metalliferous matters at the time of their entrance into veins, may have been occaſioned either by their having been diſſolved in water, if they are capable of ſuch ſolution, or by their having been raiſed in form of vapour by ſubterranean fires. For the diſpoſition to cryſtallize is acquired by every homogeneous ſubſtance that is fluid, whether it has received its fluidity by being melted by fire, or by being diſſolved in a liquid menſtruum, or by being reduced to the ſtate of vapour. Thus cryſtals of ſulphur have been obſerved to be daily formed by the ſulphureous vapours which exhale in the neighbourhood of volcanos. The volubility of the two mineralizing ſubſtances, ſulphur and arſenic, and the power which foſſile bodies poſſeſs of elevating a certain portion of any fixed matter which happens to be united with them, render it probable, that the greateſt part, at leaſt, of mineralized ores have been formed of vapours exhaled from ſubterranean fires, through the cracks in the intervening ſtrata, occaſioned by thoſe earthquakes which have, in a ſingular manner, broke and deranged the ſtrata of metalliferous countries, and which, as has been above remarked, have been probably occaſioned by, at leaſt have certainly been always accompanied with ſubterranean fires.

MINERALS, *Engliſh*. Dr. Woodward has obſerved, that the Engliſh *minerals* are much more valuable and numerous, than has been generally ſuppoſed. Fullers-earth, a thing ſo cheap as to be diſregarded by many, he obſerves, is of almoſt as much value to our commerce, as any article of foreign production. The property this earth has of imbibing oil and greaſe, is not confined to

the trifling ſervice of taking out accidental ſtains in cloaths, but it is of ſo much uſe in cleanſing the wool and the cloth made of it, that we could never have flouriſhed in the cloth-trade in the manner we have done, had we not this foſſil among us ſo very plentiful and cheap, and at the ſame time ſo excellently good. This earth is one inſtance of the pre-eminence of our ſoil above others. Another inſtance we have in our black-lead or wadd, a *mineral* of great uſe and value in ſeveral branches of trade and arts; and which is found no where fine and good, except in England, and in our colonies; and that of the laſt place, though better than the black-lead of other nations, is greatly inferior to our own.

The amber and jet of England are found in conſiderable quantity, and are equal to thoſe of any other part of the world. Our canal-coal comes very near the beauty of jet; and even our common coal for firing is greatly ſuperior in goodneſs, to that of any other part of the world, and is no where found in ſuch vaſt plenty as with us.

The Engliſh earth and gravel are well known to be ſuperior to thoſe of other countries, in none of which ſuch graſs-plats or ſuch gravel-walks are to be ſeen, as in the Engliſh gardens. We have ſtones, ſlates, flags, and other neceſſary foſſils for building, in ſufficient plenty.

Vitriol and alum are found in greater plenty in England, than in any other country; and are ſo eaſily worked or procured from their ores, that we can ſell them cheaper than any other people.

Tin is another article in which England has always had a great pre-eminence; the county of Cornwall alone produces more tin than all the world beſide; and the tin of England is well known to excel that of other nations, as well in value as in quantity.

Lead ore is alſo richer in England than in any other country, and is found in greater quantity here than any where elſe; beſide this, it runs more kindly in the fire, and requires leſs trouble and expence in the working, than any other lead; and is, when wrought, much finer and more ductile than any other lead.

This does not ariſe from any peculiarity in the metal, for lead is the ſame in all countries, when equally purified; but the ſpar which lies about, and is mixed with our lead-ore, is of ſuch a nature and diſpoſition, that it is eaſily wrought upon and readily parts from it, leaving the metal more pure than it can be procured by the common large operations in other countries; ſo that they are forced to ſend it away much leſs pure than our's is.

Copper and iron are alſo found in England in very great plenty, and ſeveral ores of theſe metals have of late been brought into uſe, which were not known before the modern improvements in chemiſtry.

MINERAL, *Æthiops*. See *Æthiops*, and MERCURY.

MINERAL, *turbith*. See TURBITH, and MERCURY.

MINERAL *oil*. See OIL.

MINERALE *bezoardicum*. See BEZOARDICUM.

MINERAL, *cryſtal*. See CRYSTAL *mineral*.

MINERAL *kermes*. See KERMES *mineral*.

MINERAL *waters*, are thoſe, which at their ſpringing forth from under-ground, are found impregnated with ſome *mineral* matter; as ſalt, ſulphur, vitriol, &c. See WATER.

Such are hot baths, ſpaws, purging, &c. ſprings.

MINERAL *waters, earth of*. See EARTH.

MINERAL *juices*. See JUICES.

MINERAL *courts, curia minerales*, in *Law*, courts for regulating the concerns of lead-mines; as *ſtannary courts* are for tin.

MINERALOGY, that previous part of metallurgy, which teaches the ways of finding, judging, and digging of mines.

Mineralogy is an art that requires a conſiderable compaſs of knowlege, before it can be practiſed to advantage; for this art requires a competent ſkill in the nature, effluvia, and effects of mineral matters, whether earths, ſalts, ſulphurs, ſtones, ores, bitumens, gems, or metals: it likewiſe requires a knowlege of the internal ſtructure of the earth, and its various ſtrata, with a competent ſkill in ſubterraneous architecture, menſuration, hydraulics, levelling, and mechanics: without theſe, we can never judge what mountain, plain, or valley, is proper to be dug; in what manner to dig it; how to diſcharge the water that may flow in upon the works; how the beds of ore and ſtone will dip or run; how the various kinds of earths, marble, and other mineral or metallic matters, are to be burſt through or broken; or how the general proceſs of mining ſhould be conducted, in order to procure with the leaſt expence, or bring to open day, the principal matter or ore required. Shaw's Lectures, p. 240.

And, even when all theſe difficulties are conquered, no more than half the work is effected; and the end can ſtill be never obtained, without a tolerable exact knowlege of ſeveral chemical operations, viz. trituration, torrefaction, lotion, calcination, cementation, fuſion, amalgamation, and the like; whence it might be laid down as a rule, that every directing mineraliſt ſhould not only be tolerably verſed in the ſeveral parts of [illegible] philoſophy, but particularly be well acquainted [illegible].

Many mines have been diſcovered by accident. [illegible] firſt laid open a rich vein of the ſilver mine [illegible] in Germany. Sometimes a violent wind, [illegible] trees, or overturning the parts of rocks, [illegible] a mine. The ſame has happened by violent [illegible] earthquakes, thunder, the ſtring of wood [illegible] ſtroke of a plough-ſhare, or a horſe's hoof.

The art of mining does not wait for theſe favourable accidents, but directly goes upon the ſearch and diſcovery of ſuch mineral veins, ores, or lands, as may be worth the working for metal.

The artificial inveſtigation and diſcovery of mines depend upon a particular ſagacity, or acquired habit of judging, from particular ſigns, that metallic matters are contained in certain parts of the earth, not far below its ſurface.

The metallic veins are commonly encompaſſed with a ſort of ſtone peculiar to the mine, and are accompanied with ſeveral ſtrata of different matters, as clay, gravel, rock, &c. Thoſe who work in mines, know by the ſize and colour of the ſtones, when they approach the vein.

They diſcover that there is a mine in a mountain by the marcaſites or mineral ſtones falling from it; by the mineral taſte of the waters; by the quality of the exhalations raiſed from it; and by the difference between the earth over the mines, and that of the neighbouring parts, in the cold time of ſpring and autumn; the froſt lying on the adjacent places, when it thaws about the mines. Add, that the ground's producing but little graſs, and that ſhort, pale, and colourleſs, is an indication of a mine.

Some pretend to diſcover mines by the ſole virtue of the hazle-tree, out of which they form a forked ſtick, called VIRGULA *divinatoria*, which, they ſay, turns of itſelf, in their hands, but differently, according to the different nature of the metals or minerals underneath. This artifice made a great noiſe in France towards the end of the ſeventeenth century; and the corpuſcular philoſophy was called to account for it. But it is now in little credit.

But when no evident ſigns of a mine appear, the ſkillful mineraliſt uſually bores into the earth, in ſuch places as, from ſome analogy of knowledge, gained by experience, (or by obſerving the ſituation, courſe, or nature of other mines) he judges may contain metal.

This method of boring conſiſts in the uſe of a ſet of ſcooping irons, made with joints, ſo as to be lengthened at pleaſure; and thruſt down to a conſiderable depth below the ſurface of the earth, ſo as, when taken out again, to bring back ſamples of the earth, or mineral matter, from the depth whereto the iron deſcended; much after the manner that ſamples of ſugar are taken, by the inſtrument called a reſt, out of the hogſhead.

This method of exploring mines is called by the tinners ſoſſeening, from *eſſus jlean*, i. e. fallen or dropt tin. See SHOAD.

Another method of diſcovering loads of mines is by working DRIFTS acroſs the country, i. e. from north to ſouth, and vice verſâ: and this method is equally cheap and certain. Another very effectual way is by driving an ADIT from the loweſt ground, either north or ſouth, whereby there is a certainty of cutting all loads at twenty, thirty, or forty fathoms deep, if the level admits of it.

After a mine is found, the next thing to be conſidered is whether it may be dug to advantage. In order to determine this, we are duly to weigh the nature of the place, and its ſituation, as to wood, water, carriage, healthineſs, and the like, and compare the reſult with the richneſs of the ore, the charge of DIGGING, STAMPING, WASHING, and SMELTING. This is a matter of œconomical prudence.

A mine is either found in a mountain, a hill, a valley, or a flat; of theſe, mountains and hills are dug with greateſt eaſe and convenience, chiefly becauſe the drains and barrows, that is, the adits and avenues, may be here readily cut both to drain off the water, and to form gangways for bringing out the ore. In whatever place the mine lies we are to look for the veins, which rains or other accidents may have diſcovered; and where ſuch a vein is found, if it be tolerably large and rich, it is beſt to open the mine there. Otherwiſe the moſt commodious place for ſituation is to be choſen, that is, neither on a flat, nor on the tops of mountains, but in their ſides.

The beſt ſituation for a mine, is a mountainous, woody, wholeſome ſpot, of a late eaſy aſcent, and bordering upon a navigable river. For wood is indiſpenſably neceſſary for making the engines and inſtruments, building the huts, fencing in the works, and working the ore. But though wood ſhould be wanting, if a navigable [illegible] be nigh, that may be ſupplied, as water-carriage [illegible]

Water however muſt never be wanting. This is beſt ſupplied by a large river, and is neceſſary on a thouſand occaſions, to waſh the ores, turn the works, &c. Good convenience of carriage muſt alſo be regarded, both for the carrying the ore or metal to market, and the bringing neceſſaries to the workmen: for proviſions are ſeldom to be found where there are mines. See DIGGING, and TRACING.

The places abounding with mines are generally healthy, as ſtanding high, and every way expoſed to the air; yet ſome places, where mines are found, prove poiſonous, and can upon no account be dug, though ever ſo rich. The way of examining a ſuſpected place of this kind, is to make experiments upon brutes, by expoſing them to the effluvia or exhalations, to find the effect.

Mines are compoſed of VEINS, which are oblong tracts, forming maſſes of metals and ores, and lying in the ſtony ſtrata of mountains, &c. Theſe veins are very different in their direction, as well as in length, breadth, and depth. Some are ſtrait, and others curved; ſome are perpendicular to the horizon, and others parallel to it; and the reſt are of the intermediate degrees of declivity. Thoſe which ſtretch obliquely from the ſurface of the earth towards its central parts, are called deep veins; others, that lie ſhallow and circular, ſo as to encompaſs a large ſpace, are called ſpreading veins; others again, whoſe length is inconſiderable in relation to their length and breadth, are called accumulated veins.

The dimenſions, the quality, and the quantity of contents, and many other circumſtances of veins, are alſo very various. Miners diſtinguiſh the ſeveral kinds of veins by names expreſſive of their differences. Thus veins are ſaid to be deep; perpendicular; horizontal, or hanging, or dilated; rich; poor; morning, noon, evening, and night veins, by which their direction towards that point of the compaſs, where the ſun is at any of theſe diviſions of the natural day, is ſignified.

The ſtratum of earth or ſtone lying above a vein is called its roof: and the ſtratum under the vein is called its floor. Some parts of veins are conſiderably thicker than others. Small veins frequently branch out from large veins, and ſometimes theſe branches return into the trunk from which they iſſued. Theſe veins, from which many ſmaller veins depart, have been obſerved to be generally rich.

Veins are terminated variouſly. 1. By a gradual diminution, as if they had been compreſſed, while yet ſoft, by ſuperincumbent weight; or by ſplitting and dividing into ſeveral ſmaller veins: or, 2. they are terminated abruptly, together with their proper ſtrata in which they lie. This abrupt termination of veins and ſtrata is occaſioned by their being croſſed by new ſtrata running tranſverſely to the direction of the former; or by perpendicular fiſſures through the ſtrata; which fiſſures are frequently filled with alluvial matters, or with water, or are empty. Theſe perpendicular fiſſures ſeem to have been occaſioned by ſome rupture or derangement of the ſtratum through which the vein paſſes, by which one part of it has been raiſed or depreſſed, or removed aſide from the other, probably by earthquakes. Where the vein is terminated abruptly it does not ceaſe, but is only broken and diſjoined; and is often recovered by ſearching in the analogous parts of the oppoſite ſide of the deranged ſtratum. A principal part of the art of miners conſiſts in diſcovering the modes of theſe derangements from external marks, that they may know where to ſearch for the diſjoined vein.

The contents of veins are metals and metalliferous mineral kinds, as, the ſeveral ſorts of ores, pyrites, blends, gulure, vitriols; the ſeveral kinds of fluors, ſpars, quartz, hornblend, in which the ores are generally imbedded, or inveloped, and to which therefore the name, matrix of the ore, is applied; ſtalactites; cryſtallizations of theſe metalliferous and ſtony ſubſtances enerufting the ſmall cavities of the circumjacent rock; and laſtly, water, which flows or drops through crevices in that rock.

In a vein, ores are found ſometimes attached to the rock or ſtratum through which the vein runs, but more frequently to a matrix which adheres to the rock; and ſometimes both theſe kinds of adheſion occur in the ſame vein at different places. Frequently betwixt the matrix and the rock is interpoſed a thin cruſt of ſtone or of earth, called by authors the fimbria of the ore.

The matrix or the ſtone in which the ore lies inveloped, is of various kinds in different veins. And ſome kinds of ſtone ſeem better adapted than others to give reception to any ore, or to the ores of particular metals. Thus quartz, ſpar, fluors, and horn-blend give reception to all ores and metals; but ſlates chiefly to copper and ſilver, and never to tin; calcareous and ſparry matrices, to lead, ſilver, and tin; and mica to iron.

Veins lie in ſtrata of different kinds of ſtone; but more frequently in ſome kinds of ſtone than in others. Thus of the ſimple or uncompounded ſtones which compoſe ſtrata, the following are metalliferous: calcareous ſtones; flaty ſand ſtone (ſcot fiſſilis arenoſus Wallerii); feldſpar (ſpatum pyrimachium ſive ſcintillans); quartz; ſometimes jaſper; frequently ſlates; and chiefly micaceous or talky ſtones; and hornblend (lapis corneus Wallerii; bolus indurata particulis ſquamoſis Cronſtedt). No veins have been found in gypſeous or in ſiliceous ſtrata, although cherts and flints frequently contain metallic particles, and ſome inſtances have been obſerved of ores of ſilver and of tin in alabaſter. Of compound ſtones, thoſe are ſaid to be chiefly metalliferous which conſiſt of particles of hornblend. Veins have alſo been found in the red granite; but ſeldom, if ever, in any other granite, or in porphyry. In general, veins are more frequently found in ſoft, fiſſile, and friable ſtrata than in thoſe which are compact and hard.

A vein ſometimes paſſes from one ſtratum into the inferior contiguous ſtratum. Sometimes even the veins of one ſtratum do ſo correſpond with thoſe of an inferior ſtratum, the contiguity of which with the former is interrupted by a maſs of different matter through which the veins do not paſs, that they ſeem originally to have been continued from one ſtratum to the other. Thus in the mines of Derbyſhire, where the veins lie in ſtrata of lime-ſtone, the contiguity of which ſtrata with each other is interrupted in ſome places by a blue marle or clay, and in other places by a compound ſtone called toad-ſtone; the veins of one ſtratum frequently correſpond with the veins of the inferior ſtratum of lime-ſtone, but are never continued through the interpoſed clay or toad-ſtone. But we muſt obſerve, that theſe interpoſed maſſes, the blue marle, clay, and toad-ſtone, have not the uniform thickneſs obſervable in regular ſtrata, but are (eſpecially the toad-ſtone) in ſome places a few feet in depth, and in others ſome hundreds of yards. The above diſpoſition ſeems to indicate, that theſe ſeveral ſtrata of lime-ſtone have been originally contiguous; that the veins now diſjoined have been once continued; that theſe ſtrata of lime-ſtone have been afterwards ſeparated by ſome violent cauſe, probably by the ſame earthquakes which have in a ſingular manner ſhattered the ſtrata of this mountainous country; that the interſtices thus formed between the ſeparated ſtrata have been filled with ſuch matters as the waters could inſinuate, probably with the mixed comminuted ruins of ſhattered ſtrata; or, with the lava of neighbouring volcanos, of which many veſtiges remain.

When a vein of ore is found, and all things prepared for the work, if the vein be of the deep kind, it is firſt to be laid bare, and a pit to be ſunk upon it, at the mouth of which a thed is to be raiſed, and a crane, or barrel and winch fixed, for craning up the ore. The pit is to be ſunk either perpendicular or oblique, as the vein happens to run. It is alſo uſual in this caſe, to cut a burrow or ADIT into the ſide of the hill, which ſhould be twice as high as it is wide, that the workmen may commodiouſly paſs along it with their barrows and burdens: if this ſide pit reaches to the firſt pit, it becomes a true burrow, open at both ends, and renders the work more eaſy and commodious, as the ore may be wheeled out in barrows inſtead of being craned to the mouth of the pit. After the ſame manner, it is uſual to dig many caverns into the ſides of the mountain, in order to ſcoop out the ore; ſo that ſometimes there are thus ſeveral burrows made, to the eaſe and advantage of the work.

The art of DIGGING the veins, varies according to the nature of the vein, or according as it is ſoft or hard. The ſoft vein is generally dug with the ſpade, and turned out into wooden trays, placed underneath to receive it: but the hard veins are knocked out with a gad, or kind of chiſſel and hammer. But, if the ore is ſo hard as to be incapable of breaking in this manner, they uſually ſoften it with fire, which has the power of rendering the hardeſt and moſt flinty ſtones brittle and friable. But a ſtill more expeditious method is the working with gun-powder, by means whereof, much of the hardeſt rock may be ſhivered and ſplit in a very little time; a ſmall parcel of powder being laid in a long hollow cut for that purpoſe, after the nature of a gun-barrel, and fired as it were at a touch hole; a ſmall vent, where the quick match is applied, being left for the purpoſe, and the orifice being otherwiſe hard ſtopped up with clay.

The manner of purſuing and digging all ſorts of veins, the ways of under propping, and diſcharging the water from the works, the ſinking of air ſhafts, curing of damps, and the like, to the beſt advantage, requires more philoſophy than the generality of mere workmen, or the common miners have, though their experience may as much aſſiſt the theoretic philoſopher, as the diſcernment of the latter may that of the former.

The

The neceſſity of cleaving and opening rocks has been always accounted one of the moſt troubleſome articles in the buſineſs of mining; they being often compoſed of ſuch ſtone as tools can work but very ſlowly upon in the common ways. Fire and gunpowder have been the two things principally had a recourſe to on theſe occaſions; and both ſucceeſsfully, but in different ways. The fire calcines ſtones, and they then eaſily become ſhattered to pieces, and give way to tools that would not touch them before; but in this caſe, beſide the expence of wood, the hindrance of the labourers is an article to be conſidered, for the rocks are made ſo hot all about the place where the fire has been, that the people cannot get to work again for a day or two, and then the effect of fire reaches but a little way in the rock.

Gunpowder makes its way much farther, and at the ſame time is much cheaper, and does not delay the work, but the labourers may go on immediately afterwards. There have been many ways contrived of uſing this, but one of the ſimpleſt and beſt, ſeems that delivered by Mr. Beaumont, in the Philoſophical Tranſactions. For this there are only three ſimple inſtruments required, a borier, a gun, and the quinet or wedge. Theſe are the names the miners on Mendip-hills give the inſtruments. The borier is an iron inſtrument, ſteeled at the end; it is two feet two inches long, and is ſomewhat thicker at the ſteeled end than in any other part: the uſe of this is to make the hole in the rock deep enough to receive the powder. The gun is about ſix inches long, and an inch and quarter in diameter; and has a hole drilled through it, to receive the priming. The quinet is a wedge of iron of about ſix inches long, and ſo ſhaped that its flat part on one ſide joins with a flat part in the gun made to receive it, and by that means the gun is faſtened very firmly in its place. Phil. Tranſ. N° 167. p. 854.

The manner of uſing theſe inſtruments, is this: one man holds the borier on the rock, turning it round while another forces its point in by blows of a large hammer on the other end. When the hole is made ſomewhat deeper than the length of the gun, they dry it with a rag, and then put into it two or three ounces of powder; over this they lay a paper, and then they put the gun into the hole, and faſten it in by driving in the quinet or wedge againſt its flat part. When the powder and gun are thus fixed, they paſs down a wire through the hole drilled in the gun, and with this they pierce a hole through the paper which covers the powder; they then prime the gun, and lay a train with a lighted match; but all go out of the mine before the gunpowder takes fire, and as ſoon as it has gone off, they go down to work again, finding the rock ſplit and the inſtruments unhurt. The paper in this caſe is put over the powder only that the tools may be ſafely employed in driving down the gun and the quinet, becauſe were not the powder covered it might do miſchief to the workmen, by going off by ſome ſpark cauſed by ſtriking either againſt thoſe inſtruments, or againſt the rock itſelf.

MINERVA, in *Mythology*, derived according to ſome *à minis*, from the threats of her ſtern countenance, otherwiſe called *Pallas*, is the goddeſs of wiſdom and the arts; and the only one of the offspring of Jupiter to whom pertain the prerogatives of the ſupreme rank of divinity. *Minerva* is repreſented both by the painters and poets of antiquity, as a beauty of the ſeverer kind: the diſtinguiſhing character of her face is dignity and a certain fierceneſs, which has more of maſculine than feminine in it: and, therefore, more apt to ſtrike one with awe and terror, than to charm one, at firſt ſight. Her dreſs and attributes are adapted to the characters of her face; ſhe moſt uſually appeared with a helmet on her head, and a plume that nodded formidably in the air; in her right hand ſhe ſhook her ſpear, and in the other graſped her ſhield, with the head of the dying MEDUSA upon it; the ſame figure appears alſo on her breaſt-plate; and ſometimes the goddeſs herſelf is repreſented as having living ſerpents about her breaſts, and about her ſhoulders; ſhe is alſo accompanied with a cock, which is a fighting bird, and correſponding to her character as the inventreſs and preſident of war, and an owl, which ſees in the dark, and, therefore, is the image of wiſdom. It is probable that the Romans conſidered JUPITER, JUNO, and *Minerva*, as one and the ſame divinity, under three different names: among which names, that of Jupiter might ſignify ſupreme goodneſs; that of *Minerva*, ſupreme wiſdom; and that of Juno, ſupreme power: thus the learned Dr. Cudworth obſerves, Intell. Syſt. b. 1. c. 4. p. 450. that the three Capitoline gods, Jupiter, Juno, and *Minerva*, may be underſtood to have been nothing elſe but ſeveral names and notions of one ſupreme deity, according to its ſeveral attributes and manifeſtations.

MINERVALIA, among the Romans, called alſo *Quinquatria*, were feaſts celebrated in honour of Minerva. One of theſe feaſts commenced on the 3d of January, and another on March 19th, and laſted five days. The firſt day was ſpent in prayers to the goddeſs; the next in offering ſacrifice, ſeeing gladiators fight, acting tragedies upon mount Albanus, and reciting pieces of wit, to which the conqueror had a prize given him. Scholars had a vacation, and made a preſent to their maſters, which was called *Minervale*.

MINIATURE, or MINIATURE, a delicate [illegible] ing, conſiſting of little points or dots, inſtead of [illegible] uſually done on vellum, ivory, or paper, with very little or ſimply water-colours.

The word comes from the Latin *minium*, [illegible] being a colour much uſed in this kind of painting. The French frequently call it *mignature*, from *mignon*, *fine*, *pretty*, on account of its ſmalneſs and delicacy; and this may be ultimately derived from *minor*, *ſmall*.

Miniature is diſtinguiſhed from other kinds of painting by the ſmalneſs and delicacy of its figures, the neatneſs of their colours, and fainteneſs of the colouring; and on this account it requires to be viewed very near.

Thoſe colours that have the leaſt body are the beſt and moſt commodious for painting in *miniature*; ſuch are carmine, ultramarine, fine lakes, and green made of the juices of ſeveral kinds of herbs and flowers.

The colours commonly uſed in *miniature* painting are for *red*, carmine, lake, roſe-pink, vermilion, red lead, ſcarlet-oker, common Indian red, red oker, Venetian red, and Spaniſh brown: for *blue*, ultramarine, ultramarine aſhes, Pruſſian blue, verditer, indigo, ſmalt, blue bice, and litmus: for *yellow*, gamboge, Naples yellow, Dutch pink, Engliſh pink, gall-ſtone, maſticot, French berry waſh, turmeric waſh, zedoary waſh, and tincture of ſaffron: for *green*, ſap-green, verdigriſe, diſtilled verdigriſe, and terra verte: for *purple*, true Indian red, archal, and logwood waſh: for *brown*, biſtre, umber, brown oker, Cologn earth, and terra Japonica: for *white*, flake white, white lead, calcined hartſhorn, pearl white, Troy white, lake white, and egg-ſhell white: and for *black*, Indian ink, lamp black, ivory-black, and blue black.

Painting in *miniature* is the niceſt and moſt tedious of all others; being performed wholly with the point of the pencil.

There are ſome painters who never uſe any white colour in *miniature*, but make the ground of the vellum ſerve to raiſe their figures; in which caſe, the lights appear bright in proportion to the depth and ſtrength of the colours of the figures. Others before they go to work, give the vellum a light waſh with white lead, well prepared and purified.

When paper of any proper kind is uſed, it is ſufficient to prime it with iſinglaſs ſize, thickened properly with pearl white, and any pigment which will give the ground the deſired colour. But common paper may be rendered ſtronger and fitter for receiving the colours, by laying on the back of it a coat of ſtarch, boiled with water to a moderate conſiſtence, and rendered more tenacious by the addition of a little iſinglaſs. This ſhould be laid on very ſmoothly with a bruſh, and the paper, when nearly dry, muſt be put betwixt two leaves of a book, or betwixt two ſheets of paper and two boards, and compreſſed by a weight laid upon them. Two ſheets of paper cemented together by the ſtarch and iſinglaſs, and treated in the ſame manner, make a very commodious ſubſtance for painting in *miniature*. Vellum requires only to be ſtrained on a paſteboard, and primed in the ſame manner; and if it ſhould be greaſy, rubbed over with the gall of any beaſt.

When the colours are laid on flat without dotting, though the figures be ſmall, and the ground either vellum or paper, it is not called *miniature*, but *waſhing*.

The colours for *miniature* may be mixed up with a ſolution of gum Arabic, or gum tragacanth, in water, or with iſinglaſs ſize. For the method of preparing ivory for *miniature*, ſee IVORY.

MINICULATOR, among the Romans, a ſervant who embelliſhed any writing with MINIUM.

MINIM, in *Muſic*, a note, or character of time; equal to two crotchets, or half a ſemibreve.

The invention of the *minim* is aſcribed to a certain prieſt in Navarre, but the firſt who uſed it was Philip de Viſtriaco, in whoſe time it was the ſmalleſt note in practice. See TIME and CHARACTERS *of muſic*.

MINIM, *ſextuple of the*. See SEXTUPLE.

MINIMA *naturæ*, or MINIMA *naturalia*, among *Philoſophers*, the primary articles, whereof bodies conſiſt; the ſame with what are otherwiſe called CORPUSCLES, and ATOMS.

MINIMA, in the *Higher Geometry*, the ſmalleſt quantities attainable in any given caſe. See MAXIMUM.

MINIMA, *per*. See PER *minima*.

MINIMENTS, or MUNIMENTS. See MUNIMENTS.

MINIMI *digiti extensor*. See EXTENSOR.

MINIMI *digiti pedis abductor*. See ABDUCTOR.

MINIMS, MINIMI, an order of religious, inſtituted about the year 1440, by S. Francis de Paulo, confirmed in 1473, by Sixtus IV. and by Julius II. in 1507. See BONHOMMES.

Theſe have improved on the humility of the MINORS, by terming themſelves *Minimi* or *Minims*, q. d. leaſt, or ſmalleſt.

MINIMUS *glutæus*. See GLUTÆUS.

MINION, a ſort of CANNON, or piece of ORDNANCE, whereof there were formerly two kinds; large, and ordinary, anſwering to our ſix-pounders. See GUN.

MINISTER, one that ſerves or conducts the public worſhip of God.

In the reformed church, prieſts, or thoſe ordained to preach, and do the other functions of the prieſthood, are called abſolutely and ſimply *miniſters*.

In which ſenſe, biſhops, &c. are ſaid to be *miniſters* of God; *miniſters* of the word, of the goſpel, &c. In ſome churches they are alſo called *paſtors*.

MINISTERS *of the altar* are properly thoſe who attend, and aſſiſt the prieſt at the adminiſtration of the euchariſt. See DEACON, and SUBDEACON.

Officers of ſtate, &c. are called the king's *miniſters*; as adminiſtering the affairs of juſtice, policy, &c. for him.

MINISTER *of ſtate*, is he with whom a prince entruſts the adminiſtration of his government; or to whom he commits the care and direction of the principal affairs thereof.

Boethius is propoſed as a model for *miniſters* of ſtate. The grand vizier is the prime *miniſter* of the Ottoman empire.

MINISTERS, *foreign*, or the *miniſters of foreign princes*, are their embaſſadors, envoys, agents, or reſidents in the courts of other princes.

There are two kinds of foreign *miniſters*. *Miniſters* of the firſt rank, who are alſo called EMBASSADORS, and *envoys extraordinary*.

And *miniſters* of the ſecond rank, who are the ordinary reſidents.

Thoſe of the firſt rank have a repreſentative character, which the others have not; though theſe laſt are ſometimes inveſted with fuller powers than the former.

MINISTER is alſo the title which certain religious orders give to their ſuperior.

In this ſenſe we ſay, the *miniſter* of the Mathurins, or Trinitarians.

MINISTER, among the *Jeſuits*, is the ſecond ſuperior of each houſe; thus called, as being an aſſiſtant to the ſuperior, or rector.

The general of the Cordeliers order is alſo called the *miniſter general*. See JESUITS.

MINISTRY, or MINISTERY, a profeſſion, office, or employment, which a perſon diſcharges for the ſervice of God, the public, or ſome particular perſon.

In which ſenſe we ſay, a biſhop muſt give account to God of his *miniſtry*, &c.

MINISTRY is alſo uſed for the government of a ſtate, by ſome great miniſter, under the ſovereign authority.

In which ſenſe we ſay, the *miniſtry* of the cardinal de Richelieu, &c.

MINISTRY is alſo frequently uſed as a collective word, ſignifying the miniſters or officers of ſtate.

Thus we ſay, the *miniſtry* oppoſed a thing; meaning, the miniſters oppoſed it.

MINIUM, in the *Natural Hiſtory of the Ancients*, a name given to what we now call CINNABAR, or native mineral of a ſhining red colour, out of which quickſilver was extracted. This native mineral becoming much in uſe was ſoon adulterated; and that commonly with lead-ore calcined to a rednels; and hence, after the two words *minium* and *cinnabar* had been long uſed in common, the cinnabar became retained only to the native mineral, and the *minium* to that adulterated with lead-ore, or to the red adulterating matter alone, which is the ſenſe in which it is ſtill uſed.

Minium, or *red* LEAD, is a CALX of lead of a vivid yellowiſh red colour, which colour it acquires by a ſlow calcination and reverberation. The *minium* in commerce is chiefly brought from Holland, where large quantities of it are manufactured.

The method in which *minium* is made in large quantities with us, is this: they firſt burn lead in a furnace into a kind of litharge, by continually ſtirring it while melted with an iron rake; this they afterwards grind with two pair of ſtones, which deliver it from one to another, the firſt pair grinding it coarſer, the ſecond finer; theſe are worked by means of a mill which moves ſix pair of them at once. When thus reduced to a fine powder, it is waſhed and then put into a furnace, and is burnt with a reverberatory fire for two or three days, all the while they continue ſtirring it with a large iron rake, hung on a ſwivel or iron hook; and toward the end of the time they watch its being of the right colour. When this is doing, the fire muſt not be carried beyond a certain degree, leſt the matter clod and run together.

The proceſs by which *minium* is prepared is deſcribed in the following manner by M. Jars. The furnace is of the reverberatory kind, with two fire-places at the ends; each fire-place being ſeparated from the area, or body of the furnace, by a wall twelve inches high. The fire-places are fifteen inches broad, and their length is equal to the breadth of the whole furnace, which is about eight or nine feet. The length of the area from one place to the other is nine or ten feet. The quantity of lead uſed in one operation is about 1500 pounds, of which nine parts are lead obtained from furnaces where the ore is ſmelted, and one part is lead extracted from the ſcoria which is formed in ſmelting the ore. This latter kind is ſaid to be neceſſary, as the former could not alone be reduced into powder. All the lead is at once put into the area, the bottom of which is level. The calx, as faſt as it is formed, is drawn to one ſide, by means of a rake ſuſpended by a chain before the mouth of the furnace. In four or five hours the whole quantity of the lead is calcined, or, if any pieces remain uncalcined, they are ſeparated, and kept for the next operation. The heat employed is that of a cherry-red, and the fire-places and mouth are kept open, that the air may accelerate the calcination. The powder or calx is to be frequently ſtirred to prevent its concreting, and when this operation has been continued about twenty-four hours, the matter is taken out of the furnace, and laid on a flat pavement. Then cold water is thrown on it, to give it weight, as the workmen ſay, but rather (as M. Jars thinks) to make it friable. It is then to be ground in a mill, and the finer part is ſeparated by waſhing, while the coarſer part, reſerved for ſome following operation, is to be placed at the mouth of the furnace in order to retain the melted lead. The fine powder, which is now of a yellow colour, is again put into the fame or a ſimilar furnace, and expoſed to a very moderate fire, from thirty-ſix to forty-eight hours; during which time, it is ſtirred frequently to prevent its concreting; and the powder gradually acquires its proper red colour. The *minium* is then to be taken out of the furnace, cooled, and ſifted through an iron ſieve placed in a caſk. Mem. de l'Academie Royal à Paris, 1770. See CALCINATION.

MINIUM, in *Medicine*, is uſed externally; it obtunds the acrimony of the humours, allays inflammations, and is excellent in the cleanſing and healing of old ulcers: it is uſed, on theſe occaſions, in many of the plaſters and ointments of the ſhops; it is an ingredient in the officinal compoſition, called *emplaſtrum de minio*, uſed as a deſiccative and cicatrizer: though more rarely than that made in the ſame manner with litharge, becauſe it does not ſtick ſo well, and is more difficult of preparation.

It was with *minium* the ancient Romans and Grecian ladies tinged their nails and faces of a red colour. For, as to our modern paints, without doubt they were not known in thoſe days.

The bright orange colour of *minium* might render it valuable in painting, if it could ſtand with certainty in either oil or water. But as it is ſubject to become black, it cannot be ſafely truſted, except in hard varniſhes: and is, therefore, ſeldom uſed in oil, or even in water, unleſs for very groſs purpoſes, or as a ground for vermilion.

The goodneſs of *minium* may be diſtinguiſhed by the brightneſs of its colour: and the adulteration to which it is liable, may be detected, by putting an ounce of it into a crucible with an equal quantity of charcoal duſt, well mixed together, and placing the crucible in a common fire ſufficient to melt lead, which is to be covered with another ſmall crucible inverted into it. When it has been continued for ſome time on the fire, take it out and ſtrike it againſt the ground. The *minium* will thus be reduced to its metallic ſtate; and its diminiſhed weight, when freed from the charcoal duſt and cold, will indicate the proportion of adulterated matter. *Minium* is alſo uſed as a FLUX in forming the ENAMEL for grounds, and in GLAZING, &c.

MINNIN, a ſtringed inſtrument of muſic among the ancient Hebrews, having three or four chords to it. See Kircher's figure of it, *Tab. Muſic. fig.* 6. Though there is reaſon to queſtion the antiquity of this inſtrument; both becauſe it requires a hair-bow, which was a kind of *plectrum* not known to the ancients, and becauſe it ſo much reſembles the modern viol. Kircher took the figures of this, the *nachal*, *chinnor*, and *plalterj*, from an old book in the Vatican library. Hawkins's Hiſt. Muſic, vol. i. p. 255.

MINOR, a Latin term, literally denoting *leſs*; uſed in oppoſition to *major*, greater.

Thus we say, St. James's *minor*; Asia *minor*; the *minor* excommunication, &c.

MINOR *ædilis*. See ÆDILES.

MINOR *anticus serratus*. See SERRATUS.

MINOR *barons*. See BARON.

MINOR, *canis*. See CANIS.

MINOR *gastricus*. See GASTRIC.

MINOR *oculi obliquus*. See OBLIQUUS.

MINOR *ordo*. See ORDERS.

MINOR, *rectus*. See RECTUS.

MINOR, *teres*. See TERES.

MINOR, *ursa*. See URSA.

MINOR, in *Law*, denotes a perſon under age, or who, by the laws of the country, is not yet arrived at the power of adminiſtring his own affairs, or the poſſeſſion of his eſtate.

Among us, a perſon is a *minor* till the age of twenty-one: before which time his acts are invalid. See AGE, and INFANT.

It is a maxim in the common law, that in the KING there is no *minority*, and therefore he hath no legal guardian; and his royal grants and aſſents to acts of parliament are good, though he has not in his natural capacity attained the legal age of twenty-one.

The *minority* of the kings of Sweden, Denmark, and the provinces of the empire, terminates at eighteen years; and that of the kings of France at fourteen, by an ordonnance of Charles V. in 1374.

It is alſo provided by the cuſtom and law of PARLIAMENT, that no one ſhall ſit or vote in either houſe, unleſs he be twenty-one years of age. This is likewiſe expreſly declared by ſtat. 7 and 8 Will. III. cap. 25. with regard to the houſe of commons.

MINOR, in *Logic*, is the ſecond propoſition of a formal or regular SYLLOGISM, called alſo the ASSUMPTION.

MINOR, in *Muſic*, is applied to certain concords, which differ from, or are lower than, others of the ſame denomination by a leſſer ſemitone, or four commas.

Thus we ſay, a third *minor*, or leſſer third: or a ſixth major and *minor*.

Concords that admit of major and *minor*, i. e. greater and leſs, are ſaid to be *imperfect* CONCORDS.

MINORESSES. See *St.* CLARE.

MINORS, or *Friers* MINORS, an appellation which the FRANCISCANS aſſume, out of ſhew of humility; calling themſelves *freares minores*, i. e. *leſſer brothers*; and ſometimes *Minorites*.

There is alſo an order of regular *Minors* at Naples, which was eſtabliſhed in the year 1588, and confirmed by Sixtus V.

MINORATIO, a word uſed by the ancients to expreſs a ſlight or moderate evacuation, only ſerving to leſſen the humours, not to carry them off.

MINOS, in *Mythology*, one of the three judges of hell, of a rank ſuperior to the other two, viz. Æacus and Rhadamanthus. Homer repreſents him as ſitting with a ſceptre in his hand, in the midſt of the ghoſts of departed mortals, who plead their reſpective cauſes in his preſence. Virg. *Æn.* 6. v. 432. places an urn by him, containing the ſeveral lots of mankind. The particular diſtrict of Ades, over which he was ſuppoſed to preſide, was EREBUS: and it was his office to determine the character and final condition of the ſpirits cited to his tribunal. *Minos*, it is ſaid, was the firſt king of Crete, and conſidered as the wiſeſt legiſlator of antiquity; on which account he obtained the honour of being judge in the inviſible world. This *Minos*, whoſe inſtitutes are ſaid to have ſerved as a model for thoſe of Lycurgus, flouriſhed, according to Selden, one thouſand four hundred and ſixty-two years, but, according to the abbé Banier, only one thouſand three hundred and twenty years before Chriſt.

MINOTAUR, MINOTAURUS, in *Antiquity*, a fabulous monſter, much talked of by the poets; feigned to be half man, and half bull.

The *Minotaur* was brought forth by Paſiphae, wife of Minos II. king of Crete. It was ſhut up in the labyrinth of that iſland; and at laſt was killed by Theſeus.

Servius gives us the explication of this fable. He ſays that a ſecretary of king Minos, named Taurus, *bull*, had an intrigue with the queen Paſiphae, in the chamber of Dædalus; and that ſhe was at length delivered of twins, one of which reſembled Minos, and the other Taurus. This occaſioned the production to be reputed monſtrous.

MINOVERY, formed of the French *main-auvre*, q. d. *handy-work*, a treſpaſs committed in the FOREST, by ſomething that is a man's handy-work; as an engine to catch deer, &c.

MINOW, or MINIM, in *Ichthyology*, a name given by the Engliſh to the ſmall fiſh, called by authors the phoxinus. According to the new Artedian ſyſtem, this is a ſpecies of the CYPRINUS; and the *cyprinus phoxinus* of Linnæus, with the dorſal fin, conſiſting of eight rays, a brown ſpot on the tail, and a pellucid body. The lateral line of this fiſh is of a golden colour; the back flat, and of a deep olive; the ſides and belly vary much in different fiſh; in a few they are of a rich crimſon, in others bluiſh, and in others white; the body is ſlender and ſmooth, the ſcales being extremely ſmall; the tail is forked, and marked near the baſe with a duſky ſpot; the whole length ſeldom exceeds three inches. The *minow* is found in ſhoals in many of our ſmall gravelly ſtreams. Pennant.

MINSTER, Saxon, *mynſter*, or *myndſter*, anciently ſignified the church of a monaſtery, or convent.

MINSTREL, an ancient term for a fidler, or player on any other kind of muſical inſtrument.

Borel derives the word from *manus* and *hiſtrio*, one who diverts with the hand; or from *minor hiſtrio*, *little buffoon*: Du Cange from *miniſtellus*, a diminutive of *miniſter*, becauſe the *minſtrels* were anciently ranked among the lower officers, miniſters, or ſervants.

According to Dr. Percy in his Eſſay on the Ancient Engliſh *Minſtrels*, the word is derived from the French *menestrier*; and was not in uſe here before the Norman conqueſt: and it is remarkable, that our old monkiſh hiſtorians do not uſe the word *citharœdus*, *cantator*, or the like, to expreſs a *minſtrel* in Latin; but either *mimus*, *hiſtrio*, *joculator*, or ſome other word that implies geſture. Hence it ſhould ſeem that the *minſtrels* ſet off their ſinging by mimickry or action; or according to Dr. Brown's hypotheſis, united the powers of melody, poem, and dance. Theſe *minſtrels* were probably the genuine ſucceſſors of the ancient bards, who joined the arts of poetry and muſic, and ſung verſes to the harp of their own compoſing. After the converſion of the Saxons to Chriſtianity, the poets and *minſtrels* became two ſeparate profeſſions: and the latter continued to be a diſtinct order of men, and got their livelihood by ſinging verſes to the harp, at the houſes of the great: where they were hoſpitably and reſpectfully received, retaining many of the honours ſhewn to their predeceſſors the Bards and Scalds. And though ſome of them only recited the compoſitions of others, many of them ſtill compoſed ſongs themſelves, and all of them could probably invent a few ſtanzas on occaſion. There are two remarkable facts in hiſtory, which prove that the profeſſion of a *minſtrel* was held in great reverence among the Saxon tribes, as well as among their Daniſh brethren. In the year 878, when king Alfred wiſhed to learn the true ſituation of the Daniſh army, which had invaded his realm, he aſſumed the dreſs and character of a *minſtrel*, *fingens ſe joculatorem*, *aſſumpta citharâ*, &c. and under this character, though he could not but be known to be a Saxon, obtained an honourable reception. About ſixty years after, a Daniſh king made uſe of the ſame diſguiſe to explore the camp of our king Athelſtan. The *minſtrel* was, therefore, a privileged character with both theſe people: and ſo late as the reign of Edw. II. the *minſtrels* were eaſily admitted into the royal preſence; an inſtance of which is mentioned by Stow, Survey of Lond. 1703, p. 469. In the fourth year of Richard II. John of Gaunt erected at Tutbury, in Staffordſhire, a court of *minſtrels*, with full power to receive ſuit and ſervice from the men of this profeſſion within five neighbouring counties, to enact laws and determine their controverſies, &c. for which they had a charter. See Plot's Hiſt. Staff. p. 435, &c. The *minſtrels* continued down to the reign of Elizabeth; in whoſe time, however, they had loſt much of their dignity, and were ſinking into contempt and neglect; yet ſtill they ſuſtained a character far ſuperior to any thing we can conceive at preſent of old ballads. Towards the end of the ſixteenth century this claſs of men loſt all credit, and were ſunk ſo low in the public opinion, that in the thirty-ninth year of Elizabeth, a ſtatute was paſſed, by which *minſtrels*, wandering abroad, were included among rogues, vagabonds, and ſturdy beggars, and were adjudged to be puniſhed as ſuch. This act ſeems to have put an end to the profeſſion, for after this time they are no longer mentioned. Judge Blackſtone obſerves, that in ſome manors, the copyholders were bound to perform many ſervile offices for the lord, who found them meat and drink, and ſometimes, (as is ſtill the uſe in the highlands of Scotland) a *minſtrel* or piper for their diverſion. Comm. b. ii. p. 96.

MINT, the place where the king's money is coined.

Anciently there were *mints* in moſt cities of England. The chief *mint*, at preſent, is the Tower of London.

MINT, *officers of the*, are, 1. The *warden*, who is the chief, and is to receive the the bullion, and overſee all the other officers. This officer has, for himſelf and a clerk, 450*l.* a year. 2. The *maſter-worker*, with an annual ſalary for himſelf and three clerks, of 650*l.* who receives the bullion from the warden, cauſes it to be melted, and delivered to the moniers; and takes it from them [illegible]

when coined. 3. *Comptroller*, with a falary, for himſelf and clerk, of 350*l.* a year, who is to ſee, that the money be made to the juſt aſſize, and to overſee the officers. 4. The *aſſay-maſter*, who weighs the ſilver and gold, and ſees whether it be STANDARD. See REMEDY. This officer has, for himſelf and clerk, 225*l.* a-year. 5. The two *auditors*, who take all the accounts. 6. The *ſurveyor of the melting*, who is to ſee the ſilver caſt out, and that it be not altered after it is delivered to the melter, i. e. after the aſſay-maſter has made a trial of it. 7. The *clerk of the irons*, who is to ſee that the irons be clean, and fit to work with. Theſe two offices are united in one perſon, who has, for himſelf and clerk, 132*l.* 10*s.* a year, and alſo a deputy. 8. The *chief engraver*, who engraves the dies and ſtamps, for the coinage of money, who has a ſalary of 200*l.* a year: there is alſo a *ſecond engraver*, with 80*l.* a year, and aſſiſtant. 9. The *melters*, who melt the bullion before it comes to coining. 10. The *blanchers*, who anneal, or boil and cleanſe the money. 11. The *porter* and *aſſiſtkeeper*, who keep the gate, &c. of the *mint*. 12. The *provoſt* of the *mint*, at 100*l.* a-year, who provides for all the moniers, and overſees them. And, laſtly, the *company of moniers*, each of whom has 40*l.* a-year; ſome of which ſhear the money, ſome forge it, ſome ſtamp or coin it, and ſome round and mill it. To this office, there are alſo the *weigher* and *teller*, who, for himſelf and clerk, has a ſalary of 142*l.* 10*s.* a year; his deputy; king's clerk and clerk of the paper, with 100*l.* a year, and his deputy; *ſurveyor of the money-preſſes*, at 40*l.* a year; *ſolicitor*, at 60*l.* a year; warden's deputy, maſter's deputy, comptroller's deputy, and ſubordinate clerks. See COINAGE.

MINT was alſo a pretended place of privilege, in Southwark, near the King's Bench, put down by ſtatute. If any perſons, within the limits of the *Mint*, ſhall obſtruct any officer in the ſerving of any writ or proceſs, &c. or aſſault any perſon therein, ſo as he receive any bodily hurt, the offender ſhall be guilty of felony, and be tranſported to the plantations &c. Stat. 9 Geo. I.

MINT, *mentha*, in *Botany*, a genus of the *didynamia gymnoſpermia* claſs. Its characters are theſe: it has a lip-flower of one petal; the mouth is cut into four almoſt equal ſegments, the upper being a little larger and indented; it has four erect ſtamina, the two neareſt being the longeſt; in the bottom of the tube is ſituated a four-pointed germen, which turns to four naked ſeeds, ſitting in the empalement. Miller enumerates eighteen and Linnæus ſixteen ſpecies.

All the ſorts of *mint*, of which we have ſeveral propagated in gardens for medicinal uſe, are to be propagated by parting the roots in ſpring, or planting cuttings in any of the ſummer months, but they muſt have a moiſt ſoil; and if the weather proves dry, they will require very frequent waterings, after they are firſt planted. They ſhould be planted in beds of four feet width, with walks two feet wide between them, and ſhould be ſet at five inches diſtance. And they ſpread ſo faſt at the roots that the beds ſhould never ſtand above three years before they are taken up and tranſplanted; for the roots after this time will mat and clog together, ſo as to choak one another.

Many people are fond of *mint*-ſallad early in the ſpring; the way to propagate this, is to take up ſome roots of *mint* before Chriſtmas, and plant them pretty cloſe upon a moderate hot bed, covering them an inch deep with freſh earth; the beds muſt then be covered either with mats, or frames and glaſſes, and in a month's time the *mint* will come up and will ſoon be fit for uſe.

When *mint* is cut for drying, it ſhould be done juſt when it is in flower, and muſt always be done in a dry day; for if cut in wet weather, the leaves will change black. It ſhould then be tied in ſmall bunches, and hung in a ſhady place upon lines.

If the ſoil be good, *mint* will afford three crops every ſpring; but after July, they ſeldom are ſo good, ſo that the ſhoots made after that time ſhould be ſuffered to remain till the end of September, to be cut for drying. After this cutting there ſhould be about an inch of freſh earth ſifted over them, which will make them ſhoot much better the following ſpring. Miller.

No plant grows ſo vigorouſly and readily in water as *mint*; and therefore none is ſo proper for trying experiments in vegetation.

Spear-mint is a name commonly given to the narrow-leaved ſpiked *mint*; this herb has a ſtrong, agreeable, aromatic ſmell, and a bitteriſh, roughiſh, moderately warm taſte. It is in general uſe as a reſtringent, ſtomachic, and carminative; in vomitings and weakneſs of the ſtomach, there are, perhaps, few ſimples of equal efficacy. The leaves are ſometimes taken in ſubſtance, beaten with thrice their weight of fine ſugar into a conferve. By diſtillation, a pound and a half of the dry leaves communicate a ſtrong impregnation to a gallon of water, yielding the common ſimple *mint*-water of the ſhops; which is occaſionally made ſtill richer in the virtue of the *mint*, by ſteeping in it, for three or four hours, in a warm place, a freſh quantity of the herb, as half an ounce to a pint: the diſtilled water proves rather more elegant if drawn from the freſh than from the dry plant. Along with the aqueous fluid an eſſential oil diſtils, called the eſſential oil of *mint*, of a pale yellowiſh colour, changing by age to a reddiſh, and at length to a dark red; in quantity near an ounce from ten pounds of the freſh herb in flower, ſmelling and taſting ſtrongly of the *mint*, but ſomewhat leſs agreeable than the herb itſelf. The officinal ſpirituous water of *mint* is prepared by drawing off a gallon of proof ſpirit from a pound and a half of the dried leaves, which will be ſtrongly impregnated with *mint*.

The *water-mint*, with leaves ſomewhat oval ſet on pedicles and long ſtamina ſtanding out from the flowers, and the *hairy water-mint*, with long hairy leaves, having no pedicles, and broad ſpikes of flowers, grow wild in moiſt meadows, marſhes, and on the brinks of rivers, and flower towards the end of ſummer. Theſe are leſs agreeable in ſmell than the *ſpear-mint*, and in taſte bitterer and more pungent. They yield a much ſmaller proportion of eſſential oil; but partake of the virtues of *ſpear-mint*, in an inferior degree. The *hairy water-mint* is ſuppoſed to be the *auricularia* or ear-wort, celebrated by Marloe for the cure of deafneſs; though probably not more effectual againſt that complaint than the other *water-mint* againſt nephritic ones, in which it is ſaid to have been formerly an empirical ſecret.

Pepper-mint is a ſpecies of *mint* with acuminated leaves, on very ſhort pedicles, and the flowers ſet in ſhort thick ſpikes or heads. It is a native of this kingdom, and raiſed plentifully in gardens, for medicinal purpoſes.—This ſpecies has a more penetrating ſmell than any of the other *mints*; and a much ſtronger and warmer taſte. It is a medicine of great importance in ſtubborn colics, hyſteric depreſſions, and other ſimilar complaints. In diſtillation with water, it yields a conſiderable quantity of eſſential oil, of a pale greeniſh yellow colour, which becomes darker coloured by age, very light, ſubtile, and poſſeſſing in a high degree the ſpecific ſmell and penetrating pungency of the *pepper-mint*. A ſimple and a ſpirituous diſtilled water, drawn in the ſame proportions as thoſe of *ſpear-mint*, and the eſſential oil, are kept in the ſhops. Lewis's Mat. Med.

MINT, *corymbiferous*, in *Botany*, a name given by ſome to a ſpecies of TANSY.

MINT, *cat's*, the Engliſh name of a genus of plants, called by botanical writers *cataria*. See CATMINT.

MINTERS, or MONIERS. See MONEYERS and MINT.

MINTING is ſometimes uſed for the COINING of money.

MINUARTIA, in *Botany*, a genus of the *triandria trigynia* claſs. Its characters are, that it has a five-leaved calyx, no corolla, and the fruit is a ſingle-celled three-valved capſule containing ſeeds. There are three ſpecies.

MINUET, or MENUET, in *Muſic*, a compoſition anſwering to a kind of dance of the ſame name, ſaid to be invented in Poictou; the motion whereof is triple, with three crotchets in a bar $\frac{3}{4}$, though it is commonly perſormed in the time $\frac{3}{2}$. It has commonly two ſtrains, each played twice over; the firſt has four or eight bars; the laſt note of which ſhould be either the *dominant* or *mediant* of the mode, never the final; and the ſecond has eight bars, it uſually ends on the final of the mode, with a pointed minim or whole bar.

The word is ſaid to be derived from the French *menu*, *little*, and ſignifying a ſmall pace.

MINUS, in *Algebra*. See CHARACTERS in *Arithmetic*.

MINUS, *quo*, in *Law*. See QUO *minus*.

MINUSCULÆ, in *Printing*, denote the ſmall or running letters; as contradiſtinguiſhed from *majuſculæ*, or capitals.

MINUTE, from the Latin *minutus*, *ſmall*, in *Geography* and *Aſtronomy*, is the ſixtieth part of a degree.

In which ſenſe *minute* is alſo called *prime*, or *prime-minute*.

The diviſions of degrees are fractions, whoſe denominators increaſe in a ſexageſcuple ratio; that is, a *minute* or prime is $= \frac{1}{60}$; a ſecond, or ſecond *minute*, $= \frac{1}{3600}$, &c.

In aſtronomical tables, &c. *minutes* are expreſſed by acute accents, thus, '; the ſeconds by two, ''; the thirds by three, '''.

MINUTE, in *Computation of Time*, is uſed for the ſixtieth part of an hour.

MINUTE, in *Architecture*, uſually denotes the ſixtieth, ſometimes only the thirtieth part, or diviſion, of a MODULE.

MINUTE

MINUTE is alſo uſed to ſignify a ſhort memoir, or ſketch of any thing haſtily taken in writing.

In this ſenſe we ſay the *minutes* of the proceedings of the houſe of lords, &c.

MINUTES *of emerſion*. See EMERSION.

MINUTES, *meridional*. See MERIDIONAL.

MINUTE *tithes*, *minores decimæ*, ſmall tithes of wool, lambs, pigs, butter, cheeſe, &c. See TITHE.

MINX, in *Zoology*, is the name of an animal in North America, very much reſembling the OTTER.

MIPARTY, *chamber of*. See CHAMBER.

MIQUELETS, a kind of foot-ſoldiers, inhabiting the Pyrenean mountains; armed with piſtols under their belts, a carbine, and a dagger. The *miquelets* are dangerous people for travellers to meet.

MIRABILE, *rete*. See RETE.

MIRABILIS, in *Botany*. See MARVEL *of Peru*.

MIRABILIS *aqua*. See WATER.

MIRABOLANS, or MYROBALANS, in *Pharmacy*. See MYROBALANS.

MIRACLE, in a popular ſenſe, is a *prodigy*, or an extraordinary event, that ſurpriſes us by its novelty.

MIRACLE, in a more accurate and philoſophical ſenſe, is an effect that does not follow from any of the regular laws of nature; or which is inconſiſtent with ſome known law thereof; or contrary to the ſettled conſtitution and courſe of things: accordingly all *miracles* preſuppoſe an eſtabliſhed ſyſtem of nature, within the limits of which they operate, and with the order of which they diſagree.

Spinoza denies, that any power can ſuperſede that of nature; or that any thing can diſturb, or interrupt, the order of things: and accordingly defines a *miracle* to be a rare event, happening in conſequence of ſome laws that are unknown to us.

Divines define a *miracle*, an extraordinary and wonderful effect, above the power of nature, wrought by God, to manifeſt his power or providence; or to give credit to ſome meſſenger ſent from himſelf. Thus Jeſus Chriſt evinced the truth of his miſſion, and his doctrine, by *miracles*; and thus alſo did Moſes. But there are ſcarce any theological writers, that preciſely agree in their definition of a *miracle*. Mr. Locke defines it to be a ſenſible operation, which, being above the comprehenſion of the ſpectator, is, in his opinion, contrary to the courſe of nature, and taken by him to be divine. Dr. Clarke's definition of a *miracle*, in the theological ſenſe of the word, is this: that it is a work effected in a manner unuſual, or different from the common and regular method of Providence, by the interpoſition either of God himſelf or of ſome intelligent agent ſuperior to man, for the proof or evidence of ſome particular doctrine, or in atteſtation to the authority of ſome particular perſon. According to Dr. Sykes, a *miracle* is a deſigned effect, ſenſible, unuſual in itſelf, beyond the art and power of man to do. Dr. Chandler ſays, that a *miracle* is an action done, or an operation viſibly performed by any being, which is really and truly above the reach, natural power, and capacity of that being who does it, of himſelf, and without the aſſiſtance of ſome ſuperior agent to perform. With this Dr. Hutcheſon's definition nearly coincides, viz. that it is a work far exceeding human power, yet performed by the command, or upon the volition of a man. And the ſame writer farther obſerves, that, though *miracles* may prove the ſuperintendency of a voluntary agent, and that the univerſe is not guided by neceſſity or fate; yet that mind muſt be weak and inadvertent, who needs them to confirm the belief of a wiſe and good Deity; ſince the deviation from general laws, unleſs upon very extraordinary occaſions, muſt be a preſumption of inconſtancy and weakneſs rather than of a ſteady wiſdom and power; and muſt weaken the beſt arguments we have for the ſagacity and power of the univerſal mind. Inquiry into the original of the ideas of beauty, &c.

A late ingenious and learned writer objects to all thoſe definitions of *miracles*, which repreſent them as effects unuſual, above human power, and manifeſting the interpoſition of ſuperior power: becauſe, he ſays, the term unuſual does not diſtinguiſh real *miracles* from many things which are not miraculous ſuch as the rare and uncommon appearances of nature: nor does the calling a *miracle* and effect above human power diſtinguiſh it from all other effects equally above human power, produced by ſuperior beings, when acting within their uſual ſphere, which for that reaſon, cannot be miraculous. Beſides, as this definition comprehends many things, which are not miraculous, and to which no perſons apply the term; ſo it excludes many things which are allowed by all to be proper *miracles*. For there ſeems to be a difference between effects above human power, or which argue a higher degree of power; and effects which argue a power barely different from human, and in no manner ſuperior to it. According to this definition, beaſts and birds may work *miracles*; for they do many things that are above the power of man. Moreover, this definition, inſtead of deſcribing *miracles* by the nature of the works themſelves, deſcribes them by their author, and the degree of power neceſſary to their performance. To which it may be added, that works, which argue only a power more than human, can be no abſolute proofs of a divine interpoſition: and farther, the laſt part of the definition, manifeſting the interpoſition of ſuperior power, is ſuperfluous; becauſe it is only ſaying effects above human power muſt be produced by a power above it.

This writer conſiders the contrariety or conformity of the event itſelf to thoſe laws by which the world is governed in the courſe of God's general providence, as the only circumſtance which denominates and conſtitutes it a proper *miracle* or not: and, therefore, before we can pronounce with certainty any effect to be a true *miracle*, it is neceſſary, (and nothing more is neceſſary than) that the common courſe of nature be in ſome degree firſt underſtood. *Miracles*, in this view, are not impoſſible to the power of God, nor neceſſarily repugnant to our ideas of his wiſdom and immutability. Neither do they imply any inconſiſtency in the divine conduct, or a defect or diſturbance of the laws of nature: ſo that in the general idea of *miracles*, conſidered as variations from the common courſe of nature, there is nothing that can furniſh a certain univerſal proof againſt their exiſtence; and there is a power ſuperior to nature, which is ever able, and which in certain circumſtances may reaſonably over-rule what was at firſt eſtabliſhed. The writer, now cited, farther maintains, that *miracles* are neither the effects of natural cauſes, nor of ſuperior created intelligences, acting from themſelves alone; but that they are always to be aſcribed to a divine interpoſition; i.e. that they are never wrought, but either immediately by God himſelf, or by ſuch other beings as he commiſſions and empowers to perform them. In proof of this propoſition, he alledges, that the ſame arguments which prove the exiſtence of ſuperior created intelligences, do much more ſtrongly conclude againſt their acting out of their proper ſphere. Farther, the ſuppoſition of the power of any created agents to work *miracles* of themſelves, in this lower world, is contradicted by the obſervation and experience of all ages: there being, in *fact*, no proper evidence of the truth of any *miracles*, but ſuch as may be fitly aſcribed to the deity. Moreover, the laws of nature being ordained by God and eſſential to the order and happineſs of the world, it is impoſſible God ſhould delegate to any of his creatures a power of working *miracles*, by which thoſe divine eſtabliſhments may be ſuperſeded and controlled. Beſides, the aſcribing to any ſuperior beings, God excepted, and thoſe immediately commiſſioned by him, the power of working *miracles*, ſubverts the foundation of natural piety, and is a fruitful ſource of idolatry and ſuperſtition. It is farther urged, that if *miracles* were performed in favour of falſe doctrines, mankind would be expoſed to frequent and unavoidable deluſion: and, if they may be performed without a divine permiſſion, and in ſupport of falſhood, they cannot be credentials of a divine miſſion, and criterions of truth. So that, upon the whole, if ſuperior beings really poſſeſs the miraculous powers which ſome writers have aſcribed to them, the exerciſe of thoſe powers, by good and evil agents, would either expoſe mankind to neceſſary and invincible error, or entirely deſtroy the credit and uſe of *miracles*, under the idea of criterions of truth and authentic credentials of a divine miſſion. If we appeal to the evidence of revelation, on this ſubject, we ſhall find, that the view which the ſcripture gives us of good angels, of the devil and his angels, as alſo of the ſouls of departed men, is inconſiſtent with their liberty of working *miracles*: and the view which the ſacred writers give us of the gods of paganiſm is alſo abſolutely inconſiſtent with their poſſeſſing a power of working *miracles*. Nevertheleſs, it has been much diſputed, how far it may be in the power of the devil to work *miracles*? or wherein the ſpecific difference lies between the *miracles* of Moſes, and thoſe of Pharaoh's magicians? thoſe of Jeſus Chriſt and the apoſtles, and thoſe of Simon Magus and Apollonius Tyaneus? Whether the latter were any more than mere deluſions of the ſenſes; or whether any ſupernatural and diabolical power concurred with them? See MAGICIAN: under which article it is ſhewn, that the magicians, diviners, and ſorcerers of antiquity, who pretended, by the aſſiſtance of the heathen deities, &c. to foretel future events, or to work *miracles*, are branded in ſcripture as mere impoſtors, incapable of ſupporting their pretenſions by any works or predictions beyond human

human power or skill. The ſcripture likewiſe reproaches the pretences to inſpiration and *miracles*, made by falſe prophets, in ſupport of error and idolatry, as the foſe effects of human craft and impoſture. And, therefore, ſince angels, whether good or evil, the ſpirits of departed men, the heathen deities, magicians, and falſe prophets, are the only agents, who have ever been conceived as capable of working *miracles*, either in oppoſition to God, or without an immediate commiſſion from him; and the ſcripture denies to all theſe the power of performing any *miracles*, it does in effect deny, that any ſingle *miracle* has ever been performed without the immediate interpoſition of God. It is likewiſe alledged, that the ſcriptures repreſent the one true God, as the ſole creator and ſovereign of the world, which he governs by fixed and invariable laws; that to him they appropriate all *miracles*, and that they urge them as demonſtrations of his divinity and ſole dominion over nature, in oppoſition to the claims of all other ſuperior beings. The ſcriptures alſo uniformly repreſent all *miracles*, as being, in themſelves, an abſolute demonſtration of the miſſion and doctrine of the prophets, at whoſe inſtance they are performed; and never directs us to regard their doctrines as a teſt of the *miracles* being the effect of a divine interpoſition. Accordingly, the *miracles* of Chriſt, in particular, were a demonſtration (not a partial and conditional, but a complete and abſolute demonſtration) of his miſſion from God: and they were farther deſigned to evince his peculiar character as the Meſſiah or anointed; i. e. his regal commiſſion and power, or his right by divine deſignation to dominion and judicature over mankind. And it may be obſerved, with reſpect to all the *miracles* of the New Teſtament, that their divinity, conſidered in themſelves, is always either expreſſly aſſerted, or manifeſtly implied; and they are accordingly urged as a deciſive and abſolute proof of the divinity of the doctrine and teſtimony of their performers, without ever taking into conſideration the nature of the doctrine, or of the teſtimony to be confirmed. It is alſo ſhewn, that the ſcriptures have not recorded any influences of real *miracles* performed by the devil; in anſwer to the objections drawn from the caſe of the magicians in Egypt, from the appearance of Samuel, after his decaſe, to Saul, which was either the work of human impoſture or a divine *miracle*, and from our Saviour's temptation in the wilderneſs, which the writer, to whom we now refer, conſiders as a divine viſion. *Miracles* conſidered as the peculiar works of God, afford a divine teſtimony to the perſon on whoſe account they are wrought, and to that doctrine or meſſage, which he delivers in the name of God. And this proof from *miracles* of the divine commiſſion, and doctrine of a prophet, is in itſelf deciſive and abſolute. It is alſo the moſt natural and agreeable to the common ſenſe of mankind in all ages. It is the moſt eaſy and compendious proof of a new revelation. *Miracles* are farther a very powerful method of conviction, making a ſtrong impreſſion upon the heart, at the ſame time that they carry light to the underſtanding. Nor is the neceſſity of *miracles* leſs evident than their propriety and advantage, in atteſting a divine commiſſion and propagating a new revelation. They alſo ſerve to revive and confirm the principles of natural religion, and to recover men from thoſe two oppoite extremes of atheiſm and idolatry. Finally, the evidence of *miracles*, whether of power or knowledge, is the fitteſt to accompany a ſtanding revelation; becauſe it is not confined to one age or nation, but may be extended over the whole globe, and conveyed to the moſt diſtant generations. On the nature and deſign of *miracles*, already illuſtrated in this article, ſee Farmer's Diſſertation on *Miracles*, &c. 8vo. 1771. paſſim.

On the other hand, Dr. Clarke, who allows that *miracles* may be wrought by other agents beſides the Deity, obſerves, that it cannot certainly be diſtinguiſhed, by the *miracle* itſelf, whether any extraordinary interpoſition of ſome power ſuperior to men be the immediate interpoſition of God himſelf, or of ſome good angel, or of ſome evil angel. The only poſſible ways, ſays this learned writer, by which a ſpectator may certainly and infallibly diſtinguiſh whether *miracles* be indeed the works either immediately of God himſelf, or of ſome good angel employed by him; and conſequently the doctrine witneſſed by the *miracles* be infallibly true and divinely atteſted: or whether, on the contrary, the *miracles* be the works of evil ſpirits, and conſequently the doctrine a fraud and impoſition upon men, are theſe: if the doctrine atteſted by *miracles* be in itſelf impious, or manifeſtly tending to promote vice; then, without all queſtion, the *miracles*, how great ſoever they may appear to us, are neither wrought by God himſelf, nor by his commiſſion. If the doctrine, atteſted by *miracles*, be in itſelf indifferent, or ſuch as cannot, by the light of nature and right reaſon alone, be certainly known whether it be true or falſe; and, at the ſame time, in oppoſition to it, and in proof of the direct contrary doctrine, there be wrought other *miracles*, more and greater than the former, or at leaſt attended with ſuch circumſtances as evidently ſhew the power by which theſe latter are wrought to be ſuperior to the power that produced the former; then that doctrine, which is atteſted by the ſuperior power, muſt neceſſarily be believed to be divine. This, he apprehends, was the caſe of Moſes, and the Egyptian MAGICIANS. If, in the laſt place, the doctrine atteſted by *miracles* be ſuch as, in its own nature and conſequences, tends to promote the honour and glory of God, and the practice of univerſal righteouſneſs among men; and yet nevertheleſs be not in itſelf demonſtrable, nor could, without revelation, have been diſcovered to be actually true; and there is no pretence of more or greater *miracles*, on the oppoſite ſide to contradict it; which is the caſe of the doctrine and *miracles* of Chriſt; then the *miracles* are unqueſtionably divine, and the doctrine muſt, without all controverſy, be acknowledged as an immediate and infallible revelation from God. In order to elviate the objection, that we prove in a circle the doctrine by the *miracles*, and the *miracles* by the doctrine; he adds, that the *miracles*, in this way of reaſoning, are not at all proved by the doctrine; but only the poſſibility and the good tendency, or at leaſt the indifferency of the doctrine, are a neceſſary condition or circumſtance, without which the doctrine is not capable of being proved by any *miracles*. The doctrine muſt be in itſelf poſſible and capable of being proved, and then *miracles* will prove it to be actually true and certainly true. Boyle's Lecture, Sermons, &c. p. 226, &c.

The Romans attribute *miracles* to their emperors Adrian and Veſpaſian. The church of Rome abounds in *miracles*: if we believe their writers, ſome of their monks have wrought more *miracles* than all the apoſtles; and this without any viſible neceſſity for them.

As full as that church pretends to be of ſaints, it is a rule with them, that none are ever canonized till there be good proof of his having wrought *miracles*. So that were all thoſe allowed good *miracles*, and to have happened out of the common order of nature, they are ſo numerous, one would be tempted to think there was no order or law of nature at all.

Some proteſtant writers have maintained, that the power of working *miracles* was exerciſed in the Chriſtian church, during the three or four firſt centuries; in proof of which they alledge that of the THUNDERING *legion*, &c. But Dr. Middleton, in his Free Inquiry into the miraculous Powers, which are ſaid to have ſubſiſted in the Chriſtian Church, &c. has maintained a very different opinion. And it muſt be acknowledged, that the evidence of the facts is, to ſay the leaſt of it, very doubtful.

The many and ſtupendous *miracles*, which are ſaid to have been wrought by the Chriſtian miſſionaries, who were ſent to convert the barbarous nations, in the eighth century, have loſt, in our times, the credit they obtained in former ages.

St. Auguſtine is a ſtrong advocate for *miracles*. He mentions ſeveral, whereof he was an eye-witneſs; and others, whereof he was informed by thoſe that were. In the ſingle city of Hippo, he tells us there were ſeventy *miracles* wrought in the ſpace of two years, on the building a chapel in honour of St. Stephen. There are thoſe, however, who ſet aſide the authority of all *miracles*; thinking it unbecoming the wiſdom of God to eſtabliſh ſuch laws, as that he ſhould find it frequently neceſſary to ſuperſede. And as the former, from the avowed authority of ſome *miracles*, fetch an argument for the truth of all, pleading thoſe which are allowed as well as thoſe which are queſtioned; ſo theſe alledge the falſe ones, very unfairly, as concluſions againſt all.

MIRACLE, *chemical*. See MAGNESIA.

MIRALETUS, in *Ichthyology*, a name given by Bellonius, and ſome other writers, to the ſpecies of ray, commonly called by others *raja oculata*. This is accurately diſtinguiſhed, by Artedi, by the name of the ray with a ſmooth back and belly, and with a row of ſpines round the eyes, and three other rows of them on the tail.

MIRE *drum*, or MIRE *ſnipe*. See BITTERN, and HERON.

MIRROR, a *ſpeculum*, or body, which exhibits the images of objects preſented to it by reflection.

The uſe of *mirrors* is very ancient. Mention is made of brazen *mirrors*, or looking-glaſſes, in Exodus xxxviii. 8. where Moſes is ſaid to have made a *brazen laver*, or baſon, *of the looking-glaſſes of the women continually aſſembled at the door of the tabernacle*. It is true ſome modern

commentators will not allow the *mirrors* themſelves to have been braſs; but of glaſs, only ſet or framed in braſs. But the moſt learned among the rabbins do all allow, that in thoſe times the *mirrors* made uſe of by the Hebrew women in dreſſing their heads were of metal; and that the devout women, mentioned in this paſſage, made preſents to Moſes of all their *mirrors*, to make the brazen laver. See the Jeſuit Bonfrerius's comment on this text. See GLASS.

It might likewiſe be proved, that the ancient Greeks made uſe of brazen *mirrors*, from divers paſſages among the ancient poets.

MIRROR, in the more confined ſenſe of the word, is peculiarly uſed to ſignify a ſmooth ſurface of glaſs, tinned and quickſilvered on the back-ſide; which exhibits the images of objects oppoſed thereto. See LOOKING-GLASS.

MIRROR, in *Catoptics*, denotes any poliſhed body impervious to the rays of light, and which of conſequence reflects them equally.

Thus water in a deep well or river, and ſmooth poliſhed metals, are ranked among the number of *mirrors*.

In this ſenſe, the doctrine of *mirrors* makes the ſubject of CATOPTRICS.

The doctrine of MIRRORS *is founded on the following general principles.* 1. Light reflected from any *mirror*, or ſpeculum, makes the angle of incidence equal to that of reflection; which ſee demonſtrated under the word REFLECTION.

Hence, a ray of light, as H B, *(Tab.* II. *Optics, fig.* 26. N° 2.) falling perpendicularly on the ſurface of a ſpeculum D E, will be reflected back upon itſelf: as we find by experience it actually is.

From the ſame point of a *mirror*, therefore, B, there cannot be ſeveral rays reflected on the ſame point; ſince, in that caſe, all the angles of incidence muſt be equal to the ſame angle of reflection C B G, and therefore to each other; which is abſurd. Nor can the ray A B be reflected to two or more points; ſince, in that caſe, all the angles of reflection would be equal to the ſame angle of incidence A B F: which is likewiſe abſurd.

2. From every point of a *mirror*, are reflected rays thrown on it from every point of a radiant object. Since then rays coming from different parts of the ſame object, and ſtriking on the ſame point of the *mirror*, cannot be reflected back to the ſame point; the rays which flow from different points of the ſame radiating object are again ſeparated after reflection: ſo that each point ſhews whence it came.

Hence it is, that the rays reflected from *mirrors* exhibit the objects to view. Hence alſo, it appears, that rough uneven bodies muſt reflect the light in ſuch manner as that rays coming from different points will be blended or thrown confuſedly together.

Mirrors may be divided into *plane*, *concave*, *convex*, *cylindrical*, *conical*, *parabolical*, and *elliptical*.

MIRRORS, *plane*, are thoſe which have a plane or flat ſurface.

Theſe, by a popular name, we call *looking-gloſſes*.

For the manner of making plane *mirrors*, or ſpecula, ſee LOOKING-GLASS.

MIRRORS, *laws and phenomena of plane.* 1. In a plane *mirror*, every point of an object, as A, *(Tab* IV. *Optics, fig.* 65.) is ſeen in the interſection B, of the cathetus of incidence A B, with the reflected ray C B.

Let C D and F E be two reflected rays, correſponding to the incident rays A D, A E: then, ſince the vertical angle C D G = E D B; and the angle of reflection C D H = A D G the angle of incidence, A D H will be = C D G = E D B. And H E F = D E B, and H E F = A E G, therefore D E B = A E G. But A E G + A D E, as well as B E D + B D E, are leſs than two right angles; conſequently the reflected rays F E and C D meet in B, and in the equiangular triangles A D E and D E B, having D E common, D B = D A. Wherefore, ſince the angle B D G = C D H = A D G, the angles at G will be equal, and conſequently A B perpendicular to H G; i. e. A B is the cathetus of incidence: and, therefore, the reflected rays F E and C D meet with the cathetus of incidence A B in the ſame point B: and the radiant point A is ſeen in B.

Hence, 1. as all the reflected rays meet with the cathetus of incidence in B; by whatever reflected ray the radiant point A be ſeen, it will ſtill appear in the ſame place. Conſequently, any number of perſons, viewing the ſame object in the ſame *mirror*, will all ſee it in the ſame place behind the *mirror*. And hence it is, that the ſame object has only one image, and that we do not ſee it double with both eyes.

Hence, alſo, the diſtance of the image B, from the eye C, is compounded of the ray of incidence A D, and the reflected ray C D: and the object A radiates reflectedly in the ſame manner as it would do directly, were it removed into the place of the image.

2. The image of a radiant point, B, appears juſt ſo far behind a plane *mirror*, as the radiant point is before it: becauſe A G = B G.

Hence, if the *mirror* H G be placed horizontally, the point A will ſeem ſo much below the horizon, as it is really elevated above it: conſequently, erect objects will appear as if inverted; and therefore men ſtanding on their feet, as if on their heads. Or, if the *mirror* be faſtened to the ceiling of a room, parallel to the horizon, objects on the floor will appear above the ceiling as much as they really are below it, and inverted.

3. In a plane *mirror*, the images are perfectly ſimilar, and equal to the objects; for every point of the object is ſeen in the catheti of incidence, and the *mirror* biſects that part of it which is intercepted between the radiant point and its image. And hence the uſe of *mirrors* as looking-glaſſes.

4. In a plane *mirror*, things on the right hand appear as on the left; and *vice verſa*.

Hence, alſo, we have a method of meaſuring any inacceſſible altitude, by means of a plane *mirror*. Thus, the *mirror* being placed horizontally in C, *(fig.* 66.) retire from it till ſuch time as the top of the tree be ſeen therein. Meaſure the height of the eye D E, the diſtance of the ſtation from the point of reflection E C, and the diſtance of the foot of the tree from the ſame: then to E C, C B, and E D, find a fourth proportional A B. This is the altitude ſought.

5. If a plane *mirror* A E *(fig.* 67.) be inclined to the horizon E H, in an angle of 45 degrees, an object C B perpendicular to it will appear parallel I K, and the horizontal object I B perpendicular in M K.

For produce B C till it meets the *mirror* in A: then as H is a right angle, and E = 45°, A will be = 45°: therefore, if from B be drawn B G perpendicular to the *mirror* A E, A B G will be = 45°; and A G = G B. Let G K be = G B, and the image of B will be in K: draw K A, and becauſe K G = G A and G a right angle, K will be = 45°, and therefore K A parallel to E H. In the ſame manner it may be ſhewn, that the point C would appear in I, and conſequently the image I K will be parallel to the horizon E H; and *vice verſa*. Hence, the eye being placed beneath the *mirror*, the earth will appear perpendicularly over it; or if placed over it, the earth will appear perpendicularly under it. Hence, alſo, a globe, deſcending down a plane a little inclined, may, by means of a *mirror*, be exhibited as mounting up a vertical plane, to the great ſurprize of ſuch as are unacquainted with catoptrics. And hence we have a method of repreſenting ourſelves as if flying: for a *mirror* inclined to the horizon under an angle of 45°, we have obſerved, will repreſent vertical objects as if horizontal; conſequently, a large *mirror* being ſo diſpoſed, as you advance towards it, you will ſeem to move horizontally; and nothing will be wanting to the appearance of flying, but to ſtrike out the arms and legs. It muſt be added, however, that as the floor is elevated along with you, your feet will ſtill be ſeen to walk as along a vertical plane. To deceive the eye entirely, therefore, it muſt be kept from the feet.

6. If the object A B *(fig.* 68.) be parallel to the ſpeculum C D, and equally diſtant from it, with the eye; the reflecting line C D will be half the length of the object A B.

Let the eye O be in the object A B, or let the ſpectator view himſelf in a glaſs. Since A B is parallel to C D, the image G H will be parallel to it likewiſe.—From O let fall O L perpendicular to C D, which, continued to I, will be alſo perpendicular to G H; therefore, O L and O I will be the reſpective altitudes of the triangles O C D and O G H, which triangles, having the angles $n = o$ and $u = y$ are ſimilar: conſequently, C D : G H :: O L : O I: and as O L = ½ O I by art. 2 above, C D will be = ½ G H = ½ A B.

And hence, to be able to ſee the whole body in a plane *mirror*, its height and breadth muſt be half your height and breadth. Conſequently, the height and breadth of any object to be ſeen in a *mirror* being given, we have alſo the height and breadth of the *mirror* wherein the whole object will appear, at the ſame diſtance with the eye.

Hence alſo, as the length and breadth of the reflecting part of the ſpeculum are ſubduple of thoſe of the object to be reflected; the reflecting part of the *mirror* is to the ſurface reflected in a ſubquadruple ratio. Conſequently, the reflecting portion being a conſtant quantity, if in any place you ſee the whole body in a *mirror*, you will ſee it in every other place, whether you approach nearer or recede farther from it.

7. If an object A B *(fig.* 69. N° 2.) be parallel to the *mirror*

EF; the length of the reflected line AB is to the reflecting part of the ſpeculum CD as the ſum of the incident and reflected rays BD + DO to the reflected ray OD; or, as the ſum of the diſtances of the eye and of the object from the ſpeculum, viz. OI + BF to the diſtance of the eye OI. For GE : CD :: OE : OD; i. e. becauſe GE = AB, and DE = DB, AB : CD :: OD + DB : OD. Moreover, OE : OD :: OK : OI, therefore GE : CD :: OK : OI; conſequently, ſince IK = FE = BF, and GE = AB, we ſhall have AB : CD :: OI + BF : OI.

8. A ſpectator will ſee his own image as far beyond the ſpeculum as he is before it; and as he moves to or from the ſpeculum, his image will, at the ſame time, move towards or from him on the other ſide, but apparently with a double velocity, becauſe the two motions are equal and contrary. In like manner, if while the ſpectator is at reſt, an object be in motion, its image behind the ſpeculum will be ſeen to move at the ſame rate. And if the ſpectator moves, the images of objects that are at reſt will appear to approach or recede from him, after the ſame manner as when he moves towards real objects.

9. If ſeveral *mirrors*, or ſeveral fragments or pieces of a *mirror*, be all diſpoſed in the ſame place, they will only exhibit an object once.

10. If two plane *mirrors*, or ſpecula, meet in any angle, the eye, placed within that angle, will ſee the image of an object placed within the ſame, as often repeated as there may be catheti drawn determining the places of the images, and terminated without the angle.

Hence, as the more catheti, terminated without the angle, may be drawn as the angle is more acute; the acuter the angle, the more numerous the images. Thus Z. Traber found, at an angle of one third of a circle, the image was repreſented twice, at ½ thrice, at ⅓ five times, and at ⅙ eleven times.

Farther, if the *mirrors* be placed upright, and ſo contracted; or if you retire from them, or approach to them, till the images reflected by them coaleſce, or run into one, they will appear monſtrouſly diſtorted: thus, if they be at an angle ſomewhat greater than a right one, the image of your face will appear with only one eye; if the angle be leſs than a right one, you will ſee three eyes, two noſes, two mouths, &c. At an angle ſtill leſs, the body will have two heads. At an angle ſomewhat greater than a right one, at the diſtance of four feet, the body will be headleſs, &c. Again, if the *mirrors* be placed, the one parallel to the horizon, the other inclined to it, or declined from it, it is eaſy to perceive, that the images will be ſtill more romantic. Thus, one being declined from the horizon to an angle of 144 degrees, and the other inclined to it, a man ſees himſelf ſtanding with his head to another's feet.

Hence it appears, how *mirrors* may be managed in gardens, &c. ſo as to convert the images of thoſe near them into monſters of various kinds; and ſince glaſs *mirrors* will reflect the image of a lucid object twice or thrice, if a candle, &c. be placed in the angle between two *mirrors*, it will be multiplied an infinite number of times.

On theſe principles are founded various catoptric machines, ſome of which repreſent objects infinitely multiplied and diſtorted; others infinitely magnified, and ſet at vaſt diſtances.

MIRRORS, *burning*. See BURNING-*glaſs*.

MIRRORS, *convex*, are thoſe whoſe ſurface is convex.

Note, by *convex* ſurfaces, authors generally mean ſuch as are ſpherically convex.

Manner of preparing or making convex ſpecula, or MIRRORS. There are various methods uſed by divers artiſts; particularly as to the matter or compoſition for the ſilvering. One of the beſt that is known, is given us by Wolfius thus:

Melt one part of tin, another of biſmuth, together; and to the melted maſs add two parts of mercury: as ſoon as the mercury begins to evaporate into ſmoke (which it preſently does), the whole compoſt is to be thrown into cold water, and when well cooled, the water decanted off. The mixture is then to be ſtrained through a linen cloth two or three-fold; and what is thus ſeparated, poured into the cavity of a glaſs ſphere: this ſphere is to be turned gently round its axis till the whole ſurface is covered, the reſt being reſerved for future uſe.

If the ſpheres were of coloured glaſs, the *mirror* will be ſo too. And in the ſame manner may conic, elliptic, cylindric, and other *mirrors*, be made.

How they may be made of metal, ſee under *concave* MIRROR. See alſo SPECULUM.

MIRRORS, *laws or phænomena of convex*. 1. In a ſpherical convex *mirror*, HCI (*fig.* 70.) the reflected ray EM concurs with the cathetus of incidence DL, and the incident ray DN with the cathetus of reflection EL, between the tangent AB, and the center L. For the perpendiculars, or catheti of incidence, obliquation, and reflection, are in the plane of reflection, and, therefore, in the plane which touches the ſpeculum in the point of incidence C; the tangent AC makes a right angle with the cathetus of obliquation FC; but the reflected ray EC or CM, makes with it an acute angle *x*, and, therefore, falls between the tangent AC, and the cathetus of obliquation CL. Wherefore, ſince CL and DL meet in the center L, the reflected ray EM ought to interſect the cathetus of incidence DL between the tangent and the center. In the ſame manner it is ſhewn, that the incident ray DN ought to meet with the cathetus of reflection between the tangent and the center. Hence, the image of a radiant point appears between the center and the tangent, becauſe it appears in the concourſe of the reflected ray and catheti of incidence.

2. In a ſpherical convex *mirror*, the cathetus of incidence DL (*fig.* 70.) is to DP, the diſtance of the object from the tangent at the point of reflection C, as LM, the diſtance of the image from the center, is to MP, the diſtance of the image from the tangent. Since $a = x$, and $x = m$, q will be equal to m, and, therefore, the right line CP biſecting the angle DCM, cuts the baſe DM into two parts, which are in the ſame proportion with the ſides; conſequently, DP : PM :: DC : CM; and if DF be drawn parallel to CM, a will be $= p$, and, as $a = q$, $p = q$, and DF = DC. Therefore, ſince DF (DC) : MC :: DL : ML, DL will be to ML :: DP : PM; and, therefore, DL : DP :: ML : PM. Hence, becauſe DL > DP, and ML > PM; and, therefore, ML much greater than RM, the diſtance of the image from the center is greater, but from the tangent leſs than half the ſemidiameter; and the image is nearer to the tangent than the center.

Hence, alſo, the diſtance of the object from the tangent is greater than that of the image; and, conſequently, the object is farther diſtant from the ſpeculum than the image.

3. If the arch BD (*fig.* 71.) intercepted between the point of incidence D, and the cathetus AB; or the angle C, formed in the center of the *mirror* by the cathetus of incidence AC, and that of obliquation FC, be double the angle of incidence, the image E will appear on the ſurface of the ſpeculum.

4. If the arch intercepted between the point of incidence, and the cathetus; or the angle C, formed in the center of the *mirror* by the catheti of incidence, and the cathetus of obliquation be more than double the angle of incidence, the image will be without the *mirror*.

5. If the arch intercepted between the point of incidence, and the cathetus; or the angle, formed in the center of the *mirror* by the catheti of incidence, and that of obliquation, be leſs than double the angle of incidence, the image will appear within the ſpeculum.

6. In a convex *mirror*, a remoter point A (*fig.* 72.) is reflected from a point F, nearer the eye O, than any nearer point B in the ſame cathetus of incidence.

Hence, if the point of the object A be reflected from the point of the *mirror* F, and the point of the object B, from the point of the *mirror* E; all the intermediate points between A and B will be reflected from the intermediate points of the ſpeculum between F and E; and, conſequently, FE will be the line that reflects AB.

Hence, alſo, a point of the cathetus B ſeems at a greater diſtance CB from the center C, than a more remote one, A.

7. A nearer point B (*fig.* 73.) not in the ſame cathetus with a remoter H, is reflected to the eye O, from a nearer point of the ſpeculum, than the remoter H.

Hence, if the point of an object A be reflected from the point of a *mirror* C, and the point of the object B, from the point of the ſpeculum D, all upon the ſame point O; all the intermediate points between A and B will be reflected from all the intermediate points between C and D. Conſequently, the image FG of the object BA is contained between the cathetus BE and AE.

8. In a ſpherical convex *mirror*, the image is leſs than the object.

And hence the uſe of ſuch *mirrors*, in the art of painting, where objects are to be repreſented leſs than the life.

9. In a convex *mirror*, the more remote the object, the leſs its image; and, again, the ſmaller the *mirror*, the leſs the image.

10. In a convex *mirror*, the right hand is turned to the left, and the left to the right; and magnitudes perpendicular to the *mirror* appear inverted.

11. The image of a right line, perpendicular to the *mirror*, is a right line; but that of a right line either oblique to the *mirror*, or parallel thereto, is convex.

12. Rays reflected from a convex *mirror* diverge more than if reflected from a plane *mirror*.

Hence light, by being reflected from a ſpherical *mirror*,

is weakened; and, consequently, the effects of reflected light are weaker than those of direct. Hence also, myopes see remote objects more distinctly in a convex *mirror*, than they do directly.

Rays reflected from a convex *mirror* of a smaller sphere diverge more than those reflected from a larger. Consequently, the light is more weakened, and its effects are less considerable in the former case than the latter.

MIRRORS, *concave*, are those whose surface is concave. These are generally made of a mixed metal.

Note, by *concave*, authors commonly mean *spherically concave*.

MIRRORS, *manner of preparing or making concave*. First, a mould is to be provided for casting them. In order to this, take clay well dried, pulverize and sift it, mix it up with water, and then strain or filtre it; with this, work up horse-dung, and hair shred small, till the mass be sufficiently tough; to which, on occasion, may be added charcoal-dust, or brick-dust, well sifted.

Two coarse moulds are then prepared of a gritty stone, the one concave, the other convex; which are to be ground by one another with wet sand between, till such times as the one perfectly fits the other. By this means a perfect spherical figure is acquired.

The mass, prepared before, is now to be extended on a table, by means of a wooden roller, till it be of a thickness proper for the *mirror*; and then being strewed with brick-dust to prevent its sticking, it is laid over the convex mould, and so gets the figure of the *mirror*. When this is dry, it is covered with another lay of the same mass; which once dried, both the covers, or segments of the clay, are taken off. The innermost of the two being laid aside, the stone mould is anointed with a pigment prepared of chalk and milk, and the outer cover again put over it.

Lastly, the joining being covered over with the same clay wherein the cover is formed, the whole mould is bound together with iron wire, and two holes are cut through the cover, the one for the melted matter of the *mirror* to be poured through, the other for the air to escape at, to prevent the *mirror's* being spoiled with bubbles.

The mould being thus prepared, eight parts of copper, one of English tin, and five of bismuth, are melted together; a little of the mixture is taken out with a ladle, and, if it be too red, when cold, more tin is put in; if too white, more copper: the mass in then poured into the mould before prepared, and so assumes the figure of a *mirror*.

Some with ten parts of copper mix four of English tin, and a little antimony and sal ammoniac, stirring the mass about as long as any fumes arise in it: others have other compositions, many of which are described by Schottus and Zahnius.

The *mirror*, being thus cast, is cemented to a wooden frame, and thus worked to and fro over the convex stone mould, first with water and sand, and, lastly, without sand, till it be fit for polishing; the stone mould is then covered with paper, and that is smeared over with tripoli dust, and cake of tin, over which the *mirror* is worked to and fro till it has got a perfect polish. And in the same manner are glass *mirrors* polished, excepting that the convex surface is there worked in the concave mould.

When the *mirrors* are very large, they are fixed on a table, and first ground with a gritty stone, then with pumice, then with fine sand, by means of a glass cemented to a wooden frame; and, lastly, they are rubbed with cake of tin, and tripoli dust, on a wet leather.

For concave *mirrors* of glass, the mould is usually made of alabaster; the rest is as in metal *mirrors*. See SPECULUM, GRINDING, and POLISHING.

MIRRORS, *laws and phenomena of concave*. 1. If a ray, as KI (*fig.* 74.) fall on a concave *mirror* EI, under an inclination of 60 degrees, and parallel to the axis AB, the reflected ray IB will concur with the axis AB in the pole of the glass B. Since $m=60°$, n also will be $=60°$, and because KI is parallel to the axis AB, $i=60°$, and $s=60°$; therefore CB=CI, the radius. Consequently the point B, in which the reflected ray IB concurs with the axis, is in the surface of the speculum. If the inclination of the incident ray be less than 60 degrees, as that of EI, the reflected ray EF will concur with the axis at the distance BF, which is less than a fourth part of the diameter. Since $i=s$, and, on account of the parallels HE and AB, $s=y$, we shall have $x=y$, and, therefore, FE=FC; but CF+EF>EC, and CE=CB; therefore CF+EF>CB; consequently CF>FB; i. e. FB is less than half the radius CB, or a fourth part of the diameter. And, universally, the distance of the point F, wherein the ray HE concurs with the axis, from the center C, is to half the radius CD in the ratio of the whole sine, to the cosine of inclination. For by the last demonstration it appears, that FE is $=$ FC; therefore if from F a perpendicular FD be let fall on EC, DC will be $=\frac{1}{2}$CE; but if CF be taken for the whole sine, CD will be the sine of the angle DFC, or the cosine of the angle DCF, i. e. of the inclination DEH; and, therefore, CF is to CD as the whole sine is to the cosine of the inclination.

Hence it is inferred, by calculation, that in a concave spherical *mirror*, whose breadth subtends an angle of six degrees, parallel rays meet, after reflection, in a part of the axis less than the one thousand four hundred fifty-seventh part of the radius: if the breadth of the concave *mirror* be 12, 18, 24, 30, 36 degrees; the part of the axis wherein the parallel rays meet, after reflection, is less than $\frac{1}{232}$, $\frac{1}{104}$, $\frac{1}{57}$, $\frac{1}{36}$, the radius.

And on this principle it is, that BURNING-*glasses* are formed.

For since the rays diffused through the whole surface of the concave *mirror*, after reflection, are contracted into a very small compass, the light and heat of the parallel rays must be prodigiously increased thereby; viz. in a duplicate ratio of the breadth of the *mirror*, and the diameter of the circle wherein all the rays are collected; and since the sun's rays are, as to any purposes on earth, parallel, it is no wonder that concave *mirrors* should burn with so much violence.

From this same principle is likewise deduced a method of representing the images of objects in a dark room; which see under CAMERA *obscura*.

2. A lucid body being placed in the focus F, of a concave *mirror* EI (*fig.* 74.) the rays, after reflection, become parallel. For parallel rays are by reflection united in a focus; but if the luminous body be in the focus F, that which was before the reflected ray EF will be now the incident ray, and *vice versâ*, therefore the reflected ray EH will now become parallel to the axis AB, and all the reflected rays parallel to one another.

Hence an intense light may be projected to a vast distance, by a lighted candle, &c. placed in the focus of a concave *mirror*.

Hence, also, if the parallel rays be received by another concave *mirror*, they will again concur in its focus, and burn.

Zahnius mentions an experiment of this kind made at Vienna, where two concave *mirrors*, the one six, the other three feet diameter, being placed about twenty-four feet apart, with a live coal in the focus of the one, and a match and tinder in the other, the rays of the coal lighted the tinder.

3. If a lucid body be placed between the focus F (*fig.* 75.) and the *mirror* HBC, the rays, after reflection, will diverge from the axis BA. If the lucid body were in F, the reflected ray CE would be parallel to the axis AB, and therefore it would constantly preserve the same distance from the axis. But since DCG>FCG, KCG will be > ECG; and, therefore, CK will fall beyond CE, and cannot be parallel to the axis, but must continually diverge from the axis, the distance from it increasing: whence it follows, that light is weakened by reflection.

4. If a lucid body be placed between the focus F, and the center G, as in I, the rays, after reflection, will meet in the axis beyond the center. In this case IHG < FHG, and, therefore, GHA < GHI; consequently, the reflected ray HA recedes from the parallel towards the axis, and its distance from the axis will be continually diminished, till at length it concurs with the axis. But if the lucid body be placed in A, that which was before the reflected ray AH will now become the incident ray, and *vice versâ*. If, therefore, the lucid body be placed beyond the center G, the rays after reflection will concur with the axis between the focus F and center G.

Hence, if a candle be placed in I, the image will appear in A; if it be placed in A, its image will be in I; in the intermediate points between I and A, the section of light will be a circle; and that so much the greater, as it is nearer the point of concourse.

5. If a luminous body be placed in the center of the *mirror*, all the rays will be reflected back upon themselves; for as they fall perpendicularly on the speculum, they will be reflected into themselves.

Hence, if the eye be placed in the center of a concave *mirror*, it will see nothing but itself, and that confusedly through the whole *mirror*.

6. If a ray falling from the point of the cathetus *h* (*fig.* 76.) on the convex *mirror* EF, be, together with its reflex IF, continued within the concavity of the *mirror*, FH will be the incident ray from the point of the cathetus H, and FO its reflex. For $\angle$FE=IFM; but $\angle$E=MFO, and IFM=EFH; therefore MFO=EFH; and, consequently, if HF be taken for the incident ray from the point H, FO will be the reflected rays.

Hence, since the point of the cathetus H is the image of

the point *b* in the convex *mirror*, but the point *b* the image of H in the concave; if the image of an object, reflected by a convex ſpeculum, be ſeen by a reflection made in its concavity, it will appear like the object itſelf.

And ſince the image of an infinite cathetus is leſs in a convex glaſs than one fourth of its diameter, a portion of the cathetus, leſs than a fourth part of the diameter, may appear of any magnitude required in a concave one. A point, therefore, diſtant from a concave ſpeculum leſs than one fourth of the diameter, muſt appear behind the *mirror* at any diſtance, how great ſoever.

Since then the image of any object, how broad ſoever, is contained in a convex ſpeculum, between the two lines of incidence of its extreme points; if an object be placed between the two lines, at a diſtance leſs than one fourth of its diameter, the breadth of the image, how great ſoever, may all appear.

Since then the image of an object included between two lines, at a diſtance leſs than one fourth of the diameter, may exceed the juſt height and breadth of the object; any, may be made of any magnitude, how big ſoever: objects placed between the focus and *mirror* muſt appear of enormous magnitudes in concave *mirrors*; the image being ſo much the greater in the concave *mirror*, as it is leſs in the convex.

In a convex *mirror*, the image of a remote object appears nearer the center than that of a nearer object: therefore, in a concave *mirror*, the image of an object remote from the *mirror* appears at a greater diſtance than that of a nearer object, provided the diſtance of the object from the center be leſs than a fourth part of the diameter.

In a convex ſpeculum, the image of a remote object is leſs than that of a near one: therefore, in a concave one, the image of an object placed between the focus and the *mirror*, is nearer the focus than the ſpeculum.

The image, therefore, of an object receding continually from a concave ſpeculum, becomes continually greater, provided it do not recede beyond the focus, where it becomes confuſed; and as it approaches, it grows continually leſs.

In a convex ſpeculum, if the ſphere, whereof it is a ſegment, be ſmaller, the image is ſmaller than in another of a larger ſphere: therefore in a concave, if the ſphere, whereof it is a ſegment, be ſmaller, the image will be larger than in another whoſe ſphere is larger: whence concave *mirrors*, if they be ſegments of very ſmall ſpheres, will do the office of microſcopes.

7. If an object AB (*fig.* 77.) be placed between a concave *mirror* and its focus, its image will appear behind the *mirror*, in an inverted ſituation. Let AB be the length of the object: ſince the point A is ſeen in the cathetus C*a*, and the point B in the cathetus C*b*, the higher point is ſeen in the higher place *a*, and the lower in the lower *b*; or the object appears behind the *mirror* in an erect ſituation. But if AB repreſent the breadth of the object, it appears in the ſame manner that the part to the right correſponds with the right and the left to the left, both of the object and image. However, in direct viſion the right hand part of an object correſponds to the left of the ſpectator, and the left to the right; and, therefore, in a concave ſpeculum, the parts to the left hand of an object between the focus and ſpeculum appear to the right, and the right to the left.

8. If an object AB (*fig.* 78.) be placed between the focus and the center, its image EF will appear inverted, and in the open air, beyond the center, the eye being placed beyond the center. For the rays, by which the point A is reflected, concur in the cathetus GF, beyond the center C in F, and thoſe by which the point B is reflected, concur in the cathetus DE, beyond the center C in E: therefore the point B radiates on the eye placed beyond EF as from E, and the point A as from F; conſequently B is ſeen in E, and A in F, and the image of the object is ſeen beyond the center in an inverted poſition.

9. If an object EF be placed beyond the center C, and the eye likewiſe beyond the center, the image will appear inverted in the open air, between the center and the focus.

Hence, the inverted images of objects placed beyond the center, are reflected by a concave *mirror*, erect; and may be received on a paper applied between the center and the focus, eſpecially if the room be dark: if the object EF be farther diſtant from the center than the focus, the image will be leſs than the object; becauſe AC is leſs than EC, and, therefore, AB ∠ EF.

On this principle, concave *mirrors*, eſpecially thoſe which are ſegments of large ſpheres, and are capable of reflecting entire objects, exhibit many pleaſing phænomena. Thus, if a man flouriſh his ſword againſt the *mirror*, neither comes out thereof, and meets him with the ſame motions; and the image of his head coming out of the *mirror*, if he ſtrike it with his real ſword, the imaginary ſword will ſtrike his real head. If he ſtretch out his hand, another hand will be ſtretched out of the *mirror*, and meet it at a great diſtance in the open air, &c. And on the ſame principle are conſtructed catoptric ciſtulæ, which, when looked into, exhibit images much bigger than the cheſt. See CATOPTRIC *ciſtula*.

10. The image of a right line, perpendicular to a concave *mirror*, is a right line; but all oblique or parallel lines are concave. For ſince every point of a line perpendicular to the ſpeculum is in the cathetus of incidence, its image will of courſe be a right line. But if AB (*fig.* 77.) be parallel, or oblique to the ſpeculum, and CF be drawn from the center C perpendicular to AB, CA will be greater than CD; and, therefore, as CF = CE. FD ∠ AE; conſequently the point D will appear farther behind the ſpeculum than A. Therefore ſince *c* is farther diſtant from D, than *a* from A, and *b* from B, the image *a c b* will appear concave.

MIRRORS, *cylindrical*, *conical*, *parabolical*, and *elliptical*, or ſpecula, are thoſe terminated by a ſurface reſpectively cylindrical, conical, parabolical, and ſpheroidical.

To prepare, or make, cylindrical, *conical*, *parabolical*, *elliptical*, and *hyperbolical* MIRRORS. For the *cylindrical* and *conical* ſort, if they are to be of glaſs, the method of preparing them is the ſame as that already laid down for convex *mirrors*.

If of metal, they are to be made after the manner of concave *mirrors*, only that the clay moulds there deſcribed, require other wooden ones of the figure of the *mirror*.

For *elliptical*, *parabolical*, and *hyperbolical mirrors*, the mould is to be thus prepared. On a wooden or brazen plane or table, deſcribe the figure of an elliplis, AB (*fig.* 79.) a parabola, or an hyperbola, CD (*fig.* 80.) after the manner taught under thoſe heads; which done, cut out the figure from the plane with all the accuracy imaginable.

To the elliptic figure fit an axis, as EF, with two fulcra to ſuſtain it, &c. and a handle to move it; lay a quantity of the clay, above deſcribed, under it; and turn about the axis by the handle, till the plane AB hath turned, or impreſſed the elliptical figure exactly upon it.

The axis of the parabolical or hyperbolical figure CD, is to be fixed at the vertex E in ſuch a manner as that it may always remain erect; this is to be turned about as above, till it hath given its own figure to the clay applied about it.

The part of the mould, thus formed, is to be dried, and either ſmeared over with fat, or ſprinkled with brick-duſt; then a convex mould is to be made, by putting a quantity of the ſame clay into the cavity thus formed. This latter is called the *male*, as the former the *female* mould.

The male mould, being well dried, is to be applied within the female, in ſuch manner, as only to leave the intended thickneſs of the *mirror* between them. The reſt as for concave *mirrors*.

Theſe *mirrors* are not made without the utmoſt difficulty; becauſe, if the moulds be ever ſo juſt, the figure of the *mirror* is apt to be damaged in the GRINDING. See SPECULUM.

MIRRORS, *phænomena, or properties of cylindrical*. 1. The dimenſions of objects correſponding lengthwiſe to the *mirror* are not much changed; but thoſe correſponding breadthwiſe have their figures altered, and their dimenſions leſſened ſo much the more, as they are farther from the *mirror*; whence ariſes a very great diſtortion.

2. If the plane of reflection cut the cylindric *mirror* through the axis, the reflection is performed in the ſame manner as in a plane *mirror*; if it cut it parallel to the baſe, the reflection happens in the ſame manner as in a ſpherical *mirror*; if, laſtly, it cut it obliquely, or be oblique to its baſe, the reflection is the ſame as in an elliptical *mirror*.

Hence, as the plane of reflection never paſſes through the axis of the *mirror*, except when the eye and objective line are in the ſame plane; nor parallel to the baſe, except when the radiant point and the eye are at the ſame height, the reflection, in a cylindrical *mirror*, is uſually the ſame as in an elliptical one.

3. If a hollow cylindrical *mirror* be oppoſed directly to the ſun, inſtead of a focus of a point, the rays will be reflected into a lucid line, parallel to its axis, at a diſtance ſomewhat leſs than a fourth part of its diameter. Hence ariſes a method of drawing anamorphoſes, i. e. wild, deformed figures, on a plane, which appear beautiful and well proportioned, when viewed in a cylindrical *mirror*.

MIRRORS, *for elliptic*, *parabolic*, *conic*, and *pyramidal*, we are not much acquainted with their properties: only that, in the firſt, if a ray ſtrike on it from one of its foci, it

it is reflected into the other; so that a lighted candle being placed in one, its light will be collected in the other. That the second, inasmuch as all the rays they reflect meet in one point, make the best burning-glasses of all others.

And, lastly, that wild, irregular figures, may be so drawn on a plane, as that, the eye being placed over the axis of the two last, they shall appear beautiful, and well proportioned. See ANAMORPHOSIS.

MIROUETTE, in the *Manege*, is used for a DAPPLE-*bay*.

MIS, a particle prefixed to divers words, particularly law-terms; denoting some default or defect. As, in *misprision*; *misdemeanor*, *to misdemean*; *misdoers*, *to teach omnis*, &c.

MISANTHROPY, *misanthropia*, formed of *μισεω*, *hatred*, and *ανθρωπος*, *a man*, a general dislike or aversion to man, and mankind. In which sense it stands opposed to *philanthropy*, or the love of mankind.

MISAVENTURE, or MISADVENTURE, *homicide by*, in *Law*, is where a man, doing a lawful act, without any intention of hurt, unfortunately kills another: as where a man is at work with a hatchet, and the head of it flies off and kills a standerby; or, where a person qualified to keep a gun, is shooting at a mark, and undesignedly kills a man; for the act is lawful, and the effect is merely accidental.

In the case of *misadventure*, the law presumes negligence, or at least a want of sufficient caution in him who was so unfortunate as to commit it; who, therefore, is not altogether faultless. The penalty inflicted by our laws is said by Sir Edward Coke to have been anciently no less than death; though others affirm, with greater reason, that it consisted in a forfeiture, as some say, of all the goods and chattels; according to others, of only part of them, by way of fine or weregild; which was probably disposed of, as in France, for pious uses, or for the benefit of the soul of the deceased. However the delinquent has now, and has had as early as our records will reach, a pardon, and writ of restitution of his goods as a matter of course and right, only paying for suing out the same; and, to prevent this expence, in cases where the death has notoriously happened by *misadventure*, or in self-defence, the judges will usually permit, if not direct, a general verdict of acquittal. See HOMICIDE.

Staundford distinguishes between *misadventure* and *misfortune*. The first he makes to be mere chance: as if a man, being upon or near the water, be taken with some sudden sickness, and so fall in, and be drowned; or into the fire, and be burnt.

Misfortune, according to him, is when a man comes to his death by some outward violence; as the fall of a tree, the running of a cart-wheel, the stroke of a horse, or the like.

MISCARRIAGE. See ABORTION; and for the method of preventing, see PREGNANCY.

MISCHIEF, *malicious*, or *damage*, in *Law*, is a species of injury to private property, which the law considers as a public crime. This is such as is done, not *animo furandi*, or with an intent of gaining by another's loss; but either out of a spirit of wanton cruelty, or diabolical revenge. Any damage arising from this mischievous disposition, though only a trespass at common law, is now by a multitude of statutes made penal in the highest degree. 22 Hen. VIII. c. 11. 43 *Eliz.* c. 13. 22 & 23 Car. II. c. 7. 1 Ann. stat. 2. c. 9. & 4 Geo. I. c. 12. 12 Ann. c. 18. 1 Geo. I. c. 48. 6 Geo. I. c. 23. 9 Geo. I. c. 22. See BLACK *act*. 6 Geo. II. c. 37. 10 Geo. II. c. 32. 28 Geo. II. c. 19. 6 Geo. III. c. 36 & 48. See FELONY.

MISCHNA, or MISNA, from שנה, *iteravit*, a part of the Jewish TALMUD.

The *Mischna* contains the text; and the gemara, which is the second part of the Talmud, contains the commentaries; so that the Gemara is, as it were, a glossary on the *Mischna*.

The *Mischna* consists of various traditions of the Jews, and of explanations of several passages of scripture: these traditions, serving as an explication of the written law, and supplement to it, are said to have been delivered to Moses during the time of his abode on the Mount; which he afterwards communicated to Aaron, Eleazer, and his servant Joshua. By these they were transmitted to the seventy elders, by them to the prophets, who communicated them to the men of the great sanhedrim, from whom the wise men of Jerusalem and Babylon received them. According to Prideaux's account, they passed from Jeremiah to Baruch, from him to Ezra, and from Ezra to the men of the great synagogue, the last of whom was Simon the Just; who delivered them to Antigonus of Socho; and from him they came down in regular succession to Simeon, who took our Saviour in his arms; Gamaliel, at whose feet Paul was educated, and last of all to Rabbi Judah the Holy, who committed them to writing in the *Mischna*. But Dr. Prideaux rejecting this Jewish fiction, observes, that after the death of Simon the Just, about two hundred and ninety-two years before Christ, the *Misphetical* doctors arose, who, by their comments and conclusions, added to the number of those traditions, which had been received and allowed by Ezra, and the men of the great synagogue; so that towards the middle of the second century, after Christ, under the empire of Antoninus Pius, it was found necessary to commit these traditions to writing; more especially as their country had considerably suffered under Adrian, and many of their schools had been dissolved, and their learned men cut off; and, therefore, the usual method of preserving their traditions had failed. Rabbi Judah, on this occasion, being rector of the school at Tiberias, and president of the sanhedrim in that place, undertook the work, and compiled it in six books, each consisting of several tracts, which altogether make up the number of sixty-three. Prid. Connect. vol. ii. p. 408, &c. ed. 9. This learned author computes that the *Mischna* was composed about the 150th year of our Lord; but Dr. Lightfoot says, that Rabbi Judah compiled the *Mischna* about the year of Christ 190, in the latter end of the reign of Commodus; or, as some compute, in the year of Christ 220. Dr. Lardner is of opinion that this work could not have been finished before the year 190, or later. Collect. of Jewish and Heathen Testimonies, &c. vol. i. p. 178. Thus the book called the *Mischna* was formed; a book which the Jews have generally received with the greatest veneration. The original has been published, with a Latin translation, by Surenhusius, with notes of his own, and others from the learned Maimonides, &c. in 6 vols. fol. Amstelod. A. D. 1698—1703. See TALMUD.

It is written in a much purer style, and is not near so full of dreams and visions as the GEMARA.

MISCONTINUANCE, in *Law*, the same with DISCONTINUANCE.

MISDEMEANOUR, an offence, or fault, particularly when in the execution of an office.

A crime, or *misdemeanour*, says judge Blackstone, is an act committed, or omitted, in violation of a public law, either forbidding or commanding it. This general definition comprehends both CRIMES and *misdemeanours*; which, properly speaking, are mere synonymous terms: though, in common usage, the word *crimes* is made to denote such offences as are of a deeper and more atrocious dye; while smaller faults, and omissions of less consequence, are comprized under the gentler name of *misdemeanours* only.

High crimes and misdemeanours denote offences of a heinous nature, next to high treason.

MISE, a French term, literally denoting expence, or disbursement: it is used in our law-books in divers acceptions. Sometimes for the profits of lands; sometimes for taxes, or tallages; and sometimes for expences, or costs: as, *pro misis & custagiis*, for costs and charges in the entries of judgments, &c.

MISE more peculiarly denotes an honorary gift, or customary present, where with the people of Wales used to salute every new king and prince of Wales, at their entrance upon the principality.

Anciently, the *mise* was given in cattle, wine, corn, &c. for the support of the prince's family; but when that dominion was annexed to the English crown, the gift was changed into money. The county of Flint paid two thousand marks, &c. for their *mise*.

The county of Chester also a *mise* or tribute of five thousand marks at the change of every owner of the said earldom, for enjoying the privileges of that palatinate. At Chester they have a *mise*-book, wherein every town and village in the county is rated what to pay towards the *mise*.

MISE is also used in speaking of a writ of right. What in other actions is called an *issue*, in a writ of right is called a *mise* or *mese*. So that *to join the mise upon the mere*, is as much as to say, to join issue on the meer right; i. e. to join upon this point, whether has the more right, the tenant or demandant.

Yet even in a writ of right, if a collateral point be tried, it is there called an *issue*, not a *mise*.

MISE is also sometimes used corruptly for *mease*, a messuage or tenement.

In some manors, a *mise* or *mease* place is taken for such a messuage or tenement as yields the lord an heriot at the death of the tenant.

MISEN, MIZEN, or MIZEN, in a *Ship*, denotes either the mast, or sail of that name; but at sea, they always mean the sail when the word *mizen* is used.

This is the hindmost of the fixed sails of a ship, extended sometimes by a gaff, and sometimes by a yard, which crosses the mast obliquely; the fore-end reaching almost

down to the deck, and the after-end being peeked up as high above the middle of the yard, where it is attached to the mast. The figure of the *mizen* is a trapezium, or parallelogram, one of whose corners is cut off by a diagonal, extended from one of its sides to the opposite corner, which becomes the peek of the *mizen*. Some great ships require two *mizens*; in which case that next the main-mast is called the *main-mizen*, and that next the poop the *bonaventure-mizen*.

The use of the *mizen* is, to keep the ship close to a wind; wherefore if a ship is apt too gripe too much, they use no *mizen*. But it is often used when a ship rides at anchor, to back her a-stern; so that she may not foul her anchor, on the turning of the tide; and sometimes a ship lies a-try with her *mizen* only.

MIZEN-*mast* is the mast upon which the *mizen* and its top-sail and slay-sails are supported, besides other sails, which are set occasionally, as the driver, ring-tail, &c. See *Talk. Ship. fig.* 1. *n.* 1. 13. 19. and MAST.

MIZEN, *change the*, is an order to bring the *mizen-yard* over to the other side of the mast. *Peak the mizen*, i. e. put the *mizen* right up and down the mast.

MIZEN, *sit to*, at Sea, the word of command to fit the *mizen-sail* right as it should stand. *Spell the mizen*, i. e. let go the sheet, and peek it up.

MIZEN-*sloop*, in a *Ship*. See STAY.

MIZEN-*yard*, in a *Ship*. See YARD.

MISERERE, *have mercy*, the name, and first word, of one of the penitential psalms; being that commonly given by the ordinary to such condemned malefactors as are allowed the benefit of the clergy: whence it is also called the *psalm of mercy*.

MISERERE *mei*, denotes a kind of COLIC, or disorder of the intestines, wherein the excrements, instead of passing off the common way, are often thrown up by the mouth. The *miserere mei* is the same with what we otherwise call *volvulus*, and ILIAC *passion*.

MISERICORDIA, *mercy*, in *Law*, an arbitrary amerciament, or punishment imposed on any person for an offence.

Where the plaintiff or defendant in any action is amerced, the entry is always *eat in misericordia*.

It is thus called, according to Fitzherbert, because it ought to be but small, and less than the offence, according to the tenor of Magna Charta.

Mulcta levior sit dicta, quæ levissima imponitur misericordia; gravissima enim mulctas hinc trahunt, miserissimas, redemptiones. See FINE, and REDEMPTION.

Hence, if a man be unreasonably amerced in a court not of record, as a court-baron, &c. there is a writ called *monstravit misericordia*, directed to the lord, or his bailiff, commanding them to take moderate amerciaments.

MISERICORDIA *communis*, is when a fine is set on the whole county, or hundred.

MISERICORDIA *in ebis & potu*, in our *Old Writers*, is used for any gratuitous portion of meat and drink, given to the religious in convents beyond their ordinary allowance. Matt. Paris. And in some convents they had a stated allowance of these over-commons upon extraordinary days, which were called *misericordiæ regulares*.

MISFEASANCE, in *Law*, a misdeed or trespass. Whence also *misfeasor*, a trespasser.

MISGUM, in *Ichthyology*, the name of a fish of the anguilliform kind, but broader and flatter than the eel, and of much the same size from the head to the tail; it has five black lines, one on the back, two, which are somewhat broader, in the middle of the sides, and two others, which are narrower lower down; these are all extended from the head to the tail; the intermediate spaces, and the belly, are of a somewhat bluish white, dotted with black spots; the fins are also spotted in the same manner; the mouth is small and round, like that of the lamprey, and is surrounded with beards, six on the upper jaw, and four on the under; and there are two other very slender ones near the nostrils; the eyes are small; the gills four on a side; and beside the back-fin there are four, two near the gills, and two lower on the body. This is a common fish about the German shores, and is esteemed a very delicate one at the table; it lays its spawn in March, and is in best season for eating in January and February. It is caught principally in standing and muddy waters; and it is said, that when out of water, it makes a sort of hissing noise.

MISKERING, *misberving*. See ARISHERING.

MISLETOE. See MISTLETOE.

MISNA. See MISCHNA.

MISNOMER, compounded of *mis*, which in composition signifies *amiss*, and *nomer*, *to name*, in *Law*, a wrong name, or the using of one name for another.

A *misnomer* sometimes one of the principal pleas in ABATEMENT.

MISPRISION, derived from the old French *mespris*, a *neglect* or *contempt*, in *Law*, signifies a neglect or overlight, and is generally used to denote all such high offences as are under the degree of capital, but nearly bordering upon them.

Misprisions are generally divided into two sorts; negative, which consist in the concealment of something which ought to be revealed; and positive, which consist in the commission of something which ought not to be done.

MISPRISION *of clerks*, is a neglect of clerks, in writing, or keeping records.

By the *misprision of clerks*, no process shall be annulled, or discontinued. And justices of assize shall amend the defaults of clerks mis-spelling of a syllable, or letter, in writing.

MISPRISION *of felony*, which is the concealment of a felony which a man knows, but never assented to, is punishable, in a public officer, by fine at. Westm. 1. 3 Ed. I. c. 9 with imprisonment for a year and a day; in a common person, with imprisonment for a less discretionary time; and in both with fine and ransom at the king's pleasure, declared by the judges in his courts of justice. Justices of the common pleas have a power to assess any amerciaments upon persons offending by *misprisions*, contempts, or neglects, for not doing, or misdoing, any thing, in or concerning fines.

MISPRISION *of treason*, is a negligence, in not revealing treason, where a person knows it to be committed.

It is enacted by stat. 1 & 2 Ph. & Mar. c. 10. that a bare concealment of treason shall be only held a *misprision*; which concealment becomes criminal, if the party apprised of the treason does not, as soon as conveniently may be, reveal it to some judge of assize, or justice of the peace. Besides, the statute 13 Eliz. c. 2. enacts, that those who forge foreign coin, not current in this kingdom, their aiders, abettors, and procurers, shall all be guilty of *misprision* of treason. The punishment of *misprision* of treason is loss of the profits of lands, during life, forfeiture of goods, and imprisonment during life.

MISSA. See MASS.

MISSAL, *missale*, a mass-book, containing the several masses to be used on the several days, feasts, &c.

The Roman *missal* was first compiled by pope Gelasius, and afterwards reduced into better order by pope Gregory the Great; who called it the *book of sacraments*. Each diocese, and each order of religious, have their particular *missals*, accommodated to the festivals of the province, or of the order.

MISSELTOE. See MISTLETOE.

MISSEL-*bird*, in *Ornithology*, the common English name of the larger species of thrush, called also the *throstle*, and by authors the *turdus viscivorus major*. It is much larger than any other of the thrush-kind: its legs and feet are yellow; its head of a brownish lead colour; and its back, tail, and rump, of the same colour, with an admixture of yellow; but in the summer months it a little changes its colour, and becomes more grey, or of the colour of unripe pickled olives; its throat, breast, and belly, are all variegated with black spots; the middle of its belly whitish, and the upper part of its breast, and part of its sides, and the under-feathers of its tail, yellowish; its bill is shorter and thicker than that of other thrushes, and of a dusky colour, except the base of the lower mandible, which is yellow. It usually is seen on the top branches of tall oaks, elms, and other high trees, and sings very sweetly, and is the largest bird that has any melody in its note. It begins its song, sitting on the summit of a high tree, very early in the spring; often with the new year, in blowing showery weather, whence it is called in Hampshire the storm-cock; the note of anger or fear is very harsh, between a chatter and shriek. It remains the whole year with us, flies singly, except with its female, and drives all the lesser species of thrushes from it. It is the best of all the kind for the table.

MISSEN-*mast*, or MIZEN-*mast*. See MIZEN.

MISSEN-*sail*. See MIZEN.

MISSILIA, among the Romans, a name given to largesses, thrown among the people on occasion of games and shews, such as small gold or silver coins, sweetmeats, and sometimes animals, as sheep, oxen, deer, &c. which were let loose to be carried off by the people.

The word comes from *mittere*, *to throw or let loose*.

MISSING-*wood*, a phrase used among *Bowlers*. See BOWLING.

MISSION, *missio*, among the Romans, a term used to signify the emperor's sending to rescue a wounded gladiator from his antagonist. The *munerarii*, or persons who exhibited the games, and likewise the people, used to rescue a favourite gladiator. The manner of their signifying this favour, was *pollice premsa*, or with the thumb hid in the palm of the hand. However the gladiator was only saved for that time; whereas by the RUDIS he had a free discharge.

MISSION. See EMISSION, MANUMISSION, REMISSION, and TRANSMISSION.

MISSION, in *Theology*, denotes a power or commission to preach the Gospel. Jesus Christ gave his disciples their *mission* in these words, *Go and teach all nations*, &c.

The Romanists reproach the Protestants, that their ministers have no *mission*; as not being authorised in the exercise of their ministry, either by an uninterrupted succession from the apostles, or by miracles, or by any extraordinary proof of a vocation.

Many among us deny any other *mission* necessary for the ministry, than the talents necessary to discharge it.

MISSION is also used for an establishment of people zealous for the glory of God, and the salvation of souls; who go and preach the gospel in remote countries and among infidels.

There are *missions* in the East, as well as in the West Indies. Among the Romanists, the religious orders of St. Dominic, St. Francis, St. Augustine, and the Jesuits, have *missions* in the Levant, America, &c.

The Jesuits have also *missions* in China, and all other parts of the globe, where they have been able to penetrate. The Mendicants abound in *missions*.

There have been also several protestant *missions* for diffusing the light of Christianity through the benighted regions of Asia and America. Of this kind has been the Danish *mission*, planned by Frederic IV. in 1706. And the liberality of private benefactors in our own country has been also extended to the support of *missionaries* among the Indians in America, &c.

MISSION is also the name of a congregation of priests and laymen, instituted by Vincent de Paul, and confirmed in 1632, by pope Urban VIII. under the title of *Priests of the congregation of the Mission*.

These profess to make it their whole business to assist the poor people in the country; and to this purpose they oblige themselves never to preach, or administer any of the sacraments, in any town where there is an archbishop, bishop, or provincial, residing.

The priests of the *Mission* were also intrusted with the direction and government of a female order, called *Virgins of Love*, or *Daughters of* CHARITY, whose office it was to administer assistance and relief to indigent persons, who were confined to their beds by sickness and infirmity. This order was founded by a noble virgin, whose name was Louise le Gras, and received, in the year 1660, the approbation of pope Clement IX.

They are settled in most provinces of France, Italy, Germany, and in Poland. At Paris they have a seminary which they call the *Foreign Mission*, where youth are bred up and qualified for *missions* abroad.

MISSIONARY, an ecclesiastic who devotes himself and his labours to some *mission*, either for the instruction of the orthodox, the conviction of heretics, or the conversion of infidels. See JESUITS.

MISSIVE, something sent to another. From the Latin *mitto*, *I send*.

We say *missive* letters, or letters *missive*, meaning letters sent from one to another.

In propriety, *letters missive* are letters of business, but not business of great concern; in contradistinction from letters of gallantry, letters on points of learning, dispatches, &c. See LETTERS.

MIST, a meteor, called also FOG.

The bluish *mist* which we sometimes see on our fields and pastures in a morning, though often innocent, yet has been in some places found to be the actual cause of murrain, and other fatal diseases among the horned cattle. Dr. Winklar gives, in the Philosophical Transactions, an account of a murrain affecting the cattle in Italy and other places, which was evidently seen to spread itself over the countries in form of a blue *mist*. Wherever this was perceived, the cattle were sure to come home sick; they appeared dull and heavy, and refused their food; and many of them would die in four and twenty hours. Upon dissection there were found large and corrupted spleens, sphacelous and corroded tongues; and in some places those people who were not careful of themselves in their management of their cattle, were infected and died as fast themselves. The principal cause of this disease seems to be the exhalation of some unwholesome steams from the earth; and it was observable, that there had been three earthquakes in Italy the year before it happened.

The method of cure which succeeded best, was this: as soon as any beast appeared to be sick, they examined the tongue, and if aphthæ or little blisters were found on it, they scraped it with a silver instrument made with sharp teeth at the sides, till it bled in all those parts where the aphthæ were; the blood was then wiped away with a cloth, and the whole tongue washed several times with vinegar and salt. After this the following medicine was given internally: take of soot, brimstone, gunpowder, and salt, of each equal parts: mix these in as much water as will make a mixture thin enough to be swallowed, and let a spoonful be given for a dose three or four times a day. The cattle which were in health had this medicine given them, as well as the sick; and the consequence was, that very few died in Switzerland, while almost all died in other places.

It was very remarkable that this contagion, on this occasion, seemed to travel slowly and regularly on: it came at the rate of about two German miles in twenty-four hours: this it kept regularly to during the whole time of its raging, and never appeared in very distant places at the same time.

The whole surface of the earth emitting these effluvia, no cattle escaped them in the course of their way, but those which were kept within doors at rack and manger fell ill at the same time, and in the same manner with those in the open fields.

Dr. Slare was of opinion, that it was owing to certain insects, which could not fly faster than at the rate of two German miles a day; and that they travelled regularly, and spread the mischief where they passed; but there wanted some judicious persons, versed in these observations, to have examined both the state of the air, and the beasts, on this occasion. Phil. Trans. N° 145.

MISTLETOE, MISLETOE, or MISSELTOE, *viscum*, in *Botany*, a genus of the *dioecia triandria* class: it has male and female flowers upon separate plants; the male flowers have an empalement composed of four oblong leaves, and no petals, but have four summits, which are oblong and acute pointed, fastened to the leaves of the empalement; the female flowers have an empalement of four small oval leaves sitting upon the germen, but have no petals or stamina; with an oblong three cornered germen, situated under the flower, having no style, but crowned by an obtuse stigma; the germen afterwards turns to a globular smooth berry with one cell, including a fleshy heart-shaped seed. Linnæus enumerates six species. We have but one species of this genus in Europe, which is the *mistletoe* with white berries, a plant of the parasite kind, growing, not on the ground, but on other trees, as the oak, apple-tree, pear-tree, white-thorn, ash, lime, willow, elm, &c. Miller's Gard. Dict.

Mistletoe grows to the height of about two feet. It consists of several stems, which are usually covered with a greenish, sometimes a yellowish bark, and are about the thickness of the finger, hard, woody, and divided by knots; from which spring the leaves, which grow by two and two, opposite to each other; they are oblong, thick, of a greenish or yellowish colour, veined their whole length, and rounded at the end. Its flowers grow by three and three, trefoil-wise, at the extremes of the branches: each flower is a sort of yellow calyx, one third of an inch in diameter, divided into four parts.

The fruit likewise grows by three and three, at the extremes of the branches; they are a kind of white, roundish berries, not unlike pearls, containing a flattish seed, in form of an heart, covered with a fine silvered membrane, and environed with a viscid, glutinous humour, of a whitish colour, wherein the seed naturally buds or germinates, and puts forth two eyes. From this juice it is, that the Latins denominate the plant *viscum*. The fruit grows on different branches from the flowers. The uncommon sort whereon the *mistletoe* grows has occasioned abundance of fabulous notions, both as to its production and virtues.

Pliny, and most naturalists, relate, that thrushes, being exceeding fond of the berries of the *mistletoe*, swallow them, and cast them out again on the branches of trees where they use to perch; and, by this means, give occasion to a new production of *mistletoe*. Hence that proverb, *Turdus sibi cacat malum*; the *viscum* being sometimes used as bird-lime. By cracking the berries, also, with their bills, or claws, they are supposed to let out the viscous juice, which facilitates their sticking.

It has been formerly supposed that the *mistletoe* was produced as a sort of excrescence from the tree on which it is found; but time and experiments have shewn, that it is raised like other plants from seeds. Its berries are of a viscous nature, and sticking to the beaks of birds that eat them, they may be rubbed off against the branches of other trees, and there take root and grow; but this is not necessary for their propagation, for the great numbers of plants of it, usually found on the same trees, seem to prove very plainly, that it is produced by the falling of its seeds, like all other plants, but that the matrix for these is not earth, but the branches of a living tree.

The trees on which *mistletoe* is principally found, are the apple, the ash, and other smooth rinded ones, such as the white thorn, the crab, the hazle, and maple. It is very rarely found upon the oak; and though it may easily be propagated by its seeds on other trees, yet it has not been found to take readily upon the oak. However the

mistletoe,

miſſletoe of the laſt has been always accounted the beſt, which opinion, as Mr. Ray obſerves, may be owing to the ſuperſtitious honour paid by the ancient Druids to the oak.

When a berry of *miſſletoe* is cruſhed and broken againſt the bark of a tree, the viſcous matter which ſurrounds the ſeed ſoon dries away into a thick and tough ſkin, which ſurrounds the ſeed, and keeps it faſt down to the bark; but the rains frequently waſh theſe off afterwards, eſpecially when they have fallen upon the ſmoother part or the bark, or upon ſuch parts of a tree as are clean and free from moſs. And hence it is, that moſt of the *miſſletoe* we find, is either found upon the under part of the branch of a tree from whence the rain could not ſo eaſily diſlodge it, or on ſuch as have a rough bark, or are in part covered with the common tree-moſſes.

Mr. Du Hamel, determined to inveſtigate the nature of this odd plant, put ſeveral of the ſeeds of it into ſmall ſlits, which he cut in the barks of different trees, by that means to defend them from being waſhed away by rains, and theſe all ſucceeded well and ſhot, except thoſe he planted on the fig, on which he made ſeveral unſucceſsful attempts; the miſchief done to the ſeeds by the milky juice of this tree was probably the cauſe of this. It is no wonder that *miſſletoe* grows equally on all ſorts of trees, ſince there requires no more to make it grow than the effect of the rains and night dews; and this author found the ſeeds ſhooting on earthen pots and ſtones, which he kept ſhaded from the heat of the ſun; and from parallel experiments it ſhould ſeem alſo, that the tranſpiration of trees helps greatly the germination of theſe ſeeds.

The ſeeds of *miſſletoe* town, if we may ſo call it, on the bark of trees in February, begin to ſhoot in June, and at that time there are ſeen two little round bodies iſſuing out at the two angles of the triangular ſeeds; but as theſe ſeeds are ſubject to ſome irregularities in their figure, ſo they alſo are in their germination, for from the oval ſeeds there is only one ſhoot, and from thoſe which are irregularly angular, there are ſometimes four or five.

Each of theſe round bodies is faſtened to a pedicle, which has its inſertion in the fleſhy part of the ſeed, in which there is a ſort of grooves, which make it ſeem as if theſe pedicles came out of a ſort of caſe.

This ſort of germination is peculiar to *miſſletoe*, no other ſeed ſhooting out ſo many radicles.

The length of theſe radicles is in a great meaſure owing to the poſition of the ſeed on the branch of the tree, for they always grow in length till they reach the bark.

It is to be obſerved alſo, in regard to the germination of theſe ſeeds, that they are the only ones in which the radicle takes indifferently any direction, in all other ſeeds it points ever downwards only. The ſeeds of *miſſletoe* will ſhoot equally well on the upper and under ſides of a branch of a tree, and thoſe on the upper will bend their radicles downward, while thoſe on the under will ſtrike theirs directly upward with the ſame eaſe.

The radicles of *miſſletoe* are, as has been already obſerved, compoſed of a little round body, ſuſtained by a pedicle. When this pedicle has grown to ſuch a length that the round body touches the bark, it opens before into the ſhape of the trunks of flies, and other inſects, and by this means touching cloſely at all its edges, it becomes faſtened extremely firm to the tree. From this reſemblance in ſhape to the trunks of ſmall animals, M. Du Hamel calls theſe radicles the trunks of the ſeed of *miſſletoe*. The ends of theſe trunks of the radicles are alſo faſtened to the bark of the tree by a viſcous matter, which, when the trunk is gently raiſed, is drawn out into ſtrings an all ſides to ſome length.

In the inner part of this trunk, or open button, there are two ſubſtances to be diſtinguiſhed; in the centre there is a white granulated matter, and round that a greenith one; both theſe are juicy, but the outer leſs ſo than the central white part; the outer one is plainly the ſame with the outer rind of the root of the *miſſletoe*, or the ſecond bark of its trunk. Theſe both very quickly adhere to the tree, ſtriking their ſeveral granuhe into it, and theſe furniſh afterwards the roots of the *miſſletoe*. The outward bark of *miſſletoe* is thin, of a deep green, and ſomewhat rough; it is ſtronger than that which it covers; and this is not extended to the roots of the plant, but ſpreads over the bark of the tree at the bottom of the ſtalk, juſt as the feet of the corals and other ſea plants do over ſtones. The viſcous matter, by which the trunk adheres to the tree, is furniſhed from all parts of the radicle, but principally from its outer bark, and is not at all owing to the juices of the tree, ſince it is found as abundantly on thoſe radicles which have been made to adhere to ſtones, as on thoſe which have been on trees. A little time fixes theſe trunks very firmly; but it is obſervable, that though the outer bark or edge of theſe open balls adheres equally all round to the bark of the tree, the granulæ of the inner ſubſtance always direct themſelves to and inſinuate in the little cleſts or cracks of the rind of the tree. While the ſeeds of *miſſletoe* are in this ſtate, they may be tranſplanted to other places, and ſet on other trees, and ſeldom fail to thrive.

Seeds of this plant may be made to ſhoot on ſtones, and will fix their trunks to them, but here they naturally ſoon periſh; they may however be removed from theſe ſtones to the branches of trees, as ſoon as they have affixed themſelves, and being then in a ſtate of drawing nouriſhment, they will affix themſelves to the tree, and from its juices begin to thrive immediately.

It has been very naturally ſuppoſed by thoſe who thought the *miſſletoe* no perfect plant, that it had no roots, nay even thoſe who allowed it to be a perfect plant, and producible from ſeeds, yet have ſuppoſed it had no root. Malpighi, however, affirms that he plainly ſaw the root. And Tournefort countenances the ſame opinion; but neither of theſe authors hath perfectly deſcribed them.

In that part of the branch of a tree where the *miſſletoe* grows, there is always obſerved a thickneſs, and the bark is always chopped in ſeveral places; but the roots of the *miſſletoe* are by no means to be ſeen externally, being hid both by the bark of the tree, and by the expanſion of the bark of the plant itſelf at its bottom. It is neceſſary, therefore, for the diſcovery of the roots, to raiſe very nicely both the bark of the plant, and that of the tree; but the hardneſs of theſe barks, and their ſtrict attachment to the roots, make this difficult; and there is indeed no way of ſucceeding well in the attempt, but by boiling the part in water, and making nice diſſections of it before it is cold.

It has been ſuppoſed by many, that the roots of the *miſſletoe* penetrated the woody ſubſtance of the tree; but though appearances make greatly for this ſyſtem, it is by no means true in fact. The roots of the young plants, when they have penetrated through all the laminæ of the bark, and reach the wood, turn off, as the roots of plants do which meet with ſtones, &c. in their paſſage, and ſpread horizontally between the inner bark and wood, or elſe re-aſcend the bark, the looſe and juicy nature of which is much fitter for affording them nouriſhment than the hard ſubſtance of the wood.

There are alſo found always a multitude of woody excreſcenſes, like warts and wens, about the place where the *miſſletoe* grows; theſe are formed like the woody galls produced on trees by the punctures of inſects, by an extravaſation of the woody juices. Theſe make the ſwelling about that part of the branch where the *miſſletoe* grows, and, as they become woody, and ſwell about the roots, ſerve to cover them with hard wood, which they never penetrated. Theſe make it probable enough that the roots of *miſſletoe* never penetrate hard wood; but what proves it much more evidently, is, that if the branches of trees full of *miſſletoe* plants be cut and ſplit in different directions, juſt at the place of the inſertion of the plant, the ſeveral annular circles of the wood within are found perfect, regular, and in their natural ſtate, ſo far as the branch was formed at the time the *miſſletoe* took root upon it; theſe ſhew the age of the branch at that time, but above theſe there are always ſeveral other laminæ, which are what have been formed ſince the time of the *miſſletoe*'s growing there; and thoſe which have been formed out of the inner laminæ of the bark, in which the roots of *miſſletoe* had made many wounds and great extravaſations of the juices, are found, though woody, full of the roots of the plant, and are very irregular, and full of the tubera which thoſe extravaſions occaſion, by no means appearing like the annular circles of the wood formed before. The ligneous fibres in the outer, or ſince formed wood, are laid in very irregular directions, and the roots of the *miſſletoe* may be eaſily diſtinguiſhed among them by their colour.

The *miſſletoe*, as the bark in which its roots were ſpread, hardened into wood, would be in the ſtate of a tree, planted in an earth which, by degrees, petrified about it, and muſt periſh; but nature has provided for it in this caſe; for as theſe roots are impriſoned in wood, and a new bark is formed by the ſap of the tree, the trunk of the *miſſletoe* ſends out a new ſeries of roots, which ſpread through this in like manner; ſo that though a plant of *miſſletoe* has ever ſo many ſeries of its roots embodied in the hard wood, from which it can have no nouriſhment, it has alſo ſome, ſufficient for its ſupport, ſpread in its new-formed bark.

Another thing very remarkable in thoſe plants of *miſſletoe*, many of the roots of which are lodged in the hard wood, is, that the roots diffuſed through the bark have often a large tubercle at their ends, which probably is furniſhed with numerous openings for receiving the juices by which the plant is to be nouriſhed, and ſerves in the place of many roots.

There are sometimes indeed found plants of *mistletoe* which live wholly by the nourishment they receive from the wood; these are in the state of grafts of common fruit-trees; but they are rare, and it very seldom succeeds when the *mistletoe* is attempted to be propagated by the common method of grafting, though the plants of *mistletoe* may very easily be grafted, by approach, into one another.

Though this plant is evidently propagated by its seeds, yet it also propagates itself very often by suckers, and it is not uncommon to find young shoots at a finger's breadth or two from the old one. The gardeners, who value their trees, are very careful to destroy the *mistletoe* from them, and that very properly, since it is extremely obvious from what has been observed, that it robs the tree it grows on of a great deal of its nutritious juice. The common method of cutting off the plants to this purpose, is, however, by no means sufficient; for the old stock frequently pushes out new shoots, and the roots afford suckers, so that the case becomes worse than before. There is indeed no way of destroying it, but by the cutting away with it a part of the tubercle it forms on the branch where it grows.

The roots of *mistletoe*, while young, are green, very tender, and granulated, as is also the bark of the older ones; but these have a woody filament within. They are not regularly round, but are often flat, and usually adapted in their shape to the place where they are lodged; and about their insertions it is not unfrequent to see a sort of elongation of their bark, which blends itself with the bark of the tree on which they grow.

The progress of the branches of *mistletoe* is much slower than that of the roots. The first year, and often the second, is spent wholly on their part, in raising themselves into an erect posture, and very often this operation proves fatal to them.

It is a very singular circumstance in this plant, that its seeds produce singly several young plants. No other vegetable has this property. It is true, indeed, that two young barrels have been seen to rise from the same nut; but then we know very well, that nuts have frequently double kernels in the same shell; but here the seed is contained singly in a berry, and, to all examination, appears of a simple uniform structure, though it doubtless is composed according to the number of young plants it will produce, of three, four, or more perfect seeds.

When the young plant of the *mistletoe* seed has freed itself from the husk at its end, and raised itself upright, it is found terminated at the end by a sort of button, like that of other young shoots, which contain the leaves. This button stands, however unaltered all the first year, and sometimes all the second; in the spring following there appear from the button two leaves, and in the axe of these leaves there are seen two other buttons; and afterwards there issue from these buttons branches, terminated usually by two, but sometimes by three leaves. These are the produce of the third or fourth year; all the succeeding years there are new buttons formed in the axe of the leaves, and the branches from these expand themselves so regularly, that very frequently the whole shrub is of a regularly round figure.

The old leaves become yellow, and fall off, and there come no new ones in their places, so that the old stalk, and consequently the whole inner part of the plant, is naked, and the leaves are only found on the circumference growing out the young branches.

It is a remarkable observation, that every button of the *mistletoe* contains the rudiments of three young branches, and hence every knot ought to be furnished with six branches; and this would ever be the case, but that several of the young branches die either before or soon after their emerging from the button.

Mistletoe will grow on all kinds of trees; but it does not grow on all with the same strength and vigour. The pear, the apple, the white thorn, and the lime, are trees it grows on very successfully. The oak, the hazel, and the juniper, are very starving for it. Mr. Du Hamel could never make it succeed by sowing on the bark of these trees; but it has sometimes been found naturally propagated on it, though in a starving condition. It will also grow on annual plants, but on these it never can come to any height, as their stalks perishing at the approach of winter, the *mistletoe* perishes with them. Mr. Du Hamel took great pains to sow and try to raise it on the ground, and succeeded so well as to make the seeds shoot, and their radicles grow to some length; but finding no proper hold to fix themselves upon, they all perished; whence it seems that this is absolutely a parasitical shrub, and can grow no where but on some other tree. Mem. Acad. Par. 1749.

As for the virtues of *mistletoe*, it seems of the most efficacy in the epilepsy; against which some will have it a specific. Dr. Colbatch has wrote expressly to prove it such. It has been also prescribed in apoplexies, lethargies, and vertigoes; and worn about the necks of children, to prevent convulsions, and ease the cutting of their teeth. However the leaves and branches of *mistletoe*, though formerly recommended as specifics in convulsive and other nervous disorders, are now fallen into general neglect, and do not appear to have any considerable medicinal power. Half a dram or a dram of the wood or leaves in substance, or an infusion of half an ounce, the doses commonly prescribed, have no sensible effect.

The virtues ascribed to the *mistletoe* may, perhaps, be the remains of the religious honours paid it by the ancient Gauls; among whom the Druids assembled constantly on the first day of the year, went in quest thereof with hymns and other ceremonies and rejoicings, distributing it again among the people, as a thing sacred; after having first consecrated it, crying *Au gui l'an neuf*, to proclaim the new year.

This cry is still kept up at Picardy, where they add *planten*, to wish a plentiful new year.

M. Perrault observes, that the *mistletoe* is full of a disagreeable juice, which weakens the tree whereon it grows; and that the fruit has always a disagreeable taste while it sticks on it.

MISUSER, in our *Old Writers*, an abuse of any liberty or benefit: as he shall make fine for his *misuser*. Old Nat. Br. 149.

By misuser, a charter of a corporation may be forfeited; so also an office, &c.

MISY, in *Natural History*, the name of a fossile substance, used very frequently by the ancients in medicine, and supposed to be one of their now lost medicines, but erroneously; it being still very common in the Turkish dominions, and not unfrequently found in the mines at Cremnitz in Hungary. It is a considerably firm substance, though of an irregular and seemingly not compact texture, and much resembles some of our gaudy marcasites; but that it wants their hardness and their weight, and is not inflammable.

It is at present no where put to any use. The ancients esteemed it of the same nature with the CHALCITIS, but that it possessed those virtues in a more remiss degree; they had it from Ægypt and Cyprus, and used it externally in hemorrhages, and some cutaneous eruptions.

MISY, in *History*, a name given by Theophrastus, and all the old Greek writers, to a kind of truffle or subterraneum mushroom, of a very delicate flavour. The truffles of Numidia, and some other parts of Africa, were always esteemed superior to those of any other part of the world. They are called *terfes*, *cumbi*, or *lomæ*, by some later writers, and were brought to Rome, and so greatly esteemed, that no dish was ranked above them. These were called Lybian truffles by the Romans, and they seem to have been the same with the Cyrenean *misy* of the Greeks. It is to be observed, that the Greeks in general, in early times, were very little acquainted with the affairs of Africa; and all that they had from this part of the world, was said to come from Cyrene, some old cities of their forefathers being there, and keeping up a friendship and trassic with them. The *thyon*, a tree growing plentifully in almost all parts of Africa, and which is the same with the citrus of the Romans, was in this manner attributed to Cyrene, by the same Theophrastus. And thus, when speaking of truffles, he adds, that the Cyrenean *misy* surpassed all the other kinds in flavour; his words haud at large in Athenæus; and thence Pliny has taken his account, which he closes in this manner: "The thing which they call *misy*, in the province of "Cyrene, is of this kind; but it is more fleshy and of "a finer taste and smell." This is the sense of Pliny, as the text stands in our copies; but it is probable that he translated Theophrastus better than they, as least as we know that what he says is not his own, but taken from that author, we have a right to understand it in his way, and that is, that the roots of this Cyrenean *misy* have a delicate smell resembling that of meat, or fish newly cut. Pliny, lib. xix. cap. 3.

It is very certain, that this Cyrenean *misy* of the old Greeks is the same thing with the delicate African truffle or terfez of Leo Africanus, and the moderns; and Pliny had read some of the ancients who were sensible of this, and had taken from them an account that the African truffles are the finest in the world; and yet did not perceive, that these African truffles were the same with the Cyrenean *misy*, which he immediately after mentions from Theophrastus.

MITCHELLA, in *Botany*, a genus of the *tetrandria monogynia* class: with a single-petaled flower, four stigmas, and a bifid four-seeded berry. There is only one species.

MITCHELS, among *Builders*, are purbeck stones, from

fifteen inches square to two feet, squared and hewed ready for paving.

MITE, in *Natural History*, the name of a small animal, very well known and found in old cheese, and in many other bodies, both recent and petrified.

To the naked eye the *mites* in cheese appear like moving particles of duft, but the microscope discovers them to be perfect animals, having as regular a figure and performing all the functions of life as perfectly as creatures that exceed them many times in bulk. See *Tab. of Microscopical Objects, Plate* 1.

They are crustaceous animals, and are usually transparent; the principal parts of them are the head, the neck, and the body; the head is small in proportion to the body, and has a sharp snout, and a mouth that opens and shuts like a snake's: they have two small eyes, and are extremely quick-sighted; and when you have once touched them with a pin, you will easily perceive how cunningly they avoid a second touch.

They are of different sorts; for some of them have six legs, and others have eight; each leg has six joints surrounded with hairs, and two little claws at the extremity, with which it very nicely takes hold of any thing; the hinder part of the body is plump and bulky, and ends in an oval form, from which there issue out a few exceeding long hairs; other parts of the body and head are also beset with thin and long hairs.

The males and females are easily distinguished in these little animals. The females are oviparous, as the louse and spider, and from their eggs the young ones are hatched in their proper form, without having any change to undergo afterwards. They are however, when first hatched, extremely minute; and, in their growing to their full size, they cast their skins several times.

These little creatures may be kept alive many months between two concave glasses, and applied to the microscope at pleasure. They are thus often seen *in coitu*, conjoined tail to tail; and this is performed by an incredible swift motion.

Their eggs, in warm weather, hatch in twelve or fourteen days; but, in winter, they are much longer: these eggs are so small, that a regular computation shews, that ninety millions of them are not so large as a common pigeon's egg. Baker's Microscope, p. 18.

Mites are very voracious animals; they not only prey upon cheese, but on all sorts of dried flesh, fish, fruits, and seeds; and almost on all things which have some degree of moisture, without ever being wet; and they have often been seen to eat one another. Their manner of eating is by thrusting alternately one jaw forward and the other backward; and in this manner grinding their food; and after they have done feeding, they seem to chew the cud.

There are several other distinctions observable in the *mites*, which are found among different substances. Those in malt-dust and oat-meal are much smaller than the cheese-*mites*, and have more and longer hairs. The *mites* among figs resemble beetles, and have two feelers at the snout, and two very long horns over them; these have only six legs, and are more sluggish than those in malt-dust. Those found among figs have also very long hairs, and those beset at certain distances with other smaller hairs; whence Mr. Leeuwenhoek conjectures, that these longer and larger hairs are jointed at those places where the short ones are found.

There is a sort of wandering *mites*, found wherever there is any thing they can feed on; these are often found in form of a white dust, and are not suspected to be living creatures.

The *mite* is an animal very tenacious of life; it will live months without food; and Mr. Leeuwenhoek had one which lived eleven weeks on the point of a pin, on which he had fixed it for examining it by his microscope. Leeuwenhoek's Arcan. Nat. tom. ii. p. 368.

MITE, a small coin, formerly current; equal to about one third part of a farthing.

MITE also denotes a small weight used by the monicrs. It is equal to the twentieth part of a grain, and is divided into twenty-four droits.

MITELLA, in *Botany*. See SANICLE.

MITELLA, in *Surgery*, a name given to the scarf for suspending the arm when injured.

MITHRA, *feasts of*, in *Antiquity*, were feasts celebrated among the Romans in honour of *Mithra*, or the sun. The most ancient instance of this *Mithra*, among the Romans, occurs in an inscription dated in the third consulate of Trajan, or about the year of Christ, 101. This is the dedication of an altar to the sun, under the name of *Mithra, deo Soli Mithræ*. But the worship of *Mithra* was not known in Egypt and Syria in the time of Origen, who died about the year of Christ 263: though it was common at Rome for more than a century before this time. The worship of *Mithra* was proscribed at Rome in the year 378, by order of Gracchus, prefect of the prætorium. According to M. Freret, the feasts of *Mithra* were derived from Chaldea, where they had been instituted for celebrating the entrance of the sun into the sign Taurus.

MITHRAX, in *Natural History*, the name given by Pliny and the ancients, to a gem found in Persia, which when held up to the sun shewed many colours. It was probably no other than the OPAL. Hence the barbarous writers of the middle ages seem to have taken their account of the *mithridates*.

MITHRIDATE, MITHRIDATIUM, in *Pharmacy*, an antidote, or composition, in form of an ELECTUARY; serving either as a remedy, or a preservative against poisons.

Mithridate is one of the capital medicines in the apothecaries shops, being compounded of a vast number of drugs; among which are, *opium, myrrh, agaric, saffron, ginger, cinnamon, spikenard, frankincense, castor, pepper, gentian*, &c.

It is accounted a cordial, opiate, sudorific, and alexipharmic. Matthiolus says, it is more effectual against poison than Venice treacle, and much easier to be made.

It takes its name from its inventor, Mithridates, king of Pontus, who is reported to have so fortified his body against poisons, with antidotes and preservatives, that when he had a mind to dispatch himself, he could not find any poison that would take effect.

The receipt of it was found in his cabinet, written with his own hand, and was carried to Rome by Pompey. It was translated into verse by Damocrates, a famous physician, and hence called *confectio Damocratis*; and was afterwards translated by Galen, from whom we have it. It has undergone considerable alterations since the time of its royal prescriber.

MITHRIDATE *mustard*. See TREACLE *Mustard*.

MITHRIDATE, *mustard bastard*, is a species of IBERIS.

MITHRIDATES, in *Natural History*, the name of a stone found in some parts of Persia, seeming to be the same as the mithridax or mithrax.

MITHRIDAX, in *Natural History*, the name of a gem described by Solinus, to which he ascribes qualities the same with those given by Pliny to the MITHRAX; and therefore probably the same stone with it.

MITRALES *valvulæ*, MITRAL *valves*, in *Anatomy*, two valves in the HEART; thus called from their resembling the figure of a mitre.

They are placed at the orifice of the pulmonary vein, in the left ventricle of the heart. Their office is to close the orifice thereof, and to prevent the return of the blood through the pulmonary vein into the lungs again.

MITRE, MITRA, from Μιτρα, which signifies the same; a pontifical ornament, worn on the head by bishops, and certain abbots, on solemn occasions.

The *mitre* is a round cap, pointed, and cleft at top, with two pendants hanging down on the shoulders, and fringed at both ends. The bishop's is only surrounded with a fillet of gold, set with precious stones: the archbishop's issues out of a ducal CORONET. See *Tab.* III. *Heraldry, fig.* 121. These are never used otherwise than on their coats of arms. Abbots wear the *mitre* turned in profile, and bear the crosier inwards, to shew that they have no spiritual jurisdiction without their own cloisters.

The pope has also granted to some canons of cathedrals the privilege of wearing the *mitre*. The counts of Lyons are also said to have assisted at church in *mitres*.

In Germany, several great families bear the *mitre* for their crest; to shew that they are advocates, or feudatories, of ancient abbeys, or officers of bishops, &c.

The pope has four *mitres*, which are more or less rich, according to the solemnity of the feast-days they are to be worn on. The *mitre* was originally the women's headdress, as the hat was that of the men. This appears from Remulus in Virgil, who reproaches the Trojans, that they were dressed like women, and wore *mitres*.

Et tunicæ manicas, & habent redimicula mitræ.

The cardinals anciently wore *mitres*, before the hat, which was first granted them by the council of Lyons, in 1243. Authors make no mention of the *mitre* as an episcopal ornament, before the year 1000.

MITRE, in *Architecture*, is the workmen's term for an angle that is just 45 degrees, or half a right one.

If the angle be a quarter of a right angle, they call it a *half-mitre*.

To describe such angles, they have an instrument called the *mitre-square*; with this they strike *mitre-lines* on their quarters, or battens; and, for dispatch, they have a *mitre-box*, as they call it, which is made of two pieces of wood, each about an inch thick, one nailed upright on the edge of the other; the upper piece hath the *mitre-lines* struck upon it, on both sides, and a keel, to direct the saw in cutting the *mitre-joints* readily, by only applying the piece into this box.

MITRE is used by the writers of the Jewish history for a sort

of base money, which was very common there about the year 1280, and for many years before, and as many after. There were beside the *mites*, several other pieces called according to the figures impressed upon them, rotaries, hoodies, eagles, and by the like names. They were imported from France, and other countries, and were so much below the proper currency of the kingdom, that they were not worth so much as a half-penny each. They were at length decryed in the year 1300, and good coins struck in their place. These were the first Irish coins in which the sceptre was left out. They were struck in the reign of Edward, the son of our Henry the Third, and are still found among the other antiquities of that country. They have the king's head in a triangle full-faced. The penny, when well preserved, weighs twenty-two grains; the half-penny ten grains and a half.

MITRED *abbots*. See ABBOT.

MITTA, in our *Old Writers*, is an ancient Saxon measure. Its quantity is not certainly known; but it is said to be *mensura decem modiorum*, a measure of ten bushels. Domesday.

Mista or *mischa*, being besides a measure for salt and corn, is used for the place where the chaldrons were put to boil salt. *Chaldrones quoque ad sal conficiendum cum propriis fedibus mischæ vocantur.*

MITTENDARII, among the Romans, commissioners sent into the provinces by order of the *præfectus prætorii*, or captain of the guards, upon some public account, as to inspect the behaviour and management of provincial governors, and observe whatever was amiss; all which they were to lay before the prefect, who had authority to remedy such abuses.

MITTENDIS *recordo & processu*. See RECORDO.

MITTENDO *manuscriptum pedes finis*, in *Law*, a writ judicial, directed to the treasurer and chamberlains of the exchequer, to search for and transmit the foot of a fine, acknowledged before justices in eyre, into the commonpleas, &c.

MITTER *l'estate*, and *mitter le droit*. See RELEASE.

MITTIMUS, in Law, a writ by which records are ordered to be transferred from one court to another; sometimes immediately, as out of the king's bench into the exchequer; and sometimes by a certiorari into the chancery; and from thence, by a *mittimus*, into another court.

MITTIMUS is also used for a precept in writing, directed by a justice of peace to a gaoler, for the receiving and safe-keeping a felon, or other offender, by him committed to the gaol.

This is a warrant under the hand and seal of the justice, containing the cause of the commitment of the offender.

MITU, or MITU-PORANGU, in *Ornithology*, the name of a Brasilian bird of the pheasant-kind, according to Marggrave, and the generality of those who speak of it; but supposed by Mr. Ray rather to approach to the nature of the peacock or turkey-cock.

It is larger than the common English cock, and is all over the back, wings, &c. of a fine deep black; but on the belly of a partridge-brown; and has a series of fine glossy black feathers on its head, which it occasionally raises up in a sort of creft; its beak is very beautiful, broad at the base and narrow at the point, and of a fine bright red; its tail is very long, and it can at pleasure raise and expand it like the turkey. It is very easily tamed, and loves to roost on trees. Its flesh is very fine and delicate. See *Tab.* III. *of Birds*, N° 34.

MIXING *of mortar*. See MORTAR.

MIXT, or MIXT *body*, in *Philosophy*, is that which is compounded of divers elements or principles.

By which, *mixt* stands contradistinguished from *simple*, or *elementary*, which is applied to bodies consisting of one principle only; as the chemists take sulphur, salt, &c. to be.

The schoolmen define a *mixt body* to be a whole, resulting from several ingredients, altered or new-modified, by the mixture. On which principle the several ingredients do not actually exist in the *mixt*; but they are all changed, so as to conspire to a new body, of a different form from the form of any of the ingredients. But the modern philosophers rarely conceive the term in so much strictness.

The business of chemistry, we say, is to resolve *mixt bodies* into their principles, or component parts.

The school-philosophers distinguish *mixt bodies* into perfect and imperfect.

MIXT, *perfect*, are the class of organized and animated bodies, where the elements, or ingredients of which they are composed, are changed, or transformed, by a perfect mixture. Such are plants, beasts, and men.

MIXT, *imperfect*, are unorganized and inanimate bodies, the forms whereof remain still the same as of the ingredients that constitute them. Such are meteors, minerals, metals, &c.

MIXT, in *Chemistry*. See AGGREGATE.

MIXT, or *mixed action*, in *Law*. See ACTION.

MIXT *angle, cloth, fable*. See ANGLE, CLOTH, and FABLE.

MIXT *figure*, in *Geometry*, is that which consists partly of right lines, and partly of curve lines.

MIXT *force, history, mathematics*. See FORCE, HISTORY, and MATHEMATICS.

MIXT or *mixed larceny*. See LARCENY.

MIXT *mode*. See MODE.

MIXT *number*, in *Arithmetic*, that which is partly an integer, and partly a fraction; as $4\frac{1}{4}$.

MIXT *obligation*. See OBLIGATION.

MIXT *ratio*, or *proportion*, is when the sum of the antecedent and consequent is compared with the difference between the antecedent and consequent—as if $3 : 4 :: 12 : 16$

$a : b :: c : d$

then $7 : 1 \ldots :: 28 : 4$

$a + b : a - b :: c + d : c - d$.

MIXT *salts, stairs, service*. See SALTS, STAIRS, and SERVICE.

MIXT *tythes*, are those of cheese, milk, &c. and of the young of beasts. See TITHE.

MIXTILINEAR *angle*. See ANGLE.

MIXTION, MIXTIO, or MISTIO, the act of *mixing*; or the union and coalition of divers corpuscles into one body. The Peripatetics, who hold an alteration essential to *mixtion*, define it the union of several altered ingredients, or miscibles.

Mixtion makes a considerable operation in the chemical and Galenical pharmacy; where divers powders, species, and other simples, are said to be *mixed*, *misceri*, though without any communication, or transition of the virtues of one into those of another. See COMBINATION and COMPOSITION.

MIXTURE, MIXTURA, or MISTURA, in a philosophical sense, is an assemblage, or union, of several bodies of different properties, in the same mass.

To determine the ratio of the ingredients of a *mixture*, is that celebrated problem proposed by Hiero, king of Syracuse, to Archimedes, on occasion of a crown of gold, wherein the workman had fraudulently mixed silver; the solution whereof was matter of so much transport to that divine mechanic. See HIERO's *Crown*.

MIXTURE, in *Matters of Drapery*, denotes the union or blending of several wools of different colours, not yet spun. Hence a *mixture*, or mixed stuff, is that whose woof and warp are of wools of different colours, dyed and mixed before they were spun. See CLOTH.

MIXTURE, in *Pharmacy*, differs from a JULEP in this respect, that it receives into its composition not only salts, extracts, and other substances dissoluble in water, but also earths, powders, and such substances as cannot be dissolved.

The principal *mixtures* are the following:

Astringent mixture is made by mixing simple cinnamon-water and common water, of each three ounces; spirituous cinnamon-water, an ounce and a half; and half an ounce of japonic confection. A spoonful or two of this *mixture* may be taken every four hours, in recent dysenteries, after the necessary evacuations, interposing every second or third day a dose of rhubarb.

Diuretic mixture is prepared by mixing five ounces of mint-water, six drams of vinegar of squills, half an ounce of sweet spirit of nitre, and an ounce and a half of syrup of ginger. Two spoonfuls of this *mixture* may be taken twice or thrice a day, in obstructions of the urinary passages.

Laxative absorbent mixture is formed by rubbing one dram of magnesia alba, in a mortar, with ten or twelve grains of the best Turkey rhubarb, and adding three ounces of common water, and simple cinnamon-water and syrup of sugar, of each one ounce. In the diseases of children, arising from acidities, a table-spoonful of this *mixture* may be repeated three times a-day: when it is intended to purge, the dose may be increased; or, for very young children, diminished.

Saline mixture is made by dissolving a dram of the salt of tartar in four ounces of boiling water, and, when cold, dropping into it spirit of vitriol, till the effervescence ceases; and then adding of pepper-mint-water, two ounces, and of simple syrup, one ounce. This *mixture* may occasionally supply the place of the *saline* JULEP.

Simple mixture, the name of a form of medicine used in the prescriptions of some modern physicians. It is made by mixing ten ounces of the spiritus theriacalis camphoratus of Bates, six ounces of spirit of tartar, and two ounces of spirit of vitriol; these are to be set in a glass, hermetically sealed, for three weeks, that they may be perfectly mixed; the dose is a dram or thereabouts. Its virtues are, that it resists putrefaction, promotes sweat, and is of great service in malignant fevers.

Squill mixture is made by mixing of ſimple cinnamon-water, five ounces; vinegar of ſquills, one ounce; ſyrup of marſh-mallows, an ounce and a half. This *mixture*, by promoting expectoration, and the ſecretion of urine, proves ſerviceable in aſthmatic and dropſical caſes. A table ſpoonful of it may be taken frequently. Buchan.

MIZEN. See MIZEN.

MIZNEPHETH, in the *Jewiſh Antiquities*, a kind of mitre worn by the high-prieſt. See CIDARIS.

MIZQUITL, in *Botany*, a name uſed by ſome authors for that ſpecies of the acacia, or Egyptian thorn, whoſe unripe fruit affords the inſpiſſated juice, which is the true ſuccus acaciæ of the ſhops, and whoſe gum naturally flowing from the trunk and branches is the true gum arabic.

MNEME-CEPHALICUM *balſamum*, the name of a famous compound balſam, ſaid to have been purchaſed from a certain Engliſh phyſician by Charles duke of Burgundy, at the price of ten thouſand florins. Some who have been very lavith in its praiſes have affirmed, that it has a power of preſerving in the mind the remembrance of all things that are paſt; but this ſeems ſtretching the praiſe of it a little too far. It is prepared in the following manner: take of the juices of the leaves of baum, and baſil-juices, of the flowers of tamariſk, lilies, primroſes, roſemary, lavender, borrage, and broom, of each two ounces; of lilies of the valley, roſes, and violets, each one ounce; of cubebs, cardamoms, grains of paradiſe, and yellow ſaunders, carpobalſamum, florentine iris, ſaffron, ſavory, piony flowers, and thyme, of each half an ounce; of liquid ſtorax, ſtorax calamita, opopanax, bdellium, galbanum, gum-ivy, and labdannm, of each ſix drams; roots of long birth-wort and piony, and oil of turpentine, ſpikenard, coſtus, bays, maſtich, ben, and ſpike, of each five drams. The dry ingredients are to be beaten to powder, then mixed with the reſt, and a ſufficient quantity of water being added, the whole is to be diſtilled by an alembic, and the oil carefully ſeparated from the water. The method of uſing it is this: the firſt two months the paſſages of the ears and noſtrils are to be anointed with the ſignels of a pea of it every day; then for two months longer, the ſame is to be repeated every third day; after this it is to be uſed once a week, then once a fortnight, till a year is expired; and after this it is to be uſed once in two months for the ſucceeding years. This is the account of Sennertus. Senner. Pract. lib. i. cap. 5.

MNEMONIC *tables*. Among the artifices to aſſiſt the memory, this is one of great uſe.

Mnemonic tables exhibit in a regular manner, what is to be remembered of the ſame ſubject. And although the ſciences ought to be taught in a ſcientifical manner, as much as poſſible, and that every thing ſhould be ſo placed as to be intelligible and demonſtrable from what has preceded it; yet tables ought not to be rejected, as they are helps to retain the doctrines of which the mind has had ſufficient evidence. In ſuch tables the properties of things are to be expreſſed concicely; illuſtrations and demonſtrations ſhould be left out, as the propoſition ought to have been made ſufficiently clear and certain, before it is regiſtered in the table. Hence the contents of ſuch tables ought only to be the definitions, and the propoſitions relative to the ſubject. If a ſubject require a long table, this may be ſubdivided into ſmaller; by making firſt a table of the moſt general heads, and referring from each of theſe heads to a ſeparate tables by this means the order and connexion of the whole will be preſerved. Such tables would produce a local and *artificial* MEMORY, of great uſe to the retention and recollection of things. They would greatly facilitate a diſtinct view of the properties of their ſubjects, and facilitate recapitulation. Beſides, as the expreſſions uſed in ſuch tables ought to be very conciſe, ſo as juſt to be ſufficient to excite the idea of the object to be remembered, ſoon after that idea has been acquired; after ſome time a certain obſcurity will be found in peruſing the tables, which will give us timely warning that our ideas begin to fade, and that they ought to be renewed. And this may be done without much trouble, if not too long delayed.

MNEVIS, in *Mythology*, the name of a ſacred bull worſhipped by the Egyptians, at Heliopolis. This *Mnevis* was, according to Bryant, a compound of *Men-nevas*, the lunar god Nevas, the ſame as Noas, or Noah. The name relates to the ſame perſon who, in Crete, was called Minos; and the ſame alſo who was repreſented under the emblem of the Men-taur, or Mino-taurus. Ant. Myth. vol. ii. p. 416, &c.

MNEMOSYNE, in *Mythology*, the goddeſs of memory; which, according to Diodorus, was the daughter of Cœlum and Terra, and the ſiſter of Saturn and Rhea. Jupiter, according to the poets, fell in love with *Mnemoſyne*, and ſhe became the mother of the nine Muſes.

MNIUM, in *Natural Hiſtory*, the name of a genus of moſſes of the *cryptogamia* claſs of plants; the characters of which are theſe: it has heads of two different kinds, the one ſort naked and duſty, having no calyptra or other covering; the others are regular capſules, like thoſe of the hypnum and bryum, containing a fine powder, and covered with a calyptra or hood. This diverſity in the fructification diſtinguiſhes the *mnia* from all the other moſſes; but theſe diverſly conſtructed heads are in ſome ſpecies found on the ſame plants; in others, on different ones of the ſame ſpecies, as the male and female flowers are in hemp, mercury, and many other of the larger plants. The ſtalks which ſupport the membranaceous heads are long, and naked; thoſe which ſupport the naked heads, are in ſome naked, in others covered with leaves; but they are in all ſhorter than the others. See *Tab. of Moſſes*, N° 7.

It is the general opinion, that the fine powder, incloſed in the capſules of the hypnum and bryum, is of the nature of the farina fœcundans of the flowers of plants, and ſerves to impregnate the buds or young ſhoots in the axe of the leaves, which are the female part of the fructification in this claſs of plants; and in this ſenſe the membranaceous heads of the *mnia* contain a like farina, which impregnates the globules in theſe naked heads, and qualifies them for acting as ſeeds or young plants; but all this is rather hypotheſis and conjecture than obſervation; though Dillenius does ſuppoſe he has ſeen the germination from the globules of the duſty heads in one ſpecies of the *mnium*. Haller ſays, that theſe duſty heads are only ſo many congeries of young plants when viewed with good glaſſes, and that therefore the *mnium* is not properly a genus of plants, but ſhould be referred to the bryums, to which it belongs. All this, however, is yet but lightly founded, and the more natural opinion ſeems to be that of ſuppoſing the powder in the capſules of all the moſſes a true ſeed, not a farina. See MOSS.

There are properly two orders of the *mnium*. Thoſe of the firſt order are erect; thoſe of the latter procumbent, or creeping. Of the firſt order there are four known ſpecies: of the creeping or procumbent *mnium*, there are only three known ſpecies. Linnæus enumerates twenty-three different ſpecies.

MOAR-*burn*, in *Huſbandry*, a term uſed to expreſs a peculiar diſtemperature of corn, generally comprehended under the common term of a blight. In this caſe the earth ſinks away from the roots of the corn, and leaves the plant ſtanding in great part above ground with naked roots: theſe being too weak to ſupport the ſtalks, the plants fall and the ears become light. This is a diſtemperature peculiar to corn growing on light and looſe lands.

The remedy is this: turn a ſhallow furrow againſt the rows, when they are ſtrong enough to bear it, and the mold is fine and dry, the motion of the ſtalks with the wind will draw in this looſe powder, and it will ſpread itſelf equally among all the plants of the row, though it be triple or quadruple. It is eaſy to ſee that this remedy is only practicable in the method of the horſehoeing huſbandry; for in the common way of ſowing, there is no means of relief in this caſe: and, in general, the horſehoeing huſbandry prevents the falling of the wheat, the ſtalks never drooping ſo abſolutely in the drilled wheat as they do in that ſown in the common way.

MOAT, in *Fortification*, a deep trench dug round a town or fortreſs to be defended, on the outſide of the wall, or rampart. See *Tab. II. Fortif. fig. 21. bt. b b b*, &c.

The depth and breadth of a *moat* often depend on the nature of the ſoil; according as it is marſhy, rocky, or the like. The brink of the *moat* next the rampart in any fortification is called the *ſcarp*, and the oppoſite one the *counterſcarp*. See DITCH.

MOAT, *dry*, is that which is deſtitute of water: this ought to be deeper than one which is full of water.

MOAT, *filled*, is that whoſe ſcarp and counterſcarp are caſed with a wall of maſon's work lying aſlope.

MOAT, *flat-bottomed*, is that which hath no ſloping, its corners being ſomewhat rounded.

MOAT, *angle of the*. See ANGLE.

MOATAZALITES, MOTAZALITES, or *ſeparatiſts*, a religious ſect among the Turks, who deny all forms and qualities in the divine Being; or who diveſt God of his attributes.

There are two opinions among the Turkiſh divines concerning God. The firſt admits metaphyſical forms, or attributes; as, that God has wiſdom, by which he *is* wiſe; power, by which he is powerful; eternity, by which he is eternal, &c.

The ſecond allows God to be wiſe, powerful, eternal; but will not allow any form or quality in God, for fear of admitting a multiplicity.

Thoſe who follow this latter opinion are called *Moatazalites*: they who follow the former, *Sephalites*.

The *Mutazalites* alſo believed that the word of God was created *in ſubjecto*, as the ſchoolmen term it, and to conſiſt of letters and ſounds; copies thereof being written in books to expreſs or imitate the original; they denied abſolute predeſtination, and affirmed that man is a free agent. This ſect is ſaid to have firſt invented the ſcholaſtic divinity, and is ſubdivided into no leſs than twenty inferior ſects, which mutually brand one another with infidelity. Sale's Prelim. Diſc. p. 159, &c.

MOBILE, *movable*, any thing ſuſceptible of motion, or that is diſpoſed to be moved either by itſelf, or by ſome other prior *mobile*, or mover.

MOBILE, *primum*, in the *Ancient Aſtronomy*, was a ninth heaven, or ſphere, imagined above thoſe of the planets, and fixed ſtars.

This was ſuppoſed to be the firſt mover, and to carry all the lower ſpheres round along with it; by its rapidity communicating to them a motion whereby they revolved in twenty-four hours. But the diurnal revolution of the planets is now accounted for, without the aſſiſtance of any ſuch *primum mobile*.

MOBILE, *perpetuum*. See *Perpetual* MOTION.

MOBILES, in the *Ancient Muſic*, was an appellation given to the two intermediate chords of a tetrachord; becauſe their variations produced the different genera and ſpecies of muſic. They were called by the Greeks κινούμεναι, or κινούμενοι.

MOBILIA *bona*, in the *Civil Law*, are what in common law, &c. we call *moveables*, or *moveable goods*.

MOBILITY, in the *Schools*, &c. an aptitude or facility to be moved.

The *mobility* of mercury is owing to the ſmallneſs and ſphericity of its particles; and it is this which alſo renders its fixation ſo difficult.

The hypotheſis of the *mobility* of the earth is the moſt plauſible; and is that univerſally admitted by the later aſtronomers.

Pope Paul V. appointed commiſſioners to examine the opinion of Copernicus touching the *mobility* of the earth. The reſult of their inquiry was, a prohibition to aſſert, not that the *mobility* was poſſible, but that it was actually true; that is, they allowed the *mobility* of the earth to be held as an hypotheſis, which gives an eaſy and ſenſible ſolution of the phænomena of the heavenly motions; but forbad the *mobility* of the earth to be maintained as a theſis, or real effective thing; becauſe they conceived it contrary to ſcripture. See COPERNICAN *ſyſtem*.

MOCHLICA, a term by which ſome authors call the violent or draſtic purges.

MOCHO or MOCOA *ſtones*. See AGAT and DENDRITIS.

MOCHUS, in *Botany*, a name uſed by ſome authors for the orobus, or bitter vetch. Dodonæus, beſide others, calls it by this name.

MOCK *bird*, the name of an American bird called, by Ray, *turdus Americanus minor canorus*, and very much approaching to the cœruleous or blauvogel. It is of the ſize of the common lark; its beak is ſhort and ſtrait; its tail very long; and its whole body of a very fine deep blue. It vies with the nightingale in melody and is called by the Indians *contototlli*, which is ſaid to ſignify four hundred tongues.

MOCK *lead*, in *Mineralogy*, a name given by the Engliſh writers to a ſort of foſſil, called alſo BLENDE and GALENA. It has very much the appearance of an ore of lead, being bright and glolſy, of a bluiſh black colour, and plated; but on trial it is found to yield very little or none at all of that metal.

MOCK *nightingale*. See BLACK-*cap*.

MOCK *orange*, in *Botany*. See PHILADELPHUS.

MOCK *privet*. See *Mock* PRIVET.

MOCK, or running a *muck*, is a practice that has prevailed time immemorial in Batavia. To *run a muck*, in the original ſenſe of the word, is to get intoxicated with *opium*, and then ruſh into the ſtreet, with a drawn weapon, and kill any one that comes in the way, till the party is himſelf either killed or taken priſoner. If the officer takes one of theſe *amucks*, or *mohawks*, (as they have been called by an eaſy corruption,) alive, he has a conſiderable reward, and the unhappy wretches are always broken alive on the wheel: but ſuch is the fury of their deſperation, that three out of four are neceſſarily deſtroyed, in attempting to ſecure them.

MODAL, in *Logic*, &c. a term applied to propoſitions which include certain conditions and reſtrictions.

MODE, or MOOD, *modus*, in *Philoſophy*, a *manner* of being; or a quality or attribute of a ſubſtance, or ſubject, which we conceive as neceſſarily depending on the ſubject, and incapable of ſubſiſting without it.

Mr. Locke defines *modes* to be thoſe ideas (he ſhould have ſaid *things*) which do not imply any ſuppoſition of ſubſiſting by themſelves, but are conſidered as mere dependences, and affections of ſubſtances.

Our ideas of things may be reduced to two kinds: the one of things, which we conceive ſeparately, and by themſelves, called *ſubſtances*; and the other of things which we conceive as exiſting in others, in ſuch manner as that we cannot allow them exiſting without them, and theſe we call *modes* or *accidents*.

It is the characteriſtic, then, of a true *mode*, to have ſuch a relation to ſome ſubject, as not to be clearly and diſtinctly conceivable without conceiving the ſubject, whereof it is a *mode*, at the ſame time: when, on the other hand, the conception of the ſubject does not at all infer or require that of the *mode*.

Thus, what gives us to know, that thought is not a *mode* of extended ſubſtance, or matter, is, that extenſion, and the other properties of matter, may be divided from thought, without ceaſing to conceive thought all the while.

We always conſider things as clothed with certain *modes*, except we reflect on them in the abſtract, or general: and it is the variety of *modes*, and the relations, that occaſions the great variety of denominations of the ſame thing. They are the various *modes* of matter, e. g. that make all the diverſity of bodies, or corporeal beings, in nature.

There are various diviſions and kinds of *modes*: as, 1. *eſſential* or *accidental*. An *eſſential mode*, or ATTRIBUTE, is that which belongs to the very nature or eſſence of the ſubject wherein it is; and the ſubject can never have the ſame nature without it, as roundneſs in a bowl, ſolidity in matter, thinking in a ſpirit, &c. and this is *primary*, when it is the firſt or chief thing, that conſtitutes any being in its particular eſſence or nature, and makes it to be that which it is, and diſtinguiſhes it from all other beings; as roundneſs in a bowl; or *ſecondary*, which is any other attribute of a thing, that is not of primary conſideration, called a PROPERTY; as volubility in a bowl. An *accidental mode*, or ACCIDENT, is ſuch a *mode*, as is not neceſſary to the being of a thing; for the ſubject may be without it, and yet remain of the ſame nature, which it had before; or it is that *mode*, which may be ſeparated from its ſubject; as blackneſs or whiteneſs in a bowl, learning in a man, &c.

2. *Modes* are *abſolute* and *relative*. An *abſolute mode* is that which belongs to its ſubject, without reſpect to any other beings whatſoever. A *relative mode* is derived from the regard which one being has to others: thus, roundneſs and ſmoothneſs are the *abſolute modes* of a bowl; but greatneſs and ſmallneſs are *relative*. See RELATION.

3. *Modes* are *intrinſical* or *extrinſical*. The former are conceived to be in the ſubject or ſubſtance; as when we ſay a globe is round, &c. The latter *mode* is a manner of being which ſome ſubſtances attain by reaſon of ſomething that is external or foreign to the ſubject, and is called external denomination; as this globe lies within two yards of the wall, &c.

4. *Modes* are alſo *inherent* or *adherent*, i. e. *proper* or *improper*. *Adherent modes* ariſe from the joining of ſome accidental ſubſtance to the chief ſubject, which yet may be ſeparated from it; as when a bowl is wet, &c. *Inherent modes* have a ſort of in-being in the ſubſtance itſelf; as the bowl is ſwift or round, &c.

5. *Action* and *paſſion*, uſing the terms in a philoſophical ſenſe, are *modes* which belong to ſubſtances; as when a ſmith with a hammer ſtrikes a piece of iron, the ſmith and hammer are agents or ſubjects of action, and the iron is the patient or ſubject of paſſion.

6. *Modes* may be divided into *natural*, *civil*, *moral*, and *ſupernatural*, all which pertain to the apoſtle Paul, who was a little man, a Roman by the privilege of his birth, a man of virtue or honeſty, and an inſpired apoſtle.

7. *Modes* belong either to *body*, or to *ſpirit*, or to both. *Modes* of *body* belong only to matter, or to corporeal beings; ſuch are FIGURE, REST, MOTION, &c. Theſe are *primary*, when they belong to bodies, conſidered in themſelves, whether there were any man to take notice of them or no, as ſhape, ſize, &c. or *ſecondary*, which are ſuch ideas as we aſcribe to bodies, on account of the various impreſſions that are made on the ſenſes of men, by them, called ſecondary qualities; ſuch are all colours, ſounds, taſtes, ſmells, and all tactile qualities. See QUALITY. *Modes* of *ſpirit* belong only to minds, ſuch are KNOWLEDGE, WILL, &c. *Modes* belonging to body and ſpirit are called mixt or human *modes*, becauſe they are found in human nature, ſuch are SENSATION, IMAGINATION, PASSION, &c. in which there is a concurrence of the operation of animal and intellectual nature.

8. There are alſo *modes* of other *modes*, which, though they ſubſiſt in and by the ſubſtance, as the original ſubject of them, are properly and directly attributed to ſome *mode* of that ſubſtance; thus ſwiftneſs and ſlowneſs are *modes* of motion, which is itſelf the *mode* of a body.—Watts's Logic. p. i. c. 2. § 3 and 4.

Mr.

Mr. Locke divides *modes* into *simple*, and *mixt* or *compound*.

MODES, *simple*, are combinations of simple ideas of the same kind, or even of the same simple ideas divers times repeated: as a dozen, a score, &c. which are only the ideas of so many distinct units put together.

The modifications of any simple idea, Mr. Locke observes, are as perfectly different and distinct ideas in the mind as those the most remote and inconsistent: thus, *two* is as distinct from *three*, as blindness is from heat. With this view that author examines the *simple modes* of space; which are found to be distance, capacity, extension, figure, place, and duration.

The mind has several distinct ideas of *sliding*, *rolling*, *twisting*, *creeping*, &c. which are all but the different modifications of motion. *Swift* and *slow* are two different ideas of motion, the measures whereof are made out of the distances of time and space put together.

The like variety we have in sounds; every articulate word is a different modification of sound, as are all notes of different length put together, which make that complex idea called *time*.

The *modes* of colours might be also very various: some of which we take notice of as the different degrees, or as they are termed, *shades of the same colour*. But since we seldom make assemblages of colours without taking in figure also, as in painting, &c. those which are taken notice of, do most commonly belong to mixed *modes*; as *brown*, *rainbow*, &c. All compounded tastes and smells are also *modes* made up of the simple ideas of those senses.

As to the *modes of thinking*; when the mind turns its view inward upon itself, *thinking* is the first idea that occurs, wherein it observes a great variety of modifications; and therefore frames to itself distinct ideas.

Thus the perception annexed to any impression on the body made by an external object, is called *sensation*. Where an idea recurs without the presence of the object, it is called *remembrance*. When sought after by the mind, and brought again in view, it is called *recollection*. When held there long under attentive consideration, it is called *contemplation*. When ideas float in the mind without regard or reflection, it is called, in French, a *reverie*. When the ideas are taken notice of, and, as it were registered in the memory, it is *attention*. When the mind fixes its view on any one idea, and considers it on all sides, it is *intention* and *study*.

Of these various *modes* of thinking, the mind forms as distinct ideas, as it does of white and red, or of a square, or a circle.

MODES, *mixt*, are combinations of simple ideas of several kinds; as in *beauty*, which consists in a certain composition of colour, figure, &c. *theft*, which is the concealed change of possession of any thing, without consent of the proprietor, &c.

There are three ways whereby we get ideas of *mixt modes*. 1. By experience and observation of things themselves: thus, by seeing two men wrestle, we get the idea of wrestling. 2. By invention, or voluntarily putting together of several simple ideas in our own minds: so he that first invented printing had an idea of it first in his mind before ever it existed. 3. By explaining the names of actions we never saw, or notions we cannot see; and by enumerating all those ideas, which go to the making them up: thus, the *mixt mode* which the word *lye* stands for is made up of the simple ideas, (1.) Articulate sounds. (2.) Certain ideas in the mind of the speaker. (3.) Words, the signs of those ideas. And, (4.) those signs put together by affirmation, or negation, otherwise than the ideas they stand for are in the mind of the speaker.

Mixt modes have their unity from an act of the mind, combining those several simple ideas together, and considering them as one complex one: the mark of this union is one name given to that combination.

This gives the reason, why there are words in every language, which cannot be rendered by any one single word of another. For the fashions and customs of one nation make several combinations of ideas familiar in one, which another had never any occasion to make. Such were ὀστρακισμὸς among the Greeks, and *proscriptio* among the Romans.

This also occasions the constant change of languages; because the change of custom and opinion brings with it new combinations of ideas, which, to avoid long descriptions, have new names annexed to them, and so they become new species of *mixt modes*.

Of all our simple ideas, those which have had most *mixt modes* made out of them, are thinking, and motion (which comprehend in them all action), and power, from whence these actions are conceived to flow.

Of this kind are the *modes* of actions distinguished by their causes, means, objects, ends, instruments, time, place, and other circumstances; as also of the powers fitted for those actions. Thus *boldness* is the power to do or speak what we intend, without fear or disorder; and this power of doing any thing, when it had been acquired by frequent doing the same thing, is that idea we call *habit*; and when forward and ready, upon every occasion, to break into action, we call it *disposition*: thus *testiness* is a disposition or aptness to be angry. Power being the source of all action, the substances, wherein those powers are, when they exert this power, are called *causes*: and the substances thereupon produced, or the simple ideas introduced into any subject, are called *effects*. The efficacy whereby the new substance or idea is produced, is called in the subject exerting that power, *action*; and, in the subject wherein any simple idea is changed, or produced, *passion*: which efficacy, in intellectual agents, we can conceive to be nothing else but *modes* of thinking and willing: in corporeal agents, nothing else but modifications of motion.

MODE, *division of a*. See DIVISION.

MODE, in *Grammar*. See MOOD.

MODE, in *Logic*. See MOOD.

MODE is also used, in logic, for the modification of a proposition; or that which renders it *modal* and *conditional*.

MODE, *indirect*. See INDIRECT.

MODE, or MOOD, in *Music*, a particular manner of beginning, continuing, and ending a song, whereby we are engaged to make use of certain notes, or chords, preferable to, or oftener than others.

MODE is defined by some authors, the particular manner of constituting the octave, or the melodious constitution of the octave, as it consists of seven essential or natural notes, besides the key, or fundamental.

A *mode*, then, is not any single note or sound; but the particular order of the conciunous degree of an octave: the fundamental note whereof may, in another sense, be called the *key*, as it signifies that principal note which regulates the rest.

The proper difference between a *mode* and a KEY, consists in this, that an octave, with all its natural and conciunous degrees, is called a *mode* with respect to the constitution, or the manner and way of dividing it; and with respect to the place of it in the scale of music, that is, the degree or pitch of tune, it is called a *key*: that is, an octave of sounds may be raised in the same order and kind of degrees which makes the same *mode*, and yet be begun higher or lower; that is, be taken at different degrees with respect to the whole, which makes different keys: and from the same definition it follows, that the same key may be found with different *modes*; that is, the extremes of two octaves may be in the same degree of tune, and the division of them different.

Now it may be farther observed, that of the natural notes of every *mode*, or octave, three go under the name of the essential notes in a peculiar manner, viz. the fundamental, the third, and fifth; their octaves being reckoned the same, and marked with the same letters in the scale: the rest are particularly called *dependents*. Again, the fundamental is also called the *final*; the fifth, the *dominante*; and the third, as being between the other two, the *mediante*.

The doctrine of the ancients, with regard to *modes*, which they sometimes also call *tones*, is somewhat obscure; there being an unaccountable difference among their authors as to the definitions, divisions, and names of their *modes*. They agree, indeed, that a *mode* is a certain system or constitution of sounds; and that an octave, with all its intermediate sounds, is such a constitution: but the specific differences of tones, or *modes*, some place in the manner of division, or order of their conciunous parts; and others merely in the different tension of the whole; i. e. as the whole series of notes are acuter or graver, or as they stand higher or lower in the scale of music.

Boethius is very obscure on this head, and defines a *mode* to be, as it were, an entire body of modulation, consisting of a conjunction of consonances; as the diapason.

Ptolemy makes the *modes* the same with the species of the diapason; but at the same time he speaks of their being at some distance from each other. Some contended for thirteen, some for fifteen *modes*, which they place at a semitone's distance from each other; but it is plain, these understood the differences to be only in their place, or distances from each other; and that there is one certain harmonious species of octave applied to them all; viz. that order which proceeds from the proslambanomenos of the systema immutatum, or the A of the modern system. Ptolemy argues, that if this be all, they may be infinite, though they must be limited for use and practice. But, indeed, much the greater part define them by the species of the DIAPASON; so that as there are in nature three different kinds of diatessaron, and four

different

different kinds of diapente; and the diapaſon is compoſed of theſe two ſyſtems: there are in nature ſeven ſpecies of diapaſon, and therefore only ſeven *modes*; but as to their uſe, we are left entirely in the dark.

If the *modes* be nothing but the ſeven ſpecies of octaves, the uſe of them can only be, that the proſlambanomenos of any *mode* being made the principal note of a ſong, there may be different ſpecies of melody anſwering to thoſe different conſtitutions. But then we are not to conceive, that the proſlambanomenos, or fundamental of any *mode*, is fixed to any particular chord of the ſyſtem, v. g. the Phrygian to g; ſo that we muſt always begin there, when we would have a piece of melody of that ſpecies. When we ſay, in general, that ſuch a *mode* begins in g, it is no more than to ſignify the ſpecies of octave as they appear in a certain fixed ſyſtem: but we may begin in any chord of the ſyſtem, and make it the proſlambanomenos of any *mode*, by adding new chords, or by altering the tuning of the old. If this were the true nature and uſe of the tones, muſt of theſe *modes* muſt have been imperfect, and incapable of good melody, as wanting ſome of thoſe which we reckon the eſſential and natural notes of a true *mode*. Again, if the eſſential difference of the *modes* conſiſt only in the gravity or acuteneſs of the whole octave, then we may ſuppoſe one ſpecies or concinnous diviſion of the octave, which, being applied to all the chords of the ſyſtem, makes them true fundamentals for a certain ſeries of ſucceſſive notes, by changing, as above, the tone of certain chords in ſome caſes, or by adding new chords to the ſyſtem. But that muſt have been a ſimple kind of melody, produced by admitting only one concinnous ſeries, and that too wanting ſome uſeful and neceſſary chords.

Sir Francis Haſkins Eyles Styles, in an elaborate eſſay on the *modes* of the ancients, Phil. Tranſ. vol. li. 695, &c. has undertaken to prove, that the two doctrines on this ſubject, which he diſtinguiſhes by the epithets of harmonic and muſical, and which have been advanced by different writers, are in reality the ſame. According to one of theſe, viz. the harmonic, the difference between one *mode* and another conſiſted in the tenſion or pitch of the ſyſtem; and, according to the other, or muſical, this difference conſiſted in the manner of dividing an octave, or in the different ſpecies of the diapaſon: but both theſe definitions of a muſical *mode* perfectly coincide. This author obſerves, that, according to the harmonic doctrine, the number of the *modes* had been augmented to fifteen; but Ptolemy, who appears to have favoured the muſical, reduces them to ſeven: of theſe ſeven, according to the direction furniſhed by Bacchius, p. 12. ed. Meibom. it appears, that the Mixolydian was the moſt acute; the Lydian graver by a ſemitone; the Phrygian graver than the Lydian by a tone; the Dorian graver than the Phrygian by a tone; the Hypolydian graver than the Dorian by a ſemitone; the Hypophrygian graver than the Hypolydian by a tone; and the Hypodorian graver than the Hypophrygian by a tone. Now as the Guidonian ſcale, in uſe among the moderns, anſwers to the ſyſtem of the ancients, in its natural ſituation, which was in the Dorian *mode*, and our A la mi re conſequently, anſwers to the pitch of the Dorian meſe: we have a plain direction for finding the abſolute pitch of the meſes, for all the ſeven in our modern notes, and they will be found to ſtand thus:

Mixolydian meſe in	*d*
Lydian in	*c ſharp.*
Phrygian in	*b*
Dorian in	*a*
Hypolydian in	*g ſharp*
Hypophrygian in	*f ſharp*
Hypodorian in	*e*

But to underſtand this doctrine as delivered by the ancients, it will be neceſſary alſo to examine, how the meſes of the ſeven *modes* were ſtationed upon the lyre. The lyre, after its laſt enlargements, conſiſted of fifteen ſtrings, which took in the compaſs of a diſ-diapaſon, or double octave. Theſe ſtrings were called by the ſame names as the fifteen ſounds of the ſyſtem; and, when tuned for the Dorian *mode*, correſponded exactly with them. In this *mode*, the meſe of the ſyſtem was placed in the meſe of the lyre; but in every one of the reſt, it was applied to a different ſtring, and every ſound of the ſyſtem tranſpoſed accordingly. Hence ariſe the diſtinction between a ſound in power, and a ſound in poſition; for when the ſyſtem was tranſpoſed from the Dorian to any other *mode*, e. g. to the Phrygian, the meſe of the lyre, though ſtill meſe in poſition, acquired in this caſe the power of the lichanos meſon; and the parameſe of the lyre, though ſtill parameſe in poſition, acquired the power of the meſe. In theſe tranſpoſitions, one or more of the ſtrings always required new tunings, to preſerve the relations of the ſyſtem; but, notwithſtanding this alteration of their pitch, they retained their old names, when ſpoken of, in reſpect to their poſitions only; for the name implied not any particular pitch of the ſtring, but only its place upon the lyre, in the numerical order, reckoning the proſlambanomenos for the firſt. The places of the meſe for theſe ſeven *modes* upon the lyre, are ſettled by Ptolemy as follow:

			ſtring.
Mixolydian		Parameſe diezeugmenon	11
Lydian		Triteſe diezeugmenon	10
Phrygian		Parameſe	9
Dorian	Meſe in	Meſe	8
Hypolydian		Lichanos Meſon	7
Hypophrygian		Parhypate Meſon	6
Hypodorian		Hypate Meſon	5

On the other hand, the muſical doctrine taught, that the difference between one *mode* and another conſiſted in the manner of dividing an octave, or in the different ſpecies of diapaſon. Theſe were, as we have already obſerved, ſeven in number; and had the denominations of Mixolydian, Lydian, Phrygian, Dorian, Hypolydian, Hypophrygian, and Hypodorian. See DIAPASON.

Theſe ſpecies, as they ſtand in the ſyſtem, are with reſpect to acuteneſs and gravity, in the inverted order of the ſeven *modes* as ſettled by the harmonic doctrine. According to the Guidonian ſcale, and preſerving the natural notes, they will ſtand in the manner repreſented under DIAPASON.

The order of the intervals of which each ſpecies is compoſed, proceeding in each from grave to acute, will be as follows:

Mixolydian. Semitone, tone, tone, ſemitone, tone, tone, tone.

Lydian. Tone, tone, ſemitone, tone, tone, tone, ſemitone.

Phrygian. Tone, ſemitone, tone, tone, tone, ſemitone, tone.

Dorian. Semitone, tone, tone, tone, ſemitone, tone, tone.

Hypolydian. Tone, tone, tone, ſemitone, tone, tone, ſemitone.

Hypophrygian. Tone, tone, ſemitone, tone, tone, ſemitone, tone.

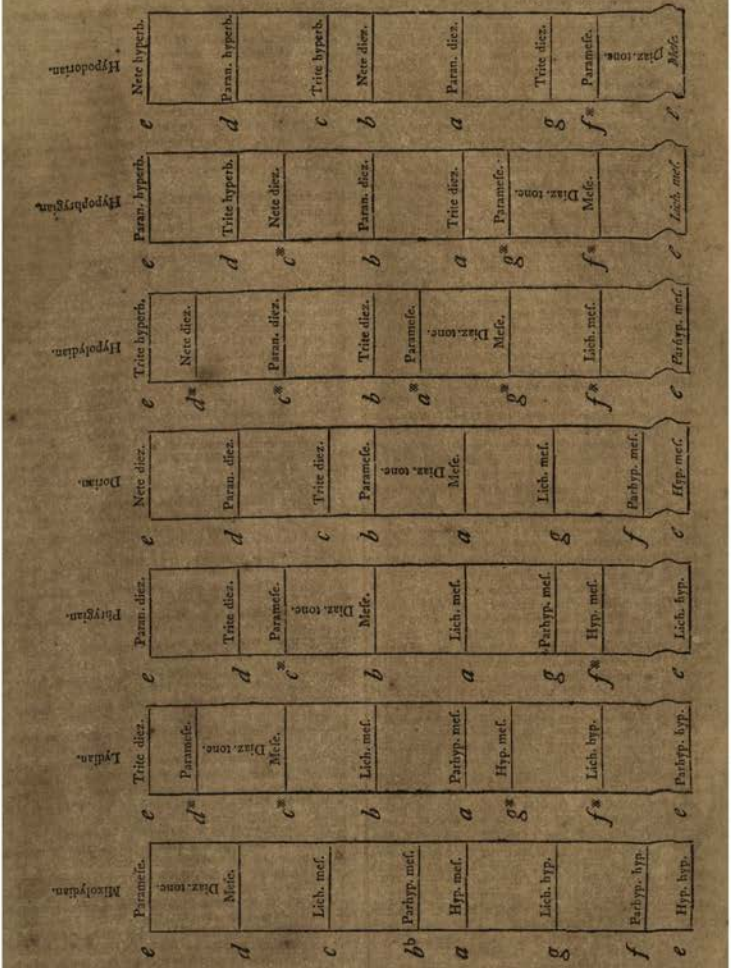
Hypodorian. Tone, ſemitone, tone, tone, ſemitone, tone, tone.

The ancients had another method of explaining the ſpecies of diapaſon, by the poſition of the diazeuctic tone, or interval from meſe to parameſe. In the mixolydian ſpecies, the diazeuctic tone was the firſt interval, reckoning from acute to grave; in the Lydian, it was the ſecond; in the Phrygian, the third; in the Dorian, the fourth; in the Hypolydian, the fifth; in the Hypophrygian, the ſixth; and in the Hypodorian, the laſt.

In order to reconcile the two doctrines already illuſtrated, it is obſerved, by ſir Francis Styles, that the harmonic doctrine ſhews the pitch of the ſyſtem for each *mode*; and the muſical directs in what part of the ſyſtem to take the ſpecies of diapaſon; therefore, by combining theſe two directions, we obtain the following canon for obtaining any *mode* required: "firſt pitch the ſyſtem for the "*mode*, as directed by the harmonic doctrine; then ſelect "from it the diapaſon, directed by the muſical, and "we have the characteric ſpecies of the *mode* in its true "pitch." The annexed diagram of the ſeven ſpecies ſhews at what pitch of the Guidonian ſcale each ſound of the diapaſon is brought out by the canon for each of the ſeven *modes*. The reſult of the canon, ſeen in the conſtruction of the diagram, is, in all reſpects, conformable to the principles of both doctrines; e. g. in the Dorian, the meſe is placed in A la mi re, and the reſt of the ſounds exhibited, in that diapaſon, are placed at the proper diſtances, for preſerving the order of the ſyſtem, as required by the harmonic doctrine. It is alſo ſeen, that the diapaſon ſelected lies between the hypate meſon and nete diezeugmenon; that the ſemitones are the firſt interval in the grave, and the third in the acute; and that the diazeuctic tone is in the fourth interval, reckoning from the acute, &c. all which circumſtances were required by the muſical doctrine for this *mode*; and all the circumſtances required by each doctrine will be found to obtain in the reſt of the *modes*.

DIAGRAM

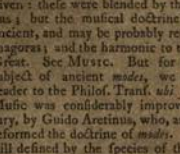
DIAGRAM of the Species of Diapason in the Seven Modes admitted by Ptolemy.


Hypodorian.
Nete hyperb. Paran. hyperb. Trite hyperb. Nete diez. Paran. diez. Trite diez. Paramese. Diaz. tone. Mese.
e d c b a g f* e
Hypophrygian.
Paran. hyperb. Trite hyperb. Nete diez. Paran. diez. Trite diez. Paramese. Diaz. tone. Mese. Lich. mes.
e d c* b a g* f* e
Hypolydian.
Trite hyperb. Nete diez. Paran. diez. Trite diez. Paramese. Diaz. tone. Mese. Lich. mes. Parhyp. mes.
e d* c* b a* g* f* e
Dorian.
Nete diez. Paran. diez. Trite diez. Paramese. Diaz. tone. Mese. Lich. mes. Parhyp. mes. Hyp. mes.
e d c b a g f e
Phrygian.
Paran. diez. Trite diez. Paramese. Diaz. tone. Mese. Lich. mes. Parhyp. mes. Hyp. mes. Lich. hyp.
e d c* b a g f* e
Lydian.
Trite diez. Paramese. Diaz. tone. Mese. Lich. mes. Parhyp. mes. Hyp. mes. Lich. hyp. Parhyp. hyp.
e d* c* b a g* f* e
Mixolydian.
Paramese. Diaz. tone. Mese. Lich. mes. Parhyp. mes. Hyp. mes. Lich. hyp. Parhyp. hyp. Hyp. hyp.
e d c b♭ a g f e

See INTERVAL.

The same author has explained at large the eight harmonic *modes* rejected by Ptolemy, and his reasons for excluding them. He has also traced the origin of the two doctrines, of which a summary has been already given: these were blended by the followers of Aristoxenus; but the musical doctrine appears to be the most ancient, and may be probably referred to the age of Pythagoras; and the harmonic to the age of Alexander the Great. See MUSIC. But for a farther view of this subject of ancient *modes*, we must refer the curious reader to the Philos. Trans. *ubi supra*.

Music was considerably improved in the eleventh century, by Guido Aretinus, who, among other innovations, reformed the doctrine of *modes*. It is true, they were still defined by the species of the octave, in Ptolemy's manner; and their number was fixed to seven; but afterwards taking occasion to consider the harmonical and arithmetical divisions of the octave, whereby it resolves into a fourth above a fifth, or a fifth above a fourth, they hence constituted twelve *modes*, making of each octave two different *modes*, according to this different division: but because there are two of them that cannot be divided both ways, there are but twelve *modes*. Of these, such as were divided harmonically, that is, with the fifths lowest (which were fix), were called *authentic*; and the other fix, which had the fifths highest, were called *plagal modes*. See the scheme annexed.



To these *modes* they gave the names of the ancient Greek tones, as Dorian, Phrygian, and Lydian; but the several authors differ in the application and order of these names: so that we are still in great measure at a loss to know what they meant by those distinctions, and what their real use was. The best account we can give was this: they considered that an octave, which wants a fourth or fifth, is imperfect; these being the concords next to octave, the song ought to touch those chords most frequently and remarkably; and because their concord is different, which makes the melody different, they

eſtabliſhed by this two *modes* in every natural octave that had a true fourth and fifth: then, if the ſong was carried as far as this octave above, it was called a *perfect mode*; if leſs, as to the fourth or fifth, it was called *imperfect*; if it moved both above and below, it was called a *mixt mode*. Thus it is that ſome authors ſpeak about theſe *modes*. Others, conſidering how indiſpenſable a chord the fifth is in every *mode*, took for the final, or key-note, in the arithmetically divided octaves, not the loweſt chord of that octave, but that very fourth. The only difference then in this method between the authentic and plagal *modes* is, that the authentic goes above its final to the octave; the other aſcends a fifth, and deſcends a fourth; which will indeed be attended with different effects; but the *mode* is eſſentially the ſame, having the ſame final to which all the notes refer.

We are now to conſider wherein the *modes* of one ſpecies, as authentic or plagal, differ among themſelves: this muſt either be by their ſtanding higher or lower in the ſcale, i. e. by the different tenſion of the whole octave, or rather by the different ſubdiviſions of the octave into its concinnous degrees: there can be no other. We are to conſider then, whether theſe differences are ſufficient to produce ſuch very different effects as are aſcribed to the ſeveral *modes*; for inſtance, that the one produces mirth, another ſadneſs, that a third is proper for religion, a fourth for love, &c. That theſe effects are owing merely to the conſtitution of the octave, ſeaces any body will affirm. The differences in the conſtitution will, indeed, have ſome influence; but it will be ſo little, as by that the various combinations of other cauſes, one of theſe *modes* may be uſed to different purpoſes. The greateſt difference is that of thoſe octaves which have the third *b*, or third *♯*, making what on other occaſions we call the *ſharp* and *flat key*.

However, if the *modes* depend upon the ſpecies of octaves, how can they be more than ſeven? And as to the diſtinction between authentic and plagal, we have already obſerved, that it is imaginary with reſpect to any eſſential difference conſtituted thereby in the kind of the melody: for though the carrying the ſong above or below the final, may have different effects, yet this is to be aſcribed to other cauſes beſides the conſtitution of the octaves. It is particularly obſervable, that thoſe authors, who give us examples in actual compoſition of their twelve *modes*, frequently take in the artificial notes *♯* and *b*, to perfect the melody of their key; and by this means depart from the conſtitution of the octave, as it ſtands fixed in the natural ſyſtem. There is nothing certain or conſiſtent, therefore, in their way of ſpeaking; but the *modes* are all really reducible to two, viz. the ſharp and flat; the other differences reſpecting only the place of the ſcale where the fundamental is taken.

The ancient *modes*, beſides their general diviſion into authentic and plagal, had alſo their reſpective names from the ſeveral Greek provinces where they are ſuppoſed to have been invented. Originally indeed there were but three, viz. Doric, Lydian, and Phrygian; which were particularly called *tones*, becauſe at a tone's diſtance from one another. The reſt were added afterwards, aand were ſome of them named from the relations they bore to the former, particularly the *Hypo-doric*, as being below the Doric. See the preceding part of this article.

The *Doric* MODE was a mixture of gravity and mirth, invented by Thamyras of Thrace.

The *Phrygian* MODE was adapted to the kindling of rage; and was invented by Marſyas the Phrygian.

The *Lydian* MODE was proper for amorous or funeral ſongs; and was invented, according to Pliny, by Amphion.

The *Myxolydian* was invented by Sappho. The *Aolic*, *Ionic*, and *Hypo-doric* by Philoxenus. And the *Hypobaſtian* by Polymneſtes. See DORIC, &c.

Beſides theſe *modes of tune*, old authors have alſo introduced *modes of time*, or meaſures of notes. Theſe at firſt were diſtinguiſhed into greater and leſs, and each of theſe again into perfect and imperfect. But afterwards they reduced all into four *modes*, which included the whole buſineſs of time. As theſe *modes* are now diſuſed, they are hardly worth the reciting.

The common *mode* now in uſe is much more ſimple and natural than any of theſe: the proportion, which in theſe's varied, being in our's fixed; viz. 2: 1. A large equal to two longs; a long to two breves; a breve to two ſemibreves, &c. proceeding in the ſame proportion to the laſt or loweſt notes. And if on ſome occaſions the proportion of 3: 1 betwixt two ſucceſſive notes is required, it is eaſily expreſſed by annexing a point (.).

The ancients had likewiſe their *mode melicpoiae*, of which Ariſtides names theſe; *dithyrambic*, *nomic*, and *tragic*: which were called *modes*, from their expreſſing the ſeveral motions and affections of the mind.

MODEL, an original or pattern propoſed for any one to copy or imitate.

St. Paul's church is ſaid to be built after the *model* of St. Peter's at Rome.

MODEL is particularly uſed in building, for an artificial pattern, made of wood, ſtone, plaiſter, or other matter, with all its parts and proportions; in order for the better conducting and executing ſome great work, and to give an idea of the effect it will have in large.

In all great buildings it is much the ſureſt way to make a *model* in relievo; and not to truſt to a bare deſign, or draught. There are alſo *models* for the building of ſhips, &c. and for extraordinary ſtair-caſes, &c.

MODEL, in *Painting* and *Sculpture*, is any thing propoſed to be imitated. And

Hence, in the academies, they give the term *model* to a naked man, diſpoſed in ſeveral poſtures, to give an opportunity to the ſcholars to deſign him in various views and attitudes.

The ſculptors have little *models* of clay or wax to aſſiſt them in their deſigns of others that are larger, in marble, &c. and to judge of the attitude and correctneſs of a figure.

Statuaries likewiſe give the name *model* to certain figures of clay or wax, which are but juſt faſhioned, to ſerve by way of guide for the making of larger, whether of marble or other matter.

MODERATA *miſericordia*, in *Law*, a writ that lies for him who is amerced in a court baron or other court not of record, for any tranſgreſſion beyond the quality or quantity of the offence. It is directed to the lord of the court, or his bailiff, commanding them to take a *moderate amercement* of the party. This writ is founded upon *Magna Charta*.

If a man be amerced in a court-baron on preſentment by the jury, where he did not any treſpaſs, he ſhall not have this writ, unleſs the amercement be exceſſive and outrageous; and if the ſteward of the court, of his own head, will amerce any tenant or other perſon without cauſe, the party ought not to ſue for this writ of *moderata miſericordia* if he be diſtrained for that amercement; but he ſhall have action of treſpaſs. New. Nat. Br. 167.

When the amercement which is ſet on a perſon is aſſeered by his peers, this writ of *moderata miſericordia* doth not lie; for then it is according to the ſtatute 10 Edw. II.

MODERATION, in *Ethics*, is a virtue conſiſting in the proper government of our appetites, paſſions, and purſuits, with reſpect to honours, riches, and pleaſures; and in this ſenſe it is ſynonymous with TEMPERANCE: it is alſo often uſed to denote *candour*.

MODERATOR, in the *Schools*, the perſon who preſides at a diſpute, or in a public aſſembly.

Such a doctor was the *moderator*, that is, the preſident, at ſuch a diſputation, in ſuch an aſſembly, &c.

MODERATOR-*ring*, in *Anatomy*, is uſed by Valſalva for that ring which the muſcles of the eye make round the optic nerve, at the bottom of the orbit. He alleiges, that the exterior fibres of theſe muſcles which riſe from the nerve, muſt ſhorten it when they contract, and when the interior fibres act they muſt compreſs it; ſo that theſe different fibres of the muſcles affect the nervous fluid here very differently.

Valſalva alſo deſcribes ſuch another ring made round the motory nerves of the eye; but acknowledges, that it is neither ſo remarkable nor diſtinct as the former. Med. Eſſ. Edimb. Abr. vol. ii. p. 410.

MODERN, ſomething *new*, or of our *time*. In oppoſition to what is antique, or *ancient*.

Modern authors, according to Naude, are all thoſe who have written ſince Boethius: the *modern* philoſophy commences with Galileo: and the *modern* aſtronomy with Copernicus.

MODERN *medals* are reckoned all thoſe that have been ſtruck within theſe three hundred years. See MEDAL.

MODERN, in *Architecture*, is improperly applied to the preſent, or Italian manner of building; as being according to the rules of the antique. Nor is the term leſs abuſed when attributed to architecture purely Gothic.

Modern architecture, in propriety, is only applicable to that which partakes partly of the antique, retaining ſomewhat of its delicacy and ſolidity; and partly of the Gothic, whence it borrows members and ornaments, without proportion or judgment.

MODERN *muſic*, *muſica moderna*, may be divided into two parts: firſt, *antiqua-moderna*, which is generally a ſerious ſort of muſic, conſiſting of many parts; and which has been in uſe from Guido's time, to the beginning of the laſt century. Secondly, the *modern* which has been uſed in this and the laſt century; it is very different from the *antiqua-moderna*, being briſker, lighter, gayer, and more ſprightly.

MODESTY, in *Ethics*, is ſometimes uſed to denote HU-

MILITY.

MILITY; and sometimes to express chastity or purity of sentiment and manners.

MODIFICATION, in *Philosophy*, that which *modifies* a thing; that is, gives it this or that manner of being.

Quantity and quality are accidents which *modify* all bodies.

According to Spinoza's system, all the beings that compose the universe are only so many different *modifications* of one and the same substance. And the different arrangement and situation of their parts, make all the difference between them.

MODIFICATIVE, something that *modifies*, or gives a thing a certain manner of being.

Father Buffier establishes a new part of speech, which he calls *modificative*. Nouns and verbs, he observes, are susceptible of divers circumstances or *modifications*: in the phrase, *wise acts*, we have a noun and verb, without any *modification*; but in that, *wise without discretion acts rashly*, the noun and verb are each attended with a *modification* or circumstance.

The last kind of words, which serve to *modify* nouns and verbs, since they have no general name in the common grammars, he chooses to call *modificatives*: which include what grammarians commonly call *adverbs*, *conjunction*, and *prepositions*.

MODILLIONS, from the Italian *modiglione*, a little *measure*, in *Architecture*, ornaments in the cornice of the Ionic, Corinthian, and Composite columns. See *Tab. Archit. fig.* 20.

The *modillions* are little inverted consoles, or brackets, in form of an S, under the soffit of the cornice, seeming to support the projecture of the larmier: though in reality they are no more than ornaments.

The *modillion* is sometimes also called *mutule*; though custom has introduced a little difference between the idea of a *modillion*, and a mutule; the mutule being peculiar to the Doric order, and the *modillion* to the higher orders.

The *modillions* ought always to be placed over the middle of the column. They are particularly affected in the Corinthian order, where they are usually enriched with sculpture. Their proportions must be so adjusted, as to produce a regularity in the parts of the soffit.

The *intermodillions*, i. e. the distances between them, depend on the intercolumniations, which require the *modillions* to be made of a certain length and breadth, in order to render the intervals perfect squares, which are always found to have better effect than parallelograms. To this it must be added, that in adjusting the *modillions*, care should be taken, that they have such a proportion, as that when the orders are placed over one another, there be the same number in the upper order as in the lower, and that they fall perpendicularly over each other.

Modillions are also used under the cornices of pediments; though Vitruvius observes, that they were not allowed of in his time; in regard *modillions* were intended to represent the ends of rafters, which could not be supposed to be found in a pediment.

Some will have the *modillions* of a pediment to represent purlins; and those at the eaves to represent rafters. Daviler rather takes them for a kind of inverted consoles or corbels.

In the Corinthian order it is usual to have a leaf which takes up the whole breadth, and almost the whole length of the *modillions*; but Le Clerc is of opinion, that they would be more graceful if this leaf were less, both in length and breadth. The leaf ought likewise to be of the same kind with those which make the ornament of the capital.

MODIOLI, in *Natural History*, a name given by some authors to the trochitæ or single joints of the rays of the petrified magellanic star-fish, which, when connected in numbers together, form that fossil called ENTROCHUS. Others have also used this word *modiolus* to express the compound body, or entrochus itself. Though the general form of the trochitæ be thin and flat, yet they are sometimes found considerably thick; and though the entrochi or compound *modioli* are usually so many cylinders of equal diameter in all parts, yet there are sometimes found such as are thick in the middle, and thence gradually taper to each end; some also are composed of joints, each of this form; these differ very greatly from the common kind, and instead of consisting of a number of little wheels, are made up of a series of little barrels, joined, as it were, end to end.

MODIOLUS, a surgeon's instrument, the same with ANABAPTISTON, and TREPANUM.

MODIUS, in *Antiquity*, a kind of dry MEASURE in use among the Romans for several sorts of grain.

The *modius* contained thirty-two heminæ, or sixteen sextaries; or $\frac{1}{3}$ of the amphora; amounting to an English peck.

MODIRA *kaniram*, in *Botany*, a name given by some authors to the tree whose wood is the *lignum colubrinum*, or snake-wood of the shops.

MODO *& forma*, in *Law*, a phrase used in processes and pleadings, whereby the defendant absolutely denies the thing charged on him by the plaintiff, *modo & forma declaratis*, in the manner and form set forth.

The civilians in the like sense say, *negat allegata, probat allegantur, esse vera*.

MODULATION, in *Music*, is the art of keeping in, and, on occasion, changing, the mode or key; and returning to it again; without offence to the ear.

Under this term is comprehended the regular progression of the several parts through the sounds that are in the harmony of any particular key, as well as the proceeding naturally and regularly from one key to another.

The rules of *modulation* in the first sense belong to harmony and melody. We shall here only add a word with regard to the rules of *modulation* in the latter sense.

As every piece must have a principal key; and since the variety, so necessary in music to please and entertain, forbids the being confined to one key; and that therefore it is not only allowable, but necessary, to *modulate* into, and make cadences on several other keys, having a relation and connection with the principal key: it must be considered what it is that constitutes a connexion between the harmony of one key, and that of another, that it may be hence determined into what keys the harmony may be conducted with propriety.

As to the manner in which the *modulation* from one key to another is to be performed, so that the transition may be easy and natural; it is not easy to fix any precise rules: for though it is chiefly performed by the help of the seventh *g* of the key, into which the harmony is to be changed, whether it be flat or sharp; yet the manner of doing it is so various and extensive, that no rules can easily circumscribe it. A general notion of it may be conceived under the following terms.

The seventh *g* in either flat or sharp key is the third *g* to the fifth *f* of the key, by which the cadence in the key is chiefly performed; and by being only a semitone under the key, is thereby the most proper note to lead into it, which it does in the most natural manner imaginable: insomuch that the seventh *g* is never heard in any of the parts, but the ear expects the key should succeed it: for whether it be used as a third, or as a fifth, it always affects us with so imperfect a sensation, that we naturally expect something more perfect to follow, which cannot be more easily and smoothly accomplished than by the small interval of a semitone, to pass into the perfect harmony of the key. Hence it is, that the transition into one key is best effected by introducing its seventh *g*, which is naturally leads to it.

MODULE, in *Architecture*, a certain measure, taken at pleasure, for regulating the proportions of columns, and the symmetry or distribution of the whole building.

Architects usually choose the diameter or semidiameter of the bottom of the column for their *module*; and this they subdivide into parts, or minutes.

Vignola divides his *module*, which is a semidiameter, into twelve parts, for the Tuscan and Doric; and into eighteen, for the other orders.

The *module* of Palladio, Scamozzi, M. Cambray, Desgodetz, Le Clerc, &c. which is also the semidiameter, is divided into thirty parts, or minutes, in all the orders.

Some divide the whole height of the column into twenty parts for the Doric, twenty-two and a half for the Ionic, twenty-five for the Roman, &c. and one of these parts they make a *module*, to regulate the rest of the building by.

There are two ways of determining the measures or proportions of buildings; the first by a fixed standard measure, which is usually the diameter of the lower part of the column, called a *module*, subdivided into sixty parts, called *minutes*. In the second there are no minutes, but any certain and stated division of the *module*; but it is divided occasionally into as many parts as are judged necessary. Thus, the height of the Attic base, which is half the *module*, is divided either into three, to have the height of the plinth; or into four, for that of the greater torus; or into six, for that of the lesser.

Both these manners have been practised by the ancient as well as the modern architects; but the second, which was that chiefly used among the ancients, is in the opinion of Perrault preferable.

As Vitruvius, in the Doric order, has lessened his *module*, which in the other orders is the diameter of the lower part of the column, and has reduced that great *module* to a mean one, which is a semidiameter; M. Perrault reduces the *module* to a third part for the same reason, viz. to determine the several measures without a fraction. For in the Doric order, beside that the height of the base, as in the other orders, is determined by one of

those

theſe mean *modules*; the ſame *module* gives likewiſe the heights of the capital, architrave, triglyphs, and metopes. But our little *module*, taken from the third of the diameter of the lower part of the column, has uſes much more extenſive; for, by this, the heights of podeſtals, of columns, and entablatures, in all the orders, are determined without a fraction.

As then the great *module* or diameter of the column, has ſixty minutes; and the mean *module*, or half the diameter, thirty minutes; our little *module* has twenty. See COLUMN.

MODUS *decimandi* is when a parcel of land, a ſum of money, or a yearly penſion, belongs to the parſon, either by compoſition or cuſtom, time out of mind, in ſatisfaction for tithes in kind.

This is ſometimes a pecuniary compenſation, as two pence an acre for the tithe of land; ſometimes it is a compenſation in work and labour, as that the parſon ſhall have only the twelfth cock of hay, and not the tenth, in conſideration of the owner's making it for him: ſometimes in lieu of a large quantity of crude or imperfect tithe, the parſon ſhall have a leſs quantity, when arrived to greater maturity, as a couple of fowls inſtead of tithe eggs, &c. In ſhort, any means whereby the general law of tithing is altered, and a new method of taking tithes is introduced, is called a *modus decimandi*, or ſpecial manner of tithing. In order to make a good and ſufficient *modus*, the following rules muſt be obſerved:

1. It muſt be certain and invariable. 2. The thing, given in lieu of tithes, muſt be beneficial to the parſon, and not for the emolument of third perſons only. 3. It muſt be ſomething different from the thing compounded for. 4. One cannot be diſcharged from payment of one ſpecies of tithe, by paying a *modus* for another. 5. The recompence muſt be in its own nature as durable as the tithes diſcharged by it; i. e. an inheritance certain. 6. The *modus* muſt not be too large, which in law is called a rank *modus*. In theſe caſes of preſcriptive or cuſtomary *moduſes*, the law ſuppoſes an original real compoſition to have been regularly made, which being loſt by length of time, the immemorial uſage is admitted as evidence to ſhew that it did once exiſt, and that from thence ſuch uſage was derived. Now time of memory hath been long aſcertained by the law, to commence from the reign of Richard I. and any cuſtom may be deſtroyed by evidence of its non-exiſtence in any part of the long period from his days to the preſent. Blackſt. Com. b. ii. p. 30.

MOEDA. See MOIDORE.

MOEHRINGIA, *mountain chick-weed*, in *Botany*, the name of a genus of plants of the *octandria digynia* claſs, deſcribed by Linnæus; the characters of which are theſe: the perianthium ſtands expanded, and is compoſed of four leaves, of a lanceolated figure; the flower is compoſed of four petals of an oval figure not indented at the ends, and ſmaller than the ſegments of the cup; the ſtamina are eight capillary filaments; the antheræ are ſimple; the germen of the piſtil is globoſe; the ſtyles are two, they are erect and of the length of the ſtamina; the ſtigmata are ſimple; the fruit is a globoſe capſule, compoſed of four valves, but having only one cell in which are ſeveral ſeeds, convex on one ſide and angular on the other. There is only one ſpecies.

MOERDA. See MURDER.

MOGORIN, in *Botany*, a name given by the Portugueſe to an Indian or Chineſe flower, growing on a ſmall ſhrub. It is of a wonderful white colour, and not unlike the *yin-ſing*, only that it abounds more with leaves, and ſmells much ſweeter; one ſingle flower filling a whole houſe with its odoriferous effluvia. On this account the Chineſe put a high value upon it, and carefully defend the ſhrub it grows on from the inclemency of the winter, by covering it with vaſes provided on purpoſe.

MOHAIR, in *Commerce*, the hair of a kind of GOAT, frequent about Angora, in Turkey; the inhabitants of which city are all employed in the manufacture of camblets made of this hair.

Some give the name *mohair* to the camblets or ſtuffs made of this hair: of theſe there are two kinds; the one ſmooth and plain; the other watered like tabbies: the difference between the two only conſiſts in this, that the latter is calendered, the other not. There are alſo *mohairs* both plain and watered, whoſe woof is of wool, cotton, or thread.

MOHAIR, *unwatered*, pays $6\frac{72}{100}d.$ per yard on importation and draw-back, on exportation, $6\frac{72}{100}d.$ The watered ſort pays on importation $11\frac{44}{100}d.$ per yard, and draws back, on exportation $10\frac{72}{100}d.$ And that made of half hair, half ſilk, pays on importation $2s.\ 10\frac{16}{100}d.$ per yard, and draws back, on exportation, $2s.\ 7\frac{72}{100}d.$

MOHAIR-*ſtuff*, in *Natural Hiſtory*. See MOIRE.

MOHAWKS *corn*, in *Botany*, a name given by the Indians to a peculiar ſort of the MAIZE, or Indian corn. It is moſt frequent in the more northerly parts of America. The general time of ſowing the maize in Virginia and other places, is in the end of April; but this *mohawk* kind need not be ſown before June, and yet will come well to maturity before the winter. The ſtalks of this kind are ſhorter than thoſe of the common ſort. The ears alſo are ſhorter, and grow nearer the ground, and the corn is generally of various colours. Phil. Tranſ. N° 142.

MOHAWKS. See MOCK.

MOIDORE, MOIDORE, or MOEDA, a gold coin, ſtruck and current in Portugal.

The *moidore* and its diviſions, are reckoned by the ree, and being numbered on the coin, the value of each piece is thus readily known. Thus that marked

four millrees	4000	is worth	£. 1: 7: 0	Engliſh money.
	2000		0: 13: 6	
	1000		0: 6: 9	
	500		0: 3: 4½	

See REE.

The *moidore* is properly the Portugueſe *piſtole*.

There are alſo *doppio-moedas*, or double *moidores*, or piſtoles, and demi-piſtoles.

MOIETY, MEDIETAS, the *half* of any thing.

MOILON, is a name given by the French to a kind of ſtone, that forms the upper cruſt and lies round the free-ſtone in moſt quarries. It is an excellent ſubſtance for forming the body of fluxes or ſoft enamel.

MOINEAU, in *Fortification*, is a flat baſtion raiſed before a curtin when it is too long, and the baſtions of the angles too remote to be able to defend one another.

Sometimes the *moineau* is joined to the curtin, and ſometimes it is divided from it by a moat. Here muſqueteers are placed, to fire each way.

MOIRE, in *Conchyliology*, the mohair ſhell, a name given by the French virtuoſi to a peculiar ſpecies of VOLUTA, which ſeems of a cloſely and finely reticulated texture, and reſembles on the ſurface a piece of mohair, or a very cloſe ſilk-worm's web.

MOISTURE. See HUMIDITY.

The *moiſture* of the air has conſiderable effects on the human body. For the quantity and quality of the food, and the proportion of the meat to the drink, being given, the weight of a human body is leſs, and conſequently its diſcharges greater in dry weather than in wet weather; which may be thus accounted for: the *moiſture* of the air moiſtens the fibres of the ſkin, and leſſens perſpiration, by leſſening their vibratory motion. When perſpiration is thus leſſened by the *moiſture* of the air, urine, indeed, is by degrees increaſed, but not equally. See Dr. Bryan Robinſon's Diſſ. on the Food and Diſcharges of the Human Bodies, p. 68, ſeq.

Hence we learn, that to keep a body of the ſame weight in wet weather as in dry, either the quantity of food muſt be leſſened, or the proportion of the meat to the drink increaſed; and both theſe may be done by leſſening the drink, without making any change in the meat.

The inſtrument uſed for determining the degree of *moiſture* in the air, is called an HYGROMETER. Since the printing of that article, Mr. Coventry, of Southwark, has furniſhed the editor with an account of his new hygrometer, the conſtruction of which is as follows: take two ſheets of fine tiſſue paper, ſuch as is uſed by hatters and watch-makers, and ſometimes called Jawn-paper, each ſheet of which generally weighs about twenty-ſeven grains. Let the moiſture be thoroughly evaporated by the fire, without ſcorching the paper; till after repeated trials it is brought to its drieſt ſtate: in this ſtate cut each ſheet till it weighs exactly twenty-five grains. Theſe ſheets, thus prepared, ſhould be kept in a box or drawer with a quantity of the ſame paper deſigned for uſe; and they will always ſerve for determining the proper weight of any quantity of paper for other hygrometers. This paper hung in any place, and kept free from duſt, and weighed with a nice pair of ſcales, will ſerve to exhibit the *moiſture* of the air, by its increaſe of weight above fifty grains. But to avoid the trouble of weighing, Mr. Coventry prepared an hygrometer of it in in the following manner. A, *Tab.* III. *Pneumatics*, *fig.* 49. repreſents a pillar ſupporting the beam B B, to one end of which are ſuſpended fifty grains of paper D, cut round, and threaded on a ſilk ſtring, with a ſmall glaſs bead between the ſheets, for the freer admiſſion of the air: at the other end of the beam is a braſs weight E, to counterbalance the weight of the paper and its appendages. At the bottom there is an ivory ſcale F F, of twelve prime diviſions, anſwering to twelve grains of *moiſture*: each prime diviſion is ſubdivided into ten parts, making in the whole one hundred and twenty diviſions: on the index C is a ſliding weight G, which, with the weight E on the beam, ſerves to adjuſt the inſtrument; ſo that twelve grains ſhall make the index juſt traverſe the ſcale of the twelve

twelve divisions. If the air was so dry as to leave no *moisture* in the paper, the index would then point to 0: if it contained six grains of *moisture*, the index would point to sixty; if twelve grains were in the paper, it would point to the moist extreme one hundred and twenty: but the air has never yet been observed so moist, as to make the index point to the moist extreme, nor so dry as to allow its reaching to the driest extreme, even in the hottest part of summer, by nearly twenty divisions: whence it is inferred that there is in the air a greater quantity of *moisture* in hot weather than is generally imagined. H is an adjusting screw for fixing the stand upright by means of the point of a plumbet that hangs behind. This hygrometer, adjusted, may be made to correspond with another, ascertained to the same weight at any distance: by which we might determine the exact difference of the state of the air, with respect to *moisture*, in inland, and places near the sea-side. The advantages of this hygrometer are the following: as it is made of the thinnest substance that can be procured, it is the soonest affected with dryness or *moisture*, and exhibits immediately the first change of the weather: it is not acted upon by heat and cold, or any other cause, as most other instruments of this kind are: it has one datum from which to reckon; viz. the dry extreme, whence all other degrees of *moisture* may be nicely estimated. All hygrometers of this sort will act nearly alike, as thermometers or barometers; and may be reduced to a regular standard. Mr. Coventry found by this hygrometer, that in clear frosty weather, the air contains a very considerable degree of *moisture*: for on Jan. 27, 1776, in the morning, being a very hard frost, the thermometer in the house 24°, and in the open air 17°, the hygrometer stood at ten grains, i. e. at the division 100: and on the next morning, when a thaw came on, it stood at 96; which shews that there is as much *moisture* in the air during the frost, as when we perceive it dissolved in a thaw. He adds, that it is pleasing to observe the constant motion of this hygrometer: for even in constant settled weather, it is always in motion, from moist towards dry, from about eight in the morning till about four in the afternoon; and from dry to moist, from about 4 P. M. to about 8 A. M. In hot gloomy weather, the hygrometer is mostly found to advance with speed towards moist, and shews that the air at such times retains a great quantity of *moisture*: and this always forebodes heavy showers. For curious experiments some of these hygrometers are made to traverse the whole scale of divisions for every grain of *moisture* that is imbibed by the papers.

MOISTURE *radical*. See RADICAL.

MOLA, in *Medicine*. See MOLE.

MOLA, in *Ichthyology*. See SUN-*fish*.

MOLA, in *Anatomy*, a bone of the knee, called also *patella*, *rotula*, &c. See *Tab. Anat. (Osteol.) fig.* 23, *n.* 21, 22.

MOLAGO *codi*, in *Botany*, a name by which some authors have called the plant which produces the common black pepper.

MOLANGA, in *Botany*, a name given by some authors to the plant which produces the common black pepper.

MOLAR *glands*, or *glandulæ molares*, so called by Heister, who first described them, are two glands situated between the masseter and buccinator, which send out small ducts perforating the buccinator, and opening into the cavity of the mouth, almost over against the *dentes molares*.

MOLARES, in *Anatomy*, the *grinders*; an epithet given to the large teeth; as serving, like mill-stones, to grind the food. See *Tab. Anat. (Osteol.) fig.* 7. *lit. f.*

The number of *molares* is not always the same. Some persons have twenty; and others only sixteen, viz. four or five on each side of either jaw. They are very large, hard, and strong; being fastened into their alveoli or sockets by several roots.

The *molares* have been, according to the difference in their size, distinguished into small grinders, large grinders, and *dentes sapientiæ*, or the teeth of wisdom, so called, because they seldom appear till people are arrived at years of discretion.

The bodies of the *molares* in general are very thick, short, and irregularly cylindrical, or rather with four sides, a little rounded, and terminated by a broad end, more or less filled with obtuse points, cut, in some measure, like so many diamonds. The name of *crown* is also frequently given to the bodies of these teeth, from some sort of resemblance they are supposed to have to it. In the two small *molares*, the crown is less than in the others, and often not so large as the bodies of the canini: they have usually but two points. In the two large *molares*, the crown has a much greater extent, and the points are three, four, or five in number. The fifth grinder, or *dens sapientiæ*, has usually a crown much like the two former, but commonly more rounded, and with fewer points. The roots of the *molares* are long, and more or less flat; in some single, in others two, three, or four, and sometimes, but rarely, five in number; sometimes all these roots are distinct, sometimes they are wholly united, and sometimes they are united only in part; they are generally strait, and at a greater distance from one another at their extremities than at the crown of the tooth. The roots of the small grinders appear often single, without being so in reality; for in examining them narrowly, they are found to have two roots united, or foldered together; and sometimes all the distinction that appears, is in their having two separate points. The great *molares* have commonly several roots, the first three, and the second four; or sometimes, the first four, and the second five; but these numbers are variable. The roots are sometimes all perfectly distinct, and sometimes they are partly distinct, and partly united in the same tooth in different degrees; and in some subjects, one or more of their points are bent outward, inward, or in other directions; and it is not always that more roots are met with in the upper teeth than in the lower. The fifth grinder has often but one root, and that is sometimes very short, and sometimes remarkably long. It is common to meet with this tooth in grown persons, almost wholly hid in its socket, and it has, in these cases, but a very small opening for it to appear at. In all the *molares*, near the collar, the roots, be they ever so many, meet and unite into one body. Winslow's Anatomy, p. 49.

MOLARES, in the *Natural History of the Ancients*, the name for the compound mineral bodies we now call PYRITES, and MARCASITES.

MOLASSES. See MOLOSSES.

MOLD. See MOULD.

MOLDAVICA, in *Botany*. See DRAGON's *head*.

MOLE, *talpa*, in the Linnæan system of *Zoology*, makes a distinct *genus* of animals, of the order of *feræ*, and class of *mammalia*: the characters of which are, that they have six upper fore-teeth, and eight lower; and the first of the laniarii is larger, and four smaller. Linnæus reckons two species, viz. the European, which has a tail, and five toes on its feet, and the Asiatic or Siberian, which has no tail, and three toes on the fore-feet.

The *mole*, though a very common animal, is very little observed by the generality of the world. Its fur is very short, soft and thick; its nose is like that of a hog; and its teeth like those of the *mus araneus*, being single and eminent on the sides of the upper jaw, and those farther within the mouth armed with many points; it has scarce any neck, its head seeming to be set between its shoulders; its legs are very short, its claws very sharp, and its toes five in number on each foot; the inner part or sole of the fore-feet is very broad, and much resembles the palm of the human hand; its claws on these are more robust and strong than in any other animal of its size; the whole feet and toes are not placed downward but sideways, for the sake of the creature's continual employment in digging, it being properly a subterranean animal; its tail is short, and hairy.

It has been supposed by many, that the *mole* had no eyes; and others have affirmed, that it had eyes, but that they were covered with a membrane; but neither of these assertions are true; the eyes are small, and have apertures in the skin, through which they may easily be discerned by a curious observer; and are very black, about the size of a millet-seed, and fastened to a nerve.

The reason they have not been observed by the common people, is, that they are hid by the fur; but, on blowing that away, they always shew themselves; it has no ears. Its skin is extremely firm and tough, so that it requires a sharp knife to pierce it.

This seems the care of nature to defend the creature from the cold; and the fineness of the fur, that is the smallness of every hair, seems proportioned to the small pores they had to grow out of.

The hair is usually black, sometimes spotted with white; and sometimes quite white. This animal has an exquisite sense of smelling, which directs it to its food, viz. worms, insects, and roots. It breeds in the spring, and brings forth four or five young at a time. It makes its nest of moss, a little beneath the surface of the ground, and screams much when taken. Palma christi and white hellebore, made into a paste, and laid in their holes, destroy them. There are no *moles* in Ireland. See *Tab.* III. *Quadrupeds*, N° 34. A yellowish kind of *mole* inhabits North America. The Siberian *mole* is of a beautiful green and gold colour, variable with the light. Ray and Pennant.

MOLE, MOLA, or MOLA *carnea*, in *Medicine*, a misshapen mass of hard flesh, sometimes generated in the wombs of women, instead of a fœtus; called also a *false conception*. The Latins give it the name *mola*, which literally signifies *mill-stone*, from its resemblance to it in form.

The *mole* is the chaos of an embryo; and would have grown to an infant, had not the process of conception been disturbed. Though it be without regular bones, viscera, &c. yet the lineaments frequently are not so far effaced, but that there are some remains of a child; sometimes a hand, and sometimes a foot, have been seen; and commonly the secundines.

It is rare that more than one *mole* is excluded at a time; though Scanertus observes there are instances of two, three, or even more. He adds, that though they usually come alone, yet they have been known to come with a fœtus, sometimes before it, and sometimes after it.

The *mole* is distinguished from an *embryo*, in that it has no placenta whereby to receive its nourishment from the mother. Instead of that it grows immediately to the womb; and is nourished there.

It has a kind of vegetative life, and continues growing in bulk till the time of exclusion. Sometimes it has been borne in the womb for two or three years.

This production is supposed to arise from some defect or indisposition of the ovum, or egg; or, perhaps, from the male's seed wanting force to penetrate it sufficiently in order to open or expand the parts: or, the effect may be accounted for, by supposing an ovum to drop into the womb, without being impregnated by the seed of the male: in all which cases, the egg continuing to grow, and yet wanting something necessary to organize and form it into an embryo, becomes a shapeless lump.

Authors are divided whether or no women ever bring forth *moles* without any intercourse with men? Some say there are *moles* which derive their origin from the menstruous blood detained, coagulated, and hardened; through which the blood and spirits have made themselves passages, &c.

The *mole*, while in the womb, may be distinguished from a true conception, by its tremulous palpitating motion; by its rolling from side to side; and by the belly's swelling equally every way. The breasts swell as in case of a just embryo; but the humour generated therein is not true milk, but a crude matter, formed of the suppressed menses.

To bring the *mola* out of the womb, bleeding and violent purging are used, and at last strong emmenagogues. If these fail, recourse is to be had to manual operation.

A *mole* is sometimes produced alone in the uterus, sometimes at the same time with a regular fœtus. There are many origins to be assigned to these concretions, but the most usual seems to be the leaving behind a part of the secundines after abortion. In young people these are less dangerous, and seldom remain in the womb more than a year, but in older persons they sometimes remain many years, and at length often occasion the death of the person. When they are produced in the womb at the same time with a regular fœtus, they usually deprive it of part of its nutriment, and occasion false pains, and many irregular complaints, during the time of gestation; but these usually are attended with fewer accidents at the time of delivery than when the same substances are produced alone in the womb. The German writers of wonders give accounts of these concretions being living animals, armed with claws and beaks, or wide mouths, and destroying the fœtus when they are in the womb at the same time with one; but these are idle reports, and are to be looked upon in the same light with the histories of sooterkins. Junk. Conf. Med. p. 721.

The signs of a *mole* in the uterus are very dubious, and during the first months of gestation, it is scarce possible to distinguish it from a genuine fœtus; but after this, if the symptoms of pregnancy go on, and there is no motion perceived at a time when the fœtus ought to stir, it is shrewdly to be suspected that this is the case; and this becomes the more evident, if after this time there come on irregular and uncertain discharges of blood from the uterus, at different times; in this case there is also usually so great a flaccidity in the ligaments of the uterus, that it does not retain its place in the body; but when the person turns in bed, is plainly felt falling like a dead weight from one side of the abdomen to the other. It is also observed, that in these cases, though the belly swells as much as when there is a genuine fœtus, yet it is not so regularly rounded before, but is flatter at the middle, and more turgid toward the sides, so that the burden seems carried on one or the other side, or partly in both, while the middle remains empty. There is always in this case also a sensation of a weight on the lower part of the abdomen, greater by much than in the case of a real a child there. At the regular time of delivery, the case becomes much plainer than before; for then either no pains at all come on, or those which come are slight, and inconsiderable, very irregular in their periods and returns, and by no means sufficient for the exclusion of a fœtus. When the *mole* happens at the same time with the fœtus, it is seldom to be discovered till the time of delivery, or if it be found out sooner, there can be nothing done till both that and the fœtus are excluded; after this the womb is to be very carefully cleansed, as in abortions. At other times, when the case is obvious, that there is a *mole* without any fœtus, the common forcing medicines are to be given for several days every month, about the time of the periodic returns of the menses; and if those do not bring it away, recourse is to be had to the hand of the midwife.

We find a very singular instance in Kerkring, of a *mole*, in which a child was inclosed. The whole was declared a false conception, and might have been sacrificed as such, had not some person present observed something stir within it, and, on the opening it, taken out the living child.

MOLE, MOLES, a massive work formed of large stones laid in the sea by means of cosser-dams, extended either in a right line, or an arch of a circle, before a port; which it serves to close; to defend the vessels in it from the impetuosity of the waves, and to prevent the passage of ships without leave.

Thus we say the *mole* of the harbour of Messina, &c.

MOLE is sometimes also used to signify the harbour itself.

MOLE, MOLES, among the Romans, was also used for a kind of mausoleum, built in manner of a round tower on a square base, insulate, encompassed with columns, and covered with a dome.

The *mole* of the emperor Adrian, now the castle of St. Angelo, was the greatest, and most stately, of all the *moles*. It was crowned with a brazen pine-apple, wherein was a golden urn containing the ashes of the emperor.

MOLE *cricket*, *gryllotalpa*, in *Zoology*. See *Mole* CRICKET.

MOLE-*hills*. These little hillocks of earth are a very great prejudice to the pasture-lands, not only in wasting so much of the land as they cover, but in hindering the scythe in mowing. In the west of England they use a peculiar instrument for the breaking up of these; it is a flat board, very thick, and of about eight inches in diameter, into which there is fastened a perpendicular handle of three or four feet long. It has four broad and sharp iron teeth at the front, which readily cut through the hill, and spread the earth it consists of; and behind there is a large knob, proper for breaking the clods with, if there are any. Some use a spade, or other common instrument, in the place of this, but not so well. There is, however, a much better instrument even than this, for destroying these hills, where they are in very great numbers. This is a kind of horse-machine; it has a sharp iron about three feet over, and with a strong back. It is about four or five inches broad, and has two long handles for a horse to be harnessed to, and a cross bar of iron to strengthen it at the bottom of the handles, reaching from the one handle to the other. The middle of this cross bar is furnished with one, two, or more, sharp pieces of iron, like small plough-shares, to cut the *mole-hills* into two, three, or more parts. The iron behind is of a semicircular figure. A single horse is harnessed to this machine, and a boy must be employed to drive it, and a man to hold and guide it; the sharp irons or shares are the first things that meet the hill, they run through it, break its texture, and cut it into several parts, and the circular iron following immediately behind them, cuts up the whole by the roots, and leaves the land level. This instrument will destroy as many *mole-hills* in one day as a common labourer can in eight, and would be of very great advantage to the kingdom, if brought into general use. Mortimer's Husbandry, p. 331.

It is to be observed, that this leaving a naked space in the place of every hill, it will be necessary to go over the land, and sow them with hay seed, otherwise these spots will want the produce of grass the first years. The farmers in some parts of England are not willing to destroy the *mole-hills*, but let them stand from year to year, supposing that they get some ground by them; but the advantage by this means is so little that it does not balance the unsightliness and damage to the mowing.

MOLECULE, MOLECULA, in *Physics*, a little mass or portion of any body.

The air, by respiration, insinuating itself into the veins and arteries, endeavours by its elastic power to divide and break the *molecules* of the blood, which on their part resist such division.

MOLES *carnea*, in *Anatomy*, a name given by Vesalius, and others, to a muscle, called by Winslow, Albinus, and others, the COMPLEXUS. Spigelius calls it the *carnea moles trigemino adjuncta*.

MOLES *carnea labia formans*, in *Anatomy*, a name given by Fallopius to the muscle called by Albinus *orbicularis oris*, and by Cowper CONSTRICTOR *labiorum*.

MOLESTANDO. See NON *molestando*.

MOLINE', in *Heraldry*. A *croſs* MOLINE' is that which turns round both ways at all its extremities, though not ſo wide or ſharp as that ſaid to be *anchored*.
In Upton, the points are all cut off, which makes it very different from the croſs anchored.

MOLINISTS, in *Eccleſiaſtical Hiſtory*, a ſect in the Romiſh church, who follow the doctrine and ſentiments of the Jeſuit Molina, relating to ſufficient and efficacious grace. Lewis Molina, after whoſe name this ſect was called, was a Spaniſh Jeſuit, and profeſſor of divinity in the univerſity of Ebora, in Portugal; in the year 1588, he publiſhed a book, to ſhew that the operations of divine grace were entirely conſiſtent with the freedom of human will; and he introduced a new kind of hypotheſis to remove the difficulties attending the doctrines of predeſtination and liberty, and to reconcile the jarring opinions of Auguſtinians, Thomiſts, Semi-Pelagians, and other contentious divines. Molina affirmed, that the decree of predeſtination to eternal glory was founded upon a previous knowledge and conſideration of the merits of the elect; that the grace, from whoſe operation theſe merits are derived, is not efficacious by its own intrinſic power only, but alſo by the conſent of our own will, and becauſe it is adminiſtered in thoſe circumſtances, in which the Deity, by that branch of his knowledge, which is called *ſcientia media*, foreſees that it will be efficacious. The kind of preſcience, denominated in the ſchools *ſcientia media*, is that foreknowledge of future contingents, that ariſes from an acquaintance with the nature and faculties of rational beings, o the circumſtances in which they ſhall be placed, of the objects that ſhall be preſented to them, and of the influence which theſe circumſtances and objects muſt have on their actions.
The great antagoniſts of the *Moliniſts* are the JANSENISTS.

MOLINOSISTS, a ſect among the Romaniſts, who adhere to the doctrine of Molinos. Theſe are the ſame with what are otherwiſe called QUIETISTS.

MOLLE, in *Botany*. See *Indian* MASTIC.

MOLLE, in *Ichthyography*, the name of a ſmall ſpecies of whiting, common in the Mediterranean, and in the markets of Rome, Venice, &c. and called by authors the *aſellus omnium minimus*, and the *merlangus*. It is the ſmalleſt of all the aſellus kind, ſeldom exceeding four inches in length; it has a beard like the cod, hanging from the angle of its lower jaw; and has on each ſide nine ſpots on its noſe and gills; the back is of a pale brown, the belly white, and it has extremely ſmall and ſoft ſcales. The fleſh is very delicate.

MOLLE, in the *Ancient Muſic*, a name given to a ſpecies of the DIATONIC; and alſo to a ſpecies of the CHROMATIC.
The Greeks call it μαλακὸν, and uſed the term in oppoſition to *intenſum*, συντονον. As the latter was formed by increaſing the tenſion of the chord, and thereby making it approach nearer to the higheſt extreme of the tetrachord; ſo the *molle* was formed by remiſſion or relaxation. Hence the diviſion of the diatonic into *molle*, μαλακὸν, and *intenſum*, συντονον. Ariſtoxenus, p. 50, 51. edit. Meibom. See GENUS.

MOLLET. See MULLET.

MOLLIS *portio*. See PORTIO.

MOLLUGO, *African chick-weed*, in *Botany*, a genus of the *triandria trigynia* claſs. Its characters are theſe: the empalement of the flower is compoſed of five oblong ſmall leaves, coloured on their inſides and permanent; the flower has five oval petals ſhorter than the empalement; and three briſtly ſtamina, which ſtand near the ſtyle, terminated by ſingle ſummits; it has an oval germen, having three furrows, ſupporting three very ſhort ſtyles: the germen becomes an oval capſule with three cells, filled with ſmall kidney-ſhaped ſeeds. There are ſeveral ſpecies, few of which are admitted into gardens. Miller reckons two, and Linnæus five ſpecies.
This plant is ſaid to have an aperitive virtue.

MOLLUSCA, in the Linnæan ſyſtem, is the denomination of the ſecond *genus* of *vermes* or worms. Theſe are ſimple naked animals, not included in a ſhell, but furniſhed with limbs, and comprehend eighteen ſubordinate genera, and one hundred and ten ſpecies.

MOLMAN, in our *Old Writers*, a man ſubject to do ſervice. It is applied to the ſervants in a monaſtery.

MOLMUTIN, or MOLMUTIAN *laws*, the laws of Dunwallo Molmutius XVI. king of the Britons, who is ſaid to have begun his reign four hundred and forty years before the incarnation.
He was the firſt who publiſhed any laws in this land; and they continued famous therein till the time of William the Conqueror.

MOLOCH, an affected term uſed by ſome chemical writers, to expreſs a leaden pot, through which mercury is made to paſs in the fire.

MOLOCH, in *Antiquity*, the name of the Phœnician god. See DÆMON.

MOLOCHITES, in *Natural Hiſtory*. See MALACHITES.

MOLOPS, a word uſed by ſome medical writers, to expreſs the purple ſpots which appear upon the ſkin in malignant fevers.

MOLOSSES, MOLASSES, or MELASSES, that groſs, yet fluid matter remaining of ſugar, after refining, and which no boiling will bring to a conſiſtence more ſolid than that of ſyrup; hence alſo called *ſyrup of* SUGAR.
Properly, *moloſſes* are only the the ſediment of one kind of ſugar called *clyppre*, or brown ſugar, which is the refuſe of other ſugars not to be whitened, or reduced into loaves.
Moloſſes are much uſed in Holland among poor people, for the preparation of tobacco, and alſo inſtead of ſugar. There is a kind of BRANDY or ſpirit made of *moloſſes*; but by ſome held exceedingly unwholeſome.

MOLOSSES, *artificial*. There has been found a method of making *moloſſes* from apples, without the addition of ſugar. The apple that ſucceeds beſt in this operation is a ſummer-ſweeting of a middle ſize, pleaſant to the taſte, and ſo full of juice, that ſeven buſhels will yield a barrel of cyder.
The manner of making it is this: the apples are to be ground and preſſed, then the juice is to be boiled in a large copper, till three quarters of it be evaporated: this will be done with a moderate fire in about ſix hours, with the quantity of juice above mentioned; by this time it will be of the conſiſtence and taſte as well as of the colour of *moloſſes*.
This new *moloſſes* ſerves to all the purpoſes of the common kind, and is of great uſe in preſerving cyder. Two quarts of it, put into a barrel of racked cyder, will preſerve it, and give it an agreeable colour.
The invention of this kind of *moloſſes* was owing to Mr. Chandler, of Woodſtock, in New England, who living at a diſtance from the ſea, and where the common *moloſſes* was very dear and ſcarce, provided this for the ſupply of his own family, and ſoon made the practice general among the people of the neighbourhood. It is to be obſerved, that this ſort of apple, the ſweeting, is of great uſe in making cyder, one of the very beſt kinds we know being made of it. The people in New England alſo feed their hogs with the fallings of their orchards of theſe apples; and the conſequence of this is, that their pork is the fineſt in the world. Phil. Tranſ. N° 174, p. 230.

MOLOSSES *ſpirit*; a very clean and pure ſpirit, much uſed in England, and made from *moloſſes* or common treacle diſſolved in water, and fermented in the ſame manner as malt or the common malt-ſpirit. If ſome particular art is not uſed in the making this, it will not prove ſo vinous as the malt-ſpirit, but more flat and leſs pungent and acid, though otherwiſe much cleaner taſted, as its eſſential oil is of a leſs naufeous flavour. Whence if good freſh wine leys, abounding in tartar, be duly fermented in the ſolution made thin for that purpoſe, the ſpirit will by that means become much more vinous and briſk, and approach more to the nature of the foreign ſpirits.
After the firſt diſtilling of *moloſſes* ſpirits from the waſh into low wines, it is to be rectified, and in the ſucceeding rectifications proper additions are to be made. Alkaline ſalts, ſo common in the rectifying the malt-ſpirits, muſt be avoided in this caſe, as not at all ſuiting this ſpirit, and the neutral ones only muſt be uſed, ſuch as ſandiver, common decrepitated ſalt, ſal enixum Paracelſi, and the like; but upon the whole nothing ſo conſiderable is to be expected from theſe ſalts, as from a careful rectification in balneo mariæ, without any other admixture; by this alone repeated two or three times with freſh water each time, the ſpirit will at once be made fit for the niceſt uſes.
Where the *moloſſes* ſpirit is brought to the common proof-ſtrength, if it be found not to have enough of the vinoſity in it, it will be very proper to add to it ſome good ſpiritus nitri dulcis; and if the ſpirit be clean worked, it may by this addition alone be made to paſs on ordinary judgments for French brandy.
When newly diſtilled, this ſpirit, like all others, is colourleſs, and limpid as water; but our diſtillers always give it the ſame tort of yellow tinge, which the foreign ſpirits are found to obtain from the caſks they are ſent over in. They have many ways of giving this colour extempore; but the two moſt in uſe are, either by an extract of oak-wood, or by burnt ſugar.
Moloſſes ſpirit coming dearer than that of malt, it is frequently met with baſely adulterated with a mixture of that ſpirit, and indeed ſeldom is to be bought without ſome daſh of it. Many have a way of mixing malt in the fermenting liquor, by this the yield of the whole is greatly increaſed, and the maker may aſſure the buyer that the ſpirit is pure as it ran from the worm.

England is the principal place where this ſpirit is made at this time: it was at one time prepared in great quantities in France, eſpecially on the river Loire; but it is now forbid there, under a ſevere penalty. In Holland alſo they have it not, on account of the high duty laid upon treacle in favour of their own ſugar-bakers.

We meet with very little of *moloſſes* ſpirit reduced to the ſtrength of alcohol or ſpirit of wine, though, when rectified to this ſtate in a proper manner it is very little inferior to the real alcohol of wine, the name of which is ſo well known among us, though the thing itſelf is perhaps never ſeen here. All that we call ſpirit of wine being no other than malt ſpirit reduced to an imperfect alcohol, or a ſpirit almoſt totally inflammable.

Great quantities of *moloſſes* ſpirit are uſed in the adulterating of brandy, rum, and arrack; and great quantities are uſed alone in the making cherry-brandy and other drams by infuſion, in all which many prefer it even to the foreign ſpirits.

In moſt of the nice caſes in our compound diſtillery, the *moloſſes* ſpirit ſupplies the place of a pure and clean malt-ſpirit, which we have not yet the way of producing in the large way to advantage. Our cinnamon, citron, and other fine cordial-waters, are made with it; for the malt ſpirit would give theſe a very diſagreeable flavour.

There is alſo another uſe to which this ſpirit ſerves extremely well, and which even a foreign ſpirit that has any remarkable flavour will not do ſo well in; this is the making the extemporaneous wine, which ſome people are ſo fond of. See *Extemporaneous* WINE.

It gives a yellow ſtain to the hands, or other ſubſtances dipped into it; and may therefore be of uſe in dying. It is poſſible alſo, that the vinegar-makers may find uſe for it in their way; but the moſt advantageous of all its uſes is to the diſtiller himſelf, a quantity of it added to new treacle intended for fermentation will be of great uſe in the proceſs, and increaſe very conſiderably the quantity of ſpirit; but the proportion in regard to the new matter muſt not be too great. Shaw's Eſſay on Diſtillery.

MOLOSSUS, in the *Greek* and *Latin Poetry*, a foot conſiſting of three long ſyllables. As *audiri, cantabant, virtutem*.

It takes it name either from a dance in uſe among the people called *Moloſſi*, or *Epirotæ*; or from the temple of Jupiter *Moloſſus*, where odes were ſung, in which this foot had a great ſhare; or elſe becauſe the march of the *Moloſſi*, when they went to the combat, was compoſed of theſe feet, or had the cadence thereof. The ſame foot was alſo called among the ancients, *Vertumnus, extenſipes, hippius, & cantus*. Dion. iii. p. 475.

MOLTA, or MOLTURA, a duty or toll paid by vaſſals to the lord for grinding their corn at his mill.

MOLTEN *greaſe*, in the *Manege*. See GREASE.

MOLTING, or MOULTING, the falling off or change of hair, feathers, ſkins, horns, or other parts of animals, happening in ſome annually, in others only at certain ſtages of their life.

The generality of beaſts *mult* in the ſpring.

The *molting* of a hawk is called *mewing*.

The *molting* of a deer is the quitting of his horns in February or March.

The *molting* of a ſerpent is the putting off his ſkin. See EXUVIÆ.

MOLUCCA *balm, moluccella*, in *Botany*, a genus of the *didynamia gymnoſpermia* claſs. Its characters are theſe: the flower has a large permanent empalement of one leaf, which is deeply indented at the brim, where it ſpreads open: the flower is of the lip kind, with a ſhort tube; the upper lip is erect, concave and entire; the under lip trifid, the middle ſegment longer than the other; it has four ſtamina, ſituated under the upper lip, two of which are ſhorter than the other; and a germen with four parts, which turn to four angular convex ſeeds, ſitting in the empalement. Linnæus reckons three and Miller two ſpecies; the one a native of the *Moluccа* iſlands, from whence it derives its name; the other grows in Syria.

This plant is a vulnerary, and very good in a phthiſis, being uſed as a tea; no plant is a better ſtrhontriptic. It has the virtues of balm, but ſmells ſomewhat ſtronger.

MOLUCCA *bean*. See BEAN.

MOLUCCA *nuts*. See GUILANDINA and BEAN.

MOLUTA *arma*. See ARMA.

MOLY. The name of this plant is rendered famous by Homer, and has been on this occaſion much inquired into as to its true ſenſe, by the botaniſts of almoſt all times. The old interpreters of Homer all explain this word by the wild rue; and the only reaſon for this is, that at ſome time, probably long after the days of Homer, the people of Cappadocia called the wild rue *moly*. But this plant is wholly different from the *moly* of Homer, which Theophraſtus affirms grew in his time in Areadia, in great plenty, and had a round bulbous root like an onion, and long and graſſy leaves like the ſquill. On the whole, the *moly* of Homer ſeems to have been a ſpecies of allium or GARLIC.

MOLYBDÆNA, *leadwort*, in *Botany*, a name given by ſome authors to the great toothwort, or dentillaria of Rondeletius. See TOOTHWORT.

MOLYBDÆNA is alſo a mineral ſubſtance, called *black-lead*.

MOLYBDIA, in *Natural Hiſtory*, the name of a genus of cryſtals. The word is derived from the Greek μολυβδος, *lead*; and expreſſes cryſtals altered in their figure by particles of that metal. The cryſtals of this genus are of a cubic form, or compoſed of ſix ſides, at right angles, like a die. Of this genus there are three known ſpecies.

MOLYBDOMANTIA, Μολυβδομαντια, in *Antiquity*, a ſpecies of divination, by obſerving the motions, figures, &c. of melted lead.

MOLYZA, μολυζα, a word uſed by the Greek phyſicians to expreſs a head of garlic.

MOMENT, in *Time*, the moſt minute and indiviſible part of duration; or what we otherwiſe call an *inſtant*.

A *moment* ought not to be conceived as the leaſt part of time, but as a termination or limit of time. Maclaurin's Fluxions, vol. i. p. 245.

MOMENTS, in the new doctrine of infinites, denote the infinitely ſmall parts of quantity.

Moments are the ſame with what we otherwiſe call *infinitiſimals*, and *differences*; being the *momentary* increments or decrements of quantity, conſidered as in a continual flux.

Moments are the generative principles of magnitude: they have no determined magnitude of their own; but are only inceptive thereof.

Hence, as it is the ſame thing, if, in lieu of theſe *moments*, the velocities of their increaſes and decreaſes be made uſe of, or the finite quantities proportionable to ſuch velocities; the method of proceeding, which conſiders the motions, changes, or fluxions of quantities, is denominated, by Sir Iſaac Newton, the method of fluxions.

Leibnitz, and moſt foreigners, conſidering theſe infinitely ſmall parts, or infiniteſimals, as the differences of two quantities; and thereby endeavouring to find the differences of quantities, i. e. ſome *moments*, or quantities infinitely ſmall, which, being taken an infinite number of times, ſhall equal given quantities; call theſe *moments*, *differences*; and the method of proceſſure, the *differential calculus*. See CALCULUS *differentialis*.

MOMENT, MOMENTUM, in *Mechanics*, is the ſame with *impetus*; or the quantity of motion in a moving body. See FORCE.

MOMENTUM is ſometimes alſo uſed ſimply for the motion itſelf. *Moment* is frequently defined by the *vis inſita*, or the power by which moving bodies continually change place.

In comparing the motions of bodies, the ratio of their *momenta* is always compounded of the quantity of matter, and the celerity of the moving body; ſo that the *moment* of any ſuch body may be conſidered as a rectangle under the quantity of matter, and the celerity.

And ſince it is certain, that all equal rectangles have their ſides reciprocally proportionable; therefore, if the *moments* of any moving bodies be equal, the quantity of matter in one to that of the other, will be reciprocally as the celerity of the latter to the celerity of the former; and, on the contrary, if the quantities of matter be reciprocally proportionable to the celerities, the *moments* or quantities in each will be equal.

The *moment*, alſo, of any moving body may be conſidered as the aggregate or ſum of all the *moments* of the parts of that body; and therefore where the magnitudes and number of particles are the ſame, and where they are moved with the ſame celerity, there will be the ſame *momenta* of the wholes.

MOMENTARY *motion*. See QUANTITY.

MOMISCUS, a word uſed by ſome as a name of the *dentes molares*, and by others only as a name of that part of thoſe teeth which is near the gums.

MOMORDICA, in *Botany*. See *Male* BALSAM *apple*.

MOMORDICA, *ſtinking*. See *White* BRYONY.

MOMOT, the name of a bird deſcribed by Nieremberg, and ſaid to be an inhabitant of the hot countries. It is of the ſize of a pigeon; its beak is black and crooked, three fingers breadth long, and ſerrated at the edge; its head is blue like the peacock's, and its feet brown; the reſt of the body is of a pleaſant green. But what is moſt ſingular in this bird, is, that it has in its tail one feather much longer than the reſt, which is naked for a great way, and is feathered only at the end. This laſt circumſtance Mr. Ray judges wholly falſe, as no birds have ſingle feathers in their tails, but all that are theſe grow in pairs.

MONACANTHUS, in *Zoology*, a name given by some to the alpheites, or cinedus, a fish approaching to the turdus kind; but differing, in that its back-fin is prickly all along, whereas the fore-part only is so in the turdus.

MONACHELLE, in *Ichthyology*, a name given by some to the fish called, by the oldeſt Greek writers, the *chromys*, and by the later ones, as alſo by the Latin authors on theſe ſubjects, *chromis*. It is properly a ſpecies of the ſparus, and is diſtinguiſhed by Artedi from the others, by the length of the ſecond ray of the belly-fins.

MONAD. See LEIBNITZIAN *philoſophy*.

MONADELPHIA, in *Botany*, the ſixteenth claſs of plants, whoſe ſtamina, or male parts, on account of their filaments running in among one another, are all formed into one body. See FRUCTIFICATION, and *Tab.* I. *Botany*, *Claſs* 16.

The word is formed of the Greek μονος, *ſingle*, and αδελφια, *brotherhood*, or *community*: theſe coalitions of the ſtamina in flowers being underſtood in botany by that term.

This claſs includes five orders, viz. 1. *Pentandria*, comprehending ſuch plants as have five ſtamina, of which order there are four genera; *waltheria*, *lereſia*, *hermannia*, and *melochia*. 2. *Decandria*, whoſe plants have ten ſtamina; of this order there are three genera, viz *connarus*, *bonyna*, and *geranium*. 3. *Endecandria*, with eleven ſtamina, of which order there is only one genus, viz. *brownea*. 4. *Dodecandria*, with twelve ſtamina, containing one genus, viz. *pentapetes*. 5. *Polyandria*, with many ſtamina, including ſeventeen genera, viz. *bombax*, *ſida*, *adanſonia*, *althæa*, *alcea*, *malva*, *lavatera*, *malope*, *urena*, *goſſypium*, *hibiſcus*, *ſtewartia*, *camellia*, *moriſonia*, *ochna*, *malachra*, and *gordonia*. See *Tab.* V. *Botany*, *Claſs* 16.

This is an extremely natural claſs, and there is not one plant uſually allowed to belong to the reſt of this kind, that this character ſeparates, nor one of any other kind that it brings in among them. Tournefort has been guilty of a very great error, in regard to the flowers of the plants of this claſs; he ſays that they are monopetalous, and only divided into five ſegments; but a ſtrict obſervation will ſhew, that they really conſiſt each of five ſeparate petals, which only are joined at the baſe by certain filaments, which together make one body. Hence it follows, that they are ſtrictly and truly pentapetalous, though they fall off together, not ſeparately, on ſhaking the plant.

Though authors in general have kept this claſs of plants together, they have been much divided in their opinions, as to the characters or parts of them, by which they ſhould divide them into genera. Some have had recourſe, on this occaſion, to the ſeed-veſſel; others, finding that inſufficient, have conſulted the leaves. Linnæus uſes the cup of the flower on this occaſion, which is a very eſſential part in this claſs of plants, and ſufficiently different in the different genera.

It is obſerved, that all the plants of this claſs are mucilaginous and emollient, and have great virtues as diuretics, &c. The common marſhmallow deſervedly ſtands at the head of theſe, and is common in the preſcriptions of the phyſicians on theſe occaſions, as well as in many of the ſhop compoſitions, as the ſyrup of marſhmallows and the like.

MONANDRIA, in *Botany*, the firſt claſs of plants which have hermaphrodite flowers, with only one ſtamen each. The word is formed of the Greek μονος, *ſingle*, and ανηρ, *male*. See *Tab.* I. *of Botany*, *Claſs* 1. and FRUCTIFICATION.

The orders belonging to this claſs are two, viz. 1. *Monogynia*, comprehending ſuch plants as have only one ſtyle, of which there are eleven genera, diſtinguiſhed into trilocular, with the pericarpium divided into three loculaments; as the *canna*, *amomum*, *coſtus*, *alpinia*, *maranta*, *curcuma*, *kempferia*, and *ibalia*; and monoſpermous, or thoſe with a ſingle ſeed, as the *boerhaavia*, *ſalicornia*, and *hippuris*. 2. *Digynia*, with two ſtyles, of which order there are four genera, viz. *coriſpermum*, *callitriche*, *bivinum*, and *cinna*. See *Tab.* III. *Botany*, *Claſs* 1.

MONARCHICI, in *Church Hiſtory*, heretics towards the end of the ſecond century, who allowed but one perſon in the Godhead, and maintained that the Father, the creator of all things, had united himſelf to the human nature of Chriſt; whence they were called *Monarchians*; and they alſo taught that the father was crucified: on this account they were denominated *Patropaſſians*.

MONARCHY, μοναρχια, a large ſtate governed by one; or a ſtate where the ſupreme power is lodged in the hands of a ſingle perſon.

The word comes from the Greek μοναρχω, *one who governs alone*; formed of μονος, *ſolus*, and αρχω, *imperium, power uturus*.

Of the three forms of government, viz. DEMOCRACY, ARISTOCRACY, and *monarchy*, the laſt is the moſt powerful, all the ſinews of government being knit together, and united in the hand of the prince; but then there is imminent danger of his employing that ſtrength to improvident or oppreſſive purpoſes. As a democracy is the beſt calculated to direct the end of a law, and an ariſtocracy to invent the means by which that end ſhall be obtained, a *monarchy* is moſt fit for carrying thoſe means into execution.

The moſt ancient *monarchy* was that of the Aſſyrians, which was founded ſoon after the deluge. We uſually reckon four grand or univerſal *monarchies*; the Aſſyrian, Perſian, Grecian, and Roman; though St. Auguſtine makes them but two, viz. thoſe of Babylon and Rome. Belus is placed at the head of the ſeries of Aſſyrian kings who reigned at Babylon, and is by profane authors eſteemed the founder of it, and by ſome the ſame whom the ſcriptures call Nimrod. The principal Aſſyrian kings after Belus were Ninus, who built Nineveh, and removed the ſeat of empire to it; Semiramis, who, diſguiſing her ſex, took poſſeſſion of the kingdom inſtead of her ſon, and was killed and ſucceeded by her ſon Ninyas; and Sardanapalus, the laſt of the Aſſyrian monarchs, and more effeminate than a woman. After his death the Aſſyrian empire was ſplit into three ſeparate kingdoms; viz. the Median, Aſſyrian, and Babylonian. The firſt king of the Median kingdom was Arbaces; and this kingdom laſted till the time of Aſtyages, who was ſubdued and diveſted of his kingdom by Cyrus. In the time of Cyrus there aroſe a new and ſecond *monarchy*, called the Perſian; which ſtood upwards of two hundred years, from Cyrus, who firſt reign began A. M. 3468, to Darius Codomannus, who was conquered by Alexander, and the empire tranſlated to the Greeks A. M. 3674. The firſt monarch was Cyrus, founder of the empire; the ſecond Cambyſes, the ſon of Cyrus. 3. Smerdis. 4. Darius, the ſon of Hyſtaſpis, who reigned 521 years before Chriſt. 5. Xerxes, who reigned 485 years before Chriſt. 6. Artaxerxes Longimanus, who reigned 464 years before Chriſt. 7. Xerxes the ſecond. 8. Ochus, or Darius, called Nothus, 424 years before Chriſt. 9. Artaxerxes Mnemon, 405 years before Chriſt. 10. Artaxerxes Ochus, 359 years before Chriſt. 11. Arſes, 338 years before Chriſt. 12. Darius Codomannus, 336 years before Chriſt, who was defeated by Alexander the Great, and deprived of his kingdom and life about 331 years before Chriſt: the dominion of Perſia after his death was tranſlated to the Greeks. The third *monarchy* was the Grecian. As Alexander when he died did not declare who ſhould ſucceed him, there ſtarted up as many kings as there were commanders. At firſt they governed the provinces, that were divided among them, under the title of viceroys; but when the family of Alexander the Great was extinct, they took upon them the name of kings. Hence, in proceſs of time, the whole empire of Alexander produced four diſtinct kingdoms; viz. 1. The Macedonian, the kings of which, after Alexander, were Antipater, Caſſander, Demetrius Poliorcetes, Seleucus Nicanor, Meleager, Antigonus Doſon, Philip, and Perſeus, under whom the Macedonian kingdom was reduced to the form of a Roman province. 2. The Aſiatic kingdom, which, upon the death of Alexander, fell to Antigonus, comprehending that country now called Natolia, together with ſome other regions beyond Mount Taurus. From this kingdom proceeded three leſſer ones; viz. that of Pergamus, whoſe laſt king, Attalus, appointed the Roman people to be his heir; Pontus, reduced by the Romans into the form of a province, when they had ſubdued the laſt king, Mithridates. 3. The Syrian, of whoſe twenty-two kings the moſt celebrated were Seleucus Nicanor, founder of the kingdom, Antiochus Deus, Antiochus the Great, Antiochus Epiphanes, and Tigranes, who was conquered by the Romans under Pompey; and Syria was reduced into the form of a Roman province. 4. The Egyptian, which was formed by the Greeks in Egypt, and flouriſhed near two hundred and forty years under twelve kings; the principal of whom were Ptolemy Lagus, its founder; Ptolemy Philadelphus, founder of the ALEXANDRIAN *library*; and queen Cleopatra, who was overcome by Auguſtus; in conſequence of which Egypt was added to the dominion of the Romans. The fourth *monarchy* was the Roman, which laſted two hundred and forty-four years, from the building of the city, until the time when the royal power was abrogated. The kings of Rome were Romulus its founder, Numa Pompilius, Tullus Hoſtilius, Ancus Martius, Tarquinius Priſcus, Servius Tullius, and Tarquin the Proud, who was baniſhed, and with whom terminated the regal power. Hollberg's Introd. to Univ. Hiſt. by Dr. Sharpe, p. 85, &c.

There ſeems, in reality, no neceſſity to make the Medes, Perſians, and Greeks, ſucceed to the whole power of the Aſſyrians, to multiply the number of the *monarchies* at

was the same empire still, and the several changes that happened in it, did not constitute different *monarchies*. Thus the Roman empire was successively governed by princes of different nations, yet without any new *monarchy* being formed thereby. Rome, therefore, may be said to have immediately succeeded Babylon in the empire of the world. See EMPIRE.

Of *monarchies*, some are *absolute* and *despotic*, where the will of the monarch is uncontrolable; as Denmark, &c. others are *limited*, where the prince's authority is restrained by laws, and part of the supreme power lodged in other hands; as in England. See GOVERNMENT.

Some *monarchies*, again, are *hereditary*, where the succession devolves immediately from father to son; and others are *elective*, where, on the death of the *monarch*, his successor is appointed by election; as in Poland.

According to Hobbes, *monarchy*, as well as aristocracy, derives all its authority from the people, who transfer all their right, v. gr. the supreme power, by a plurality of suffrages, &c. to some one person called a *monarch*; so that whatever the people could have done before this translation, may be now rightfully done by him to whom the translation is made. This done, the people are no longer to be looked upon as a body, but a dissolved multitude; because they were only one by virtue of the supreme power, which they have now transferred to another.

Nor can the *monarch*, according to this author, oblige himself by any covenants, to any person, for the authority he has received; because he receives the power from the people, which, as soon as that is done, ceases to be a body; and the body ceasing, the obligation to the body ceases of course. The people, therefore, are obliged to pay obedience to the *monarch*, by virtue of those covenants, whereby they mutually oblige themselves to what the people, as a body, enjoin to be done.

He argues, farther, that as a *monarch* cannot be obliged by any covenants; so neither can he do any injury to his subjects; an injury being nothing else but a breach of covenant: and where there is no covenant, there can be no breach of one. De Cive, c. 8. See HOBBISM.

Fifth-MONARCHY *men*, in the *Ecclesiastical History of England*, were a set of wrong-headed and turbulent enthusiasts who arose in the time of Cromwell, and who expected Christ's sudden appearance upon earth to establish a new kingdom; and, acting in consequence of this illusion, aimed at the subversion of all human government. Burnet's Hist. of his Own Times, vol. 1. p. 67.

MONARDA, *Oswego-tea* and *American field bush*, in *Botany*, a genus of the *diandria monogynia* class. Its characters are these: the flower has a cylindrical empalement of one leaf, cut into five equal parts at the brim; the flower has one petal, which is of the lip kind, and divided at the top into two lips; the upper lip is narrow, entire, and erect; the under lip broad, trifid, and reflexed; it has two bristly stamina, the length of the upper lip; in the bottom of the tube is situated a four-pointed germen, supporting a slender style, involved with the stamina, and crowned by an acute bifid stigma; the germen turns to four naked seeds, inclosed in the empalement. Linnæus enumerates five, and Miller three, species, natives of North America.

MONASTERII *provisor*. See PROVISOR.

MONASTERY, a convent, or house built for the reception of religious; whether it be ABBEY, PRIORY, NUNNERY, or the like.

MONASTERY is only properly applied to the houses of monks, mendicant friars, and nuns. The rest are more properly called *religious houses*.

For the origin of *monasteries*, see MONASTIC and MONK. The houses belonging to the several religious orders, which obtained in England and Wales, were cathedrals, colleges, abbies, priories, preceptories, commandries, hospitals, frieries, hermitages, chantries, and free chapels. These were under the direction and management of various officers. The dissolution of houses of this kind began to early as the year 1312, when the TEMPLARS were suppressed; and in 1323 their lands, churches, advowsons, and liberties, here in England, were given, by 17 Ed. II. stat. 3. to the prior and brethren of the hospital of St. John at Jerusalem. In the years 1390, 1437, 1441, 1459, 1497, 1505, 1508, and 1515, several other houses were dissolved, and their revenues settled on different colleges in Oxford and Cambridge. Soon after the last period, cardinal Wolsey, by licence of the king and pope, obtained a dissolution of above thirty religious houses, for the founding and endowing his colleges at Oxford and Ipswich. About the same time a bull was granted by the same pope to cardinal Wolsey, to suppress *monasteries*, where there were not above six monks, to the value of eight thousand ducats a year, for endowing Windsor, and King's College in Cambridge; and two other bulls were granted to cardinals Wolsey and Campeius, where there were less than twelve monks, and to annex them to the greater *monasteries*; and another bull to the same cardinals to enquire about abbies, to be suppressed, in order to be made cathedrals. Although nothing appears to have been done in consequence of these bulls, the motive which induced Wolsey, and many others, to suppress these houses, was the desire of promoting learning; and archbishop Cranmer engaged in it with a view of carrying on the Reformation. There were other causes that concurred to bring on their ruin: many of the religious were loose and vicious; the monks were generally thought to be, in their hearts, attached to the pope's supremacy; their revenues were not employed according to the intent of the donors; many cheats in images, feigned miracles, and counterfeit relics, had been discovered, which brought the monks into disgrace; the Observant friars had opposed the king's divorce from queen Catharine; and these circumstances operated, in concurrence with the king's want of a supply, and the people's desire to save their money, to forward a motion in parliament, that in order to support the king's state, and supply his wants, all the religious houses might be conferred upon the crown, which were not able to spend above 200*l.* a year; and an act was passed for that purpose, 27 Hen. VIII. c. 28. By this act about three hundred and eighty houses were dissolved, and a revenue of 30 or 32,000*l.* a year came to the crown; besides about 100,000*l.* in plate and jewels. The suppression of these houses occasioned discontent, and at length an open rebellion: when this was appeased, the king resolved to suppress the rest of the *monasteries*, and appointed a new visitation; which caused the greater abbies to be surrendered apace; and it was enacted by 31 Hen. VIII. c. 13. that all *monasteries*, &c. which have been surrendered since the fourth of February, in the twenty-seventh year of his majesty's reign, and which hereafter shall be surrendered, shall be vested in the king. The knights of St. John of Jerusalem were also suppressed by the 32 Hen. VIII. c. 24. The suppression of these greater houses by these two acts, produced a revenue to the king of above 100,000*l.* a year, besides a large sum in plate and jewels. The last act of dissolution in this king's reign was the act of 37 Hen. VIII. c. 4. for dissolving colleges, free chapels, chantries, &c. which act was farther enforced by 1 Ed. VI. c. 14. By this act were suppressed ninety colleges, a hundred and ten hospitals, and two thousand three hundred and seventy-four chantries and free chapels. The number of houses and places suppressed from first to last, so far as any calculations appear to have been made, seems to be as follows:

Of lesser *monasteries*, of which we have the valuation	374
Of greater *monasteries*	186
Belonging to the Hospitallers	48
Colleges	90
Hospitals	110
Chantries and free chapels	2374
Total	3182

Besides the friars houses, and those suppressed by Wolsey, and many small houses, of which we have no particular account.

The sum total of the clear yearly revenue of the several houses at the time of their dissolution, of which we have any account, seems to be as follows:

	l.	*s.*	*d.*
Of the greater *monasteries*	104919	13	3½
Of all those of the lesser *monasteries*, of which we have the valuation	29702	1	10½
Knights Hospitallers head house in London	2385	12	8
We have the valuation of only 28 of their houses in the country	3026	9	5
Friars houses, of which we have the valuation	751	2	0½
Total	140784	19	3½

If proper allowances are made for the lesser *monasteries*, and houses not included in this estimate, and for the plate, &c. which came into the hands of the king by the dissolution, and for the value of money at that time, which was at least six times as much as at present; and also consider that the estimate of the lands was generally supposed to be much under the real worth, we must conclude their whole revenues to have been immense.

It doth not appear that any computation hath been made of the number of persons contained in the religious houses.

Those

Thoſe of the leſſer *monaſteries* diſſolved by 27 Hen. VIII. were reckoned at about -	10000
If we ſuppoſe the colleges and hoſpitals to have contained a proportionable number, theſe will make about - - - - -	5347
If we reckon the number in the greater *monaſteries*, according to the proportion of their revenues, they will be about 35000; but as probably they had larger allowances in proportion to their number than thoſe of the leſſer *monaſteries*, if we abate upon that account 5000. they will then be - - - - -	30000
One for each chantry and free chapel -	2374
Total	47721

But as there were probably more than one perſon to officiate in ſeveral of the free chapels, and there were other houſes which are not included within this calculation, perhaps they may be computed in one general eſtimate at about 50,000. As there were penſions paid to almoſt all thoſe of the greater *monaſteries*, the king did not immediately come into the full enjoyment of their whole revenues; however, by means of what he did receive, he founded ſix new biſhopricks, viz. thoſe of Weſtminſter (which was changed by queen Elizabeth into a deanry, with twelve prebends, and a ſchool), Peterborough, Cheſter, Glouceſter, Briſtol, and Oxford. And in eight other ſees he founded deanries and chapters, by converting the priors and monks into deans and prebendaries, viz. Canterbury, Wincheſter, Durham, Worceſter, Rocheſter, Norwich, Ely, and Carliſle. He founded alſo the colleges of Chriſt-church in Oxford, and Trinity in Cambridge, and finiſhed King's college there. He likewiſe founded profeſſorſhips of divinity, law, phyſic, and of the Hebrew and Greek tongues, in both the ſaid univerſities. He gave the houſe of Grey Friars, and St. Bartholomew's hoſpital, to the city of London; and a perpetual penſion to the poor knights of Windſor, and laid out great ſums in building and fortifying many ports in the channel. It is obſervable, upon the whole, that the diſſolution of theſe houſes was an act, not of the church, but of the ſtate, in the period preceding the Reformation, by a king and parliament of the Roman catholic communion, in all points except the king's ſupremacy; to which the pope himſelf, by his bulls and licences, had led the way. See Tanner's Notitia Monaſtica; and for an abſtract, Burn's Eccl. Law, art. *Monaſteries*.

MONASTIC, ſomething belonging to monks, or the monkiſh life.

The *monaſtic* profeſſion is a kind of civil death, which in all worldly matters has the ſame effect with the natural death.

The council of Trent, &c. fix fifteen years for the age at which a perſon may be admitted into the *monaſtical* ſtate.

St. Antony is the perſon who, in the fourth century, firſt inſtituted the *monaſtic* life; as St. Pachomius, in the ſame century, is ſaid to have firſt ſet on foot the cœnobitic life, i. e. regular communities of religious.

In a ſhort time, the deſarts of Egypt became inhabited with a ſet of ſolitaries, who took upon them the *monaſtic* profeſſion. See ANACHORET, HERMIT, &c. St. Baſil carried the monkiſh humour into the Eaſt, where he compoſed a rule which afterwards obtained through a great part of the Weſt.

In the eleventh century, the *monaſtic* diſcipline was grown very remiſs. St. Odo firſt began to retrieve it in the monaſtery of Cluny: that monaſtery, by the conditions of its erection, was put under the immediate protection of the holy ſee; with a prohibition to all powers, both ſecular and eccleſiaſtical, to diſturb the monks in the poſſeſſion of their effects, or the election of their abbot. In virtue hereof, they pleaded an exemption from the juriſdiction of the biſhop, and extended this privilege to all the houſes dependent on Cluny. This made the firſt congregation of ſeveral houſes under one chief immediately ſubject to the pope, ſo as to conſtitute one body; or, as they now call it, one *religious order*. Till then, each monaſtery was independent, and ſubject to the biſhop. See MONK.

MONBIN, in *Botany*. See *Jamaica* PLUM.

MOND. See MOUND.

MONDAY, *dies lunæ*. See PLOUGH.

MONEDULA, in *Ornithology*. See JACKDAW.

MONEMERION, *pierrogeny*, among the ancient Romans, a ſhew, according to ſome, wherein none but tame beaſts were expoſed to view.

Others will have it to be a ſhew of one day's continuance.

MONETÆ *pes*. See PES.

MONETAGIUM, MONETAGE, or MINTAGE, the right or privilege of COINING money.

MONETALES *triumviri*. See TRIUMVIRI.

MONETARIUS, or MONEYER, a name which antiquaries and medaliſts give to thoſe who ſtruck the ancient coins, or monies.

Many of the old Roman, &c. coins have the name of the *monetarius*, either written at length, or at leaſt the initial letters of it. See MEDAL.

MONEY, or MONY, *moneta*, a piece of metal marked for coin, with the arms of a prince, or ſtate, who make it circulate or paſs, at a fixed rate, for things of different value; to facilitate the buſineſs of commerce.

Paulus the lawyer defines *money*, a thing ſtamped with a public coin, and deriving its uſe and value from its impreſſion, rather than its ſubſtance.

Monſ. Boizard defines *money*, a piece of matter to which public authority has affixed a certain value and weight; to ſerve as a medium in commerce.

Or, *money* may be defined an univerſal medium, or common ſtandard, by compariſon with which the value of all merchandize may be aſcertained; or, it is a ſign, which repreſents the reſpective values of all commodities. Metals are well calculated for this ſign, becauſe they are durable, and are capable of many ſubdiviſions; and a precious metal is ſtill better calculated for this purpoſe, becauſe it is the moſt portable. A metal is alſo the moſt proper for a common meaſure, becauſe it can eaſily be reduced to the ſame ſtandard in all nations; and every particular nation fixes on it its own impreſſion, that the weight and ſtandard, wherein conſiſts the intrinſic value, may both be known by inſpection only. And as *money* is the medium of commerce, it is the king's prerogative, as the arbiter of domeſtic commerce, to give it authority, or make it current. It is evident, that, as the quantity of precious metals increaſes, i. e. the more of them there is extracted from the mine, this univerſal medium, or common ſign, will ſink in value, and become leſs precious. Above a thouſand millions of bullion are calculated to have been imported into Europe from America within leſs than three centuries; and the quantity is daily increaſing. The conſequence is, that more *money* muſt be given now for the ſame commodity than was given a hundred years ago. And if any accident was to diminiſh the quantity of gold and ſilver, their value would proportionably riſe.

The æra of the invention of *money* is not eaſy to be ſettled. There is no room to doubt, but that, in the earlieſt ages, the ordinary way of traffic among men was, by trucking, or exchanging commodity for commodity. Thus, in Homer, Glaucus's golden armour was valued at one hundred oxen; and Diomedes's armour at ten.

But in courſe of time it was found neceſſary, in the way of commutative juſtice, to have ſome common meaſure, or ſtandard, according to which all other things ſhould be eſtimated. This, as ſome gather from Joſephus, was firſt invented by Cain; though the firſt tidings we hear of it are, in the time of Abraham, who paid four hundred ſhekels for a burying-place.

The Greeks refer the invention of *money* to Hermodice, wife of king Midas; and the Latins to Janus. *Money* being a common meaſure for reducing wares to a balance, it was called, by the Greeks, *nomiſma*; not from king Numa, but from *nomos*, as being eſtabliſhed by law; by the Latins it was called *pecunia*; either becauſe the wealth of thoſe days conſiſted in their cattle; or, as Pliny will have it, becauſe their firſt coin was ſtamped with the figure of a cow: they alſo call it *moneta*, a *monendo*, as Suidas obſerves; becauſe, when the Romans were in want of *money*, Juno admoniſhed them to uſe juſtice, and there ſhould be no want of *money*: the effect whereof when they had found, the was ſurnamed *Juno Moneta*, and *money* was coined in her temple. In proceſs of time, *Money* herſelf was made a goddeſs, and inſhrined by the name of *Dea Pecunia*, under the figure of a woman holding a balance in one hand, and a cornucopiæ in the other. On the foot *money* now ſtands, it may be divided into *real*, or *effective*, and *imaginary*.

MONEY, *real*, includes all coins, or ſpecies, of gold, ſilver, copper, and the like; which have courſe in commerce, and do really exiſt. Such are *guineas*, *crowns*, *piſtoles*, *pieces of eight*, *ducats*, &c. which ſee under their proper heads; as alſo under COIN.

Real money, civilians obſerve, has three eſſential qualities; viz. *matter*, *form*, and *weight* or *value*. For *matter*, copper is that thought to have been firſt coined; afterwards, ſilver; and, laſtly, gold, as being the moſt beautiful, ſcarce, cleanly, divilible, and pure, of all metals.

The degrees of goodneſs are expreſſed in gold by carats, and in ſilver by penny-weights, &c. for there are ſeveral reaſons for not coining them pure, and without alloy. See COINAGE.

Among the ancient Britons, iron rings, or, as ſome ſay, iron plates, or tin plates and rings, were uſed for *money*. Among the Lacedæmonians, iron bars, quenched with vinegar,

vinegar, intended that they might not ſerve for any other uſe. Seneca obſerves, that there was anciently ſtamped *money* of leather, *certum forma publica impreſſum*; and the ſame thing was put in practice by Frederic II. at the ſiege of Milan; to ſay nothing of an old tradition among ourſelves, that, in the confuſed times of the barons wars, the like was done in England. In 1360, king John of France, who agreed to pay our Edward III. for the raunſom of his perſon three millions of gold crowns, was reduced to the neceſſity of paying for the neceſſaries of his houſhold in leather *money*, in the middle whereof there was a little nail of ſilver. The Hollanders, we know, coined great quantities of paſteboard in the year 1574. Numa Pompilius made *money* of wood and leather; nor does it appear, that the Romans were much acquainted with the art of ſtriking *money* in metal, during the time of their kings. There is reaſon to believe, that both gold and ſilver *money* were very early in uſe in Egypt and Aſia, and thence ſoon afterwards introduced into Carthage and Greece. From Greece it was brought to Rome, and thence gradually weſtward into all the Roman provinces. The firſt ſilver *money* coined by the Romans was in the year of Rome 484, and their firſt gold *money* in 546.

With regard to the materials of Engliſh *money*, Sir Edward Coke lays it down, that the *money* of England muſt either be of gold or ſilver; and none other was ever iſſued by the royal authority till 1672, when copper farthings and half-pence were coined by king Charles the Second, and ordered by proclamation to be current in all payments, under the value of ſixpence, and not otherwiſe. But this copper coin is not upon the ſame footing with the other in many reſpects, particularly with regard to the offence of counterfeiting it.

As to the *form of money*, it has been more various than the matter. Under this are comprehended the weight, figure, impreſſion, and value.

For the *impreſſion*, the Jews, though they deteſted images, yet ſtamped on the one ſide of their ſhekel, the golden pot which had the manna; and on the other, Aaron's rod; the Dardans, two cocks fighting; Alexander, as is held by ſome, his horſe Bucephalus: though this may be doubted of, becauſe the horſe is found as frequently on the coins of ſeveral of the kings of Macedon, his predeceſſors, as his. The Athenians ſtamped their coins with an owl, or an ox; whence the proverb on bribed lawyers, *bos in lingua*; the people of Ægina with a tortoiſe; whence that other ſaying, *Virtutem & ſapientiam vincunt teſtudines*. For the Romans, the monetarii ſometimes impreſſed the images of men that had been eminent in their families, on their coins; but no living man's head was ever ſtamped on a Roman coin till after the fall of the commonwealth; after that time, they bore the emperor's head on one ſide; and, from this time, the practice of ſtamping the prince's image on coins has obtained among all civilized nations, the Turks and other Mahometans excepted; who, in deteſtation of images, inſcribe only the prince's name, with the year of the tranſmigration of their prophet.

As to the impreſſion of Britiſh *money*, the ſtamping thereof is the unqueſtionable prerogative of the crown; for though divers biſhops and monaſteries had formerly the privilege of coining *money*, yet, as Sir Matthew Hale obſerves, this was uſually done by ſpecial grant from the king, or by preſcription, which ſuppoſes one; and, therefore, was derived from, and not in derogation of, the royal prerogative. Beſides, they had only the profit of the coinage, and not the power of inſtituting either the impreſſion or denomination; but had uſually the ſtamp ſent them from the exchequer. The denomination, or the value for which the coin is to paſs current, is likewiſe in the breaſt of the king; and if any unuſual pieces are coined, that value muſt be aſcertained by proclamation. In order to fix the value, the weight and the fineneſs of the metal are to be taken into conſideration together. When a given weight of gold or ſilver is of a given fineneſs, it is then of the true ſtandard, and called ſterling metal; and of this ſterling metal all the coin of the kingdom muſt be made, by 25 Edw. III. c. 13. ſo that the king's prerogative ſeems not to extend to the debaſing or enhancing the value of the coin, below or above the ſterling value; though Sir Matthew Hale appears to be of another opinion. The king *may alſo*, by his proclamation, legitimate foreign coin, and make it current here; declaring at what value it ſhall be taken in payments. But this, judge Blackſtone apprehends, ought to be by compariſon with the ſtandard of our own coin; otherwiſe the conſent of parliament will be neceſſary. There is now no legitimated *money*. The king may alſo at any time decry, or cry down any coin of the kingdom, and make it no longer current.

As to the *figure of money*, it is either round, as in England; multangular, or irregular, as in Spain; ſquare, as in ſome parts of the Indies; or nearly globular, as in moſt of the reſt.

After the arrival of the Romans in this iſland, the Britons imitated them, coining both gold and ſilver, with the images of their kings ſtamped on them: when the Romans had ſubdued the kings of the Britons, they alſo ſuppreſſed their coins, and brought in their own, which were current here from the time of Claudius to that of Valentinian the Younger, this being about the ſpace of five hundred years.

Mr Camden obſerves, that the moſt ancient Engliſh coin he had known, was that of Ethelbert, king of Kent, the firſt Chriſtian king in the iſland; in whoſe time all *money* accounts began to paſs by the names of *pounds*, *ſhillings*, *pence*, and *mancuſes*.

The penny ſeems borrowed from the Latin *pecunia*, or rather from *pondo*, on account of its juſt weight, which till king Edward the third's reign contained as much ſilver as about three pence of our *money*: theſe were coarſely ſtamped with the king's image on the one ſide, and either the miſt-maſter's name, or the city's where it was coined, on the other: five of theſe pence made their ſcilling, probably ſo called from *ſcillingus*, which the Romans uſed for the fourth part of an ounce; forty of theſe ſcillings made their pound, and four hundred of theſe pounds were a legacy, or a portion for a king's daughter; as appears by the laſt will of king Alfred.

By theſe names they tranſlated all ſums of *money* in their old Engliſh teſtament; talents by *pounds*; judas's thirty pieces of ſilver by *thirtie ſcillings*; tribute-*money*, by *penincg*; and the mite by *feorthling*.

But, it muſt be obſerved, they had no other real *money*, but pence only; the reſt being imaginary *monies*, i. e. names of numbers, or weights: thirty of theſe pence made a mancus, which ſome take to be the ſame with a mark; manca, as appears by an old MS. was *quinque ſexcuntæ*. Theſe mancæ, or mancuſes, were reckoned both in gold and ſilver; for in the year 680, we read, that Ina, king of the Weſt Saxons, obliged the Kentiſh men to buy their peace at the price of thirty thouſand mancas of gold. In the notes on king Canute's laws we find this diſtinction, that *mancuſa* was as much as a mark of ſilver; and *manca* a ſquare piece of gold, valued at thirty pence. See MANCUS.

The Danes introduced a way of reckoning *money* by ores, *per oras*, mentioned in Domeſday book; but whether they were a diſtinct coin, or a certain ſum, does not plainly appear: this, however, may be gathered from the abbey-book of Burton, that twenty ores were equivalent to two marks.

They had alſo a gold coin called *bizantine*, or *bezant*, as being coined at Conſtantinople, then called *Byzantium*; the value of which coin is not only now loſt, but was ſo entirely forgotten, even in the time of king Edward III. that, whereas the biſhop of Norwich was fined a bizantine of gold, to be paid the abbot of St. Edmundſbury, for infringing his liberty (as it had been enacted by parliament, in the time of the Conqueror), no man, then living, could tell how much it was; ſo that it was referred to the king, to rate how much he ſhould pay; which is the more unaccountable, becauſe, but a hundred years before, two hundred thouſand bezants were exacted by the ſoldan, for the raunſom of St. Lewis of France; which were then valued at one hundred thouſand livres.

Though the coining of *money* be a ſpecial prerogative of the king, yet the ancient Saxon princes communicated it to their ſubjects; inſomuch that in every good town there was, at leaſt, one mint, but at London eight; at Canterbury four for the king, two for the archbiſhop, one for the abbot at Winchcſter, ſix at Rocheſter, at Haſtings two, &c.

The Norman kings continued the ſame cuſtom of coining only pence, with the prince's image on one ſide, and on the other the name of the city where it was coined, with a croſs ſo deeply impreſſed, that it might be eaſily parted, and broken into two halves, which, ſo broken, they called half-pence; or into four parts, which they called *farthings*, or FARTHINGS.

In the time of king John, *money*, coined in the eaſt parts of Germany, came in ſpecial requeſt in England, on account of its purity, and was called *eaſterling money*, as all the inhabitants of thoſe parts were called *Eaſterlings*; and, ſhortly after, ſome of thoſe people, ſkilled in coining, were ſent for hither, to bring the coin to perfection; which, ever ſince, has been called STERLING, from *eaſterling*.

King Edward I. who firſt aſſiſted the meaſure of an ell by the length of his arm, herein imitating Charles the Great,

Great, was the first, also, who established a certain standard for the coin, which is expressed to this effect by Greg. Rockley, mayor of London, and mint-master. "A pound "of money contained twelve ounces: in a pound there "ought to be eleven ounces, two esterlings, and one "farthing; the rest allays: the fine pound ought to weigh "twenty shillings and three pence in account and weight; "the ounce ought to weigh twenty pence, and a penny "twenty-four grains and a half. Note, that eleven "ounces two pence sterling ought to be of pure silver, "called *halfpenny*; and the master must add, of other "weight, fourteen pence halfpenny farthing, if the "silver be so pure."

About the year 1320, the states of Europe first began to coin gold; and, among the rest, our king Edward III. The first pieces he coined were called *Florences*, as being coined by Florentines; afterwards he coined nobles; then rose-nobles, current at six shillings and eight pence; half-nobles, called *halfpennies*, at three shillings and four pence of gold; and quarters at twenty pence, called *farthings of gold*. The succeeding kings coined rose-nobles, and double rose-nobles, great sovereigns, and half Henry nobles, angels, and shillings.

King James I. coined units, double crowns, Britain crowns; then crowns, half-crowns, &c.

TABLES of GOLD and SILVER, composed from the authority of Mr. Lowndes, who inspected the original indentures, and from bishop Fleetwood.

Reigns.	Gold Table. Specie	Division s.	d.	Tale. l.	s.	d.	Stand. fine. Car.	Gr.	Silver Table. Specie.	Tale. s.	d.	Stand. fine. oz.	dwt.	Propor. 100
28 Edw. I.														
18 Edw. III.	Florins	VI		15	00	0	23	3½						
Endeav. ann.	Nobles	VI	VIII	13	3	4	Ditto							
20	Ditto	Ditto		14	0	0	Ditto							
27	Ditto	Ditto		15	0	0	Ditto							
30, 37, 46														
12 Ric. II.	Ditto	Ditto		Ditto			Ditto		Ditto	Ditto		Ditto		
3 H. IV.														
9 Hen. V.	Ditto	Ditto		16	13	4	Ditto		Ditto	Ditto		Ditto		
1 Hen. VI.	Royals	X												
	Angels	VI	VIII	22	10	0	Ditto		Ditto					
4	Nobles	VI	VIII	16	13	4			Ditto	Ditto		Ditto		
24	Ditto	Ditto		Ditto			Ditto		Ditto	Ditto		Ditto		
30	Angels	VI	VIII	22	10	0	Ditto		Ditto					
4 Edw. IV.				20	16	0	Ditto		Ditto	Ditto		Ditto		
5	Nobles	X												
	Angels	VI	VIII	22	10	0	Ditto		Ditto	Ditto		Ditto		
8, 11, 16, 22														
1 Ric. III.														
9 H. VII.														
	Sovereigns	XXII	VI											
3 Hen. VIII.	Royals	XI	III											
	Angels	VII	VI	27	00	0	Ditto		Ditto	XXXV		Ditto		11 17
	Nobles	VI	VIII											
	Crowns	V		Gold stand. lowered										
	½ Ditto	II	VI	25	2	6	22	0	Ditto			Ditto		
										Silver stand. lowered.				
34	Sovereigns	XX		28	16	0	23	0	XII VI III	XLVIII		10	0	
	Angels	VIII							¼ ½					
36	Crowns	V		30	00	0	22	0	Ditto	Ditto		6	0	
37				30	00	0	20	0	Ditto	Ditto		4	0	
1 Edw. VI.	Ditto	Ditto		Ditto			Ditto			Ditto		Ditto		
3	Ditto	Ditto		34	00	0	22	0	XII	LXXII		6	0	
4	Sovereigns	XXIV		28	16	0	23	3½						
	Angels	VIII										Ditto		
5									Ditto	Ditto		3	0	
6	Sovereigns	XXX		36	00	0	23	3						
	Angels	X							s. s. d.					
									V 2 6	LX		11	1	
									d. XII VI III					
									¼ ½ d.					
	Sovereigns	XX		33	00	0	22	0						
	Crowns	V												
1 Mary				36	00	0	23	3½		LX		14	0	
2 Eliz.	Sovereigns	XXX												
	Royals	XV		36	00	0	23	3½	VI IV III	Old stand.				
	Angels	X							½ ¼					
	Sovereigns	XX		33	00	0	22	0		LX		11	2	11 16
	Crowns	V												
19 Eliz.	Angels	X		36	00	0	23	3½	Ditto	LX		11	2	
26	Nobles	XV		36	00	0	23	3½						
33	Sovereigns	XX		33	00	0	22	0						
	Crowns	V												
									s. s. d. d.					
43	Angels	X		36	10	0	23	3½	V 2 6 XII	LXII		11	2	
									d.					
									VI 11 1½					
	Sovereigns	XX												
	Crowns	V		33	10	0	22	0						
2 Jac. I.	Unites	XX												
	Dub. crow.	X												
	British crow.	V		37	4	0	22	0	Ditto	Ditto		11	2	
	Thistl. crow.	IV												
3	Royals	XXX												
	Angels	X		40	10	0	23	3½						
10	Ditto	Ditto		44	00	0	Ditto							
	Unites	XXII												
	Doub. Carolus's, &c	XI		40	18	4	22	0						

A rate of coinage.

Reigns.	Gold Table. Specie.	Division.	Tale. l. s. d.	Stand. fine. Car. Gr.	Specie. d.	Silver Table. Tale. s. d.	Stand. fine. Oz. dwt.	Proport. 100
2 Car. I.	Rose Royal	xxx -			s. s. d. d.			
	Spur Royal	xv -	44 10 0	23 3½	v 2 6 xii			
	Angels	x -			d.	LXII	11 2	
	Unites	xx -			vi 11 1½			
	Dub. crow.	x -	40 00 0	22 0	- - -			
	British crow.	v -						
12 Car. II.	-	- - -	The same of both kinds and value gold and silver					
22 - -	Guinea	xx -	44 10 0	22 0	Ditto -	LXII -	11 2	14 54
	½ Guinea	x -						
	¼ Guinea	v -						
	⅕ Guinea	ii -	- - -	- - -	- - -	- - -	- - -	
1 Jac. II.	Ditto	Ditto -	Ditto	Ditto -	Ditto -	Ditto -	Ditto	
1 W. & M.	I do not find any alteration in the standard of the gold or silver down to the pre-							
Queen Anne	sent time; 22 Carats fine and 2 alloy is the ℔ of gold, and 11 oz. 2 dwts fine, and							
	18 dwts alloy, the standard ℔ of silver; and the division of the pound gold continues							
	the same; that is to say, into 44 guineas ½, and the silver into the usual number of							15 21
George I.	crowns, &c. But the guineas have varied in the nominal value several times, rising							
	up to xxix. and declining to xxi, the present current value; but never have been re-							
George II.	duced again to their intended level of xxii, nor indeed ought, when compared with							
	the Portugal pieces of 3l. 12s. or 3l. 16s. it appears to be better worth xxii.							

	To the ℔. Troy.	
Portugal -	£3 12 - 13	£46 16 0
English guineas -	1 1 - 44½	46 14 6
		00 1 6
And the Portuguese standard worse ¼ grain		00 2 6
Total worse ℔ Troy in standard and tale -		00 4 0

This, with the difference in point of exactness in coining, wherein the Portugal is much more defective than the English coins, may be very good reasons for their being refused in payments in any of the receipts of the public revenue; but answer very well the purpose of those who benefit by the irregularity, in trading with the heavier and passing off the lighter by tale; and which, if they can turn into guineas or heavy silver, make another gain.

How our standard is proportioned to that of other countries, and thence what the true par of exchange is between us, see COIN.

A TABLE exhibiting the standard, weight, value, and a comparative view of English GOLD MONEY from King William I. Ann. 1066, to King George III. Ann. 1761.

Years of the kings and queens reigns, or the states of the several successions.	Standard of the gold at each period.		Value or No. of pounds, &c. the ℔ Troy of stand. gold has been coined into.	Value or number of shillings, &c. the ℔ Troy has been coined into.	Value of 22 shillings of coined gold in each period in our present money.	Proportions of the same number of shillings in our present and their standard.	Proportions between the current value of the ℔. Troy of standard silver and standard gold.	Proportion of fine silver to fine gold at each period.
	Fine gold	Alloy.						
Anni Regnorum. A.D.	oz. dw. gr.	oz. dw. gr.	l. s. d.	s. d.	l. s. d.	l. s. d.		
William I. — 1066	11 18 18	0 1 6						
William II. — 1087	11 18 18	0 1 6	9 0 0	0 15 0	5 12 8½	5.63414	9.0000	8.36874
18th Edw. III. { 1345	11 18 18	0 1 6	15 0 0	1 5 1½	3 7 7½	3.38048	14.8148	13.7564
18th same — 1345	11 18 18	0 1 6	13 3 4	1 2 0½	3 17 0½	3.85118	13.0041	12.0917
20th same — 1347	11 18 18	0 1 6	14 0 0	1 3 5	3 12 5½	3.62194	12.4444	11.5714
17, 36, 37, and 46th d° 1373								
18th Richard II. 1395	11 18 18	0 1 6	15 0 0	1 5 1½	3 7 7½	3.38048	12.0000	11.1581
and 3d Henry IV. 1400								
9th Henry V. — 1422	11 18 18	0 1 6	16 13 4	1 7 11½	3 0 10½	3.04243	11.1111	10.3315
1st and 39th Henry VI. { 1422	11 18 18	0 1 6	20 10 0	1 17 6½	2 5 0½	2.53365	12.0000	11.1581
{ 1461								
4th same — 1426	11 18 18	0 1 6	16 13 4	1 7 11½	3 0 10½	3.04243	11.1111	10.3315
4th Edw. IV. { — 1465	11 18 18	0 1 6	20 16 8	1 14 10½	2 8 8½	2.43394	11.1111	10.3316
1st Edw. VII.								
5, 8, 11, 16, and 22d d° 1482								
1st Richard III. — 1483	11 18 18	0 1 6	22 10 0	1 17 6½	2 5 0½	2.53365	12.0000	11.1581
and 19th Henry VII. 1504								
1st and 23d Henry { 1509	11 18 18	0 1 6	27 0 0	2 5 2½	1 17 6½	1.87804	12.0000	11.1581
VIII. 1532								
1st and 23d same { 1509	11 0 0	1 0 0	25 2 6	2 5 8½	1 17 2½	1.85971	11.1666	11.2682
{ 1532								
34th same — 1543	11 10 0	0 10 0	28 16 0	2 10 1½	1 13 11½	1.69614	12.0000	10.1348
36th same — 1545	11 0 0	1 0 0	30 0 0	2 14 6½	1 11 1½	1.55750	12.5000	6.82818
37th same — 1546								
1st and 2d VI. 1549	10 0 0	2 0 0	30 0 0	2 14 6½	1 8 5½	1.41592	12.5000	5.0000
Edw. IX.								
3d same — 1550	11 0 0	1 0 0	34 0 0	3 1 9½	1 7 5½	1.37526	9.4444	5.85331
4th same — 1551	11 18 18	0 1 6	22 16 0	2 8 3½	1 15 2½	1.70066	8.0000	2.02048
6th same — 1553	11 18 18	0 1 6	36 0 0	3 5 0½	1 8 4½	1.40853	12.0000	11.1076
6th same — 1553	11 0 0	1 0 0	33 0 0	3 0 0½	1 8 5½	1.41591	11.0000	11.0500
1st Mary I. — 1553								
2d Elizabeth — 1560	11 18 18	0 1 6	36 0 0	3 0 0½	1 8 4½	1.40853	12.0000	11.0576
3d and 35th same { 1560	11 0 0	1 0 0	33 0 0	3 0 0½	1 8 5½	1.41591	11.0000	11.1000
{ 1594								
19th and 26th d° { 1578	11 18 18	0 1 6	36 0 0	3 0 0½	1 8 4½	1.40853	12.0000	11.1581
{ 1585								
43d same — 1601	11 18 18	0 1 6	36 10 0	3 1 1½	1 7 9½	1.38034	11.7241	10.9481
43d same — 1601	11 0 0	1 0 0	33 10 0	3 0 10½	1 7 12½	1.39477	10.8064	10.0247
1st James I. — 1603	11 0 0	1 0 0	37 10 0	3 8 2½	1 4 11½	1.24600	12.0967	11.2067
3d same — 1604	11 0 0	1 0 0	37 4 0	3 7 7½	1 5 1½	1.25004	12.0000	12.1091
5th same — 1605	11 18 18	0 1 6	40 10 0	3 7 10½	1 5 0½	1.25203	13.6545	12.1479
10th same — 1613	11 18 18	0 1 6	44 0 0	3 13 8½	1 3 0½	1.15743	14.1935	13.1077
2d Charles I. — 1627	11 0 0	1 0 0	40 18 4	3 14 4½	1 2 10½	1.14195	13.4935	12.3189
13th Charles II. — 1661	11 18 18	0 1 6	44 10 0	3 14 6½	1 2 0½	1.13948	14.3548	13.3478
2d Charles I. — 1627	11 0 0	1 0 0	41 0 0	3 14 6½	1 2 9½	1.13948	13.3258	13.3460
22d Charles II. — 1671								
1st James II. — 1685	11 0 0	1 0 0	44 10 0	4 0 10½	1 1 0½	1.05000	14.3548	14.4853
William III.								
3d George I. — 1717	11 0 0	1 0 0	47 15 9½	4 6 11½	0 19 6½	.97643	15.4314	15.5747
3d George III. — 1763	11 0 0	1 0 0	46 14 6½	4 4 11½	1 0 0	1.00000	15.07258	15.20960

A TABLE, shewing the ſtandard weight, value, and comparative view of Engliſh ſilver *money*, from King William the Firſt, A. D. 1066, to A. D. 1765.

Dates of the ſeveral Mint indentures.	Standard of the ſilver at each period.		Numb. of ſhillings, &c. in the pound weight, viz. in twelve ounces Troy, of ſtandard ſilver coined at each period.	Weight of twenty ſhillings in reckoning of ſtandard ſilver at each period.			Weight of fine ſilver contained in twenty ſhillings at each period.			Value of the ſame twenty ſhillings in reckoning of our preſent money.			Proportion of money at each period, to that of our preſent money.	Value of the ounce of the then ſtandard ſilver to that of our preſent money.	Value of the ounce fine ſilver at each period.		Kings and Queens of their Periods.
	Fine Silver.	Alloy.															
A. D.	oz. pw.	oz. pw.	ſh. d.	oz.	pw.	gr.	oz.	pw.	gr.	£.	ſ.	d.		ſh. d.		ſh. d.	
1066	11 2	0 18	21 4	11	5	0	10	8	3	2	18	1½	2.0062	5 2		1 11	William Conq.
1087	11 2	0 18	20 0	12	0	0	11	2	9	3	2	0	3.1000	5 2		1 9½	William Rufus.
1300	11 2	0 18	20 3	11	17	1	10	19	6	3	1	2½	3.0674	5 2		1 9	Edward I.
1347	11 2	0 18	22 6	10	13	8	9	17	8	2	15	1¼	2.7557	5 2		2 0	Edward III.
1354																	
1395	11 2	0 18	25 0	9	12	0	8	17	11½	2	9	7½	2.4802	5 2		2 3	Richard II.
1402																	Henry IV.
1412	11 2	0 18	32 0	7	10	0	6	18	18	1	18	9	1.9375	5 2		2 10	
1422	11 2	0 18	30 0	8	0	0	7	8	0	2	1	4	2.0666	5 2		2 8½	Henry VI.
1422	11 2	0 18	37 6	6	8	0	5	18	10	1	13	0½	1.6531	5 2		3 4½	"
1426	11 2	0 18	30 0	8	0	0	7	8	0	2	1	4	2.0666	5 2		2 8½	
1446																	
1461																	
1464																	Edward IV.
1482	11 2	0 18	37 6	6	8	0	5	18	10	1	13	0½	1.6531	5 2		3 4½	
1483																	Edward V.
1494																	Henry VII.
1505	11 2	0 18	40 0	6	0	0	5	11	0	1	11	0	1.5500	5 2		3 7½	
1509	11 2	0 18	45 0	5	6	16	4	18	6	1	7	6½	1.3776	5 2		4 0½	Henry VIII.
1632																	
1543	10 0	2 0	48 0	5	0	0	4	3	8	1	3	3½	1.1635	4 7½		4 9½	
1545	6 0	6 0	48 0	5	0	0	2	10	0	0	13	11½	0.6984	2 9½		8 0	
1546																	
1547	4 0	8 0	48 0	5	0	0	1	13	8	0	9	3½	0.4656	1 10½		12 0	
1548																	
1549	6 0	6 0	72 0	3	6	16	1	13	8	0	9	3½	0.4656	2 9½		12 0	Edward VI.
1551	3 0	9 0	72 0	3	6	16	0	16	16	0	4	7½	0.2328	1 4½		24 0	
1553	11 1	0 19	60 0	4	0	0	3	13	16	1	0	6½	1.0286	5 1½		5 5½	Mary I.
1560	11 2	0 18	60 0	4	0	0	3	14	0	1	0	8	1.0333	5 2		5 4½	Elizabeth.
1583																	
1601																	
1605																	James I.
1627																	Charles I.
1661	11 2	0 18	62 0	3	17	10	3	11	14½	1	0	0	1.0000	5 2		5 7	Charles II.
1671																	
1685																	James II.
1720																	George I.
1764																	George III.

The king, by proclamation, may at any time prohibit all his ſubjects, not exceeding one year, to lend or advance *money* to any foreign prince or ſtate, without licence under the great or privy ſeal; and if any perſon knowingly offend in the premiſes, he ſhall forfeit treble the value of the *money* lent, &c. two-thirds to the king, and the other to the informer; but perſons may deal in foreign ſtocks, or be intereſted in any bank abroad, eſtabliſhed before iſſuing his majeſty's proclamation. Stat. 3 Geo. II. c. 5.

MONEY, *falſe*, or *baſe*, is either that ſtruck by an unqualified perſon, and of unſtatutable metals; or that which has loſt of its weight, either by being clipped on the corners, or filed on the edges; or, laſtly, by having ſome of its ſurface eaten off; if gold, by aqua regia; if ſilver, by aqua fortis.

Another kind of baſe *money* is that made of pieces of iron, copper, or other metal, covered on each ſide with a thin plate or leaf of gold or ſilver, neatly ſoldered and joined round the edges, and ſtruck, like other coin, with figures, legends, &c. only to be diſtinguiſhed from them by the touch, and weight, and ſound.

MONEY, *imaginary*, or MONEY *of account*, is that which has never exiſted, or, at leaſt, which does not exiſt in real ſpecies, but is a denomination invented, or retained, to facilitate the ſtating of accounts, by keeping them ſtill on a fixed footing, not to be changed, like current coins, which the authority of the ſovereign ſometimes raiſes, or lowers, according to the exigencies of ſtate. Of which kinds are, *pounds*, *livres*, *marks*, *maravedies*, &c. See ACCOUNT.

Money of account, according to M. Boizard, is a ſum of *money*, or a certain number of ſpecies which may change in ſubſtance and quantity, but never in quality. Thus fifty pounds conſiſts of fifty pieces called *pounds*, which are not real, but may be paid in ſeveral real ſpecies, as in guineas, crowns, ſhillings, &c. which are changeable, as guineas, v. gr. which are ſometimes higher, ſometimes lower. For the *money* current and of account in different countries, ſee COIN.

MONEY-*bills*, in *Parliamentary Language*, comprehend all bills, by which *money* is directed to be raiſed upon the ſubject, for any purpoſe or in any ſhape whatſoever; either for the exigencies of government, and collected from the kingdom in general, as the LAND-TAX; or for private benefit, and collected in any particular diſtrict, as by turnpikes, pariſh-rates, and the like. With reſpect to theſe bills, the commons are ſo reaſonably jealous of their privilege of framing new taxes for the ſubject, that they will not ſuffer the other houſe to exert any other power but that of rejecting; they will not permit the leaſt alteration or amendment to be made by the lords to the mode of taxing the people by bills of this nature.

MONEY, *arri*, *chimney*, *machine*, *poll*, *preſt*, *preſtation*, *ſalvage*, *ſhip*, and *trophy*. See the ſeveral articles.

MONEY-*wort*, *nummularia*, in *Botany*, a ſpecies of the LOOSESTRIFE. It is a perennial plant, growing in moiſt ſhady places in many parts of England, ſo is not cultivated in gardens. It flowers from May to near the end of ſummer. It is one of the principal vulneraries; and, drank in wine, cures dyſenteries, weakneſſes, fluxes, and humidities of the belly; it is alſo good for vomiting of blood, uterine fluxes, internal wounds or ulcers, eſpecially of the lungs. Boerhaave conſiders it as ſimilar to a mixture of ſcurvy-graſs with ſorrel; though Lewis ſays, it is far weaker than thoſe herbs, or than any mixture of the two.

MONEYERS, MONEYORS, or MONIERS, officers of the MINT, who work and coin gold and ſilver *money*; and anſwer all the waſte and changes.

MONEYERS is ſometimes alſo uſed for *bankers*; or thoſe who make a trade of turning and returning *money*.

MONGER, a little ſea-veſſel which fiſhermen uſe.

When a word ends with *monger*, it signifies *mercator*; from the Saxon *mangor*, i. e. *mercator*.

MONGOOSE, or MONGOOZ, in *Zoology*, is a species of LEMUR in the Linnæan system, the woolly *maucauco* of Pennant, and by some called the Macaffar fox. The sides of this animal are orange-coloured; its ears short and rounded; the end of the nose black; the eyes lodged in a circle of black, and the space between them of the same colour; the rest of the nose and sides of the cheek white; the whole upper part of the body covered with long, soft, thick fur, a little curled or waved, of a deep brownish ash-colour; the tail is long, covered with the same sort of hair, and of the same colour; the breast and belly white; the hands and feet naked and dusky; the nails flat, except that of the inner toe of the hind-feet; about the size of a cat; and varies, sometimes with white or yellow spots, and with a face wholly brown. It inhabits Madagascar and the adjacent isles; sleeps on trees, protects itself from rain, by turning its tail over its head, lives on fruits, and is very sportive and good-natured. Pennant. See *Tab.* III. *Quadrupeds*, N° 35.

MONITORY *letters*, are letters of warning and admonition, sent from an ecclesiastical judge upon information of scandals and abuses within the cognizance of his court.

MONK, anciently denoted a person who retired from the world to give himself up wholly to God, and to live in solitude and abstinence.

The word is derived from the Latin *monachus*, and that from the Greek *μονος*, *solitary*, of *μονη*, *sola*, *alone*; because the ancient *monks* lived in solitude, as the true *monks* still do.

Such were the HERMITS and ANACHORETS, who withdrew into deserts, and lived remote from all commerce of mankind.

Some writers, as father Helyot, Differt. Prelim. trace the origin of *monks* up as early as the time of the Therapeutæ; and maintain, that there had been an uninterrupted succession of *monks* from the Therapeutæ to St. Antony. Others, on the contrary, are contented with going back as far as St. Paul the Hermit.

The original of *monks* seems to have been this. The persecutions, which attended the first ages of the Gospel, forced some Christians to retire from the world, and live in deserts and places most private and unfrequented, in hopes of finding that peace and comfort among beasts, which were denied them among men. And this being the case of some very extraordinary persons, their example gave to much reputation to retirement, that the practice was continued, when the reason of its commencement ceased. After the empire became Christian, instances of this kind were numerous, and those, whose security had obliged them to live separately and apart, became afterwards united into societies. We may also add, that the mystic theology, which gained ground towards the close of the third century, contributed to produce the same effect, and to draw men into solitude for the purposes of enthusiastic devotion.

The *monks*, at least the ancient ones, were distinguished into *solitaires*, *cœnobites*, and *sarabaites*.

The *solitary* are those who live alone, in places remote from all towns and habitations of men, as do still some of the hermits.

The *cœnobites* are those who live in community with several others in the same house, and under the same superiors.

The *sarabaites* were strolling *monks*, having no fixed rule or residence.

The houses of *monks* again were of two kinds, viz. *monasteries*, and *lauræ*. See MONASTERY, and LAURA.

Those we call *monks* now-a-days, are cœnobites, who live together in a convent or monastery, who make vows of living according to a certain rule established by the founder, and wear a habit which distinguishes their order.

Those that are endowed, or have a fixed revenue, are most properly called *monks*, *monachi*; as the Charterux, Benedictines, Bernardines, &c. The Mendicants, or those that beg, as the Capuchins and Franciscans, are more properly called *religious*, and *friers*; though the names are frequently confounded.

The first *monks* were those of St. Antony; who, towards the close of the fourth century, formed them into a regular body, engaged them to live in society with each other, and prescribed to them fixed rules for the direction of their conduct. These regulations, which Antony had made in Egypt, were soon introduced into Palestine and Syria by his disciple Hilarion. Almost about the same time, Ammo or Eugenius, with their companions Gaddanas and Azyzas, instituted the monastic order in Mesopotamia, and the adjacent countries; and their example was followed with such rapid success, that, in a short time, the whole East was filled with a lazy set of mortals, who, abandoning all human connexions, advantages, pleasures, and concerns, were out a languishing and miserable life amidst the hardships of want, and various kinds of suffering, in order to arrive at a more close and rapturous communication with God and angels. From the East this gloomy institution passed into the West, and first into Italy, and its neighbouring islands; though it is uncertain who transplanted it thither. St. Martin, the celebrated bishop of Tours, erected the first monasteries in Gaul, and recommended this religious solitude with such power and efficacy, both by his instructions and his example, that his funeral is said to have been attended by no less than two thousand *monks*. From hence, the monastic discipline extended, gradually, its progress through the other provinces and countries of Europe. There were besides the *monks* of St. Basil, called in the East, *Cathari*, from *καθος πνευμα εχει την τροπον*, and those of St. Jerom, the hermits of St. Augustine, and afterwards those of St. Benedict and St. Bernard; at length came those of St. Francis and St. Dominic, with a legion of others; all which see under their proper heads, BENEDICTINES, &c.

Towards the close of the fifth century, the *monks*, who had formerly lived only for themselves in solitary retreats, and had never thought of assuming any rank among the facerdotal order, were now gradually distinguished from the populace, and endowed with such opulence and honourable privileges, that they found themselves in a condition to claim an eminent station among the supports and pillars of the Christian community. The fame of their piety and sanctity was so great, that bishops and presbyters were often chosen out of their order; and the passion of erecting edifices and convents, in which the *monks* and holy virgins might serve God, in the most commodious manner, was at this time carried beyond all bounds. However, their licentiousness, even in this century, was become a proverb; and they are said to have excited the most dreadful tumults and seditions in various places. The monastic orders were at first under the immediate jurisdiction of the bishops, from which they were exempted by the Roman pontiff, about the end of the seventh century; and the *monks*, in return, devoted themselves wholly to advance the interests, and to maintain the dignity of the bishop of Rome. This immunity which they obtained, was a fruitful source of licentiousness and disorder, and occasioned the greatest part of the vices, with which they were afterwards so justly charged. In the eighth century the monastic discipline was extremely relaxed both in the eastern and western provinces, and all efforts to restore it were ineffectual. Nevertheless, this kind of institution was in the highest esteem, and nothing could equal the veneration that was paid, about the close of the ninth century, to such as devoted themselves to the sacred gloom and indolence of a convent. This veneration induced several kings and emperors to call them to their courts, and to employ them in civil affairs of the greatest moment. Their reformation was attempted by Lewis the Meek, but the effect was of short duration. In the eleventh century they were exempted by the pope from the authority of their sovereigns, and new orders of *monks* were continually established; insomuch that in the council of Lateran, that was held in the year 1215, a decree was passed, by the advice of Innocent III. to prevent any new monastic institutions; and several were entirely suppressed. In the fifteenth and sixteenth centuries, it appears from the testimonies of the best writers, that the *monks* were generally lazy, illiterate, profligate, and licentious Epicureans, whose views in life were confined to opulence, idleness, and pleasure. However, the Reformation had a manifest influence in restraining their excesses, and rendering them more circumspect and cautious in their external conduct.

Monks are distinguished by the colour of their habits into *black*, *white*, *grey*, &c. Among the *monks*, some are called *monks of the choir*, others *professed monks*, and others *lay monks*; which last are destined for the service of the convent, and have neither clericate nor literature.

MONKS, *cloistered*, are those who actually reside in the house: in opposition to *extra-monks*, who have benefices depending on the monastery.

Monks are also distinguished into *reformed*, whom the civil and ecclesiastical authority have made matters of ancient convents, and put in their power to retrieve the ancient discipline, which had been relaxed; and *antient*, who remain in the convent, to live in it according to its establishment at the time when they made their vows, without obliging themselves to any new reform.

Anciently, the *monks* were all lay-men, and were only distinguished from the rest of the people by a particular habit, and an extraordinary devotion. Not only the

monks were prohibited the priesthood, but even priests were expressly prohibited from becoming *monks*, as appears from the letters of St. Gregory. Pope Syricius was the first who called them to the clericate, on occasion of some great scarcity of priests, that the church was then supposed to labour under: and since that time, the priesthood has been usually united to the monastical profession.

MONKS, *professed*. See PROFESSED.

MONKS, *proprietary*. See PROPRIETARY.

MONK-*fish*, the English name of a species of the squalus, according to the new Artedian system; called *rhina* and *squatina* by the old authors. It is distinguished by Artedi from the other squali, by the name of the *squalus* with no *pinna ani*, and with the mouth on the top of the head: it is of a middle shape, between the long and flat cartilaginous fishes, being much broader than the galei, and rounder than the rays; it grows to a very large size, sometimes to four, five, or six feet long; it is covered all over with a mucous substance, but under it the skin is harsh, and rough enough to serve for the polishing wood and ivory; it is of a brownish grey on the back and sides, and white under the belly; the head is flatted and roundish, and the mouth large, and opening at the extremity of the snout, not, as in other of the fishes of this class, under the head; it has three rows of teeth, eighteen in a row; its eyes are large, and placed near its mouth, and seem as if meant for looking sideway, rather than up or down; its upper pair of fins very much resemble wings, from whence it has its name of the *angel-fish*, and at the extremities of these are a number of sharp hooked thorns; it has also a row of short prickles on its back. See *Tab.* III. *of Fish*, N° 27.

It is common in the English seas, and is not unfrequently caught in Cornwall.

MONK's *hood*, a name given to several species of ACONITE, or WOLF's-*bane*.

The flowers of this plant are in common use in the country, to garnish dishes, though generally suspected of being poisonous; but the stalks have been found very violently so, according to an account given in the Philosophical Transactions. Phil. Trans. N° 432.

The young shoots of this plant have some resemblance to celery, and were put into the sallad as such.

MONK's *rhubarb*. See RHUBARB, and DOCK.

MONKS *frow*, among *Sailors*, is when the selvedges of sails are laid a little over one another, and sewed on both sides.

MONKEY, in *Zoology*, a name given by way of distinction to those apes which have tails; the others, or those without tales, being more properly called *apes*.

The same distinction holds in Latin, the tailed ones being called *cercopitheci*, and those without tails *simiæ*. See CERCOPITHECUS and SIMIA.

Mr. Pennant distributes *monkies* into two classes, viz. 1. Those of the old world, or the continents of Asia and Africa, having within each lower jaw pouches for the reception of their food, buttocks generally naked, and tails strait, but not prehensile. Under this class he enumerates and describes the dog-faced *monkey*, or *simia hamadryas*, of Linnæus; the lion-tailed *monkey*, or *simia sylvanus*, of which there are several varieties; for one of which see *Tab.* III. *Quadrupeds*, *fig.* 36. the hair-lipped *monkey*, or *simia labiata*; the spotted *monkey*, or *simia diana*; the green *monkey*, CALLITRICHUS, or *simia sabæa*; the white-eye-lid *monkey*, or *simia œthiops*; the mustache *monkey*, or *simia cephus*; the talapoin of Buffon; the negro *monkey*; the ascot, or *simia agilis*; the red *monkey*; the Chinese; the varied *monkey*; the *monkey* of Cochin-China; the tawny; the winking; the goat; the annulated *monkies*; and the Philippine, or *simia fascicularis* of Linnæus. 2. *Monkies* of the new world, or the continent of America, having neither pouches in their jaws, nor naked buttocks: the tails of many are prehensile and naked on the under side, for a certain space next their end: of those with prehensile tails, he enumerates the preacher, GUARIBA, or *simia Beelzebub*, of Linnæus; the four-fingered *monkey*, or *simia paniscus*; the capuchin, or *simia capucina*, and *trepida*, and *apella*; the weeper; the orange *monkey*, or *simia sciurea*; the horned *monkey*, or *simia fatuellus*; and the Antigua *monkey*: of those with strait tails, not prehensile, he reckons the fox-tailed, or *simia pithecia* of Linnæus; the great-eared or *simia Midas*; the striated, or *simia fascicus*; the silky, or *simia rufiventer*; the red-tailed, or *simia ursina*; and the fair *monkey*. See Pennant's Synopsis of Quadrupeds, p. 107, 134.

MONKEY of the West Indies. See GUARIBA.

MONKEY, *green*. See CALLITRICHUS.

MONKEY, *in the Sea Language*, a block made of iron, with a catch, used in guns for driving piles.

MONNIERIA, in *Botany*, a genus of the *diadelphia pentandria* class: the characters are, that the calyx is divided into five segments, and the corolla ringent; the fruit is formed into five capsules, containing single seeds. There is only one species.

MONOCEROS, *Unicorn*, in *Astronomy*, a southern constellation formed by Hevelius, containing in his catalogue nineteen stars, and in the Britannic Catalogue thirty-one: the situation, longitude, latitude, &c. are as follow.

Names and situations of the stars.	Mag.	Longitud.		Latitude.		
		°	′	°	′	″
	6	25	21	52	51	56
		25	22	38	2	18
		26	11	54	4	39
		28	8	34	56	26
18. Between the fore-feet		29	53	29	42	0
5.	4-5					
	6-7	0	32	34	7	42
		1	21	51	12	30
In the noſtrils		1	56	18	45	44
2d. between the fore-feet		3	17	27	39	56
10.	5	3	34	28	2	58
In the left fore-foot		3	56	30	18	2
At the knee	5	4	10	54	18	22
At the eye in the forehead	4	4	10	33	15	54
		4	38	5	15	38
At the ear	5-6	6	4	31	13	12
15.	4					
	6	7	34	46	14	23
In the nape of the neck	5	7	49	46	14	56
In the neck	4	8	23	56	20	32
		13	17	39	16	45
		15	19	3	26	32
20.						
In the lower part of the neck	5	15	4	0	22	35
2d.	4-5	15	13	27	22	45
		15	34	6	22	20
	6-7	16	5	34	22	19
In the side	6	22	42	32	25	20
25.						
In the belly	4-5	24	56	52	30	29
In the side under the back	5	25	39	8	35	47
In the back		28	29	44	31	22
	6	0	49	52	22	37
In the left thigh at the root of the tail	5	5	32	22	22	28
30.						
In the tail	4	11	13	54	24	28

MONOCEROS *minor*, in *Ichthyography*, the name of a fish caught in the American seas; its usual length is a foot and half; its height about nine inches, very flat bodied, and high backed like a perch, and bow-bellied; its head has some resemblance to that of a baboon.

From the top of the head is prolonged a smooth, round, tapered strait horn, two inches round about the root, and about three inches long; this seems to have no bone within it, nor is inserted into any, but seems merely the cuticle hardened, into a sort of horny substance; the back-fin reaches from the head to the tail; it is covered with a tough thick skin, feeling somewhat rough.

MONOCEROS *piscis*, is also used as the name of a fish, common in the American seas; and called *pira oca* by Margrave, and some other authors; and by the Portuguese *picus porcus*.

It is a very small fish, of about three fingers breadth long, and two broad where broadest; it is of a flatted compressed shape; the mouth is very small, but of the figure of that of a hog; a little behind the eyes, on the ridge of the back, it has an upright horn, a little bending backwards, less than a finger's breadth long, of a rounded figure, and of the thickness of a large thread; its skin is very rough to the touch, and is of an obscure yellowish colour. The fins and the ridge at the back are yellower than any other part of it. See *Tab.* III. *of fishes*, N° 28.

MONOCHORD, a musical instrument wherewith to try the variety and proportion of musical sounds.

The *monochord*, according to Boethius, is an instrument invented by Pythagoras, for measuring geometrically, or by lines, the quantities and proportions of sounds.

The ancient *monochord* was composed of a rule divided and subdivided into divers parts, whereon there was a string pretty well stretched upon two bridges, at each extreme thereof. In the middle between both was a moveable bridge, called *magas*, by means of which, in applying it to the different divisions of the line, the sounds were found to be in the same proportion to one another, as the divisions of the line cut by the bridge were.

The *monochord* is also called the *harmonical canon*, or *canonical rules*; because serving to measure the degrees of gravity, and acuteness of sounds. Ptolemy examines his harmonical intervals by the *monochord*.

There are alſo *monochords* with divers ſtrings, and a multitude of fixed bridges; but the uſe of all theſe may be ſupplied by one ſingle moveable bridge; by only ſhifting it under a new chord or ſtring, which is placed in the middle, and repreſents the entire ſound, or open note, anſwering to all the diviſions on the other bridges.

When the chord was divided into equal parts, ſo that the terms were as 1 and 1, they called them *uniſons*; if they were as 2 to 1, *octaves*, or *diapaſons*; when they were as 8 to 7, *ſtibs*, or *diapentes*; if they were as 4 to 3, they called them *fourths*, or *diateſſarons*; if the terms were as 5 to 4, *dytons*, or a *greater third*; if as 6 to 5, a *demi-dyton*, or a *leſſer third*; laſtly, if as 24 to 25, *demi-ditons* or *diaſes*.

The *monochord*, being thus divided, was properly what they call a *ſyſtem*, of which there were many kinds, according to the different diviſions of the *monochord*.

Dr. Wallis has taught the diviſion of the *monochord* in the Philoſophical Tranſactions; but that inſtrument is now diſuſed, the modern muſic not requiring ſuch diviſion.

MONOCHORD, Μονόχορδον, formed of μόνος, *ſolus*, *ſingle*, and χορδὴ, *chord*, is alſo uſed for any muſical inſtrument, conſiſting of only one chord or ſtring. Such is the trumpet-marine.

MONOCHROMA, Μονόχρωμα, compounded of μόνος, *ſingle*; and χρῶμα, *colour*, a picture all of one colour.

MONOCOLI, Μονόκωλοι, a kind of fabulous men, who, as the Arabians give out, inhabit the country of Segir, in Arabia Felix; and are but half formed.

The word is Greek, compounded of μόνος, *one*, and κῶλον, *a member*.

MONOCULUS, in *Zoology*, the name of a genus of inſects, of the PODARIA kind, and of the order of *aptera*, in the Linnæan ſyſtem.

Its body is ſhort, of a roundiſh figure, and covered with a firm cruſtaceous ſkin; the fore-legs are ramoſe, and ſerve for leaping and ſwimming; it has but one eye, which is large, and compoſed of three ſmaller ones.

Of this genus, many of which have been reckoned among the microſcopic animals, authors enumerate a great number of ſpecies. Linnæus enumerates nine ſpecies.

MONODON, in the Linnæan ſyſtem of *Zoology*, the name of the monoceros, or ſea unicorn, a fiſh of the whale-kind, which makes a diſtinct genus of fiſhes; the characters of which are, that it has a pipe in the forehead, and no fin on the back, and two very long ſpiral teeth in its upper jaw.

The word is Greek, compounded of μόνος, *one*, and ὀδοὺς, *a tooth*, and expreſſes this fiſh's having only a ſingle tooth, referring to its ſpiral horn.

Artedi makes the *monodon* a peculiar genus among the cetaceous fiſhes, or plagiuri. The NARWAL is the only known ſpecies of this genus.

MONODY, Μονῳδία, compounded of μόνος, *ſolus*, and ᾠδὴ, *ſong*, in the *Ancient Poetry*, a kind of mournful ſong, or ditty, ſung by a perſon all alone, to utter his grief.

MONOECIA, in *Botany*, the twenty-firſt claſs of plants which have not the male and female parts, that is, the ſtamina and piſtillum in the ſame, but in different flowers; and thoſe on the ſame individual, or on the different ſtalks, growing from the ſame root; thoſe which contain the ſtamina, are called the male flowers, thoſe which contain the piſtillum, the female ones. See *Tab.* I. *of Botany*, *claſs* 21.

The word is derived from the Greek μόνος, the ſame, and οἶκος, *habitation*.

The orders of this claſs are eleven, viz. 1. *Monandria*, comprehending ſuch plants as have their male flowers furniſhed with one ſtamen; to which belong five genera, *zannichellia*, *ceratocarpus*, *cynomorium*, *elaterium*, and *chara*. 2. *Diandria*, with two ſtamina, containing two genera, *lemna* and *anguria*. 3. *Triandria*, with three ſtamina, including twelve genera; *amphalea*, *typha*, *ſparganium*, *carex*, *oxis*, *triſpicum*, *elyna*, *cacao*, *avena*, *triticum*, *bromus*, and *phyllanthus*. 4. *Tetrandria*, with four ſtamina; comprehending eight genera, *centella*, *batula*, *betula*, *urtica*, *morus*, *cicca*, *ſcrpicula*, and *littorella*. 5. *Pentandria*, with five ſtamina, containing eight genera; *xanthium*, *ambroſia*, *parthenium*, *iva*, *iuca*, *amaranthus*, *nephelium*, and *clibadium*. 6. *Hexandria*, with ſix ſtamina, to which belong two genera; *zizania* and *phorus*. 7. *Heptandria* with ſeven ſtamina, of which there is one genus, viz. *guettarda*. 8. *Polyandria*, with many ſtamina, including thirteen genera, viz. *ceratophyllum*, *myriophyllum*, *ſagittaria*, *hydnora*, *theligonum*, *viburnum*, *quercus*, *juglans*, *fagus*, *corylus*, *carpinus*, *platanus*, and *liquidambar*. 9. *Monadelphia*, with one ſet of united ſtamina, containing fifteen genera, viz. *buxus*, *pinus*, *cupreſſus*, *thuja*, *acalypha*, *dalechampia*, *phyllanthus*, *cupania*, *croton*, *ricinus*, *jatropha*, *ſterculia*, *hippomane*, *ſtillingia*, and *guerina*. 10. *Syngeneſia*, with the anthers of the ſtamina united, including ſix genera, viz. *trichoſanthes*, *momordica*, *cucumis*, *cucurbita*, *feroa* and *bryonia*. 11. *Gynandria* with the male flowers furniſhed with ſtamina, that grow out of a kind of ſtyle or imperfect piſtillum, the perfect one being in the female flower; containing two genera, viz. *andrachne*, and *agynoia*. See *Tab.* VI. *Botany*, *claſs* 21.

MONOGAMY, compounded of μόνος, *ſolus*, and γάμος, *marriage*, the ſtate or condition of thoſe who have only married once, or are reſtrained to a ſingle wife. See POLYGAMY.

MONOGASTRIC, in *Anatomy*, a name given by Vieuſſens, and ſome of the French writers, to one of the muſcles of the ear, called by Cowper, the *internus auris*, and more properly by Albinus, the *tenſor tympani*.

MONOGRAM, Μονόγραμμος, a cipher, or character, compoſed of one or more letters interwoven; being a kind of abbreviation of a name; anciently much uſed as a badge, ſeal, arms, &c.

Under the eaſtern empire, it is uſual to find MIK, which are the *monogram* of Maria, Jeſus, Conſtantine.

The uſe of *monograms* is of an ancient ſtanding, as appears from Plutarch, and from ſome Greek medals of the time of Philip of Macedon, Alexander his ſon, &c.

The Roman LABARUM bore the *monogram* of Jeſus Chriſt, conſiſting of two letters, a P placed perpendicularly through the middle of a X, i. e. gr. ☧, as we find it in ſeveral medals of the time of Conſtantine, thoſe being the two firſt letters of the word Χριστὸς, *Chriſt*.

Kings formerly marked their coins with their *monograms*: of this we have inſtances in Charlemagne's coins. That prince alſo uſed the *monogram* for his ſignature. Eginhard gives us this reaſon for it, viz. that Charlemagne could not write; and that, having attempted in vain to learn in his grown age, he was reduced to the neceſſity of ſigning with a *monogram*.

The ancients alſo uſed *monograms* as notes, or abbreviations of inſcriptions; for the underſtanding whereof we have expreſs treatiſes of Valerius Probus, Sert. Uffatius, &c.

MONOGRAPHI, in *Botany*, authors who have written expreſs treatiſes on only one plant; as Douglas on the Gueruſey filx, &c.

MONOLOGUE, formed of μόνος, *ſolus*; and λόγος, *diſcourſe*, *ſpeech*, a dramatic ſcene, wherein a perſon appears alone on the ſtage, and ſpeaks to himſelf. See SOLILOQUY.

MONOMACHIA, Μονομαχία, from μόνος, *ſolus*, and μάχη, *combat*, a duel, or ſingle combat of man againſt man.

Monomachia was anciently allowed by law, for the trial or proof of crimes. It was even permitted in pecuniary cauſes, as appears by ancient records. It is now forbid both by the civil and canon laws. See COMBAT.

Alciat has written a treatiſe *De Monomachia*.

MONOMACHON, a name given by ſome to the inteſtine otherwiſe called COECUM.

MONOMERES, a word uſed by the ancients alone, but more frequently joined with the word *phorbeia*, to expreſs one ſort of the bandage uſed to confine the breath, by thoſe who played on the ancient pipe. This conſiſted only of one ſtrait, and one tranſverſe piece; and the latter came fully over the mouth, and cloſed it up, except that a hole was cut in it to receive the mouth-piece of the pipe. The *phorbeiæ* conſiſted of ſeveral pieces, and only tied up the lower-lip.

MONOMIAL, in *Algebra*, a root or quantity that has but one name; or conſiſts but of one part or member. Such are *a*, *ab*, *aabb*. See QUANTITY, BINOMIAL, TRINOMIAL, ROOT, &c.

Monomials may be either RATIONAL, or irrational.

MONOPAGIA, a word uſed by ſome medical writers, for that ſpecies of head-ach which affects only one point, or ſmall part of the head.

MONOPETALOUS, in *Botany*, a term applied to flowers which have only one petalum, or leaf. See theſe flowers repreſented in *Tab.* VIII. *of Botany*, *claſs* 1. 2. 3. 4. and *Tab.* X. *claſs* 20.

MONOPHAGI, Μονοφάγοι, in *Antiquity*, a deſignation given to thoſe who celebrated the Æginean feſtival, becauſe they feaſted or eat together without the aſſiſtance of their ſervants; none but the denizens of that iſland being allowed to be preſent.

MONOPHYSITES, from μόνος, *ſolus*, and φύσις, *nature*, a general name given to all thoſe ſectaries in the Levant, who only own one nature in Jeſus Chriſt; and maintain, that the divine and human nature of Chriſt were ſo united, as to form only one nature, yet without any change, confuſion, or mixture of the two natures.

The *Monophyſites*, however, properly ſo called, are the followers of Severus, a learned monk of Paleſtine, who was created patriarch of Antioch, in 513, and Petrus Fullenſis.

The *Monophyſites* were encouraged by the emperor Anaſta-

ſius,

sius, but depressed by Justin and succeeding emperors. However this sect was restored by Jacob Baradæus, an obscure monk, insomuch, that when he died bishop of Edessa, A. D. 588, he left it in a most flourishing state in Syria, Mesopotamia, Armenia, Egypt, Nubia, Abyssinia, and other countries. The laborious efforts of Jacob were seconded in Egypt, and the adjacent countries, by Theodosius, bishop of Alexandria, and he became so famous that all the *Monophysites* of the East considered him as their second parent and founder, and are to this day called JACOBITES, in honour of their new chief. The *Monophysites* are divided into two sects or parties, the one African, the other Asiatic; at the head of the latter is the patriarch of Antioch, who resides for the most part in the monastery of St. Ananias, near the city of Merdin: the former are under the jurisdiction of the patriarch of Alexandria, who generally resides at Grand Cairo, and are subdivided into COPHTS and ABYSSINIANS. From the fifteenth century downwards, all the patriarchs of the *Monophysites* have taken the name of Ignatius, in order to shew that they are the lineal successors of Ignatius, who was bishop of Antioch in the first century, and consequently the lawful patriarchs of Antioch. In the seventeenth century, a small body of the *Monophysites* in Asia, abandoned, for some time, the doctrine and institutions of their ancestors, and embraced the communion of Rome; but the African *Monophysites*, notwithstanding that poverty and ignorance which exposed them to the seductions of sophistry and gain, stood firm in their principles, and made an obstinate resistance to the promises, presents, and attempts employed by the papal missionaries, to bring them under the Roman yoke: and in the eighteenth century, those of Asia and Africa have persisted in their refusal to enter into the communion of the Romish church, notwithstanding the earnest intreaties and alluring offers, that have been made from time to time by the pope's legates, to conquer their inflexible constancy. The *Monophysites* propagate their doctrine in Asia with zeal and affluity, and have not long ago gained over to their communion a part of the Nestorians, who inhabit the maritime coasts of India.

MONOPODIA, among the *Ancients*, a sort of tables used in their feasts, and distinguished by this name from their having but one foot; the name being derived from the Greek, μονος, *one*, and ποδ, *foot*.

MONOPOLY, MONOPOLIUM, formed of μονος, *solus*, and πωλεω, *vendo*, q. d. *I sell alone*, an unlawful kind of traffic, when one or more persons make themselves sole masters of any commodity, trade, manufacture, or the like, with design to enhance its price; those who have occasion for it being obliged to purchase it at their hands, and on their own terms.

There are two kinds of *monopolies*: the one, when a merchant buys up, for instance, all the corn of a province, to retail it at an advanced rate to the people. The other, when a letter, or PATENT, is procured from the prince, prohibiting any other person to sell a particular commodity besides the patentee.

Monopolies are much the same offence in other branches of trade, that ENGROSSING is in provisions. These had been carried to an enormous height during the reign of queen Elizabeth; but were in great measure remedied by stat. 21 Jac. I. cap. 3. which declares such *monopolies* to be contrary to law, and void (except as to patents, not exceeding the grant of fourteen years, to the authors of new inventions); and *monopolists* are punished with the forfeiture of treble damages, and double costs, to those whom they attempt to disturb; and if they procure any action, brought against them for these damages, to be stayed by any extrajudicial order, other than that of the court wherein it is brought, they incur the penalties of PRÆMUNIRE.

MONOPS, in *Natural History*, a name given by Ælian, and some other of the old Greek writers, to the ROMAUSA. The name *monopus* was given this animal, according to Aristotle, by the people of the country where the creature was most frequent, and therefore is not to be attempted on any Greek etymology. Some of the Greeks have called the same creature *monopus*, and some *ballinthos*.

MONOPTERE, μονοπτερος, a kind of temple among the ancients, round, and without walls; having its dome supported by columns.

MONOPTOTE, MONOPTOTON, in *Grammar*, a noun which has only one case; as *inficias*.

MONOPYRENEOUS *fruits*, are such as only contain one kernel or seed.

MONORCHIS. Beside the common signification of this word as the name of a plant, physicians have also used it to express a man who has but one testicle.

MONORHYME, from μονος, *solus*, and ῥυθμος, *rhyme*, a poetical composition, all the verses whereof end with the same rhyme.

Monorhymes are said to have been invented by the old French poet Leonin, who addressed some Latin verses of this kind to pope Alexander III. whence they are also called *Leonine verses*.

MONOSPERMALTHÆA, in *Botany*, a name given by Mr. Hinard, in the Acta Germanica, to a genus of plants afterwards called WALTHERIA by Linnæus.

MONOSTICH, MONOSTICHON, an epigram, or poetical piece, consisting of one single verse.

MONOSYLLABLE, MONOSYLLABUM, a word of a single syllable; or, that consists of one or more letters which are pronounced together.

The French language abounds in *monosyllables* more than any other. This renders it the more perplexing to foreigners, and yet the beauty of the language seems to consist in it. One of the best and smoothest lines in Malherbe consists of twelve *monosyllables*: speaking of Calista, he says, *—Et moi je ne vai rien quand je ne la vis pas*. In this the genius of the English tongue differs very much from the French, an uninterrupted series of *monosyllables* in the former having always an ill effect. This Mr. Pope both intimates and exemplifies in the same verse. *Awaken low words oft creep in one dull line*. Pasquier cites an Elegy of forty-two verses, consisting wholly of *monosyllables*.

MONOTHELITES, compounded of μονος, *single*, and θελημα, *will*, of θελω, *volo*, *I will*, an ancient sect, which sprung out of the EUTYCHIANS; thus called, as only allowing of one will in Jesus Christ.

The opinion of the *Monothelites* had its rise in 630, and had the emperor Heraclius for an adherent: it was the same with that of the Acephalous Severians.

They allowed of two wills in Christ, considered with regard to the two natures; but reduced them to one, by reason of the union of the two natures; thinking it absurd there should be two free wills in one and the same person. See ECTHESIS and TYPE.

They were condemned by the fifth general council, in 680, as being supposed to destroy the perfection of the humanity of Jesus Christ, depriving it of will and operation. Their sentiments were afterwards embraced by the MARONITES.

MONOTONIA, MONOTONY, a want of variation, or inflexion, of the voice; or a fault in pronunciation, where long series of words are delivering with one unvaried tone. This is one of the principal faults of our English orators. *Monotonia* is opposed to chanting or singing in speaking.

MONOTRIGLYPH, in *Architecture*, denotes the space of one TRIGLYPH, between two pilasters or two columns.

MONOTROPA, in *Botany*, the name of a genus of plants, of the *decandria monogynia* class; its characters are, that it has no empalement, and ten petals, the outer five of which are hollowed at their base, and yield a sweet juice; the fruit is a capsule with five valves. There are two species. This is called Fournefort, *orobanche alba*, and by Dillenius, *hypopitis*.

MONRINGION, in *Botany*, a name given by some authors to the tree whose fruit is the ben-nut, and whose wood is the *lignum nephriticum* of the shops.

MONS *lunæ*. See ADDUCTOR.

MONSEIGNEUR, compounded of *mon*, *my*, and *seigneur*, *lord*, in the plural MESSEIGNEURS, a title of honour and respect used by the French in writing to persons of superior rank, or quality.

Dukes, peers, archbishops, bishops, and presidents *à la mortier*, are complimented with the title of *monseigneur*. In the petitions presented to the sovereign courts, they use the term *messeigneurs*.

MONSEIGNEUR, absolutely used, is a title now restrained to the dauphin of France.

This custom was unknown till the times of Louis XIV. till then, the dauphin was styled *monsieur le dauphin*.

MONSIEUR, a compound of *mon*, *my*, and *sieur*, *sir*, in the plural MESSIEURS, a term or title of civility, used by the French, in speaking to their equals, or those a little below them; answering to Mr. or Sir, among the English.

The superscriptions of all letters begin, *A monsieur monsieur* such a one.

The use of the word *monsieur* was formerly more extensive than at present: they applied it to people who lived many ages before them. Thus, *monsieur* St. Augustine, *monsieur* St. Ambrose; and the vulgar still say, *monsieur* St. Paul, *monsieur* St. Jaques, &c. The Romans, during the flourishing time of their liberty, were unacquainted with that term of parade and flattery, which they afterwards made use of in the word *dominus*. In speaking or writing to each other, they only gave each other their proper names; which practice lasted even after Cæsar had brought the republic under his command: but after the Roman emperors were once well seated in the throne, the courtiers and minions, who by flattery sought to procure

cure favours from them, studied new honours. Suetonius observes, that a comedian on the theatre having called Augustus *dominus*, *lord*; the spectators all flared at him: so that the emperor forbad, for the future, the title to be attributed to him. Caligula was the first who expressly commanded himself to be called *dominus*. Martial, entirely devoted to tyranny, calls Domitian, *dominum ac deum nostrum*. In time, the title was also applied to the people; and of *dominus*, at length was formed DON.

MONSIEUR, absolutely used, is a title or quality appropriated to the second son of France, or the King's brother. In a letter of Philip De Valois, that prince, speaking of his predecessor, calls him *monsieur le roy, monsieur the king*. At present nobody calls the king *monsieur*, but the children of France. See SIRE.

MONSONIA, in *Botany*, a genus of the *pentadelphia decandria* class: its characters are, that it has a five-leaved calyx; the corolla has five petals; the stamina are fifteen, and united in five filaments; the style is divided into five segments, and the fruit is a five-berried capsule. There is only one species.

MONSOON, a regular or periodical wind, in the East Indies, blowing constantly the same way, during six months of the year, and the contrary way the remaining six.

In the Indian ocean, the winds are partly *general*, and blow all the year round the same way, as in the Ethiopic ocean; and partly *periodical*, i. e. half the year blow one way, and the other half near on the opposite points: and those points and times of shifting differ in different parts of this ocean. These latter are what we call *monsoons*.

The shifting of these *monsoons* is not all at once: and in some places the time of the change is attended with calms, in others with variable winds; and particularly those of China, at ceasing to be westerly, are very subject to be tempestuous: and such is their violence, that they seem to be of the nature of the West India HURRICANES, and render the navigation of those seas very unsafe at that time of the year. These tempests the seamen call the *breaking up of the monsoon*.

Monsoons, then, are a species of what we otherwise call TRADE-*winds*.

They take the denomination *monsoon* from an ancient pilot, who first crossed the Indian sea by means hereof. Though others derive the name from a Portuguese word signifying *season*, or change of wind, and *sea*.

Lucretius and Apollonius make mention of annual winds which arise every year, *certis flabris*, which seem to be the same with what in the East Indies we now call *monsoons*. For the physical cause of these winds, see WIND.

MONSTER, MONSTRUM, a birth or production of a living thing, degenerating from the proper and usual disposition of parts, in the species it belongs to. As, when there are too many members, or too few; or some of them are extravagantly out of proportion, either on the side of defect or excess.

The word comes from the Latin, *monstrum*, of *monstrando, showing*. Whence also the box wherein relics were anciently kept to be shewn was called *monstrum*. Dugdale mentions an inventory of the church of York with this article, *Item unum monstrum cum ossibus sancti Petri in Beryl, & crucifixo in summitate*.

Aristotle defines a *monster* to be a defect of nature, when, acting towards some end, it cannot attain to it, by reason some of its principles are corrupted.

Monsters do not propagate their kind; for which reason some rank mules among the number of *monsters*, as also hermaphrodites.

Females, which naturally bring forth twins, are found most liable to produce *monsters*. The reason, probably, is owing to this; that though the twins are covered with one common chorion, yet they have each their separate amnios, which, by their contiguity, may chance to grow together, and so occasion a confusion or blending of the parts. Hence so many double creatures.

F. Malebranche accounts for the production of *monsters*, in the animal world, thus. The Creator has established such a communication between the several parts of his creation, that we are not only naturally led to imitate one another, i. e. have a disposition to do the same things, and assume the same manners, with those with whom we converse; but we also have certain natural dispositions, which incline us to compassion, as well as imitation. These things most men feel, and are sensible of; and, therefore, they need not be proved. The animal spirits then are not only naturally carried into the respective parts of the body to perform the same actions, and the same motions, which we see others do, but also to receive in some manner their wounds, and take part in their sufferings.

Experience tells us, that, when we look attentively on any person severely beaten, or that has a large wound, ulcer, or the like, the spirits immediately flow into those parts of our body which answer to those we see suffer in the other; unless their course be stopped from some other principle. This flux of spirits is very sensible in persons of a delicate constitution, who frequently shudder, and find a kind of trembling in the body, on these occasions; and this sympathy in bodies produces compassion in the mind.

Now, it must be observed, that the view of a wound, &c. wounds the person who views it the more strongly and sensibly, as the person is more weak and delicate; the spirits making a stronger impression on the fibres of a delicate body than on those of a robust one. Thus strong vigorous men, &c. see an execution without much concern, while women, &c. are struck with pity and horror. As to children still in their mothers womb, the fibres of their flesh being incomparably finer than those in women, the course of the animal spirits must necessarily produce much greater alterations in them.

These things being laid down, *monsters* are easily accounted for. Suppose, v. gr. a child born a fool, and with all its legs and arms broken in the same manner as those of criminals in some countries are; which case we choose to instance in, because we are told from Paris, that such a *monster* was actually born there, and lived in one of their hospitals twenty years: the cause of this accident, according to the principles laid down, was, that the mother being a criminal executed, every stroke given to the poor man struck forcibly the imagination of the woman; and, by a kind of counter-stroke, on the tender and delicate brain of the child. Now though the fibres of the woman's brain were strongly shaken by the violent flux of animal spirits on this occasion; yet they had strength and consistence enough to prevent an entire disorder; whereas the fibres of the child's brain, being unable to bear the shock of those spirits, were quite ruined; and the ravage was great enough to deprive him of reason all his life-time.

Again, the view of the execution frighting the woman, the violent course of the animal spirits was directed forcibly from the brain to all those parts of the body corresponding to the suffering parts of the criminal; and the same thing must also happen in the child. But in regard the bones of the mother were strong enough to resist the impulse of those spirits, they were not damaged; and yet the rapid course of these spirits could easily overpower and break the tender and delicate fibres of the bones of the child; the bones being the last parts of the body that are formed, and having a very tender consistence while the child is yet in the womb.

To which it may be here added, that had the mother determined the course of these spirits towards some other parts of her body, by tickling or scratching herself vehemently, the child would not, in all probability, have had his bones broken; but the part answering that, to which the motions of the spirits was determined, would have been the sufferer.

Hence appears the reason why women, in the time of gestation, seeing person, &c. marked in such a manner in the face, imprefs the same mark on the same parts of the child; and why, upon rubbing those hidden parts of the body, when startled at the sight of any thing, or agitated with any extraordinary passion, the mark of impression is fixed on that hidden part rather than on the face of the child. From the principles here laid down, if the reader is disposed to allow them, may most, if not all, the phenomena of *monsters* be easily accounted for.

The French Academicians have of late disputed whether *monsters*, that is, creatures born with their organs preternaturally formed or situated, supernumerary or defective, were originally so formed in their first stamina; or whether this deformity has been owing to some accidental change upon them. The arguments for these opinions, are remarks upon particular histories of such *monsters*, which we cannot abridge, and therefore must refer to the Memoirs de l'Acad. des Sciences, 1733, 1734, 1734, 1739.

A MONSTER, in *Law*, is one that hath not human shape, and yet is born in lawful wedlock; and such may not purchase or retain lands; but a person may be an heir to an ancestor's land, though he have some deformity in any part of his body. If there appears no other heir than such a prodigious birth, the land shall escheat to the lord.

MONSTERS, *vegetable*. There are also monstrous productions in the vegetable world: such, e. gr. are what some botanists call MULES.

Florists also give the denomination *monsters*, or *monstrous flowers*, to those flowers which are not only double, but double podded; or when, instead of one flower, there are two or three rising one above another from a single stalk.

MONSTRANS *de droit*, a writ iſſuing out of chancery, for reſtoring a perſon to lands or tenements that are his in right, though on ſome occaſion found in poſſeſſion of another lately dead.

MONSTRAVERUNT, a writ which lies for a tenant who holds by free charter in ancient demeſne, upon his being diſtrained for the payment of any ſervice or impoſition contrary to the liberty he does or ought to enjoy.

MONTANISTS, ancient heretics, ſo called from their leader Montanus, who acted the prophet, and had his propheteſſes.

Montanus was an obſcure man, without any capacity or ſtrength of judgment, who lived in a Phrygian village, called Pepuza, towards the cloſe of the ſecond century. This weak man gave out that he was the *paraclete*, or comforter, which the divine Saviour, at his departure from the earth, promiſed to ſend to his diſciples to lead them to all truth. Some have aſſerted, that *Montanus* pretended to be the Holy Ghoſt. But others have obſerved, with greater reaſon, that he made a diſtinction between the *paraclete*, promiſed by Chriſt to his apoſtles, and the holy ſpirit: underſtanding by the former a divine teacher, who was to perfect the Goſpel by the addition of ſome doctrines omitted by our Saviour, and to caſt a full light on others which were expreſſed in an obſcure and imperfect manner: accordingly he pretended to be this divine teacher. Under this character, he added to the laws of the Goſpel many auſtere deciſions; inculcated the neceſſity of multiplying faſts; prohibited ſecond marriages as unlawful; maintained that the church ſhould refuſe abſolution to thoſe who had fallen into the commiſſion of enormous ſins; and condemned all care of the body, eſpecially all neatly in dreſs, and all female ornaments. He ſhewed the ſame averſion to the nobleſt employments of the mind, that he did to the innocent enjoyments of life; and gave it as his opinion, that philoſophy, arts, and whatever favoured of polite literature, ſhould be mercileſſly baniſhed from the Chriſtian church. He looked upon thoſe Chriſtians as guilty of a moſt heinous tranſgreſſion, who ſaved their lives, by flight, from the perſecuting ſword, or who ranſomed them by money, from the hands of their cruel and mercenary judges. He added many other precepts equal to theſe in ſeverity and rigour: and iſſued many predictions concerning the diſaſters that were to happen in the empire, and the approaching deſtruction of the Roman republic, which rendered him obnoxious to the governing powers. *Montanus* was, therefore, firſt by a decree of certain aſſemblies, and afterwards by the unanimous voice of the whole church, ſolemnly ſeparated from the body of the faithful. However he had many patrons and adherents, the principal of whom was Tertullian, and his cauſe ſpread abroad through Aſia, Africa, and a part of Europe. Moth. Eccl. Hiſt. vol. i. p. 192, &c. 8vo.

The *Montaniſts* are the ſame with what were otherwiſe denominated *Phrygians*, *Cataphrygians*, and *Quintilians*; which ſee.

MONTANUM *ſaxum*. See VERU.

MONTENSES. See AGONISTICI, CAMPITÆ, and DONATISTÆ.

MONTH, in the *Computation of Time*, the twelfth part of the year.

Among the ancient Greeks, the year was divided into twelve *months*, which contained thirty and twenty-nine days alternately; but ſo as the *months* of thirty days always went before thoſe of twenty-nine; the former were termed πλήρεις, *full*, and ἔμπλεοι, as ending on the tenth day; the latter were called κοῖλοι, *hollow*, and from their ending on the ninth day, ἐννεάφθοι.

In order to underſtand their method of reckoning the days of the *month*, it muſt be conſidered that every *month* was divided into three δεκάδες or three decads of days; the firſt decad they called the πρώτη ἀρχομένου or ἱσταμένου; the ſecond, δευτέρα μεσούντος; the third, τρίτη φθίνοντος, or ἑνὸς καὶ νέας. Whence the firſt day of the *month* was called ἱσταμένου, as falling upon the new moon, and πρώτη ἀρχομένου or ἱσταμένου, as being the firſt day of the firſt decad; the ſecond day was termed, δευτέρα ἱσταμένου; the third, τρίτη ἱσταμένου; and ſo on to the tenth inclusive.

The firſt day of the ſecond decad, which was the eleventh day of the *month*, was called πρώτη μεσούντος or πρώτη φθίνοντος; the ſecond of this decad, δευτέρα μεσούντος, or φθίνοντος, and ſoon to δεκάτη, the twentieth, which was the laſt of the ſecond decad.

The firſt day of the third decad was termed πρώτη τοῦ μηνὸς; the ſecond, δευτέρα τοῦ μηνὸς, and ſo of the reſt. Sometimes they inverted the numbers of this laſt decad, the firſt being called ἑνδεκάτη φθίνοντος; the ſecond, δωδεκάτη φθίνοντος; the third, τρισκαιδεκάτη; and ſo on to the laſt day of the *month*, which was called Δημήτριος, *Demetrius*, from Demetrius Poliorcetes; before whoſe time, particularly in Solon's laws, it was called ἕνη καὶ νέα, *the old and new*; becauſe the new moon falling out on that day part of it belonged to the old moon, and part to the new. It was alſo called τριακὰς, *the thirtieth*; and that not only in the *months* which conſiſted of thirty days, but alſo in thoſe of twenty-nine; for in theſe, according to ſome accounts the twenty-ſecond day was omitted; or, according to others, the twenty-ninth: but which day ſoever was omitted in computation, the thirtieth was conſtantly retained. Hence, according to Thales's firſt ſcheme, all the *months* were called *months* of thirty days; though, by Solon's regulation, half of them contained only twenty-nine: and the lunar year of Athens was called a year of three hundred and fifty days; though really after Solon's time, it conſiſted of no more than three hundred and fifty-four. Vide Petr. Archæol. Gr. lib. ii. cap. 30.

The names of the *months* being various in different parts of Greece, it will be ſufficient particularly to conſider thoſe of Athens, barely mentioning thoſe of others that correſpond with them. 1. *Hecatombæon*, or ECATOMBÆON. 2. METAGITNION. 3. BOEDROMION. 4. MAIMACTERION. 5. PYANEPSION. 6. ANTHESTERION. 7. POSIDION. 8. GAMELION. 9. ELAPHEBOLION. 10. MUNYCHION. 11. THARGELION. 12. SCIROPHORION.

As the Roman *months* were the ſame with thoſe now in uſe among the Europeans, we ſhall only refer to the article CALENDS, where the manner of their computation is explained.

The Hebrew *months* were originally reckoned in order, as the firſt, ſecond, &c. but after the Babyloniſh captivity, the Iſraelites borrowed the names of their *months* from the Chaldeans and Perſians: and they were diſtinguiſhed in the ſacred and civil year as follows. In the ſacred year, *Niſan*, anſwering to our March, *Iyar* to April, *Sivan* to May, *Thammuz* to June, *Ab* to July, *Elul* to Auguſt. *Tizri* to September, *Marſcheſvan* to October, *Caſlev* to November, *Tebet* to December, *Schbat* to January, and *Adar* to February. In the civil year, *Tizri* correſponding to September, *Marſcheſvan* to October, *Caſlev* to November, *Tebet* to December, *Schbat* to January, *Adar* to February, *Niſan* to March, *Iyar* to April, *Sivan* to May, *Thammuz* to June, *Ab* to July, and *Elul* to Auguſt.

Time, we have obſerved, is duration marked out for certain uſes, and meaſured by the motions of the heavenly bodies.

Hence reſult divers kinds of years, and *months*, according to the particular luminary by whoſe revolutions they are determined, and the particular purpoſes they are deſtined for: as, *ſolar months*, *lunar months*, *civil months*, *aſtronomical months*, &c.

MONTH, *ſolar*, is the ſpace of time wherein the ſun moves through one entire ſign of the ecliptic.

Hence, if regard be had to the ſun's true motion, the *ſolar months* will be unequal; ſince the ſun is longer in paſſing through the ſummer ſigns, than through thoſe of the winter.

But as he conſtantly travels through all the twelve in 365 days, 5 hours, and 49 minutes, the quantity of a mean *month* will be had by dividing that number by 12. On this principle, the quantity of a *ſolar month* will be found 30 days, 10 hours, 29 minutes, 5 ſeconds.

MONTH, *lunar*, are either *ſynodical*, *periodical*, or *illuminative*.

MONTH, *lunar ſynodical*, called alſo, abſolutely, *lunar* MONTH, and *lunation*, is the ſpace of time between two conjunctions of the moon with the ſun; or between two new moons. See SYNODICAL *month*, and LUNATION. The quantity of the *ſynodical month* is 29 days, 12 hours, 44′, 3″, 11‴. See MOON.

MONTH, *lunar periodical*, is the ſpace of time wherein the moon makes her round through the zodiac, or wherein ſhe returns to the ſame point.

The quantity of this *month* is 27 days, 7 hours, 43′, 8″.

The ancient Romans made uſe of *lunar months*, and made them alternately of 29 and 30 days: and they marked the days of each *month* by three terms, viz. *calends*, *nones*, and *ides*.

MONTH, *lunar illuminative*, is the ſpace from the firſt time of the moon's appearance after new moon, to her firſt appearance after the new moon following.

Hence, as the moon appears ſometimes ſooner after the new moon, and ſometimes later; the quantity of the *illuminative month* is not always the ſame. By this *month* the Turks and Arabs reckon.

MONTH, *aſtronomical* or *natural*, is that meaſured by ſome exact interval correſponding to the motion of the ſun, or moon.

Such are the lunar and ſolar *months* above mentioned.

Where note, that theſe *months* can be of no uſe in civil life, where it is required that the *months* begin and end on ſome certain days. For this reaſon, recourſe is had to another form of *months*.

MONTH, *civil*, or *common*, is an interval of a certain num-

ber of whole days, approaching nearly to the quantity of some astronomical, either lunar, or solar *month*.

Civil months are various, according to the astronomical *month* they are accommodated to.

MONTHS, *civil lunar*, are to consist alternately of 29 and 30 days. Thus will two *civil months* be equal to two astronomical ones, abating for the odd minutes; and, consequently, the new moon will be hereby kept to the first day of each such *civil month* for a long time together. However to make them keep constant pace with the *civil months*, at the end of each 948 *months*, a month of 29 days must be added; or else every 33d *month* must consist of 30 days.

This was the *month* in civil or common use among the Jews, Greeks, and Romans, till the time of Julius Cæsar.

MONTHS, *civil solar*, are to consist alternately of 30 and 31 days, excepting one *month* of the twelve, which for every fourth year should consist of 30 days, and for the other years of 29. This form of *civil months* was introduced by Julius Cæsar.

Under Augustus, the sixth *month*, till then from its place called *Sextilis*, was denominated *Augustus*, in honour of that prince; and, to make the compliment yet the greater, a day was added to it: so that it now consisted of 31 days, though till then it had only contained 30; to make up for which, a day was taken from February; so that henceforward it only consisted of 28 days, and every fourth year of 29; though before it had ordinarily consisted of 29 days, &c. and such are the *civil* or CALENDAR *months* which now obtain through Europe.

MONTH, *philosophical*, among *Chemists*, is the space of forty days and nights.

MONTH, *ecclesiastic, embolismic, fence, revolving*. See the adjectives.

MONTH-*minutes*. See CLIMATE.

MONTHLY *courses*. See MENSES.

MONT-PAGNOTE, *the pell of the mountebanks*, an eminence chosen without the reach of the cannon of a place besieged; where curious persons put themselves to see an attack, and the manner of the siege, without being exposed to danger.

MONTIA, *blinks*, in the Linnæan system of *Botany*, the name of a distinct genus of plants of the *triandria trigynia* class; the characters of which are these: the cup is a perianthium compoled of two oval, hollow, obtuse, and erect leaves, which remain when the flower is fallen; the flower is compoled of one irregular petal; the ftamina are three capillary filaments, of the length of the flower; the antheræ are fmall; the germen of the piftillum is of a turbinated form; the ftyles are three, hairy and expanded; the ftigmata are fimple; the fruit is a capfule of a turbinated form obtufe, of one cell, feparated by three valves; the feeds are three in number and roundifh. There is only one fpecies.

MONTIFRINGILLA, in *Zoology*, the name of a bird, known in Engliih by the name of the BRAMBLE, *brambling, or mountain-finch*; and called, by the ancients, *ærithus*.

MONUMENT, *monumentum*, of *monere*, to *admonish, admonish*, in *Architecture*, a building deftined to preferve the memory of the perfon who raifed it, or of him for whom it was raifed: fuch are, a triumphal arch, a mauloleum, a pyramid, &c.

The firft monuments, which the ancients erected, were the ftones which they laid over their tombs, whereon they wrote the names and actions of the deceafed.

Thefe ftones were diftinguifhed, by various names, according as their figures were different. The Greeks gave the name of *ftelæ*, στλαι, to fuch as were fquare in their bafe, and preferved the fame depth throughout their whole length; whence we derived our fquare pilafters, or Attic columns. They called thofe *ftyles*, στυλοι, which, being round in their bafe, ended in a point at top, which gave occafion to the invention of diminifhed columns.

The name *pyramids* they gave to thofe which were fquare at the foot, and determined in a point at top, in manner of a funeral pile.

And the name *obelifc*, to thofe whofe bafes were more in length than in breadth, and which rofe, ftill leffening, to a very great height, refembling the figure of the fuits or inftruments ufed by the ancients in roafting the flefh of their facrifices, which they called *obeli*, οβελοι.

MONUMENT, *the*, abfolutely fo called among us, denotes a magnificent pillar, defigned by fir Chriftopher Wren, erected by order of parliament, in memory of the burning of the city of London, anno 1666, in the very place where the fire began.

This pillar was begun in 1671, and finifhed in 1677. It is of the Doric order, fluted, 202 feet high from the ground, and fifteen feet in diameter, of folid Portland ftone, with a ftone-cafe in the middle of black marble, containing 345 fteps. The loweft part of the pedeftal is 28 feet fquare, and its altitude 40 feet; the front being enriched with curious baflo reliefs. It has a balcony within 32 feet of the top, where is a curious and fpacious blazing urn of gilt brafs.

MONYCHA, formed of *μονος, fingle*, and *ονυξ, hoof*, an epithet applied by naturalifts to thofe animals whofe hoofs are fingle and undivided; fuch are the horfe, and the like.

MOOD, or MODE, in *Logic*, called alfo *Syllogiftic* MOOD, is a proper difpofition of the feveral propofitions of a fyllogifm, in refpect of quantity and quality.

By proper difpofition, we mean fuch wherein the antecedent being true, the confequent, in virtue of the form, cannot be falfe. So that all thofe modes or manners of fyllogifms are at once excluded, where no conclufion formally follows; or where the antecedent being true, a falfe conclufion may be drawn from it.

There are two kinds of *moods*; the one *direct*, the other *indirect*.

MOOD, *direct*, is that wherein the conclufion is drawn from the premifes directly and immediately: as, every animal is a living thing; every man is an animal; therefore every man is a living thing.

MOOD, *indirect*, is that wherein the conclufion is not inferred immediately from the premifes, but follows from them by means of a converfion: as, every animal is a living thing; every man is an animal; therefore fome living thing is a man. Thefe are fourteen direct moods; whereof four belong to the firft figure, four to the fecond, and fix to the third. See FIGURE.

They are denoted by fo many artificial words formed for that purpofe; viz. 1. *Barbara, celarent, darii, ferio*. 2. *Baroko, cefare, cameftres, feftino*. 3. *Darapti, felapton, disamis, datisi, bocardo, ferifon*. 4. *Bamalip, calentes, dimatis, fefapmo, fresifon*.

The ufe and effect of which words fee under the fyllables, and the letters wherein the fyllables confift. Each word, e. g. conftits of three fyllables, denoting the three propofitions of a fyllogifm; viz. major, minor, and conclufion. Add, that the letters of each fyllable are either vowels or confonants: the vowels are *a*, which denotes an univerfal affirmative propofition; *e*, an univerfal negative; *i*, a particular affirmative; and *o*, a particular negative.

Thus, *barbara* is a fyllogifm or *mood* of the firft figure, confifting of three univerfal affirmative propofitions: *baralip* of the fourth figure, confifting of two univerfal affirmative premifes, and a particular affirmative conclufion. The confonants are chiefly of ufe in the REDUCTION of fyllogifms.

MOOD, or MODE, in *Grammar*, is ufed to fignify the different manners of conjugating verbs, agreeably to the different actions or affections to be expreffed; as fhowing, commanding, wifhing, &c.

Hence arife five *moods*; viz. the *indicative, imperative, optative, fubjunctive*, and *infinitive*; which fee.

Some grammarians reckon but four *moods*, confounding the optative with the fubjunctive; and fome make fix, dividing the optative into potential and optative.

The Greeks have five *moods* of verbs different in termination; but the Latins have only four. In Engliih the terminations are the fame in all the *moods*.

For the origin of *moods*, it may be obferved, that verbs are of that kind of words which fignify the manner and form of our thought: whereof the principle is affirmation. Verbs are alfo formed to receive different inflexions, as the affirmation regards different perfons, and different times: whence arife the tenfes and perfons of verbs.

But, befides thefe, men have thought fit to invent other inflexions, to explain what paffes in their mind ftill more diftinctly: for, in the firft place, they conidered, that, befides the fimple affirmations, as *I love, he loves*, there were others modified and conditional, as, *if he loved, though he fhould love*: and the better to diftinguifh thefe affirmations from the others, they doubled the inflexions of thofe tenfes or times; making fome ferve for fimple affirmations, as, *I love, he loves*; and referving the reft for affirmations that were modified, as, *if he fhould love, might he have loved*. Yet they kept not fteadily to their rules; but fometimes made ufe of fimple inflexions to expreis affirmations that were modified: as, *if he come*, for *if he fhould come*. And it is from this kind of reflection, that grammarians have formed the *mood* they call *fubjunctive*.

But farther, befides the affirmation, the action of our mind may be taken for a *mood*, or manner of our thought: and men have found themfelves under a neceffity of expreffing what they *will*, as well as what they *know*. Now we may will a thing in feveral manners; whereof there are three which may be conidered as the principal. Firft then, we fometimes will things which do not depend

depend on ourselves; and in that case we only will them by a bare wish, which the Latins express by the particle *utinam*; and we by *please God*. Some languages, for instance the Greek, have invented particular inflexions for this end; whence the grammarians have taken occasion to call this the *optative mood*: and there seems something like both in the French, Italian, and Spanish tongues, in regard these have a kind of triple tenses; but in Latin, English, &c. the same inflexions serve for the subjunctive, and for the optative. For this reason, one may very well retrench this *mood* from the Latin conjugations; it being the different inflexions that make *moods*, not the different manners of signifying, which may be varied to infinity.

We sometimes will in another manner; as when we are content a thing should come to pass, though we do not absolutely desire it; as when Terence says, *profundat perdat, perdas, lex hanc fecit, fecit, peristi*. Men might have invented a particular inflexion to express this movement, as in Greek they have done to express a simple desire: but they have not done it; and, in lieu thereof, they make use of the subjunctive. In English, we add the particle *let*, let him spend, &c. Authors call this the *permissive mood*, or *concessive mood*.

The third manner of willing is, when what we desire, depends on another person, of whom we can obtain it, and we signify our will that he do it. This is the motion we use, when we command or pray; and to express this motion, was invented the *mood* we call *imperative*; which has no first person in the singular, because a man, properly speaking, cannot command himself: in some languages it has no third person, because, in strictness, a man cannot command any person, but him to whom he speaks and addresses himself. And in regard the command or prayer always relates to what is to come, it happens that the imperative *mood*, and the future tense, are frequently used for each other (especially in the Hebrew); as, *non occides, thou shalt not kill, for do not kill*. Hence some grammarians place the imperative among the number of futures.

Of all the *moods* we have mentioned, the oriental languages have none but the last, which is the imperative; and, on the contrary, the modern languages have none of them any particular inflexion for the imperative. The method we take for it in English, is either to omit the pronoun, or transpose it: thus, I love, is a simple affirmation; love, an imperative: we love, an affirmation; love we, an imperative.

In explaining the origin of *moods*, the ingenious Mr. Harris observes, that the soul's leading powers are those of perception and volition; and that all speech or discourse is a publishing either a certain perception or volition. Hence then, according as we exhibit it either in a different part, or after a different manner, the variety of *moods*. If we simply declare or indicate something to be, or not to be, whether a perception or volition, this constitutes the declarative or indicative *mood*. If we affect something possible only, and in the number of contingents, this makes the potential *mood*. When this is subjoined to the indicative, and used, as it usually is, to denote the end or final cause, it is the subjunctive. When we address others, in order to have some perception informed, or some volition gratified, we form new modes of speaking: if we interrogate, it is the interrogative *mood*: if we require, it is the requisitive, which, with respect to inferiors, is imperative; and, with respect to equals and superiors, precative or optative. The indicative, potential, interrogative, and requisitive *moods* have their foundation in nature; and, therefore, certain marks or signs of them have been introduced into language, that we may be enabled by our discourse to signify them to one another: so that *moods* are, in fact, no more than so many literal forms, intended to express these useful distinctions. All these *moods*, with their respective tenses, the verb being considered as denoting an attribute, have always reference to some person or substance. But there is another *mood* or form, under which verbs sometimes appear, where they have no reference at all to persons or substances: there, from their indefinite nature, are called INFINITIVES. Hermes, p. 140, &c.

MOOR, in *Philosophy*, and *Music*. See MOOR.

MOON, *luna*, ☽, in *Astronomy*, one of the heavenly bodies, usually ranked among the planets; but with more propriety accounted a satellite, or secondary planet.

The *moon* is an attendant of our earth, whom she respects as a centre, and in whose neighbourhood she is constantly found; insomuch as, if viewed from the sun, she would never appear to depart from us by an angle greater than ten minutes.

As all the other planets move primarily round the sun, so does the *moon* round the earth: her orbit is an ellipsis, in which she is retained by the force of gravity; performing her revolution round the earth, from change to change, in 29 days, 12 hours, and 44 minutes, and round the sun with it every year: tho' she goes round her orbit in 27 days, 7 hours, 43 minutes, moving about 2190 miles every hour; and turns round her axis exactly in the time that she goes round the earth, which is the reason of her keeping always the same side towards us; and that her day and night taken together are as long as our lunar month.

The mean distance of the *moon* from the earth is 60½ semi-diameters of the earth; which is equivalent to 240,000 miles. The mean eccentricity of her orbit is 11/2 of her mean distance, or 10 miles 4,000, which makes a considerable variation in that mean distance.

The *moon*'s diameter is to that of the earth, as 100 to 365, or 11 to 40.15, or 2180 miles: its mean apparent diameter is 31 minutes 16½, and that of the sun 32 minutes 12 seconds. Its mean diameter, as seen from the sun, is 6 seconds.

The *moon*'s surface contains 14,898,750 square miles, and its solidity 5,208,240,000 cubical ones. The density of the *moon*'s body is to that of the earth, as 48,972 to 370,141; to that of the sun, as 48,911 to 19,020; its quantity of matter to that of the earth, nearly as 1 to 39.15; the force of gravity on its surface, is to that on the surface of the earth, as 1392 to 4077.8; and the *moon*'s bulk to that of the earth as 1 to 1. The *moon* has scarce any difference of seasons; because her axis is almost perpendicular to the ecliptic.

The full *moon* appears to the naked eye broader than a circular object subtending an equal angle seen by perfect vision. In a moon of three or four days old the illuminated part appears too broad, in proportion to the obscure part, and likewise seems to extend more outwards, or to have a greater diameter that the obscure part. Also, in an eclipse of the sun or *moon*, the bright part appears too broad in proportion to the dark part, and the eclipse appears less than it really is.

This observation was made by Horrox, and is accounted for by Dr. Jurin, in his Essay upon distinct and indistinct Vision.

In the Philosophical Transactions, N° 473, we have a new method of computing the appulses of the *moon* to the fixed stars and planets; as also of eclipses of the earth, commonly called eclipses of the *sun*, by Mr. Gerbet, professor of the mathematics at Gresham.

MOON, *phenomena of the*. The different appearances of the *moon* are very numerous; sometimes she is increasing, then waning; sometimes horned, then semicircular; sometimes gibbous, then full and round.

Sometimes, again, she illumines us the whole night; sometimes only a part of it; sometimes she is found in the southern hemisphere, sometimes in the northern; all which variations having been first observed by Endymion, an ancient Grecian, who watched her motions, she was fabled to have fallen in love with him.

The source of most of these appearances is, that the *moon* is a dark, opake, and spherical body, and only shines with the light she receives from the sun; whence only that half turned towards him, at any instant, can be illuminated, the opposite half remaining in native darkness. The face of the *moon* visible on our earth, is that part of her body turned towards the earth; whence, according to the various positions of the *moon*, with regard to the sun and earth, we observe different degrees of illumination; sometimes a large, and sometimes a less portion of the enlightened surface being visible.

MOON, *phases of the*. To conceive the lunar phases, let S (*Tab. Astronomy, fig.* 13.) represent the sun; T the earth, RTS a portion of the earth's orbit, and ABDEFG the orbit of the *moon*, wherein she revolves round the earth, in the space of a month, advancing from west to east: connect the centres of the sun and *moon* by the right line S L, and through the centre of the *moon* imagine a plane M L N to pass perpendicular to the line S L; the section of that plane, with the surface of the *moon*, will give the line that bounds light and darkness, and separates the illumined face from the dark one.

Connect the centres of the earth and *moon* by T L, perpendicular to a plane P L O, passing through the centre of the *moon*: that plane will give on the surface of the *moon* the circle that distinguishes the visible hemisphere, or that towards us, from the invisible one, and therefore called *the circle of vision*. Whence it appears, that, whenever the *moon* is in A, the circle bounding light and darkness and the circle of vision coincides; so that all the illumined face of the *moon* will be turned towards the earth: in which case the *moon* is, with respect to us, full, and shines the whole night; with respect to the sun, she is in opposition; in regard the sun and *moon* are then seen in opposite parts of the heavens, the one

rising

filling when the other sets. But it is to be observed, that the *moon*'s disc is not perfectly round when she is full, in the highest or lowest part of her orbit, because we have not a full view of her enlightened side at that time. When *full*, in the highest part of her orbit, a small deficiency appears on her lower edge; and the contrary when full in the lowest part of her orbit.

When the *moon* arrives at B, the whole illuminated disc M P N is not turned towards the earth; so that the visible illumination will be short of a circle; and the *moon* will appear gibbous, as in B.

When she reaches C, where the angle C T S is nearly right, there only one half of the illumined disc is turned towards the earth, and then we observe a *half moon*, as in C; and she is said to be *dichotomized*, or *bisected*.

In this situation the sun and *moon* are a fourth part of a circle removed from each other; and the *moon* is said to be in a *quadrate aspect*, or to be in her *quadrature*.

The *moon* arriving at D, only a small part of the illumined face M P N is turned towards the earth; for which reason the small part that shines upon us will be seen falcated, or bent into narrow angles, or horns as in D.

The inclination of that part of the ecliptic to the horizon, to which the *moon* is at any time when horned, may be known by the position of her horns; for a right line touching their points is perpendicular to the ecliptic. And as the angle, which the *moon*'s orbit makes with the ecliptic, can never raise her above, nor depress her below the ecliptic, more than two minutes of a degree, as seen from the sun; it can have no sensible effect upon the position of her horns. Therefore, if a quadrant be held up, so as one of its edges may seem to touch the *moon*'s horns, the graduated side being kept towards the eye, and as far from the eye as it can be conveniently held, the arc between the plumb-line and the edge of the quadrant, which seems to touch the *moon*'s horns, will shew the inclination of that part of the ecliptic to the horizon. And the arc, between the other edge of the quadrant and plumb-line, will shew the inclination of a line, touching the *moon*'s horns, to the horizon.

At last, the *moon* arriving at E, shews no part of her illumined face at all to the earth, as in E; this position we call the *new moon*, and she is then said to be in conjunction with the sun; the sun and *moon* being in the same point of the ecliptic.

As the *moon* advances towards F, she resumes her horns; and as before the new *moon* the horns were turned westward, so now they change their position, and look eastward: when she comes to G, she is again in quadrate aspect with the sun; in H she is gibbous; and in A she is again full.

Here the arch E L, or the angle S T L, contained under lines drawn from the centres of the sun and *moon* to that of the earth, is called *the elongation of the moon* from the sun: and the arch M O, which is the portion of the illumined circle M O N, that is turned towards us, and which is the measure of the angle that the circle bounding light and darkness, and the circle of vision, make with each other, is every where nearly similar to the arch of elongation E L; or, which is the same thing, the angle S T L, is nearly equal to the angle M L O: as is demonstrated by geometers.

To delineate the MOON*'s phases for any time.* Let the circle C O B P (*fig.* 14.) represent the *moon*'s disc turned towards the earth, and let O P be the line in which the semicircle O C P is projected, which suppose cut at right angles by the diameter B C; then making L P the radius, take L F equal to the co-sine of the elongation of the *moon*; and upon B C, as the greater axis, and L F the less, describe the semiellipsis B F C; this ellipsis will cut off from the *moon*'s disc the portion B F C P, of the illumined face visible on the earth.

As the *moon* illumines the earth by a light reflected from the sun, so she is reciprocally illumined by the earth, which reflects the sun's rays to the surface of the *moon*, and that much more abundantly than she receives them from the *moon*. For the surface of the earth is above 13 times greater than that of the *moon*; and, therefore, supposing the texture of each body alike, as to the power of reflecting, the earth must return 13 times more light to the *moon* than she receives from it. In new *moons*, the illumined side of the earth is turned fully towards the *moon*, and will, therefore, at that time, illumine the dark side of the *moon*; and then the lunar inhabitants (if such there be) will have a full earth, as we, in a similar position, have a full *moon*: and hence arises that dim light observed in the old and new *moons*; whereby, besides the bright horns, we perceive somewhat more of her body behind them, though very obscurely. When the *moon* comes to be in opposition to the sun, the earth, seen from the *moon*, will appear in conjunction with him, and its dark side will be turned towards the *moon*; in which position the earth will disappear to the *moon*, as she does to us at the time of the new *moon*, or in her conjunction with the sun. After this, the lunar inhabitants will see the earth in an horned figure. In fine, the earth will present all the same phases to the *moon*, as the *moon* does to the earth. But from one half of the *moon*, the earth is never seen at all; from the middle of the other half it is always seen over head, turning round almost thirty times as quick as the *moon* does. From the circle which limits our view of the *moon*, only one half of the earth's side next her is seen; the other half being hid below the horizon of all places on that circle. To her the earth seems to be the biggest body in the universe; for it appears thirteen times as big as she does to us. As the earth turns round its axis, the several continents, seas, and islands appear to the *moon*'s inhabitants like so many spots of different forms and brightness, moving over its surface; but much faster at some times than others, as our clouds cover or leave them. By these spots, the Lunarians can determine the time of the earth's diurnal motion, just as we do the motion of the sun: and perhaps they measure their time by the motion of the earth's spots; for they cannot have a truer dial.

Dr. Hook, accounting for the reason why the *moon*'s light affords no visible heat, observes, that the quantity of light, which falls on the hemisphere of the full *moon*, is rarified into a sphere 288 times greater in diameter than the *moon*, before it arrives at us; and, consequently, that the *moon*'s light is 104368 times weaker than that of the sun. It would, therefore, require 104368 full *moons* to give a light and heat equal to that of the sun at noon.

Dr. Smith has endeavoured to shew, in his book on Optics, that the light of the full *moon* is but equal to a 90 thousandth part of the common light of the day when the sun is hidden by a cloud. See LIGHT.

MOON, *course and motion of the.* Though the *moon* finishes its course in 27 days 7 hours 43′, which interval we call a *periodical* month, yet she is longer in passing from one conjunction to another; which space we call a *synodical* month, or a *lunation*. The reason is, that while the *moon* is performing its course round the earth in its own orbit, the earth and *moon* are making their progress round the sun, and both are advanced almost a whole sign towards the east, so that the point of the orbit, which, in the former position, was in a right line passing through the centres of the earth and sun, is now more westerly than the sun: and, therefore, when the *moon* is arrived again at that point, it will not yet be seen in conjunction with the sun; nor will the lunation be completed in less than 29 days and an half.

Were the plane of the *moon*'s orbit coincident with the plane of the ecliptic, i. e. were the earth and *moon* both moved in the same plane, the *moon*'s way in the heaven, viewed from the earth, would appear just the same with that of the sun; with this only difference, that the sun would be found to describe his circle in the space of a year, and the *moon* her's in a month. But this is not the case; for the two planes cut each other in a right line, passing through the centre of the earth, and are inclined to each other in an angle of about five degrees eighteen minutes.

Suppose, e. g. A B (*fig.* 15.) a portion of the earth's orbit, T the earth, and C E D F the *moon*'s orbit, wherein is the centre of the earth; from the same centre T, in the plane of the ecliptic, describe another circle C G D H, whose semidiameter is equal to that of the *moon*'s orbit. Now these two circles, being in several planes, and having the same centre, will intersect each other in a line D C, passing through the centre of the earth. Consequently, C E D, one half of the orbit of the *moon*, will be raised above the plane of the circle C G H, towards the north; and D F C, the other half, will be sunk below towards the south. The right line D C, wherein the two circles intersect each other, is called *the line of the nodes*; and the points of the angles C and D, *the nodes*: whereof that where the *moon* ascends above the plane of the ecliptic, northwards, is called, *the ascending node*, and *the head of the dragon's* and the other, D, *the descending node*, and *the dragon's tails* and the interval of time between the *moon*'s going from the ascending node, and returning to it, *an antic month*.

If the line of the nodes were immoveable, that is, if it had no other motion, but that whereby it is carried round the sun, it would still look towards the same point of the ecliptic; i. e. it would always keep parallel to itself: but it is found by observation, that the line of the nodes constantly changes place, and shifts in situation from east to west, contrary to the order of the signs; and, by a retrograde motion, finishes its circuit in about nineteen years; in which time each of the nodes returns to that point of the ecliptic whence it before receded.

Hence it follows, that the *moon* is never precisely in the ecliptic,

ecliptic, but twice each period; viz. when she is in the nodes. Throughout the rest of her course she deviates from it, being nearer or farther from the ecliptic, as she is nearer or farther from the nodes. In the points F and E she is at her greatest distance from the nodes; which points are therefore called *her limits of north and south latitude*.

The *moon*'s distance from the nodes, or rather from the ecliptic, is called her *latitude*, which is measured by an arch of a circle drawn through the *moon*, perpendicular to the ecliptic, and intercepted between the *moon* and the ecliptic. The *moon*'s latitude, when at the greatest, as in E or F, never exceeds 5 degrees and about 18 minutes; which latitude is the measure of the angles at the nodes.

It appears by observation, that the *moon*'s distance from the earth is continually changing; and that she is always either drawing nearer, or going farther from us. The reason is, that the *moon* does not move in a circular orbit, which has the earth for its centre; but in an elliptic orbit (as represented in *fig.* 16.) one of whose foci is the centre of the earth: A P represents the greater axis of the ellipsis, and the line of the apsides; and T C the eccentricity: the point A, which is the highest apsis, is called the *apogee* of the *moon*; and P, the lower apsis, is the *moon's perigee*, or the point wherein she comes nearest the earth.

Besides, there is reason to believe that the *moon* is somewhat nearer the earth now than she was formerly; her periodical month being shorter than it was in former ages. For our astronomical tables, which in the present age shew the times of solar and lunar eclipses to great precision, do not answer so well for ancient eclipses.

The space of time wherein the *moon*, going from the apogee, returns to it again, is called the *anomalistic month*.

If the *moon*'s orbit had no other motion but that wherewith it is carried round the sun, it would still retain a position parallel to itself, and always point the same way, and be observed in the same point of the ecliptic; but the line of the apsides is likewise observed to be moveable, and to have an angular motion round the earth, from west to east, according to the order of the signs, returning to the same situation in the space of about nine years.

The irregularities of the Moon's *motion*, and that of her orbit, are very considerable. For, 1. when the earth is in her aphelion, the *moon* is in her aphelion likewise; in which case she quickens her pace, and performs her circuit in a shorter time; on the contrary, when the earth is in its perihelion, the *moon* is so too, and then she slackens her motion: and thus she revolves round the earth, in a shorter space, when the earth is in her aphelion than when in her perihelion; so that the periodical months are not all equal.

2. When the *moon* is in her syzygies, i. e. in the line that joins the centres of the earth and sun, which is either in her conjunction or opposition, she moves swifter, *ceteris paribus*, than when in the quadratures.

3. According to the different distances of the *moon* from the syzygies, i. e. from opposition to conjunction, she changes her motion: in the first quarter, that is, from the conjunction to her first quadrature, she abates somewhat of her velocity; which in the second quarter she recovers; in the third quarter she again loses; and in the last she again recovers. This inequality was first discovered by Tycho Brahe, who called it *the moon's variation*.

4. The *moon* moves in an ellipsis, one of whose foci is in the centre of the earth, round which the describes areas proportionable to the time, as the primary planets do round the sun; whence her motion in the perigee must be quickest, and it must be slowest in the apogee.

5. The very orbit of the *moon* is changeable, and does not always persevere in the same figure; its eccentricity being sometimes increased, and sometimes diminished: it is greatest, when the line of the apsides coincides with that of the syzygies; and least, when the line of the apsides cuts the other at right angles.

6. Nor is the apogee of the *moon* without an irregularity; being found to move forward, when it coincides with the line of the syzygies; and backward, when it cuts that line at right angles. Nor is this progress and regress in any measure equal: in the conjunction or opposition, it goes briskly forward; and in the quadratures it moves either slowly forward, stands still, or goes backwards.

7. The motion of the nodes is not uniform; but when the line of the node coincides with that of the syzygies at right angles, they go backward, from east to west; and this sir Isaac Newton shews, is at the rate of 10′, 19″, 24‴, in an hour.

The only equable motion the *moon* has, is that wherewith she turns round her axis exactly in the same space of time, in which she revolves round us in her orbit; whence it happens, that she always turns the same face towards us.

For as the *moon*'s motion round its axis is equal, and yet its motion, or velocity, in its orbit, is unequal, it follows, that when the *moon* is in its perigee, where it moves swiftest in its orbit, that part of its surface, which, on account of its motion in the orbit, would be turned from the earth, is not so entirely; by reason of its motion round its axis. Thus some parts in the limb or margin of the *moon*, sometimes recede from the centre of the disc, and sometimes approach towards it; and some parts, that were before invisible, become conspicuous; which is called *the moon's libration*.

Yet this equability of rotation occasions an apparent irregularity; for the axis of the *moon* not being perpendicular to the plane of her orbit, but a little inclined to it; and this axis, maintaining its parallelism, in its motion round the earth; it must necessarily change its situation, in respect of an observer on the earth; to whom sometimes the one, and sometimes the other pole of the *moon* becomes visible; whence it appears to have a kind of wavering, or vacillation.

Physical cause of the Moon's *motions.* The *moon*, we have observed, moves round the earth by the same laws, and in the same manner, as the earth, and other planets, move round the sun. The solution, therefore, of the lunar motions, in general, comes under those of the earth, and other planets.

As for the particular irregularities in the *moon*'s motion, to which the earth, and other planets, are not subject, they arise from the sun, which acts on, and disturbs her in her ordinary course through her orbit; and are all mechanically deducible from the same great law whereby her general motion is directed; viz. the law of *gravitation* and *attraction*.

Other secondary planets, viz. the satellites of Jupiter and Saturn, are, doubtless, subject to the like irregularities with the *moon*; as being exposed to the same perturbating or disturbing force of the sun; but their distance secures them from our observation.

The laws of the several irregularities in the syzygies, quadratures, &c. see under Syzygies, Quadratures, &c.

We shall, however, in this place, introduce a general view of the Newtonian theory of gravity, as it is applied to the solution of the irregularities of the *moon*'s motion.

It must first be considered, that if the sun acted equally on the earth and *moon*, and always in parallel lines, this action would serve only to restrain them in their annual motions round the sun, and no way affect their actions on each other, or their motions about their common centre of gravity. But because the *moon* is nearer the sun, in one half of her orbit, than the earth is, and farther in the other half of her orbit, and the power of gravity is always greater at a less distance, it follows, that, in one half of her orbit, the *moon* is more attracted than the earth towards the sun, and in the other half less attracted than the earth: and hence irregularities necessarily arise in the motions of the *moon*; the excess, in the first case, and the defect, in the second, of the attraction, becoming a force that disturbs her motion: and besides, the action of the sun, on the earth and *moon*, is not directed in parallel lines, but in lines that meet in the centre of the sun.

In order to understand the effects of these powers, let us suppose that the projectile motions of the earth and *moon* were destroyed, and that they were allowed to fall freely towards the sun. If the *moon* was in conjunction with the sun, or in that part of her orbit which is nearest to him, the *moon* would be more attracted than the earth, and fall with greater velocity towards the sun; so that the distance of the *moon* from the earth would be increased in the fall. If the *moon* was in opposition, or in the part of her orbit which is farthest from the sun, she would be less attracted than the earth by the sun, and would fall with a less velocity, towards the sun than the earth, and the *moon* would be left behind by the earth; so that the distance of the *moon* from the earth would be increased, in this case also. If the *moon* was in one of the quarters, then the earth and *moon* being both attracted towards the centre of the sun, they would both directly descend towards that centre, and, by approaching to the same centre, they would necessarily approach at the same time to each other, and their distance from one another would be diminished, in this case. Now, wherever the action of the sun would increase their distance, if they were allowed to fall towards the sun, there we may be sure the sun's action, by endeavouring to separate them, diminishes their gravity to each

other; wherever the action of the sun would diminish their distance, there the sun's action, by endeavouring to make them approach to one another, increases their gravity to each other: that is, in the conjunction and opposition, their gravity towards each other is diminished by the action of the sun; but in the two quarters it is increased by the action of the sun. To prevent mistaking this matter, it must be remembered, it is not the total action of the sun on them that disturbs their motions, it is only that part of its action by which it tends to separate them, in the first case, to a greater distance from each other; and that part of its action, by which it tends to bring them nearer to each other, in the second case, that has any effect on their motions, with respect to each other. The other, and the far more considerable part has no other effect but to retain them in their annual course, which they perform together about the sun.

In considering, therefore, the effects of the sun's action on the motions of the earth and *moon*, with respect to each other, we need only attend to the excess of its action on the *moon* above its action on the earth, in their conjunction; and we must consider this excess as drawing the *moon* from the earth towards the sun in that place. In the opposition, we need only consider the excess of the action of the sun, on the earth, above its action on the *moon*, and we must consider this excess as drawing the *moon* from the earth, in this place, in a direction opposite to the former, that is, towards the place opposite to where the sun is; because we consider the earth as quiescent, and refer the motion, and all its irregularities to the *moon*. In the quarters, we consider the action of the sun as adding something to the gravity of the *moon* towards the earth.

Suppose the *moon*, setting out from the quarter that precedes the conjunction, with a velocity that would make her describe an exact circle round the earth, if the sun's action had no effect on her; and because her gravity is increased by that action, she must descend towards the earth, and move within that circle: her orbit, there, will be more curve than otherwise it would have been: because this addition to her gravity will make her fall farther at the end of an arc below the tangent drawn at the other end of it; her motion will be accelerated by it, and will continue to be accelerated till she arrives at the ensuing conjunction; because the direction of the action of the sun upon her, during that time, makes an acute angle with the direction of her motion. At the conjunction, her gravity towards the earth being diminished by the action of the sun, her orbit will be less curve there, for that reason; and she will be carried farther from the earth as she moves to the next quarter; and, because the action of the sun makes then an obtuse angle with the direction of her motion, she will be retarded by the same degrees by which she was accelerated before.

Thus she will descend a little towards the earth, as she moves from the first quarter towards the conjunction, and ascend from it, as she moves from the conjunction to the next quarter. The action which disturbs her motion will have a like, and almost equal effect upon her, while she moves in the other half of her orbit, that is, that half of it which is farthest from the sun: she will proceed from the quarter that follows the conjunction with an accelerated motion to the opposition, approaching a little towards the earth, because of the addition made to her gravity, at that quarter, from the action of the sun; and receding from it again, as she goes on from the opposition to the quarter from which we supposed her to set out. The areas described in equal times, by a ray drawn from the *moon* to the earth, will not be equal, but will be accelerated by the conspiring action of the sun, as she moves towards the conjunction or opposition from the quarters that precede them; and will be retarded by the same action, as she moves from the conjunction or opposition to the quarters that succeed them. Newton has computed the quantities of these irregularities from their causes. He finds, that the force added to the gravity of the *moon*, in her quarters, is to the gravity with which she would revolve in a circle about the earth, at her present mean distance, if the sun had no effect on her, as 1 to $178\frac{1}{2}$. He finds the force subducted from her gravity, in the conjunctions and oppositions, to be double of this quantity, and the area described in a given time in the quarters, to be to the area described in the same time in the conjunctions and oppositions, as 10073 to 11073. He finds, that in such an orbit, her distance from the earth in her quarters, would be to her distance in the conjunctions and oppositions, as 70 to 69.

As to the effect of the action of the sun on the nodes, and consequently, on the inclination of the *moon*'s orbit to the ecliptic, see NODES.

Moreover, the action of the sun diminishes the gravity of the *moon* towards the earth, in the conjunctions and oppositions, more than it adds to it in the quarters, and, by diminishing the force which retains the *moon* in her orbit, it increases her distance from the earth and her periodic time: and because the earth and *moon* are nearer the sun in their perihelion than in their aphelion, and the sun acts with a greater force there, so as to subduct more from the *moon*'s gravity towards the earth; it follows, that the *moon* must revolve at a greater distance, and take a longer time to finish her revolution in the perihelion of the earth, than in the aphelion; and this also is conformable to observation.

There is another remarkable irregularity in the *moon*'s motion, that also arises from the action of the sun: which is the progressive motion of the apsides. The *moon* describes an ellipse about the centre of the earth, having one of the foci in that centre. Her greatest and least distances from the earth are in the apsides, or extremities of the longer axis of the ellipse. This is not found to point always to the same place in the heavens, but to move with a progressive motion forwards, so as to finish a revolution round the earth's centre in about nine years.

To understand the reason of this motion of the apsides, we must consider, that, if the gravity of a body decreased less as the distance increases, than according to the regular course of gravity, the body would descend sooner from the higher to the lower apsis, than in half a revolution; and therefore the apsis would recede in that case, for it would move in a contrary direction to the motion of the body, meeting it in its motion. But if the gravity of the body should decrease more as the distance increases, than according to the regular course of gravity, that is, in a higher proportion than as the square of the distance increases, the body would take more than half a revolution to move from the higher to the lower apsis; and, therefore, in that case, the apsides would have a progressive motion in the same direction as the body.

In the quarters, the sun's action adds to the gravity of the *moon*, and the force it adds is greater, as the distance of the *moon* from the earth is greater; so that the action of the sun hinders her gravity towards the earth from decreasing as much while the distance increases, as it ought to do according to the regular course of gravity; and, therefore, while the *moon* is in the quarters, her apsides must recede. In the conjunction and opposition, the action of the sun subducts from the gravity of the *moon* towards the earth, and subducts the more the greater her distance from the earth is, so as to make her gravity decrease more as her distance increases, than according to the regular course of gravity; and therefore, in this case, the apsides are in a progressive motion. Because the action of the sun subducts more in the conjunctions and oppositions from her gravity, than it adds to it in the quarters, and, in general, diminishes more than it augments her gravity; hence it is that the progressive motion of the apsides exceeds the retrograde motion: and, therefore, the apsides are carried round according to the order of the signs. See Maclaurin's Account of Sir Isaac Newton's Phil. Disc. book 1. chap. 4.

We have some observations and tables concerning the *moon*'s motion, by Mr. Richard Dunthorn, in the Philosophical Transactions, N° 482, sec. 13. where he gives a hundred observed longitudes of the *moon* compared with the tables, viz. twenty-five eclipses of the *moon*, taken (except the first) from Flamsteed's Historia Coelestis, the Philosophical Transactions, and the Memoirs of the Royal Academy of Sciences; the two great eclipses of the sun in 1706, and 1715; twenty-five select places of the *moon*, from Flamsteed's Historia Coelestis; and forty-eight of those longitudes of the *moon*, computed from Flamsteed's Observations by Dr. Halley, and printed in the first edition of the Historia Coelestis.

Figure of the MOON'S *path with respect to the sun.* The path of the *moon* is concave towards the sun throughout.

In other secondary planets, as the satellites of the superior planets, that part of the path of these satellites which is nearest the sun, is convex towards the sun, and the rest is concave. And we often find in elementary treatises of astronomy, the *moon*'s path represented in the same manner; that is, as partly convex and partly concave towards the sun; but this is a mistake. For it is to be observed, in general, that the force which bends the course of the satellite into a curve, when the motion is referred to an immoveable plane, is, at the conjunction, the difference of its gravity towards the sun, and of its gravity towards the primary. When the former prevails over the latter, the force that bends the course of the satellite tends toward the sun; and, consequently, the concavity of the path is towards the sun; and this is the case

caſe of the *moon*. When the gravity towards the primary exceeds the gravity towards the ſun, at the conjunction, then the force which bends the courſe of the ſatellite tends toward the primary, and therefore towards the oppoſition of the ſun; conſequently the path is there convex toward the ſun; and this is the caſe of the ſatellites of Jupiter. When theſe two forces are equal, the path has, at the conjunction, what mathematicians call a point of rectitude; in which caſe, however, the path is concave toward the ſun throughout.

If, indeed, the earth had no annual motion, the *moon*'s motion round the earth, and her track in open ſpace, would be always the ſame. But as the earth and *moon* move round the ſun, the *moon*'s real path in the heavens is very different from her viſible path round the earth; the latter being in a progreſſive circle, and the former in a curve of different degrees of concavity, which would be always the ſame in the ſame parts of the heavens, if the *moon* performed a complete number of lunations in a year, without any fractions.

Mr. Ferguſon has ſuggeſted the following familiar idea of the earth's and *moon*'s path. Let a nail in the end of a chariot-wheel repreſent the earth, and a pin in the nave the *moon*; if the body of the chariot be propped up, ſo as to keep that wheel from touching the ground, and the wheel be then turned round by hand, the pin will deſcribe a circle both round the nail, and in the ſpace it moves through. But if the props be taken away, the horſes put to, and the chariot driven over a piece of ground which is circularly convex; the nail in the axle will deſcribe a circular curve, and the pin in the nave will ſtill deſcribe a circle round the progreſſive nail in the axle, but not in the ſpace through which it moves. In this caſe, the curve deſcribed by the nail will reſemble in miniature as much of the earth's annual path round the ſun, as it deſcribes whilſt the *moon* goes as often round the earth as the pin does round the nail: and the curve deſcribed by the nail will have ſome reſemblance to the *moon*'s path during ſo many lunations.

Let us now ſuppoſe that the radius of the circular curve, deſcribed by the nail in the axle, is to the radius of the circle, which the pin in the nave deſcribes round the axle, as 337½ to 1; which is the proportion of the radius or ſemidiameter of the earth's orbit to that of the *moon*'s; or of the circular curve A 1 2 3 4 5 6 7 B, &c. (*Tab.* IV. *Aſtronomy, fig.* 81.) to the little circle *a*, and then, whilſt the progreſſive nail deſcribes the ſaid curve from A to E, the pin will go once round the nail, with regard to the centre of its path, and, in ſo doing, will deſcribe the curve *a b c d e*. The former will be a true repreſentation of the earth's path for one lunation, and the latter of the *moon*'s for that time. Here we may ſet aſide the inequalities of the *moon*'s motion, and alſo the earth's moving round its common centre of gravity, and the *moon*'s: all which, if they were truly copied in this experiment, would not ſenſibly alter the figure of the paths deſcribed by the nail and pin, even though they ſhould rub againſt a plain upright ſurface all the way, and leave their tracks viſible upon it. And if the chariot was driven forward on ſuch a convex piece of ground, ſo as to turn the wheel ſeveral times round, the track of the pin in the nave would ſtill be concave toward the centre of the circular curve deſcribed by the pin in the axle; as the *moon*'s path is always concave to the ſun in the centre of the earth's annual orbit.

In this diagram, the thickeſt curve line A B C D E, with the numeral figures ſet to it, repreſents as much of the earth's annual orbit as it deſcribes in 32 days from weſt to eaſt; the little circles at *a, b, c, d, e*, ſhew the *moon*'s orbit in due proportion to the earth's; and the ſmalleſt curve *a b c d e f* repreſents the line of the *moon*'s path in the heavens for 32 days, accounted from any particular new *moon* at *a*.

The ſun is ſuppoſed to be in the centre of the curve A 1 2 3 4 5 6 7 B, &c. and the ſmall dotted circles upon it repreſent the *moon*'s orbit, of which the radius is in the ſame proportion to the earth's path, in this ſcheme, that the radius of the *moon*'s orbit, in the heavens, bears to the radius of the earth's annual path round the ſun; that is, as 240,000 to 81,000,000, or as 1 to 337½.

When the earth is at *a*, the new *moon* is at *a*; and in the ſeven days that the earth deſcribes the curve 1 2 3 4 5 6 7, the *moon*, in accompanying the earth, deſcribes the curve *a b*; and is in her firſt quarter at *b* when the earth is at B. As the earth deſcribes the curve B 8 9 10 11 12 13 14, the *moon* deſcribes the curve *b c*; and is at *c*, oppoſite to the ſun, when the earth is at C. Whilſt the earth deſcribes the curve C 15 16 17 18 19 20 21 22, the *moon* deſcribes the curve *c d*; and is in her third quarter at *d* when the earth is at D. And, laſtly, whilſt the earth deſcribes the curve D 23 24 25 26 27 28 29, the *moon* deſcribes the curve *d e*; and is again in conjunction at *e* with the ſun, when the earth is at E, between the 29th and 30th day of the *moon*'s age, accounted by the numeral figures from the new *moon* at A. In deſcribing the curve *a b c d e*, the *moon* goes round the progreſſive earth as really as if ſhe had kept in the dotted circle A, and the earth continued immoveable in the centre of that circle.

And thus we ſee, that although the *moon* goes round the earth in a circle, with reſpect to the earth's centre, her real path in the heavens is not very different in appearance from the earth's path. To ſhew that the *moon*'s path is concave to the ſun, even at the time of change, it is carried on a little farther into a ſecond lunation, as to *f*.

The *moon*'s abſolute motion from her change to her firſt quarter, or from *a* to *b*, is ſo much ſlower than the earth's, that ſhe falls 240 thouſand miles (equal to the ſemidiameter of her orbit) behind the earth at her firſt quarter in *b*, when the earth is in B; that is, ſhe falls back a ſpace equal to her diſtance from the earth. From that time her motion is gradually accelerated to her oppoſition or full at *c*, and then ſhe is come up as far as the earth, having regained what ſhe loſt in her firſt quarter from *a* to *b*. From the full to the laſt quarter at *d*, her motion continues accelerated, ſo as to be juſt as far before the earth at *d*, as ſhe was behind it at her firſt quarter in *b*. But from *d* to *e* her motion is retarded ſo, that ſhe loſes as much with reſpect to the earth, as is equal to her diſtance from it, or to the ſemidiameter of her orbit; and by that means ſhe comes to *e*, and is then in conjunction with the ſun, as ſeen from the earth at E. Hence we find, that the *moon*'s abſolute motion is ſlower than the earth's, from her third quarter to her firſt; and ſwifter than the earth's, from her firſt quarter to her third: her path being leſs curved than the earth's in the former caſe, and more in the latter. Yet it is ſtill bent the ſame way towards the ſun; for if we imagine the concavity of the earth's orbit to be meaſured by the length of a perpendicular line C *g*, let down from the earth's place upon the ſtraight line *b d*, at the full of the *moon*, and connecting the places of the earth at the end of the *moon*'s firſt and third quarters, that length will be about 640 thouſand miles; and the *moon*, when new, only approaching nearer to the ſun, by 240 thouſand miles, than the earth is, the length of the perpendicular let down from her place, at that time, upon the ſame ſtrait line, and which ſhews the concavity of that part of her path, will be about 400 thouſand miles.

The gravity of the *moon* towards the ſun has been found to be greater, at her conjunction, than her gravity towards the earth, ſo that the point of equal attraction, where thoſe two powers would ſuſtain each other, falls then between the *moon* and earth: and ſince the quantity of matter in the ſun is almoſt 230 thouſand times as great as the quantity of matter in the earth, and the attraction of each body diminiſhes as the ſquare of the diſtance from it increaſes, it may be eaſily found, that this point of equal attraction between the earth and the ſun is about 70 thouſand times nearer the earth than the *moon* is at her change: whence ſome, and particularly Mr. Baxter, author of Matho, have apprehended, that either the parallax of the ſun is very different from that which is aſſigned by aſtronomers, or that the *moon* ought neceſſarily to abandon the earth; becauſe ſhe is conſiderably more attracted by the ſun than by the earth at that time. This apprehenſion may be removed eaſily, by attending to what has been ſhewn by Sir Iſaac Newton, and is illuſtrated by vulgar experiments concerning the motions of bodies about one another, that are all acted upon by a third force in the ſame direction. Their relative motions not being in the leaſt diſturbed by this third force, if it act equally upon them in parallel lines; as the relative motions of the ſhips in a fleet, carried away by a current, are no way affected by it, if it act equally upon them; or as the rotation of a bullet or bomb, about its axis, while it is projected in the air; or the figure of a drop of falling rain, are not at all affected by the gravity of the particles of which they are made up, towards the earth. The *moon* is ſo near the earth, and both of them ſo far from the ſun, that the attractive power of the ſun may be conſidered as equal on both; and, therefore, the *moon* will continue to circulate round the earth in the ſame manner as if the ſun did not attract them at all. It is to the inequality of the action of the ſun, upon the earth and *moon*; and the want of paralleliſm in the directions of theſe actions, only, that we are to aſcribe the irregularities in the motion of the *moon*.

But

But it may contribute farther towards removing this difficulty to obſerve, that if the abſolute velocity of the *moon*, at the conjunction, was leſs than that which is requiſite to carry a body in a circle there around the ſun, ſuppoſing this body to be acted on by the ſame force which acts there on the *moon*, (i. e. by the exceſs of her gravity towards the ſun, above her gravity towards the earth,) then the *moon* would, indeed, abandon the earth. For, in that caſe, the *moon* having leſs velocity than would be neceſſary to prevent her from deſcending within that circle, ſhe would approach to the ſun, and recede from the earth. But though the abſolute velocity of the *moon*, at the conjunction, be leſs than the velocity of the earth in the annual orbit, yet her gravity towards the ſun is ſo much diminiſhed, by her gravity toward the earth, that her abſolute velocity is ſtill much ſuperior to that which is requiſite to carry a body in a circle, there, about the ſun, that is acted on by the remaining force only. Therefore, from the moment of the conjunction, the *moon* is carried without ſuch a circle, receding continually from the ſun to greater and greater diſtances, till ſhe arrives at the oppoſition; where being acted on by the ſum of thoſe two gravities, and her velocity being now leſs than what is requiſite to carry a body in a circle, there, about the ſun, that is acted on by a force equal to that ſum, the *moon* thence begins to approach to the ſun again. Thus, ſhe recedes from the ſun, and approaches to it by turns, and in every month her path hath two apſides, a perihelion at the conjunction, and an aphelion at the oppoſition; between which ſhe is always carried in a manner ſimilar to that in which the primary planets revolve between their apſides. The planet recedes from the ſun at the perihelion, becauſe its velocity, there, is greater than that with which a circle could be deſcribed about the ſun, at the ſame diſtance, by the ſame centripetal force; and approaches towards the ſun from the aphelion, becauſe its velocity, there, is leſs than is requiſite to carry it in a circle, at that diſtance, about the ſun.

If we ſuppoſe the earth to revolve in a circular orbit round the ſun as its center, and the *moon* to revolve round the earth in the ſame manner; the planes of their orbits to coincide; the diameters of their orbits to be as 340 to 1; and the *moon* to perform 13,368 revolutions to every ſingle revolution of the earth; it is eaſy to inveſtigate the nature and deſcription of the curve generated by the center of the *moon*; and to determine whether this curve, in one lunation, be any-where convex towards the ſun.

Let S (*Tab.* III. *Analyſis*, *fig.* 69.) repreſent the ſun, E the earth; E*a* an arch of the orbit of the earth paſſed over by its center, in one lunation of the *moon*; the circumference of the circle E A F = the concentric arch A *a*: then, (becauſe 13 368 − 1 = 12.368 = the number of lunations in the year, or one revolution of the earth, and therefore S A : E A :: 12.368 : 1,) when the *moon* is in conjunction with the ſun, the diſtance between the ſun and *moon* will be greater than the diſtance or radius S A. Now the curve, deſcribed by the center of the *moon*, is the ſame as that deſcribed by a point M (E M being the ſemidiameter of the *moon*'s orbit), carried round by the rotation of the circle E A F on the arch A *a*: it is therefore of the cycloidal kind, having a point of inflexion, if every cycloid, deſcribed by a point within the generating circle, is inflected, as well upon a circular as upon a rectilineal baſe. To determine which,

Put S A or S R = *a*, E A or *e* R = *b*, E M or *e m* = *c*, R *m* = *r*, R *d* = *z*; and let *m* C be the radius of curvature at any point *m*, which, it is evident, muſt paſs through the point of contact R. Suppoſe the point *n* indefinitely near to *m*: then, R *r* and R *r* being the indefinitely ſmall contemporary arches with *m n*, and, conſequently, the triangles R *m r* and R *n r* equal in all reſpects; if we conſider the ſaid little arches R *r* and R *r* as little right lines perpendicular to the radii *e r* and S *r*, we ſhall have the ∠ *m* R *s* = ∠ *r* R *r* = (becauſe the angles *e* R *r* and S R *r*, added to either ſide of the equation, make it two right angles) ∠ R *e r* + ∠ R S *r*. Now, S R : *e* R :: ∠ R *e r* : ∠ R S *r*, and S R : S R + *e* R :: ∠ R *e r* : ∠ R *e r* + ∠ R S *r*, that is, $a : a+b :: \angle R\,e\,r : \angle m\,R\,n = \frac{a+b}{a} \angle R\,e\,r$.

Again, in any triangle, as *d m r*, if the angles *m d r*, *m r d*, and R *m r*, the complement of the obtuſe angle to two right angles, be indefinitely ſmall, they will be proportional to the oppoſite ſides *m r*, *m d*, and *d r*; that is, *d r* : *m d* :: ∠ R *m r* : ∠ *m r d*; and *d n* − *m d* : *d r* :: ∠ R *m r* − ∠ *m r d* : ∠ R *m r*, that is, *m* R : *d* R :: ∠ R *d r* : ∠ R *n r*, or, $r : z :: \frac{1}{2}\angle R\,e\,r : \angle R\,n\,r = \frac{z}{2r} \angle R\,e\,r$. And again, ∠ R C *n* : ∠ R *n* C :: R *n* : R C, that is, $\angle m\,R\,n - \angle R\,n\,r : \angle R\,n\,r :: R\,m : R\,C$, or, $\left(\frac{a+b}{a} - \frac{z}{2r}\right) \angle R\,r\,r : \frac{z}{2r} \angle R\,r\,r :: r : R\,C = \frac{ar z}{2ar + 2br - az}$.

Conſequently, $m\,R + R\,C = m\,C = \frac{2ar^2 + 2br^2}{2ar + 2br - az} = \frac{r^2}{r - \frac{az}{2a+2b}}$ = the radius of curvature at any point *m*.

Now, it is evident, that, at the point of inflection, the radius of curvature muſt be infinite; or that, on one ſide of the ſaid point, the expreſſion for the radius of curvature muſt be affirmative, and on the other negative; therefore, *r* muſt be more than $\frac{az}{2a+2b}$ on one ſide of the ſaid point, and on the other leſs; and conſequently, at the point of inflection, $r = \frac{az}{2a+2b}$; which, ſubſtituted for *r*, makes $(dm \times mR =) rz - r^2 = \frac{2nb^2 + a^2z^2}{2a+2b^2}$ = (becauſe $dm \times mR = fm \times ma =$) $b^2 - c^2$; from which equation we have $z = \frac{2a+2b\sqrt{b^2-c^2}}{\sqrt{2ab+a^2}}$. Or, to find *r*, ſay $2ar + 2br = az$, or $z = \frac{2ar+2br}{a}$; then, $(dm \times mR =) rz - r^2 = \frac{ar^2+2br^2}{a} = (fm \times ma =) b^2 - c^2$; which equation gives $r = \sqrt{\frac{ab^2-ac^2}{a+2b}}$, when the point *m* becomes a point of inflection.

Now, as *m* R (*r*) muſt, by the nature of the circle, always be greater than *m a*; that is, as $\sqrt{\frac{ab^2-ac^2}{a+2b}}$ muſt always be more than $b - c$; and conſequently, $\frac{ab^2-ac^2}{a+2b}$ be more than $\overline{b-c}^2$, that is, $\frac{ab+ac}{a+2b} \times \overline{b-c}$ be more than $\overline{b-c} \times \overline{b-c}$; therefore, *c* muſt always be more than $\frac{b^2}{a+b}$; that is, E M muſt be more than a third proportional to E S and E A, in order to have a point of inflection take place in the curve: but, in the preſent caſe, ES, EA, and EM, being as 13.368, 1, and $\frac{13.368}{340}$ or .039; therefore, EM is leſs than the ſaid third proportional; and conſequently, the curve M *m* *μ*, generated by the center of the *moon*, has not a point of inflection, or is no where convex towards the ſun. See Ferguſon's Aſtronomy, p. 120, &c. Maclaurin's Account of Sir Iſaac Newton's Phil. Diſc. book iv. ch. 5. p. 336, &c. 4to. Rowe's Fluxions, p. 127, &c.

MOON, *aſtronomy of the*. 1. To determine the period of the *moon*'s revolution round the earth, or the *periodical month*; and the time between one oppoſition and another, or the *ſynodical month*.

Since in the middle of a lunar eclipſe, the *moon* is oppoſite to the ſun, compute the time between two eclipſes, or oppoſitions, between which there is a great interval of time; and divide this by the number of lunations that have paſſed in the mean time; the quotient will be the quantity of the ſynodical month. Compute the ſun's mean motion, during the time of the ſynodical month, and add this to the entire circle deſcribed by the *moon*. Then, as the ſum is to 360°, ſo is the quantity of the ſynodical month to the periodical.

Thus, Copernicus, in the year 1500, November 6, at twelve at night, obſerved an eclipſe of the *moon* at Rome; and Auguſt 1, 1523, at 4h. 25′, another at Cracow: hence the quantity of the ſynodical month is thus determined:

Obſ. 2 An. 1523 d. 237 h. 4.25′
Obſ. 1 An. 1500 d. 310 h. 2.20′

Interval of time An. 22 d. 297 h. 2.5′
Add the intercalary days 5

Exact interval An. 22 d. 297 h. 2.5′
or 110910065′

Which divided by 282 months, elapſed in the mean time, gives the quantity of the ſynodical month 392211′, 9″, 9‴; that is, 29 days, 12 hours, 44 minutes.

From two other obſervations of eclipſes, the one at Cracow, the other at Babylon, the ſame author determines more accurately the quantity of the ſynodical month to be 392524′. 3″. 10‴. 9ⁱᵛ.

That is 29 d. 11h. 43′. 3″. 10‴.

The

The sun's mean motion in the time 29°. 6'. 24". 18"'.
The *moon's* motion . . . 389. 6. 24. 18.
Quantity of the periodical month 27 d. 7 h. 43'. 5".
Hence, 1. the quantity of the periodical month being given, by the rule of three we may find the *moon's* diurnal and horary motion, &c. And thus may tables of the mean motion of the *moon* be constructed.

2. If the sun's mean diurnal motion be subtracted from the *moon's* mean diurnal motion, the remainder will give the *moon's* diurnal motion from the sun: and thus may a table thereof be constructed.

3. Since, in the middle of a total eclipse, the *moon* is in the node, if the sun's place be found for that time, and to this be added six signs, the sum will give the *place of that node*.

4. From comparing the ancient observations with the modern, it appears, that the nodes have a motion, and that they proceed *in antecedentia*, i. e. from Taurus to Aries, from Aries to Pisces, &c. If, then, to the *moon's* mean diurnal motion be added the diurnal motion of the nodes, the same will be the motion of the *moon* from the node; and thence, by the rule of three may be found in what time the *moon* goes 360° from the dragon's head, or in what time the goes from, and returns to it: that is the quantity of the *draconitic month*.

5. If the motion of the apogee be subtracted from the mean motion of the *moon*, the remainder will be the *moon's* mean motion from the apogee; and thence, by the rule of three, is determined the quantity of the *anomalistic month*.

According to the observations of Kepler, the mean synodical month is 29 d. 12 h. 44' 3". 2"'. Her periodical month 27 d. 7 h. 43'. 8". The place of the apogee for the year 1700, January, 1, old style, was 11 S 8°. 57'. 1". The place of the ascending nodes 4 S 27°. 39'. 17". Mean diurnal motion of the *moon* 13°. 10'. 35". Diurnal motion of the apogee 6'. 41". Diurnal motion of the nodes 3'. 11". Lastly, the eccentricity 4362 parts, such, whereof the semidiameter of the eccentric is 100,000: and therefore the diurnal motion of the latitude is 13°. 13'. 46"; and the diurnal motion from the apogee 13°. 3'. 54".

To find the MOON'S *age or change.* The following canon, in which the twelve numbers answer to the twelve months, beginning with January, will serve for this purpose.

Janus 0, 2, 1, 2, 3, 4, 5, 6.
8, 8, 10, 10, these to the EPACT fix,
The sum, bate 30, to the month's day add,
Or take from 30, age or change is had.

The reason of adding these numbers to the epact in the several months, is because the lunar synodical months fall short of the calendar months; so that the epact, which expresses how much the lunar year falls short of the solar or calendar year, must be considered as continually increasing; and therefore to find the new *moons*, which are the beginnings of the synodical months, an addition must be made to the epact in every month, and more and more as the year advances; which additional numbers are called the menstrual epacts. Only nothing is to be added to the epact in January, because the annual epact, together with the day of the month, does then express the true age of the *moon*: but as January has 31 days, which is near 2 days more than a synodical month, therefore the beginning of the lunar months in February will fall near 2 days sooner than it did in January; consequently 2 is the menstrual epact of February; and then as February has but 28 or at most 29 days, which may be accounted one day less than a synodical month, the next lunar month will begin one day later in March than it did in February; consequently the menstrual epact of March decreases instead of increasing, and is but 1. If from thence you reckon the lunar months to consist of 30 days and 29 interchangeably, the new *moons* will fall so much earlier in the following months than the new *moons* did in January, as is expressed by the menstrual epacts in the canon, viz 2 days in April, 3 in May, &c. until they amount to 11 days at the end of the year, which are then added to the annual epact.

To find the time of the MOON'S *being in the meridian, or southing.* Multiply her age by 4; and divide the product by 5; the quotient gives the hour, and the remainder, multiplied by 12, the minute.

The reason of this rule is, that as the *moon* at the change comes to the south with the sun, or at twelve o'clock, and as there are thirty days, nearly, from one new *moon* to another, and twenty-four hours in a day; therefore she loses one day with another $\frac{4}{5}$, or $\frac{4}{5}$ of an hour in the time of her southing: now the *moon's* age, a number of days from the change being multiplied by 4, the product is so many fifths of an hour as she has lost, which divided by 5, is reduced to hours, and the remainder, if any, multiplied by 12, will be minutes.

To find the time of the MOON'S *beginning to shine.* Multiply her age, if under 15, by 48; and divide the product by 60: the quotient gives the hour; and the remainder the minute. If her age be above 15 days, subtract the time thus found, from 24; the remainder gives the time of shining in the morning.

MOON, *for the eclipses of the*, See ECLIPSES. *For the* MOON'S *parallax*, see PARALLAX.

Theory of the MOON'S *motions and irregularities.* The tables of equation, which serve to solve the irregularities of the sun, do likewise serve for those of the *moon*.

But then these equations must be corrected for the *moon*, otherwise they will not exhibit the true motions in the syzygies. The method is thus: Suppose the *moon's* place in the zodiac, required in longitude, for any given time; here, we first find, in the tables, the place where it would be, supposing its motion uniform, which we call *mean*, and which is sometimes faster, and sometimes slower, than the true motion: then, to find where the *true* motion will place her, which is also the *apparent*, we are to find in another table at what distance it is from its apogee; for, according to this distance, the difference between her true and mean motion, and the two places which correspond thereto, is the greater. The true place thus found, is not yet the *true* place; but varies from it, as the *moon* is more or less remote both from the sun, and the sun's apogee: which variation respecting, at the same time, those two different distances, they are to be both considered and combined together, as in a table apart. Which table gives the correction to be made of the true places first found. That place, thus corrected, is not yet the *true* place, unless the *moon* be either in conjunction, or opposition: if the be out of these, there must be another correction, which depends on two things taken together, and compared, viz. the distance of the *moon's* corrected place from the sun; and of that at which she is with regard to her own apogee; this last distance having been changed by the first correction.

By all these operations and corrections, we at length arrive at the *moon's true place* for that instant. In this, it must be owned, there occur prodigious difficulties: the lunar inequalities are so many, that it was in vain the astronomers laboured to bring them under any rule, before the great Sir Isaac Newton; to whom we are indebted both for the mechanical causes of these inequalities, and for the method of computing and ascertaining them: so that he has given us a world, in a great measure, of his own discovering, or rather subduing.

From the theory of gravity he shews, that the larger planets, revolving round the sun, may carry along with them smaller planets revolving round themselves; and shews also, *a priori*, that these smaller must move in ellipses having their umbilici in the centres of the larger; and must have their motion in their orbits variously disturbed by the motion of the sun; and, in a word, must be affected with those inequalities which we actually observe in the *moon*. And from this theory, he argues analogous irregularities in the satellites of Saturn.

From the same theory he examines the force which the sun has to disturb the *moon's* motion, determines the horary increase of the area which the *moon* would describe in a circular orbit by radii drawn to the earth—her distance from the earth—the horary motion in a circular and elliptic orbit—the mean motion of the nodes—the true motion of the nodes—the horary variation of the inclination of the *moon's* orbit to the plane of the ecliptic. Lastly, From the same theory he has found the annual equation of the *moon's* mean motion to arise from the various dilatation of her orbit; and that variation to arise from the sun's force, which being greater in the perigee, distends the orbit; and, being less in the apogee, suffers it to be again contracted. In the dilating orbit she moves more slowly; in the contracted, more swiftly: and the annual equation, whereby this inequality is compensated, in the apogee and perigee, is nothing at all; at a moderate distance from the sun, it amounts to 11' 50": and in other places it is proportional to the equation of the sun's centre, and is added to the mean motion of the *moon*, when the earth proceeds from its aphelion to its perihelion; and subtracted when in the opposite part.

Thus, supposing the radius of the *orbis magnus* 1000, and the earth's eccentricity 163; this equation, when greatest, according to the theory of gravity, comes out 11'. 49".

He adds, that in the earth's perihelion, the nodes move swifter than in the aphelion, and that in a triplicate ratio of the earth's distance from the sun, inversely. Whence arise annual equations of their motions, proportionable to that of the centre of the sun. Now the sun's motion in a duplicate ratio of the earth's distance from the sun inversely, and the greatest equation of the centre which this inequality occasions, is 1°, 56', 20", agreeable to

the sun's eccentricity 16½. If the sun's motion were in a triplicate ratio of its distance inversely, this inequality could generate the greatest equation 2°, 56′, 9″; and therefore the greatest equations which the inequalities of the motions of the *moon*'s apogee and nodes occasion, are to 2°, 56′, 9″, as the mean diurnal motion of the *moon*'s apogee, and the mean diurnal motion of her nodes, are to the mean diurnal motion of the sun. Whence the greatest equation of the mean motion of the apogee comes out 19′, 42″; and the greatest equation of the mean motion of the nodes 9′, 27″. The former equation is added, and the latter subtracted, when the earth proceeds from its perihelion to its aphelion, and the contrary in the opposite part of its orbit.

From the same theory of gravity, it also appears, that the sun's action on the *moon* must be somewhat greater when the transverse diameter of the lunar orbit passes through the sun, than when it is at right angles with the line that joins the earth and sun; and, therefore, that the lunar orbit is somewhat greater in the first case than in the second. Hence arises another equation of the mean lunar motion, depending on the situation of the *moon*'s apogee with regard to the sun, which is greatest when the *moon*'s apogee is in an octant with the sun; and none, when the arrives at the quadrature, or syzygies; and is added to the mean motion, in the passage of the *moon*'s apogee from the quadrature to the syzygies, and subtracted in the passage of the apogee from the syzygies to the quadrature.

This equation, which Sir Isaac calls *semestris*, when greatest, viz. in the octants of the apogee, arises to 3′, 45″, at a mean distance of the earth from the sun; but it increases and diminishes in a triplicate ratio of the sun's distance inversely; and therefore, in the sun's greatest distance, is 3′, 34″; in the smallest, 4′, 56″, nearly. But when the apogee of the *moon* is without the octants, it becomes less, and is to the greatest equation, as the sine of double the distance of the *moon*'s apogee from the next syzygy, to quadrature, to the radius.

From the same theory of gravity it follows, that the sun's action on the moon is somewhat greater when a right line, drawn through the *moon*'s nodes, passes through the sun, than when that line is at right angles with another joining the sun and earth: and hence arises another equation of the *moon*'s mean motion, which he calls *secunda semestris*, and which is greatest when the nodes are in the sun's octants, and vanishes when they are in the syzygies, or quadratures; and, in other situations of the nodes, is proportionable to the sine of double the distances of either node from the next syzygy, or quadrature.

It is added to the *moon*'s mean motion while the nodes are in their passage from the sun's quadratures to the next syzygy, and subtracted in their passage from the syzygies to the quadratures in the octants.

When it is greatest, it amounts to 47″, at a mean distance of the earth from the sun; as appears from the theory of gravity: at other distances of the sun, this equation in the octants of the nodes is reciprocally as the cube of the sun's distance from the earth; and therefore, in the sun's perigee is 45″; in his apogee nearly 49″.

By the same theory of gravity the *moon*'s apogee proceeds the fastest when either in conjunction with the sun, or in opposition to it; and is retrograde when in quadrature with the sun. In the former case, the eccentricity is greatest, and in the latter smallest. These inequalities are very considerable, and generate the principal equation of the apogee, which he calls *semestris*, or *semimenstrual*. The greatest *semimenstrual* equation is about 12°, 18′.

Horrox first observed the *moon* to revolve in an ellipsis round the earth placed in the lower umbilicus: and Halley placed the centre of the ellipsis in an epicycle, whose centre revolves uniformly about the earth: and from the motion in the epicycle arise the inequalities now observed in the progress and regress of the apogee, and the quantity of the eccentricity.

Suppose the mean distance of the *moon* from the earth divided into 100,000; and let T (*Tab. Astron. fig.* 17.) represent the earth, and TC the mean eccentricity of the *moon* 5505 parts; produce TC to B, that CB may be the sine of the greatest semimenstrual equation 12°, 18′, to the radius TC; the circle EDA, described on the centre C, with the interval CB, will be the epicycle wherein the centre of the lunar orb is placed, and wherein it revolves according to the order of the letters EDA. Take the angle ECD equal to double the annual argument, or double the distance of the true place of the sun from the *moon*'s apogee once equated, and CTD will be the semimenstrual equation of the *moon*'s apogee; and TD the eccentricity of its orbit tending to the apogee equated a second time. From hence the *moon*'s mean motion, apogee, and eccentricity, as also the greater axis of its orbit 200,000, the *moon*'s true place, as also her distance from the earth, are found, and that by the commonest methods.

In the earth's perihelion, by reason of the greater force of the sun, the centre of the *moon*'s orbit will move more swiftly about the centre C than in the aphelion, and that in a triplicate ratio of the earth's distance from the sun inversely. By reason of the equation of the centre of the sun, comprehended in the annual argument, the centre of the *moon*'s orbit will move more swiftly in the epicycle BDA, in a duplicate ratio of the distance of the earth from the sun inversely.

That the same may still move more swiftly in a simple ratio of the distance inversely from the centre of the orbit D, draw DE towards the *moon*'s apogee, or parallel to TC; and take the angle EDC equal to the excess of the annual argument, above the distance of the *moon*'s apogee from the sun's perigee in consequentia; or, which is the same thing, take the angle CDF equal to the complement of the true anomaly of the sun to 360°; and let DF be to DC as double the eccentricity of the *orbis magnus* to the mean distance of the sun from the earth, and the mean diurnal motion of the sun from the *moon*'s apogee, to the mean diurnal motion of the sun from its own apogee, conjunctly, i. e. as 33′ is to 1000, and 52′, 27″, 16‴, to 59′, 8″, 10‴, conjunctly; or as 3 to 160. Conceive the centre of the *moon*'s orbit placed in the point F, and to revolve in an epicycle, whose centre is D, and its radius DF, while the point D proceeds in the circumference of the circle DABD: thus the velocity, wherewith the centre of the *moon*'s orbit moves in a certain curve, described about the centre C, will be reciprocally as the cube of the sun's distance from the earth.

The computation of this motion is difficult; but it will be made easy by the following approximation: if the *moon*'s mean distance from the earth be 100,000 parts, and its eccentricity TC 5505 of those parts, the right line CB or CD will be found 1123; and the right line DF 33½. This right line, at the distance TC, subtends an angle to the earth, which the transferring of the centre of the orbit from the place D to F generates in the motion of this centre; and the same right line doubled, in a parallel situation, at the distance of the upper umbilicus of the *moon*'s orbit from the earth, subtends the same angle, generated by that translation in the motion of the umbilicus; and at the distance of the *moon* from the earth subtends an angle which the same translation generates in the motion of the *moon*; and which may therefore be called *the second equation of the centre*.

This equation of a mean distance of the *moon* from the earth, is as the sine of the angle contained between the right line DF, and a right line drawn from the point F to the *moon*, nearly; and when greatest, amounts to 2′, 25″. Now the angle comprehended between the right line DF and a line from the point D, is found either by subtracting the angle EDF from the mean anomaly of the *moon*, or by adding the *moon*'s distance from the sun to the distance of the *moon*'s apogee from the apogee of the sun. And as radius is to the sine of the angle thus found, so is 2′, 25″, to the second equation of the centre; which is to be added, if that line be less than a semicircle; and subtracted, if greater: thus we have its longitude in the very syzygies of the luminaries.

If a more accurate computation be required, the *moon*'s place thus found must be corrected by a second variation. The first and principal variation we have already considered, and have observed it to be greatest in the octants. The second is greatest in the quadrants, and arises from the different action of the sun on the *moon*'s orbit, according to the different position of the *moon*'s apogee to the sun, and is thus computed; as radius is to the versed sine of the distance of the *moon*'s apogee from the sun's perigee, in consequentia, so is a certain angle P to a fourth proportional. And as radius is to the sine of the *moon*'s distance from the sun, so is the sum of this fourth proportional and another angle Q to the second variation; which is to be subtracted, if the *moon*'s light be increasing; and added, if diminishing.

Thus we have the *moon*'s true place in her orbit; and by reduction of this place to the ecliptic, we have the *moon*'s longitude. The angles P and Q are to be determined by observation: in the mean time, if for P be assumed 2′, and for Q 1′, we shall be near the truth.

MOON, *nature and properties of the*. I. From the various phases of the *moon*: from her only shewing a little part illumined, when following the sun nearly to set; from that part's increasing as she recedes from the sun, till at the distance of 180° she shines with a full face; and again wanes as she re-approaches that luminary, and loses all her light when she meets him: from the lucid part's being constantly turned towards the west, while the moon increases; and towards the east when she decreases: it is evident, that only that part turned on which the sun's rays fall. And from the phenomena of eclipses,

happening when the *moon* ſhould ſhine with a full face; viz. when ſhe is 180° diſtant from the ſun; and the darkened parts appearing the ſame in all places; it is evident ſhe has no light of her own, but borrows whatever light ſhe has from the ſun: for if ſhe did, being globular, we ſhould always ſee her with a round full orb like the ſun.

2. The *moon* ſometimes diſappears in a clear heaven, ſo as not to be diſcoverable by the beſt glaſſes; little ſtars of the fifth and ſixth magnitude all the time remaining viſible. This phenomenon Kepler obſerved twice anno 1580, and 1584, and Herelius in 1620. Riccioius, and other Jeſuits at Bologna, and many people throughout Holland, obſerved the like April 14, 1642, yet at Venice and Vienna ſhe was all the time conſpicuous. December 23, 1707, there was another total obſcuration. At Arles the firſt appeared of a yellowiſh brown; at Avignon ruddy and tranſparent, as if the ſun had ſhone through it at Marſeilles, one part was reddiſh, the other very duſky; and, at length, though in a clear ſky, ſhe wholly diſappeared. Here it is evident, that the colours appearing different at the ſame time, do not belong to the *moon*; but they are probably occaſioned by our atmoſphere, which is variouſly diſpoſed at different times, for reflecting of thoſe or thoſe coloured rays.

3. The eye, either naked, or armed with a teleſcope, ſees ſome parts in the *moon*'s face darker than others, which are called *maculæ*, or *ſpots*. Through the teleſcope, while the *moon* is either increaſing or decreaſing, the illuminated parts in the maculæ appear evenly terminated; but in the bright parts, the boundary of the light appears jagged and uneven, compoſed of diſſimilar arches, convex and concave. (See *Tab. Aſtron. fig.* 18.) There are alſo obſerved lucid parts diſperſed among the darker; and illuminated parts are ſeen beyond the limits of illumination; other intermediate ones remaining ſtill in darkneſs; and near the maculæ, and even in them, are frequently ſeen ſuch lucid ſpecks. Beſide the maculæ obſerved by the ancients, there are other variable ones inviſible to the naked eye, called *new maculæ*, always oppoſite to the ſun; and which are hence found among thoſe parts which are the ſooneſt illumined in the increaſing *moon*, and in the decreaſing *moon* loſe their light later than the intermediate ones; running round, and appearing ſometimes longer, ſometimes ſmaller.

Hence, 1. As all parts are equally illumined by the ſun, inaſmuch as they are equally diſtant from him; if ſome appear brighter, and others darker; ſome reflect the ſun's rays more copiouſly than others; and therefore they are of *different natures*. And, 2. Since the boundary of the illumined part is very ſmooth and equable in the maculæ, their ſurface muſt be ſo too. 3. The parts illumined by the ſun ſooner, and deſerted later, than others that are nearer, are higher than the reſt; i. e. they ſtand upabove the other ſurface of the *moon*. 4. The new maculæ anſwer perfectly to the ſhadows of terreſtrial bodies.

4. Hevelius writes, that he has ſeveral times found, in then perfectly clear, when even ſtars of the ſixth and ſeventh magnitude were conſpicuous, that at the ſame altitude of the *moon*, and the ſame elongation from the earth, and with one and the ſame excellent teleſcope, the *moon* and its maculæ ſeemed equally lucid, clear, and perſpicuous, at all times; but are much brighter, purer, and more diſtinct, at one time than another. From the circumſtances of the obſervation, it is evident, the reaſon of this phenomenon is not either in our air, in the tube, in the *moon*, or in the ſpectator's eye; but it muſt be ſought for in ſomething exiſting about the *moon*.

5. Caſſini frequently obſerved Saturn, Jupiter, and the fixed ſtars, when hid by the *moon*, near her limb, whether the illumined or dark one, to have their circular figure changed into an oval one; and in other occultations he found no alteration of figure at all. In like manner, the ſun and *moon* riſing and ſetting in a vaporous horizon, do not appear circular, but elliptical.

Hence, as we know, by ſure experience, that the circular figure of the ſun and *moon* is only changed into an elliptical one by means of the refraction in the vapoury atmoſphere; ſome have concluded, that at the time when the circular figure of the ſtars is thus changed by the *moon*, there is a denſe matter encompaſſing the *moon*, wherein the rays, emitted from the ſtars, are refracted; and that, at other times, when there is no change of figure, this matter is wanting.

This phenomenon is well illuſtrated by the following experiment.

To the inner bottom of any veſſel, either plane, convex, or concave, with wax faſten a circle of paper; then pouring in water, that the rays, reflected from the circle in the air, may be refracted before they reach the eye: viewing the circle obliquely, the circular figure will appear changed into an ellipſis.

6. The *moon*, then, is a denſe opake body, furniſhed with mountains and valleys. That the *moon* is denſe, and impervious to the light, has been ſhewn; but ſome parts ſink below, and others riſe above the ſurface; and that conſiderably, inaſmuch as they are viſible at ſo great a diſtance as that of the earth from the ſun: in the *moon*, therefore, are huge mountains, and very deep valleys. Riccioius meaſured the height of one of the mountains, called St. Catharine, and found it nine miles high.

Moon, to meaſure the heights of the mountains of the. Suppoſe ED (*fig.* 19.) the *moon*'s diameter, ECD the boundary of light and darkneſs; and A the top of a hill in the dark part beginning to be illumined: with a teleſcope obſerve the proportion of AE, or the diſtance of A from the line where the light commences to the diameter ED: here we have two ſides of a rectangled triangle AE, CE; the ſquares of which added together give the ſquare of the third; whence the ſemi-diameter CA being ſubtracted, leaves AB, the height of the mountain.

Riccioius, v. gr. found the top of the mount St. Catharine illumined at the diſtance of $\frac{1}{15}$ of the *moon*'s diameter from the confines of light. Suppoſing, therefore, CE 8, and AE 1, the ſquares of the two will be 65, whoſe root is 8.062 the length of AC: ſubtracting therefore BC = 8, the remainder is AB = 0.062. The *moon*'s ſemidiameter, therefore, is to the mountain's height as 8 is to 0.062; i. e. as 8000 to 62. Suppoſing, therefore, the ſemidiameter of the *moon* 1162 Engliſh miles, by the rule of three we find the height of the mountain 9 miles.

The heights, &c. of the lunar mountains being meaſurable, aſtronomers have taken occaſion to give each its name. Riccioius, whom moſt others now follow, diſtinguiſhed them by the names of celebrated aſtronomers; and by theſe names they are ſtill expreſſed in obſervations of the lunar eclipſes, &c. See the figure, *Tab. Aſtron. fig.* 20.

Aſtronomers are now generally of opinion, that the *moon* has no atmoſphere of any viſible denſity ſurrounding her, as we have: for if ſhe had, we could never ſee her edge ſo well defined as it appears: but there would be a ſort of miſt or hazineſs round her, which would make the ſtars look fainter, when they are ſeen through it. But obſervation proves, that the ſtars which diſappear behind the *moon* retain their full luſtre until they come to touch her very edge, and then they vaniſh in a moment. This has been often obſerved by aſtronomers, but particularly by Caſſini, of the ſtar γ in the breaſt of Virgo, which appears ſingle and round to the bare eye; but through a refracting teleſcope of fifteen feet, appears to be two ſtars ſo near together, that the diſtance between them ſeems to be but equal to one of their apparent diameters. The *moon* was obſerved to paſs over them on the 21ſt of April, 1705, N. S. and as her dark edge drew near to them, it cauſed no change in their colour or ſituation. At 25 min. 14 ſec. paſt twelve at night, the moſt weſterly of theſe ſtars was hid by the dark edge of the *moon*; and in 30 ſeconds afterward, the moſt eaſterly ſtar was hid: each of them diſappearing behind the *moon* in an inſtant, without any preceding diminution of magnitude or brightneſs; which by no means could have been the caſe if there were an atmoſphere round the *moon*: for then, one of the ſtars falling obliquely into it before the other, might by refraction to have ſuffered ſome change in its colour, or in its diſtance from the other ſtar which was not yet entered into the atmoſphere. But no ſuch alteration could be perceived, though the obſervation was performed with the utmoſt attention to that particular; and was very proper to have made ſuch a diſcovery. The faint light, which has been ſeen all around the *moon*, in total eclipſes of the ſun, has been obſerved, during the time of darkneſs, to have its centre coincident with the centre of the ſun; and was therefore much more likely to ariſe from the atmoſphere of the ſun, than from that of the *moon*; for if it had been owing to the latter, its centre would have gone along with the *moon*'s.

If there were ſeas in the *moon*, ſhe could have no clouds, rains, nor ſtorms, as we have; becauſe ſhe has no ſuch atmoſphere to ſupport the vapours which occaſion them. And every one knows, that when the *moon* is above our horizon in the night-time, ſhe is viſible, unleſs the clouds of our atmoſphere hide her from our view; and all parts of her appear conſtantly with the ſame clear, ſerene, and calm aſpect. But thoſe dark parts of the *moon*, which were formerly thought to be ſeas, are now found to be only vaſt deep cavities, and places which reflect not the ſun's light ſo ſtrongly as others, having many caverns and pits whoſe ſhadows fall within them, and are always dark on the ſides next the ſun; which demonſtrates their being hollow: and moſt of theſe pits have little knobs like

hillocks

hillocks standing within them, and casting shadows also; which cause these places to appear darker than others which have fewer, or less remarkable caverns. All these appearances shew that there are no seas in the *moon*; for if there were any, their surfaces would appear smooth and even, like those on the earth.

There being no atmosphere about the *moon*, the heavens in the day time have the appearance of night to a lunarian who turns his back towards the sun; and when he does, the stars appear as bright to him as they do to us the night to us. For it is entirely owing to our atmosphere that the heavens are bright about us in the day.

MOON, *as to the influence of the*, on the changes of our weather, and the constitution of the human body, we shall observe that the vulgar doctrine concerning it is very ancient, and has gained credit among the learned, without sufficient examination; but it is now generally exploded by philosophers, as equally destitute of all foundation in physical theory, and unsupported by any plausible analogy.

The common opinion is, that the lunar influence is exerted at the syzygies and quadratures, and for three days before and after each of those epochs. There are twenty-four days, therefore, in each synodic month, over which the *moon* at this rate is supposed to preside, and as the whole consists but of 29 days, 12½ hours, only 5¼ days, are exempt from her pretended dominion. Hence, though the changes of the weather should happen to have no connection whatever with the *moon's* aspects, and they should be distributed in an equal proportion through the whole synodic month; yet any one who shall predict, that a change shall happen on some one of the twenty-four days assigned, rather than in any of the remaining 5¼, will always have the chances 24 to 5¼ in his favour. Men may, therefore, easily deceive themselves, especially in so unsettled a climate as our's. Moreover, the writers who treat of the signs of the weather, derive their prognostics from circumstances, which neither argue any real influence of the *moon* as a cause, nor any belief of such an influence, but are merely indications of the state of the air at the time of observation: such are, the shape of the horns, the degree and colour of the light, and the number and quality of the luminous circles which sometimes surround the *moon*, and the circumstances attending their disappearance. See the *Diosemeia* of Aratus, and the Scholia of Theon. The vulgar soon began to consider these things as causes, which had been proposed to them only as signs: and the notion of the *moon's* influence on all terrestrial things was confirmed by her manifest effect upon the ocean. See on this subject, Phil. Trans. vol. lxv. part 2. p. 178, &c.

The famous Dr. Mead was a believer in the influence of the sun and *moon* on the human body, and published a book to this purpose, intitled, De Imperio Solis ac Lunæ in Corpore humano: but this opinion has been exploded by philosophers, as equally unreasonable in itself, and contrary to fact. As the most accurate and sensible barometer is not affected by the various positions of the *moon*, it is not likely that the human body should be affected by them. See LUNATIC.

MOON, *harvest*. It is remarkable, that the *moon*, during the week in which she is full in harvest, rises sooner after sun-setting than she does in any other full *moon* week in the year. By doing so, she affords an immediate supply of light after sun-set, which is very beneficial to the farmers for reaping and gathering in the fruits of the earth: and therefore they distinguish *this* full *moon* from all the others in the year, by calling it the *harvest-moon*.

Mr. Ferguson has given a full account of the *harvest-moon* in his Astronomy; the substance of which is as follows, in a problem on the common celestial globe.

Make chalk-marks all round the globe, on the ecliptic, at 12½ degrees from each other (beginning at Capricorn) which is equal to the *moon's* daily mean motion from the sun; then elevate the north pole of the globe to the latitude of any place in Europe; suppose London, whose latitude is 51½ degrees north.

This done, turn the ball of the globe round, westward, in the frame thereof; and you will see that different parts of the ecliptic make very different angles with the horizon, as these parts rise in the east: and therefore, in equal times, very unequal portions of the ecliptic will rise. About Pisces and Aries, seven of these chalk-marks will rise in little more than two hours, as measured by the motion of the index on the horary circle: but, about the opposite signs, Virgo and Libra, the index will go over eight hours in the time that seven marks will rise. The intermediate signs will more or less partake of these differences as they are more or less remote from those above mentioned.

Hence it is plain, that when the *moon* is in Pisces and Aries, the difference of her rising will be little more than two hours in seven days; but in Virgo and Libra it will be eight hours in seven days: and this happens every month of the year, because the *moon* goes through all the signs of the ecliptic in a month, or rather in 27 days, 8 hours.

The *moon* is always opposite to the sun when she is full, and the sun is never in Virgo and Libra but in our harvest months; and therefore, the *moon* is never full in Pisces and Aries (which are the signs opposite to Virgo and Libra) but in our harvest months. Consequently, when the *moon* is about her full in harvest, she rises with less difference of time, or more immediately after sun-set, than when she is full in any other month of the year.

In our winter, the *moon* is in Pisces and Aries about the time of her first quarter, and rises about noon; but her rising is not then taken notice of, because the sun is above the horizon.

In spring, *the moon* is in Pisces and Aries about the time of her change; and then, as she gives no light, and rises with the sun, her rising cannot be perceived.

In summer, the *moon* is in Pisces and Aries about the time of her last quarter; and then, as she is on the decrease, and rises not till midnight, her rising generally passes unobserved.

But in harvest, the *moon* is full in Pisces and Aries (these signs being opposite to the sun in our autumnal months) and rises soon after sun-set for several evenings successively; which makes her regular rising very conspicuous at that time of the year, as it is so beneficial then to the farmers, in affording them an immediate supply of light after the going down of the sun.

This would always be the case if the *moon's* orbit lay in the plane of the ecliptic. But as the *moon* moves in an orbit which makes an angle of 5 degrees 18 minutes with the ecliptic, and crosses it only in the two opposite points called the nodes, her rising when in Pisces and Aries, will sometimes not differ above an hour and forty minutes through the whole of seven days; and at other times, in the same two signs, she will differ three hours and a half in the time of her rising in a week, according to the different positions of the nodes with respect to these signs; which positions are constantly changing, because the nodes go backward through the whole ecliptic in 18 years and 225 days.

This revolution of the nodes will cause the *harvest moons* to go through a whole course of the most and least beneficial states with respect to the farmers every nineteen years. The following table shews in what years the *harvest moons* are least beneficial as to the times of their rising, and in what years most, from 1751 to 1861. The columns of years under the letter L, are those in which the *harvest moons* are least of all beneficial, because they fall about the descending node; and those under M are the most of all beneficial, because they fall about the ascending node. In all the columns from N to S, the *harvest moons* gradually descend in the lunar orbit, and rise to less heights above the horizon. From S to N, they ascend in the like proportion, and rise to greater heights above the horizon. In both the columns under S, the *harvest moons* are in the lowest part of the *moon's* orbit, that is, farthest south of the ecliptic; and in the columns under N, the reverse. And in both these cases, their rising, though not at the same times, are nearly the same with regard to the difference of time, as if the *moon's* orbit were coincident with the ecliptic.

Years in which the *harvest moons* are least beneficial.

N		L		S	
1752	1753	1754	1755	1756	1757	1758	1759		
1770	1771	1772	1773	1774	1775	1776	1777	1778	
1788	1789	1790	1791	1792	1793	1794	1795	1796	1797
1807	1808	1809	1810	1811	1812	1813	1814	1815	
1826	1827	1828	1829	1830	1831	1832	1833	1834	
1844	1845	1846	1847	1848	1849	1850	1851	1852	

Years in which they are most beneficial.

S		M					N		
1760	1761	1762	1763	1764	1765	1766	1767	1768	1769
1779	1780	1781	1782	1783	1784	1785	1786	1787	
1798	1799	1800	1801	1802	1803	1804	1805	1806	
1816	1817	1818	1819	1820	1821	1822	1823	1824	1825
1835	1836	1837	1838	1839	1840	1841	1842	1843	
1854	1854	1855	1856	1857	1858	1859	1860	1861	

We may observe farther, that in summer, with us the full *moons* are low, and their stay is short above the horizon, when the nights are short and we have the least occasion for *moon*-light: in winter they go high, and stay long above the horizon, when the nights are long, and we want the greatest quantity of *moon*-light. Moreover, as the sun is above the horizon of the north pole from the 20th of March till the 23d of September, it is plain that the *moon*, when full, being opposite to the sun, must be below the horizon during that half of the year. But when

when the sun is in the southern half of the ecliptic, he never rises to the north pole, during which half of the year, every full *moon* happens in some part of the northern half of the ecliptic, which never sets. Consequently, as the polar inhabitants never see the full *moon* in summer, they have her always in the winter, before, at, and after the full, shining for fourteen of our days and nights. And when the sun is at his greatest depression below the horizon, being then in Capricorn, the *moon* is at her first quarter in Aries, full in Cancer, and at her third quarter in Libra. And as the beginning of Aries is the rising point of the ecliptic, Cancer the highest, and Libra the setting point, the *moon* rises at her first quarter in Aries; is most elevated above the horizon, and full, in Cancer; and sets at the beginning of Libra in her third quarter, having continued visible for fourteen diurnal rotations of the earth. Thus the poles are supplied one half of the winter time with constant *moon*-light in the sun's absence; and only lose sight of the *moon* from her third to her first quarter, while the gives but very little light, and could be but of little, and sometimes of no service to them.

To find the true time of new and full moon. For this purpose, Mr. Ferguson has calculated and given us the following tables; by which the method of operation is perhaps the shortest and easiest extant.

For any proposed year, within the limits of table I. write out the mean time of new or full *moon* in January, with its arguments for the two equations under A and B. With these arguments find the correspondent equations in table III. and IV. which add to the above mean time, and you will have the true time of new or full *moon* in January.

For the time of new or full *moon* in any month after January, to the mean time in that month add as many lunations from table II. as the given month is after January; and to the arguments A and B for January, add those under A and B belonging to the number of lunations taken out. With the sum of all these arguments, if not more than 360, find the correspondent equations in table III. and IV. which equations being added to the mean time, will give the true time of the required new or full *moon*, near enough for any almanack. When the sum of the arguments under A or B exceeds 360, subtract 360 from it; and with the remainder enter the corresponding table, and take out the equation.

N. B. If the number of months (thus taken out) after January, be equal to, or exceed the number of days accounted from the beginning of January on which the new or full *moon* falls, in that month, you must take out one lunation more from table II. than what answers to the number of months after January; otherwise you will not have the time of the required new or full *moon*, but of that which is next before it.

Lastly, with the number of days (arising from the lunations added to the time in January) enter table V. under the given month; and, against *that* number, look in the left hand column, under *days*, and you will have the day of the month on which the required new or full *moon* falls.

N. B. In leap years, in the months of January and February, to have the new or full *moon* on the day wherein it really falls, add a day to the time found by the tables.

EXAMPLE I. *Required the true time of new* moon *in January*, 1772?

	D.	H.	M.	A	B
A. D. 1772, (tab. I. for Jan.) new *moon*	3	6	9	185	298
In tab. III. (A) against 185 is the equation	0	4	33		
In tab. IV. (B) against 298 is the equation	0	0	52		
These added together give the true time, viz. January	3	11	34	Add 1 day.	

So the true time (1772 being a leap year) is January 4th, at 34 minutes past 11 o'clock at night; the time being always reckoned from noon.

EXAMPLE II. *Required the true time of new* moon, in *July*, 1772.

	D.	H.	M.	A.	B.
A. D. 1772, mean new *moon* in Jan.	3	6	9	185	298
Add 7 lunations from tab. II.	206	17	8	204	181
The sums are	209	23	17	389	479
In table III. (A) against 29 is		2	12	360	360
In table IV. (B) against 119 is		18	3	29	119
The whole sum amounts to	210	19	32		

Then, in table V. under July, against 210 is 29 in the left hand column: so that the true time is the 29th of July, at 19 hours 32 minutes past noon; which, in common reckoning, is the 30th of July, at 32 minutes past seven in the morning.

EXAMPLE III. *Required the true time of full* moon *in July*, 1770?

	D.	H.	M.	A.	B.
A.D. 1770, mean full *moon* in Jan.	10	18	5	192	205
Add 6 lunations from table II.	177	4	24	175	155
The sums are	187	22	33	367	360
In table III. (A) against 7 is		3	42	0	0
In table IV. (B) against 360 is		9	48	7	
The whole amounts to	188	12	3		

Then, in table V. under July, against 188, is 7 in the left hand column: so that the true time is the 7th of July, at three minutes past twelve o'clock at night.

The times found by these tables never differ above twenty minutes from the truth, and it is very seldom the error is half so much. The calculation is made in less than a twentieth part of the time that it could be done from Flamsteed's Tables.

TABLE I.

The mean times of new and full *moon* in January.

Years.	New *Moon*.				Full *Moon*.			
	D.	H.	M.	A.	B.	D.	H.	M.	A.	B.
1770	25	12	31	207	58	10	18	9	192	205
1771	14	21	20	196	348	0	2	58	181	155
L. 1772	3	6	9	185	298	18	0	31	200	131
1773	22	3	41	204	273	7	9	19	189	80
1774	11	12	30	193	223	26	6	52	208	56
1775	0	21	19	182	173	15	15	41	197	6
L. 1776	18	18	51	201	148	4	0	29	186	346
1777	8	3	40	190	198	22	2	8	205	191
1778	27	1	12	209	72	12	6	50	194	141
1779	16	10	1	198	23	1	15	39	183	191
L. 1780	4	18	50	187	334	19	13	12	202	167
1781	23	16	27	206	309	8	22	0	191	117
1782	13	1	11	195	259	27	19	33	210	92
1783	2	10	0	184	209	17	4	22	198	42
L. 1784	20	7	32	203	184	5	13	10	187	352
1785	9	16	21	192	134	24	10	43	206	327
1786	28	13	54	210	110	13	19	32	195	277
1787	17	22	42	199	59	3	4	20	184	227
L. 1788	6	7	31	188	9	21	1	53	203	202
1789	25	5	3	207	345	10	10	41	192	152
1790	14	13	52	196	295	29	8	14	211	128
1791	3	22	41	185	245	18	17	3	200	78
L. 1792	21	20	23	204	220	7	1	51	189	28
1793	11	5	2	194	170	25	23	24	208	5
1794	0	13	51	182	120	15	8	13	197	313
1795	19	11	23	201	95	4	17	1	186	265
L. 1796	7	20	12	190	45	22	14	34	204	238
1797	26	17	44	208	21	11	23	22	193	188
1798	16	2	33	197	331	1	8	11	182	138
1799	5	11	22	186	281	20	5	44	201	114
1800	24	8	54	205	256	9	14	32	190	63

TABLE II. Mean lunations.

Lun.	D.	H.	M.	A	B.	Lun.	D.	H.	M	A.	B.
1	29	12	44	29	26	9	265	18	36	362	232
2	59	1	28	58	52	10	295	7	20	391	258
3	88	14	12	87	78	11	324	20	53	420	284
4	118	2	56	116	104	12	354	8	36	349	310
5	147	15	40	146	130	13	383	21	33	18	336
6	177	4	24	175	155	To be added to the num-					
7	206	17	8	204	181	bers in table I. for new					
8	236	5	52	233	207	and full *moons* after Jan.					

TABLE III. The first equation. (A).

A.	H.	M.	A.	H.	M.	A.	H.	M.	A.	H.	M.	A.	H.	M.	A.	H.	M.
1	4	7	23	2	35	45	1	16	67	0	22	89	0	6			
2	8	14	24	2	31	46	1	13	68	0	20	90	0	0			
3	3	58	25	2	27	47	1	10	69	0	19	91	0	6			
4	3	54	26	2	23	48	1	7	70	0	17	92	0	0			
5	3	50	27	2	19	49	1	4	71	0	15	93	0	0			
6	3	46	28	2	15	50	1	1	72	0	14	94	0	0			
7	3	42	29	2	12	51	0	58	73	0	13	95	0	1			
8	3	37	30	2	8	52	0	56	74	0	12	96	0	1			
9	3	33	31	2	4	53	0	53	75	0	11	97	0	1			
10	3	29	32	2	0	54	0	51	76	0	10	98	0	2			
11	3	24	33	1	57	55	0	48	77	0	9	99	0	2			
12	3	20	34	1	54	56	0	45	78	0	8	100	0	3			
13	3	16	35	1	50	57	0	43	79	0	7	101	0	4			
14	3	12	36	1	46	58	0	40	80	0	6	102	0	5			
15	3	7	37	1	43	59	0	38	81	0	5	103	0	6			
16	3	3	38	1	39	60	0	36	82	0	4	104	0	7			
17	2	59	39	1	36	61	0	34	83	0	3	105	0	8			
18	2	55	40	1	32	62	0	32	84	0	2	106	0	9			
19	2	51	41	1	29	63	0	30	85	0	2	107	0	10			
20	2	47	42	1	26	64	0	28	86	0	1	108	0	11			
21	2	43	43	1	23	65	0	26	87	0	1	109	0	12			
22	2	39	44	1	19	66	0	24	88	0	1	110	0	14			

A	H.M.	A	H.M.	A	H.M.	A	H.M.	A	H.M.	A	H.M.
111	0	15	161	2	48	211	6	23	261	8	30	311	7	38
112	0	17	162	2	52	212	6	26	262	8	30	312	7	15
113	0	18	163	2	56	213	6	30	263	8	31	313	7	18
114	0	20	164	3	0	214	6	34	264	8	31	314	7	9
115	0	22	165	3	5	215	6	37	265	8	31	315	7	6
116	0	23	166	3	9	216	6	41	266	8	32	316	7	3
117	0	25	167	3	13	217	6	45	267	8	32	317	7	0
118	0	27	168	3	18	218	6	48	268	8	32	318	6	56
119	0	29	169	3	22	219	6	52	269	8	32	319	6	53
120	0	31	170	3	27	220	6	55	270	8	32	320	6	50
121	0	34	171	3	31	221	6	59	271	8	32	321	6	47
122	0	36	172	3	35	222	7	3	272	8	32	322	6	44
123	0	38	173	3	40	223	7	6	273	8	32	323	6	39
124	0	41	174	3	44	224	7	8	274	8	30	324	6	36
125	0	43	175	3	49	225	7	11	275	8	29	325	6	32
126	0	45	176	3	53	226	7	13	276	8	28	326	6	28
127	0	48	177	3	58	227	7	15	277	8	27	327	6	24
128	0	50	178	4	2	228	7	17	278	8	26	328	6	20
129	0	52	179	4	7	229	7	20	279	8	25	329	6	16
130	0	55	180	4	11	230	7	22	280	8	24	330	6	12
131	0	57	181	4	15	231	7	24	281	8	23	331	6	8
132	1	0	182	4	20	232	7	27	282	8	22	332	6	4
133	1	3	183	4	24	233	7	29	283	8	21	333	6	0
134	1	8	184	4	29	234	7	31	284	8	20	334	5	59
135	1	11	185	4	33	235	7	33	285	8	20	335	5	55
136	1	14	186	4	38	236	7	34	286	8	20	336	5	51
137	1	17	187	4	42	237	7	34	287	8	0	337	5	47
138	1	20	188	4	47	238	7	36	288	8	0	338	5	43
139	1	24	189	4	51	239	7	36	289	8	0	339	5	39
140	1	27	190	4	55	240	7	37	290	8	0	340	5	35
141	1	30	191	5	0	241	7	37	291	8	0	341	5	31
142	1	34	192	5	4	242	7	37	292	8	0	342	5	27
143	1	37	193	5	9	243	7	37	293	8	0	343	5	22
144	1	41	194	5	13	244	7	37	294	7	58	344	5	19
145	1	44	195	5	17	245	8	0	295	7	56	345	5	15
146	1	48	196	5	22	246	8	2	296	7	54	346	5	10
147	1	52	197	5	26	247	8	4	297	7	52	347	5	6
148	1	56	198	5	30	248	8	6	298	7	50	348	5	2
149	1	59	199	5	34	249	8	8	299	7	48	349	4	58
150	2	2	200	5	39	250	8	9	300	7	46	350	4	54
151	2	6	201	5	43	251	8	10	301	7	44	351	4	49
152	2	11	202	5	47	252	8	11	302	7	41	352	4	45
153	2	15	203	5	51	253	8	12	303	7	39	353	4	41
154	2	19	204	5	55	254	8	13	304	7	37	354	4	37
155	2	23	205	5	59	255	8	14	305	7	34	355	4	34
156	2	27	206	6	3	256	8	15	306	7	31	356	4	30
157	2	31	207	6	7	257	8	16	307	7	29	357	4	24
158	2	35	208	6	11	258	8	17	308	7	26	358	4	20
159	2	39	209	6	15	259	8	18	309	7	23	359	4	15
160	2	43	210	6	19	260	8	19	310	7	21	360	4	11

TABLE IV. The second equation. (B.)

B.	H. M.	B.	H. M.	B.	H. M.	B.	H. M.	B.	H. M.	B.	H. M.
1	9	55	51	17	5	89	19	35	133	16	35	177	10	17
2	10	10	52	17	12	90	19	35	134	16	28	178	10	7
3	10	21	53	17	19	91	19	34	135	16	21	179	9	58
4	10	32	54	17	26	92	19	33	136	16	14	180	9	48
5	10	43	55	17	33	93	19	32	137	16	6	181	9	38
6	10	54	56	17	39	94	19	31	138	15	59	182	9	29
7	11	5	57	17	46	95	19	30	139	15	51	183	9	19
8	11	16	58	17	53	96	19	28	140	15	44	184	9	8
9	11	27	59	17	58	97	19	26	141	15	36	185	8	58
10	11	38	60	18	4	98	19	24	142	15	28	186	8	48
11	11	49	61	18	9	99	19	22	143	15	20	187	8	38
12	12	0	62	18	15	100	19	20	144	15	12	188	8	28
13	12	10	63	18	20	101	19	18	145	15	4	189	8	18
14	12	20	64	18	25	102	19	15	146	14	56	190	8	8
15	12	31	65	18	30	103	19	12	147	14	48	191	7	58
16	12	41	66	18	35	104	19	9	148	14	39	192	7	48
17	12	51	67	18	40	105	19	6	149	14	31	193	7	38
18	13	2	68	18	44	106	19	2	150	14	23	194	7	28
19	13	12	69	18	48	107	18	59	151	14	15	195	7	18
20	13	23	70	18	52	108	18	55	152	14	7	196	7	8
21	13	33	71	18	56	109	18	51	153	13	57	197	6	58
22	13	43	72	19	0	110	18	47	154	13	48	198	6	48
23	13	53	73	19	4	111	18	43	155	13	39	199	6	38
24	14	3	74	19	7	112	18	38	156	13	31	200	6	28
25	14	13	75	19	10	113	18	34	157	13	22	201	6	18
26	14	23	76	19	13	114	18	29	158	13	13	202	6	8
27	14	32	77	19	16	115	18	24	159	13	5	203	5	58
28	14	42	78	19	19	116	18	19	160	12	56	204	5	48
29	14	52	79	19	21	117	18	14	161	12	46	205	5	37
30	15	1	80	19	23	118	18	8	162	12	37	206	5	28
31	15	10	81	19	25	119	18	3	163	12	28	207	5	18
32	15	19	82	19	27	120	17	57	164	12	18	208	5	8
33	15	28	83	19	29	121	17	51	165	12	9	209	4	58
34	15	37	84	19	30	122	17	45	166	12	0	210	4	47
35	15	45	85	19	32	123	17	40	167	11	51	211	4	37
36	15	54	86	19	33	124	17	34	168	11	42	212	4	27
37	16	2	87	19	34	125	17	28	169	11	32	213	4	17
38	16	11	88	19	35	126	17	23	170	11	23	214	4	6
39	16	19	89	19	35	127	17	17	171	11	14	215	3	56
40	16	27	90	19	36	128	17	9	172	11	4	216	3	45
41	16	35	91	19	36	129	17	2	173	10	55	217	3	35
42	16	43	92	19	36	130	16	56	174	10	45	218	3	25
43	16	50	93	19	36	131	16	49	175	10	36	219	3	14
44	16	58	94	19	36	132	16	42	176	10	26	220	3	4

B.	H.M.	B.	H.M.	B.	H.M.	B.	H.M.	B.	H.M.
221	3	46	249	0	53	277	0	1	305	4	25	333	5	2
220	3	37	250	0	49	278	0	2	306	4	32	334	5	12
223	3	30	251	0	46	279	0	3	307	4	38	335	5	23
224	3	22	252	0	42	280	0	4	308	4	44	336	5	32
225	3	15	253	0	38	281	0	6	309	4	50	337	5	42
226	3	8	254	0	35	282	0	7	310	4	57	338	5	52
227	3	1	255	0	31	283	0	9	311	5	3	339	6	1
228	2	54	256	0	27	284	0	11	312	5	10	340	6	11
229	2	47	257	0	24	285	0	13	313	5	17	341	6	21
230	2	40	258	0	21	286	0	14	314	5	24	342	6	31
231	2	34	259	0	19	287	0	16	315	5	31	343	6	44
232	2	27	260	0	16	288	0	18	316	5	38	344	6	54
233	2	21	261	0	14	289	0	20	317	5	46	345	7	5
234	2	14	262	0	12	290	0	23	318	5	53	346	7	16
235	2	8	263	0	10	291	0	26	319	6	1	347	7	26
236	2	2	264	0	8	292	0	29	320	6	8	348	7	37
237	1	56	265	0	6	293	0	32	321	6	15	349	7	48
238	1	51	266	0	5	294	0	36	322	6	23	350	7	58
239	1	45	267	0	4	295	0	40	323	6	30	351	8	8
240	1	39	268	0	3	296	0	44	324	6	38	352	8	20
241	1	33	269	0	2	297	0	48	325	6	46	353	8	31
242	1	28	270	0	1	298	0	52	326	6	54	354	8	42
243	1	22	271	0	1	299	0	56	327	7	2	355	8	53
244	1	17	272	0	1	300	1	1	328	7	11	356	9	4
245	1	12	273	0	0	301	1	6	329	7	21	357	9	16
246	1	7	274	0	0	302	1	11	330	7	30	358	9	28
247	1	2	275	0	0	303	1	16	331	7	40	359	9	40
248	0	58	276	0	1	304	1	22	332	7	50	360	9	52

TABLE V.

The days in a common year, reckoned from the beginning of January, and serving (with the foregoing tables) to find the days of new and full *moons* in all the other months.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1	32	60	91	121	152	182	213	244	274	305	335
2	2	33	61	92	122	153	183	214	245	275	306	336
3	3	34	62	93	123	154	184	215	246	276	307	337
4	4	35	63	94	124	155	185	216	247	277	308	338
5	5	36	64	95	125	156	186	217	248	278	309	339
6	6	37	65	96	126	157	187	218	249	279	310	340
7	7	38	66	97	127	158	188	219	250	280	311	341
8	8	39	67	98	128	159	189	220	251	281	312	342
9	9	40	68	99	129	160	190	221	252	282	313	343
10	10	41	69	100	130	161	191	222	253	283	314	344
11	11	42	70	101	131	162	192	223	254	284	315	345
12	12	43	71	102	132	163	193	224	255	285	316	346
13	13	44	72	103	133	164	194	225	256	286	317	347
14	14	45	73	104	134	165	195	226	257	287	318	348
15	15	46	74	105	135	166	196	227	258	288	319	349
16	16	47	75	106	136	167	197	228	259	289	320	350
17	17	48	76	107	137	168	198	229	260	290	321	351
18	18	49	77	108	138	169	199	230	261	291	322	352
19	19	50	78	109	139	170	200	231	262	292	323	353
20	20	51	79	110	140	171	201	232	263	293	324	354
21	21	52	80	111	141	172	202	233	264	294	325	355
22	22	53	81	112	142	173	203	234	265	295	326	356
23	23	54	82	113	143	174	204	235	266	296	327	357
24	24	55	83	114	144	175	205	236	267	297	328	358
25	25	56	84	115	145	176	206	237	268	298	329	359
26	26	57	85	116	146	177	207	238	269	299	330	360
27	27	58	86	117	147	178	208	239	270	300	331	361
28	28	59	87	118	148	179	209	240	271	301	332	362
29	29		88	119	149	180	210	241	272	302	333	363
30	30		89	120	150	181	211	242	273	303	334	364
31	31		90		151		212	243		304		365

MOON, *acceleration of the*. See ACCELERATION.

MOON-*dial*. See DIAL.

MOON, *horizontal*. See *Apparent* MAGNITUDE.

MOON, *prime of the*. See PRIME.

MOON-*eyes*, in the *Manege*. A horse is faid to have *moon-eyes* when the weakneſs of his eyes increaſes or decreaſes according to the courſe of the *moon*; ſo that in the wane of the *moon* his eyes are muddy and troubled, and at new *moon* they clear up; but ſtill he is in danger of loſing his eye-ſight quite.

MOON-*fiſh*, a name given to the fiſh called by authors ORBIS.

MOON-*ſeed*, *menifpermum*, in *Botany*, a genus of the *dioecia dodecandria* claſs. Its characters are theſe: they are male and female in different plants; the male flowers have four exterior and eight interior petals, and fixteen ſtamina; the female have eight barren ſtamina, and double ſingle-ſeeded berries. Linnæus reckons eight ſpecies.

MOON *trefoil*, in *Botany*. See *Snail* TREFOIL.

MOON-*wort*, in *Botany*. See HONESTY.

MOOR, *mor*, a word ſometimes uſed to expreſs a heath, or barren tract of ground.

The word is ſometimes alſo uſed for a *morafs*, *muſh*, or *fen*.

Mera

Moro masse, in *Ancient Writings*, particularly denotes a mass, or peat mass.

MOOR-*berry*, in *Botany*. See WHORTLE-*berry*.

MOOR-*hazard*. See HAZZARD.

MOOR-*cock*, an English name for the red game, or lagopus, more commonly called the gor-cock. It is a very delicate bird, larger than a partridge, and common on the hills in Derbyshire and Yorkshire. See GOR-*cock*.

MOOR-*hens*, in *Ornithology*, is according to some authors, the name of a genus of water-birds. See GALLINULA.

The common *moor-hen*, called *gallinula aquatica* by authors, and by Linnæus *fulica coerulea*, is a very well known bird, somewhat like the coot in shape, but smaller, and very much differing from the body; the crown of the head, hind part of the neck, the back, and coverts of the wings, are of a fine, but very deep olive green; its feet are greenish, and its breast a lead-coloured blue; its belly greyish; the colours of the plumage in the female are much less brilliant than those of the male; and it is inferior in size. This bird is common about our rivers, breeds twice or thrice in the summer, strikes with the bill like a hen, and in the spring has a shrill call; and is a very well-shaped bird.

MOOR-*land*, or *Moor-ground*, in *Agriculture*, is a black, light, and soft earth, very loose, and without any admixture of stones, and with very little clay, or sand.

The uppermost stratum of the fen-lands is usually of this earth, and it commonly constitutes a moderately thick or deep bed. Intermixed with water it cannot easily be worked up into a paste; and when with labour worked up into somewhat of a firm mass, its surface appears spungy and porous; and as soon as dry, it easily moulders away to powder.

It is usually soft to the touch, unless it be worked very closely between the fingers, then it shews a mixture of a small quantity of sand, both to the touch and to the eye. It seems indeed to consist almost entirely of pure vegetable matter, and this lying in such plenty on the surface of the fen-lands is the cause of their being so very fertile.

The great disadvantage of the places which have this soil, is their being liable to be glutted with wet; and to remedy the inconveniencies arising from thence, the farmers who rent these lands have a custom of burning the soil at proper seasons. It burns very freely and easily, the surface readily catching flame, and a substance somewhat bituminous, usually contained among the soil, helps the burning.

MOOR-*stone*, the name of a very remarkable stone found in Cornwall, and some other parts of England, and used in the coarser works of the present builders.

This is truly a white granite, and is a very valuable stone. It is a very coarse and rude, but beautiful congeries of variously constructed and differently figured particles, not diffused among, or running into one another, but each pure and distinct, though firmly cohering with whatever it comes in contact with. Its colours are principally black and white; the white are of a soft, marbly texture, and opake, formed into large congeries, and containing a sort of tabulated structure; among these there are many of a pure crystalline splendor and transparence; and in some are lodged in different directions many small flaky masses of pure talcs of several colours; some are wholly pellucid, others of an opake white, others of the colour of brown crystal, and a vast number perfectly black. It is found in immense strata in some parts of Ireland, but is differgarded there.

It is found with us in Devonshire, Cornwall, and some other counties; and brought thence in vast quantities to London. It never forms any whole strata there, but is found on the surface of the earth in immense and unmanageable masses; and to separate these into portable ones, they dig a hole with a wedge in some part of them, and surrounding it with a ridge of clay they fill it up with water; this by degrees soaks in, and finding its way into the imperceptible cracks, so far loosens the cohesions of the particles there, that the day after they drive a larger wedge into the hole, and the stone breaks into two or more pieces. It is used in London for the steps of public buildings; and on other occasions, where great strength and hardness are required.

The people of Cornwall, who have this stone in great plenty, use it in their tin-works, and particularly in their tin-kiln, on the good effect of which a great deal depends. This kiln is four-square, and at its top is placed a large block of *moor-stone*; the usual size of this block is six feet in length, and four in breadth; in the middle of this block there is made a hole of about six inches in diameter. This stone serves as a head to cover another like stone placed beneath it; but this under one is not so long as the upper by six inches. The reason of this is, that it must not reach the innermost or back part of the wall, which is the open place through which the flame ascends from another place below that, where a very strong fire of furze is constantly kept up; and there is another little hole also on the outside. The fore-part is like a common oven, and has such a sort of chimney.

The tin-ore is roasted in this kiln, to burn away the mundic, in this manner: the ore is brought in powder, and poured out in heaps on the surface of the top-stone; a man stands there and thrusts it down through the hole in this stone into the kiln, that is, to the surface of the under-stone; a person who stands below spreads this as it falls with an iron rake, and gives notice to the person above when there is enough down, that is when the surface of the lower stone is covered three or four inches thick. When this is done, the hole at the top is covered with green furze, that the flame may reverberate the stronger; and the heat that the *moor-stone* acquires helps to roast the ore: while the flame that comes up from the ore is blue, there yet remains mundic among it; but when this is burnt off, the flame is yellow. Phil. Trans. N° 69.

The miners in some parts of Cornwall use the name *moor-stone* for a sort of coarse free-stone, which lies very often over the tin-ore; this is of a greyish colour, and is somewhat softer than that usually employed in building. See GROWAN.

MOOR-*stitching*, a common English name for the œnanthe, more frequently called the CROSS-*chaster*.

MOORING, at *Sea*, is the act of confining and securing a ship in a particular station, by chains or cables, which are either fastened to the adjacent shore, or to anchors in the bottom.

To MOOR *across*, is to lay out one of the anchors on one side.

To MOOR *alongst*, is to have an anchor in a river, and a hawser on shore.

To MOOR *quarter fast*, is to moor quartering, between the two first ways.

MOORING *for east, west*, &c. is when they observe which way, and on what point of the compass the wind or sea is most likely to endanger the ship, and there lay out an anchor.

MOORING *a fair birth*, at *Sea*, is *mooring* in a place free from any annoyance.

MOORING *a-precife*, at *Sea*, is to have an anchor out, and a hawser athore; then the ship is *moored* with her head athore: and two cables are the least, and four the best to *moor* by. See ANCHOR.

MOORING *water-fast*, is to *moor* neither alongst nor athwart the tide, but quartering between both.

MOORINGS, in *Sea-Language*, are usually an assemblage of anchors, chains, and bridles, laid athwart the bottom of a river, or haven, to ride the shipping contained therein. The anchors, employed on this occasion, have rarely more than one fluke, which is sunk in the river near low-water mark. Two anchors, being fixed in this manner, in the opposite side of the river, are furnished with a chain extending across from one to the other. In the middle of the chain is a large square link, whose lower end terminates in a swivel, which turns round in the chain as about an axis, whenever the ship veers about with the change of the tide. To this swivel-link are attached the bridles, which are short pieces of cable, well served, whose upper ends are drawn into the ship, at the *mooring* ports, and afterwards fastened to the masts, or cable-bolts. A great number of *moorings* of this sort are fixed in the harbours adjacent to the king's dock-yards, as Deptford, Chatham, Portsmouth, Plymouth, &c. Falconer.

MOORS, in the Isle of Man, those who summon the courts for the several *sheadings*; such are the lord's bailiffs. Every *moor* has the like office with our bailiff of the hundred.

MOOR-*head*, in *Chemistry*, a copper cap made in form of a head, to be set over any vessel, or over a reverberating furnace.

MOOR-*head* also denotes the head of a copper or glass still or alembic, which is fitted on to the body or cucurbit, and hath a beak or pipe to let the spirit run down into the receiver.

MOOR-*hoard*, in the *Mystery*. See MOOR-*head*.

MOOSE-*deer*. The first mention we find of this remarkable animal, is in a tract of Mr. Josselyn's, entitled, New England Rarities. That author says, it is a very fine creature, growing to twelve feet high; the horns are extremely beautiful, with broad palms, some of those full grown being two fathom from the tip of one horn to the tip of the other. The same author, in another work, entitled, Two Voyages to New England, calls this creature a monster of superfluity; and says, that when full

grown,

grown, it is many times larger than an ox. What Neal fays of this animal feems copied from Joſſelyn. But the beſt account we have of it, is from Mr. Paul Dudley. This gentleman ſays, that they are of two kinds: the common light-grey *moſe-deer*, called by the Indians *wumpoſe*, and the larger black *moſe*. The grey *moſe* is the ſame animal which Mr. Clayton, in his account of the Virginian quadrupeds, publiſhed in the Philoſophical Tranſactions, calls the elk; and this is the creature, deſcribed in the Anatomical Diſcoveries of the Paris Academy, under the name of the ſtag of Canada. Horns of this creature have been ſent from Virginia, and called elks horns: they are wholly the ſame with thoſe of our red deer, except in ſize; weighing about twelve pounds, and meaſuring from the burr to the tip about ſix feet long. Phil. Tranſ. N° 444. p. 386. abr. vol. vii. p. 447. See ELK.

Mr. Dudley ſays, that the grey *moſe* is like the Engliſh deer; and that theſe creatures herd together thirty or more in a company. The black or large *moſe* has been taken, he ſays, meaſuring fourteen ſpans in height from the withers, which, allowing nine inches to the ſpan, is ten feet and a half.

The ſtag or male of this kind has a palmed horn, not like that of our common or fallow deer, but the palm is much longer and more like to that of the German elk; but it differs from that in having a branched brow-antler between the burr and the palm, which the German elk hath not.

The large horns found foſſile in Ireland, have, from their vaſt dimenſions, been ſuppoſed to have originally belonged to the black *moſe-deer*; but they, as likewiſe moſt other of the large horns found in this part of the world, muſt be referred to the elk kind, but of a ſpecies different from the European, being provided with brow-antlers, which that wants. Some of theſe horns are near twelve feet between tip and tip, and ſix feet four inches long; and may probably be ranked among thoſe remains which foſſiliſts diſtinguiſh by the title of diluvian. The largeſt horns of the American *moſe* ever brought over are only thirty-two inches long, and thirty-four between tip and tip.

Mr. Ray mentions, in his Synopſis of Animals, a pair of extremely large foſſile horns, which he ſaw in a muſeum in Suſſex; but he mentions no brow-antlers in theſe, and therefore probably they, as well as ſome others preſerved in muſeums, were the horns of the German elk.

It is not agreed by authors what number of young the *moſe* brings forth at a time; Mr. Dudley ſays but two; but Joſſelyn, and from him Neal, ſay three; and theſe authors add, that they do not go ſo long with young as ours does, by two months.

There is, beſide the *moſe*, another animal of the deer-kind, very common in Virginia, and other of the northern provinces of America. This creature has round horns, not ſpreading out as in the ſtag or red deer, but meeting nearer together at the tips, and bending forwards over the creature's head; and the brow-antlers are not crooked and ſtanding forward, but ſtraight and upright. The ſkin of this deer is of a ſandy colour with ſome black hairs, and is ſpotted all over while young with white ſpots, as ſome of our fallow deer are, and it is about the bigneſs of our fallow deer when full grown.

The *dama Virginiana* of Mr. Ray was different from this, if the deſcription be exact, and the horns of the palmated kind. This *dama* of Mr. Ray ſeems to be what Joſſelyn, in his Voyages, calls the *mauvoiſe*; but his deſcription is too ſhort to form any regular judgment from; he only ſays, that the *mauvoiſe* is like the *moſe*, but that its horns are ſmall, and the creature about the bigneſs of a ſtag. Phil. Tranſ. N° 444. p. 388.

Joſſelyn mentions alſo the buck, the ſtag, and the reindeer; but it is very much to be doubted whether they are the ſame animals that we mean by thoſe names. He mentions alſo another ſort of American deer, an animal called a *macarib*, a *caribe*, or a *pohano*; but this ſeems a mere fiction; no ſuch animal exiſting in nature.

MOOT, formed either from the Saxon *motan*, *gemetan*, *meeting*; or from the French *mot*, *word*, a difficult caſe, or queſtion, argued by the ſtudents of inns of court, by way of exerciſe.

MOOTER, in the *Dock-Yards*, the perſon who forms and ſmooths the tree-nails for uſe.

MOOTING, the chief exerciſe of the ſtudents in the inns of court; being the arguing of caſes, which young utter barriſters, &c. perform at appointed times, the better to enable them for practice, and the defence of their clients cauſes.

Such as, from their learning and ſtanding, are called by the benchers to argue *moot-caſes*, are ſometimes called *utter barriſters*; the reſt, who, for want of experience, &c. are not admitted, are by ſome called *inner barriſters*. The place where the *moot-caſes* were argued, was anciently called a *moot-hall*.

In the inns of court there is a *bailiff* or *ſurveyor of the moots*, yearly choſen by the bench to appoint the *mootmen* for the inns of chancery, and to keep account of performance of exerciſes, both there and in the houſe.

MOOT-MEN, are thoſe who argue *moot-caſes*.

Out of theſe *moot-men* are choſen readers for the inns of chancery; where, in term-time, and in vacations, they argue caſes in the preſence of attornies and clerks.

MOP, in ſome counties in England, is the term for what is called the ſtatute in other places; being the time that young perſons who intend themſelves for ſervants, meet at ſome certain place, in order to be hired into ſervice.

MORAI, is the name given at Otaheite, in the South Sea, to their burying grounds, which are alſo places of worſhip. This is a pile of ſtone raiſed pyramidically upon an oblong baſe or ſquare, two hundred and ſixty-ſeven feet long, and eighty-ſeven wide. On each ſide is a flight of ſteps; thoſe at the ſides being broader than thoſe at the ends; ſo that it terminated not in a ſquare of the ſame figure with the baſe, but in a ridge, like the roof of a houſe. There were eleven of theſe ſteps to one of theſe *morais*, each of which was four feet high, ſo that the height of the pile was forty-four feet; each ſtep was formed of one courſe of white coral ſtone, which was neatly ſquared and poliſhed; the reſt of the maſs, for there was no hollow within, conſiſted of round pebbles, which, from the regularity of their figure, ſeemed to have been wrought. The foundation was of rock ſtones, which were alſo ſquared. In the middle of the top ſtood an image of a bird, carved in wood, and near it lay the broken one of a fiſh, carved in ſtone. The whole of this pyramid made part of one ſide of a ſpacious area or ſquare, 360 feet by 354, which was walled in with ſtone, and paved with flat ſtones in its whole extent. About a hundred yards to the weſt of this building was another paved area or court, in which were ſeveral ſmall ſtages raiſed on wooden pillars, about ſeven feet high, which are called by the Indians *ewattas*, and ſeem to be a kind of altars, as upon theſe are placed proviſions of all kinds, as offerings to their gods. On ſome of them were ſeen whole hogs, and on others the ſculls of above fifty, beſides the ſculls of many dogs. The principal object of ambition among the natives is to have a magnificent *morai*. The male deities, for they have them of both ſexes, are worſhipped by the men, and the female by the women; and each have *morais*, to which the other ſex is not admitted, though they have alſo *morais* common to both. Hawkeſworth's Voyages, vol. ii. p. 166—230.

MORALS, any thing relating to the manners or conduct of life.

Beſides the theological virtues, as *faith*, *hope*, *charity*, &c. there are alſo *moral* virtues; as *juſtice*, *temperance*, &c.

MORAL *actions*, or *acts*, are ſuch as render the agent *good*, or *evil*; and, conſequently, rewardable, or puniſhable, becauſe he does them. See ACTION.

MORAL *cauſe*. See CAUSE.

MORAL *certainty*, or *aſſurance*, is uſed to ſignify a very ſtrong probability; in contradiſtinction to a mathematical demonſtration. See CERTITUDE.

MORAL *evidence*, *evil*, *fables*, *good*. See the ſeveral ſubſtantives.

MORAL *impoſſibility*, is what we otherwiſe call a *very great*, and almoſt *inſuperable difficulty*; in oppoſition to a phyſical, or natural impoſſibility. See IMPOSSIBLE.

MORAL *liberty*, *neceſſity*, and *perfection*. See the ſubſtantives.

MORAL *philoſophy*, a ſcience whoſe object is, to direct and form men's manners; to explain the reaſon and nature of actions; and to teach and inſtruct us how to acquire that felicity which is agreeable to human nature.

Moral philoſophy is the ſame with what we otherwiſe call ETHICS, ſometimes MORALITY.

MORAL *quantity*. See QUANTITY.

MORAL *ſenſe*, the faculty whereby we diſcern or perceive what is good, virtuous, beautiful, &c. in actions, manners, characters, &c.

A late author has endeavoured to prove, that it is a peculiar ſenſe whereby we get the ideas of theſe things; and denominates it a *moral ſenſe*. See SENSE.

MORAL *theology* is that which treats of caſes of conſcience; called alſo *caſuiſtry*, or *caſuiſtical divinity*.

MORAL *univerſality*. See UNIVERSALITY.

MORAL *of a fable* is the inſtruction drawn from it.

Thus when Phædrus at the end of a fable adds, *Hoc illis dictum qui*, &c. this makes what we call the *moral*: the Greeks called it ἐπιμυθιον, when at the end of the fable; and προμυθιον, when at the beginning. Among the Latins it was called *affabulatio*.

MORALITIES, in *Engliſh Antiquity*. See MYSTERY.

MORALITY denotes a conformity, in things and actions, to those unalterable obligations which result from the nature of our exiſtence, and the neceſſary relations of life; whether to God as our creator, or to mankind as our fellow-creatures.

For other definitions of *morality* or virtue, given by ſome celebrated writers, as well as different hypotheſes relating to its foundation, ſee *Moral* VIRTUE.

MORALITY is alſo uſed for the ſcience or doctrine of morals, or the art of living well and happily; deduced from reaſon, and the nature, relation, and fitneſs of things.

In this ſenſe it amounts to the ſame with what we otherwiſe call *ethics*, *moral philoſophy*, or the *doctrine of offices*. Notwithſtanding the great obſcurity and uncertainties in the moral ſcience, Mr. Locke is of opinion, that the doctrine of manners is equally capable of being brought to demonſtration with the doctrine of quantity and number; that is, with the pureſt parts of mathematics.

According to this author, the idea of a Supreme Being, infinite in power, goodneſs, and wiſdom, whoſe workmanſhip we are, and on whom we depend; and the idea of ourſelves, as underſtanding, rational creatures; would, if duly conſidered, afford ſuch foundations of our duty, and rules of action, as might place *morality* among the ſciences capable of demonſtration; wherein we need not doubt but that, from principles as inconteſtible as thoſe of the mathematics, by neceſſary conſequences, the meaſure of right and wrong might be made out to any one, who will apply himſelf, with the ſame indifferency and attention, to the one, as he doth to the other of theſe ſciences: for the relations of other modes may certainly be perceived, as well as thoſe of number and extenſion. E. gr. that *where there is no property, there can be no injuſtice*, is a propoſition as certain as any in Euclid: for the idea of property being a right to any thing, and the idea of injuſtice being the invaſion or violation of that right, it is evident, that theſe ideas being thus eſtabliſhed, and theſe names annexed to them, we can as certainly know this propoſition to be true, as that a triangle has three angles equal to two right ones. Again, *no government allows abſolute liberty*: the idea of government being the eſtabliſhment of ſociety, upon certain rules or laws, which require conformity to them; and the idea of abſolute liberty being for any one to do whatever he pleaſes, I am as capable of being certain of the truth of this propoſition, as of any in mathematics.

What has given the advantage to the ideas of quantity, and made them thought more capable of certainty and demonſtration than the ideas of good and evil, right and wrong, &c. is,

1. That the former can be repreſented by ſenſible marks, which have a nearer correſpondence with them than any words or ſounds. Diagrams drawn on paper are copies of the ideas, and are not liable to the uncertainty that words carry in their ſignification; but we have no ſenſible marks that reſemble our moral ideas, and nothing but words to expreſs them by; which, though, when written, they remain the ſame, yet the ideas they ſtand for may change in the ſame man, and it is very ſeldom that they are not different in different perſons.

2. Moral ideas are commonly more complex than figures; whence theſe two inconveniences follow: 1. That their names are of more uncertain ſignification; the preciſe collection of ſimple ideas they ſtand for not being ſo eaſily agreed on; and ſo the ſign that is uſed for them in communication always, and in thinking often, does not readily carry with it the ſame idea.

2. The mind cannot eaſily retain thoſe preciſe combinations ſo exactly and perfectly, as is neceſſary in the examination of the habitudes and correſpondences, agreements or diſagreements, of ſeveral of them one with another, eſpecially where it is to be judged of by long deductions, and the intervention of ſeveral other complex ideas, to ſhew the agreement or diſagreement of two remote ones.

One part of theſe diſadvantages in moral ideas, which has made them be thought not capable of demonſtration, may in a good meaſure be remedied by definitions, ſetting down that collection of ſimple ideas which every term ſhall ſtand for, and then uſing the term ſteadily and conſtantly for that preciſe collection.

The mathematician conſiders the truth and properties belonging to a rectangle or circle, only as they are ideas in his own mind, which poſſibly he never found actually exiſted mathematically, that is, preciſely, true: yet his knowledge is not only certain, but real; becauſe real things are no farther, nor intended to be, meant by any ſuch propoſitions, than as things really agree to thoſe archetypes in the mind. It is true of the idea of a triangle, that its three angles are equal to two right ones; it is true alſo of a triangle, wherever it exiſts: what is true of thoſe figures that have barely an ideal exiſtence in the mind, will hold true of them alſo, when they come to have a real exiſtence in matter. Hence it follows, that moral knowledge is as capable of real certainty as mathematics: for certainty being nothing but the perception of ſuch agreement, by the intervention of other ideas; our moral ideas, as well as mathematical, being archetypes themſelves, and ſo adequate or complete ideas, all the agreement or diſagreement we ſhall find in them will produce real knowledge, as well as in mathematical figures. That which is requiſite to make our knowledge certain, is the clearneſs of our ideas; and that which is required to make it real, is that they anſwer their archetypes.

But it will here be ſaid, that if moral knowledge be placed in the contemplation of our own moral ideas, and thoſe are of our own making, what ſtrange notions will there be of juſtice and temperance! what confuſion of virtues and vices, if every man may make what ideas of them he pleaſes? It is anſwered, no confuſion or diſorder at all in the things themſelves, nor the reaſonings about them, no more than there would be a change in the properties of figures, and their relations one to another, if a man ſhould make a triangle with four corners, or a trapezium with four right angles; that is, in plain Engliſh, change the names of the figures, and call that by one name which is called ordinarily by another. The change of name will indeed at firſt diſturb him who knows not what idea it ſtands for; but as ſoon as the figure is drawn, the conſequences and demonſtration are plain and clear.

Juſt the ſame is it in moral knowledge: let a man have the idea of taking from others, without their conſent, what they are juſtly poſſeſſed of, and call this *juſtice*, if he pleaſeth; he that takes the name there, without the idea put to it, will be miſtaken, by joining another idea or his own to that name; but ſtrip the idea of that name, or take it, ſuch as it is in the ſpeaker's mind, and the ſame things will agree to it, as if you called it *injuſtice*. One thing we are to take notice of, that where God, or any other law-maker, has defined any moral names, there they have made the eſſence of that ſpecies to which that name belongs; and there it is not ſafe to apply or uſe them otherwiſe; but in other caſes it is bare impropriety of ſpeech to apply them contrary to the common uſage of the country they are uſed in.

MORASS, a marſh, fen, or low moiſt ground, which receives the waters from above, without having any deſcent to carry them off again.

Somner derives the word from the Saxon *merſe*, *lake*; Salmaſius from *mare*, *a collection of waters*; others from the German *moraſt*, *a muddy place*; and others from *marſc*, of *mariſcum*, *à mariſci*, *i. e. ruſtici*. See BOG, FEN, MARSH, &c.

In Scotland, Ireland, and the north of England, they have a peculiar kind of *moraſſes*, called *moſſes*, or *peat-moſſes*, whence the country people dig their peat or turf, for firing.

The earl of Cromertie gives a particular account of theſe moſſes in the Philoſophical Tranſactions. They are covered with a heathy ſcurf, under which is a black, moiſt ſpongy earth, in ſome places ſhallower, in others deeper, ordinarily from three or four, to ſeven or eight feet depth, though in ſome few places twice or thrice as much.

This black ſpongy earth they cut into oblong ſquares with iron ſpades made for that purpoſe, eight or nine inches long, and four or five broad: as the men cut them up, they are carried and ſpread on a dry ground, to be dried in the wind and ſun. Some of theſe become harder, ſome ſofter, according to the nature of the mould or earth: the more black and ſolid they are, the better fire they make; and thoſe are the leaſt eſteemed which are greyeſt, lighteſt, and moſt ſpongy.

When they have cut off one ſurface of four or five inches deep, they proceed downwards to another, and ſo to a third and a fourth, till they come to the hard ſtrata; unleſs they be ſtopped with water, which they alſo ordinarily remove by making a channel, if they can; but where they cannot, there the water ſtagnates. In ſuch waſted pits, or *peat-dikes*, as they call them, where water hinders the cutting the ſpongy earth to the bottom, the pits will be filled up again, in ſome years, with a new ſpongy earth; which, in proceſs of time, comes to the conſiſtence of peat-moſs as at firſt, and a ſcurfy heathy turf grows over the top of it. When the dikes are dug down to the hard channel, the moſſes do not renew, as in the other caſe; though it has been obſerved, that if they be cut down to the channel, provided the heathy turf cut off from the top be but laid on the channel, in courſe of time the moſs grows again. Theſe moſſes are always level; though they are frequently found on hills, and near the tops of them too; yet, as that curious nobleman obſerves, the moſſes have always a deſcent to them, and

generally from them; insomuch that he never knew any where the water might stagnate. It is the water draining from above, that seems to be the parent of the peat. In many of these mosses are found quantities of fir and oak-wood, usually in whole trees; but the smaller branches are seldom found unconsumed. This wood is as good for use as any old wood is; only that, having imbibed a deal of moisture, it takes some time to dry, in order to fit it for burning.

There are many places where wood will not grow, where yet the mosses are well stocked with this under-ground timber; but yet it appears there must have been woods formerly there; else how came they in the mosses? To prove this, that noble lord gives us the history and origin of a moss, in great measure from his own experience. In the parish of Lochburn, in the year 1651, he saw, near the top of a very high hill, a plain about a mile over, then covered with a firm standing wood, but which was so very old, that not only the trees had no leaves or bark on, but the outside, for the space of an inch inwards, was dead white timber, though within they were firm. Coming by the place fifteen years after, he could not discover the least appearance of a tree; but, instead thereof, there was a plain green ground covered with a moss; the trees being all fallen, and having lain so thick over one another, that the green had over-run the whole timber, by means of the moisture draining from the hill above it, and stagnating on the plain. He adds, that none could pass over it; the scurf not being firm enough to support them. In thirty years more he found this whole piece of ground turned into a common peat-moss, and the country people digging turf and peat there. This accounts for the generation of mosses, and whence it is that many of them are furnished with timber.

It appears from the whole, that all the trees which we find in this fossile state, originally grew in the very places where we now find them, and have only been thrown down and buried there, not brought from elsewhere. It may appear indeed an objection to this opinion, that most of these fossile trees are of the fir-kind; and that Cæsar says expressly, that no firs grew in Britain in his time; but this is easily answered by observing, that these trees, though of the fir-kind, yet are not the species usually called the fir, but pitch-tree; and Cæsar has no where said that pitch-trees did *not* grow in England. Norway and Sweden yet abound with these trees, and there are at this time whole forests of them in many parts of Scotland, and a large number of them wild upon a hill at Wareton in Staffordshire to this day.

In Hatfield-marsh, where such vast numbers of the fossile trees are now found, there has evidently once been a whole forest of them growing. The last of these was found alive, and growing in that place within a hundred years last past, and cut down for some common use. See *Bog-Wood*.

The Roman historians tell us, that when their armies pursued the wild Britons, these people always sheltered themselves in the miry woods, and low watery forests. Cæsar expressly says this, and observes, that Cassibelan and his Britons, after their defeat, passed the Thames, and fled into such low *morasses* and woods, that there was no pursuing them; and we find that the Silures secured themselves in the same manner when attacked by Ostorius and Agricola. The same thing is recorded of Venutius, king of the Brigantines, who fled to secure himself into the boggy forests of the midland part of this kingdom; and Herodian expressly says, that, in the time of the Romans pushing their conquests in these islands, it was the custom of the Britons to secure themselves in the thick forests which grew in their boggy and wet places, and when opportunity offered, to issue out thence, and fall upon the Romans. The consequence of all this was, the destroying all these forests, the Romans finding themselves so plagued with parties of the natives issuing out upon them at times from these forests, that they gave orders for the cutting down and destroying all the forests in Britain which grew on boggy and wet grounds. These orders were punctually executed; and to this it is owing that at this day we can hardly be brought to believe that such forests ever grew with us as are now found buried.

The Roman histories all join in telling us, that when Suetonius Paulinus conquered Anglesea, he ordered all the woods to be cut down there, in the manner of the Roman generals in England; and Galen tells us, that the Romans, after their conquest in Britain, kept their soldiers constantly employed in cutting down forests, draining of marshes, and paving of bogs. Not only the Roman soldiers were employed in this manner, but all the native Britons made captives in the wars, were obliged to assist in it; and Dion Cassius tells us, that the emperor Severus lost no less than fifty thousand men in a few years time, in cutting down the woods, and draining the bogs of this island. It is not to be wondered at, that such numbers executed the immense destruction which we find in these buried forests. One of the greatest subterranean treasures of wood is that near Hatfield; and it is easy to prove that these people, to whom this havock is thus attributed, were upon the spot where these trees now lie buried. The common road of the Romans out of the south into the north, was formerly from Lindum (Lincoln) to Segelochum (Little-Borrow upon Trent), and from thence to Danum (Doncaster), where they kept a standing garrison of Crispinian horse. A little off on the east, and north-east of their road, between the two last named towns, lay the borders of the greatest forest, which swarmed with wild Britons, who were continually making their sallies out, and their retreats into it again, intercepting their provisions, taking and destroying their carriages, killing their allies and passengers, and disturbing their garrisons. This at length so exasperated the Romans, that they were determined to destroy it; and to do this safely and effectually, they marched against it with a great army, and encamped on a great moor not far from Finningley: this is evident from their fortifications, yet remaining.

There is a small town in the neighbourhood called Osterfield, and as the termination *field* seems to have been given only in remembrance of battles fought near the towns whose names ended with it, it is not improbable that a battle was fought here, between all the Britons who inhabited this forest, and the Roman troops under Ostorius. The Romans flew many of the Britons, and drove the rest back into this forest, which at that time overspread all this low country. On this the conquerors taking advantage of a strong south-west wind set fire to the pitch trees, of which this forest was principally composed; and when the greater part of the trees were thus destroyed, the Roman soldiers and captive Britons cut down the remainder, except a few large ones, which they left standing, as remembrances of the destruction of the rest. These single trees however could not stand long against the winds; and these falling into the rivers which ran through the country, interrupted their currents, and the water then overspreading the level country, made one great lake, and gave origin to the *mosses* or moory bogs, which were afterwards formed there, by the workings of the waters, the precipitation of earthy matter from them, and the putrefaction of rotten boughs and branches of trees, and the vast increase of water moss, and other fuel plants which grow in prodigious abundance in all these sorts of places. Thus were these burnt and felled trees buried under a new-formed spungy and watery earth; and afterwards found, on the draining and digging through this earth again.

Hence it is not strange, that Roman weapons and Roman coins are found among these buried trees; and hence it is that among the buried trees some are found burnt, some chopped and hewn; and hence it is that the bodies of the trees all lie by their proper roots, and with their tops lying north-east, that is, in that direction in which a south-west wind would have blown them down. Hence also it is, that some of the trees are found with their roots lying flat, these being not cut or burned down, but blown up by the roots afterwards when left single; and it is not wonderful that such trees as these should have continued to grow even after their fall, and shoot up branches from their sides, which might easily grow into high trees. Phil. Trans. N° 255.

By this system it is also easily explained why the moor soil in the country is in some places two or three yards thicker than in others, or higher than it was formerly, since the growing up of peat-earth or bog-ground is well known, and the soil added by overflowing of waters is not a little.

As the Romans were the destroyers of this great and noble forest, so they probably were also of the several other ancient forests; the ruins of which furnish us with the bog-wood of Staffordshire, Lancashire, Yorkshire, and other counties. But as the Romans were not much in Wales, in the Isle of Man, or in Ireland, it is not to be supposed, that forests cut down by these people gave origin to the fossile wood found there; but though they did not cut down these forests, others did; and the origin of the bog-wood is the same with them and with us. Hollinghead informs us, that Edward the First being not able to get at the Welch, because of their hiding themselves in boggy woods, gave orders at length that they should be destroyed by fire and by the ax; and doubtless the roots and bodies of trees found in Pembrokeshire under ground, are the remains of the execution of this order. The fossile wood in the bogs of the Isles of Man and Anglesea, is doubtless of the same origin; though

we have not any accounts extant of the time or occasion of the forests there being destroyed; but as to the fossile trees of the bogs of Ireland, we are expressly told, that Henry the Second, when he conquered that country, ordered all the woods to be cut down that grew in the low parts of it, to secure his conquests by cutting away the places of resort of rebels.

We have an account in the Philosophical Transactions of a moving moss, near Church-town in Lancashire, which greatly alarmed the neighbourhood as miraculous. The moss was observed to rise to a surprising height, and soon after sunk as much below the level, and moved slowly towards the south. See *Moving* BOG.

MORAVIAN, or BOHEMIAN *brethren*, in *Ecclesiastical History*, were protestants of Bohemia, who, in the fifteenth century, threw off the despotic yoke of Rome, animated by the zealous exhortations and heroic example of John Huss. These *Moravian* brethren were distinguished by several religious institutions of a singular nature, and well adapted to guard their community against the reigning vices and corruptions of the times. In 1552 they united themselves to the Lutheran churches in Saxony; but after the death of Luther, and their expulsion from their country in 1547, many of them, who retired into Poland, embraced the religious sentiments and discipline of the reformed; and by degrees they all entered into the communion of the Swiss church. This union was, at first, formed on the express condition, that the two churches should continue to be governed by their respective laws and institutions, and should have separate places of public worship; but, in the following century, all remains of diffension were removed in the synods held at Astrog in 1620 and 1627, and the two congregations were formed into one, under the title of the *Church of the United Brethren*. From this honourable origin the modern *Moravians* pretend to derive their descent. See HERRNHUTERS.

MORATUR, or DEMORATUR, in *Law*, signifies as much as, *he demurs*; that is, the party here goes not forward, but rests or abides by the judgment of the court, who take time to deliberate, argue, and advise thereon.

When the counsel of the party are of opinion, that the count or plea of the adverse party is insufficient in law; then he *demurs*, or abides in law, and refers the same to the judgment of the court. See DEMURRER.

MORBID, *morbidus*, in *Medicine*, is applied to those parts, humours, &c. wherein a disease lies.

MORBID, in *Painting*, is particularly applied to fat flesh very strongly expressed.

MORBILLI, in *Medicine*, a disease popularly called MEASLES.

MORBUS, a term purely Latin, signifying DISEASE.

MORBUS *caducus* denotes the EPILEPSY.

MORBUS *Gallicus*. See VENEREAL *disease*.

MORBUS *Hungaricus*. See HUNGARICUS *morbus*.

MORBUS *prodromus*. See PRODROMUS.

MORBUS *pedicularis*. See PEDICULARIS.

MORBUS *regius*. See JAUNDICE.

MORBUS *strigosus*. See CHLOROSIS.

MORBUS, *cholera*. See CHOLERA.

MORDEH, an East Indian name for a disease, to which the people of that country are subject. It consists in a violent disorder of the stomach. The great heats, copious sweats, and supervening cold of that country, all naturally tend to weaken the stomach. Now if the inhabitants eat or drink immoderately at night, the concoction of their aliments can be but very unduly performed. Hence, besides this distemperature of the stomach, they are subject to others of the bowels; and diarrhœas are very common among them, and with difficulty cured.

MORDELLA, a name given by some writers to the EARWIG.

MORDELLA, in *Zoology*, the name of a genus of four-winged flies, of the *coleoptera* order of insects; the characters of which are, that the antennæ are filiform and serrated; the head deflexed under the neck; that the palpi are compressed, elevated, and obliquely truncated; that the elytra are bent downwards towards the apex; and that the fore-thighs are broad at the base of the abdomen. Linnæus enumerates six species. See INSECT. Dr. Hill distinguishes this genus by slender antennæ, the last joint being globose, and by most of the species having legs, which serve them for leaping. Hist. Anim. p. 40.

MORDEXYN, or MORDOXI, a name given to a disease very frequent among the inhabitants of Goa, which consists in a nausea, and continued vomiting, and usually seizes the patient suddenly and unexpectedly, and often proves fatal.

MORDILAPIS, a name given by some writers to loaches, a small fish, often found under stones in shallow waters.

MORE'S-*head*, in the *Manege*, implies the colour of a *roan-horse*, who, besides the mixture or blending of a grey and a bay, has a black head, and black extremities, as the main and tail. See ROAN.

MORÆA, in *Botany*, a genus of the *triandria monogynia* class. Its characters are these: the flower is very like those of the iris, but it has six spear-shaped petals, which spread open horizontally; three of which are alternately longer than the other; and it has three erect standards, which have no falls as the irises have; the spatha, number of stamina, and seed-vessel, agree very nearly with the iris. Linnæus reckons five, and Miller three species, natives of the Cape of Good Hope.

MORELLA, in *Botany*, a name used by some as a common term for all the nightshades; others have appropriated it to the *lycopersicum*, or love-apple only. Æmilius Macer tells us, that in his time all the plants called by the Greeks *strychna*, were called by the Latins *morella*.

MORESK, or MORISKO, a kind of painting, carving, &c. done after the manner of the Moors; consisting of several grotesque pieces and compartiments promiscuously interminghed, not containing any perfect figure of a man, or other animal, but a wild resemblance of birds, beasts, trees, &c.

These are also called *arabesques*, and are particularly used in embroideries, damask-work, &c.

Moresque-dances, vulgarly called *morrice-dances*, are those altogether in imitation of the Moors; as farabands, chacons, &c. and are usually performed with castanets, tambours, &c.

There are few country places in this kingdom where the *morrice-dance* is not known. It was probably introduced into this country about, or a little before, the reign of HENRY VIII. and is a dance of young men in their shirts, with bells at their feet, and ribbands of various colours tied round their arms, and flung across their shoulders.

MORETUM, among the Romans, a kind of sallad, composed of the eight following ingredients, viz. garlic, parsley, rue, coriander, onions, cheese, oil, and vinegar.

MORGANATIC *marriage*. See MARRIAGE.

MORGAY, an English name for the sea-fish, called also the *rough hound-fish*, one of the galeus kind; the *catulus minor* of Salvian, and *mustelus stellatus tertius* of Belonius.

It is of a pale, and somewhat reddish grey, and is spotted with brown and whitish spots; the belly is silver white, and the body long and round; its skin is very rough, and its flesh very firm, and finely flavoured; some say it tastes of musk, or some such perfume. It is the smallest of all this genus of fishes, and seldom weighs above a pound and a half. It is common in the Mediterranean, and is frequent in the markets in Italy.

MORGH, among the *Mahometans*, a sect who lay much stress upon belief, and stand opposed to the ALWAIDII.

MORHUA, in *Zoology*, a name used by some authors for the common cod-fish.

MORIAM, in our *Old Writers*, a head-piece called a pot, stat. 4 & 5 P. & M. c. 2.

The word comes from the French *morion*, or Italian *morione*, i. e. *casque*.

MORILLES, a kind of mushroom, about the bigness of a walnut, pierced with holes like a honey-comb, and said to be good for creating an appetite. They are also accounted restorative, and frequently used in sauces and ragouts.

MORILLON, in *Zoology*, the name of a species of duck, seeming the same with the *capo rosso*, a small red-headed wild duck. See DUCK.

MORINA, in *Botany*, a genus of the *diandria digynia* class. Its characters are these: it has a double empalement, which is tubulous, bifid, of one leaf, and permanent; the flower hath one petal, with a long tube a little incurved; the top is divided into two lips; the upper lip is small and bifid; the under lip is cut into three equal obtuse segments, the middle one being extended beyond the other; it hath two bristly stamina; the globular germen is situated under the flower, supporting a slender style, which is longer than the stamina, and crowned by a target-shaped stigma; the germen afterward becomes a single seed, crowned by the empalement of the flower. There is but one species of this genus known at present, which grows naturally near Erzeron, in Persia. It is cordial, cephalic, and stomachic; good for resisting the influence of a bad air, and to excite the transpiration of peccant humours, being taken in infusion or conserve.

MORINDA, in *Botany*, a genus of the *pentandria monogynia* class. Its characters are, that the flowers are aggregate and monopetalous; the stigma divided into two segments, and the fruit aggregate drupes. There are three species.

MORINELLUS, in *Zoology*. See DOTTEREL, and TURNSTONE.

MORINGA, in *Botany*, the name by which some authors call the tree which produces the ben nut, or *glans unguentaria*, and whose wood is the *lignum nephriticum*, or nephritic wood of the shops.

MORION, in *Botany*, a name given by the ancients to a kind of nightshade. The ancient Greeks, Theophrastus, and others, called all the nightshades in general by the name *strychnos*. Some of these they said were poisonous, and other esculent. The poisonous were of two kinds, some bringing on sleepy disorders, and others making the patient mad.

The esculent kind was the *pomum amoris*, or love-apple, eaten at this time by the Portuguese, and many other nations, and by some in England. Some after-writers use the word *morion* as a distinctive name for those kinds of nightshade which caused sleepy disorders; and after these, some used it as the peculiar name of one species, and others as the name of the male mandrake of Dioscorides, whose fruit, according to that author, was commonly eaten by the shepherds; but when taken too largely, threw them into sleepy disorders. From this word *morion* has come, in all probability, the Latin name *morella*, given at first to the *pomum amoris*, or love-apple; and afterwards, according to Æmilius Macer, to all the nightshades; for he expressly says, that those plants which the Greeks called *strychnos*, the Latins called *morella*; and we find that the old Greeks called all the nightshades *strychnos*.

MORION, in the *Natural History of the Ancients*, a name given to one of the semi-pellucid gems, more commonly called HAMMON. It is a stone appearing externally only of a fine deep black; but when held up against a candle, or against the sun-shine, giving a very beautiful red, in different degrees, from that of the hyacinth to that of the amethyst or carbuncle.

MORISONIA, in *Botany*, the name of a genus of plants of the *monadelphia polyandria* class; the characters of which are these: the perianthium is one leaved, inflated, and divided at the top into two lips; these stand open; but the neck is contracted, and the whole soon withers; the flower consists of four oblong obtuse petals, which are expanded when they are out of the cup; the stamina are numerous filaments; the anthers are simple; the style is capillary and erect, and is longer than the tube of the flower; the germen of the pistil is oval; the stigma is capitated, and of a plano-convex figure; the fruit is a globose berry, with a hard smooth rind; it has only one cell, and is supported by the style by way of pedicle; the seeds are numerous, and are of the shape of the common kidney-beans, but small. Linnæi Gen. Plant. p. 230.

MORLING, or MORTLING, in our *Old Writers*, the wool which is taken from the skin of dead sheep, whether killed, or dying of the rot. See SHORLING.

MORMYLUS, in *Ichthyology*, the name of a species of SPARUS, with the upper jaw longest, and with twelve parallel, transverse black lines on each side.

MORMYRUS, in *Ichthyology*, a genus of abdominal fish, with a smooth head, several emarginated teeth, a linear aperture in the gills, without a cover, and squamose body. There are two species, inhabitants of the Nile.

MORNING, the beginning of the day; or the time of the sun-rising.

The astronomers reckon *morning*, *noon*, from the time of midnight, to that of mid-day. Thus an eclipse is said to begin at eleven o'clock in the *morning*, &c.

MORNING *star* is the planet Venus, when a little to the westward of the sun; that is, when she rises a little before him. In this situation she is called, by the Greeks, *Phosphorus*; by the Latins, *Lucifer*, &c.

MORNING *twilight*. See CREPUSCULUM.

MOROCCO, or MAROQUIN, the skin of a goat, or some other animal resembling it, dressed in sumac or galls, and coloured of any colour at pleasure; much used in book-binding, &c.

The name is ordinarily derived from the kingdom of *Morocco*, whence it is supposed the manner of preparing these skins was first borrowed.

We have *Morocco* skins brought from the Levant, Barbary, Spain, Flanders, and France; red, black, yellow, blue, &c. The various manners of preparing *Morocco*, both black and in colours, are so curious, and withal so little known among us, that the public will not be displeased to find them here.

MOROCCO, *manner of preparing black*. The skins having been dried in the hair, are steeped in clear water three days and nights; then they are stretched on a wooden horse or leg, like that used by tanners; then beaten with a large knife for the purpose, and steeped afresh in water, changed daily till they be well come again. In this state they are thrown into a large vat in the ground, full of water, wherein quicklime has been flaked, where they lie fifteen days; whence, however, they are taken, and again returned every night and morning; they are thrown into a fresh vat of lime and water, and shifted night and morning, as before, for fifteen days longer; then rinsed in clear water; and the hair is then taken off, on the leg, with the knife; the skins are then returned into a third vat, and shifted, as before, for about eighteen days; then steeped twelve hours in a river; then taken out, rinsed, put in pails, where they are pounded with wooden pestles, changing the water twice; then laid on the horse, and the flesh taken off, returned into pails of new water, taken out, and the hair-side scraped; then returned into fresh pails, taken out, and thrown into a pail of a particular form, having holes at bottom; here they are beaten the space of an hour, and fresh water poured on from time to time; stretched on the leg, and scraped on either side; returned into pails of fresh water; taken out, stretched, and sewed up all around in manner of bags, leaving out the hind legs, which serve to make an aperture for the conveyance of a mixture mentioned hereafter.

The skins, thus sewed, are put in lukewarm water, where dogs excrement has been dissolved. Here they are stirred with long poles half an hour, left at rest a dozen, taken out, rinsed in fresh water, and filled by a tunnel with a preparation of water and sumac, mixed and heated over the fire till ready to boil; and as they are filled, the hind legs are sewed up to stop the passage. In this state they are let down into the vessel of water and sumac, and kept stirring four hours successively; they are then taken out, and heaped on one another; after a little time, their sides are changed; and thus they continue an hour and a half, till drained. This done, they are loosened, and filled a second time with the same preparation, sewed up again, and kept stirred two hours, piled up, and drained as before. This is again repeated a third time, with this difference, that they are now only stirred a quarter of an hour; after which, they are left till the morrow morning, when they are taken out, drained on a rack, unsewed, the fumac taken out, folded in two from head to tail, the hair-side outwards, laid over each other on the leg, to perfect their draining, stretched out, and dried; then trampled under-foot by two and two, stretched on a wooden table, what flesh and sumac remains scraped off, and the hair-side rubbed over with oil, and that again with water.

Having thus received their oil and water, they are wrung in the hands, then stretched and pressed right on the table with an iron instrument like that of the curriers, the flesh-side uppermost; then turned, and the hair-side rubbed strongly over with a handful of rushes, to squeeze out as much of the oil remaining within as possible. The first course of black is now laid on the hair-side, by means of a lock of hair twisted and steeped in a kind of black dye, prepared of sour beer, wherein pieces of old rusty iron have been thrown. When half dry, by hanging in the air, they are stretched on a table, and rubbed over every way with a paumelle, or wooden-toothed instrument, to raise the grain, over which is passed a light couche of water, then flocked by rubbing them with rushes prepared for the purpose. Thus flocked, they have a second couche of black; they are then dried, laid on the table, rubbed over with a paumelle of cork, to raise the grain again; and, after a light couche of water, flocked over anew; and, to raise the grain a third time, a paumelle of wood is used.

After the hair-side has thus received all its preparations, the flesh-side is pared with a sharp knife for the purpose, and the hair-side rubbed strongly over with a woollen cap, having first given it a lustre with barberries, citron, or orange. The whole is finished by raising the grain lightly, for the last time, with the paumelle of cork, which leaves them in a condition for sale and use.

MOROCCO, *manner of preparing red*. The skins are steeped twenty-four hours in a river, taken out, stretched on the leg, beaten with the knife, returned into the water for twenty-four hours, re-beaten on the leg, re-steeped; thrown into a vat, and for three weeks taken out, and returned every morning, to dispose them to peel. Being taken out for the last time, they are scraped with the knife, and when the hair is quite off, thrown into pails of fresh water, where they are rinsed; then the flesh-side scraped, thrown into the pails, and thus alternately from the leg to the pails, till they leave the water quite clean; then they are put in lukewarm water, with the sumac as before; and, after twelve hours, they are rinsed in clear water, and scraped on the leg on both sides, pounded in pails, and the water changed three times; then wrung, and stretched on the leg, and pailed after each other into water, with alum dissolved in it. Thus alumed, they are left to drain till the morning, then wrung out, pulled on the leg, and folded from head to tail, the flesh inwards.

In this state they receive their first dye, by passing them one

one after another into a red liquor, prepared with laccs, and some other ingredients, kept secret among the *morequinners*. This they repeat again and again, till the skins have got their first colour. They are then rinsed in clear water, stretched on the leg, and left to drain twelve hours; then thrown into water, into which white galls pulverized have been passed through a sieve, and stirred incessantly for a whole day with long poles, taken out, hung on a bar across the water all night, white againſt red, and red againſt white; and in the morning the water is stirred up, and the skins are returned into it for twenty-four hours. See DYEING *of leather*.

MOROCHITES, in *Natural History*, a name by which some of the old authors have called the *marochthus*, or French chalk.

MOROCHTHUS, in the *History of Fossils*, a name of an indurated clay, commonly known among us by the name of French chalk, or marking-stone; and its principal use with us is the taking of spots out of cloaths, and the ſerving taylors to mark with, as it makes a much more determinate and a neater line than chalk. The ancients, however, had it much in eſteem in medicine, and used it as an aſtringent, and in colics and hæmorrhages, and externally in ulcerations of the eyes.

It is diſtinguiſhed from all other earths, by being the hardeſt of all, conſiderably heavy, ſemi-tranſparent, of a very ſmooth, unctuous, glaſſy ſurface, and of a greyiſh white colour, with a conſiderable admixture of green; it is of a diſagreeable brackiſh taſte, and does not ferment with acids; it does not colour the hands, nor adhere to the tongue, nor melt in the mouth, and it is not diſſuſible in water. It burns to a great hardneſs, and a white colour. It is dug in Germany, the iſland of Sardinia, and many other places; but no where ſo pleniſully about Bruncon in France, whence it is there commonly called *Bruncon d'alk*.

MOROCTES, one of the names by which Pliny, and ſome other of the older authors, called the *morochthus*, or French chalk.

MORONA, a name uſed by ſome for the HUSO, or iſinglaſs-fiſh.

MORPHASMUS, *μορφασμος*, among the *Antients*, a kind of dance, wherein, by a great many figures, they imitated the tranſformations of Proteus.

MORPHEW, *morphœa*, a leproſy ſort of freckle or ſcurf, which breaks out ſometimes upon the ſkin, particularly about the forehead; called alſo *alphus*.

MORRHA, in *Natural History*, a name given by ſome to the ſubſtance more properly called *murra* or *myrrha*, of which the cups called MURRHINA and *myrrhina* were made.

MORRHINA *vaſa*, in the *Writings of the Ancients*. See MURRHINA.

MORRICE-*dance*. See MORRIS.

MORSE, in *Zoology*, the name of a monſtrous ſea animal, called by ſome the *rosmarus* and *rosmarus*, and by others, very improperly, the *hippopotamus* and *equus marinus*.

The *morſe*, or TRICHECUS *roſmarus* of Linnæus is an ill-ſhaped amphibious animal, of the ſize of a large ox, covered with a hair like that of the ſeal, and ſomewhat reſembling an ox in the head; for which reaſon ſome have called it the ſea-cow, or *cavea marina*; whence it has been erroneouſly confounded by ſome with the *manati*.

It has two large prominent and crooked tuſks in the upper jaw, which are as fine as ivory, and are uſed by artificers for the ſame purpoſes; and four grinders on both ſides above and below, but no cutting teeth: the teeth have been ſometimes found of the weight of twenty pounds each; it brings forth uſually but one young at a time, never more than two. It is a very ſtrong and vigorous animal, and difficultly taken; when it is caught, it is uſually at land, ſeldom at ſea. See *Tab.* III. *Quadrupeds*, N° 37.

Vorſtius, who met with a young one of this creature, has very accurately deſcribed it; whence we have the beſt deſcription extant of the nature of the animal. This young one was of the ſize of a large dog, and in ſhape much reſembled the phoca or ſea-calf. Its head was round; its eyes large, and like thoſe of an ox; its noſtrils diſtended and wide, and opening, and drawing together as the creature pleaſed; it had apertures on the ſides of the head for ears; its mouth opened round, and not very large; and on the upper lip it had a ſort of whiſkers, compoſed of thick cartilaginous briſtles; the lower jaw was of a trigonal form; the tongue ſhort and thick, and the mouth well furniſhed with broad and flatted teeth; its fore-feet, as well as the hinder ones, were very broad; and the hinder extremity of its body very much reſembled that of the *phoca* or ſea-calf: when it walked, the fore-feet were directed forwards, the others turned backward; the toes were five on each foot, and theſe were joined by a membrane, which was remarkably thick; the hinder feet had claws, the fore ones had none; and the creature had no tail, and crept rather than walked on the hinder parts; its ſkin was thick and tough, and covered with a few ſhort grey hairs; it made a noiſe like the grunting of a hog.

Theſe animals inhabit the coaſt of Spitzbergen, Nova Zembla, Hudſon's Bay, and the Gulph of St. Lawrence, and the icy ſea, as far as Cape Iſchukitſchi; they are gregarious: in ſome places appear in herds of hundreds: are thy animals, and avoid places that are much haunted by mankind. The method of killing them on the Magdalene iſles is ſaid to be as follows: the hunters watch their landing, and as ſoon as they find a ſufficient number for what they call a *cut*, go on ſhore, each armed with a ſpear, ſharp on one ſide like a knife, with which they cut their throats, taking care not to ſtand in the way of thoſe which attempt to get again to ſea, which they do with great agility, by tumbling headlong; for they would crush any body to death by their vaſt weight. They are killed for the ſake of their oil, one *cut* producing about half a tun. The knowledge of this chace is of great antiquity: Other, the Norwegian, about the year 890, made a report of it to king Alfred, ſaying, as he ſays, made the voyage beyond Norway, for the convenience of fiſhing for *horſe whales*, which have in their teeth bones of great value, of which he brought ſome at his return to the king. Pennant.

MORSELLI, or MORSULI, are denominations given to thoſe forms of medicine intended to be ſucked in the mouth, as a *lozenge*; the word ſignifying a little mouthful.

MORSUS *diaboli, devil's bit*, a plant of the ſcabious kind, which ſeems to have a fringe around the bottom of its root; otherwiſe called *ſucciſa*. See SCABIOUS.

It has its denomination from its roots, which appear as if bitten off at the bottom; which ſuperſtitious people attributed to the devil, as done out of envy, leſt we ſhould have too much of ſo ſalutary a root. It was formerly looked on as a good alexipharmic; but is now much out of uſe.

From a likeneſs to this plant, the edge or ſelvedge of the tubæ Falloppianæ has obtained the ſame appellation.

MORSUS *canis rabidi*. See HYDROPHOBIA.

MORSUS *ranæ*. See HYDROCHARIS.

MORSUS *viperæ*. See VIPER.

MORT *d'anceſtre*, in *Law*. See ASSIZE *of mort d'ancestre*.

MORT, among the fiſhermen of ſome parts of England, a name given to the SALMON while in its third year's growth.

MORTALITY, a term frequently uſed to ſignify a contagious diſeaſe, which deſtroys great numbers of either men, or beaſts.

MORTALITY, *bills of*, are accounts or regiſters ſpecifying the numbers born, married, and buried in any pariſh, town, or diſtrict. In general they contain only theſe numbers; and, even when thus limited, are of great uſe, by ſhewing the degrees of healthineſs and proliſickneſs, and the progreſs of population in the places where they are kept. It is therefore much to be wiſhed, that ſuch accounts had been always correctly kept in every kingdom, and regularly publiſhed at the end of every year. We ſhould then have had under our inſpection the comparative ſtrength of every kingdom, as far as it depends on the number of inhabitants, and its increaſe or decreaſe at different periods.

But ſuch accounts are rendered more uſeful, when they include the ages of the dead, and the diſtempers of which they have died. In this caſe they convey ſome of the moſt important inſtruction, by furniſhing us with the means of aſcertaining the law which governs the waſte of human life, the values of annuities dependent on the continuance of any lives, or any ſurviorſhips between them, and the favourableneſs or unfavourableneſs of different ſituations to the duration of human life. There are but few regiſters of this kind; nor has this ſubject, though ſo intereſting to mankind, ever engaged much attention till lately. The firſt bills containing the ages of the dead were thoſe for the town of Breſlaw in Silcſia. It is well known what uſe has been made of theſe by Dr. Halley, and after him by De Moivre. A table of the probabilities of the duration of human life at every age, deduced from them by Dr. Halley, has been publiſhed in the Philoſophical Tranſactions (ſee the Abridgment, vol. iii. p. 669.) and has been inſerted under the article LIFE-*Annuities* in this work; and this is the firſt table of this ſort that has been ever publiſhed. Since the publication of this table, ſimilar bills have been eſtabliſhed in a few towns of this kingdom; and particularly in London (in the year 1728), and at Northampton, in 1735.

Two improvements of theſe regiſters have been propoſed: the firſt is, that the ſexes of all that die in every period

of life ſhould be ſpecified in them, under the denominations of *boys*, *married men*, *widowers*, and *bachelors*; and of *girls*, *married women*, *widows*, and *virgins*. The ſecond is, that they ſhould ſpecify the numbers of both ſexes dying of every diſtemper in every month, and at every age. See the end of the fourth eſſay in Dr. Price's Treatiſe on Reverſionary Payments. Regiſters of *mortality* thus improved, when compared with records of the ſeaſons, and with the circumſtances that diſcriminate different ſituations, might contribute greatly to the increaſe of medical knowledge; and they would afford the neceſſary *data* for determining the difference between the duration of human life among males and females; for ſuch a difference there certainly is, much in favour of females, as will appear from the following facts; in addition to thoſe which have been already recited under the article MARRIAGE, which the reader is deſired to conſult.

At Northampton, though more males are born than females, and nearly the ſame number die; yet the number of living *females* appeared, by an account taken in 1746, to be greater than the number of males, in the proportion of 2301 to 1770, or 39 to 30.

At Berlin it appeared, from an accurate account which was taken of the inhabitants in 1747, that the number of *female* citizens exceeded the number of *male* citizens in the proportion of 459 to 391. And yet out of this ſmaller number of males, more had died for twenty years preceding 1751, in the proportion of 19 to 17.

At Edinburgh, in 1743, the number of *females* was to the number of *males*, as 4 to 3. (See Maitland's Hiſtory of Edinburgh, p. 220.) But the females that died annually from 1749 to 1758, were to the males in no higher proportion than 3¼ to 3.

He that will take the pains to examine the accounts in Phil. Tranſ. abr. vol. viii. part iv. p. 46, &c. referred to under MARRIAGE, will find, that though in the towns there enumerated, the proportion of males and females born is no higher than 19 to 18, yet the proportion of boys and girls that die is 8 to 7; and that, in particular, the *ſtill-born* and *chryſom* males are to the ſtill-born and chryſom females as 3 to 2. See MARRIAGE.

In thirty-nine parishes of the diſtrict of Vaud in Switzerland, the number of *males* that died during ten years before 1766, was 81703 of females 81673 of whom the numbers that died under one year of age were 1817 *males*, and 1305 *females*; and under ten years of age 3099 *males*, and 2598 *females*. In the beginning of life, therefore, and before any emigrations can take place, the rate of mortality among males appears to be greater than among females. And this is rendered yet more certain by the following accounts. At Vevey, in the diſtrict of Vaud, juſt mentioned, there died in the courſe of twenty years, ended at 1764, in the firſt month after birth of males 135 to 89 females; and in the firſt year 225 to 162. To the ſame effect, it appears from a table given by Suſmilch, in his Gottliche Ordnung, vol. ii. p. 317, that in Berlin 203 males die in the firſt month, and but 168 females; and in the firſt year, 489 to 395; and alſo, from a table of Struyck's, that in Holland 396 *males* die in the firſt year to 366 *females*.

The authorities for the facts here mentioned, and much more on this ſubject, may be found in the fourth eſſay in Dr. Price's Treatiſe on Reverſionary Payments, and in the ſupplement, at the end of that treatiſe.

We ſhall here only add the following table, taken from a memoir of Mr. Wargentin's, publiſhed in the collection of the Memoirs of the Royal Academy of Sciences at Stockholm, printed at Paris in 1772.

In all Sweden for nine years, ended in 1763, the proportion of females to males that died out of a given number living, was

Under the age of one year		—	1000 to	1099
From 1 to 3 years of age		—	1000	1022
3	5	——	——	1042
5	10	——	——	1074
10	15	——	——	1080
15	20	——	——	1097
20	25	——	——	1283
25	30	——	——	1161
30	35	——	——	993
35	40	——	——	1159
40	45	——	——	1115
45	50	——	——	1340
50	55	——	——	1339
55	60	——	——	1292
60	65	——	——	1115
65	70	——	——	1080
70	80	——	——	1022
80	90	——	——	1045
Above	90	——	——	1044

Regiſters of *mortality* on the improved plan before mentioned, were eſtabliſhed in 1772 at Cheſter, and alſo in 1773, at Warrington in Lancaſhire; and they are ſo comprehenſive and correct, that there is reaſon to expect they will afford much inſtruction on the ſubject of human *mortality*, and the values of lives.

But the country moſt diſtinguiſhed in this reſpect is Sweden; for in that kingdom exact accounts are taken of the births, marriages, and burials, and of the numbers of both ſexes that die at all ages in every town and diſtrict; and alſo, at the end of every period of five years, of the numbers living at every age; and at Stockholm a ſociety is eſtabliſhed, whoſe buſineſs it is to ſuperintend and regulate the enumerations, and to collect from the different parts of the kingdom the regiſters, in order to digeſt them into tables of obſervations. Theſe regulations were begun in Sweden in 1755; and tables, containing the reſult of them from 1755 to 1763, have been publiſhed in Mr. Wargentin's memoir juſt referred to, and the moſt material parts of them may be found in an eſſay by Dr. Price on the Difference between the Duration of Human Life in Towns and in Country Parishes, printed in the ſixty-fifth volume of the Philoſophical Tranſactions, part ii.

In the fourth eſſay in Dr. Price's Treatiſe on Reverſionary Payments and Life-Annuities, the following account is given of the principles on which tables of obſervation are formed from regiſters of *mortality*; and of the proper method of forming them, ſo as to render them juſt repreſentations of the number of inhabitants, and the probabilities of the duration of human life in a town or country.

In every place which juſt ſupports itſelf in the number of its inhabitants, without any recruits from other places; or where, for a courſe of years, there has been no increaſe or decreaſe, the number of perſons dying every year at any particular age, and above it, muſt be equal to the number of the living at that age. The number, for example, dying every year, at all ages, from the *beginning* to the utmoſt *extremity* of life, muſt, in ſuch a ſituation, be juſt equal to the whole number *born* every year. And for the ſame reaſon, the number dying every year at *one* year of age and upwards; at *two* years of age and upwards; at *three* and upwards, and ſo on, muſt be equal to the numbers that attain to thoſe ages every year; or, which is the ſame, to the numbers of the living at thoſe ages. It is obvious, that unleſs this happens, the number of inhabitants cannot remain the ſame. If the former number is greater than the latter, the inhabitants muſt *decreaſe*; if leſs, they muſt *increaſe*. From this obſervation it follows, that in a town or country, where there is no increaſe or decreaſe, bills of *mortality* which give the ages at which all die, will ſhew the exact number of inhabitants; and alſo the exact law, according to which human life waſtes in that town or country.

In order to find the number of inhabitants; the mean numbers dying annually, at every particular age and upwards, muſt be taken as given by the bills, and placed under one another in the order of the ſecond column of the following tables. Theſe numbers will, it has appeared, be the numbers of the living at 1, 2, 3, &c. years of age; and, conſequently, the ſum, diminiſhed by half the number born annually, will be the whole number of inhabitants.

This ſubtraction is neceſſary for the following reaſon. In a table formed in the manner here directed, it is ſuppoſed, that the numbers in the ſecond column are all living together at the beginning of every year. Thus: the number in the *ſecond* column oppoſite to 0 in the *firſt* column, the table ſuppoſes to be all juſt born together on the firſt day of the year. The number, likewiſe, oppoſite to 1, it ſuppoſes to attain to one year of age juſt at the ſame time that the former number is born. And the like is true of every number in the ſecond column. During the courſe of the year, as many will die at all ages as were born at the beginning of the year; and, conſequently, there will be an exceſs of the number alive at the beginning of the year, above the number alive at the end of the year, equal to the whole number of the annual births; and the true number conſtantly alive together, is the arithmetical mean between theſe two numbers; or, agreeably to the rule here given, the *ſum* of the numbers in the ſecond column of the table, leſſened by *half* the number of annual births.

In ſuch a ſeries of numbers, the exceſs of each number above that which immediately follows it, will be the number dying every year, out of the particular number alive at the beginning of the year; and theſe exceſſes ſet down regularly as in the third column of the table to which we have referred, will ſhew the different rates at which human life waſtes through all its different periods, and the different probabilities of life at all particular ages.

It muſt be remembered, that what has been now ſaid goes on the ſuppoſition, that the place whoſe bills of *mortality* are given, ſupports itſelf, by procreation only, in the number of its inhabitants. In towns this very ſeldom happens, on account of the luxury and debauchery which generally prevail in them. They are, therefore, commonly kept up by a conſtant acceſſion of ſtrangers, who remove to them from country parithes and villages. In theſe circumſtances, in order to find the true number of inhabitants, and probabilities of life, from bills of *mortality* containing an account of the ages at which all die; it is neceſſary, that the proportion of the annual births to the annual ſettlers ſhould be known, and alſo the period of life at which the latter remove. Both theſe particulars may be diſcovered in the following method.

If for a courſe of years there has been no ſenſible increaſe or decreaſe in a place, the number of annual ſettlers will be equal to the exceſs of the annual burials above the annual births. If there is an *increaſe*, it will be *greater* than this exceſs. If there is a *decreaſe*, it will be *leſs*.

The period of life at which theſe ſettlers remove, will appear in the bills by an increaſe in the number of deaths at that period and beyond it. Thus, in the London bills, the number of deaths, between 20 and 30, is generally above double; and between 30 and 40, near triple the number of deaths between 10 and 20; and the true account of this is, that from the age of 18 or 20, to 35 or 40, there is an afflux of people every year to London from the country, which occaſions a great increaſe in the number of inhabitants as theſe ages; and, conſequently, raiſes the deaths for all ages *above* 20, conſiderably above their due proportion, when compared with the number of deaths *before* 20. This is obſervable in all the bills of *mortality* for towns with which we are acquainted, not excepting even the Breſlaw bills. Dr. Halley takes notice, that theſe bills gave the number of deaths, between 10 and 20, too ſmall. This he conſidered as an irregularity in them, owing to chance; and, therefore, in forming his table of obſervations, he took the liberty to *vary* to correct it, ſo to render the proportion of thoſe who die to the living in this diviſion of life, nearly the ſame with the proportion which, he ſays, he had been *informed* die annually of the young lads in Chriſt-Church Hoſpital. But the truth is, that this irregularity in the bills was derived from the cauſe we have juſt aſſigned. During the five years for which the Breſlaw bills are given by Dr. Halley, the births did, indeed, a little exceed the burials; but it appears, that this was the effect of ſome peculiar cauſes that happened to operate juſt at that time; for, during a complete century from 1633 to 1734, the annual medium of *births* was 1089 (ſee Dr. Short's Comparative Hiſtory, p. 63), and of burials 1256. This town, therefore, muſt have been all along kept up by a number of yearly recruits from other places, equal to about *a fourth* part of the yearly births.

It appears from the account in the Philoſophical Tranſactions (Abridgment, vol. vii. N° 380, p. 46, &c.) that from 1717 to 1725, the annual medium of births at Breſlaw was 1252, of burials 1507; and alſo, that much the greateſt part of the births died under ten years of age. From a table in Sufmilch's Works, vol. i. p. 38, it appears, that, in reality, the greater part of all that die in this town are children under five years of age.

What has been now obſerved, concerning the period of life at which people remove from the country to ſettle in towns, would appear ſufficiently probable, were there no ſuch evidence for it as has been mentioned; for it might be well reckoned, that theſe people in general muſt be ſingle perſons in the beginning of mature life, who, not having yet obtained ſettlements in the places where they were born, migrate to towns in queſt of employments.

Having premiſed theſe obſervations, it will be proper next to endeavour to explain diſtinctly the effect which theſe acceſſions to towns muſt have on tables of obſervation formed from their bills of *mortality*. This is a ſubject proper to be inſiſted on, becauſe miſtakes have been committed about it; and becauſe alſo the diſcuſſion of it is neceſſary to ſhew, how near to truth the values of lives come as deduced from ſuch tables.

The following general rule may be given on this ſubject. If a place has, for a courſe of years, been maintained in a ſtate nearly ſtationary, as to number of inhabitants, by recruits coming in every year, to prevent the decreaſe that would ariſe from the exceſs of the burials above the births; a table formed on the principle, "That the number dying annually, after every particular age, is equal "to the number living at that age," will give the number of inhabitants, and the probabilities of life, too *great*, for all ages preceding that at which the recruits ceaſe; and after this it will give them *right*. If the acceſſions are ſo great as to cauſe an *increaſe* in the place, ſuch a table will give the number of inhabitants, and the probabilities of life, too *little*, after the age at which the acceſſions ceaſe; and too great, if there is a decreaſe. *Before* that age it will in *both* caſes give them too great; but moſt conſiderably ſo in the former caſe, or when there is an increaſe.

Agreeably to theſe obſervations, if a place increaſes, not in conſequence of acceſſions from other places, but of a conſtant exceſs of the births above the deaths; a table, conſtructed on the principle that has been mentioned, will give the probabilities of life too low through the *whole extent* of life; becauſe, in ſuch circumſtances, the number of *deaths* in the *firſt* ſtages of life muſt be too great, in compariſon of the number of deaths in the *latter* ſtages; and more or leſs ſo, as the *increaſe* is more or leſs rapid. The contrary, in all reſpects, takes place where there is a decreaſe, ariſing from the exceſs of the *deaths* above the *births*.

For example. Let us ſuppoſe, that 244 of thoſe born in a town, attain annually to 20 years of age; and that 250 more, all likewiſe twenty years of age, come into it annually from other places; in conſequence of which, it has, for a courſe of years, been juſt maintained in the number of its inhabitants, without any ſenſible increaſe or decreaſe. In theſe circumſtances, the number of the living in the town of the age of 20, will be always 244 *natives* and 250 *ſettlers*, or 494 in all; and, ſince theſe are ſuppoſed all to die in the town, and no more recruits are ſuppoſed to come in, 494 will be likewiſe the number dying annually at 20 and upwards. In the ſame manner it will appear, on theſe ſuppoſitions, that the number of the living, at every age, ſubſequent to 20, will be equal to the number dying annually at that age and above it; and, conſequently, that the number of inhabitants and the decrements of life, for every ſuch age, will be given exactly by the table. But for all ages *before* 20, they will be given much too great. For let 280 of all born in the town, reach 10; in this caſe, 280 will be the true number of the living in the town at the age of 10; and the recruits not coming in till 20, the number given by the bills, as dying between 10 and 20, will be the true number dying annually of the living in this diviſion of life. Let this number be 36; and it will follow, that the table ought to make the numbers of the living at the ages between 10 and 20, a ſeries of decreaſing means between 280 and (280 diminiſhed by 36, or) 244. But in forming the table on the principle juſt mentioned, 250 (the number above 20 dying annually *in* the town who were not born in it) will be added to each number in this ſeries; and, therefore, the table will give the numbers of the living, and the probabilities of life in this diviſion of life, almoſt twice as great as they really are. This obſervation, it is manifeſt, may be applied to *all* the ages under 20.

It is neceſſary to add, that ſuch a table will give the number of inhabitants, and the probabilities of life equally wrong before 20, whether the recruits all come in at 20, agreeably to the ſuppoſition juſt made, or only *begin* then to come in. In this laſt caſe, the table will give the number of inhabitants, and probabilities of life, too great throughout the whole extent of life, if the recruits come in at all ages above 20. But if they ceaſe at any particular age, it will give them right only from that age; and before, it will err all along on the ſide of exceſs; but leſs conſiderably between 20 and that age, than before 20. For example: if, of the 250 ſuppoſed to come in at 20, only 150 then come in, and the reſt at 30; the number of the living will be given 100 too high, at every age between 20 and 30; but, as juſt ſhewn, they will be given 250 too high at every age before 20. In general, therefore, the number of the living at any particular age, muſt be given by the ſuppoſed table, as many too great as there are annual ſettlers *after* that age; and, if theſe ſettlers come in at all ages indiſcriminately, during any certain interval of life, the number of inhabitants and the probabilities of life will be continually growing leſs and leſs wrong, the nearer any age is to the end of that interval. Theſe obſervations prove, that tables of obſervation formed in the common way, from bills of *mortality* for places where there is an exceſs of the burials above the births, muſt be erroneous, for a great part of the duration of life, in proportion to the degree of that exceſs. They ſhew likewiſe at what parts of life the errors in ſuch tables are moſt conſiderable, and how they may be in a great meaſure corrected.

All this ſhall be exemplified in the particular caſe of London.

The number of deaths between the ages of 10 and 20, is always ſo ſmall in the London bills, that it ſeems certain few recruits come to London under 20; or, at leaſt, not ſo many as before this age are ſent out for education to ſchools and univerſities. After 20, great numbers come

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in till 30, and some, perhaps, till 40 or 50. But at every age after 50, it is probable, that more retire from London than come to it. The London tables of observation, therefore, being formed on the principle already mentioned, cannot give the probabilities of life right till 40. Between 30 and 40 they must be a little too high; but more so between 20 and 30; and most of all before 20. It follows also, that these tables must give the number of inhabitants in London much too great.

The first of the following tables is formed in the manner here explained, from the London bills for ten years, from 1759 to 1768; and adapted to a 1000 born as a *radix*. The sum of the numbers in the second column, diminished by half the number born, is 25,757. According to this table, then, for every 1000 deaths in London, there are 25½ as many inhabitants; or, in other words, the expectation of a child just born is 25½; and the inhabitants are to the annual burials as 25½ to 1. But it has appeared, that the numbers in the second column, being given on the supposition, that all those who die in London were born there, must be too great; and we have from hence a demonstration, that the probabilities of life are given in the common tables, of London observations, too high, for, at least, the first 30 years of life; and also, that the number of inhabitants in London must be *less* than 25½, multiplied by the annual burials. The common tables, therefore, of London observations undoubtedly need correction, as Mr. Simpson suggested, and in some measure performed; though too imperfectly, and without going upon any fixt principles, or shewing particularly, how tables of observation ought to be formed, and how far in different circumstances, and at different ages, they are to be depended on. The way of doing this, and, in general, the right method of forming genuine tables of observation for towns, may be learnt from the following rules.

"From the sum of all that die annually, *after* any given "age, subtract the number of annual settlers *after* that "age; and the remainder will be the number of the "living *at* the given age."

This rule can want no explication or proof, after what has been already said.

If, therefore, the number of annual settlers in a town at every age could be ascertained, a perfect table of observations might be formed for that town, from bills of *mortality*, containing an account of the ages at which all die in it. But no more can be learnt in this instance, from any bills than the whole number of annual *settlers*, and the general division of life in which they enter. This, however, may be sufficient to enable us to form tables that shall be tolerably exact. For instance: suppose the *annual deaths* in a town which has not increased or decreased, to have been for many years, in the proportion of 4 to 3, to the *annual births*. It will hence follow, that ¼ of the persons who die in such a town are *settlers*, or *emigrants* from other places, and not *natives*; and the sudden increase in the deaths after 20, will also shew, agreeably to what was before observed, that they enter after this age. In forming, therefore, a table for such a town, a *quarter* of all that die at all ages throughout the whole extent of life, must be deducted from the sum of all that die after every given age before 20; and the remainder will be the true number living at that given age. And if, at 20, and every age above it, this deduction is omitted, or the number of the living at every such age is taken the same with the sum of all that die after it, the result will be (supposing *most* of the settlers to come in before 30, and *all* before 40) a table exact till 20; too high between 20 and 30; but nearly right for some years before 40; and after 40 exact again. Such a table, it is evident, will be the same with the table last described at all ages above 20, and different from it only under 20. It is evident also that, on account of its giving the probabilities of life too great for some years after 20, the number of inhabitants deduced from it may be depended on as somewhat greater than the truth; and more or less so, as the annual recruits enter in general later or sooner after 20.

Let us now consider what the result of these remarks will be, when applied particularly to the London bills. It must be here first observed, that, at least one *quarter* of all that die in London are supplies or *settlers* from the country, and not *natives*. The medium of annual burials for ten years, from 1759 to 1768, was 23,936; of births, 15,710. The excess is 8246, or near a *third* of the burials. The same excess, during ten years, before 1750, was 10,500, or near *half* the burials. London was then *increasing*. For the last 12 or 15 years it has been *increasing*. This excess, therefore, agreeably to the foregoing observations, was then *greater* than the number of annual settlers, and it is now *less*. It is, however, here supposed, that the number of annual settlers is now no more than a *quarter* of the annual burials, in order to allow for more omissions in the births than the burials; and also, in order to be more sure of obtaining results that shall not exceed the truth.

Of every thousand then who die in London, only 750 are *natives*, and 250 are recruits, who come to it after 18 or 20 years of age; and, consequently, in order to obtain from the bills a more correct table than the first of the following tables, 250 must be subtracted from every one of the numbers in the second column till 20; and the numbers in the third column must be kept the same, the bills always giving these right. After 20, the table is to be continued unaltered; and the result will be, a table which will give the numbers of the living at all ages in London much nearer the truth, but still somewhat too high. Such is the second of the following tables. The sum of all the numbers in the second column of this table, diminished by 500, is 20,750. For every 1000 deaths, therefore, in London, there are, according to this table, 20,750 living persons in it; or for every single death, 20¾ inhabitants. It was before shewn, that the number of inhabitants in London could not be so great as 25 times ½ the deaths. It now appears (since the numbers in the second column of this table are too high) that the number of inhabitants in London cannot be so great as even 20 times ½ the deaths. And this is a conclusion which every one, who will bestow due attention on what has been said, will find himself forced to receive. It will not be amiss, however, to confirm it by the following fact, the knowledge of which is derived from the particular enquiry and information of Mr. Harris, the late ingenious master of the Royal Mathematical School in Christ-Church Hospital. The average of lads in this school has, for thirty years past, been 831. They are admitted at all ages between seven and eleven; and few stay beyond fifteen: they are, therefore, in general, lads between the ages of eight and fifteen. They have better accommodations than it can be supposed children commonly have; and about three hundred of them have the particular advantage of being educated in the country. In such circumstances it may be well reckoned, that the proportion of children dying annually, must be less than the general proportion of children dying annually at the same ages in London. The fact is, that, for the last thirty years, 212 have died annually, or *one* in 70.

According to Table II. *one* in 74 dies between 10 and 20, and *one* in 70 between 8 and 16. That table, therefore, probably, gives the decrements of life in London, at these ages, too little, and the numbers of the living too great: and, if this is true of these ages, it must be true of all other ages *under* 20; and it follows demonstrably, in conformity to what was before shewn, that more people settle in London after 20, than the ¼ above supposed; and that from 20 to at least 30 or 35, the numbers of the living are given too great, in proportion to the decrements of life.

In this table the numbers in the second column are doubled at 20, agreeably to what really happens in London; and the sum of the numbers in this column diminished by half the whole number of deaths, gives the *expectation* of life, not of a child just born, as in other tables, but of all the inhabitants of London at the time they enter it, whether that be at birth, or at 20 years of age. The *expectations*, therefore, and the *values* of London lives under 20, cannot be calculated from this table. But it may be very easily fitted for this purpose, by finding the number of births which, according to the given decrements of life, will leave 404 alive at 20; and then adapting the intermediate numbers in such a manner to this radix, as to preserve all along the number of the living, in the same proportion to the numbers of the dead. This is done in the third of the following tables; and this table may be recommended as better adapted to the present state of London than any other table. The values of lives, however, deduced from it, are in general nearly the same with those deduced by Mr. Simpson from the London bills, as they stood forty years ago; the main difference is, that after 52, and in old age, this table gives them somewhat lower than Mr. Simpson's table.

For the method of applying these observations in determining the number of inhabitants in London, &c. see EXPECTATION of *life*.

Under the article EXPECTATION, an account has been given of the difference between the rate of human *mortality* in great towns and in country parishes and villages. The fourth and fifth of the following tables, compared with the two last, will give a more distinct and full view of this difference.

TABLE

TABLE I.

Shewing the Probabilities of Life in London, on the fuppofition, that all who die in London were born there. Formed from the Bills, for 10 years, from 1759 to 1768.

Ages	Perſons living.	Decr. of Life.	Ages	Perſons living.	Decr. of Life.	Ages	Perſons living.	Decr. Life.
0	1000	240	31	404	9	62	132	7
1	760	99	32	395	9	63	125	7
2	661	42	33	386	9	64	118	7
3	619	29	34	377	9	65	111	7
4	590	21	35	368	9	66	104	7
5	569	11	36	359	9	67	97	7
6	558	10	37	350	9	68	90	7
7	548	7	38	341	9	69	83	7
8	541	6	39	332	10	70	76	6
9	535	5	40	322	10	71	70	6
10	530	4	41	312	10	72	64	6
11	526	4	42	302	10	73	58	5
12	522	4	43	292	10	74	53	5
13	518	3	44	282	10	75	48	5
14	515	3	45	272	10	76	43	5
15	512	3	46	262	10	77	38	5
16	509	3	47	252	10	78	33	4
17	506	3	48	242	9	79	29	4
18	503	4	49	233	9	80	25	3
19	499	5	50	224	9	81	22	3
20	494	7	51	215	9	82	19	3
21	487	8	52	206	8	83	16	3
22	479	8	53	198	8	84	13	2
23	471	8	54	190	7	85	11	2
24	463	8	55	183	7	86	9	2
25	455	8	56	176	7	87	7	2
26	447	8	57	169	7	88	5	1
27	439	8	58	162	7	89	4	1
28	431	9	59	155	8	90	3	1
29	422	9	60	147	8			
30	413	9	61	139	7			

TABLE II.

Shewing the *true* Probabilities of Life in London till the age of 19.

Age	Perſons living.	Decr. of Life.	Age	Perſons living.	Decr. of Life.
0	750	240	12	272	4
1	510	99	13	268	3
2	411	42	14	265	3
3	369	29	15	262	3
4	340	21	16	259	3
5	319	11	17	256	3
6	308	10	18	253	4
7	298	7	19	249	
8	291	6	20	424	
9	285	5	21	487	
10	280	4	&c.	&c.	
11	276	4			

The numbers in the fecond column to be continued as in the laſt table.

TABLE III.

Shewing the *true* Probabilities of Life in London for all Ages. Formed from the Bills for 10 years, from 1759 to 1768.

Ages	Perſons living.	Decr. of Life.	Ages	Perſons living.	Decr. of Life.	Ages	Perſons living.	Decr. Life.
0	1338	486	31	404	9	62	132	7
1	1012	200	32	395	9	63	125	7
2	812	85	33	386	9	64	118	7
3	747	59	34	377	9	65	111	7
4	688	42	35	368	9	66	104	7
5	646	23	36	359	9	67	97	7
6	623	20	37	350	9	68	90	7
7	603	14	38	341	9	69	83	7
8	589	12	39	332	10	70	76	6
9	577	10	40	322	10	71	70	6
10	567	9	41	312	10	72	64	6
11	558	9	42	302	10	73	58	5
12	549	8	43	292	10	74	53	5
13	541	7	44	282	10	75	48	5
14	534	6	45	272	10	76	43	5
15	528	6	46	262	10	77	38	5
16	522	7	47	252	10	78	33	4
17	515	7	48	242	9	79	29	4
18	508	7	49	233	9	80	25	3
19	501	7	50	224	9	81	22	3
20	494	7	51	215	9	82	19	3
21	487	8	52	206	8	83	16	3
22	479	8	53	198	8	84	13	2
23	471	8	54	190	7	85	11	2
24	463	8	55	183	7	86	9	2
25	455	8	56	176	7	87	7	2
26	447	8	57	169	7	88	5	1
27	439	8	58	162	7	89	4	1
28	431	9	59	155	8	90	3	1
29	422	9	60	147	8			
30	413	9	61	139	7			

TABLE IV.

Shewing the Probabilities of Life in the Diſtrict of Vaud, Switzerland, formed from the Regiſters of 43 Pariſhes, given by Mr. Muret, in the Firſt Part of the Bern Memoirs for the Year 1766.

Age	Living	Decr.	Age	Living	Decr.	Age	Living	Decr.
0	1000	185	31	558	5	62	286	12
1	815	46	32	553	5	63	274	12
2	769	30	33	548	4	64	262	12
3	735	20	34	544	5			
4	715	14				65	250	14
			35	539	6	66	236	16
5	701	13	36	533	6	67	220	18
6	688	11	37	527	7	68	202	18
7	677	10	38	520	7	69	184	16
8	667	8	39	513	7			
9	659	6				70	168	15
			40	506	6	71	153	13
10	653	5	41	500	6	72	140	11
11	648	5	42	494	6	73	129	10
12	643	4	43	488	6	74	119	10
13	639	4	44	482	6			
14	635	4				75	109	11
			45	476	7	76	98	13
15	631	5	46	469	8	77	85	14
16	626	4	47	461	10	78	71	13
17	622	4	48	451	10	79	58	12
18	618	4	49	441	10			
19	614	4				80	46	10
			50	431	9	81	36	7
20	610	4	51	422	8	82	29	5
21	606	4	52	414	8	83	24	4
22	602	5	53	406	9	84	20	3
23	597	5	54	397	9			
24	592	5				85	17	3
			55	388	11	86	14	3
25	587	5	56	377	13	87	11	2
26	582	5	57	364	16	88	9	2
27	577	5	58	348	17	89	7	2
28	572	5	59	331	17			
29	567	4				90	5	1
			60	314	15			
30	563	5	61	299	13			

All the bills, from which this and the following tables are formed, give the numbers dying under 1 as well as under 2 years; and, in the numbers dying under 1, are included, in the country pariſh in Brandenburg, and at Berlin, all the ſtill-borns. All the bills alſo give the numbers dying in every period of five years.

TABLE V.

Shewing the Probabilities of Life in a Country Pariſh in Brandenburg, formed from the Bills for 50 Years, from 1720 to 1759, as given by Mr. Suſmilch, in his Gottliche Ordnung.

Age	Living	Decr.	Age	Living	Decr.	Age	Living	Decr.
0	1000	225	31	482	5	62	260	12
1	775	57	32	477	5	63	248	12
2	718	31	33	472	5	64	236	12
3	687	23	34	467	5			
4	664	22				65	224	11
			35	462	6	66	213	11
5	642	20	36	456	6	67	202	12
6	622	15	37	450	6	68	190	12
7	607	12	38	444	6	69	178	12
8	595	10	39	438	6			
9	585	8				70	166	13
			40	432	5	71	153	15
10	577	7	41	427	5	72	138	16
11	570	6	42	422	5	73	122	15
12	564	5	43	417	5	74	107	14
13	559	5	44	412	0			
14	554	5				75	93	13
			45	407	6	76	80	12
15	549	5	46	400	6	77	68	9
16	544	5	47	394	6	78	59	8
17	539	4	48	388	7	79	51	7
18	535	4	49	381	7			
19	531	4				80	44	6
			50	374	7	81	38	6
20	527	5	51	367	8	82	32	6
21	522	5	52	359	8	83	25	6
22	517	5	53	351	8	84	21	5
23	512	5	54	343	9			
24	507	5				85	15	4
			55	334	10	86	11	3
25	502	4	56	324	10	87	8	2
26	498	3	57	314	10	88	6	2
27	495	3	58	304	11	89	4	1
28	492	3	59	293	11			
29	489	3				90	3	1
			60	282	11	91	2	1
30	486	4	61	271	11	92	1	1

TABLE VI.

Shewing the Probabilities of Life at Vienna, formed from the Bills for Eight Years, as given by Mr. Sufmilch, in his Gottliche Ordnung, page 32, Tables.

Age	Living	Decr.	Age	Living	Decr.	Age	Living	Decr.
0	1495	682	31	364	6	62	129	6
1	813	107	32	358	5	63	123	7
2	706	61	33	353	6	64	116	7
3	645	46	34	347	7			
4	599	33				65	109	8
			35	340	8	66	101	8
5	566	30	36	332	8	67	93	8
6	536	20	37	324	8	68	85	7
7	516	11	38	316	9	69	78	7
8	505	9	39	307	9			
9	496	7				70	71	6
			40	298	8	71	65	5
10	489	6	41	290	7	72	60	5
11	483	5	42	283	6	73	55	4
12	478	5	43	277	6	74	51	4
13	473	6	44	271	7			
14	467	6				75	47	5
			45	264	8	76	42	5
15	461	6	46	256	9	77	37	5
16	455	7	47	247	9	78	32	5
17	448	6	48	238	9	79	27	4
18	442	6	49	229	9			
19	436	6				80	23	3
			50	220	8	81	20	2
20	430	5	51	212	7	82	18	2
21	425	5	52	205	7	83	16	2
22	420	5	53	198	7	84	14	2
23	415	6	54	191	7			
24	409	6				85	12	2
			55	184	8	86	10	2
25	403	6	56	176	8	87	8	2
26	397	6	57	168	9	88	6	2
27	391	7	58	159	8	89	4	1
28	381	7	59	151	8			
29	377	7				90	3	1
			60	143	7	91	2	1
30	370	6	61	136	7	92	1	1

TABLE VII.

Shewing the Probabilities of Life at Berlin, formed from the Bills for four Years, from 1752 to 1755, given by Mr. Sufmilch, in his Gottliche Ordnung, vol. ii. page 37, Tables.

Age	Living	Decr.	Age	Living	Decr.	Age	Living	Decr.
0	1427	524	33	361	7	65	112	6
1	903	151	34	354	7	66	106	7
2	752	61				67	99	7
3	691	73	35	347	8	68	92	6
4	618	45	36	339	9	69	86	6
			37	330	10			
5	573	21	38	320	10	70	80	6
6	552	15	39	310	10	71	74	6
7	536	13				72	68	6
8	523	9	40	300	10	73	62	5
9	514	7	41	290	9	74	57	5
			42	281	8			
10	507	5	43	274	7	75	52	5
11	502	4	44	266	7	76	47	5
12	498	4				77	42	5
13	494	4	45	259	7	78	37	5
14	490	4	46	252	7	79	32	4
			47	245	7			
15	486	4	48	238	7	80	28	4
16	482	5	49	231	7	81	24	3
17	477	5				82	21	2
18	472	5	50	224	7	83	19	2
19	467	6	51	217	7	84	17	2
			52	210	7			
20	461	6	53	203	8	85	15	2
21	455	6	54	195	8	86	13	2
22	449	6				87	11	2
23	443	7	55	187	8	88	9	2
24	436	8	56	179	8	89	7	1
			57	171	8			
25	428	9	58	163	9	90	6	1
26	421	9	59	154	9	91	5	1
27	412	9				92	4	1
28	403	9	60	145	8	93	3	1
29	394	9	61	137	7	94	2	1
			62	130	6			
30	385	9	63	124	6			
31	376	8	64	118	6			
32	368	7						

This writer has alſo given the bills of the pariſh of St. Peter's at Berlin, for 24 years; and a table formed from them, agrees nearly with this.

MORTAR, or MORTER, in *Architecture*, a compoſition of lime, ſand, &c. mixed up with water; ſerving, as a cement to bind the ſtones, &c. of a building.

The ancients had a kind of *mortar* ſo very hard and binding, that, after ſo long a duration as to this time, it is next to impoſſible to ſeparate the parts of ſome of their buildings; though there are ſome who aſcribe that exceſſive ſtrength to time, and the influence of certain properties in the air, which is, indeed, found to harden ſome bodies very ſurpriſingly.

The lime uſed in the ancient *mortar* is ſaid to have been burnt from the hardeſt ſtones, or often from fragments of marble.

De Lorme obſerves, that the beſt *mortar* is that made of pozzolana for ſand; adding, that this penetrates black flints, and turns them white. See POZZOLANA, and *Puteolanus* PULVIS.

Mr. Worlidge obſerves, that fine ſand makes weak *mortar*, and that the larger the ſand the ſtronger the *mortar*. He therefore adviſes, that the ſand be waſhed before it is mixed; and adds, that ditty water weakens the *mortar* conſiderably.

Wolfius obſerves, that the ſand ſhould be dry and ſharp, ſo as to prick the hands when rubbed; yet not earthy, ſo as to ſoul the water it is waſhed in.

Vitruvius obſerves, that foſſile ſands dry ſooner than thoſe taken out of rivers. Whence he adds, the latter is fitted for the inſides, the former for the outſides of a building. He ſubjoins, that foſſile ſand, lying long in the air, becomes earthy. Palladio takes notice, that of all ſands white ones are the worſt; and the reaſon is owing to their want of aſperity.

The proportion of lime and ſand in our common *mortar* is extremely variable: Vitruvius preſcribes three parts of pit-ſand, and two of river ſand, to one of lime; but the quantity of ſand here ſeems to be too great.

The proportion moſt commonly uſed in the mixing of lime and ſand is to a buſhel of lime a buſhel and a half of ſand, i. e. two parts of lime and three of ſand; though the common *mortar*, in and about London, has more ſand in it than according to this proportion. The improvement of *mortar* is certainly an object of great importance: and different ſchemes have been ſuggeſted for giving it that degree of durability for which the *mortar* uſed by the ancients is ſo juſtly celebrated.

Mr. Doſſie, in the ſecond volume of the Memoirs of Agriculture, p. 20, &c. gives the following method of making *mortar* impenetrable to moiſture, acquiring great hardneſs and exceedingly durable, ſimilar to that uſed by the ancients, which was diſcovered by a gentleman at Neufchatel: take of unſlaked lime and of fine ſand, in the proportion of one part of the lime to three parts of the ſand, as much as a labourer can well manage at once; and then adding water gradually, mix the whole well together, with a trowel, till it be reduced to the conſiſtence of *mortar*. Apply it immediately, while it is hot, to the purpoſe, either of *mortar*, as a cement to brick or ſtone, or of plaſter for the ſurface of any building. It will then ferment for ſome days in drier places, and afterwards gradually concrete, or ſet, and become hard: but in a moiſt place it will continue ſoft for three weeks or more; though it will, at length, attain a firm conſiſtence, even if water have ſuch acceſs to it ſo as to keep the ſurface wet the whole time. After this it will acquire a ſtone-like hardneſs, and reſiſt all moiſture. The perfection of this *mortar* depends on the ingredients being thoroughly blended together; and the mixture's being applied immediately after to the place where it is wanted. The lime for this *mortar* muſt be made of lime-ſtone, ſhells, or marble; and the ſtronger it is, the better the *mortar* will be: beſides, the lime ſhould be carefully kept from the acceſs of air or wet; otherwiſe, by attracting moiſture, it will loſe proportionably that power of acting on the ſand, by which their incorporation is produced. It is proper alſo to exclude the ſun and wind from the *mortar*, for ſome days after it is applied; that the drying too faſt may not prevent the due continuance of the fermentation, which is neceſſary for the action of the lime on the ſand. When a very great hardneſs and firmneſs are required in this *mortar*, the uſing of ſkimmed milk inſtead of water, either wholly or in part, will produce the deſired effect, and render the *mortar* extremely tenacious and durable.

M. Loriot's *mortar*, the method of making which was announced by order of his majeſty, at Paris, in 1774, is made in the following manner: take one part of brick-duſt finely ſifted, two parts of fine river ſand ſcreened, and as much old ſlaked lime as may be ſufficient to form *mortar* with water, in the uſual method, but ſo wet as to ſerve for the ſlaking of as much powdered quick-lime as amounts to one fourth of the whole quantity of brick-duſt and ſand. When the materials are well mixed, employ

employ the compoſition quickly, as the leaſt delay may render the application of it imperfect or impoſſible. Another method of making this compoſition is to make a mixture of the dry materials; i. e. of the ſand, brick-duſt, and powdered quick-lime, in the preſcribed proportion; which mixture may be put in ſacks, each containing a quantity ſufficient for one or two troughs of *mortar*. The above mentioned old ſlaked lime and water being prepared apart, the mixture is to be made, in the manner of plaſter, at the inſtant when it is wanted, and is to be well chaſed with the trowel. With reſpect to this method, Dr. Higgins obſerves, that M. Loriot corrects the bad quality of the old and effete lime, which conſtitutes the baſis of his *mortar*, and which has regained a part of the fixed air, that had been expelled from it, by the addition of freſh and non-effervefcent lime, ſtiſtly added to it, at the time of uſing the compoſition, which muſt undoubtedly improve the imperfect maſs. And he adds, that when an ignorant artiſt makes *mortar* with whiting inſtead of lime, he can mend it conſiderably by adding lime to it; but his *mortar* will ſtill be defective, in compariſon with the beſt that may be made, by reaſon of the old ſlaked lime or whiting: this on repeated trials he has found to be the true ſtate of the caſe. Dr. Higgins has made a variety of experiments, in conſequence of the modern diſcoveries relating to fixed air, for the purpoſe of improving the *mortar* uſed in our buildings. According to this author, the perfection of lime, prepared for the purpoſe of making *mortar*, conſiſts chiefly in its being totally deprived of its fixed air. On examining ſeveral ſpecimens of the lime commonly uſed in building, he found that it is ſeldom or never ſufficiently burned; for they all effervefced, and yielded more or leſs fixed air, on the addition of an acid, and ſlaked ſlowly, in compariſon with well burned lime. Dr. Higgins alſo relates ſome experiments, which ſhew how very quickly lime imbibes fixed air from the atmoſphere; on its expoſure to which, it by degrees loſes thoſe characters which chiefly diſtinguiſh it from mere lime-ſtone or powdered chalk; by ſoon attracting from thence that very principle, to the abſence of which it owes its uſeful quality as a cement, and which had before been expelled from it in the burning. Hence he concludes, that, as lime owes its excellence to the expulſion of fixed air from it in the burning, it ſhould be uſed as ſoon as poſſible after it is made, and guarded from expoſure to the air, as much as poſſible, before it is uſed. It is no wonder, therefore, he ſays, that the London *mortar* is bad, if the imperfection of it depended ſolely on the badneſs of the lime; ſince the lime employed in it is not only bad when it comes freſh from the kiln, becauſe it is inſufficiently burned and the air has acceſs to it, but becomes worſe before it is uſed, by the diſtance and mode of its conveyance, and when ſlaked is as widely different from good lime, as it is from powdered chalk. For a ſimilar reaſon, every other cauſe, which tends to reſtore to the lime, the fixed air, of which it had been deprived in the burning, muſt deprave it. It muſt receive this kind of injury, for inſtance, from the water, ſo largely uſed, firſt in ſlaking the lime, and afterwards in making it into *mortar*; if that water contains fixed air, from which few waters are perfectly free, and which will greedily be attracted by the lime. The injury ariſing from this cauſe is prevented by the ſubſtitution of lime-water, ſo far as may be practicable or convenient.

From other experiments, made with a view of aſcertaining the beſt relative proportions of lime, ſand, and water, in the making of *mortar*, it appeared, that thoſe ſpecimens were the beſt which contained one part of lime in ſeven of the ſand; for thoſe which contained leſs lime, and were too ſhort whilſt freſh, were more eaſily cut and broke, and were pervious to water; and thoſe which contained more lime, although they were cloſer in grain, did not harden ſo ſoon or to ſo great a degree, even when they eſcaped cracking by lying in the ſhade to dry ſlowly. It appeared farther, that *mortar*, which is to be uſed where it muſt dry quickly, ought to be made as ſtiff as the purpoſe will admit, or, with the ſmalleſt practicable quantity of water, and that *mortar* will not crack, although the lime be uſed in exceſſive quantity, provided it be made ſtiffer, or to a thicker conſiſtence than *mortar* uſually is.

Dr. Higgins has alſo ſhewn, that though the ſetting of *mortar*, as it is called by the workmen, chiefly depends on the exſiccation of it, yet its induration, or its acquiring a ſtony hardneſs, is not cauſed by its drying, as has been ſuppoſed, but is principally owing to its abſorption of fixed air from the atmoſphere, and is promoted in proportion as it acquires this principle; the acceſſion of which is indiſpenſably neceſſary to the induration of calcareous cements. In order to the greateſt induration of *mortar*, therefore, it muſt be ſuffered to dry gently and ſet; the exſiccation muſt be effected by temperate air, and not accelerated by the heat of the ſun or fire; it muſt not be wetted ſoon after it ſets; and afterwards it ought to be protected from wet as much as poſſible, until it is completely indurated; the entry of acidulous gas muſt be prevented as much as poſſible, until the *mortar* is finally placed and quieſcent; and then it muſt be as freely expoſed to the open air, as the work will admit, in order to ſupply acidulous gas, and enable it ſooner to ſuſtain the trials to which *mortar* is expoſed in cementitious buildings, and incruſtations.

Dr. Higgins has alſo inquired into the nature of the beſt ſand or gravel for *mortar*, and into the effects produced by bone aſhes, plaſter powder, charcoal, ſulphur, &c. and he deduces great advantages from the addition of bone aſhes, in various proportions, according to the nature of the work for which the compoſition is intended.

This author deſcribes a water cement or ſtucco, of his own invention, for incruſtations internal and external, exceeding, as he ſays, Portland ſtone in hardneſs, for which he obtained his majeſty's letters patent in 1779. As for the materials of which this is made; driſt ſand, or quarry ſand, or, as it is commonly called, pit ſand, conſiſting chiefly of hard quartoſe flat-faced grains, with ſharp angles, the moſt free from clay, ſalts, and calcareous, gypſeous, or other grains, leſs durable than quartz, containing the ſmalleſt quantity of pyrites, or heavy metallic matter, inſeparable by waſhing, and admitting the leaſt diminution in bulk by waſhing, is to be preferred to any other. The ſand is to be ſifted in ſtreaming clear water, through a ſieve which ſhall give paſſage to all ſuch grains as do not exceed one ſixteenth of an inch in diameter: and the ſtream of water and ſifting are to be ſo regulated, that all the ſand, which is much finer than the Lynn ſand, together with clay and other matter, ſpecifically lighter than ſand, may be waſhed away with the ſtream; whilſt the purer and coarſer ſand, which paſſes through the ſieve, ſubſides in a convenient receptacle, and whilſt the coarſe rubbiſh and ſhingle remain on the ſieve to be rejected. The ſubſiding ſand is then waſhed in clean ſtreaming water, through a finer ſieve, ſo as to be further cleanſed and ſorted into two parcels, a coarſer, which will remain in the ſieve which is to give paſſage to ſuch grains of ſand only as are leſs than one thirtieth of an inch in diameter, and which is to be ſaved apart under the name of coarſe ſand: and a finer, which will paſs through the ſieve and ſubſide in the water, and which is to be ſaved apart under the name of fine ſand. Theſe are to be dried ſeparately, either in the ſun, or on a clean iron plate ſet on a convenient ſurface, in the manner of a ſand heat. Let the lime be choſen, which is ſtone-lime, which heats the moſt in ſlaking, and ſlakes the quickeſt when duly watered; which is the freſheſt made and moſt cloſely kept; which diſſolves in diſtilled vinegar with the leaſt effervefcence, and leaves the ſmalleſt reſidue inſoluble, and in this reſidue the ſmalleſt quantity of clay, gypſum, or martial matter. Let this lime be put in a braſs-wired fine ſieve, to the quantity of fourteen pounds. Let the lime be ſlaked by plunging it in a butt, filled with ſoft water, and raiſing it out quickly and ſuffering it to heat and ſume, and by repeating this plunging and raiſing alternately, and agitating the lime, until it be made to paſs through the ſieve into the water: reject the part of the lime that does not eaſily paſs through the ſieve; and uſe freſh portions of lime, till as many ounces of lime have paſſed through the ſieve, as there are quarts of water in the butt. Let the water, thus impregnated, ſtand in the butt, cloſe covered, until it becomes clear; and, through wooden cocks placed at different heights in the butt, draw off the clear liquor, as faſt and as low as the lime ſubſides, for uſe. This clear liquor is called the cementing liquor. Let fifty-ſix pounds of the foreſaid choſen lime be ſlaked, by gradually ſprinkling on it, and eſpecially on the unſlaked pieces, the cementing liquor, in a cloſe clean place. Let the ſlaked part be immediately ſifted through the fine braſs-wired ſieve. Let the lime which paſſes be uſed inſtantly, or kept in air-tight veſſels, and let the part of the lime which does not paſs through the ſieve be rejected: the other part is called purified lime. Let bone aſh be prepared in the uſual manner by grinding the whiteſt burnt bones; but let it be ſifted to be much finer than the bone aſh commonly ſold for making cupels. Having thus prepared the materials, take fifty-ſix pounds of the coarſe ſand, and forty-two pounds of the fine ſand; mix them on a large plank of hard wood placed horizontally: then ſpread the ſand ſo that it may ſtand to the height of ſix inches, with a flat ſurface on the plank; wet it with the cementing liquor; to the wetted ſand add fourteen pounds of the purified lime, in ſeveral ſucceſſive

ceſſive portions, mixing and beating them up together; then add fourteen pounds of the bone aſh in ſucceſſive portions, mixing and beating all together. This Dr. Higgins calls the water-cement coarſe-grained, which is to be applied in building, pointing, plaſtering, ſtuccoing, &c. obſerving to work it expeditiouſly in all caſes, and in ſtuccoing to lay it on by ſliding the trowel upwards upon it; to wet well the materials uſed with it, or the ground on which it is laid, with the cementing liquor, at the time of laying it on; and to uſe the cementing liquor for moiſtening the cement and facilitating the floating of it.

If a cement of a finer texture be required, take ninety-eight pounds of the fine ſand, wet it with the cementing liquor, and mix it with the purified lime and the bone aſh, as above, with this difference, that fifteen pounds of lime are to be uſed inſtead of fourteen pounds, if the greater part of the ſand be as fine as Lynn ſand. This is called water-cement fine-grained; and is uſed in giving the laſt coating or the finiſh to any work, intended to imitate the finer grained ſtones or ſtucco. For a cheaper and coarſer cement, take of coarſe ſand or ſhingle fifty-ſix pounds, of the foregoing coarſe ſand twenty-eight pounds, and of the finer ſand fourteen pounds; and after mixing and wetting theſe with the cementing liquor, add fourteen pounds, or ſomewhat leſs, of the purified lime, and then as much of the bone aſh, mixing them together. When the cement is required to be white, white ſand, white lime, and the whiteſt bone aſh are to be choſen. Grey ſand, and grey bone aſh, formed of half-burnt bones, are to be choſen to make the cement grey; and any other colour is obtained, either by chuſing coloured ſand, or by the admixture of the neceſſary quantity of coloured talc in powder, or of coloured vitreous or metallic powders, or other durable colouring ingredients, commonly uſed in paint. The water-cement above deſcribed is applicable to forming artificial ſtone, by making alternate layers of the cement and of flint, hard ſtone, or brick, in moulds of the figure of the intended ſtone, and by expoſing the maſſes ſo formed to the open air to harden. When it is required for water fences, two thirds of the bone aſhes are to be omitted, and in its ſtead an equal meaſure of powdered terras is to be uſed. When the cement is required of the fineſt grain, or in a fluid form, ſo that it may be applied with a bruſh, flint powder, or the powder of any quartoſe or hard earthy ſubſtance, may be uſed in the place of ſand, ſo that the powder ſhall not be more than ſix times the weight of the lime, nor leſs than four times its weight. For inſide work, the admixture of hair with the cement is uſeful. Higgins's Exp. and Obſ. on Calcareous Cements, &c. 8vo. 1780, paſſim. See STUCCO.

MORTAR, *mixing and blending of.* M. Felibien obſerves, that the ancient maſons were ſo very ſcrupulous herein, that the Greeks kept ten men conſtantly employed, for a long ſpace of time, to each baſon; this rendered the *mortar* of ſuch prodigious hardneſs, that Vitruvius tells us the pieces of plaſter falling off from old walls ſerved to make tables. The ſame Felibien adds, it is a maxim among old maſons to their labourers, that they ſhould dilute with the ſweat of their brow, i. e. labour it a long time, inſtead of drowning it with water, to have done the ſooner.

Beſides the common *mortar* uſed in laying of ſtones, bricks, &c. there are ſeveral other kinds: as,

MORTAR, *white*, uſed in plaſtering the walls and ceilings, made of ox or cow's hair mixed with lime and water, without any ſand. The common method of making this *mortar* is one buſhel of *hair* to ſix buſhels of lime.

MORTAR *uſed in making water-courſes, ciſterns, &c.* is very hard and durable, being made of lime and hogs-greaſe, ſometimes mixed with the juice of figs, and ſometimes with liquid pitch: and, after application, is waſhed over with linſeed-oil. See BUTON.

For this purpoſe, *mortar* made of terras, pozzolana, tile-duſt, or cinders, is mixed and prepared in the ſame manner as common *mortar*: only that theſe ingredients are mixed with lime, inſtead of ſand, in a due proportion, which is about half and half. The lime ſhould be made of ſhells or *marble*; and in works which are ſometimes dry and ſometimes wet, inſtead of terras, which is very dear, tile-duſt or cinder-duſt may be uſed.

MORTAR *for furnaces, &c.* See LUTE.

MORTAR *for ſun-dials* on walls may be made of lime and ſand, tempered with linſeed-oil; or, for want of that, with ſkimmed milk. This will grow to the hardneſs of a ſtone.

For buildings, one part of waſhed ſoup-aſhes, mixed with another of lime and ſand, make a very durable *mortar*. See CEMENT.

The ſalt-petre workers in France uſing the *mortar* of old buildings for extracting that ſalt, Mr. Petit has thought it worthy a peculiar attention, and has made ſeveral trials, by way of analyſis of *mortar*, to determine whether it really and eſſentially contains nitre in it, or whether it be only ſerviceable in that mixture of ſalts from which nitre is produced.

The common managers of the ſalt-petre works are of opinion, that *mortar* contains in it all the ſalt-petre they procure from it, and that the wood aſhes, and other ſubſtances they uſe with it, only ſerve to abſorb the fat or oily parts, and ſo ſet the ſalt-petre at liberty to ſhoot. This they pretend to affirm upon experience; but they do not conſider that though they can procure ſalt-petre from the rubbiſh or *mortar* without the addition of wood aſhes, yet it is not pure *mortar* that they make their experiments upon, but ſuch as is taken from their own heaps, upon which they always throw all the reſiduum of their former works, and all that liquor which will ſhoot no more cryſtals, but which they call the mother-water of ſalt-petre.

This gentleman, therefore, very properly judged, that to make a regular trial of the *mortar* or rubbiſh alone, he muſt not take it from their ſtores, uſed in the ſalt-petre works, but pick it himſelf from the ruins of old buildings.

The mark the ſalt-petre workers have to know good *mortar* for their purpoſe, is, that it taſtes acrid and ſalt when applied to the tongue; but to this it may be alſo added, that it ought to be of a greyiſh colour, and ſuch as when powdered and ſprinkled upon burning charcoal yields ſome ſparks of fire; and the more ſparks it gives, the better it is for the purpoſe: and another character of the goodneſs is, that theſe well impregnated *mortars* have a certain unctuoſity or fatineſs to the touch, which other kinds have not.

The fineſt of all kinds of *mortar* for ſalt-petre work, is ſuch as is had from the ruins of old buildings in a low ſituation, and out of the way of much ſunſhine; where there has been no great quantity of fire kept, and eſpecially ſuch as has ſerved for the cements of the walls of ſtables, or the like.

Mr. Petit choſe from ſuch a wall twelve pounds of old *mortar*; this he had beat to powder, and poured upon it eighteen pints of water: the whole was then ſet over the fire, and ſtirred from time to time for three or four hours, that the water might be well tinctured from the *mortar*; after this the water was filtered through paper, and was then found to be tinctured to a pale, yellow, tranſparent bitter, and ſomewhat acrid to the taſte.

The impregnation may be made without heat, by only ſtirring the *mortar* about for nine or ten days in cold water, and a quantity of the ſalt taken up will be according to the goodneſs of the *mortar* and the quantity of water employed. The common ſpecific gravity of this liquor to water, is as 32 to 31, or thereabouts. Mr. Petit having procured the tincture of fifty pounds of *mortar*, by ſeveral impregnations, in ſeventy-two French pints of water, evaporated it ſo far till it appeared highly charged with ſaline particles, taſting very acrid and bitter, and being of a brownith red colour; and its ſpecific gravity was in this ſtate to water as 4 to 3, there being more in quantity than about four pints. This was ſtill limpid and of a duſky colour, and was afterwards evaporated over a gentle fire, to the conſiſtence of an extract, which as it cooled became much thicker and firmer, reſembling butter. This being left open to the air, ſoon relented into a liquor of the conſiſtence of a ſyrup: its ſpecific gravity was now to water as 5 to 3; but in leaving it open to the air, it continually attracted freſh humidity, and became leſs ſpecifically heavy. Experiments made with this extract ſucceeded in the following manner.

1. It turned the common blue paper to a fine deep red. The impregnations in water uninſpiſſated do this alſo in different degrees according to their ſtrength.

2. Mixed in equal quantities with ſpirit of nitre and with ſpirit of ſea ſalt, it made no effervеſcence or alteration in either.

3. A leaf of gold being put into the mixture of this impregnation with ſpirit of nitre was immediately diſſolved, and in an hour or two afterwards the liquor was much clearer than before.

A leaf of gold being put into the mixture of this impregnation and ſpirit of ſea ſalt, was in the ſame manner diſſolved in a few minutes. It is generally ſuppoſed indeed that the ſpirit of ſalt alone will diſſolve gold, but there ſeems an error in this founded on the inaccuracy of the preparation of ſuch ſpirit of ſalt; for Meſſrs. Geoffroy and Boulduc have at different times produced before the French Academy ſpirit of ſalt carefully prepared by themſelves, which would not at all diſſolve gold, not even with the aſſiſtance of heat; even ſuch ſpirit of ſalt would however be made to diſſolve gold, by

mixing

mixing this impregnation with it: so that it has the power of diſſolving gold in a great degree.

4. A leaf of ſilver being diſſolved in ſpirit of nitre, and this impregnation of *mortar* added to the ſolution, the whole became turbid, and a precipitation happened, part of the matter being thrown to the bottom, and part remaining ſuſpended in form of a white cloud, which kept its place without falling.

5. The impregnation being mixed in equal quantities with oil of vitriol formed a coagulum, and made a great effervescence, with copious red vapours, and a ſtrong ſmell of aqua fortis; and theſe vapours appeared at any time, on ſtirring the mixture for ſeveral days together. If a larger quantity of oil of vitriol be added to this coagulum, it all becomes fluid, but ferments violently; and finally there will be a white matter precipitated to the bottom of the clear liquor; and if a leaf of gold be brought near this mixture it will be diſſolved even by the vapour which exhales from it. Spirit of nitre has no effect upon this mixture, either in its ſtate of a coagulum, or when reduced by more oil of vitriol into a clear liquor; but the volatile ſpirit of urine ferments violently, without the leaſt heat with it.

6. Oil of tartar *per deliquium* being added to the impregnation, the liquors would not readily mix, but remained ſeparate, the impregnation ſinking to the bottom; but on ſtirring them thoroughly together, they finally were made to unite into a white ſubſtance like butter, with a ſtrong urinous ſmell. If a ſmall quantity of corroſive ſublimate be added to this mixture, the urinous ſmell ceaſes; and if oil of vitriol be added, there is a violent fermentation occaſioned; and, in fine, a large quantity of precipitate.

7. This impregnation of *mortar* being mixed with an equal quantity of a ſolution of corroſive ſublimate, there is nothing remarkable produced, though the mixture be ever ſo much ſhaken; but if a little oil of tartar *per deliquium* be added to this, the mixture becomes turbid, and, on ſtirring all together for ſome time, it becomes white and thick like butter. If to this, more corroſive ſublimate be added in ſolution, it becomes orange-coloured; and, on more ſtirring, this becomes again white; and finally gives a white precipitate at the bottom of a tranſparent liquor.

8. If inſtead of oil of tartar an equal quantity of lime-water be added, this in the ſame manner gives an urinous ſmell, and the whole difference is, that the mixture will not become thick with this, as it will with oil of tartar.

9. The impregnation of *mortar* produced the ſame coagulum, on mixing with ſpirit of urine, that it did with oil of tartar *per deliquium*; but it made no coagulation with ſpirit of ſal armoniac with lime; the occaſion of this difference is, that the ſpirit of urine contains a great deal of volatile ſalt, and the other but little. It is a common error to ſuppoſe that the ſpirit of ſal armoniac, which is moſt pungent, contains the greateſt quantity of ſalt; but this is not the caſe, for the ſpirit made with lime is much more pungent than that with ſalt of tartar, though the laſt is well known to contain a much larger portion of ſaline particles.

10. If a piece of paper or linen be wetted in this impregnation, and afterwards dried, it takes fire very violently, and ſparkles with the ſame violence as if it was impregnated with ſalt-petre.

From theſe experiments it is abundantly proved, that the impregnation of *mortar* contains a large quantity of a ſaline and nitrous armoniac ſalt; for a diſſolution of ſal armoniac and ſpirit of nitre mixed together are found to produce all the changes in the different bodies before named, that the impregnation does. On the whole, though it has been ſuppoſed by Mr. Tournefort, and others, that *mortar* contained ſalt-petre, ſea ſalt, and a fixed alkali; yet there does not appear any proof of its containing any of theſe ſalts; no fixed alkali can ever be ſeparated from the impregnation of it; and though the linen or paper wetted in the impregnation of it ſparkled when on fire, yet it is not nitre, but merely a nitrous ſal armoniac, which occaſions that phenomenon. The ſame effect is produced, if the linen or paper be wetted with a mixture of ſpirit of urine and ſpirit of nitre. And the ſeveral experiments before recited prove, that there is in *mortar* a ſpirit of nitre and a ſpirit of ſea ſalt, which, with the volatile urinous ſalts, form a nitrous or a ſaline armoniac. Mem. Acad. Scienc. Par. 1734.

MORTAR, in *Chemiſtry*, is an inſtrument, very uſeful for the diviſion of bodies, partly by percuſſion, and partly by grinding. They have the form of an inverted bell; and are made of all ſizes and materials, as marble, copper, glaſs, iron, grit-ſtone, and agate. The matter intended to be pounded is to be put into them, and there ſtruck and bruiſed by a long inſtrument called a *peſtle*. This, when large and heavy, ought to be ſuſpended by a cord or chain, fixed to a moveable pole, placed horizontally above the *mortar*, which conſiderably relieves the operator, becauſe its elaſticity aſſiſts the raiſing of the peſtle.

MORTAR-PIECE, in the *Military Art*, a ſhort piece of ordnance, thick and wide, proper for throwing bombs, carcaſes, ſhells, ſtones, bags filled with grape-ſhot, &c. The uſe of *mortars* is thought to be older than that of CANNON: for they were employed in the wars of Italy, to throw balls of red-hot iron and ſtones, long before the invention of ſhells. It is generally believed that the Germans were the firſt inventors. See BOMB.

The method of throwing red-hot balls out of *mortars* was firſt put in practice at the ſiege of Straſſund in 1675, by the elector of Brandenburg; though ſome ſay, in 1633, at the ſiege of Bremen.

With us, *mortars*, which are made either of braſs or iron, are chiefly diſtinguiſhed by the diameter of the bore; e. g. a 13 inch *mortar* is that the diameter of whoſe bore is 13 inches. There are ſome of 10 and 8 inch diameters; and ſome of a ſmaller ſort, as cohorns of 4.6 inches, and royals of 5.8 inches. The principal parts of a *mortar* (*Tab.* II. *Gunnery*, *fig.* 12.) are, on the outſide, the chaſe A, the reinforce B, the breech C, and the trunnions D: in the inſide, the part where the ſhell is lodged, which is the bore; and the part where the powder is lodged, called the chamber. This is uſually made cylindrical, all but the baſe, which they make hemiſpherical; though ſome of the later engineers prefer ſpherical chambers; as the ſurfaces of thoſe, being leſs, under equal capacities, make leſs reſiſtance to the gunpowder. Hiſt. Acad. Scienc. 1740.

But this propoſition ſeems doubtful. By ſome experiments, made before the Royal Society, in 1742, it appeared, that the longeſt cylindrical chambers of the ſame capacity threw the ball fartheſt; which may give ground to ſuſpect that a long cylinder might be a better figure for the chamber of a *mortar* than a ſphere of equal capacity. See GUNNERY.

The figure of the chamber is made variouſly by different nations: the Spaniards uſe chiefly the ſpherical; the French, Germans, and Dutch, the conic, cylindric, and the concave or bottled; the Portugueſe, the parabolic, invented by count de Lippe Buckeburg; and the Engliſh make them in the form of the ſruſtum of a cone. However, the concave and cylindric chambers are reckoned the beſt. See CHAMBER.

The thickneſs of the *mortar* about the chamber is to be much greater than about the chaſe; by reaſon the gunpowder makes a much greater effort about the chamber than elſewhere: the diameter of the chamber is alſo to be much leſs than that of the bore; by reaſon bombs, ſhells, &c. are much lighter than the bullets of equal diameters; and, conſequently, leſs powder ſuffices.

MORTAR, *cochorn*, a ſmall kind of *mortar*, invented by the famous engineer baron Cochorn, to throw ſmall ſhells or grenades. Theſe *mortars* are commonly fixed, to the number of a dozen, to a block of oak, at the elevation of 45°.

MORTARS, *fire-lock*, or *bombards*, are ſmall *mortars* fixed at the end of a fire-lock: they are loaded as all common fire-locks are; and the grenade, placed in the *mortar* at the end of the barrel, is diſcharged by a flint lock; and to prevent the recoil from hurting the bombardier, the bombard reſts on a kind of halberd made for that purpoſe. They were firſt invented by major-general Siebach, a German, about the year 1740.

MORTARS, *hand*, were frequently uſed before the invention of cochorns. They were fixed at the end of a ſtaff of 4½ feet long, the other end being ſhod with iron to ſtick in the ground; while the bombardier with one hand elevates it at pleaſure, he with the other hand fires.

MORTARS, *land*, are thoſe uſed in ſieges, and of late in battles, mounted on beds, made of ſolid timber, conſiſting generally of four pieces, thoſe of the royal and cochorn excepted, which are but one ſingle block; and both *mortar* and BED are tranſported on block-carriages. There is likewiſe a kind of land-*mortars*, mounted on travelling carriages, invented by count Buckeburg, which may be elevated to any degree; whereas our's are fixed to an angle of 45 degrees, and firmly laſhed with ropes. The following table ſhews the weight of land-*mortars* and ſhells; together with the quantity of powder the chambers hold when full; the weight of the ſhells, and powder for loading them.

Diameter of *mortars*.	13-inch.	10-inch.	8-inch.	8-inch royal.	4·6-inch cochorn.
	C. qr. lb.	C. qr. lb.	C. qr. lb.	C. qr. lb.	C. qr. lb.
Mortar's weight.	25 0 0	12 2 18	4 0 10	1 1 0	0 3 0
Shell's weight.	3 2 21	0 2 23	0 1 13	0 0 22	0 0 7
	lb. oz. gr.	lb. oz. gr.	lb. oz. gr.	lb. oz. gr.	lb. oz. gr.
Shell's cont. of powder.	9 4 8	2 11 12	0 5 8	0 1 8	0 0 9
Chamber's cont. of pow.	9 5 8	4 0 0	1 0 0	0 0 8	0 0 1

MORTAR, *partridge*, is a common *mortar* surrounded by thirteen other little *mortars*, bored round its circumference, in the body of its metal. The central *mortar* is loaded with a fhell, and the other with grenades. The vent of the large *mortar* being fired, communicates its fire to the fmall ones; fo that both fhell and grenades go off at once. The French ufed them in the war of 1701; and more efpecially at the fiege of Lifle, in 1708, and at the defence of Bouchain, in 1702.

MORTARS, *fea*, are thofe which are fixed in the bomb-veffels, for bombarding of places by fea: and as they are generally fired at a much greater diftance than that which is required by land, they are made fomewhat longer and much heavier than the land-*mortars*.

The following table exhibits the weight of the fea-*mortars* and fhells, and alfo of their full charges.

Nature of the *mortar*.	Powder contained in the chamber, when full.	Weight of the *mortar*.	Wt. of the fhell, when fixed.	Wt. of gunpowder contained in the fhell.
	lb. oz.	C. qr. lb.	lb.	lb. oz.
10-inch MORTARS.	12 0	15 2 26	-	-
13-inch *mortar*.	20 0	81 2 1	196	7 0
10-inch *mortar*.	12 0	34 2 13	93	-

Mr. Muller very juftly obferves, that the breech of our 13-inch fea-*mortars* is loaded with an unneceffary weight of metal. The chamber thereof contains 32 pounds of powder, and, at the fame time, they are never charged with more than 12 or 15 pounds, becaufe the bomb-veffel is unable to bear the violent fhock of their full charge. Thus the action of powder is diminifhed by the vacancy left in the chamber, which is never above half filled. As a charge of 12 or 15 pounds of powder at moft is therefore fufficient, it is evidently proved, by the theory of powder, that this will produce the greateft effect when difcharged from a *mortar* with a cylindrical chamber. He alfo proves, by a variety of experiments made by captain Defaguliers and himfelf, that the conical chamber, now ufed, is conftderably inferior to the cylindrical one, with the laft charge of powder. To facilitate the ufe of the *mortar*, it is placed in a folid carriage of timber, called the BED, whofe different parts are ftrongly bolted together. By means of this it is firmly fecured in its fituation, fo that the explofion of the powder may not alter its direction. In the middle of the upper fide of this carriage are two femicircular notches, to receive the TRUNNIONS; over thefe are fixed two very ftrong bands of iron, called the CAP-*fquares*, the middle of which is bent into a femicircle, to embrace the trunnions, and keep them faft in the *mortar*-bed. The cap-fquares are confined to the timber-work by ftrong pins of iron, called the eye-bolts, into whofe upper ends are driven the keys, chained beneath them. On the fore part of the bed a piece of timber is placed tranfverfely, upon which refts the belly of the *mortar*, or that part which contains the chamber. Thefe beds are placed upon very ftrong frames of timber, which are fixed in the bomb-ketch. They are fecurely attached to the frames, by means of a ftrong bolt of iron, called the PINTLE, paffing perpendicularly through both, and afterwards through one of the beams of the veffel. Thus the pintle, which paffes through the hole in the centre, ferves as an axis to the bed; fo that the *mortar* may be turned about horizontally as occafion requires.

MORTARS, *ftone*, ferve to throw ftones into the enemy's works, when near at hand; fuch as from the town into the trenches in the covert-way, or upon the glacis; and from thefe trenches into the town. The bore is terminated by two quadrants of a circle, terminated by the reinforce and lines drawn from the ends of the cylinder, made to lodge the tompions parallel to the axis of the *mortar*. The bottom of the conic chamber is terminated by an arc of 60 degrees, and the round part of the outfide is a femicircle. The weight of a 13-inch ftone-*mortar* is 10 C. 3qr. 4 lb. and the chamber contains three pounds of powder. Muller's Artillery, part iii. p. 116, &c.

MORTAR, *to charge*, or *load in*, the proper quantity of gunpowder is put into the chamber; and, if there be any vacant fpace, they fill it up with hay; fome chufe a wooden plug to cover this they lay a turf, fome a wooden tampion, fitted to the bore of the piece; and laftly the bomb; taking care that the fufe be in the axis thereof, and the orifice be turned from the muzzle of the piece: what fpace remains, is to be filled up with hay, ftraw, turf, &c. fo as the load may not be exploded without the utmoft violence.

The quantity of gunpowder to be ufed, is found by dividing the weight of the bomb by 30; though this rule is not always to be ftrictly obferved.

When the proper quantity of powder, neceffary to charge a fea-*mortar*, is put into the chamber, it is covered with a wad, well beat down with the rammer. After this the fixed fhell is placed upon the wad, as near the middle of the *mortar* as poffible, with the fufe-hole uppermoft, and another wad preffed down clofe upon it, fo as to keep the fhell firm in its pofition. The officer then points the *mortar*, according to the propofed inclination.—When the *mortar* is thus fixed, the fufe is opened; the priming-iron is alfo thruft into the touch-hole of the *mortar*, to clear it, after which it it is primed with the fineft powder. This done, two of the matroffes, or failors, taking each one of the matches, the firft lights the fufe, and the other fires the *mortar*. The bomb, thrown out by the explofion of the powder, is carried to the place intended: and the fufe, which ought to be exhaufted at the inftant of the fhell's falling, inflames the powder contained in it, and burfts the fhell in fplinters; which, flying off circularly, occafion incredible mifchief wherefoever they reach.

If the fervice of *mortars* fhould render it neceffary to ufe pound-fhots, 200 of them, with a wooden bottom, are to be put into the 13 inch *mortar*, and a quantity of powder, not exceeding five pounds; and 100 of the above fhot with 2½ pounds of powder, for the 10-inch *mortar*, or three pounds at moft.

MORTAR, *to elevate the*, fo as its axis may make any given angle with the horizon; they apply the artillery-level, or gunners quadrant: the ufe whereof fee under the articles LEVEL and QUADRANT.

An elevation of 70 or 80 degrees is what is commonly chofen for rendering *mortars* moft ferviceable in caffing fhells into towns, forts, &c. though the greateft range be at 45 degrees.

All the Engliſh *mortars* are fixed to an angle of 45 degrees, and laſhed ſtrongly with ropes at that elevation. Although, in a ſiege, there is only one caſe, in which ſhells ſhould be thrown with an angle of 45 degrees; that is, when the battery is ſo far off that they cannot otherwiſe reach the works: for when ſhells are thrown out of the trenches into the works of a fortification, or from the town into the trenches, they ſhould have as little elevation as poſſible, in order to roll along, and not bury themſelves; whereby the damage they do, and the terror they occaſion, are much greater than if they ſink into the ground. On the contrary, when ſhells are thrown upon magazines, or any other buildings, with an intention to deſtroy them, the *mortars* ſhould be elevated as high as poſſible, that the ſhells may acquire a greater force in their fall, and conſequently do greater execution.

If all *mortar-pieces* were, as they ought to be, exactly ſimilar, and their requiſites of powder as the cubes of the diameters of their ſeveral bores; and if their ſhells, bombs, carcaſes, &c. were alſo ſimilar; then, computing like with like, their ranges on the plane of the horizon, under the ſame degree of elevation, would be equal; and conſequently one piece being well proved, i. e. the range of the grenado, bomb, carcaſe, &c. being found to any degree of elevation, the whole work of the *mortar-pieces* would become very eaſy and exact.

But ſince *mortars* are not thus ſimilar, it is required, that the range of the piece, at ſome known degree of elevation, be accurately found by meaſuring; and from hence all the other ranges may be determined.

Thus, to find the range of the piece at any other elevation required: ſay, as the ſine of double the angle under which the experiment was made, is to the ſine of double the angle propoſed, ſo is the range known to the range required.

Suppoſe, for inſtance, it be found, that the range of a piece, elevated to 30°, is 2000 yards: to find the range of the ſame piece with the ſame charge, when elevated to 45°; take the ſign of 60°, the double of 30°, and make it the firſt term of the rule of three; the ſecond term muſt be the ſign of 90°, the double of 45°; and the third the given range 2000: the fourth term will be 2310, the range of the piece at 45°. If the elevation be greater than 45°, inſtead of doubling it, take the ſine of double its complement to 90°. As ſuppoſe the elevation of a piece be 50°, take the ſign of 80°, the double of 40°. Again, if a determinate diſtance to which a ſhot is to be caſt, be given, and the angle of elevation, to produce that effect be required; the range known muſt be the firſt

first term in the rule of three, which suppose 2000 yards; the range proposed, which we suppose 1600 yards, the second term; and the sine of 60 double of the elevation for the range of 2000 yards, the third term. The fourth term will be found the sine of 43° 52', whose half 21° 56', is the angle of elevation the piece must have, to produce the desired effect. And if 21° 56', be taken from 90°, you will have 68° 4', for the other elevation of the piece, with which the same effect will likewise be produced.

Note, to avoid the trouble of finding sines of double the angles of proposed elevations, Galileo and Torricelli give us the following table, wherein the signs of the angles sought are had by inspection.

Degrees.	Degrees.	Ranges.	Degrees.	Degrees.	Ranges.
90	0	0	0	0	0
89	1	349	66	24	7431
88	2	698	65	25	7660
87	3	1045	64	26	7880
86	4	1392	63	27	8090
85	5	1736	62	28	8290
84	6	2079	61	29	8480
83	7	2419	60	30	8660
82	8	2756	59	31	8829
81	9	3090	58	32	8988
80	10	3420	57	33	9135
79	11	3746	56	34	9272
78	12	4067	55	35	9397
77	13	4384	54	36	9511
76	14	4695	53	37	9613
75	15	5000	52	38	9703
74	16	5299	51	39	9781
73	17	5592	50	40	9841
72	18	5870	49	41	9903
71	19	6157	48	42	9945
70	20	6428	47	43	9976
69	21	6691	46	44	9994
68	22	6947	45	45	10000
67	23	7193			

The use of the table is obvious. Suppose, for instance, it be known by experiment, that a *mortar* elevated 15°, charged with three pounds of powder, will throw a bomb to the distance of 350 fathom; and it be required, with the same charge, to throw a bomb 100 fathom farther: seek in the table the number answering to 15 degrees, and you will find it 5000. Then as 350 is to 450, so is 5000 to a fourth number, which is 6428. Find this number, or the nearest to it, in the table; and against it you will find 20°, or 70°; the proper angles of elevation. See RANGE.

For the weight, dimensions, &c. of the bombs, &c. to be cast out of *mortars*, and the lines of their projection, see BOMB and PROJECTILE.

MORTARIOLUM, a word applied by different writers to different things, from their resemblance to a mortar in shape. The chemists express by this name a small mould made for fashioning their copels; and anatomists call the sockets of the teeth, the *mortariola* of the jaws.

MORTERE, in *English Antiquity*, a *mortarium*, a light or taper set in churches, to burn over the graves or shrines of the dead.

MORTGAGE, in *Law*, an obligation, whereby lands or tenements of a debtor are pawned or bound over to the creditor for money, or other effects borrowed; peremptorily to be the creditor's for ever, if the money be not repaid at the day agreed on.

In this sense, *mortgage*, in the common law, amounts to much the same with HYPOTHECA, in the civil law.

The creditor holding such land, on such agreement, is in the mean time called *tenant in mortgage*. He who lays the pawn or gage, is called the *mortgager*; and he that takes it, the *mortgagee*. If a *mortgage* include excessive usury, it is prohibited by a statute 37 Hen. VIII.

The French sometimes use the word *mortgage* in the same sense in their language, where it stands in contradistinction to a simple contract, which does not carry with it the mean profits, and which they call *vif-gage, life-pledge*.

Glanville defines *mortgage, mortuum vadium*, to be that *cujus fructus vel redditus interim percepti in nulle se acquietant*. Thus, it is called *mortgage*, i. e. *dead gage*, of *mort, death*, and *gage, pledge*; because whatever profit it yields, yet it redeems not itself by yielding such profit, except the whole sum borrowed be likewise paid at the day; the *mortgager* being by covenant to receive the profits till default of payment. Others hold it called *mortgage*, because, if the money be not paid at the day, the land *mortuur, dies*, to the debtor, and is forfeited to the creditor.

Thus if a man borrows of another a specific sum (e. g. 200 *l.*) and grants him an estate in fee, on condition that if he, the mortgager, shall repay the mortgagee the said sum of 200 *l.* on a certain day mentioned in the deed, that then the mortgagee may re-enter on the estate so granted in pledge; or, as is now the more usual way, that the mortgagee shall re-convey the estate to the mortgager; in this case the land, which is so put in pledge, is, by law, in case of non-payment at the time limited, for ever dead and gone from the mortgager; and the mortgagee's estate in the lands is then no longer conditional, but absolute. But as it was formerly a doubt, whether, by taking such estate in fee, it did not become liable to the wife's dower, and other incumbrances of the mortgagee (though that doubt has been long ago over-ruled by our courts of equity), it, therefore, became usual to grant only a long term of years, by way of *mortgage*; with condition to be void on repayment of the *mortgage*-money; which course has been since continued, principally because, on the death of the mortgagee, such term becomes vested in his personal representatives, who alone are intitled in equity to receive the money lent, of whatever nature the *mortgage* may happen to be. As soon as the estate is created, the mortgagee may immediately enter on the lands; but is liable to be dispossessed, upon performance of the condition by payment of the *mortgage*-money at the day limited. And, therefore, the usual way is to agree that the mortgager shall hold the land, till the day assigned for payment; when, in case of failure, whereby the estate becomes absolute, the mortgagee may enter upon it and take possession, without any possibility, at *law*, of being afterwards evicted by the mortgager, to whom the land is now for ever dead. But here again the courts of equity interpose: and, though a *mortgage* be thus forfeited, and the estate absolutely vested in the mortgagee, at the common law, yet they will consider the real value of the tenements compared with the sum borrowed. And, if the estate be of greater value than the sum lent thereon, they will allow the mortgager at any reasonable time to recall or redeem his estate; paying to the mortgagee his principal, interest, and expences: for, otherwise, in strictness of law, an estate worth 1000 *l.* might be forfeited for non-payment of 100 *l.* or a less sum. This reasonable advantage, allowed to mortgagers, is called the *equity of* REDEMPTION. And this enables a mortgager to call on the mortgagee, who has possession of his estate, to deliver it back and account for the rents and profits received, on payment of his whole debt and interest; thereby turning the *mortuum* into a kind of *vivum vadium*. But, on the other hand, the mortgagee may either compel the sale of the estate, in order to get the whole of his money immediately, or else call upon the mortgager to redeem his estate presently, or in default thereof to be for ever FORECLOSED from redeeming the same; i. e. to lose his equity of redemption without possibility of recall. And also in some cases of fraudulent *mortgages*, specified in 4 and 5 W. & M. cap. 16, the fraudulent mortgager forfeits all equity of redemption whatsoever. It is not, however, usual for mortgagees to take possession of the mortgaged estate, unless where the security is precarious or small; or where the mortgager neglects even the payment of interest. When the mortgagee is frequently obliged to bring an ejectment, and take the land into his own hands, it is in the nature of a pledge, or the *pignus* of the Roman law: whereas, while it remains in the hands of the mortgager, it more resembles their HYPOTHECA, which was where the possession of the thing pledged remained with the debtor. But, by 7 Geo. II. cap. 20. after payment or tender by the mortgager of principal, interest, and costs, the mortgagee can maintain no ejectment; but may be compelled to re-assign his securities. Blackst. Comm. book ii. cap. 10.

The civil lawyers distinguish twenty-six different kinds of *toxic mortgages*.

MORTIER, a badge or ensign of dignity, borne by the chancellors, and great presidents, of the parliaments of Paris. That borne by the chancellor is a piece of cloth of gold, lined and turned up with ermin; that of the first president is a piece of velvet edged with a gold lace; that of the other presidents is only a piece of gold lace.

They formerly bore it on their head, but now in their hands, except in grand ceremonies, as at the entry of a king. Hence the denomination, *presidents à mortier*.

MORTIFICATION, *necrosis*, in *Medicine*, a total extinction of the natural heat of the body, or a part thereof.

Some define *mortification* a disease, wherein the natural juices of any part quite lose their proper motion; and by that means fall into a fermentative one, and corrupt and destroy the texture of the part.

The indications of cure are, to confirm the strength or to raise and maintain the vital heat a little above the natural healthy degree, to prevent the ingress of the putrid matter

matter into the veins, and to check and remove the putrefaction that is formed. The bark is the only known ſpecific; however the uſe of it is not to be indiſcriminately admitted in every caſe: in habits that are lax and feeble, no objections can occur to prohibit it; but in inflammatory habits, nitre or mineral acids ſhould accompany it if given, and great caution is neceſſary before it is preſcribed. If the inflammation is conſiderable, the mineral acids are more proper than the bark. If the pulſe is ſtrong, large, and hard, and the extremities of the body are warm, the urine red and high-coloured, the circulation is ſufficiently ſtrong, and need not be increaſed: but if the pulſe is weak, and the ſymptoms indicate a defective vital heat, cordials will be neceſſary. Mr. Pott obſerves, that a *mortification* proceeds from a circulation that is too rapid or too languid: in the firſt caſe, bleeding and diluters, and in the ſecond, cordials and invigorating medicines muſt be preſcribed. If a putrid SCURVY affects the patient, adminiſter ſuch medicines as will oppoſe it: or, if any other diſorder attends, the proper means muſt be made uſe of by which it may moſt ſpeedily be removed.

There are two ſpecies, or rather degrees, of *mortification*; the one called a GANGRENE, which is a *mortification* in its firſt or beginning ſtate; the other, a *ſphacelus*, which is a perfect or finiſhed *mortification*.

In caſes of a perfect *ſphacelus*, or *mortification*, where the parts are become abſolutely dead, and wholly without ſenſe, and ſoft, ſo as to retain the impreſſions of one's fingers ends, and are plainly fetid and corrupted, all the medicines in the world will be ineffectual to reſtore the part to its life and ſenſe again; and all that remains to be done, is the one miſerable remedy of preſerving the reſt of the body, by cutting off that part, to prevent the *mortification* from ſpreading farther. A different method is to be taken, however, in this operation, according to the degree of the ſymptoms, and the nature of the part affected.

If only ſome extremity of the foot, tarſus, metatarſus, or inſtep, or only the bare ſkin and fat are *ſphacelated*, which is ſometimes the caſe, the whole foot is not to be amputated in that caſe, but preſerving the limb entire, the ſurgeon is only to remove that part which is vitiated; and that is frequently beſt of all done by ſuppuration, or if not to be effected by that means, may be attempted by the cauſtic. When it is to be done by ſuppuration, that is to be brought on as faſt as poſſible, and when it is done, the cruſt or eſchar of the ulcer is to be ſeparated from the ſound part with proper caution.

To haſten effectually a ſuppuration in theſe caſes, nothing is ſo ſerviceable as the making numerous long and deep ſcarifications near the ſound parts; and afterwards the inciſed parts are to be well anointed with the common digeſtive ointment, and after that treated with the balſamic cataplaſms and fomentations, in common uſe on the like occaſions.

A fomentation, alſo very ſerviceable in theſe caſes, is made by mixing, in a quart of a decoction of ſcordium, or of barley-water, vinegar of rue ſix ounces, ſpirit of wine with Venice treacle four ounces, and an ounce, or two ounces of common ſalt: this is to be applied hot with compreſſes to the part, and frequently repeated, till it is ſeen that the diſorder ſpreads no farther; which is known to be the caſe, when we ſee the tumor of the vitiated parts ſubſide, and the edges of the ſound parts become tumid all round; and on the ſecond or third day after this a ſuppuration is uſually formed, and the ſound parts gradually become ſeparated from the vitiated. After this, to ſoften and promote a ſpeedy ſeparation of the eſchar, the following cataplaſm is always found highly ſerviceable. Take of ſcordium two handfuls, mallows, marſh-mallows, and henbane, of each one handful; lavender-flowers half a handful; let theſe be boiled to the conſiſtence of a cataplaſm in vinegar, or oxycrate, and when in that ſtate add to them three ounces of flour of linſeed, one ounce of linſeed-oil, and two ounces of ſal ammoniac. This is to be applied warm over the whole, and retained in a proper degree of heat as long as ſhall be found neceſſary, by means of a brick boiled in water, and applied wrapped in a linen-cloth, or ſome other like means. After theſe methods have been uſed, and the whole ſurrounding ſkin is gently tumefied with redneſs, a cruſt, or eſchar, is then formed by degrees, and the ſound fleſh begins to ſeparate from the reſt: by this we know that the diſorder has done ſpreading, and that an entire ſeparation of the vitiated parts will very ſhortly follow.

When this ſeparation ſhews itſelf beginning, it muſt be promoted as much as poſſible, by dreſſing the part with the common digeſtive, either alone, or mixed with Venice treacle, which muſt be retained on between the ſound and dead parts. To make way for this, it is ſometimes neceſſary to divide them a little by the lancet; and when that is done, and the *dreſſing* has been applied, the before deſcribed cataplaſm ſhould be again laid on warm; and in all the ſucceeding dreſſings, whatever is found looſe of the dead part muſt be carefully removed. And if it be neceſſary, from the adheſion of the vitiated parts to the ſound, to uſe the ſciſſars, or ſcalpel, to divide them, this is always to be done with very little, either of pain or of danger; it will then be proper to dreſs the part with the digeſtive, and a plaiſter of diachylon, or the like, over it, till the corrupted parts are entirely caſt off, and the ulcer appears perfectly well cleanſed, and then the cure is eaſily perfected in the common way.

This is the gentler, and more common method; ſome ſurgeons, however, from the tediouſneſs of it, have recourſe directly, in theſe caſes, to the cauſtic. They anoint either the edges only, or elſe the whole of the corrupted part, every day, with butter of antimony, or the cauſtic ſtone liquefied, till the living parts are ſurrounded by a *ſort* of eſchar, applying afterwards the cataplaſms before deſcribed, or others of the ſame kind, to prevent the diſorder from ſpreading; and to make the corrupted parts ſeparate from the ſound, the corroſive lixivium of Boerhaave is greatly in repute, and much uſed on theſe occaſions. It is made of three ounces of very ſtrong quick-lime, mixed with nine ounces of pot-aſhes, firſt ground ſeparately to powder, and afterwards mixed, adding a little water; they are then to be put into a glaſs veſſel, and ſet in a cellar to run per deliquium.

As ſoon as they are found to become fluid, the matter muſt be put into a filtre of coarſe paper, and the clear liquor that runs through muſt be kept for uſe. It is to be uſed by dipping a bruſh or feather into it, and rubbing it over the part affected once or twice a day; or fine linen rags may be wetted with it, and applied all over the part; not forgetting, however, at the ſame time, the uſe of the before ordered cataplaſm: this application is to be continued till the corrupted part begins to caſt off in cruſts or ſcales; and when this is the caſe, it muſt be dreſſed with the common digeſtive, and when perfectly cleanſed, healed with a vulnerary balſam.

Another cauſtic, highly commended by Belloſte in theſe caſes, is made by diſſolving one part of crude mercury in two parts, either of ſpirit of nitre, or of aqua fortis. This is to be rubbed over the parts as the former, and will occaſion a ſpeedy ſeparation. Several great authors, however, adviſe the uſing the knife and actual cautery in theſe caſes, dividing and burning down to the ſound parts; but the cruelty of this method, and the pain, and ſometimes danger that attend it, make the methods of cure by ſuppuratives, and mild cauſtics, much to be preferred: indeed, the ſurgeons in general are not now ſo fond of calling in the actual cautery as formerly.

Finally, when the *ſphacelus* is ſo deeply affixed in any part of the upper or lower extremity, that it has penetrated through the muſcles as far as the bone, and has either reſiſted the force of all medicines, or the proper time for the applying them has been neglected; in this caſe, to preſerve the reſt of the body, the injured part muſt be amputated. Heiſter's Surgery, p. 217.

MORTIFICATION, in *Religion*, any ſevere penance obſerved on a religious account. How ancient and how univerſal the practice of it has been, and for what reaſons obſerved, ſee FAST.

MORTIS *cauſa donatio*. See DONATION.

MORTISE, or MORTOISE, in *Carpentry*, &c. a kind of joint, wherein a hole or inciſion, of a certain depth, is made in the thickneſs of a piece of wood, which is to receive another piece, called a *tenon*.

The word is originally French, *mortoiſe*, which ſignifies the ſame; and which Borel farther derives from *mordere*, *to bite*.

MORTMAIN, in *Law*, the alienation of lands and tenements to any guild, corporation, or fraternity, ſole or aggregate, eccleſiaſtical or temporal, and their ſucceſſors; as biſhops, parſons, vicars, &c. which may not be done without the king's licence, and that of the lord of the manor; or that of the king alone, if it be immediately holden of him. Stat. 7 & 8 W. III. cap. 37. And by ſtat. 9 Geo. II. cap. 36, no manors, lands, or money to be laid out in lands, are to be given for charitable uſes, unleſs by deed executed twelve months before the death of the donor.

The word literally denotes *dead-hand*; being a compound of *mort*, *dead*, and *main*, *hand*. Accordingly Hottoman defines *mortmain* to be the poſſeſſion of thoſe who are, as it were, immortal, becauſe they never ceaſe to have heirs; ſo that the eſtate never reverts to its firſt lord; *main*, *hand*, being uſed for poſſeſſion; and *mort*, *dead*, by antiphraſis, for immortal. Others aſſign the reaſon of the name thus: that the ſervices and other profits due for ſuch lands, ſhould not, without ſuch licence, come into a dead hand *(mainmort)*, i. e. into a hand as it were dead, that is, ſo dedicated to God, or pious uſes, as to

be different from other lands, tenements, or hereditaments, and never to revert to the donor, or any temporal or common use.

Purchases in *mortmain* were usually made by ecclesiastical bodies, the members of which (being professed) were reckoned dead persons in law; and, therefore, land holden by them might with great propriety be said to be held *in mortua manu*.

In order to understand the rise and progress of the statutes of *mortmain*, it is necessary to observe, that by the common law any man might dispose of his lands to any other private man at his own discretion, especially when the feodal restraints of alienation were worn away. Yet in consequence of these it was always, and is still, necessary for corporations to have a licence of *mortmain* from the crown, to enable them to purchase lands; and such licences of *mortmain* seem to have been necessary among the Saxons, above sixty years before the Norman Conquest. But, besides this general licence from the king, as lord paramount of the kingdom, it was also requisite, whenever there was a mesne or intermediate lord between the king and the alienor, to obtain his licence also, upon the same feodal principles, for the alienation of the specific land. And if no such licence was obtained, the king or other lord might respectively enter on the lands so aliened in *mortmain* as a forfeiture.

However such were the influence and ingenuity of the clergy, that, notwithstanding this fundamental principle, the largest and most considerable donations of religious houses happened within less than two centuries after the Conquest: and they formed contrivances for evading the necessity of obtaining licences. In process of time, it was observed, that the feodal services, ordained for the defence of the kingdom, were every day visibly withdrawn; that the circulation of landed property from man to man began to stagnate; and that the lords were curtailed of the fruits of their seignories, their escheats, wardships, reliefs, and the like: and, therefore, in order to prevent this, it was ordained by the second of king Henry III's great charters, A. D. 1217, cap. 43. ed. Oxon. and afterwards by that printed in our common statute books, that all such attempts should be void, and the land forfeited to the lord of the fee. Mag. Cart. 9 Hen. III. cap. 36. This was afterwards superseded by the statute *de religiosis*, 7 Edw. I. which provided, that no person, religious or other whatsoever, shall buy or sell, or receive, under pretence of a gift, or term of years, or any other title whatsoever, nor should by any act or ingenuity appropriate to himself, any lands or tenements in *mortmain*; upon pain that the immediate lord of the fee, or, on his default for one year, the lords paramount, and, in default of all of them, the king might enter thereon as a forfeiture.

Farther, the statute of Westminster the second, 13 Edw. I. cap. 32. enacted, that, in cases now known under the name of common recoveries, a jury should try the true right of the demandants or plaintiffs to the land; and if a religious house or corporation be found to have it, they should still recover seisin; otherwise it should be forfeited to the immediate lord of the fee, or else to the next lord, and finally to the king, upon the immediate or other lord's default. And to prevent any future evasions, when the statute of *quia emptores*, 18 Edw. I. abolished all subinfeudations, and gave liberty for all men to alienate their lands to be holden of the next immediate lord, a proviso was inserted, cap. 3. that this should not extend to authorize any kind of alienation in *mortmain*. And when afterwards the method of obtaining the king's licence, by writ of *ad quod damnum*, was marked out, by 27 Edw. I. stat. 2. it was farther provided by 34 Edw. I. stat. 3. that no such licence should be effectual, without the consent of the mesne or intermediate lords. It was afterwards enacted, by 15 Ric. II. cap. 5. that lands which had been purchased to uses (another method of evasion, to which ecclesiastical ingenuity recurred) should be amortised by licence from the crown, or else be sold to private persons: and that, for the future, uses should be subject to the statutes of *mortmain*, and forfeitable like the lands themselves: and large tracts of land adjoining to churches, and consecrated by the name of churchyards, were declared to be within the compass of the statutes of *mortmain*. And civil or lay corporations, as well as ecclesiastical, are also declared to be within the mischief, and the remedy provided by these salutary laws. Moreover it was declared, by 23 Hen. VIII. cap. 10. that all grants of lands to superstitious uses, such as obits, chanteries, &c. if granted for any longer term than twenty years, should be void. However, during all this time, it was in the power of the crown, by granting a licence of *mortmain*, to remit the forfeiture, so far as related to its own rights; and to enable any spiritual or other corporation to purchase and hold any lands or tenements in perpetuity; which prerogative is declared and confirmed by 18 Edw. III. stat. 3. cap. 3. And it was farther provided, by 7 and 8 W. III. cap. 37. that the crown, for the future, at its own discretion, may grant licences to alien or take in *mortmain*, of whomsoever the tenements may be holden.

The statutes of *mortmain* were suspended for twenty years by 1 and 2 P. and M. cap. 8. and during that time any lands or tenements were allowed to be granted to any spiritual corporation, without any licence whatsoever. And, for the augmentation of poor livings, it was enacted, by 17 Car. II. cap. 3. that appropriators may annex the great tithes to the vicarages, and that all benefices under 100*l. per annum* may be augmented by the purchase of lands without licence of *mortmain* in either case; and the like provision hath been since made, in favour of the governors of queen Anne's bounty, 2 and 3 Anne, cap. 11. It hath also been held, that, notwithstanding the statute 23 Hen. VIII. a man may give lands for the maintenance of a school, an HOSPITAL, or any other charitable uses. But as it was apprehended, from recent experience, that persons on their death-beds might make large and improvident dispositions, even for these good purposes, and defeat the political ends of the statutes of *mortmain*; it is therefore enacted, by 9 Geo. II. cap. 36. that no lands or tenements, or money to be laid out thereon, shall be given for or charged with any charitable uses whatsoever, unless by deed indented, executed in the presence of two witnesses, twelve calendar months before the death of the donor, and enrolled in the court of chancery within six months after its execution, except stocks in the public funds, which may be transferred within six months previous to the donor's death, and unless such gift be made to take place immediately, and be without power of revocation; and that all other gifts shall be void. The two universities, their colleges, and the scholars upon the foundation of the colleges of Eaton, Winchester, and Westminster, are excepted out of this act. Blackst. Com. book ii. chap. 18.

MORTUARY is a gift left by a man at his death to his parish church, for a recompence of personal tithes and offerings, not duly paid in his life-time.

Mortuary is also the fee paid to an incumbent, for carrying a corpse out of his parish to be buried in another.

A *mortuary* is not properly and originally due to an incumbent from any but those of his own parish: but, by custom, in some places of the kingdom, it is paid to the parsons of other parishes, as the corpse passes through them.

They seem to have been originally, like lay HERIOTS, only a voluntary bequest to the church, and it was anciently brought to the church with the corpse, when it came to be buried; and called a CORSE *present*: but so early as the time of Henry III. it was riveted into an established custom; insomuch that the bequests of heriots and *mortuaries* were held to be necessary ingredients in every testament of chattels.

Mortuaries are taken away in Wales, Berwick, and Cheshire, by 21 Hen. VIII. cap. 6. *sect.* 6. 12 Anne, stat. 2. cap. 6. 18 Geo. II. cap. 6.

It is enacted, by 21 Hen. VIII. cap. 6. that all *mortuaries* or corse presents to parsons of any parish shall be taken in the following manner, unless where by custom less or none at all is due: viz. for every person who does not leave goods to the value of ten marks, nothing; for every person who leaves goods to the value of ten marks, and under 30*l.* 3*s.* 4*d.* if above 30*l.* and under 40*l.* 6*s.* 8*d.* if above 40*l.* of what value soever they be 10*s.* and no more. And no *mortuary* shall throughout the kingdom be paid for the death of any feme-covert; nor for any child; nor for any one of full age, that is not a housekeeper; nor for any way-faring man; but such way-faring man's *mortuary* shall be paid in the parish to which he belongs. And upon this statute stands the law of *mortuaries* to this day.

MORTUUM *caput*. See CAPUT.

MORUS, in *Botany*. See MULBERRY.

MORXI, the Indian name of a pestilential distemper, very common in Malabar, and in some other parts of the East Indies, frequently carrying off great numbers of people.

MOSAIC, MOSAIC *work*, or, as some choose to call it, MUSAIC, an assemblage of little pieces of glass, marble, shells, precious stones, woods, or the like, of various colours, cut square, and cemented on a ground of stucco, &c. imitating the natural colours and degradations of painting. In this sense *mosaic work* includes *marquetry*, or *inlaid work*, *veneering*, &c.

The critics are divided as to the origin and reason of the name: some derive it from *musicum*, a corruption of *musivum*, as that is of *musseum*, as it was called among the Romans. Scaliger derives it from the Greek μυσα, and imagines the name was given to this sort of work,

as being very fine and ingenious. Nebricenſis is of opinion it was ſo called, becauſe *ea illis picturis ornabantur muſæa.*

But, in its more proper and reſtrained ſenſe, *moſaic* only takes in works of ſtone, metals, and glaſs; thoſe of wood being diſtinguiſhed by the name of MARQUETRY, or *inlaying*.

Others diſtinguiſh otherwiſe between *moſaic* and *marquetry*. In that properly called *moſaic*, they ſay, the ſeveral ſtones are all of the ſame colour; and the changes and diminutions of colours, and ſhades, are made by applying different ſtones one on another, but all of the ſame colour. *Marquetry*, on the contrary, conſiſts of ſtones of different colours; and by theſe the ſeveral colours, ſhades, degradations, &c. are expreſſed.

Moſaic ſeems to have taken its origin from *paving*: the fine effect and uſe of pavements compoſed of pieces of marble of different colours ſo well joined together, as that, when dried, they might be poliſhed, and the whole make a very beautiful and ſolid body, which, continually trodden upon, and waſhed with water, was not at all damaged, gave the painter the hint, who ſoon carried the art to a much greater perfection; ſo as to repreſent foliages, maſques, and other groteſque pieces of various colours, on a ground of black or white marble. In fine, obſerving the good effect which this kind of work had in pavements, and finding that it reſiſted water, they proceeded to line walls therewith, and to make various figures by it, for the ornament of their temples and public buildings. But nature not producing variety of colours enough for them in marbles, to paint all kinds of objects, they bethought of counterfeiting them with glaſs and metal colours; which ſucceeded ſo well with them, that having given all manner of teints to an infinite number of little pieces of theſe two matters, to counterfeit ſtones of various colours, in order to get more colours; the workmen arranged them with ſo much art, that their *moſaic* ſeemed almoſt to diſpute with paintings; this way of repreſenting objects having this advantage, that it reſiſts the injuries of the air, as well as marble itſelf; and even grows more beautiful with time, which effaces all other kinds of painting.

But the moderns have gone yet farther; and, ſetting aſide glaſs and metals, as too mean materials, have introduced, along with the fineſt marbles, the richeſt of precious ſtones, as lapis lazuli, agat, cornelians, emeralds, turquoiſes, &c.

Of theſe three kinds of *moſaic* work, that of coloured glaſs and metals is now little in uſe, though of a ſurpriſing luſtre and durableneſs: of the other two, that of marbles alone is in common uſe; the *moſaic* in precious ſtone being ſo very dear, that few workmen who apply themſelves to it, make little elſe but petty works, as ornaments for altar-pieces, tables for rich cabinets, &c. Though out of theſe muſt be excepted that ſumptuous chapel of the dukes of Tuſcany, which will be a noble monument of the magnificence and piety of thoſe princes, as well as of the patience and addreſs of the workmen employed therein.

We ſhall, however, enter into ſome detail of the manner of working in thoſe three kinds of *moſaics*; to which we ſhall add a fourth much newer, yet equally ingenious with any of the reſt, made with a kind of gypſum or tale, found in the ſtone-quarries about Paris.

MOSAIC *work of glaſs*. This kind they begin with little pieces of glaſs, which they provide of as many different colours as poſſible. To this end, the glaſſmen's furnaces being diſpoſed, and their pots or crucibles full of the matter of which glaſs is made, or rather of glaſs already made, they put what metalline colour or dye they think fit in each crucible, always beginning with the weakeſt, and augmenting the ſtrength of the colours from crucible to crucible, till they come to the deepeſt dye, as in mixing of colours on the pallet to paint in oil. When the glaſs has had ſufficient coction, and all the colours are in their perfection, they take out the glaſs hot, as it is, and lay it on a ſmooth marble, flatting it down with another marble, and then cut it into ſlices of equal bigneſs, and about the thickneſs of an inch and half. They then with an inſtrument, which the Italians call *bocce di cane*, make ſome pieces ſquare, and others of different figures and ſizes, as occaſion requires; theſe they diſpoſe orderly in caſes, as in painting in freſco, it is uſual to range all the different teints in ſhells, according to their colour. If it be deſired to have gold, either in the ground of the painting, or in the ornaments, or the draperies, they take ſome of the pieces of glaſs, formed and cut in the manner juſt mentioned: theſe they moiſten on one ſide with gum-water, and afterwards lay them over with gold-leaf. They then put this piece, or ſeveral pieces at a time, on a fire-ſhovel, which they place in the mouth of the furnace, after having firſt covered them with another hollow piece of glaſs. Here they continue till ſuch time as they become red-hot; after which the ſhovel is drawn out, all at once; and the gold becomes ſo firmly bound to the glaſs, that it will never afterwards leave it.

Now, to apply theſe ſeveral pieces, and out of them to form a picture, they firſt make a cartoon, or deſign; this they tranſfer on the ground or plaſter, by calquing, as in painting in freſco.

As this plaſter is to be laid thick on the wall, it will continue freſh and ſoft a conſiderable time, ſo that there may be enough prepared at once to ſerve three or four days. This plaſter is compoſed of lime made of hard ſtone, with brick-duſt ground very fine, gum tragacanth, and whites of eggs: when it is thus prepared, and laid on the wall, and the deſign finiſhed of what is to be repreſented; with pliers they take out the little pieces of glaſs, ranging them one after another, and ſtill keeping ſtrictly to the light, ſhadow, and different teints and colours repreſented in the deſign; preſſing or flatting them down with a ruler, which ſerves both to ſink them within the ground, and to render the ſurface even.

Thus, in a long time, and with an infinite deal of trouble, they finiſh the work; which is ſtill the more beautiful, as the pieces of glaſs are more uniform, and ranged at more equal heights. Some of theſe are executed with ſo much juſtneſs, that they appear as ſmooth as a table of marble, and as finiſhed and maſterly as a painting in freſco; with this advantage, that they have a fine luſtre, and will hold almoſt for ever.

The fineſt works of this kind, that have deſcended to us, and thoſe from which the moderns have retrieved the art, almoſt loſt, are thoſe of the church of St. Agnes, formerly the temple of Bacchus, at Rome; beſides ſome at Piſa, Florence, and other cities of Italy. The moſt eſteemed among the works of the moderns are thoſe of Joſeph Pine, and the chevalier Lanfranc, in the church of St. Peter at Rome. There are ſome very good ones likewiſe at Venice.

MOSAIC *work of marble, and precious ſtones*.- Theſe two kinds bear ſo near a relation to each other, as to the manner of working, that, to avoid repetition, we ſhall give them both under one; obſerving, by the way, wherein the one differs from the other, either in the ſawing or ranging of the ſtones.

Moſaic of marble is uſed in large works, as in pavements of churches, baſilics, and palaces; and in the incruſtation and veneering of the walls of the ſame edifices. As to that of ſtones, eſpecially *precious ſtones*, it is only uſed in ſmall works, as before obſerved.

The ground of *moſaic* works, wholly marble, is ordinarily a maſs of marble, either white or black. On this ground the deſign is cut with a chiſſel, having been firſt calqued. When it is dug of a ſufficient depth, i. e. an inch or more, it is filled up with marble of a proper colour, firſt contoured, or faſhioned to the deſign, and reduced to the thickneſs of the cavities, with various inſtruments. To make the pieces, thus inſerted into the cavities, hold, whoſe ſeveral colours are to imitate thoſe of the deſign, they uſe a ſtucco, compoſed of lime and marble duſt; or a maſtic, which each workman prepares differently: after which, the work is half poliſhed with a ſoft kind of ſtone.

The figures thus marked out, the painter or ſculptor himſelf draws, with a pencil, the colours of the figures not determined by the ground, and in the ſame manner makes ſtrokes or hatchings, to the places where ſhadows are to be; and when he has engraved, with a chiſſel, all the ſtrokes thus drawn, he fills them up with a black maſtic, compoſed chiefly of Burgundy pitch, poured on hot; taking off, afterwards, what is ſuperfluous, with a piece of ſoft ſtone or brick, which with water and beaten cement, takes away the maſtic, poliſhes the marble, and renders the whole ſo even, that one would imagine it only conſiſted of a ſingle piece: it is this kind of *moſaic* we ſee in the pompous church of the invalids at Paris, and the fine chapel at Verſailles; and wherewith ſome entire apartments of that palace are incruſted.

For moſaic work of precious ſtones; there are required other and more delicate inſtruments than thoſe uſed in marble; as wheels, drills, tin-plates, &c. uſed by lapidaries, and carvers in ſtone. As none but the richeſt marbles and ſtones enter this work, to make them go the farther, they are ſawn into the thineſt leaves imaginable, ſcarce exceeding half a line in thickneſs: the block to be ſawed, is faſtened firmly with cords, on the bench, only raiſed a little on a piece of wood, one or two inches high. Two iron pins, which are on one ſide the block, and which ſerve to faſten it, ſerve alſo to direct the ſaw. The pieces to be ſawed are put into a vice contrived for the purpoſe: in which ſtate, with a kind of ſaw or bow made of a fine braſs wire, bent on a piece of ſpringy wood, together

with emery moiſtened with water, the leaf is gradually faſhioned, by following the ſtrokes of the deſign made on the paper and then glued to the piece.

When there are pieces enough faſhioned to form an entire flower, or ſome other part of the deſign, they are applied. The ground, that ſuſtains this *moſaic*, is uſually of ſtone. The matter, wherewith the ſtones are joined together, is maſtic, or ſtucco, laid very thin on the leaves as they are faſhioned; and the leaves in this ſtate are applied with pivers. If any contour, or ſide of a leaf, be not either rounded enough, or ſquared enough, to fit the place where it is to be uſed, when it is too large, it is brought down with a braſs file or raſp; and when too ſmall, is managed with a drill, and other lapidary inſtruments.

Manner of making MOSAIC *work of gypſum.* This is a kind of coarſe ruled or ſhining tranſparent ſtone, found in the quarries of Montmartre near Paris, among the ſtones thence dug to make the plaſter of Paris. It is different from the plaſter; but retains the name which the Romans gave the plaſter, viz. GYPSUM.

Of this ſtone, calcined in a kiln, beaten in a mortar, and paſſed through a ſieve, they make a kind of artificial marbles, imitating precious ſtones; and of theſe they compoſe a kind of *moſaic* work, which comes little ſhort either of the durableneſs or vivacity of the natural ſtones; and which has this advantage, that it admits of continued pieces, or paintings, of entire compartiments, without any joining viſible.

Some make the ground of plaſter of Paris, others of freeſtone: if the former, it is ſpread in a wooden frame, of the length and breadth of the intended work, and about an inch and half thick. This frame is ſo contrived, as that the tenons being only joined to the mortiſes by ſingle pins, they may be taken aſunder, and the frame be diſmounted when the plaſter is dry; this frame they cover on one ſide with a ſtrong linen cloth, nailed all round; and being placed horizontally, with the linen at bottom, it is filled with plaſter, paſſed through a wide ſieve: the plaſter being half-dry, the frame is ſet perpendicular, and left till it be quite dry, and then taken out, by diſmounting the frame. In this *moſaic*, the ground is the moſt important part. Now, to prepare the ſifted gypſum to be applied on this ground, they diſſolve and boil it in the beſt Engliſh glue; and, after mixing with it the colour it is to bear, the whole is worked up together into the ordinary conſiſtence of plaſter; and then taken and ſpread on the ground, five or ſix inches thick. It muſt be obſerved, that if the work be ſuch, as that mouldings are required, they are formed with gouges, and other inſtruments.

It is on this plaſter, thus coloured like marble, or precious ſtone, and which is to ſerve as a ground to a work either of lapis lazuli, agat, alabaſter, or the like, that the deſign to be repreſented is drawn; having been firſt pounced, or calqued. To hollow or impreſs the deſign, they uſe the ſame inſtruments with the ſculptors; the ground, whereon they are to work, not being much leſs hard than marble itſelf. The cavities, thus made in the ground, are filled up with the ſame gypſum boiled in glue, only differently coloured: and thus are the ſeveral colours of the original repreſented. To have the neceſſary colours and teints at hand, they temper quantities of the gypſum with the ſeveral colours, in little pots. When the deſign is thus filled, and rendered viſible, by half-poliſhing it with brick, or ſoft ſtone; they go over it again, cutting ſuch places as are either to be weaker, or more ſtrongly ſhadowed, and filling them with gypſum; which is repeated till all the colours, added one after another, repreſent the original to the life. The work being finiſhed, is ſcoured with ſoft ſtone, ſand, and water; then with pumice-ſtone; and, laſtly, poliſhed with a wooden rubber, and fine emery: then a luſtre is given it, by ſmearing it over with oil, and rubbing it a long time with the palm of the hand; which gives it a gloſs nothing inferior to that of natural marble.

If it be only required to make a variegated table, or other work of ſeveral colours, without *moſaic* figures; the proceſs is ſomewhat different. To this end, they only prepare ſeparately, in large bowls, as many different colours as nature ſhews in the marble to be imitated; and, after incorporating them with the gypſum and glue-water, they take a trowel full of each, and diſpoſe them in a trough, without any order; then, without mingling them, and only by cutting or croſſing the gypſum of each trowel once or twice with each of the reſt, they give them that beautiful confuſion, for which natural marbles are ſo much valued: of theſe they then make their tables, or lay a mould, according to the work to be done.

As to MOSAIC *work of wood*, more properly called MARQUETRY, or *inlaid work*, the ancients were well acquainted with it, and uſed it for the adorning of their beds, tables, and other moveables; employing, for this purpoſe, ivory, beſides the richeſt woods.

There are, beſide theſe, two other branches of *moſaic* work; the one called DAMASKEENING, or *damaſk work*, conſiſting in an aſſemblage of gold or ſilver threads, of which are ſometimes formed flat works, and ſometimes baſſo-relievos.

The other is called *ſhell-work*; conſiſting of ſhells, artificial congelations, petrifications, &c. uſed in grottos.

MOSCH, a name of a ſort of reſiniferous veſſels, ſaid to have been diſcovered by Baſſius, in the kidneys.

MOSCHELÆUM, a name given by authors to a compound, fragrant, and aromatic oil, in which muſk is a predominating ingredient.

MOSCHATELLINA, *hollow root*, or *tuberoſe muſkwort*, in *Botany*, the name of a little plant common under our hedges in ſpring, which conſtitutes a peculiar genus, under the title of ADOXA: the characters of which are theſe: the empalement of the flower is biſid and permanent; the flower conſiſts of one leaf, and is rotated and divided into four ſegments at the edge; from the cup of this riſes a piſtil, which is fixed in the manner of a nail to the middle of the flower; and finally becomes a ſoft ſucculent berry, which hath four cells, containing flatted ſeeds; the leaves and flowers ſmell like muſk, whence it has been called by ſome *muſk-roſeſeed*.

MOSCHELAPHUS, in *Natural Hiſtory*, a name given by ſome writers to a creature of a mixed nature, produced by the copulation of a ſtag with a cow. Wagner tells us, that theſe creatures are ſometimes ſeen in the mountainous parts of Switzerland; as are alſo the hippotauri, generated between a bull and a mare; but neither of theſe ever propagate their ſpecies. See BUSELAPHUS.

MOSCHIFERUM *animal*, or *moſchus moſchiferus* of Linnæus, *muſk*, in *Natural Hiſtory*, the name of the creature which affords us the perfume called MUSK.

This creature ſeems to be neither of the goat nor deer-kind, and it is doubtful whether or not it chews the cud; it has however no *dentes inciſores* in the upper-jaw, which ſeems a mark that it does; but it has, according to the obſervation of Ariſtotle, two exerted teeth or tuſks there, in the manner of the boar; his noſe is ſharp like that of a greyhound; his ears like a rabbit's, about three inches long, and erect; and his tail or feut, about two inches; his foot is deeply cloven; the hair on the body is about half an inch long, and very thick, and of a brown and white colour. *Tab.* III. *Quadrupeds*. N° 38. The female is leſs than the male; the noſe ſharper; wants the two tuſks, and has two ſmall teats.

The *muſk* bladder or bag is about three inches long, and two over, ſwelling out an inch and half from the belly of the male, and ſtanding as much before the groin. It has no horns, and its tuſks by their figure ſeem intended equally for feeding and fighting.

MOSCHUS, in *Zoology*, a genus of the *pecora*; the characters of which are, that it has no horns, and two long tuſks in the upper jaw. Linnæus enumerates three ſpecies, one of which is the MOSCHIFERUM *animal*.

MOSES, in *Sea Language*, is a very flat broad boat, uſed by merchant ſhips amongſt the Caribbee iſlands, to bring hogſheads of ſugar off from the ſea-beach to the ſhipping, which are anchored in the roads.

MOSQUE, or MOSK, among the *Mahometans*, is a temple ſet apart for the exerciſes of their religion.

The word comes from the Turkiſh *meſgid*, or *meſchid*, which properly ſignifies a temple built of wood, ſuch as the Turks firſt uſed. Hence the Spaniards derive their *meſchera*, and the Italians *moſchea*, and the French and Engliſh *moſque*, and *moſk*. Borel derives the word from the Greek μοσχος, *calf*, becauſe of the frequent mention of a cow in the Alcoran: but others, with the greateſt appearance of reaſon, derive it from the Arabic *maſgiad*, a place of worſhip.

There are royal *moſques* founded by the emperors, as the Solimania, and Veliſca, at Conſtantinople; and private *moſques* founded by muftees, viziers, baſſas, &c.

Moſques are built like large halls, with iſles, galleries, and domes; and are adorned on the inſide with compartiments, and pieces of *Arabeſque* work. On one ſide is always found a pool with ſeveral cocks; and on the top is placed a crelcent.

The women are not allowed to enter the *moſques*, but ſtay in the porches without.

Moſt of the *moſques* have a kind of hoſpital belonging to them, in which travellers of any religion are entertained during three days.

The Turks have converted moſt of the Chriſtian churches into *moſques*.

MOSS, MUSCUS, in *Botany*, an order of plants, belonging to the *cryptogamia* claſs, conſiſting in the Linnæan ſyſtem of

eleven

eleven genera: viz. *lycopodium*, *porella*, *sphagnum*, *phascum*, *splachnum*, *polytricum*, *muium*, *hypnum*, *fontinalis*, and *buxbaumia*. These are found growing on the barks of trees as well as on the ground. See *Tab. Mosses*.

The moſt eſteemed and odoriferous *moſs* is that of the cedar.

It is of ſome medicinal uſe; being aſtringent, and proper to ſtop hæmorrhages and dyſenteries.

The ancients took the *moſs* of trees to be the effect of a diſorder or diſcompoſure of the texture of the bark; or, at moſt, a kind of little filaments ariſing from the bark: but the moderns find, by ſeveral obſervations, that *moſſes* are all real, diſtinct plants, whoſe ſeed, being extremely ſmall, is incloſed in little capſulæ; which burſting of themſelves, the ſeed is carried off by the winds; till, falling into the inequalities of the bark of trees, it is there ſtopped, takes root, and feeds at the expence of the tree, as mouldineſs does on bread, &c.

What the botanical writers ſtrictly underſtand by the word *moſs*, is a claſs of plants appearing of an inferior rank, to the common vegetables; the leſs perfect genera of which have been ſuppoſed to be wholly deſtitute of flower or ſeed, or any thing analogous to either, and to conſiſt of ſimple, ſimilar, and uniform parts; the genera a little above theſe have ſome diverſity of parts, and carry ſomething that looks analogous to vegetation in the common way, having a reſemblance of thoſe parts which ſerve other plants for their fructification. The more perfect genera of the *moſſes* not only conſiſt of different parts, but have alſo their appropriated organs containing a pulpy matter, which finally becomes dry, and aſſumes the form of a fine and ſubtile powder, compoſed of granules, each of which is either a ſeed or a granule of farina, ſerving for the propagation of the ſpecies.

The more imperfect *moſſes* are diſtinguiſhed from the others by their appearance to the naked eye; they are either in form of a fine lanugo, or down, covering the ſurface of different bodies; or elſe they appear as ſlender filaments, or foliaceous bodies, floating about in the water; or as filaments of a tougher texture, hanging down from the branches of old trees; or as little ſhrubs, or ſingle horns, growing erect on the parched earth of mountains and heathy places; or finally, as broad and foliaceous bodies ſpreading themſelves over the dry barks of trees or rocks, without any pedicle or other ſupport.

The more perfect kinds of *moſſes* are found in the ſhape of ſmall but regular plants, divided into ſeveral branches, and clothed with leaves; theſe are of various forms and ſtructures, ſome being broad and thin, others ſlender as hairs; ſome pellucid, others opake; ſome ſmooth, others hairy. From the alæ of theſe leaves in ſome kinds, and from the ſummit of the ſtalks in others, there ariſe heads or capſules of a various figure and ſtructure, but all unicapſular; ſome of theſe are naked, and others covered with a calyptra or hood; ſome ſtand on long pedicles, and others are placed cloſe to the ſtalks. Theſe heads are uſually called *capſulæ*, which contain their ſeeds or farina, and their pedicles *ſetæ*, in the *muia*, *hypna*, *bryi*, and *polytricha*, &c.

Theſe capſulæ, in ſome are covered with a calyptra, or hood; in others they are naked. Of the firſt kind are the *ſphacnum*, *polytricum*, *muium*, *bryum*, *hypnum*, *fontinalis*, and *buxbaumia*; and of the latter ſort, the *lycopodium*, *porella*, *ſphagnum*, and *phaſcum*.

The ſubſtance with which the heads or capſules of all the *moſſes* are filled, reſembles either ſeeds, or the ſmall globules of the farinæ of flowers, which all reſemble ſeeds of particular figures in miniature. The fructifications of theſe minute plants ſeem to be either from theſe, as ſeeds falling to the earth; or according to the opinion of ſome, they ſeem to contain only farinæ in the capſules, which impregnating certain bulbs or nodules in the alæ of the leaves, cauſe them to grow and vegetate, as is ſeen in ſome of the larger plants, as in the bulbs produced in the alæ of the leaves of the dentaria, and of the lilies, and ſome others. The former opinion, of the powder in the heads or capſules being actually perfect ſeeds, is the more probable, as the bulbs in the alæ of the leaves are found only in ſome of the hypna, and others of a few other genera; whereas the propagation is as quick and certain in thoſe which have none of them, as in thoſe which have: and the want of female parts of fructification, which makes ſo many deſiderata in the Linnæan ſyſtem of botany, is eaſily made up, and the whole explained according to the uſual courſe of nature in other vegetables, by allowing the powder in the capſules to be real ſeeds, and the ſmall globules on the pointals ſurrounding the aperture of the capſule, the farina.

The opinion of the *moſſes* growing only from theſe nodules in the alæ of the leaves, or from the impregnated ends of the branches which had received the powder from the capſules, was originally founded on the obſerving that the trailing or branched hypnums annually grew out into length, from the extremities of all their branches, and annually loſt as much of the old ſtalk at the root, as they gained of the new at the ſummit; but it appears from farther obſervations, that they are real ſeeds which are contained in form of powder in the capſules; ſince the bryums, and many others, are found growing from ſmall points or ſpots, which are aſſemblages of their minute leaves, propagated on the ground, under the old ones juſt where the powder of the capſules has fallen; and though it be allowed, that the hypnums and other trailing *moſſes* do grow from the ends of the branches, yet they may alſo be produced in form of new plants, from regular and perfect ſeeds ſhed from the capſules. It is certain that the bryums are by this means propagated and ſpread into large tufts, and the other genera may alſo be ſo propagated, though they have beſide a property of increaſing by growth of the ſtalk; which ſeems no other than the property of many of the large plants to creep at the root, and ſhoot out in length greatly from the extremities of their horizontal branches, lying on or under the ground, as thoſe ſpreading parts may more properly be ſo called than roots, the ſhoots puſhed out from them perpendicularly into the earth being properly the roots: and it is well known that theſe plants, though they propagate themſelves thus by the root, produce ſeeds alſo like the others, by which they may be equally propagated: and this analogy is to be carried yet farther; for as thoſe plants which creep by the roots produce fewer ſeeds than thoſe which are propagated only by ſeeds; ſo the hypnums, which are the genus of *moſſes* in which this growth by the ſtalks is principally obſerved, are very thinly beſet with capſules of ſeed, and many of them produce but very few in a ſeaſon; whereas the brya, and other *moſſes*, which have not this advantage of growing from the ends of the ſtalks, are found every year profuſely covered with capſules from every tuft; nay, there is ſcarce any branch which does not produce its capſule. Now if theſe capſules contained only a farina capable of impregnating the nodules, or the ends of the branches, it is obvious there would be as much of it required for the hypna as for any other kinds of *moſſes*; but if they are real and perfect ſeeds, it is no wonder that nature has given them profuſely to ſuch kinds as are to be propagated only by ſeeds, and more ſparingly to thoſe which are propagated alſo by the increaſe of the branches.

To this it may finally be added, that the ferns and other epiphylloſpermous plants approach moſt of all others to the nature of the *moſſes*; and though it has been ſuſpected by many, that the fine powder at the back of their leaves was not ſeeds, but only a farina; yet it is now well known that it is true and perfect ſeed, ſince, under many ſpecies of them, there are conſtantly found new and ſelf-ſown plants ariſing in their firſt rudiments of leaves and figure, which have plainly grown from the duſt or powder fallen from the old plants; and as this is now found to be the caſe in regard to the ferns, probably it will alſo appear the ſame in regard to *moſſes*, when they have been yet farther examined than at preſent. But whether theſe grains of powder have the lobes and radicles by which the ſeeds of larger plants propagate themſelves, or whether they grow into plants like the parent ones, in the manner of the lichens, by mere expanſion, is a thing that requires farther obſervation to determine.

Some of the *moſſes*, it is evident, approach to the nature of the plants, which have their male and female parts in the ſame flower, and others to thoſe which have them in different ones.

The manner of ſeeding of *moſſes* in general may be in ſome degree gueſſed at by that of one genus of them, which has been traced through all its ſtages, and to which moſt of the others, though every genus has its diſtinct fructification in ſome reſpects, yet bear a very great general analogy.

The genus already obſerved, is that called by Dr. Dillenius, the HYPNUM. The ſpecies of this are very numerous and common; but that particular one which was the ſubject of theſe obſervations, is the ſhort-branched ſilky-kind, common on old walls; and called by that author in his hiſtory, *hypnum vulgare, ſericeum, ramoſum, capſulis oblongis cuſpidatis*.

The head of this *moſs* appears to the naked eye a ſmall, ſmooth, brownish-yellow, oblong body, of about a ninth or an inch long; this is covered at its upper end with a membranaceous calyptra or hood, in ſhape reſembling an extinguiſher, or a funnel inverted. When this calyptra is taken off, and the head viewed with a microſcope, the ſurface of it is ſeen to be ruled with longitudinal ſtriæ. The baſis of the head is of a deep orange colour, and more opake than the reſt; and the top is bounded by an orange-coloured ring ſwelling out ſomething beyond the

furface of the contiguous parts of the head. Good glaſſes ſhew that in this head there are not wanting the parts eſſential to the fructification of what are uſually called the more perfect plants. This ring is truly a monophyllous undulated calyx, within which ariſe fifteen pyramidal imbricated ſtamina; theſe are of a pale greeniſh colour, and are loaded with a whitiſh oval farina. The ſtamina all bend toward each other from their baſes, and almoſt meet in a point at the top. This is their appearance when the head is nearly ripe; and immediately under the arch formed by theſe ſtamina, is a cylindric hollow piſtillum, through which the farina makes its way, and is diſperſed among the ſeeds in the head; the fruit is a large capſule, filling every part of the membrane which ſhews itſelf on the outſide of the head, and in moſt places is contiguous to it; this capſule is filled with perfect and very beautiful ſeeds; they are round, tranſparent when unripe, but afterwards opake, and of a very beautiful green, which colour they retain even when dried. Phil. Tranſ. N° 478. ſect. 12.

When this head is firſt produced from the plant, the ſtamina are very ſlender, and ſtand erect; the head is ſcarce any thicker than the ſtalk, and the calyptra covers it all over, to ſhield the tender ſubſtance of the farina from external injuries. As the farina afterwards ſwells in the ſtamina, the ſeeds in the head increaſe alſo in bulk, and by their increaſe the head is more extended in thickneſs; and the ſtamina are by this means ſeparated farther and farther from each other at their baſes, but bend inwards toward their points, ſo as to form a kind of arched covering over the ſtigma of the piſtillum, which is ſingle; and from hence the farina falls as it ripens into the head, and impregnates the ſeeds. *M.* Ibid.

All the *moſſes*, liverworts, and the other plants of the ſame character, poſſeſs the ſame general virtues of drying and aſtringency.

The *moſſes* of Virginia, Penſylvania, and other parts of North America, are in part the ſame with our's, and in part different; about two-thirds of the number of *moſſes* of theſe countries hitherto obſerved being common to our own country alſo, the reſt peculiar to that part of the world. Thoſe of South America are almoſt all wholly diſtinct from our's. The *moſſes* of Greenland and Lapland are moſtly of the ſame kind with thoſe of our Welch mountains. And in the mountainous parts of the world between the tropics, there are many extremely beautiful fern-like *moſſes*, unknown in all other places.

It cannot but be acknowledged, that the diſtinctions of theſe little vegetables are ſo minute, and their appearance ſo various in their difference ſtates, that very probably ſucceeding obſervations will much retrench the number deſcribed by Dillenius; but as the ſame obſervers will probably add as many new and truly diſtinct ſpecies, as they find occaſion to ſtrike off from the old liſt, there is no doubt but that the number will be found at leaſt as great as it ſtands at preſent with that author.

Moss *on trees*, in *Gardening*. The growth of large quantities of *moſs* on any kind of tree is a diſtemper of very bad conſequence to its increaſe, and much damages the fruit of the trees of our orchards.

The preſent remedy is the ſcraping it off from the body and large branches, by means of a kind of wooden knife, that will not hurt the bark, or with a piece of rough hair-cloth, which does very well after a ſoaking rain. But the moſt eſſential cure is the taking away the cauſe. This is to be done by draining off all the ſuperfluous moiſture, from about the roots of the trees, and may greatly be guarded againſt in the firſt planting of the trees, by not ſetting them too deep.

If trees ſtand too thick in a cold ground, they will always be covered with *moſs*; and the beſt way to remedy the fault is to thin them. When the young branches of trees are covered with a long and ſhaggy *moſs*, it will utterly ruin them; and there is no way to prevent it, but to cut off the branches near the trunk, and even to take off the head of the tree, if neceſſary; for it will ſprout again; and if the cauſe be in the mean time removed by thinning the plantation, or draining the land, and ſtirring the ground well, the young ſhoots will continue clear after this.

If the trees are covered with *moſs*, in conſequence of the ground's being too dry, as this will happen from either extreme in the ſoil, then the proper remedy is the laying mud from the bottom of a pond or river, pretty thick about the root, opening the ground to ſome diſtance and depth to let it in; this will not only cool it, and prevent its ſtopping growth to any great quantity of *moſs*, but it will alſo prevent the other great miſchief which fruit-trees are liable to in dry grounds, which is the falling off of the fruit too early.

The *moſſes* which cover the trunks of trees, as they always are freſheſt and moſt vigorous on the ſide which points to the north, if only produced on that, ſerve to preſerve the trunk of the tree from the ſeverity of the north-winds, and direct the traveller in his way, by always plainly pointing out that part of the compaſs.

Moſſes make an article of commerce; there being ſeveral kinds uſed in medicine, in perfuming, &c. among others, the *ſea-moſs*, called *coralline*; and the *moſs* of cedar and fir, which enter the compoſition of Cyprus powders.

The *moſs* of common trees, as oak, aſh, poplar, &c. is uſed for caulking of veſſels; it is alſo uſed by bird-merchants, to prepare cages for certain kinds of birds to hatch in.

The ſoft marſh and bog *moſſes* ſerve the poor in many places for ſtuffing their beds; and in the buſineſs of tranſporting plants from other countries, nothing is of ſo great uſe as the ſtalks and leaves of theſe little vegetables: the ſucculent plants coming over in great beauty and vigour when rolled up in dry *moſs*; and the trees and ſhrubs, by having their roots covered with ſuch as is ſomewhat moiſt.

The great quality of the *moſſes*, which makes them ſo ſerviceable in this caſe, is, that they do not heat and ferment on being moiſtened, as hay and ſtraw would.

Several ſpecies of the *moſſes* and *algæ* have been applied to medicinal uſe. Thus ſeveral of the *moſſes* are great and valuable medicines, uſed as deterſives and aſtringents; that the common *cup-moſs* is one of the greateſt remedies in the convulſive coughs of children, called the chin-cough, is known to every one; and Dr. Mead has ennobled the grey ground-lichen, by publiſhing its virtues in one of the moſt terrible of all diſeaſes, the bite of a mad dog. The common green liverworts are known medicines in diſorders of the breaſt, as are alſo all the ſpecies of polytricha. The ſeeds of our lycopodiums are given with ſucceſs in nephritic caſes; and the Indians give one of their ſpecies in many diſtempers, and, as they ſay, with great benefit. The common white ground coralloides ſerves the rein-deer of Lapland for food, when all other herbage is loſt; and the conferva ſerve for food to many of the fiſh both of the ſea and rivers, and to ſeveral water-fowl. And theſe, as well as the land *moſſes*, afford ſhelter and habitation to many inſects, and their young. Many of the ſpecies of coralloides and lichenoides are found of great uſe in that profitable branch of commerce the art of dying; and doubtleſs many others have alſo the ſame qualities, though not yet diſcovered; and we may be guided in ſearches of this kind by obſerving that many of them tinge the papers between which they are dried, with very beautiful and laſting colours.

Moss, *heath*, *coralloides*, in *Botany*, the name, according to Dillenius, of a genus of the *moſſes*; the characters of which are theſe: they are compoſed of ſtalks often branched in the manner of corals, and compoſed of parts of a different figure and appearance, not ſimple and uniform as the byſſi and conſervæ. On the ſummits of the branches there grow a ſort of fleſhy tubercles, which Micheli calls the receptacles of flowers; and the little atoms which are ſeen adhering to the different parts of the ſtalks, he calls the ſeeds. Dillenius is rather for thinking them the farinæ; and the tubercles, either the capſules of ſeeds, or the young plants, ready to fall off from the parent ſtem, and ſhoot for themſelves like the bulbs of the dentaria, biſtort, and the like. However this be, theſe are parts too minute to found generical diſtinctions on, which may be better deduced from a groſſer conſideration of the ſtalk, and the figure of the tubercles. Theſe have no rim or margin, and are uſually larger in the leſs branched kinds, and ſmaller in the more ramoſe. This being a very numerous genus of *moſſes*, it is divided into ſeveral orders: 1. The fungiform. 2. The cup-like. 3. The ramoſe or corniculate ones. Dillen. Hiſt. Muſc. p. 76. See Coralloides.

Moss, *ſilk*, in *Natural Hiſtory*, a name given by count Marſigli to a ſpecies of ſea-*moſs*, or coralline, of a very remarkable fineneſs and ſoftneſs, much more reſembling ſilk than any other of the marine productions. It is wholly compoſed of a ſort of tuft of fine hairs or filaments, and is of a bluiſh green colour, and almoſt tranſparent. It grows on rocks, ſtones, ſhells, or any thing elſe that lies in its way, and is found uſually at ſmall depths; it is not ſo tough and flexible as many other of the ſea-plants, but is eaſily rubbed to powder between the fingers. When examined by the microſcope, the ſingle filaments do not appear of the ſame equable ſurface and uniform texture; but they are ſeen to be jointed and made up as it were of a great number of pieces faſtened end by end to one another, in the manner of the beads of a lady's necklace. It is of a fine bluiſh green, and perfectly tranſparent before the microſcope, and reſembles a ſtring of gems, ſuch as the aqua marina, or ſome other like ſtone.

Moss, *ſea*. Theſe marine ſubſtances are very beautiful

when viewed by the naked eye; but when examined with the microscope, they afford a very pleasing variety of structure and conformation.

The common kinds afford a great variety of colouring, the different parts of the same plant often appearing, some brown, some yellow, some red, and some grey. On drying, these colours become less elegant; but on putting the dried substance again to soak in water, they are in some degree recovered, and the variations are usually found to be owing to the joints and knots in the stalks, which interrupt the course of the general colour, and are often themselves either black, or of a dark and deep brown. See CORALLINE.

MOSS-*tree*. See LIVER-WORT.

MOSS, *upright fir*. See LYCOPODIUM.

MOSS, *wall*, *bryum*, in *Botany*, the name of a genus of *mosses*, the characters of which are these: they produce membranaceous capsules, covered with a calyptra or hood, and standing on pedicles more or less long. In all this they agree with the hypnums; but they differ from them in that this pedicle has no covering round its base, but in the place of it has a node or tubercle. These pedicles also usually arise from the tops of the branches, or from those of the last years, which were then the tallest, though now nearer the roots. To this it is to be added, that the stalks are usually erect, less branched than in the hypnums, and not creeping. The calyptræ in some species stand strait, in others obliquely on the capsules; and the opercula, when the dusty matter within the head has arrived at its maturity, fall off transversely, sometimes with a smooth, sometimes with a jagged eye.

The characters of this genus, according to Linnæus, are, that the anthera is operculated; the calyptra smooth; and the filament arises out of the tubercle. He enumerates thirty-one species.

The family of the *bryums* being very numerous, they are divided into several orders and series by Dillenius, Hist. Muscs. The first order comprehends those which have erect heads; and of these, those of the first series have rounded, bellied, and turbinated heads.

The second series of this order of *bryums* contains those which have oblong oval, and rounded heads.

The second subdivision of the narrow-leaved *bryums* contains those of the short-leaved kind.

The third division of the first order of *bryums* comprehends those with extremely narrow, or capillaceous leaves.

Of these some resemble the hypnums, and many of these have their leaves terminated by long hairs.

The second subdivision of these *bryums* contains such as are hairy, and have capillaceous leaves; but differ from the hypnums in their proper figure, and general appearance.

The third subdivision comprehends such of these *bryums* as have curled leaves, or leaves that become variously undulated as they dry.

The fourth subdivision of these *bryums* comprehends those which have rostrated calyptræ and pointed capsules, afterwards becoming of the shape of bottles, from the rim of which there grow up several oblong bodies, in form of a beard.

The fifth subdivision of these *bryums* comprehends those which have a shorter operculum, and whose capsules appear striated when fully ripe.

The sixth subdivision of these *bryums* takes in those which have either no stalks, or at the utmost only very short ones.

The second order of the *bryums* comprehends those which have capsules, hanging downward from the bending of the pedicles. The calyptræ in these species quickly fall off, and the opercula are usually obtuse.

The first series of these comprehends those which have extremely narrow leaves.

The second series of these *bryums* contains those which have leaves a little broader, and though narrow, not capillaceous.

The first division of these contains those which have equal and cylindric branches. Dillen. Hist. Muscs.

The third series of these *bryums* comprehends such as have broad leaves.

MOSS is also a name given in many parts of England to the ground called a BOG, FEN, MARSH, or MORASS in other places.

MOSS-*berries*. See WHORTLE-*berry*.

MOSS-*troopers*, a rebellious sort of people in the north of England, that lived by robbery and rapine, not unlike the tories of Ireland, the buccaneers in Jamaica, or banditti of Italy: the counties of Northumberland and Cumberland were charged with a yearly sum, and a command of men, to be appointed by the justices of peace, to apprehend and suppress them. Stat. 4 Jac. I. cap. 1. 13 and 14 Car. II. cap. 22. 30 Car. II. cap. 2. See 6 Geo. II. cap. 37.

MOSTRA, in the *Italian Music*, a little mark set at the end of each line of a tune, thus , to shew that the first note of the next line is in that place.

If this first note be accompanied with a ♯ or ♭, it is right to place those characters with a *mostra*. Also if in a thorough bass this first note have any cyphers, it would be of use to put the same cyphers with the character, at the end of the preceding half. Again, if the part change its cleff with the first note, the cleff ought to be marked with the *mostra* in the same manner. The *mostra* is of great use, especially in quick motions, as it prepares the player for what is to come. Vide Bross. Mus. Dict. in voc.

MOSYNÆCUM *æs*, in *Metallurgy*, a name given by the ancients to a white metal made of copper, in great esteem among them.

Aristotle tells us, that it was extremely bright and of a perfect fine white colour; and adds, that it was made of copper by melting it with an admixture of a peculiar kind of earth. Strabo also mentions this; and Theopompus tells us, that it was made of copper and an earth, and that it looked so like silver, that it was called *pseudargyrus*.

Virgil mentions it under the name of *aurichalcum album*, and seems to give it great praises. We are not able at present to say what it was they used in making it. We know several things that will render copper white, as arsenic, and the like; but none of these can well be supposed to be the thing. For arsenic, and all the things we use to make our factitious metal, debase the copper, and render it brittle; whereas by the accounts of Strabo, and others, their white metal seems to have been better for all uses than the copper itself. As to their telling us that it was a sort of earth which they used on this occasion, very little regard is to be paid to the terms; for they had an inaccuracy in speaking that leaves us much in the dark, in many other things beside this. They called the *calaminaris* stone, which is an ore of zinc, by the name of *Cadmian* earth, in their description of the manner of making brass.

It has seemed absurd to some to call this white metal *aurichalcum album*, because they suppose the word *aurichalcum* to signify gold-coloured copper; but this is an error. The *aurichalcum* is but a false spelling of ORICHALCUM.

MOTACILLA, in *Ornithology*. See WATER-*wag-tail*.

MOTALAZITES. See MOATALAZITES.

MOTE, MOTA, frequently occurs, in our ancient customs, for a meeting, court, or plea.

Of *motes*, by the Saxons also called *gemotes*, considered in the sense of assemblies, or courts, there were divers kinds; as *wittenagemote*, *folcegemote*, *shiregemote*, *hundredgemote*, *burgemote*, *wardegemote*, *halimote*, *sheawegemote*, &c. See each under its proper article, WITTENAGEMOTE, FOLKEGEMOTE, &c.

MOTE, *mota*, was also used for a fortress, or castle; as *mota de Windsor*, &c.

MOTE also denoted a standing water to keep fish in; and sometimes a large ditch encompassing a castle, or dwelling-house.

MOTECTICO *stylo*. See STYLE.

MOTETTO, in the *Italian Music*, a kind of church-music, composed with much art and ingenuity from one to eight parts, with or without instruments, usually accompanied with a thorough bass. When the composer gives a loose to his fancy, without confining himself to any rules, subjects or passions, it is called FANTASIA or RICERCATA. The word is sometimes used for pieces made to hymns to saints, &c. and whole psalms are often thus called; and was probably derived from *motus*, *motion*, because the church songs were designed to move the hearts of the hearers; or because this kind of composition was originally of a very gay and lively nature. Brossard and Du-Cange.

MOTH, in *Zoology*. See PAPILIO and PHALÆNA.

MOTH, *field*, *tinea campestris*, in *Natural History*, the name given by Mr. de Reaumur to a species of insect, which in all respects resembles the *moth* so destructive of cloaths, except in its food; as that feeds upon woollen, and makes its nest or covering of that substance; this eats the leaves of trees, and in the same manner makes itself a covering from the fibres and integuments of them.

Their changes are the same with those of the common *moth*, and performed in the same manner; they only seem to differ in having a more moist food.

Mr. Reaumur first observed these on the leaves of the ash. This creature for a great part of its life wants no covering, but like the cockroaches making its way through the upper integument of the leaf, it feeds on the parenchyma and juices at length when it has eat away all the substance

of the leaf, it bites out a piece from each intire part of it, over and under its body, and fastens the edges all round with threads of its own spinning; thus making a complete case or covering, enabling it to bear the open air. This done, it marches from its place to find another leaf fit to supply it with more nourishment: thus it changes place several times during its life, and as often changes its covering, which requires but a very little time to make anew.

These are small animals of this genus; but there are others which are considerably larger, and which make their coverings of various matters and of different structure: they are usually very rough and ragged, and seem made of any matter that happens to be in the way; some species usually make them of pieces of straw and particles of chaff, others of small twigs of bushes, others of the dry leaves of the oak, broom, and other plants.

All these animals might have been described as the dependants on the beetle and fly kinds; but as they have this remarkable quality of feeding in the same manner, and making themselves cases of different materials in the manner of the *vines*, or sloaths *moth*, while in the worm-state, and in this state they are much more obvious to the eye than the flies, beetles, &c. produced of them, many of which are so small as to escape observation; this accurate author has chosen to describe them together, and in this their imperfect state. He adds an account of another set of animals somewhat allied to them, which he therefore calls the *pseudo-vines*, or false *moth*. See PSEUDO-*vines*.

MOTH *mullein*. See MULLEIN.

MOTHER, *mater*, a female, who hath borne, and stands in the relation of parent to another.

Thus Eve is called our common *mother*; Cybele, among the ancients, was the *mother* of the gods.

MOTHER, *town*, signifies the same with what we otherwise call *mater ecclesiæ*.

We meet with empresses on medals and inscriptions, with the title of *mother* of the camp; *mother* of the senate, *mother* of the country: *mater senatus, mater castrorum, mater patriæ*, &c.

MOTHER *of God*, is an attribute commonly given to the blessed Virgin. It had its origin from the Greeks, who first called her Θεοτοκος; in imitation of whom, some Latins began to call her *Deipara, Dei genitrix*. The council of Ephesus first gave a sanction to the appellation; but the fifth of Constantinople decreed, that the Virgin should always be thus called. This gave rise to terrible disputes: Anastasius, a presbyter of Nestorius, patriarch of Constantinople, first asserted, in a sermon, that the Virgin was by no means to be called Θεοτοκος; upon which words, a great tumult arising, Nestorius took his presbyter's part, and taught the same doctrine.

MOTHER-*tongue* is properly an original language, from which others are formed.

Of *mother-tongues*, Scaliger reckons ten in Europe; viz. the *Greek, Latin, Teutonic* or *German, Sclavonic, Epirotic, Scythian* or *European Tartar, Hungarian, Cantabrian, Irish*, and *British*.

MOTHER-*churches* are those which have founded or erected others. See PARISH.

In hereditary matters they say, it is not lawful for a man to enjoy, at the same time, both the *mother* and the daughter: meaning, that the canon-law does not allow an abbey and the benefices depending thereon, to be held by the same person.

MOTHER, *fits of the*. See HYSTERIC *affection*.

MOTHER, *water*. See WATER.

MOTHER *of vinegar*. See NITRE.

MOTHER *of thyme*. See THYME.

MOTHER *wort, cardiaca*, in *Botany*. Its characters are these: it hath a cylindrical five-cornered empalement of one leaf, which is permanent, and divided into five parts at the top; the flower is of the lip kind, of one leaf, with a narrow tube spreading at the brim; it has four stamina fastened to the upper lip, two of which are longer than the other; it has four germina, which afterwards become four naked oblong seeds, inclosed in the empalement. There are three species; the common sort used in medicine, growing naturally on the sides of banks in many parts of England, and flowering in July.

Linnæus has changed the title of this genus to *leonurus*. See LION'S *tail*.

It is only used in the shops as an ingredient in some of the compound waters, intended against hysteric complaints; and the country people frequently make an infusion of it in the manner of tea, for the same purpose. It is also said to be good in flatulencies, and colics, to give great relief in epileptic cases, and to destroy worms. It promotes urine, and the menses; but its power this way is greatly inferior to that of PENNY-*royal*.

The name *cardiaca*, improperly given to this plant, has led many into an opinion of its being a cordial; but experience does not shew any such thing.

MOTHER *of vinegar*. See VITRIOL.

MOTHER *Carey's chickens*, a name given by the English sailors, to birds which they suppose to be the fore-runners of a storm.

MOTION, primarily so called, or *local* MOTION, is a continued and successive change of place; or that state of a body, whereby it corresponds successively to several different places; or is present successively in different parts of space.

In this sense, the doctrine and laws of *motion* make the subject of mechanics, or statics.

The ancient philosophers considered *motion* in a more general and extensive manner: they defined it, a passage out of one state into another; and thus made six kinds of *motion*, viz. *creation, generation, corruption, augmentation, diminution*, and *lation*, or *local motion*.

Some of the later schoolmen reduce these six kinds of *motion* to four: the first is general, including any passage from one state to another; under which kind come *creation, production*, and *mutation*. The second is a passage of something already existing from one state to another; and thus *generation is a motion*. The third is a successive passage of something already existing from one term to another; and thus *alteration*, and *accretion*, are species of *motion*. The last is *lation*, or *local motion*; and thus *walking is motion*.

But the latest philosophers deny any other species beside *local motion*; and reduce all the sorts above mentioned to this one. So that we have here only to do with *lation*, or *local motion*; wherein the rest are only so many different determinations, or effects.

Physical writers, both ancient and modern, have ever been perplexed about the nature and definition of *local motion*. The Peripatetics define it by, *Actus entis in potentia, prout in potentia*, Arist. 3. Phys. cap. 2. But this notion seems too abstract and metaphysical for our days, and is of no use in explaining the properties of *motion*.

The Epicureans explain *motion* by the migration of a body, or a part of a body from one place to another; on which definition the later Epicureans refine, and call it, the migration or passage of a body from space to space; thus substituting the word *space* for that of *place*.

The Cartesians define *motion*, a passage or removal of one part of matter out of the neighbourhood of those parts immediately contiguous thereto, into the neighbourhood of others.

Which definition agrees, in effect, with that of the Epicureans: all the difference between them consisting in this; that what the one call *body*, and *place*, the other call *matter*, and *contiguous parts*.

Borelli, and other late writers after him, define *motion*, more accurately and fully, the successive passage of a body from one place to another, in a determinate time, by becoming successively contiguous to all the parts of the intermediate space.

Motion, then, is agreed to be the translation of a body from place to place; but authors differ much when they come to explain wherein this *translation* consists. And hence their divisions of *motion* become exceedingly precarious.

Aristotle, and the Peripatetics, divide all *motion* into *natural* and *violent*.

MOTION, *natural*, is that which has its principle, or moving force, within the moving body. Such is that of a stone falling towards the centre of the earth.

MOTION, *violent*, is that whose principle is without, and against which the moving body makes a resistance. Such is that of a stone thrown upwards.

The moderns generally divide *motion* into *absolute* and *relative*.

MOTION, *absolute*, is the change of absolute place, in any moving body; whose celerity, therefore, will be measured by the quantity of absolute space which the moveable body runs through.

MOTION, *relative*, is a mutation of the relative or vulgar place of the moving body; and has its celerity estimated by the quantity of relative space run through.

Others divide *motion* into *proper*, and *improper*, or *foreign*.

MOTION, *proper*, is a removal out of one proper place into another, which hereby becomes proper, as being possessed by this body alone, in exclusion of all others. Such is the *motion* of a wheel in a clock.

MOTION, *improper, extraneous, foreign*, or *common*, is the passage of a body out of one common place into another common place. Such is that of a clock when moving in a ship, &c.

The reason of all this diversity seems to arise from the not attending to the different meanings of the words, but comprizing all in one definition and division; which they should rather have distinguished into several parts.

Some, e. gr. in their definitions of *motion*, consider the

moving

moving body, not as it regards the adjacent bodies, but as it regards immoveable and infinite space. Others, again, consider the moving body, not as it regards infinite space, but as it regards other bodies vastly remote. And others, lastly, consider the moving body, not as it regards remote bodies, but that surface only to which it is contiguous.

But these various meanings being once settled, the dispute clears up. For as every thing that moves may be considered in these three several manners; there hence arise three several kinds of *motion*: wherein that which regards the parts of infinite immoveable space, without consideration of the circumambient bodies, may be called *absolutely and truly proper motion*.

That, which regards circumambient bodies vastly remote, which may themselves possibly be moved, we call *relatively common motion*.

The last, which regards the surfaces of the next contiguous bodies, inasmuch as it may want all both absolute and common *motion*, we call *relatively proper motion*.

MOTION, *absolutely and truly proper*, then, is the application of a body to different parts of infinite and immoveable space.

This alone is *proper and absolute motion*, being always generated and changed by forces impressed on the moving body itself, and by those only; and being that to which the real forces of all bodies to put others in *motion* by impulse, are owing, and to which those *motions* are proportioned. But this *motion* we cannot investigate or determine accurately; nor can we distinguish, when two bodies are impelled on each other, in which of the two (e. gr. that which appears to move the more swiftly, or the other, which appears to move more slowly, and perhaps even to be at rest) the real *motion*, and, consequently, the real force whence the impulse arose, is placed; not being able to determine whether the centre of gravity of the whole system (which is but a point in infinite space) is itself at rest, or in *motion*.

MOTION, *relatively common*, is a change of the situation of a body with respect to the other remote circumambient bodies: and this is the *motion* we speak of, when we say, that men, cities, and the earth itself move round the sun. This is also the *motion* we mean, when we estimate the quantity of *motion*, and the FORCE any body has to impel another. For instance; if a wooden sphere, filled with lead, to make it the heavier, be dropped from the hand; we use to estimate the quantity of *motion*, and the force which the sphere has to impel another, by the celerity of the sphere, and the weight of the included lead; and that truly with regard to the force itself, and the effect thereof, as it falls under our senses. But whether the real power or *motion* be in the sphere which appears to strike, or in the earth which appears to be struck; that, as has been observed above, we cannot determine.

MOTION, *relatively proper*, is the successive application of a body to the different parts of the contiguous bodies.

And this is the *motion* usually understood in physical disputes about the natures of particular things; as when we say, that heat, sound, fluidity, &c. consist in *motion*. This must be added, however, that by successive application of a body, its whole surface, taken together, must be conceived successively applied to different parts of the contiguous bodies.

From these several definitions of *motion* arise as many definitions of place: for when we speak of *motion* (or rest) *truly and absolutely proper*; then place is that part of infinite and immoveable space which the body fills. When of *motion relatively common*; then place is a part of any space or moveable dimension. When of *motion relatively proper* (which is really very improper); place is then the surface of the next adjacent bodies, or sensible spaces.

The definition of rest is pretty well agreed on; but whether rest be a mere privation of *motion*, or any thing positive, is warmly disputed. Malebranche, and others, maintain the former side of the question; Cartes, and others, the latter. These last contend, that a body at rest has no power to persevere in that rest, nor to resist any bodies that would destroy it; and that *motion* may as well be called a cessation of rest, as rest of *motion*.

The main argument urged by the former is this: Suppose a globe at rest, and suppose God cease to will its rest; what will be the consequence? It will rest still. Let it be in *motion*, and let God cease to will its *motion*; what will be the consequence? it will cease to move; that is, it will be at rest: because the power whereby a body in *motion* perseveres in that state, is the positive will of God; that whereby the quiescent body perseveres, is only his privative will.

But this is a *petitio principii*: for the force or conatus whereby bodies, whether moving or quiescent, persevere in their states, is the mere inactivity of matter; and therefore, were it possible for God not to will any thing, a body already in *motion* would move for ever; as a body at rest would rest for ever. To this inactivity of matter it is owing, that all bodies resist according to their quantities of matter; and that any body striking another with any given velocity, will move it in the same proportion which its density, or quantity of matter, has to the density, or quantity of matter, of the other.

Motion has ever been esteemed a species of quantity; and its *quantum*, or greatness, which we otherwise call its *momentum*, is estimated partly from the length of the line which the moving body describes (as if a body pass over a line of a hundred feet, the quantity of its *motion* is greater than if it passed over only ten feet), and partly from the quantity of the matter moved together, or at the same time; i. e. not from the bulk or extension of the body, but from its mass or weight; the air, and other subtile matters wherewith the pores are filled, not entering into the account: as if a body of two cubic feet run over a line of a hundred feet, the quantity of its *motion* is greater than that of a body of one cubic foot describing the same line: for whatever *motion* one whole has, that is half in one half of the other; and the *motion* of the whole is the sum of the *motion* of all its parts. See FORCE.

Hence it follows, that for two unequal bodies to have equal *motions* or momentums, the lines which they pass over must be in a reciprocal proportion of their masses or weights; i. e. if any body have three times the quantity of matter that another has, the line that it runs over must be one-third of the line run over by the other. If two bodies, then, fastened to the two extremities of a balance or lever, have their masses in reciprocal ratio of their distances from the fixed point, when these are moved, they must describe lines in a reciprocal ratio of these masses.

For instance, if the body A, (*Tab.* V. *Mechanics, fig.* 73.) have three times the mass or weight of B, and each be fastened to the extremes of the lever AB, whose fulcrum or fixed point is C, in such manner as that the distance BC is thrice the distance CA, the lever cannot incline either way, but the space which the less body moves, BE, will be thrice the space AD, which the greater moves: so that their motions will be equal. Nor is there any reason why the body A, tending downwards, should with four degrees of *motion*, should raise the body B, rather than B, tending downwards likewise, with the same four degrees of *motion*, should raise the body A: they will therefore be in æquilibrio. On which foundation depends the whole doctrine of MECHANICS.

Hence that great problem of Archimedes, with any given power, how small soever, to raise any weight given, how great soever. For by increasing the distance CB infinitely, the power of the body B will be increased infinitely.

It is allowed on all hands, that *motion* is no essential attribute of matter: and hence arises a dispute about its *production*, and to what cause its *continuation* is owing.

MOTION, *for the general laws of*, see *Laws of* NATURE.

MOTION, *quantity of, whether always the same?* The CARTESIANS maintain, that the Creator at the beginning impressed a certain quantity of *motion* on bodies; and that under such laws, as that no part of it should be lost, but the same portion of *motion* should be constantly preserved in matter: and hence they conclude, that if any moving body strike on any other body, the former loses no more of its *motion* than it communicates to the latter. This principle Sir Isaac Newton overturns in the following words: "From the various compositions of two *motions*, "it is manifest there is not always the same quantity of "*motion* in the world; for if two balls, joined together "by a slender wire, revolve with an uniform *motion* about "their common centre of gravity, and at the same time "that centre be carried uniformly in a right line drawn "in the plane of their circular *motion*, the sum of the *mo-* "*tion* of the two balls a soften as they are in a right line, "drawn from their common centre of gravity, will be great- "er than the sum of their *motions* when they are in a line "perpendicular to that other. Whence it appears, that "*motion* may be both generated and lost. But by reason "of the tenacity of fluid bodies, and the friction of "their parts, with the weakness of the elastic power in "solid bodies, nature seems to incline much rather to the "destruction, than the production of *motion*; and, in "reality, *motion* becomes continually less and less. For "bodies which are either so perfectly hard, or so soft, "as to have no elastic power, will not rebound from each "other: their impenetrability will only stop their motion. "And if two such bodies, equal to each other, be carried "with equal, but opposite *motions*, so as to meet in a "void space, by the laws of *motion* they must stop in the "very place of concourse, lose all their *motion*, and be "at rest for ever; unless they have an elastic power to "give them a new *motion*. If they have elasticity enough "to enable them to rebound with $\frac{1}{4}$, or $\frac{1}{2}$, or $\frac{3}{4}$, of the "force wherewith they meet, they will lose $\frac{3}{4}$, or $\frac{1}{2}$, or "$\frac{1}{4}$,

" I, of their *motion*. And this is confirmed by experiments: for if two equal pendulums be let fall from equal heights, so as to strike full on each other; if those pendulums be of lead, or soft clay, they will lose all, or almost all, their *motion*; and if they be of any elastic matter, they will only retain so much *motion* as they receive from their elastic power." If it be asked, how it happens, that *motion* being thus continually lost, should be continually renewed again; the same author adds, that it is renewed from some active principles, "Such as the cause of gravity, whereby the planets and comets preserve their *motion* in their orbits, and all bodies acquire a great degree of *motion* in falling; and the cause of fermentation, whereby the heart and blood of animals preserve a perpetual warmth and *motion*; the inner parts of the earth are kept continually warmed; many bodies burn and shine; and the sun himself burns and shines, and with his light warms and cherishes all things:" (as also from the cause of elasticity, by which bodies restore themselves into their former figures) "for we find but little *motion* in the world, except what plainly flows, either from these active principles, or from the command of the maker." The preservation of the same quantity of *motion* in the universe, was a principle laid down universally by Descartes; but has been found false, and holds true only in the same direction, which is thus expressed by Sir Isaac Newton: "The quantity of *motion*, which is collected by taking the sum of the *motions* directed towards the same parts, and the difference of those that are directed to contrary parts, suffers no change from the action of bodies among themselves." Newt. Princip. lib. i. See ante.

Some philosophers, after Descartes, have supposed the preservation of the same force or *vis viva*. See the articles FORCE and VIS *viva*.

But this holds only in elastic bodies, when there is a shock; and hence those philosophers have been led to maintain, that all bodies were elastic, at least in their elements, and that an inflexible body was impossible, being repugnant to the law of continuity. See CONTINUITY.

MOTION, *a to the continuation of*, or the cause why a body once in *motion* comes to persevere in it: this has been extremely controverted among physical writers; and yet it follows very evidently from one of the grand *laws of* NATURE; viz. that all bodies persevere in their present state, whether of rest or *motion*, unless disturbed by some foreign powers. *Motion* therefore, once begun, would be continued *in infinitum*, were it to meet with no interruption from external causes; as the power of gravity, the resistance of the medium, &c. So that Aristotle's principle, every thing in *motion* affects rest, is groundless. Nor has the COMMUNICATION *of motion*, or the manner how a moving body comes to affect another at rest, or how much of its motion is communicated by the first to the last, been less disputed. See the laws thereof under the word PERCUSSION.

MOTION, we have observed, is the subject of mechanics; and mechanics is the basis of all natural philosophy; which hence becomes denominated *mechanical*.

In effect, all the phenomena of nature, all the changes that happen in the system of bodies, are owing to *motion*; and are directed according to the laws thereof.

Hence, the modern philosophers have applied themselves with peculiar ardour to consider the doctrine of *motion*; to investigate the properties, laws, &c. thereof; by observation, experiment, and the use of geometry. And to this we owe the great advantages of the modern philosophy above that of the ancients; who were extremely disregardful of *motion*; notwithstanding that they seemed so sensible of its importance, that they defined nature by the first principle of *motion*, and rest of the substance wherein it is.

Among all the ancients there is nothing extant on *motion*, excepting some things in Archimedes's books, De æquoponderantibus. To Galileo a great part of the doctrine of *motion* is owing: he first discovered the general laws of *motion*, and particularly of the descent of heavy bodies, both at liberty and on inclined planes; the laws of the *motion* of projectiles; the vibrations of pendulums, and stretched chords, with the theory of resistances, &c. which were things the ancients had little notion of.

His disciple, Torricelli, polished and improved the discoveries of his master; and added to them divers experiments concerning the force of percussion, and the equilibrium of fluids. M. Huygens improved very considerably on the doctrine of the pendulum; and both he and Borelli on the force of percussion. Lastly, Newton, Leibnitz, Varignon, Mariotte, &c. have brought the doctrine of *motion* still much nearer to perfection.

The general laws of *motion* were first brought into a system, and analytically demonstrated together, by Dr. Wallis, Sir Christopher Wren, and M. Huygens, all much about the same time; the first in bodies not elastic, and the two last in elastic bodies. Lastly, the whole doctrine of *motion*, including all the discoveries both of the ancients and moderns on that head, was given by Dr. Wallis in his Mechanics, five de Motu, published in 1670.

MOTION may be considered either as *equable*, and *uniform*; or as *accelerated*, and *retarded*. *Equable motion*, again, may be considered either as *simple*, or as *compound*; and *compound motion* either as *rectilineal*, or as *curvilineal*.

And all these, again, may be considered either with regard to themselves, or with regard to the manner of their production, and communication, by percussion, &c.

MOTION, *equable*, is that wherein the moving body proceeds with the same uninterrumpting velocity.

The laws of *equable motion* are as follow; the reader being only to observe, by the way, that *mass*, or quantity of matter, is expressed by M; *momentum*, or the quantity of *motion* or impetus, by I; *time*, or the duration of *motion*, by T; *velocity*, or its swiftness, by V; and *space*, or the line it describes, by S.

Thus, if the space be $=s$, and the time $=t$; the velocity will be expressed by $\frac{s}{t}$. And if the velocity $=v$, and the mass $=m$; the momentum will likewise be $=vm$.

MOTION, *laws of uniform or equable*. 1. The velocities V and v of two bodies, moving equably, are in a ratio compounded of the direct ratio of the spaces S and s, and the reciprocal ratio of the times T and t.

For $V = \frac{S}{T}$, and $v = \frac{s}{t}$:

Therefore, $V : v :: \frac{S}{T} : \frac{s}{t}$.

And $V : v :: S : s :: T : t$; consequently $V \times T = v \times S$.

This, and the following theorems, may be illustrated in numbers, thus: suppose a body A, whose mass is as 7, that is 7 pounds, in the time of 3 seconds, passes over a space of 12 feet; and another body B, whose mass is as 5, in the time of 8 seconds, passes over a space of 16 feet: we shall then have $M=7$, $T=3$, $S=12$; $m=5$, $t=8$, $s=16$. And therefore $V=4$, $v=2$. The case then will stand thus:

$$V : v :: S : s :: T : t$$
$$4 : 2 :: 12 \times 8 : 16 \times 3 :: 4 : 2.$$

Hence, if $V=v$, then will $S=s$; T : therefore $S :: T : t$. That is, if two bodies move equably, and with the same velocities, their spaces are as the times.

The corollaries may be illustrated by numbers, in like manner as the theorems. Thus suppose $S=12$, $T=6$, $s=8$, $t=4$. Then will $V = \frac{12}{6} = 2$, and $v = \frac{8}{4} = 2$.

Consequently V being $=v$

$$S : s :: T : t$$
$$12 : 8 :: 6 : 4.$$

If $T=t$, $S : s :: V : v$: i. e. the spaces will be as the velocities.

If $V=v$, and also $t=T$, then will $S=s$; and so the bodies, moving equably, will describe equal spaces in equal times.

2. The spaces S and s, over which two bodies pass, are in a ratio compounded of the ratio of the times T and t, and of the velocities V and v.

For $V : v :: S : s :: T$

Therefore $V \times T = S \times$

And $S : s :: V T : v t$.

In numbers, $12 : 16 :: 4 \times 3 : 2 \times 8 :: 12 : 16$.

Hence, if $S=s$, $VT=vt$, so that $V : v :: t : T$. That is, if two bodies, moving equably, describe equal spaces; their velocities will be in a reciprocal ratio of their times. In numbers, if we suppose $S=12$, and $s=12$. Because $S=VT$ and $s=vt$; if $V=2$ and $v=3$, $T=6$ and $t=4$.

So that we have $V : v :: t : T$

$$2 : 3 :: 4 : 6.$$

Farther, if $t=T$, then will $V=v$; and therefore bodies which move equably, describe equal spaces in equal times, and have their velocities equal.

If $V : v :: T : t$; then $V t = v T$; and multiplying the equal quantities $V \times T$ and $v \times t$, by T, and dividing the products by $V t$ and $v T$, we shall have $: T T = S t ::$ and $S : s :: T T : t t$, or the spaces as the squares of the times.

3. The momenta, or quantities of *motion*, of two bodies moving equably, I and i, are in a ratio compounded of the velocities V and v, and the masses or quantities of matter M and m.

For $I = VM$, and $i = vm$; therefore $I : i :: VM : vm$; that is, the ratio I to i is compounded of the ratio of V to v, and of M to m.

If I=*i*, then will VM=*vm*; and therefore V : *v* :: *m* : M. That is, if the moments of two bodies, moving equably, be equal; the velocities will be in a reciprocal ratio of their masses.

And therefore if M=*m*, V=*v*; that is, if the moments and masses of two moving bodies be equal; their velocities are also equal.

4. The velocities V and *v* of two bodies, moving equably, are in a ratio compounded of the direct ratio of their momenta I and *i*, and the reciprocal one of their masses M and *m*.

Since I : *i* :: VM : *vm*

I*vm*=*i*VM

Therefore V : *v*=I*m* : *i*M.

In numbers, 4 : 2 :: 28×5 : 10×7 :: 4×1 : 2×1 :: 4 : 2. Hence, If V=*v*, then I*m*=*i*M; and therefore I : *i*=M : *m*; that is, if two bodies move equably, and with the same velocity, their momenta will be in the same ratio with their masses. If M=*m*, I=*i*; and therefore if two bodies, that have the same masses, move equably, and with equal velocity, their momenta are equal.

5. In an equable *motion*, the masses of the bodies M and *m* are in a ratio compounded of the direct ratio of their momenta, and the reciprocal ratio of their velocities V and *v*.

For, since I : *i* :: VM : *vm*

I*vm*=*i*VM

Therefore M : *m*=I*v* : *i*V.

In numbers, 7 : 5 :: 28×2 : 10×2 :: 7×1 : 5×1 :: 7 : 5. If M=*m*, then will I*v*=*i*V; and therefore I : *i*=V : *v*. That is, if two bodies, moving equably, have their masses equal, their moments will be as their velocities.

In numbers, suppose I=12, *i*=8, M=4, *m*=4; then will $V = \frac{12}{4} = 3$, and $v = \frac{8}{4} = 2$.

Therefore 1 : *i* :: V : *v*.

12 : 8 :: 3 : 2.

6. In an equable *motion*, the momenta I and *i* are in a ratio compounded of the direct ratios of the masses M and *m*, and the spaces S and *s*, and the reciprocal ratio of the times T and *t*.

For because V : *v* :: S : *s* : T

And I : *i* :: VM : *vm*

Therefore VI : *vi* : : VMS*t* : *vm*S T

And I : *i* : : MS*t* : *m*S T.

Hence, if I=*i*, then will MS*t*=*m*S T; and therefore M : *m* : : S T, S : : *m* T : M *t*, and T : *t* :: MS : *m* : *t*; that is, if two bodies, moving equably, have their momenta equal, 1. Their masses are in a ratio compounded of the direct ratio of the times, and the reciprocal one of their spaces. 2. Their spaces are in a ratio compounded of the direct ratio of the times, and the reciprocal one of their masses. 3. Their times are in a ratio compounded of their masses, and their spaces.

Farther, if M=*m*; then will S T=S *t*; and therefore S : *s*=T : *t*; that is, if two bodies, moving equably, have their momenta and their masses equal, their spaces are as their times.

Again, if T=*t*, then will S=*s*. The two moving bodies therefore, whose masses and momenta are equal, describe equal spaces in equal times.

If besides I=*i*, S=*s*, then will *m* T=M *t*; and therefore M : *m* : : T : *t*; that is, if two moving bodies, whose momenta are equal, pass over equal spaces, their masses are proportionable to their times.

Farther, if T=*t*, then will M=*m*; and therefore bodies, whose momenta are equal, and which, moving equably, describe equal spaces in equal times, have their masses equal.

If besides I=*i*, T=*t*; then will MS=*ms*; and therefore S : *s* : : *m* : M; that is, the spaces passed over in the same time, by two moving bodies, whose momenta are equal, are in a reciprocal ratio of their masses.

7. In an equable *motion*, the spaces S and *s* are in a ratio compounded of the direct ratios of the momenta I and *i*, and times T and *t*; and the reciprocal one of the masses M and *m*.

For because I : *i* : : MS *t* : *m* S T,

I*m* S T=*i*MS*t*.

Wherefore S : *s* : : IT *m* : *i* t M.

In numbers, 12 : 16 : : 3×28×5 : 8×10×7 : : 3×4×1 : 8×2×1 : : 12 : 16.

Hence, if S=*s*, IT*m*=*i*t M; and therefore I : *i* : : tM : T*m*, M : *m* : : I T : *t*, T : *t* : : M : I*m*. If two bodies therefore move equably over equal spaces, 1. Their momenta will be in a ratio compounded of the direct ratio of the masses, and the reciprocal one of the times. 2. Their masses will be in a ratio compounded of the momenta, and the times. 3. The times will be in a ratio compounded of the direct ratio of the masses, and the reciprocal one of the momenta.

If besides S=*s*, M=*m*; then will I T=*i* t; and therefore I : *i* : : : T. That is, bodies whose masses are equal, have their momenta reciprocally proportionable to the times in which they move over equal spaces.

If besides S=*s*, T=*t*; then will M=*m*; and I : *i* : : M : *m*; and therefore two bodies moving equably, and through equal spaces in equal times, have their momenta proportionable to their masses.

8. Two bodies, moving equably, have their masses M and *m*, in a ratio compounded of the direct ratios of the momenta I and *i*, and the times T and *t*, and the reciprocal one of the space *s* and S.

For because I : *i* : : : MS : *m* t T, I *m* t T=*i* MS *t*.

Wherefore M : *m* : : I T : : *t* S.

In numbers, 7 : 5 : : 3×28×16 : 8×10×12 : : 3×7×2 : 1×10×3 : : 7 : 5.

Hence, if M=*m*, then will I T=*i* t S; and therefore, I : *i* : : S T, S : : : I T : *i* t, and T : *t* : : S : I. That is, in two moving bodies, whose masses are equal; 1. The momenta are in a ratio compounded of the direct ratio of the spaces, and the reciprocal one of the times. 2. The spaces are in a ratio compounded of the momenta and the times. 3. The times are in a ratio compounded of the direct ratio of the spaces, and the reciprocal one of the momenta. If beside M=*m*, T=*t*, then will *i* S=I *s*; and therefore I : *i* : : S : *s*. That is, the momenta of two bodies, whose masses are equal, are proportional to the spaces passed over in equal times.

9. In equable *motion*, the times T and *t* are in a ratio compounded of the direct ratios of the masses M and *m*, and the spaces S and *s*, and the reciprocal one of the momenta I and *i*.

For because I : *i* : : : MS : *m* s T, I *m* s T=*i* MS *t*.

Wherefore T : *t* : : : MS : I *m* s.

Hence, if T=*t*, *i* MS=I *m* s; and therefore I : *i* :: MS : *m* s, M : *m* : : I : *i* S; and S : *s* : : I *m* : *i* M. That is, if two bodies, moving equably, describe equal spaces in equal times; 1. Their momenta will be in a ratio compounded of the masses, and the spaces. 2. Their masses will be in a ratio compounded of the direct ratio of the momenta, and the reciprocal one of the spaces. 3. The spaces will be in a ratio compounded of the direct ratio of the momenta, and the reciprocal one of the masses.

MOTION, *accelerated*, is that which continually receives fresh accessions of velocity. It is said to be *uniformly accelerated*, when in equal times its accessions of velocity are equal.

MOTION, *retarded*, is that whose velocity continually decreases. It is said to be *uniformly retarded*, when its decrease is continually proportional to the time.

MOTION, *laws of, uniformly accelerated and retarded*. It is an axiom, that a body once at rest will never move, unless some other body put it in *motion*; and when once in *motion*, it will continue for ever to move with the same velocity, and in the same direction, unless it be forced from its state by some other cause. This is evident from that fundamental axiom in philosophy, that nothing happens without a sufficient cause.

It follows, that a body, moved by one only impulse, must proceed in a right line. If then it be carried in a curve, it must be acted on by a double power; one, whereby it would proceed in a right line; another, whereby it is continually drawn out of it.

If the action and re-action of two *(mutuallie)* bodies be equal, there will no *motion* ensue; but the bodies, after collision, will remain at rest, by each other.

If a moving body be impelled in the direction of its *motion*, it will be accelerated; if by a resisting force, it will be retarded. Heavy bodies descend with an accelerated *motion*.

10. If a body move with an uniform accelerated velocity, the spaces will be in a duplicate ratio of the times.

For, let the velocity acquired in the time *t* be=*v*, then will the velocity acquired in the time 2 *t*=2 *v*, in the time 3 *t*=3 *v*, &c. and the spaces corresponding to those times, *t*, 2 *t*, 3 *t*, &c. will be as *v t*, 4 *v t*, 9 *v t*, &c. The spaces therefore are as 1. 4. 9, &c. and the times as 1. 2. 3, &c. that is, the spaces are in a duplicate ratio of the times. Hence, in a *motion* uniformly accelerated, the times are in a subduplicate ratio of the spaces.

11. The spaces passed over by a body uniformly accelerated, increase, in equal times, according to the unequal numbers 1. 3. 5. 7, &c.

For, if the times, wherein a moving body, equably accelerated, proceeds, be as 1. 2. 3. 4. 5, &c. the space passed over in one moment, will be as 1, in 2 moments as 4, in 3 as 9, in 4 as 16, in 5 as 25, &c. *(Laws* 10). If therefore you subtract the space passed over in one moment, viz. 1. from that passed over in two moments. 4. there will remain the space correfponding to the fecond moment, viz. 3. In the fame manner may be found the

ſpace paſſed over in the third moment, 9−4=5. The ſpace correſponding to the fourth moment, 16−9=7; and ſo of the reſt. The ſpace of the firſt moment therefore is as 1, that of the ſecond as 3, that of the third as 5, of the fourth as 7, of the fifth as 9, &c. Therefore the ſpaces paſſed over by a body, moving with an uniformly accelerated *motion* in equal times, increaſe according to the unequal numbers, 1, 3, 5, 7, 9, &c.

12. The ſpaces paſſed over by a body equably accelerated are in a dupliçate ratio of the velocities.

For, ſuppoſing the velocities to be V and *v*, the times T and *t*, and the ſpaces S and *s*; then will V : *v* :: T : *t*. Wherefore, ſince S : *s* :: T^2 : *t*^{2}, *(Law 10.)* S : *s* :: V^2 : *v*^{2}.

Wherefore, in a *motion* uniformly accelerated, the velocities are in a ſubdupliçate ratio of the ſpaces.

13. Heavy bodies deſcend with an uniformly accelerated *motion*, in a medium void of reſiſtance, if the ſpaces be not very great. For, ſince heavy bodies deſcend with an accelerated velocity, the power of gravity muſt continually impel them. But the power of gravity is found the ſame at all diſtances from the earth where the experiment can be made. Therefore heavy bodies muſt be driven downwards in the ſame manner in equal times. If then, in the firſt moment of time, they be impelled with the velocity *v*, they will be impelled with the ſame velocity *v* in the ſecond moment, and with the ſame in the third, fourth, &c. moments. Now the medium being ſuppoſed void of all reſiſtance *(by Hypoth.)* they will ſtill retain the velocity they acquire; and by reaſon of their equal freſh acquiſitions every minute, they will deſcend with a *motion* uniformly accelerated.

Hence, the ſpaces of deſcent are in a duplicate ratio of their times, and alſo of their velocities, and increaſe according to the uneven numbers 1, 3, 5, 7, 9, &c.

The times, and likewiſe the velocities, are in a ſubduplicate ratio of the ſpaces. See the laws of accelerated *motion*, otherwiſe illuſtrated and evinced under ACCELERATION, and *laws of the* DESCENT *of bodies*.

14. If a heavy body fall through a medium void of reſiſtance, and from a height not very great; the ſpace it paſſes over is the ſubduple of that which it would paſs over by an uniform *motion* in the ſame time, with the velocity it has acquired at the end of its fall.

For, let the right line AB *(Tab. V. Mechanics, fig. 74.)* repreſent the whole time of a heavy body's deſcent; and let this be divided into any number of equal parts; to the abſciſſes AP, AQ, AS, AB, draw the right lines PM, QI, SH, BC, which may be as the velocities acquired, in thoſe times, in the deſcent. Since then AP : AQ :: PM : QI, AP : AS :: PM : SH, &c. (Euc. VI. 2). If then the altitude of the triangle ABC be conceived to be divided into equal parts infinitely ſmall; the *motion* being uniform in a moment of time infinitely ſmall; the little area P*p*×PM may be conſidered as the ſpace paſſed over in the little moment of time P*p*. Therefore the ſpace paſſed over in the time AB, will be as the ſum of all the little areas, i. e. as the triangle ABC. But the ſpace that would be deſcribed in the ſame time AB with the uniform velocity BC, being as the rectangle ABCD, it will be to the other ſpace as 2 to 1. (Euc. I. 41).

Hence the ſpace paſſed over in half the time AB, with the velocity BC, is equal to the ſpace which the heavy body paſſes over from a ſtate of reſt in the whole time AB.

Hence, alſo, the time wherein a heavy body falls from any given altitude being given; it is eaſy to determine the ſpaces it paſſes over in each part of that time. For the method of doing this, ſee *laws of the* DESCENT *of bodies*.

15. If a body proceed with a *motion* uniformly retarded, it will paſs over half the ſpace which it would deſcribe in the ſame time by an equable *motion*.

For, ſuppoſe the given time divided into any number of equal parts; and draw the right lines BC, SH, QI, PM, thereto, which are to be as the velocities correſponding to the parts of time, BS, BQ, BP, BA; ſo as letting fall the perpendiculars HE, IF, MG, the right lines CE, CF, CG, CB, may be as the velocities loſt in the times, HE, FI, GM, AB; that is, BS, BQ, BF, BA. Since CE : CF :: EH : FI, CG : CB :: GM : BA, ABC will be a triangle (Euc. III. 1). If B*b*, therefore be a moment of time infinitely ſmall, its *motion* will be uniform; and therefore the ſpace deſcribed by the moving body will be as the little area B*b* *c*. The ſpace, therefore, deſcribed in the time AB is as the triangle ABC; viz. as the ſum of all the little areas B*b* *c*. Now the ſpace deſcribed by the body moving uniformly with the velocity BC in the time AB, is as the rectangle ABCD: therefore the former is half of this (Euc. I. 41.)

16. The ſpaces deſcribed by a *motion* uniformly retarded, in equal times, decreaſe according to the unequal numbers 7, 5, 3, 1.

For, ſuppoſe the moving body in the firſt inſtant of time to paſs over ſeven feet; I ſay, that in the ſecond, if it be equally retarded, it will paſs over 5; in the third, 3; and in the fourth, 1. For, let the equal parts of the axis of the triangle BS, SQ, QP, PA, be as the times; the ſemi-ordinates BC, SH, QI, PM, as the velocities at the beginning of any time; the traperia BSHC, SQIH, QPMI, and the triangle PAM, as the ſpaces deſcribed in thoſe times. Let then BC=4, and BS=SQ=QP=PA=1. Then will SH=3, QI=2, PM=1, *(Law 13.)* BSHC=(4+3)÷2=$\frac{7}{2}$. SQIH=(3+2)÷2=$\frac{5}{2}$. QPMI=(2+1)÷2=$\frac{3}{2}$ PAM=$\frac{1}{2}$. Conſequently the ſpaces deſcribed in equal times are as $\frac{7}{2}$, $\frac{5}{2}$, $\frac{3}{2}$, $\frac{1}{2}$, that is as 7, 5, 3, 1.

For the cauſe, &c. of the acceleration of MOTION, ſee GRAVITY, and ACCELERATION.

For the cauſe, &c. of retardation, ſee RESISTANCE, and RETARDATION.

The laws wherein MOTION *is communicated* by the colliſion and percuſſion of bodies, are very different, as the bodies are either *elaſtic* or *unelaſtic*, and as the direction of the ſtroke is either *oblique* or *direct*. See PERCUSSION.

MOTION, *ſimple*, is that produced by ſome one power.

MOTION, *compound*, is that produced by ſeveral conſpiring powers. See COMPOUND, and COMPOSITION *of motion*. Powers are ſaid to *conſpire*, when the direction of the one is not oppoſite to that of the other; as when the radius of a circle is imagined to whirl round on its centre, and a point in the ſame radius is at the ſame time ſuppoſed impelled ſtrait along it.

All *curvilinear motion* is compound; as all ſimple *motion* is rectilinear.

17. If a moving body, *(Tab. Mechanics, fig. 76.)* be acted on by a double power; the one according to the direction AB, the other according to AC; with the *motion* compounded thereof, it will deſcribe the diagonal of a parallelogram AD; whoſe ſides AB and AC it would have deſcribed in the ſame time with each of the reſpective powers apart.

For, if the body A were only acted on by the force impreſſed along AB, in the firſt inſtant of time it would be in ſome point of the right line AB, as in H, and ſo in the line HL parallel to AC; if it were only acted on by the power impreſſed in the direction AC, it would in the ſame inſtant of time be in ſome point of the line AC, as in I, and ſo in the line IL parallel to AB. But ſince the directions of the powers are not oppoſite to each other, neither of them can impede the other; and therefore the body in the ſame inſtant of time will arrive both at the lines HL and IL; and will conſequently be in the point L, where the two meet. In the ſame manner it appears, that if KM and MG be drawn parallel to AB and AC, the body in the ſecond inſtant of time will be in M, and at length in D. Q. E. D.

This important law of *motion* may be farther illuſtrated by ſuppoſing the ſpace EFGH, *(Tab. V. Mechanics, fig. 75.* to be carried uniformly forward in the direction AB, and with a velocity repreſented by AB. Let a *motion* in the direction AD, and meaſured by the right line AD, be impreſſ upon the body A in the ſpace EFGH. To thoſe who are in this ſpace, the body A will appear to move in the right line AD; but its real or abſolute *motion* will be in the diagonal AC of the parallelogram ABCD; and it will deſcribe AC in the ſame time that the ſpace by its uniform *motion*, or any point of it, is carried over a right line equal to AB, or that the body A, by its *motion* acroſs the ſpace, deſcribes AD. For it is manifeſt, that the line AD, in conſequence of the *motion* of the ſpace, is carried into the ſituation BC, and the point D to C; ſo that the body A really moves in the diagonal AC. This law may alſo be confirmed by an experiment in the following manner: let there be a wooden ſquare ABCD, *fig. 76.* ſo contrived, as to have the part BEFC made to draw out or puſh into the ſquare at pleaſure. To this part let the pulley H be joined, ſo as to turn freely on an axis, which will be at H when the piece is puſhed in, and at *h* when it is drawn out. To this part let the ends of a ſtraight wire *k* be fixed, ſo as to move along with it, under the pulley; and let the ball G be made to ſlide eaſily on the wire. A thread *m* is fixed to this ball, and goes over the pulley to I; by this thread the ball may be drawn up on the wire, parallel to the ſide AD, when the part BEFC is puſhed as far as it will go into the ſquare. But, if this part be drawn out, it will carry the ball along with it, parallel to the bottom of the ſquare DC. By this means, the ball G may either be drawn perpendicularly upward by pulling the thread *m*, or moved horizontally along by pulling out the part BEFC, in equal times, and through equal ſpaces; each power acting equably and ſeparately upon it. But if, when the ball is at G, the upper end of the thread be tied to the pin I, in the corner A of the fixed ſquare, and the moveable part BEFG be drawn out, the

ball

ball will then be acted upon by both the powers together: for it will be drawn up by the thread towards the top of the square, and at the same time carried with its wire towards its right hand BC, moving all the while in the diagonal line L; and will be found at 2 when the sliding part is drawn out as far as it was before; which then will have caused the thread to draw up the ball to the top of the inside of the square, just as high as it was before, when drawn up singly by the thread without moving the sliding part.

The converse of this law is, that the *motion* in the diagonal AC, *fig.* 75. may be resolved into the *motions* in the sides of the parallelogram AB and AD. For it is manifest that if AK, *fig.* 77. be taken equal to AD with an opposite direction, and the parallelogram AKBC be completed, the right line AB shall be the diagonal of his parallelogram; consequently, the *motion* AC compounded with the *motion* AK equal and opposite to the *motion* AD, produces the *motion* AB; that is, if from the *motion* AC, in the diagonal, you subduct the *motion* AD in one of the sides, there will remain the *motion* AB in the other side of the parallelogram ABCD.

This doctrine will receive farther illustration by resolving each of the *motions* AB and AD into two *motions*, one in the direction of the diagonal AC, and the other in the direction perpendicular to it; that is, by solving, *(Tab.* III. *Mechanics, fig.* 30.) the *motion* AB into the *motions* AM and AN, and *motion* AD into the *motions* AK and AL. For the triangles ADK and BCM being equal and similar, DK is equal to BM, or AL to AN; so that the *motions* AL and AN, being equal and opposite, destroy each other's effects; and it being an obvious and general principle, that the *motion* of a body in a right line is no way affected by any two equal powers or *motions* that act in directions perpendicular to that line, and opposite to each other, it thus appears how the body A is determined to move in the diagonal AC; and, because AK is equal to MC, it appears how the remaining *motions* AM and AK are accumulated in the direction AC, so as to produce a motion measured by AC. It appears likewise how absolute *motion* is lost in the composition of *motion*; for the parts of the *motions* AB and AD that are represented by AN and AL, being equal and opposite, destroy each other's effect, and the other parts AM and AK, only, remain in the direction of the compounded *motion* AC: while, on the contrary, in the resolution of *motion*, the quantity of absolute *motion* is increased, the sum of the *motions* AB and AD, or BC, being greater than the *motion* AC. But the sum of the *motions*, estimated in a given direction, is no way affected by the composition or resolution of *motion*, or indeed by any actions or influences of bodies upon each other, that are equal and mutual and have opposite directions.

For suppose that *(Tab.* V. *Mechanics, fig.* 78.) the *motions* are to be estimated in the direction AP; let CP, BR, DQ, be perpendicular to this direction in the points P, R and Q; then the *motions* AC, AB, AD, reduced to the direction AP, are to be estimated by AP, AR, and AQ respectively, the parts which are perpendicular to AP having no effect in that direction. Let AP meet BC in S; then because RP is to SP, as BC (or AD) to CS, that is, as AQ to SP, it follows that AQ is equal to RP, and that AR + AQ is equal to AP; that is, that the sum of the *motions* AB and AD, reduced to any given direction AP, is equal to the compounded *motion* AC reduced to the same direction. From which it is obvious, that, in general, when any number of *motions* are compounded together, or are resolved, the sum of their *motions* continues invariably the same, till some foreign influence affects them.

From the above reasoning it is plain that since about every right line, as AD, *(Tab. Mathem. fig.* 26.) a parallelogram, as ABCD, may be constructed, by making two equal triangles ACD and ABD, on one common base AD; *every rectilinear motion*, which it may be of service for the demonstration, may be considered as a compound one. But as the proportion of the sides AC and CD may be various, so also may the right line AD be described by a *motion* compounded various ways; and therefore the same rectilinear *motion* may be reduced to various compound *motions*.

Hence, if a moveable body be drawn by three several powers, according to the directions BA, AD, and AC, *(Tab.* V. *Mechanics, fig.* 79.) two of which taken together are equivalent to the third; they will be to each other as the right lines DC, DA, DB, parallel to their directions; that is, reciprocally as the sines of the angles included between the lines of their directions, and the line of direction of the third: DB being to AD as the sine of the angle BAD to the sine of the angle ABD.

19. In an equable compound *motion*, the velocity produced by the conspiring powers is, to the velocity of each of the two apart, as the diagonal AD *(fig.* 76.) of the parallelogram ABDC, in the direction of whose sides they act, to either of those sides AB or AC.

For in the same time that one of the powers will carry it over the side of the parallelogram AB, and the other over AC separately, joined together they carry it over the diagonal AD. The diagonal AD, therefore, is the space described by the conspiring powers in the same time: but in an equable *motion* the velocities in the same time are as the spaces: the velocities therefore arising from the conspiring forces are to the velocity arising from either force, as AD to AB or AC.

Hence the conspiring forces thereof being given; i. e. the ratio of the velocities being given, by the lines AB and AC given in magnitude, and the direction through those lines being given in position, or by the angle of direction; the celerity and direction of the oblique *motion* is given; because the diagonal is given both in magnitude and position.

The oblique *motion* however being given, the simple ones are not, *vice versa*, given; because the same oblique *motion* may be compounded of various simple ones.

20. In a compound *motion* produced by the same forces, the velocity is greater, if the angle of direction be less; and less, if this be greater.

For, let the greater angle of direction be BAC *(Tab.* V. *Mechanics, fig.* 80.) the less FAC; since the powers are supposed the same, AC will be common to each parallelogram AFCE and BACD, and besides AB = AF. Now it is evident, that, in the case of the greater angle, the diagonal AD is described; and, in the case of the less angle, AE: and both in the same time, because AB = AF. The velocities, therefore, are as AD to AE: wherefore since AD is less than AE, the velocity in the case of the greater angle is less than that of the less angle.

Hence, since the legs AC and CE, with the included angle, being given, the angle CEA, and thence, also, AE, is found; the velocity of the conspiring powers, and the angle of direction, in any particular case, being given, the velocity of the compound *motion*, and consequently the ratio of the velocities produced by the same powers under different angles of direction, may be determined.

For the particular laws of MOTION *arising from the collision of bodies both* elastic *and* unelastic, *and that where the directions are both* perpendicular *and* oblique, see PERCUSSION.

For curvilinear MOTION, *and the laws of* projectiles, see PROJECTILE.

For the MOTION *of pendulums, and the laws of* oscillation, see PENDULUM.

MOTION, *altitude of*. See ALTITUDE.

MOTION, *longitude of*. See LONGITUDE.

MOTION, *perpetual*, in *Mechanics*, a *motion* which is supplied and renewed from itself without the intervention of any external cause: or it is an uninterrupted communication of the same degree of *motion* from one part of matter to another, in a circle or other curve returning into itself, so that the same momentum still returns undiminished upon the first mover.

The celebrated problem of a *perpetual motion* consists in the inventing a machine, which has the principle of its *motion* within itself. M. de la Hire has demonstrated the impossibility of any such machine, and finds that it amounts to this; viz. to find a body which is both heavier and lighter at the same time; or to find a body which is heavier than itself.

To find a *perpetual motion*, or to construct an engine, &c. which shall have such a motion, is a famous problem that has employed the mathematicians of two thousand years; though none perhaps have prosecuted it with attention and correctness equal to those of the present age.

Infinite are the schemes, designs, plans, engines, wheels, &c. to which this longed-for perpetual *motion* has given birth: it were as endless as impertinent to give a detail of them all.

In effect, there seems but little in nature to countenance all this avidity and expectation: among all the laws of matter and *motion*, we know of none yet, which seem to furnish any principle or foundation for such an effect.

Action and re-action are allowed to be ever equal; and a body which gives any quantity of *motion* to another, always loses just so much of its own; but under the present state of things, the resistance of the air, the friction of the parts of machines, &c. do necessarily retard every *motion*.

To keep the *motion* on foot, therefore, either, first, there must be a supply from some foreign cause; which in a perpetual *motion* is excluded.

Or, secondly, all resistance from the friction of the parts of matter must be removed; which necessarily implies a change in the nature of things.

For, by the second *law of* NATURE, the changes made

in the *motions* of bodies, are always proportional to the impreſſed moving force, and are produced in the ſame direction with it; no *motion* then can be communicated to any engine, greater than that of the firſt force impreſſed.

But, on our earth, all *motion* is performed in a reſiſting medium, and muſt therefore of neceſſity be retarded; conſequently a conſiderable quantity of its *motion* will be ſpent on the medium.

Nor is there any engine or machine wherein all friction can be avoided; there being in nature no ſuch thing as exact ſmoothneſs, or perfect congruity; the manner of the cohesion of the parts of bodies, the ſmall proportion the ſolid matter bears to the vacuities between them, and the nature of thoſe conſtituent particles not admitting it. This friction, therefore, will alſo in time ſenſibly diminiſh the impreſſed, or communicated force; ſo that a perpetual *motion* can never follow, unleſs the communicated force be ſo much greater than the generating force, as to recompence the diminution made therein by all theſe cauſes; but *ut dat quod non habet*, and the generating force cannot communicate a greater degree of *motion* than it hath itſelf.

Or, thirdly and laſtly, there muſt be ſome method of gaining a force equivalent to what is loſt, by the artful diſpoſition and combination of mechanic powers; to which laſt point, then, all endeavours are to be directed; but how, or by what means ſuch force ſhould be gained, is ſtill a myſtery!

The multiplication of powers or forces, it is certain, avails nought; for what is gained in power is ſtill loſt in time, ſo that the quantity of *motion* ſtill remains the ſame.

This is an inviolable law of nature; by which nothing is left to art, but the choice of the ſeveral combinations that may produce the ſame effect.

Although it is allowed, that, by the reſolution of force, there is a gain or increaſe of the abſolute quantity of force, as the two forces in the ſides of the parallelogram taken together exceed the force in the diagonal which is reſolved into them, yet you cannot proceed reſolving *motion* in infinitum by any machine whatſoever; but thoſe you have reſolved muſt be again compounded, in order to make a continual movement, and the gain obtained by the reſolution will be loſt again by the compoſition. In like manner, if you ſuppoſe two bodies to be perfectly elaſtic, and that the leſſer body ſtrikes the other at reſt, there will be an increaſe of the abſolute quantity of force, becauſe the ſtriking body will be reflected; but if you ſuppoſe them both to turn round any center, after the ſtroke, ſo as to meet again, this increaſe of force will be loſt, and their *motion* will be reduced to its firſt quantity. Such a gain, therefore, of force, as muſt be afterwards loſt in the actions of the bodies, can never produce a perpetual movement. There are various ways, beſides theſe, by which abſolute force may be gained; but ſince there is always an equal gain in oppoſite directions, and no increaſe obtained in the ſame direction; in the circle of actions neceſſary to make a perpetual movement, this gain muſt be preſently loſt, and will not ſerve for the neceſſary expence of force employed in overcoming friction, and the reſiſtance of the medium. We may obſerve, therefore, that though it could be ſhewn, that in an infinite number of bodies, or in an infinite machine, there could be a gain of force for ever, and a *motion* continued to infinity, it does not follow that a perpetual movement can be made. That which was propoſed by M. Leibnitz in Auguſt, 1690, in the Leipſick Acts, as a conſequence of the common eſtimation of the forces of bodies in *motion* is of this kind, and for this and other reaſons ought to be rejected.

The poſſibility of a perpetual *motion* has been urged from the following ſpecious argument. Let the height AB (*Tab.* V. *Miſcellaneous, fig.* 81.) be divided into four equal parts AC, CD, DE, EB: ſuppoſe the body A to acquire, by the deſcent AC, a velocity as 1; and this *motion*, by any contrivance, to be tranſmitted to an equal body B; then let the body A, by an equal deſcent CD, acquire another degree of motion as 1, to be tranſmitted likewiſe to the ſame body B, which in this manner is ſuppoſed to acquire a *motion* as 2, that is ſufficient to carry it upwards from B to A; and becauſe there yet remain the motions which A acquires by the deſcents DE and EB, that may be ſufficient to keep an engine in *motion*, while B and A aſcend and deſcend by turns, it is hence concluded, that a ſufficient gain of force may be obtained in this manner, *ſo as* to produce a perpetual movement. But it ſhould be conſidered, that two equal ſucceſſive impulſes, acting upon the ſame body, will not produce a *motion* in it double of that which would be generated by the firſt impulſe; becauſe the ſecond impulſe has neceſſarily a leſs effect upon the body, which is already in *motion*, than the firſt impulſe which acted upon it while at reſt. In like manner, if there is a third and fourth impulſe, the third will have leſs effect than the ſecond, and the fourth leſs than the third. Hence it appears, that a *motion* as 2, in the preceding caſe, cannot be produced in B, by the two ſucceſſive impulſes tranſmitted from A, each of which is as 1. Maclaurin's View, &c. book ii. c. 3. See ORTYTREUS's *wheel*.

MOTION, *animal*, is that whereby the ſituation, figure, magnitude, &c. of the parts, members, &c. of animals are changed.

Under theſe *motions* come all the animal funcſtions; as *reſpiration, circulation of the blood, excretion, walking*, &c. *Animal motions* are uſually divided into two ſpecies; viz. *ſpontaneous*, and *natural*.

MOTION, *ſpontaneous*, or *muſcular*, is that performed by means of the muſcles, at the command of the will; hence alſo called *voluntary motion*. See MUSCULAR *motion*.

MOTION, *natural*, or *involuntary*, is that effected without ſuch command of the will; by the mere mechaniſm of the parts.

Such is the *motion* of the heart and pulſe; the PERISTALTIC *motion* of the inteſtines, &c.

MOTION, *inteſtine*, denotes an agitation of the particles whereof a body conſiſts.

Some philoſophers will have every body, and every particle of a body, in continual *motion*. As for fluids, it is the definition they give of them, that their parts are in continual *motion*.

And as to ſolids, they infer the like *motion* from the effluvia continually emitted through their pores.

Hence *inteſtine motion* is repreſented to be a *motion* of the internal and ſmaller parts of matter, continually excited by ſome external, latent agent, which of itſelf is inſenſible, and only diſcovers itſelf by its effects; appointed by nature to be the great inſtrument of the changes in bodies.

MOTION, in *Aſtronomy*, is peculiarly applied to the orderly courſes of the heavenly bodies.

The *motion* of the earth, from weſt to eaſt, is now generally granted among aſtronomers: ſee it proved under the article EARTH.

MOTION, *mean*. See MEAN.

The *motions* of the celeſtial luminaries are of two kinds: *diurnal*, or *common*; and *ſecondary*, or *proper*.

MOTION, *diurnal*, or *primary*, is that wherewith all the heavenly bodies, and the whole mundane ſphere, appear to revolve every day round the earth, from eaſt to weſt. This is alſo called the *motion of the primum mobile*, and the *common motion*; to diſtinguiſh it from that rotation which is peculiar to each planet, &c.* It is about the various phænomena reſulting from this *motion*, that aſtronomy is chiefly employed. See DIURNAL.

MOTION, *ſecondary*, or *proper*, is that wherewith a ſtar, planet, or the like, advances a certain ſpace every day from weſt towards eaſt.

See the ſeveral *motions* of each luminary, with the irregularities, &c thereof, under the proper articles, EARTH, MOON, STAR, &c.

MOTION, *angular*. See ANGULAR.

Horary MOTION *of the earth*. See HORARY.

Paracentric MOTION *of impetus*. See PARACENTRIC.

MOTION *of trepidation*, &c. See TREPIDATION, and LIBRATION.

MOTION, in *Muſic*, denotes the manner of beating the meaſure, to haſten or ſlacken the time of the words, or notes. See TIME.

The *motion*, in ſongs compoſed in double time, differs from that in thoſe in triple time. It is the *motion* that diſtinguiſhes courants and ſarabands from gavots, borees, chacones, &c.

MOTION, *mots*, or *movements*, in the *Italian Muſic*, has many ſignifications; ſometimes it means only a *motion* or paſſage from one note to another, at whatſoever diſtance, as a ſecond, third, or any other interval; and in the ſame whether the intermediate degrees (if there are any) be ſounded, or only the extremes of them, as the firſt and laſt ſound of any given interval. Sometimes it regards the quickneſs and ſlowneſs of ſuch *motions*, as a briſk, ſlow, lively, or languid *motion*; and in this ſenſe it is uſed with regard to minuets, gavots, ſarabands, &c. See each article in its proper place.

But the moſt common, and indeed the moſt important acceptation of the word, is with reſpect to HARMONY; thoſe above deſcribed only regarding MELODY.

With regard to harmony, it is the comparing the manner wherein an upper or treble part moves from one ſound to another, with that wherein a lower or baſs-part moves; this is to be done three ways. The firſt is when the upper and lower parts both move the ſame way, either upwards or downwards, and is called *moto recto*. The ſecond is when in comparing the upper with the lower part,

the one aſcends while the other deſcends, or *à contrâ*, and hence called *motes contrarii*. The laſt is when one of the parts holds out, or continues a ſound, while the other ſtirs or falls on any note whatſoever; and this is called *mote obliquæ*.

MOTION, in the *ancient Muſic*, was uſed to ſignify the tranſition of the voice, from an acute to a grave ſound; or the contrary. This they expreſſed by κατὰ τόπον ἀνιοῦσα. See LOCUS.

Meibomius tranſlates it, *moveri in loca*.

MOTION is alſo uſed, among *Mechanics*, for the inſide of a watch, &c. more commonly called MOVEMENT.

MOTIONS, in *War*, denote the marches, countermarches, &c. which an army makes in changing its poſt.

The great ſkill of a general conſiſts in diſcovering the enemies *motions*, and concealing his own. Nothing is more dangerous than to make great *motions* before a powerful enemy, ready to come to blows. See MARCH.

MOTION, in the *Manege*. A horſe is ſaid to have a pretty *motion*, when he moves and bends his foreſlegs with great eaſe and freedom upon the manege. But if a horſe trots right out, and keeps his body ſtraight, and his head high, and bends his fore-legs handſomely, then to ſay he has a pretty *motion* with him, implies the liberty of action of the forehead.

MOTION, or EMOTION, in *Rhetoric*. See PASSION.

MOTIONS, *rythmical*, a phraſe uſed by Voſſius, and other writers on the ancient rythm, to expreſs thoſe *motions* which were made uſe of in the Greek and Roman entertainments to convey the ideas of the poet, or to aſſiſt muſic in rouſing the paſſions. Theſe not only had great force when joined with ſounds, but even without any voice or ſound they could move the paſſions in the ſpectators more than many of the beſt orators of the times could do with their moſt laboured diſcourſes.

Roſcius, the ſtage-player ſo famous in their pantomimes, which were all dumb-ſhew, was ſo excellent at expreſſion by theſe *rythmical motions*, or geſtures, that Cicero and he being cotemporaries, there were many diſputes between them, which could vary the ſame ſentence moſt; the one uſing all the power of words, the other being confined to geſtures alone.

MOTION *in court*. In the courts of chancery, king's bench, &c. *motions* are made by barriſters and counſellors at law, for what concerns their clients cauſes; and where any *motion* is made in chancery, that is not of courſe, generally an affidavit of the facts alledged muſt be read in court; and if *motions* are founded on the general rules or uſage of the court, and are not of courſe, but granted or denied as the court thinks fit, on hearing counſel on both ſides, notice is to be given in writing to the ſolicitor of the other party, or his clerk in court, expreſſing every thing to be moved for, which muſt be ſerved two days at leaſt before the day on which the *motion* is to be made; whereof affidavit muſt alſo be made.

MOTIVE is ſometimes applied to that faculty of the human mind, by which we purſue good and avoid evil. Thus Hobbes diſtinguiſhes the faculties of the mind into two ſorts, the COGNITIVE, and *motive*.

MOTORII, MOTORY *nerves*, the third pair of nerves; ſerving for the motion of the eye.

This pair is united into one near their inſertion into the brain; by which means, when one eye is moved towards any object, the other is naturally directed towards the ſame. See NERVES, and EYE.

MOTOS, *uſtus*, a piece of lint, or linen cloth, opened like wool, to be put into ulcers, to ſtop the flux of blood, &c.

MOTOS, in the *Materia Medica of the Ancients*, was a name given by Galen and others to a kind of caſſia bark, the beſt and fineſt that has been uſed at any time. The ancients were very fond of this drug, and ranged it, according to its different goodneſs, into ſeveral ſorts.

MOTRIX, ſomething that has the power or faculty of *moving*.

MOTRIX, *vis*. See VIS *motrix*, and MOTION.

MOTTO, an Italian term, literally ſignifying *word*, or *ſaying*; uſed in arms, devices, &c.

MOTTO *of an armory*, is a ſhort ſentence or phraſe carried in a ſcroll generally over, ſometimes under the arms; ſometimes alluding to the name of the bearer, ſometimes to the bearing, and ſometimes to ſome remarkable atchievement of the bearer.

The *motto*, or word, ſays Guillim, is an external ornament annexed to coat-armour; being the invention or conceit of the bearer, ſuccinctly and ſignificantly expreſſed, uſually in three or four words, which are ſet in ſome ſcroll or compartiment, placed at the foot of the eſcutcheon.

As the *motto* holds the loweſt place in arms, ſo it is the laſt in blazoning. In ſtrictneſs, it ſhould expreſs ſomething intended in the atchievement; but cuſtom has now received whatſoever be the fancy of the deviſer.

The uſe of *mottos* is very ancient; hiſtory, both ſacred and profane, furniſhing inſtances thereof. Our anceſtors made choice of *mottos* to expreſs their predominant paſſions; as of piety, love, war, &c. or ſome extraordinary adventure befallen them; moſt of which, from ſome ſuch original, have become hereditary in divers families.

The *motto* of the royal family of England is, *Dieu & mon droit*; of the royal family of Bourbon, *Eſperance*; of the order of the Garter, *Honi ſoit qui mal y penſe*, &c.

The *motto of a device* is alſo called the *ſoul of the* DEVICE.

MOTU.—*Ex motu* MOTU. See EX.

MOUCHEROLLE, in *Ornithology*, the name of a ſmall bird of the ſize of the ſparrow, and of the ſame colour, but longer bodied; its wings are of a duſkier colour than the reſt of its body, and its head is variegated with very ſmall blackiſh ſpots; its throat and belly are white, but the throat and the ſides of the breaſt and belly have a faint reddiſhneſs; the beak is black, ſtraight and ridged, ſo as to appear triangular; it feeds on flies and other inſects, and is common in gardens and orchards in many parts of England, though it has no Engliſh name. It is confounded by the common people with the common white-throat, but differs from it in that its tail is all of one colour, whereas the white-throat's is variegated. It ſomewhat reſembles alſo the BECCAFICO, or petty-chaps, but differs from it in having no greeniſh colour, and in its bill being ridged and triangular.

MOVE *in arreſt of judgment*. See ARREST.

MOVEABLE, ſomething ſuſceptible of MOTION, or that is diſpoſed to be moved. See MOTION.

A ſphere is the moſt *moveable* of all bodies, i.e. it is the eaſieſt to move; a door is *moveable* on its hinges, the magnetical needle on a pin, or pivot, &c.

Moveable is frequently uſed in contradiſtinction to *fixt*.

MOVEABLE *feaſts* are ſuch as are not always held on the ſame day of the year, or month; though they be on the ſame day of the week. See FEASTS.

Thus, Eaſter is a *moveable* feaſt; being always held on the Sunday which falls upon or next after the firſt full moon following the 21ſt of March. Vide Phil. Tranſ. N° 240, p. 185.

All the other *moveable* feaſts follow EASTER, i. e. they keep their diſtance from it, ſo that they are fixed with reſpect thereto.

Such are Septuageſima, Sexageſima, Aſh-Wedneſday, Aſcenſion-Day, Pentecoſt, Trinity-Sunday, &c. which ſee under their proper articles, SEPTUAGESIMA, &c.

MOVEABLES, or MOVEABLE *goods*, by civilians called *bona mobilia*, are thoſe which are capable of being removed from one place to another; or which may be concealed or perverted; as not being fixed to the ground, &c. See GOODS and CHATTLES.

In England, we have two kinds of effects, *moveable* and *immoveable*: the *moveable* are, ready money, merchandizes, bonds, book debts, cattle, and houſhold furniture, not faſtened either with iron or nail, nor ſealed in the plaſter, but which may be tranſported without either fraction or deterioration.

In the cuſtomary laws, they ſay, *moveables* follow the perſon, and his proper habitation; *moveables* follow the body, &c. which words have different meanings in different countries.

Sometimes they ſignify, that *moveables* go according to the cuſtom of the place where is the habitation of the deceaſed, though he die in another place; and ſometimes they ſignify that *moveables* follow the cuſtom of the place where the deceaſed died.

MOVEMENT, *motion*, a term frequently uſed in the ſame ſenſe with AUTOMATON.

The moſt uſual *movements* for keeping time are *watches* and *clocks*: the firſt are ſuch as ſhew the parts of time, and are portable in the pocket; the ſecond ſuch as perliſh it by ſounds, and are fixed as furniture. See HOROLOGY.

MOVEMENT, in its popular uſe among us, ſignifies all the inner work of a watch, clock, or other engine, which *move*, and, by that motion, carry on the deſign of the inſtrument.

The *movement* of a clock, or watch, is the inſide; or that part which meaſures the time, ſtrikes, &c. excluſive of the frame, caſe, dial-plate, &c.

The parts common to both of theſe *movements* are, the *main-ſpring*, with its appurtenances; lying in the ſpring-box, and in the middle thereof lapping about the ſpring-arbor, to which one end of it is faſtened. A-top of the ſpring-arbor is the *endleſs ſcrew*, and its wheel; but in ſpring-clocks, this is a ratchet-wheel with its click, that ſtops it. That which the main-ſpring draws, and round which the chain or ſtring is wrapped, is called the *fuſy*: this is ordinarily taper; in large works, going with weights, it is cylindrical, and called the *barrel*. The ſmall teeth at the bottom of the fuſy or barrel, which

ſtop

ſtop it in winding up, is called the *ratchet*; and that which ſtops it when wound up, and is for that end driven up by the ſpring, the *gard-goit*. The *wheels* are various: the parts of a wheel are, the *hoop* or *rim*; the *teeth*, the *croſs*, and the *collet*, or piece of braſs ſoldered on the arbor or ſpindle whereon the wheel is rivetted. The little wheels, playing in the teeth of the larger, are called *pinions*; and their teeth, which are 6, 7, 6, 8, &c. are called *leaves*; the ends of the ſpindle are called *pivots*; and the guttered wheel, with iron ſpikes at bottom, wherein the line of ordinary clocks runs, the *pulley*. We need not ſay any thing of the *band*, *ſcrews*, *wedges*, *ſtops*, &c. See WHEEL, FUSE, &c.

MOVEMENTS, *theory of calculating the numbers for*. 1. It is to be obſerved, that a wheel, divided by its pinion, ſhews how many turns the pinion has to one turn of the wheel.

2. That, from the uſe to the balance, the wheels drive the pinions; conſequently, the pinions run faſter, or make more revolutions, than the wheel; but it is the contrary from the great wheel to the dial-wheel.

3. That the wheels and pinions we write down either as vulgar fractions, or in the way of diviſion in common arithmetic: v. gr. a wheel of 60, moving a pinion of 5, is written either $\frac{60}{5}$, or better, 5)60. And the number of turns the pinion has in one turn of the wheel, as a quotient, thus, 5)60(12. A whole *movement* may be written as in the adjoining ſcheme; where the uppermoſt number expreſſes the pinion of report 4, the dial-wheel 36, and the turns of the pin. 9; the ſecond, the pinion, and great wheel; the third, the ſecond wheel, &c. the fourth, the contrat wheel; and the laſt, 12. the crown-wheel.

4	36(9
	5)55(11
	5)45(9
	5)40(8
	12.

Hence, 4. From the number of turns any pinion makes in one turn of the wheel it works in, may be determined the number of turns a wheel or pinion has at any greater diſtance, viz. by multiplying together the quotients; the produce whereof is the number of turns. Thus,

Suppoſe the wheels and pinions as in the caſe adjoining: 11 multiplied by 9, gives 99, the number of turns in the ſecond pinion 5, in one turn of the wheel 55, which runs concentrical, or on the ſame ſpindle with the pinion 5.

5)55(11	
5)45(9	
5)40(8	

Again, 99 multiplied by 8 gives 792, the number of turns the laſt pinion has in one turn of the firſt wheel 5. Hence we proceed to find, not only the turns, but the number of beats of the balance in the time of thoſe turns. For, having found the number of turns the crown-wheel has in one turn of the wheel fought, thoſe turns multiplied by its notches give half the number of beats in that one turn of the wheels. Suppoſe, v. gr. the crown-wheel to have 720 turns, to one of the firſt wheel, this number multiplied by 15, the notches in the crown-wheel, produces 10,800; half the number of ſtrokes of the balance in one turn of the firſt wheel of 80 teeth.

The general diviſion of a *movement* is, into the clock and watch-parts. See CLOCK-*work*, and WATCH-*work*. See alſo TIME-*keeper*.

MOVEMENT, in *Architecture*, is a term uſed by ſome writers to expreſs the riſe and fall, the advance and receſs, with other diverſity of form, in the different parts of a building, ſo as to add greatly to the picturesque of the compoſition. For the riſing and falling, advancing and receding, with the convexity and concavity, and other forms of the great parts, have the ſame effect in architecture, that hill and dale, fore-ground and diſtance, ſwelling and ſinking, have in landſcape; that is, they ſerve to produce an agreeable and diverſified contour, that groups and contraſts like a picture, and creates a variety of light and ſhade, which give great ſpirit, beauty, and effect, to the compoſition.

MOVER, or *firſt* MOVER. See MOBILE.

MOVER, *perpetual*. See *Perpetual* MOTION.

MOULD, or MOLD, in the *Mechanic Arts*, &c. a cavity artfully cut, with deſign to give its form, or impreſſion, to ſome ſofter matter applied therein.

Moulds are inſtruments of great uſe in ſculpture, foundery, &c.

The workmen employed in melting the mineral or metallic globe dug out of mines, have each their ſeveral *moulds*, to receive the melted metal as it comes out of the furnace; but theſe are different, according to the diverſity of metals and works. In gold mines, they have *moulds* for ingots; in ſilver mines, for bars; in copper and lead mines, for pigs or ſalmons; in tin mines, for pigs and ingots; and in iron mines, for ſows, chimney-backs, anvils, caldrons, pots, and other large utenſils and merchandizes of iron; which are here caſt, as it were, at firſt hand.

The MOULDS *of founders of large works*, as ſtatues, bells, guns, and other brazen works, are of wax, ſupported within-ſide by what they call a *core*, and covered without-ſide with a cap or caſe. It is in the ſpace which the wax took up, which is afterwards melted away to leave it free, that the liquid metal runs, and the work is formed; being carried thither through a great number of little canals, which cover the whole *mould*. See FOUNDERY.

The MOULDS *of monyers* are frames full of ſand, wherein the plates of metal are caſt that are to ſerve for the ſtriking of ſpecies of gold and ſilver. See COINING.

A ſort of concave *moulds* made of clay, having within them the figures and inſcriptions of ancient Roman coins, are found in many parts of England, and ſuppoſed to have been uſed for the caſting of money.

Mr. Baker having been favoured with a ſight of ſome of theſe *moulds* found in Shropſhire, bearing the ſame type and inſcriptions with ſome of the Roman coins, gave an account of them to the Royal Society.

They were found in digging of ſand, at a place called Ryton in Shropſhire, about a mile from the great Watling-ſtreet road. They are all of the ſize of the Roman denarius, and of little more than the thickneſs of our halfpenny. They are made of a ſmooth pot or brick clay, which ſeems to have been firſt well cleanſed from dirt and ſand, and well beat or kneaded, to render it fit for taking a fair impreſſion. There were a great many of them found together, and there are of them not unfrequently found in Yorkſhire; but they do not ſeem to have been met with in any other kingdom, except that ſome have been ſaid to be once found at Lyons. They have been ſometimes found in great numbers joined together ſide by ſide, on one flat piece of clay, as if intended for the caſting a great number of coins at once; and both theſe, and all the others that have been found, ſeem to have been of the emperor Severus. They are ſometimes found impreſſed on both ſides, and ſome have the head of Severus on one ſide, and ſome well known reverſe of his on the other. They ſeem plainly to have been intended for the coinage of money, though it is not eaſy to ſay in what manner they can have been employed to that purpoſe, eſpecially thoſe which have impreſſions on both ſides, unleſs it may be ſuppoſed that they coined two pieces at the ſame time by the help of three *moulds*, of which this was to be the middle one.

If by diſpoſing theſe into ſome ſort of iron frame or caſe, as our letter-founders do the braſs *moulds* for caſting their types, the melted metal could be eaſily poured into them, it would certainly be a very eaſy method of coining; as ſuch *moulds* require little time or expence to make, and therefore might be ſupplied with new ones as often as they happen to break.

Theſe *moulds* ſeem to have been burnt or baked ſufficiently to make them hard; but not ſo as to render them porous like our bricks, whereby they would have loſt their ſmooth and even ſurface, which in theſe is plainly ſo cloſe, that whatever metal ſhould be formed in them would have no appearance like the ſand-holes by which counterfeit coins and medals are uſually detected.

MOULDS *of founders of ſmall works* are like the frames of coiners: it is in theſe frames, which are likewiſe filled with ſand, that their ſeveral works are faſhioned; into which, when the two frames, whereof the *moulds* conſiſted, are rejoined, the melted braſs is run.

MOULDS *of letter-founders* are partly of ſteel, and partly wood: the wood, properly ſpeaking, ſerves only to cover the real *mould* which is within, and to prevent the workman, who holds it in his hand, from being incommoded by the heat of the melted metal. Only one letter or type can be formed at once in each *mould*. See *Letter*-FOUNDERY.

MOULDS, in the *Manufacture of Paper*, are little frames compoſed of ſeveral braſs or iron wires, faſtened together by another wire ſtill finer. Each *mould* is of the bigneſs of the ſheet of paper to be made, and has a rim or ledge of wood to which the wires are faſtened. Theſe *moulds* are more uſually called *frames* or *forms*.

MOULDS, *furnace and crucible makers*, are made of wood, of the ſame form with the crucibles; that is, in form of a truncated cone: they have handles of wood to hold and turn them with, when, being covered with the earth, the workman has a mind to round or faſhion his veſſel.

MOULDS *for leaden bullets* are little iron pincers, each of whoſe branches terminates in a hemiſpherical concave, which, when ſhut, form an entire ſphere. In the lips or ſides, where the branches meet, is a little jet or hole, through which the melted lead is conveyed.

MOULDS, *laboratory*, are made of wood, for filling and driving all ſorts of rockets and cartridges, &c.

MOULDS, *glaziers*. The glaziers have two kinds of *moulds*, both ſerving to caſt their lead: in the one they caſt the lead into long rods or canes fit to be drawn through the vice, and the grooves formed therein; this they ſometimes call *ingot-mould*. In the other they *mould* thoſe little

little pieces of lead a line thick, and two lines broad, fastened to the iron bars. These may be also cast in the vice.

MOULDS, *goldsmiths*. The goldsmiths use the bones of the cuttle-fish to make *moulds* for their small works; which they do by pressing the pattern between two bones, and leaving a jet or hole to convey the silver through, after the pattern has been taken out.

MOULD, among *Masons*, is a piece of hard wood or iron, hollowed within-side, answerable to the contours of the mouldings or cornices, &c. to be formed. This is otherwise called *caliber*.

MOULDS, among *Plumbers*, are the tables whereon they cast their sheets of lead. These they sometimes call simply *tables*. Besides which, they have other real *moulds*, wherewith they cast pipes without soldering. See each described under PLUMBERY.

MOULDS, among the *Glass-Grinders*, are wooden frames, whereon they make the tubes wherewith they fit their perspectives, telescopes, and other optic machines.

These *moulds* are cylinders, of a length and diameter according to the use they are to be applied to, but always thicker at one end than the other, to facilitate the sliding. The tubes made on these *moulds* are of two kinds; the one simply of pasteboard and paper; the other of thin leaves of wood joined to the pasteboard. To make these tubes to draw out, only the last or innermost is formed on the *mould*; each tube made afterwards serving as a *mould* to that which is to go over it, but without taking out the *mould* from the first. See GRINDING.

MOULDS used in basket-making are very simple, consisting ordinarily of a willow or osier turned or bent into an oval, circle, square, or other figure, according to the baskets, panniers, hampers, and other utensils intended. On these *moulds* they make, or, more properly, measure, all their work; and, accordingly, they have them of all sizes, shapes, &c.

MOULD, in *Ship-Building*, a thin flexible piece of timber, used by shipwrights, as a pattern whereby to form the different curves of the timbers, and other compassing pieces, in a ship's frame. There are two sorts of these, viz. the *bend-mould* and *bollen-mould*: the former of these determines the convexity of the timbers, and the latter their concavity on the outside, where they approach the keel, particularly towards the extremities of the vessel. The figure given to the timbers by this pattern is called their BEVELLING.

MOULDS, among *Tallow-Chandlers*, are of two kinds: the first for the common dipped candles, being the vessel wherein the melted tallow is disposed, and the wick dipped.

This is of wood, of a triangular form, and supported on one of its angles, so that it has an opening of near a foot at top: the other, used in the fabric of *mould* candles, is of brass, pewter, or tin. Here each candle has its several *moulds*. See each under CANDLE.

MOULD, among *Gold-Beaters*, a certain number of leaves of vellum, or pieces of guts, cut square, of a certain size, and laid over one another, between which they put the leaves of gold and silver which they beat on the marble with the hammer. See GOLD-*leaf*.

They have four kinds of *moulds*; two whereof are of vellum, and two of gut: the smallest of those of vellum consists of forty or fifty leaves; the largest contains a hundred: for the others, each contain five hundred leaves.

The *moulds* have all their several cases, consisting of two pieces of parchment, serving to keep the leaves of the *mould* in their place, and prevent their being disordered in beating.

MOULD, or MOLD, in *Natural History*, that kind of earth every where obvious on the surface of the ground; called also natural or mother earth. See EARTH and LOAM.

Moulds are defined by Dr. Hill to be earths composed of dissimilar particles of a loose soft texture, somewhat ductile while moist, composed of argillaceous particles separated by sand or the grit of stone, and usually found mixed with the putrefied remains of vegetable and animal substances.

Of this class of bodies there are two genera: 1. The thruttomicthes, or *moulds* of a lax friable texture; and, 2. The gloiomicthes, which are of a more tough and viscid texture. Of these there are several species; viz. the red and friable brown of the first, and the greyish-brown and heavy yellowish-brown of the second.

Moulds, according to Mr. Da Costa, are compound earths, of a loose soft texture, somewhat ductile while moist, and composed of earthy particles, mixed with the putrefied remains of animal and vegetable bodies. He distinguishes them by their colours into the black, not acted upon by acids, to which belongs the common vegetable *mould*, or garden earth; the red, which is alkaline; and the brown, some of which are not acted upon by acids, and others alkaline.

The goodness of *mould*, for the gardener's purposes, is known by the sight, smell, and touch.

Those *moulds* are accounted best which are of a bright brown, or hazel colour. This is always the colour of the best loams, and other natural earths; and this is judged the better, if the earth cut tolerably easy, and does not stick and cling to the spade, but is light, friable, and falls into small clods; and is such as naturally neither chaps and cracks in dry weather, nor turns to mortar in wet. Next to these the dark grey and russet *moulds* are accounted best; and the worst of all are the light and dark ash-colour; these are usually found on heaths and commons. The clear tawny *mould* is not by any means to be preferred; but that of a yellowish red is accounted the worst of all: this is commonly found in wild and waste places, and seldom produces any thing naturally but furze and fern.

All that lands give us to judge of them by from the smell is, that the best after rain, and after digging up, emit a good and pleasing scent. But by the touch they may be judged of with considerable accuracy; for by this may be known whether they are too sandy or too clayey; and whether they be tender, fatty, detersive, and slippery; or more harsh, gritty, porous, and friable. What we are to judge best by the touch, is the middle nature between the extremes on either side, such as will easily dissolve and break, and being made of a just proportion of sand and clay, will not stick to the spade or fingers after every light shower of rain. Miller.

To analyse *mould* by means of water, wash it thoroughly in warm water in large quantities, and filtrate the liquor. Evaporate this to a considerable degree of concentration, and it is manifestly of a saline taste, but making no alteration in syrup of violets; therefore the salt it contains is neither acid nor alkaline, but neutral. This analysis pursued farther, the particles may be disunited and kept separate, and will be found to be a large proportion of sand, a quantity of a light mud, capable of remaining a long time suspended in water, and a heavier mud sinking immediately in water. By an analysis of any particular *mould* by this means, we may find its true constituent particles, and be able to mix up and compound a similar one for the growth of any peculiar plant it produces. But plants have the assistance of heat as well as moisture, in the drawing their juices from the earth; therefore it may not be improper to try the effect of fire on the same subject. The common garden *mould* distilled in a retort in a naked fire, managed in its various degrees, affords a water, and oil and spirit like those yielded by animal subjects, and possibly arising from some extraneous particles mixed with the earth, and a dry *caput mortuum*, or indolent earth, remains in the retort.

The particles of animal, vegetable, and mineral substances, floating in the atmosphere, and thence precipitated on the earth, may give some of the properties to garden *mould*, and those different in different places; as is evident about London, where the *mould* is so impregnated with smoak, precipitated on it from the atmosphere, that it differs much from that of open countries. Shaw's Lectures, p. 64.

MOULD, *hip*. See HIP-*mould*.

MOULD, *iron*. See IRON-*mould*.

MOULDINESS, a term applied to bodies which corrupt in the air, from some hidden principle of humidity therein; and whose corruption shews itself by a certain white down, or lanugo, on their surface.

This *mouldiness*, when viewed with a microscope, affords a curious spectacle; being a kind of meadow, out of which arise herbs and flowers; some only in the bud, others full blown, and others decayed; each having its little root, stalk, and other parts; the figure whereof may be seen in Hook's Micrographia. The same may be observed of the *mouldiness* which gathers on the surface of liquid bodies.

Mr. Bradley observed this *mouldiness* in a melon very accurately, and found the vegetation of these little plants to be exceedingly quick. Each plant had its seeds in great abundance, which did not seem to be three hours before they began to shoot up; and in six hours more the new plant was complete and mature, and the seed ready to fall. When the fruit had been covered with a mould for six days, its vegetative quality began to abate, and it was entirely gone in two days more; then came on a putrefaction, and the fleshy parts of the melon yielding nothing but a stinking water, which began to have a gentle motion on its surface; and in two days time maggots appeared, which in six more laid themselves up in their bags, where they continued four days, and then came out flies. These maggots were owing to the eggs of flies deposited in the putrefaction.

MOULDING, any thing cast in a mould, or that seems to have been so, though in reality it were cut with a chissel, or the ax.

MOULDINGS, in *Architecture*, are jettings, or projectures beyond the naked of a wall, column, wainfcot, &c. the aſſemblage whereof form cornices, door-caſes, and other decorations of architecture. See *Tab. Architect. fig.* 1. to 12.

Some *mouldings* are ſquare, others round; ſome are ſtrait, others curved, &c. and ſome are plain, others carved, or adorned with ſculpture, either hollowed or in relievo.

Some *mouldings*, again, are crowned with a fillet; others are without, as the doucine, talon, orolo, torus, plinth, ſcotia, aſtragal, gula, corona, and cavetto. See each under its proper article.

Mouldings are in architecture what letters are in writing. By the various diſpoſitions and combinations of *mouldings*, may be made as infinite number of different profiles for all ſorts of orders and compoſitions, regular and irregular; and yet all the kinds of *mouldings* may be reduced to three; viz. ſquare, round, and mixt, i. e. compoſed of the other two.

For this reaſon, thoſe who invented the Gothic architecture, reſolving to recede from theſe perfect figures, and affecting to uſe others leſs perfect, to diſtinguiſh their architecture from the antique, introduced a new ſet of whimſical *mouldings* and ornaments.

Regular *mouldings* are either *large*; as doucines, ovolos, gulas, talons, toruſes, ſcotias, &c. or *ſmall*, as fillets, aſtragals, conges, &c. which ſee in their places.

MOULDINGS, in *Gunnery*, are annexed to guns by way of ornament, and depend chiefly on the maker's fancy.

It may be obſerved in general, that they ſhould be plain and ſimple, and the metal ſhould be projected as little as poſſible, ſo that the piece may lie cloſe on the carriage. See GUN. and *Tab. Gunnery, fig.* 1. n. and *o*.

MOULDING, *bed*. See BED-*moulding*.

MOULDING, *plane*. See PLANE.

MOUL-ELAVOU, *ſive arbor lanigera ſpinoſa*. H. M. *Goſſypium arboreum ſecundum ſpinoſum*. C. B. is a fine, tall, lanigerous, or cotton-bearing tree, ſometimes no leſs than fifty feet in height, and eighteen in compaſs in the ſtem or trunk. The down, or cotton, ſerves to ſtuff beds and pillows: the bark of the tree pulveriſed, and with the juice of lemons reduced into the form of a liniment, mitigates all kinds of inflammations, and conſolidates fractures of the bones; mixed with burnt wine of the Indian nut, or cocoa, it makes a liniment for the herpes: of the bark of the root is prepared an excellent emetic: the ſweet liquor collected in the boſom of the flower, exhibited with the leaves of the tamarind, potently evacuates watery humours by ſtool and urine. Ray.

MOULIN. *Fer de* MOULIN. See FER.

MOULINET, a French term properly ſignifying a little mill, being the diminutive of *moulin, mill*.

It is uſed in mechanics to ſignify a roller, which, being croſſed with two levers, is uſually applied to cranes, capſtans, and other ſorts of engines of the like nature, to draw ropes, and heave up ſtones, timber, &c.

MOULIRET is alſo a kind of turn-ſtile, or wooden croſs, which turns horizontally upon a ſtake fixed in the ground; uſually placed in the paſſages to keep out horſes, and to oblige paſſengers to go and come one by one.

Theſe *mouliets* are often ſet near the outworks of fortified places, at the ſides of the barriers, through which people paſs on foot.

MOULLAVA, H. M. in *Botany*, a ſiliquous Indian plant, with a yellow, pentapetalous flower, and a ſmooth pod, containing generally four ſeeds. It grows to the height of eight or nine feet, and delights in ſandy places; it is an evergreen, flouriſhes moſt in a wintry ſeaſon, and the fruit is ripe in November and December. It is of no medicinal uſe, but only to the poſſias (ſo they call the poor in thoſe countries), who receive the ſmoke of the leaves up their noſtrils, and ſo cure themſelves of the head-ache and vertigo. Ray.

MOULTING, in *Natural Hiſtory*. See MOLTING.

MOUND, a term uſed for a bank, rampart, or other fence, particularly of earth.

MOUND, or MOND, in *Heraldry*, is a ball or globe with a croſs upon it; ſuch as our kings are uſually drawn with, holding it in their left hand, as they do the ſceptre in the right.

MOUNT, an elevation of earth, called alſo *mountain*.

The words *mount* and *mountain* are ſynonymous; but the former is ſcarce ever uſed in proſe, unleſs when accompanied with ſome proper name; as *mount* Ætna, *mount* Gibel, *mount* Lebanon, *mount* Sinai, *mount* Atlas, *mount* Parnaſſus, &c.

MOUNT *Sinai, St. Catharine of*. See CATHARINE.

MOUNT *Carmel, knights of*. See CARMEL.

MOUNTED, in *Sea Language*, the ſtate of being armed or equipped with a certain number of cannon; expreſſed of a veſſel of war.

MOUNT-*up*. In the tin-works, after that tin from the burnt ore is melted down, and re-melted, there will ſometimes remain a different ſlag in the bottom of the float; this they call *mount-up*; and though of a tin-colour, yet it is of an iron nature, as hath been found by applying a magnet to it.

MOUNT *guard*. See GUARD.

MOUNTS *of piety*, are certain funds, or eſtabliſhments in Italy, where money is lent out on ſome ſmall ſecurity. We had alſo *mounts of piety* in England, raiſed by contribution for the benefit of people ruined by the extortions of the Jews.

MOUNTAIN, MONS, a part of the earth riſing to a conſiderable height above the level of the ſurrounding ſurface.

The origin of *mountains* is variouſly aſſigned by philoſophers; ſome will have them coeval with the world, and created along with it.

Others, among whom is Dr. Burnet, will have them to take their riſe from the deluge; urging, that the extreme irregularity and diſorder viſible in them plainly ſhew they do not come immediately out of the hand of God, but are the wrecks of the old world broken into the abyſs.

Others, again, alledge from hiſtory, that the foundations of many hills being gradually deſtroyed, the hills themſelves have ſubſided, and ſunk into plains: whence they conclude, that where the corruption is natural, the generation is ſo too.

It appears to many, that ſome *mountains* muſt have been generated gradually, and have grown up in proceſs of time, from the ſea-ſhells, &c. found in many of them; which they ſuppoſe may be accounted for from a violent wind blowing the ſand, &c. into huge heaps, which are afterwards made into a maſs by the rain, &c. Some among the divines tell us, that the earth was created perfectly even; and that when God ſeparated the water from the land, he dug channels in the earth; and the earth ſcooped out he threw up in *mountains*: but whether all the *mountains* be ſufficient to fill all the channels of the ocean, they muſt decide.

The origin of *mountains*, according to Mr. Ray, ſeems to have been explofions by means of ſubterranean fires; and it is very probable that they have all vaſt hollows beneath them; that this might have been the means uſed at the creation, to make the dry land appear, is no way diſſonant to reaſon, ſince hiſtory proves, that fires have raged in ſubterranean caverns under the ſeas, and there is no natural impoſſibility in fire's ſubſiſting in ſuch caverns, even when the earth was all over covered with water, as at the firſt creation.

Mr. Le Cat, in his memoirs read in 1744, before the academy of Rouen, has delivered a new ſyſtem of the formation of *mountains*. He ſuppoſes, that in the beginning the ſubſtances of which metals, ſtones, earth, &c. were to be formed, were ſoft maſſes of a kind of mud; that theſe arranged themſelves according to their ſpecific gravity, forming regular ſtrata of a ſpherical or ſpheroidical figure, and covered with water; ſo that the ſurface of the earth was originally regular, or without the inequalities of hills and vallies. But afterwards, by reaſon of the action of the ſun and moon, theſe ſoft maſſes were variouſly driven into enormous maſſes or *mountains* of mud, which left in their interſtices vallies, whoſe capacities, receiving vaſt quantities of water, left part of the earth expoſed and dry, and contributed to form a continent, which has gradually increaſed by the ſame alternate motions. By the continuance of this excavation of the earth, by means of the flux and reflux of the ſea, and the augmentation of the land thrown up by them, all the vaſt tracts of Europe, Aſia, &c. which were originally covered with water, became ſucceſſively expoſed and habitable. Theſe waters have left on the ſurface of the earth, ſkeletons, both of thoſe animals which lived in them, and of thoſe terreſtrial animals which may be ſuppoſed to have periſhed in theſe fluctuations. What the flux and reflux of the ſea has performed from the beginning, is ſtill continued, though in a leſs ſenſible manner. The materials of the earth being more compact and ſolid, the ſea is continually excavating its bed, and throws upon the banks the ſtones and earth which it forces away from its bottom. At length by this continued retreat of the ſea and excavation of the earth, he ſuppoſes that this globe will be ſo undermined as to produce a confluence of the ſeas from hemiſphere to hemiſphere; in conſequence of which a new chaos will take place; and a new world will be formed out of the ruins of the old.

Mountains appear, to many, defects and blemiſhes in the earth; but they are truly of the utmoſt uſe and neceſſity to the well-being both of man and other animals. Many creatures cannot live but in particular ſituations, and even the tops of the higheſt and the coldeſt *mountains* are the

only places where some creatures, as well birds as quadrupeds, will live: of this kind are the ibex and chamois among beasts, and the lagopus among birds.

They serve as screens to keep off the cold and nipping blasts of the northern and eastern winds; they also serve for the production of a great number of vegetables and minerals, which are not found in any other soil; they enable us to keep those mines dry, which furnish the most useful metals; besides, the long ridges and chains of lofty and jagged *mountains*, being generally found to run from east to west, serve to stop the evagation of the vapours towards the poles, without which they would all run from the hot countries, and leave them destitute of rain.

Mr. Ray adds, that they condense those vapours, like alembic heads, into clouds; and so by a kind of external distillation, give origin to springs and rivers; and, by amassing, cooling, and condensing them, turn them into rain; and, by that means, render the torrid regions of the torrid zone habitable. Thus the more we consider nature, the more we must admire her works; and what seems to be a defect or blemish in them, on a slight view, often proves, on more just observation, a great benefit and beauty.

In history we have instances of *mountains* travelling considerable distances.

To measure the height of a *mountain*, see ALTITUDE, &c. Though there is another way used by Dr. Halley, in the measure of Snowdon hill in Wales, by means of a BAROMETER, the different heights of whose mercury at the top and bottom of the *mountain* give its perpendicular altitude; accounting eighty-two feet perpendicular ascent for every inch varied in the height of the mercury.

The method often used for measuring the heights of *mountains*, by the sinking of the mercury in the barometer, is very far from being accurate in practice. That the mercury generally falls, when the barometer is carried up to a higher ground is true, and has been known ever since the time of Pascal. The only question is, in what proportion? and this question is not yet determined with sufficient accuracy. The rule followed by the generality of authors, is, that the heights of *mountains*, or other rising grounds, are as the logarithms corresponding to the heights of the mercury in the barometer. And the foundation of this rule is, that the density of the air is every where proportional to the weight of the superincumbent air. But the application of this principle is improper in the present case, because it can hold true only when the air is of the same degree of heat, which it seldom is, on the different parts of high *mountains*, in the valleys, and at the surface of the sea. In ascending the Cordelieras of Peru, for instance, the air is found to be of all temperatures, from the hottest summer to the coldest winter. And experiments are directly contrary to the rule. For by father Feuillee's observations on the Pic of Teneriffe, the mercury in the barometer stood at 17 inches 5 lines Paris measure, at the height of 13158 Paris feet above the surface of the sea, when the barometer at that surface stood at 27 inches 10 lines. But, according to the rule above mentioned, the barometer on the Pic ought to have been above 2 inches 2 lines lower than what it was found to be by the experiment.

A difference may also be perceived between the computed and observed heights of the barometer, at much smaller elevations; such as 1548 feet; where the observed height of the mercury exceeded that found by computation above a line and a half; which would make a very considerable error in the height of the place.

From whence it follows, that the elasticity or spring of the air at different heights, is not proportional to its density, or, which amounts to the same thing, that the mean degree of heat is different at different heights from the surface of the earth; for it is well known, that a difference of heat will make a difference of elasticity in the air, its density remaining the same. See Daniel Bernoulli Hydrodynamic, p. 213.

This learned author observes, that father Feuillee's experiment on the Pic of Teneriffe overturns all the rules and hypotheses hitherto contrived for discovering the heights of places, from the fall of mercury in the barometer. Mr. Bernoulli has given a new hypothesis of his own, and has founded some computations on it, which agree pretty well with the experiments he mentions; but it were to be wished that this subject were re-examined with more care by a greater variety of experiments than has been done hitherto.

Monf. Caſſini de Thuri has given us a detail of ſeveral obſervations made with care on two high *mountains* of Auvergne, and upon the *mountain* Canigou, one of the highest of the Pyrenees. From theſe obſervations it appears, that the variations of the heights of the mercury in the barometer, correſponding to the elevation of places above the level of the ſea, follow no regular progreſſion; there having been found ſometimes an inch of difference between the height of the mercury found by obſervation on the *mountain* Canigou, from the height that reſulted from the progreſſion eſtabliſhed in the Memoirs of the Royal Academy in 1703. This progreſſion, being deduced from obſervations made at ſmall elevations, proved erroneous; nor have any of the hypotheſes made ſince been ſufficient to reconcile the irregularities in obſervations, the exactitude of which admits of no doubt. Mem. Acad. Scienc. 1740. p. 94.

On this ſubject, ſee M. de Luc's elaborate and excellent work, entitled Recherches ſur les Modifications de l'Atmoſphere, in two volumes 4to. Geneva, 1772: and Phil. Tranſ. vol. lxvii. part 2. art. 29. vol. lxviii. part 2. art. 32.

The difficulty of breathing at the tops of high *mountains* is a thing ſo plainly felt, that there are none who have ever been in the way of making the experiment, who are not well convinced of the certainty of the fact. Acoſta deſcribes what he felt on the tops of the high *mountains* of Pariacaca very judiciouſly. See AIR.

The *mountains* of Armenia, and particularly that on which Noah's ark is ſuppoſed to have reſted, have been alſo made famous by the like accounts; though the ſnows that lie on the tops of theſe *mountains* make it impracticable to aſcend their tops; the people who climb as high as they can, always find that they breathe with more difficulty, and are compelled to fetch their breath oftener than when on the plains; and on travellers complaining of this, their guides always tell them, that it is a known thing, and is what every body ſuffers there.

The *mountains* in Languedoc and the Pyrenees have the ſame effect. People of curioſity have ſometimes remained hours on the ſummit of theſe *mountains*, and always found the ſame ſort of difficulty in breathing; but it is poſſible that this may be owing to the exhalations of certain ſteams from the earth in theſe places, leſs loaded with a weight of air than below; and this appears the more probable, as in going up the *mountain* Teneriffe, if many people are in company, and aſcend different ways, ſome uſually bear it better than others; and the very complexions of ſome are turned yellow by the exhalations, which are very plainly perceived by their ſmell and thirſtneſs, while others, who aſcend to the ſame height by different tracts, eſcape.

The moſt remarkable *mountain* in the world, in ſhape, is that called the *needle mountain*, or the *inacceſſible mountain*, in Dauphiny.

This is a vaſt hill, placed as it were bottom upwards, or ſet on its ſummit on the earth with its broad baſe elevated in the air; it is about a thouſand paces in circumference at the bottom, and is above two thouſand at the top. On the center of the plain at the top there ſtands another ſmall and very narrow, but very high hill.

It obtained the name of the *needle*, as it got the other, by its being ſuppoſed impracticable to the aſcent of any one, by reaſon of its projecting ſo greatly outwards. Some hardy perſons, however, once ventured to climb it, and found at the top a number of the chamois, animals by no means qualified for climbing, and which doubtleſs had never either aſcended or deſcended the *mountain*, and which muſt be ſuppoſed to have bred there for many ages, though it is very difficult to account for their firſt getting to the place. Hiſt. Acad. Par. 1700.

MOUNTAINS, *attraction of*. See ATTRACTION.

MOUNTAINS, *chains of*, a term uſed by geographers to expreſs thoſe continuations of *mountains* which run in ridges along whole countries, and appear diſpoſed in uninterrupted orders wherever they are found. Kircher, in his *Mundus Subterraneus*, labours to prove, that theſe chains are annular, and reach abſolutely round the globe of the earth, encompaſſing it from north to ſouth, and thence to the north again; and in the ſame manner from eaſt to weſt, and from thence to the eaſt again; their courſe only diſappearing, by the wiſe proviſence of nature, in the bottoms of the ſea, that the immenſe body of waters treaſured there might have its motion free and unimpeded in its channel, but appearing again in the ſame line, in every the ſmalleſt iſland that ſhews itſelf in the way of their ſtraight courſe, from the country where the laſt link of the chain was ſeen, to that where their firſt link appears again. He ſays, that theſe vaſt hills of earth and ſtone ſerve not only to ſtrengthen and ſupport the fabric of this vaſt globe of earth, but they have another very great uſe, not only to man, but to all animals, and even vegetables; which is, that they are the ſtore-houſes, where the grand reſervoirs of freſh water, ſo neceſſary to all life, are treaſured up, and from whence it is eaſily poured down upon the lower parts of the globe. In Europe, the great reſervoirs of water, that ſupply whole countries

countries of immenſe extent, are placed in that vaſt chain of *mountains* called the Alps, from which, as from an inexhauſtible ſtore, the vaſt tracts of fruitful land that lie below them are ſufficiently watered.

The *mountains* which compoſe this part of the great annular chain running north and ſouth round the globe, are called by three different names; the *Cottian*, the *Rhætian hills* with the *Vogeſus*, and the *Appennines*. From theſe are poured out the immenſe rivers which water this fruitful part of the world, the Danube, the Rhine, the Rhone, the Moſelle, and an almoſt infinite number of others, every one of which, after it has ſupplied the inhabitants of a whole tract of vaſt extent, diſcharges ſo much water hourly into the ſea, that the mind is aſtoniſhed at the account, and would wonder whence only one of them could be ſupplied. Theſe rivers, and a multitude of other ſmaller ones, and beſides theſe a great number of lakes of vaſt extent, are all ſupplied by the hydrophylacia or reſervoirs of water treaſured up in the boſoms of theſe hills, and could not have performed their office of watering theſe extenſive countries, had thoſe reſervoirs been placed any where except in ſuch a lofty ſituation in theſe *mountains*.

The Alps, though they all ſupply more or leſs of this profuſion of water, yet they are not equally hollowed for the reception of it, and conſequently do not all contain ſupplies for an equal tract of land; this is provided for by nature by a vaſt number of other ſmaller *mountains*, which in ſeveral parts of the countries through which this chain paſſes, run from its ſides like leſſer knots, and extend over ſome ſmaller or greater part of the country.

Theſe are a ſort of auxiliary ſupplies, and ſerve for many countries in the place of the original heads; but the rivers propagated from theſe, though ſufficient for the occaſions of the inhabitants of the lower country, yet do not diſcharge thoſe vaſt quantities of waſte water into the ſea, that thoſe which derive their origin from the greater *mountains* do. The Noric *mountains* in Germany, the Vogeſus, many *mountains* in Dauphiny, and thoſe in Italy, which run from the ſides of that long chain, which reaches like a ſpine all along that country, are all of this kind, and all convey this benefit to the lower countries. The Pyrenean and Carpathian *mountains* alſo yield a vaſt number of rivers from their ſides; and the rivers of Spain, of Poland, and of Hungary, all have evidently the ſame origin from theſe high-ſeated reſervoirs, in the chains of *mountains* which paſs through them. The countries where extended plains are found for vaſt tracts, uninterrupted by any of the links or knots of theſe vaſt chains of *mountains*, are the only places where thirſt and drought are the deſtruction both of animals and plants; and, in general, that country which has moſt and higheſt *mountains*, is the moſt plentifully, moſt regularly, and moſt conſtantly watered by ſmaller as well as larger ſtreams.

The diſpoſition of *mountains* on the ſurface of the globe ſeems more regular than is generally ſuppoſed by thoſe who ſee but a few of them in particular countries at a time; they are diſpoſed in reality in ranges or chains, reaching to vaſt extents, and in ſome from pole to pole, from north to ſouth.

One grand chain of *mountains* reaches from Iceland through Scotland, England, and Germany, with a ſtraight courſe to the Alps, which are as it were a vaſt knot in this chain, more cloſely diſpoſed, and more eminent than the others.

Theſe are ſucceeded in the ſame ſeries by the Appennines, which run through the whole kingdom of Italy, in the manner of the ſpine of the back in animals, and are continued on in the ſame ſeries by thoſe of Sicily; and from theſe the ſame chain is carried on to Africa, and continues in what are called the *mountains of the moon*. From hence another vaſt knot or link of this extenſive chain is carried on to the utmoſt part of Africa, and terminates, as to our view, at the Cape of Good Hope; and there is no reaſon to doubt but that the chain is continued in the oppoſite land, and ſo on to the utmoſt limits of the ſouthern pole. From hence the ſame ſeries makes its way again, and beginning anew as it were from the ſouth pole, is carried on through the little known ſouthern regions to the Magellanic Streights. Here the famous Andes, *mountains* of South America take it up, and along this vaſt tract it is carried through this part of the new world into North America, and thence to the northern pole again, terminating where it began, or joining the other part of the chain where we took up the beginning of our account; ſo that the whole ſeries, making a vaſt belt or circle round the globe, has no beginning nor end, but in our imagination, or in our ignorance of the parts of the world through which it is carried in the ſame regularity as in thoſe countries whither commerce has led us, and where maps have ſhewn them.

Another vaſt chain of *mountains*, running with the ſame regularity, and in the ſame manner forming a belt round the whole globe of the earth, cuts this at right angles, and is continued in its courſe. This goes through Tartary, from a beginning far beyond our reſearches up behind that vaſt country, and continuing itſelf through the middle of Scythia, forms a ſeries that appears in the Eaſt Indies, running along the middle of that vaſt region to Cape Comorin; here the chain dips into the ſea; but if its courſe is exactly marked it will be found to be continued in the ſame route through the iſland of Ceylon; hence it is carried under water to its oppoſite point on the limits of the earth, and hence through ſeas and lands not yet known to us, is carried on to the place in the back of Tartary, and from which we have begun the account. We have but very ſmall proofs indeed of its continuation through a vaſt tract of this its courſe; but we are to accuſe for this defect not nature in her diſpoſal, but our own ignorance, whatever little we do know plainly pointing out, that this chain is continued in the ſame regular manner as the other, and placed exactly at right angles with it.

As the continual flux and reflux of that vaſt body of ſeas from the eaſt weſtward, might by its force do ſome miſchief to the compages of the earth, *provident* nature has provided, for the ſtrengthening the great frame of this globe, certain tranſverſe chains of belts of mountains, which are ſo diſpoſed as to ſtrengthen and keep together the whole machine in the moſt ſtrong and laſting manner.

One ſeries of theſe runs directly from the eaſt weſtward from the utmoſt limits of the Chineſe empire, through that whole vaſt country; and where theſe are ſtopped by the boundaries of that country, they are continued through the weſt of Scythia, India, and the Caſpian ſea, America, Aſia Minor, Macedonia, and to the Rhætian *mountains*, which carry on the chain to the *mountains* of Narbonne Gaul, and theſe to the Pyreneans; and theſe are carried on weſtward in the ſame direct chain, ſo far as we are able to trace them, and apparently run on toward the point from which the account began, ſo as to form as regular a circle as the others, were every link of it expoſed to our ſight, by our knowledge of the regions through which it paſſes, and many of which are yet left to future diſcoveries.

Thoſe who haſtily judge of this ſyſtem may ſuppoſe, that it wants due weight, becauſe the chains of *mountains* here deſcribed do not appear to be regularly carried on through the bottom of the ſea from the firſt link on one land to the firſt on the oppoſite land to it; but the whole chain ſeems broken abruptly at either promontory, and only to be renewed, not continued at the other; but it is very probable, that, though not ſo evident to our eyes, theſe chains of *mountains* are continued under the bottoms of the deepeſt ſeas in the ſame regular manner as on the openeſt land, though their heads do not appear above the ſurface of the water, but are only ſeen at thoſe places where the ſcattered iſlands happen in their courſe, till they arrive at the main land again. This diſpoſition is not to be ſuppoſed owing to chance or irregularity, but appears contrived by the wiſdom of the great Creator.

The vaſt body of ſeas, that ſurrounds the globe with its neceſſary and perpetual flux, required a clear and free bed to roll its immenſe congeries of water in; and the tops of the *mountains* appear to have been diſcontinued in the courſe of this fluid, that it might have a free channel, and no ſtops or hindrances in its courſe, to ſpread its waters over the whole earth.

MOUNTAIN, *cock of the*, *urogallus*, in *Ornithology*. See COCK and GROUSE.

MOUNTAIN-*green*. See GREEN.

MOUNTAIN-*heath*, the name by which ſome call the SAXIFRAGE of botanical writers.

MOUNTAINS, *burning*. See VOLCANO.

MOUNTAINS *in the moon*. See MOON.

MOUNTEBANKS, derived from the Italian *montare in banco*, are quack doctors or jugglers, who vend their boaſted medicines and exhibit their tricks on a public ſtage. See NUISANCE.

MOUNTING *the guard*, *trenches*, *breach*, *&c.* denotes the going upon duty, being upon guard in the trenches, running to the breach, *&c.*

MOUNTING *a cannon*, *mortar*, *&c.* is the ſetting it on its carriage, or the raiſing its mouth.

MOUNTING, *in the Manufactories*, ſomething that ſerves to raiſe or ſet off a work. Thus the frame or border, and its dependencies, make the *mounting* of a looking-glaſs: the *foil*, or but, the *mounting* of a muſquet, cartine, *&c.* and the hilt, *&c.* the *mounting* of a ſword.

MOUNTING *of a fan*, the ſticks which ſerve to open and ſhut

shut it, whether they be of wood, ivory, tortoise-shell, whalebone, Indian-cane, or the like. See FAN.

MOURAILLE, in *Farriery*. See BARNACLES.

MOURNING, a particular dress or habit, worn to signify grief, on some melancholy occasion.

The modes of *mourning* are various in various countries; as are also the colours that obtain for that end. In Europe, the ordinary colour for *mourning* is black; in China, it is white; in Turkey, blue or violet; in Egypt, yellow; in Ethiopia, brown. The ancient Spartan and Roman ladies mourned in white; and the same colour obtained formerly in Castile, on the death of their princes. Herrera observes, that the last time it was used, was in 1496, at the death of prince John. Kings and cardinals always mourn in purple.

Each people pretend to have their reasons for the particular colour of their *mourning*: white is supposed to denote purity; yellow, that death is the end of human hopes, in regard leaves when they fall, and flowers when they fade, become yellow; brown denotes the earth, whither the dead return; black, the privation of life, as being the privation of light; blue expresses the happiness which it is hoped the deceased does enjoy; and purple, or violet, sorrow on the one side, and hope on the other, as being a mixture of black and blue.

Mourning among the ancients, was expressed various ways, as by tearing their cloaths, by wearing slackcloth, laying aside crowns, and every other mark of joy. Plutarch, in his life of Cato, relates, that from the time of his leaving the city with Pompey, he neither shaved his head, nor, as usual, wore the crown or garland.—Sometimes public grief was testified by a general FAST. Among the Romans a year of *mourning* was ordained by law, for women who lost their husbands.

In public *mournings* at Rome the shops were shut up, the women laid aside all their ornaments, the senators their laticlavian robes, and the consuls sat in a lower seat than usual.

The ancients had a remarkable way of *mourning* for soldiers slain in battle. The whole army attended the funeral solemnities, with their arms reversed, it being customary for mourners, in most of their actions, to behave themselves in a manner contrary to what was usual at other times. In those places where it was the fashion to wear long hair mourners were shaved; and where others shaved, mourners wore long hair. The conjecture of those, therefore, is frivolous, who imagine that the soldiers turned the heads of their shields downwards, lest the gods, whose images were engraved upon them, should be polluted with the sight of a corpse; since not the gods only, but any other figures, were frequently represented on shields; nor did the few only near the corpse, but the whole company held their shields in the same position: not to mention that other arms were also pointed downwards. Potter, Archæol. Græc. tom. ii. p. 103.

The *mournings* of the Eastern nations of Indians are much more closely followed, though of much shorter duration than our's. After the death of a near relation they mourn fifteen days, during which time they eat nothing but rice and water: they are not to chew betle, or to use the common washings in this time; but they are to do acts of charity, such as distributing food to the poor; and prayers are said, intreating the Almighty to forgive the sins of the dead person, and assign him a good place in the other world. On the fifteenth day, that is the day after the finishing of the time of *mourning*, they make a solemn feast according to their abilities, and invite to it all their friends and neighbours. After this they annually, on this day, give food to the poor, and renew their prayers for the happiness of the dead person. Phil. Trans. N° 243.

MOUSE, *mus*, in *Zoology*. See MUS.

MOUSE, in the *Sea Language*, is a sort of knob, usually in the shape of a pear, wrought on the outside of a rope, by means of spun-yarn, parselling, &c. and used to confine some other securely to the former, and prevent it from sliding along its surface. These *mouses* are particularly used on the stays of the lower mast, to prevent the eye from slipping up to the mast.

MOUSE, *ear*. See HOUNDE.

MOUSE, *fossil*, called also *lemmer*, or *lemming*, in *Natural History*, the name of an animal found in Lapland, and in other cold countries: many extraordinary things are related of the manner of living of these creatures.

This is the MUS *lemmus* of Linnæus, with a short tail, five toes on the fore, very short legs, large whiskers, small eyes, long sharp teeth, and a yellow body varied with black. See NORWAY RAT.

They are of the bigness of a squirrel, and their skin is streaked with brown and black; there are also some spots beside the streaks; the black is a very fine deep colour, the brown is pale; they have two very sharp teeth above, and two below of the same kind; their feet are like a squirrel's; they are usually very fat and flothy, and are so quarrelsome and fierce, that if a stick be held out to them they will bite at it, and will hold it so fast, that they may be tossed and swung about in the air by it without letting it go. In their march they usually keep a direct line from north-east to south-west, and always travel in thousands in the same troop. The whole number forms a square body, and they march only from the time of the twilight to the morning, lying still all the day.

They march in lines, which are some ells distant, but always exactly parallel to each other, so that the places they have gone over look like the furrows of a ploughed field. If they meet with any thing in their way that might deter another animal, it never stops them; but though it be fire, a deep well, a pond, a torrent, or a bog, they without hesitation venture through, and by that means many thousands of them are destroyed, and are found dead in the mornings, in the waters or otherwise.

They never come into a house, nor meddle with any thing that we eat; if they chance to come to a house in their way, there they stop till they die; but if they come to a stack of hay or corn, they eat their way through.

When they march over a meadow, they do it great damage, by eating the roots of the grass; but if they encamp there, they wholly destroy the produce; the land looks like a place where there had been a fire, and the whole surface looks as if strewed with ashes.

The Laplanders are always glad to see these creatures on their march, for it always foretels plenty of more valuable creatures among them: the same cold that sends these out, sending also a number of fowl, squirrels, foxes, and other animals the same way. Wormius has written a complete treatise on this animal, calling it MUS *Norwegicus*: this is reprinted at large in his Museum.—Phil. Trans. N° 251. p. 112.

They commonly visit the country once or twice in twenty years: Linnæus supposes that they come from the Norwegian Lapland Alps; but Pontoppidan thinks that Kolan's rock, which divides Nordland from Sweden, is their native place. After ravaging the country, destroying the grass, and infecting the very ground, they at length perish, either through want of food, destroying one another, or in some great water or the sea.

MOUSE, *sea*. See APHRODITA.

MOUSE-*ear*, in *Botany*. See HAWKWEED.

MOUSE-*ear chickweed*, in *Botany*, *cerastium*, a genus of the *decandria pentagynia* class. Its characters are these: it has a permanent five-leaved empalement, which spreads open; the flower has five bifid petals, and ten slender stamina; in the centre is situated an oval germen, with five styles; the empalement afterward becomes an oval cylindrical or globular capsule, with one cell, containing many roundish seeds. Miller enumerates five and Linnæus fifteen species.

MOUSE-*ear scorpion-grass*, *myosotis*, in *Botany*, a genus of the *pentandria monogynia* class. Its characters are, that the corolla is hypocrateriform, marginated, and divided into five segments. There are four species.

MOUSE-*tail*, *myosurus*, in *Botany*, a genus of the *pentandria polygynia* class. Its characters are, that the five-leaved empalement is joined to the base; it has five awl-shaped peraliform nectaria, and many seeds. There is only one species.

This plant is very near akin to the ranunculus, under which genus it is ranged by some botanists; the flowers are extremely small, and are succeeded by long slender spikes of seed, resembling the tail of a mouse, whence it obtained its name: it grows wild upon moist ground in divers parts of England. The whole plant is used, and by some thought to possess the same virtues with plantain, and the coronopus.

MOUSING *a hook*, in *Sea Language*, the operation of fastening a small cord or line across the upper part from the point to the back thereof, in order to prevent it from unhooking, by the motion of the vessel, or otherwise.

MOUTH, in *Anatomy*, a part of the human face, consisting of the lips, the gums, the inside of the cheeks, and the palate.

All these parts are lined with a glandulous coat, which is continued over the whole inner surface of the *mouth*, and all its parts, the teeth excepted.

From the glands of this coat, through innumerable little excretory ducts, is separated a kind of lifeless juice, which serves to keep the *mouth* and all its parts moist, smooth, and slippery.

On the hind part of the palate, perpendicularly over the rima of the larynx, hangs a round, soft, smooth body, like the end of a child's finger, formed by the duplicature of the

the membrane of the palate, and called the *uvula*, which is moved by two muscles, called *sphenostaphylinus* and *pterygostaphylinus*; and is suspended by as many ligaments.

Under the membrane of the palate are a great number of glands, pretty conspicuous in the fore-part, like grains of millet; whose excretory ducts, piercing the membrane, open into the *mouth*: but towards the hinder-part they lie much thicker, and about the root of the uvula they are gathered so close to one another, that they seem to form one large conglomerate gland; which is therefore, by Verheyen, called *glandula conglomerata palatina*. See PALATE. The gums are, as it were, the lockets and ligaments of the teeth.

Besides the proper parts of the *mouth*, there are in and about it others highly serviceable and necessary thereto; among which are the glands; the most considerable whereof are, the parotides, the glandulæ maxillares, the sublinguales, and the tonsils, or amygdalæ; which see in their respective places.

These are the salival organs, whence springs all that liquor we call the *spittle*, which flows into the *mouth* by the respective ducts, after its separation from the blood in the bodies of the glands: as the demand of spittle is greater in actions of the lower jaw, i. e. in mastication, deglutition, much talking, &c. so does the supposition of these salival ducts favour that discharge on those occasions.

Whether the *mouth* of a fœtus be necessary for its nutrition, has been controverted. The learned Mr. Monro is of opinion it is not: see his reasons, and the answers to what has been advanced by many learned men in favour of the contrary opinion, in the Med. Ess. Edin. vol. ii. art. 9. or the Abridgment, vol i. p. 305.

Mr. Monro observes farther, that the opening of the *mouth* does not only depend on the motion of the lower jaw downwards, but also on the superior jaw being raised up by the muscles, which extend the head back. He says any one may convince himself of the truth of this, by putting the blade of a knife opposite to the conjoined edges of the teeth, when the *mouth* is shut; and the knife being held unmoved while the *mouth* is opened, he may, by the help of a mirror, see the upper-teeth raised remarkably at every aperture he performs. Med. Ess. Edin. vol. i. art. 1.

Dr. Derham observes, that the *mouth*, in the several species of animals, is nicely adapted to the uses of such a part; and well sized and shaped for the catching of prey, for the gathering and receiving food, the formation of speech, &c.

In some creatures it is wide and large, in others little and narrow; in some it is formed with a deep incisure up into the head, for the better catching and holding of prey, and more easy comminution of hard, large, and troublesome food; in others with a shorter incisure, for the gathering and holding of herbaceous food.

In the fish-kinds the *mouth* is very different in the several genera and species in its situation, figure, and proportion, and is by the best naturalists made a mark of distinction among them. In regard to situation, it is, 1. in some placed in the front or tip of the head; and in this case both jaws are sometimes of the same length; but sometimes the one is considerably longer than the other. 2. In some the *mouth* is placed in the lower or under part of the head, under the snout. 3. In some it is placed transversely in the body; i. e. the opening of the *mouth* cuts the line of the back and belly at right angles. 4. In others it is oblique. As to figure, there are also many differences. When the *mouth* is opened; in some, it is, 1. of an oblong, round, or roundish square shape. 2. In others it is oblong and wide. 3. It is also spherical. The proportion of the *mouth* to the head is also various. 1. In some it is much smaller than the breadth of the head; and, 2. in some it is equal, or nearly equal to the width of the head. Artedi.

In insects it is very variable: in some it is forcipated, to catch, hold, and tear the prey; in others aculeated, to pierce and wound an enemy, and suck their blood; in others strongly tufted with jaws and teeth, to gnaw and scrape out their food, carry burdens, perforate the earth, nay, and the hardest wood, and even stones themselves, for holes and cells for their young.

Nor is the *mouth* less remarkable in birds, being neatly shaped for piercing the air, hard and horny, to supply the want of teeth; hooked, in the rapacious kind, to catch and hold their prey; long and slender, in those who have their food to grope for in moorish places; and broad and long, in those that search it in muddy places.

MOUTH is also used, in the courts of princes, for what relates to their eating and drinking. Hence, *officers of the mouth, groom of the mouth*, &c.

Du-fer defines *mouth*, an apartment composed of several rooms, as offices, kitchens, &c. where the meat intended for the first tables is dressed by itself. At court, this is called the *king's mouth*.

MOUTH, in the *Manage*, denotes a horse's feeling or sensibility in that part where the bits are applied. See HORSE.

MOUTH, *shape of a bit's*. See BITS.

MOUTH, *opening*, in *Roman rite*, of a cardinal, is a ceremony used in the consistory at Rome; wherein the pope shuts a new-elected cardinal's *mouth*, to that he may not speak at all, even though the pope should speak to him; and remains, in the mean time, deprived of all voice, both active and passive, till the calling of another consistory, when the pope *opens his mouth* again, making a little harangue, to teach him how to speak, and comport himself in the consistory.

MOUTON *d'or*, an old French coin. See AGNEL.

MOXA, a sort of cotton, or downy substance, brought from China, and by authors said to grow on the lower part of the mugwort-leaf.

It is not much known among us for any medicinal efficacy: however celebrated in the Indies for curing the gout, by being burnt upon the part, people here have not faith enough to try it this way: and some think, if they had, in all likelihood, any other caustic would do as well.

The ancient physicians used flax, as the people of the eastern nations now do their *moxa*, for cauterizing in certain parts of the body. The method of using the *moxa* is this: a small cone of the down, or *moxa*, is to be made up of about a thumb's breadth long, much after the manner they are for a fusitus. The bulk of this cone is to be stuck upon the part with a mucilage of gum arabic, and its top is then to be set on fire by a candle of burning coal; by this means the whole cone will be gradually consumed, and the part by degrees cauterized. This is used in cases of the GOUT; and if the pain does not cease on the first operation, it is to be repeated till it does. Heister's Surgery, p. 349.

MOYNOU, in *Fortification*. See MOULEAU.

MUCILAGE, *mucilago*, in *Pharmacy, &c.* a thick viscous juice, of a white transparent colour; so called as resembling the MUCUS of the nose.

Mucilages are prepared chiefly from roots and seeds, pounded in a mortar, and infused in hot water, and strained through a cloth: and they are the most relaxing, emollient, and softening remedies in medicine.

The roots principally used for this purpose are those of althæa, mallows, symphytum, &c. the seeds are those of quinces, flea-wort, &c.

Mucilages enter the composition of several plasters. They are sometimes also made of gums and fruits; as figs, quinces, juniglans, tragacanth, &c.

MUCILAGE also denotes a thick pituitous matter, evacuated with the urine, in the gravel and dysuria.

MUCILAGINOUS *glands*, a very numerous set of glands in the joints, first described by Dr. Havers.

There are two sorts of *mucilaginous* glands, some small, next a-kin to miliary glands, being glandules placed all along the surface of the membranes which lie over the articulations. See MUCUS, and ARTICULATION.

The other sort are conglomerated, or are many glandules collected, and planted one upon another, so as to make a bulk, and appear conspicuously. In some of the joints there are several of them; in others there is a single one.

As to the structure of these large glands, they consist of small vesicles, which are not gathered together into several lobes, or bags of glandules, but are disposed upon several membranes lying over one another; of which membranes there are several in every one of these glands, which appear evidently in those who are hydropical.—They have their blood-vessels, as other glands; but their veins have a particular texture, in their course, for retarding the return of the blood from the glands, that the *mucilaginous* liquor, which is not separated with the greatest expedition, may have time for separation; which is a contrivance observed wherever a thick fluid is to be secerned.

The large *mucilaginous* glands are variously situated; some in a sinus formed in the joint; others stand near or over against the interstice between the articulated bones: but in general they are so placed, as to be squeezed gently, and lightly pressed, in the inflexion or extension of the joint, in order to yield a quantity of mucilage proportionate to the motion of the part, and the present occasion, without any injury.

The design of all these glands is to separate a *mucilaginous* kind of liquor, which serves principally to lubricate the joints, or to make them slippery; it serves likewise to preserve the ends of the articulated bones from attrition and beating: but all this it does in conjunction

with the medullary oil; with which, together, is made a composition admirably well fitted for those ends; for the mucilage adds to the lubricity of the oil, and the oil preserves the mucilage from growing too thick and viscous. Dr. Havers observes the same glands to lie between the muscles and tendons; and supposes that there is the same mixture there of an oily and *mucilaginous* substance; the one being that fat, which is found between the muscles, and is supplied by the glandulæ adiposæ; and the other separated by the *mucilaginous* glandules, of which the common membrane of the muscles is every where full. This mixture in the interstices of the muscles lubricates them, and their tendons; and preserves them from shrinking, and growing rigid and dry.

The rough uneven depression at the bottom of the cotyloide cavity of the ossa innominata is filled by a broad, flat, *mucilaginous* gland, bordered with a fatty substance, and covered with a fine membrane. The *mucilaginous* glands of the bones of the leg lie in small spaces, depressions, and superficial notches, near the edges of the cartilages of each joint, and are all covered by the capsular ligaments. In the bones of the foot these glands answer in number and figure to the depressions between the *cartilaginous* edges and ligaments.

In the articulations of the sternum, vertebræ, and ribs, the *mucilaginous* glands are very small; but they are accompanied by many fatty molecules lying round each joint. The inner surface of the ligamentary tube which lines the bone canal of the spine, is lubricated also by an oily or adipose substance. And the true *mucilaginous* glands of the occipital and maxillary articulations in the bones of the *head*, are all proportioned to the joints to which they belong, and lie between the capsular ligaments and the circumferences of the cartilages. Winslow.

MUCILAGO, in *Botany*, a name under which Micheli has comprised some species of that kind of fungus called MUCOR, consisting of small bladders, or vesicles, with seeds affixed to filaments on the inner part.

MUCK. See Mock.

MUCOCARNEOUS, an epithet used by authors for a sort of abscesses, which are partly made up of flesh, and partly of a thick mucous matter.

MUCOR, in *Botany*, a name given by Micheli, and continued by Linnæus, to a genus of mushrooms, often comprised by authors among the moffes, and called by the same Micheli, under the small varieties of some of the species, *muscilago* and *farago*. Their characters are these: they are fungules consisting of roundish little bladders, in which are found numerous seeds affixed to fibre-like receptacles, placed all over the inside of the bladders. Linnæus enumerates twelve species.

MUCOSA, in *Ichthyology*, a name given by the Italians to a species of the raya, called by the old authors, *lisirata*, and *lia marjana*; and, by the later authors, *raya expynchus* and *lavernia*. It is distinguished by Arteds by the name of the variegated ray, with ten prickly tubercles on the middle of the back. See Raia.

MUCOUS *fevers*, a term used by medical writers to express those fevers in which nature is endeavouring to rid herself of an abundance of pituitous, mucous, and serous matter. The catarrhal fevers of all sorts are expressed under this denomination. See Fever.

MUCOUS *glands* are three glands which empty themselves into the urethra; so called by the first discoverer, Mr. Cowper, from the tenacity of the liquor which they separate. See *Phil. Trans. Abridged*, *vol. ii. p.* 8, &c.

The two first discovered of these are about the bignefs of a French bean, of a depreffed oval figure, and a yellowish colour, like the proftates; being on each fide the bulb of the cavernous body of the urethra, a little above it.

Their excretory ducts fpring from the internal furface, near the inner membrane of the urethra; into which they open a little lower, by two diftinct orifices, juft below its bending under the offa pubis, in perinæo, where they difcharge a tranfparent vifcous liquor.

The third *mucous* gland is a fmall, conglobate, yellowifh gland, like the former, but fomewhat leſs, ſituate above the angle of bending of the urethra, under the offa pubis, in the perinæum, near the anus. It has two excretory ducts, which enter the urethra obliquely, a quarter of an inch below the two former; and difcharge a liquor like the former, both in colour and conſiſtence.

MUCRO *cordis*, in *Anatomy*, the lower or pointed end of the heart.

The word is Latin, *mucro*, where it properly ſignifies *the point of a ſpear*.

Hence, MUCRONATED is applied to whatever tends to, or terminates in a point, like that of a ſpear; as *mucronata cartilago*, &c.

MUCU, in *Ichthyology*, the name of a Brafilian fiſh of the lamprey kind. It is long and ſlender; its head is pointed; its eyes black and ſmall; and its mouth very ſmall; and it has no fins; it is brown all over, only of a duſkier colour on the back than on the belly, and has a number of obliquely tranſverſe lines on the ſides, which are black. It is an eatable fiſh, and is caught in lakes in Brafil.—Margrave.

MUCUNA *grows*, the largeſt and moſt beautiful ſpecies of phaſeolus growing in Brafil; it grows on a tree of the ſame name: the pod has a black ſhell, almoſt as hard as a ſtone, and covered with ſoft yellow hair, is a hand's breadth long and three fingers breadth wide. When broke open, it diſcovers three or four very beautiful globular beans, divided by interſtices of a ſcarlet or red colour, round, ſmooth, and with a large eye, which, being macerated in water, are deprived of ſome part of their noxious qualities; and being prepared with *ſpices & medicines*, are eaten by the natives; ſo that their poiſonous quality does not ſeem ſo deeply implanted in them by nature, as not to admit of proper correctives; for though the interior ſubſtance of the bean, by its acrimony and biting property reſembling the ſiſcera, excites great perturbations in the body, and purges violently by ſtool and vomiting, the cooling and demulcent medicinal aliment, prepared of the ſpices, ſerves as an antidote, and is therefore preferable to other things employed to correct it. Ray.

MUCUS *of the joints* is a mucilaginous liquor, ſeparated by its proper glands, conveniently placed in the interſtices of the bones, where thoſe glands are gently preſſed by the motion of the parts: it ſerves to make the extremities of the bones or joints ſlip more eaſily.

MUCUS *of the urethra*, a viſcous tranſparent liquor, ſerving to line and lubricate the parts that the ſeed and the urine may ſlip more freely, without either adhering to or lacerating the part.

It comes from glands, lately diſcovered by Mr. Cowper, about the penis; and is that, which in women is often miſtaken for ſemen.

MUCUS *of the noſtrils* is a viſcid excrementitious humour ſeparated by its proper glands, placed in the internal membrane of thoſe parts. It ſerves to moiſten, lubricate, and defend the olfactory nerves; which, being extremely ſoft and naked, would, without ſuch proviſion, be ſoon ſpoiled. See Nose.

MUCUS *of fiſh*. The bodies of moſt of the fiſhes called *ſcaly-ones* by authors, from their having either no ſcales at all, or only a few ſmall ones, are covered in the place of ſcales with this *mucus*. It is a tough and thick viſcous liquor, and ſticks firmly to the body, defending the ſkin from injuries from ſtones, and the like: it is ſecreted from certain glands placed about the head, and on moſt parts of the body, but particularly in the lines lateralis. Artedi.

MUD *walls*. See Wall.

MUDD, in *Ichthyology*, a name given by the Swedes to the fiſh called by Schoneveldt and others *aphya* or *aphye*.

It is a ſpecies of the CYPRINUS, according to Artedi, and is diſtinguiſhed by that author by the name of the *ſides and two-inch cyprinus*, with nine bones in the pinna ani.

MUEZDEM, among the Turks, an officer belonging to their moſques, who with his voice calls the people to prayers; thereby ſupplying the want of bells, which the Mahometans will not uſe. See Bell and Mosque.

MUFFLE, in *Metallurgy*, is an arched cover, reſiſting the ſtrongeſt fire, and made to be placed over coppels and teſts in the operations of allaying, to preſerve them from the falling of coals or aſhes into them; though at the ſame time of ſuch a form, as not to hinder the action of the air and fire on the metal, nor prevent the inſpection of the allayer.

The *muffle* may be made of any form, ſo that they have theſe conditions; but thoſe uſed with coppels are commonly made ſemi-cylindrical, or when greater veſſels are employed, in form of a hollow hemiſphere.

The *muffle* muſt have apertures, that the allayer may look in, and the fore part of it muſt be always quite open, that the air may act better in conjunction with the fire, and be inceſſantly renewed; for without this, ſcarce any fumes are to be produced, and without theſe, the vitrification of lead is ſcarce practicable; for when the air is once filled with a certain quantity of vapours, it ſcarce admits any more afterwards; and for this reaſon a conſtant ſucceſſion of freſh air is neceſſary. The apertures in the *muffle* ſerve alſo for the regimen of the fire; for the cold air ruſhing into the larger opening before, cools the bodies in the veſſel; but if ſome coals are put in it, and its aperture before be then ſhut with a door fitted to it, the fire will be increaſed to the higheſt degree; much more quickly than it can be by the breathing-holes of the furnace. Another uſe of theſe apertures is alſo, that the arſenical vapours of lead and antimony,

paſſing

passing through the holes in the back part of the *muffle*, may not be offenſive to the aſſayer, who ſtands before it.

As to the height, length, and depth of the *muffle*, theſe muſt be proportioned to the ſize and number of the veſſels they are intended to cover; and care muſt be taken in theſe, that all parts of the inner furface of their veſſels muſt be in the reach of the aſſayer's eye. The moſt frequent ſize of the *muffle*, has been, in four inches height, or eight inches long, and four or ſix inches broad. The ſegments cut out at the ſides, for the leſſer holes, muſt be of ſuch a proportioned height, that the leaſt veſſels put under it may not be in the way of coals or aſhes falling into them, for that always hinders the aſſay-maſter of leaſt, and the moſt accuſtomed of other metals and ſemi-metals, and will ſometimes entirely reduce them again when already deflagrated; and the ſcoriæ, ſoftened by aſhes, joſtle and corrode the cupellæ.

Wooden moulds of proper ſhape, are moſt convenient for the making theſe *muffles* in, and the matter for making them of is the ſame with that of the German clay-veſſels; that is, either a pure native clay, or a compoſition to bear the fire, which will be known upon the trials or ſuch clay hardened by a mixture of the powder of ſtones; and in order to the forming of theſe, the maſs muſt be made tolerably ſoft and pliant. Knead a ſufficient quantity of this maſs with your hands upon a flat ſtone; ſpread it out exactly into a thin cake or plate, ſomewhat longer and broader than you intend the *muffle* to be made; and ſo thick, that two or more thin plates or lamina, of about two lines thick each, may be cut out from it. This is eaſily done by rolling the maſs on the ſtone with a rolling-pin, ſtrewed over lightly with aſhes, or powder of chalk.

When the cake is thus rolled out, with a thin, fine, and perfectly ſtraight braſs-wire cut off from the cake one thin plate; this muſt be done with great caution leſt it ſhould break; take this up, and rubbing it over with oil or fat, lay it over the mould; then cut out a ſemicircular piece from the maſs, of the ſame thickneſs with the former, and with this cover the back plane, or further end of the mould, joining the edges of this plate to thoſe of the former, cloſely and perfectly, by wetting them well with water.

Next cut off from the cake another thin plate, to be the bottom of the *muffle*; this may be either left looſe for the *muffle* to be pinned on it occaſionally, or the bottom edges of the already formed *muffle* may be joined to it all round by means of water, as the back was before joined to the arched part of the *muffle*. But whether it be intended that the bottom ſhall be thus fixed on, or left looſe, it muſt be half an inch broader every way than the bottom of the *muffle*, that this may ſtand the more ſafe and firm upon its baſis.

When the *muffle* is thus made, wet your hand, and rub it carefully all over, that the ſmall and perhaps inviſible cracks and chinks in the plates may be gladly joined, and the whole matter of it applied perfectly cloſe to the ſurface of the mould.

When the *muffle* has been ſome time expoſed to the air, and is tolerably dried, and hardened on the mould, cut out two or three hemiſpherical pieces on each ſide, to make the holes before deſcribed, at the bais and back; and then draw away the mould from within it, for if the *muffle* is ſuffered to dry perfectly on the mould, it always cracks. When the whole is perfectly dry, let it be baked in a potter's kiln, or in the aſſayer's own; but without great care in the latter method, and lighting the fire at top at firſt, it is apt to crack, ſo that the potter's kiln, where at hand, is much the better way of baking it. See *Table* II. *of Chemiſtry*, N° 151, 56.

If there be adapted to the formerly deſcribed convex mould, another concave one nearly fitting it, only leaving room for the thickneſs of the *muffle* between, and the clay be placed between them, and formed by this means into its exact ſhape, by a ſtrong and every way equal preſſure, this will make *muffles* not only with much leſs trouble, but they will be much ſtronger, leſs apt to crack, and more capable of reſiſting the fire, than thoſe made by the hand in the other way.

The only cautions neceſſary for making theſe, are, that the clay be a little drier than when it is to be worked by the hand; that the ſides, both of the inner or convex mould, and of the outer concave one, be thoroughly oiled or greaſed, and the preſſure on the ſurface of the outer or concave mould, be as ſtrong and equal as may be. There is no clay better for making theſe *muffles* than the *Wenſor-loam*, an earth well known among the chemiſts and platiners, and always to be ſold in London; and rubbing the inſide of the mould with black lead in fine powder very well ſupplies the place of greaſing them, to prevent the matter from ſticking to them.

Theſe are the *muffles* ordinarily uſed in aſſaying; but when very large teſts are to be covered, they uſe large ſemicircular *muffles*, made of caſt iron, or ſometimes of the ſame clay, and wrought in the ſame manner, only made upon proportionably larger moulds. The clay is uſually, for theſe large ones, only laid in a lump on the top of the mould, and with wet hands ſpread all over it to the bottom, and by this means a *muffle* is made with little trouble. Cramer.

MUFFI. See MUFFLE.

MUGGENT, in *Zoology*, the name of a ſpecies of freſh water wild duck, called by many authors the *merganſer*, from its catching fiſh that play on the ſurface of the waters.

It is about the ſize of the common tame duck; the beak is ſhort and broad, and is of a ſaffron colour; it is all over of a mottled colour, like that of the partridge, made up of black, white, brown and grey, ſo oddly mixed together, as to ſhew neither ſeparately: the crown of the head is black, and the feet are yellow.

Mr. Ray ſuſpects this not to be different from our common wild duck.

MUGGLETONIANS, a religious ſect, which aroſe in England about the year 1657, ſo denominated from their leader, Ludowick Muggleton, a journeyman taylor.

Muggleton, with his aſſociate Reeves, ſet up for great prophets; and, it is ſaid, pretended to an abſolute power of ſaving and damning whom they pleaſed; giving out, that they were the two laſt witneſſes of God, that ſhould appear before the end of the world.

MUGIL, in *Ichthyology*. See MULLET.

MUGWEED, in *Botany*. See CARDUUS.

MUGWORT, *artemiſia*, in *Botany*, a genus of the *polygamia ſuperflua* claſs. Its characters are theſe: the flower is compoſed of hermaphrodite and female florets; the hermaphrodite flowers compoſe the diſk or middle, in the centre is placed the germen, which is encompaſſed by five hairy ſtamina; the germen becomes a ſingle naked ſeed, ſitting upon a naked placenta. Linnæus enumerates twenty-two ſpecies, joining to this genus the *abrotanum* and *ſantolina*; but Miller only reckons two ſpecies; of which the common ſort grows naturally on banks and the ſides of footpaths, in moſt parts of England.

The *mora*, ſo famous in the cathartic countries, for curing the gout, by burning the part affected, is the bunch or down which is on the under part of the leaves of *ſempervivum*. *Mugwort* has long been famous as an uterine and antiſpaſmodic, and a medicine of great efficacy in all diſeaſes of the nerves. It is ſuddenly operative and abſtergent; it promotes the menſes, and cleanſes the womb. It is given in decoction, or much more agreeably in a light infuſion, in the manner of tea. The midwives uſe it alſo externally, boiling it, and applying it to the belly, to promote the menſtrual diſcharges, or the expulſion of the ſecundines. It is by ſome much recommended as a cure for the *ſcurvy*, and is to be taken for this purpoſe, either in powder, two drams for a dole, or the expreſſed juice, drank an ounce or two twice a day for ſome months. There uſed to be a diſtilled water, a ſyrup, a conſerve, and an extract of *mugwort* in the ſhops, and the laſt was made as that of wormwood; but at preſent theſe are diſuſed, and the dried herb only is kept there, as an ingredient in ſome of the compound waters.

MUID, a large meaſure, in uſe among the French, for dry commodities; as corn, pulſe, ſalt, lime, coals, &c.

The *muid* is no real ſettled uſed as a meaſure; but an eſtimation of ſeveral other meaſures, as the ſeptier, mine, minot, buſſel, &c.

At Paris, the *muid* of wheat, pulſe, and the like, is compoſed of twelve ſeptiers, each ſeptier making two mines, the mine two minots, the minot three buſhels, the buſhel four quarts, or ſixteen litrons, each litron 96 cubic inches, exceeding our pint by 1½ cubic inch. The *muid* of oats is double that of wheat, though compoſed, like that, of twelve ſeptiers; but each ſeptier contains twenty-four buſhels. The *muid* of charcoal contains twenty mines, facks, or loads, each mine two minots, each minot eight buſhels, and each buſhel four quarts, &c.

Muid is alſo one of the nine caſks, or regular veſſels uſed in France, to put wine and other liquors in. The *muid* of wine divided into two *demi-muids*, four *quarts-muids*, and eight *half quarts-muids*, contains thirty-ſix ſeptiers, each ſeptier eight pints, Paris meaſure; ſo that the *muid* contains two hundred and eighty-eight pints.

MULÆ, a word uſed by ſome medical writers to expreſs puſtules on the ſkin, which are owing to extreme heat, or to cold.

MULA *herba*, in *Botany*, a name uſed by ſome for the cetrach, or ſmooth ſpleenwort.

MULATTO, a name given, in the Indies, to thoſe who are begotten by a Negro man on an Indian woman; or an Indian man on a Negro woman.

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The word is originally Spanish, *mulato*, formed of *mulo*, a *mule*, as being begotten of two different species.

Those begotten of a Spanish woman and an Indian man, are called *mesti*; and those begotten of a negro by a *mesti* are called *jambos*. These are all very different in colour, and in their hair.

MULBERRY-*tree*, *morus*, in *Botany*, a genus of the *monœcia tetrandria* class. Its characters are these: it hath male flowers growing at separate distances from the female on the same tree: the male flowers are collected in long taper ropes of katkins; these have no petals, but have four long, awl-shaped, erect stamina: the female flowers are collected into roundish heads; these have no petals, but a heart-shaped germen, supporting two long, rough, reflexed styles, crowned by single stigmas; the empalement of these afterwards becomes large, fleshy, fuculent fruit, composed of several protuberances, in each of which is lodged one oval seed. Linnæus enumerates seven, and Miller eight species.

The common *mulberry*-tree, which grows naturally in Persia, from whence it was first brought to the southern parts of Europe, is to be propagated either by cuttings, or by laying down the tender branches, which in one year will be well rooted, and may be cut off from the tree, and transplanted into the places where they are to remain. But the better way is to propagate them by cuttings, which, if rightly chosen, and skilfully managed, will take root very well: these cuttings should be the shoots of the former year, with one joint of the two year's wood to the bottom; and they should be planted their whole length, leaving two or three buds above ground. The best season for planting them is in March, after the danger of hard frost is over: they should be planted in light rich earth, pressing the ground pretty close about them; and if they are covered with glasses, it will forward their putting out roots: but in the want of glasses, the ground about them should be covered with moss, which will render less watering needful. They may be transplanted the following spring into a nursery, where they should be trained to stems, by tying down stakes by each, to which the principal shoots should be fastened; and most of the lateral branches should be closely pruned off, leaving only two or three of the weakest to detain the sap, for the augmentation of the stem. After about four years growth in the nursery, they will be fit to transplant where they are to remain.

The *mulberry*-tree thrives best in a light soil, which should not be too wet, nor over dry; and if should always have an open exposure; for if planted too near the trees or buildings, to as to be shaded thereby, fruit seldom ripens well; though it will be to great advantage to have them defended from the west and south-west winds, by trees or buildings at a distance.

The soil under the *mulberry*-tree should always be well dug up every year, and manured, which proves of very great service to the fruit.

The white *mulberry* is cultivated in France and Italy for the sake of its leaves, as there is an opinion, that the silk-worms should be fed only with these; but it is affirmed by persons who seem to know best, that the Persians feed their worms only with the leaves of the black kind.

The trees intended for feeding silk-worms should not be suffered to grow tall, but kept in a sort of hedge; and instead of pulling off the leaves singly, they should be cut off with sheers together with the young branches; this is not only much sooner and more easily done, but it is less injurious to the trees. The white sort is propagated either by seeds or layers as the black, and is equally hardy. Miller.

The fruit of this tree, while unripe, is very astringent; but when thoroughly ripe, it is of a contrary quality, rather purgative, cooling, very pleasant, and quenching thirst. Its syrup, which is very pleasant, is the only use made of it in the shops.

The more general cultivating *mulberry*-trees in England might be of greater use than is at present supposed in many respects. In Devonshire they have a way of mixing *mulberry* juice with their cyder in the making, and this makes the very best of all English vinous liquors. And as to the great article of breeding silk-worms, though a recommendation from the crown could not bring about the planting these trees in sufficient number for it in James the First's time, yet the trees have been found to flourish every where with us when properly planted, and the worms feed very kindly and work very well with us. When this manufacture was first attempted, the people of many parts of England, nay, and in some parts of the dampest places in it too, tried it, and always with success. The only thing that stopped the progress of so valuable a thing at that time, was the want of a sufficient quantity of *mulberry*-trees, and the scheme has been neglected ever since. Phil. Trans. N° 133.

The tree was always esteemed by the ancients for its delicious fruit, before the use of its leaves was ever found out. The Romans, in the height of their luxury, preferred it before all the foreign fruits; and Columella and the other ancients are very explicit in the methods of propagating it.

The RUSTICK *mul*, which grows plentifully at Campeachy, and exported from Jamaica, is a species of the *mulberry*; as is also the China and Japan *mulberry*-tree, of the bark of which the inhabitants make paper.

MULBERRY-*tree*. See *Strawberry* BUSH.

MULBERRY-*wine*, a name given by the people of Devonshire, and some other parts of England, to a sort of cyder rendered exceptionable by an admixture of *mulberry* juice in the making: they choose for this purpose the ripest and blackest *mulberries*, and pressing out their juice and mixing it with a full-bodied cyder at the time of the grinding and pressing, give half so much of it as adds a perceptible flavour. It is very worthy the attention of people who live in other countries, where strong and good cyder is made, that this renders it a sort of wine much more agreeable than any other English liquor, and might be brought into general use, to the great advantage of the dealer. The colour of this liquor resembles that of the brightest red wine; and the flavour of the *mulberry* never goes off. Phil. Trans. N° 133.

MULBERRY-*shell*, a species of DOLIUM.

MULCH, a term used by gardeners for rotten dung, or the like, thrown upon beds of young plants, to preserve them from the bad effects of cold or drought.

MULCT, MULCTA, a penalty, or fine of money, imposed for a fault or misdemeanour.

MULE, *equus mulus*, in *Natural History*, a mongrel kind of quadruped usually generated between an ass and a mare; sometimes also between a horse and a she-ass: those of the first kind are reckoned the best.

Mules are a sort of monsters; and, therefore, they do not propagate their kind.

And yet the ancients mention a sort of *mules* that were prolific, in Phrygia, Syria, Cappadocia, and Africa. Witness Aristole, Hist. Animal. lib. vi. cap. 36. Varro de Re Rustica, lib. ii. cap. 1. Columella, lib. vii. cap. 36. Theophrastus, and, after him, Pliny, lib. viii. cap. 44.

Steno, examining the testicles of a *mule*, found ova therein, with a sort of placenta about them; which persuaded him, that *mules* might ingender without any miracle. But the observation is fanciful, and the conclusion unworthy so able a naturalist.

The Roman ladies had equipages drawn by *mules*; as appears from the medals of Julia and Agrippina. And, at this day, in Spain, the coaches of the nobility, and even of princes, are usually drawn by no other than *mules*.

We are assured, that M. de Thou, first president of the parliament, had the fourth coach in France, in 1585, till which time every body rode to court, parliament, &c. on *mules*.

These animals are very hardy. Savoy produces very large ones, but the finest are bred in Spain.

Mules are chiefly used in countries where there are rocky and stony ways, as about the Alps and Pyrenees, &c. Great numbers of them are kept in those places; they are usually strong, and are strong, well-limbed, and large, being chiefly bred out of fine Spanish mares.

The *mules* are sometimes fifteen or sixteen hands high, and the best of them are worth forty or fifty pounds a piece. No creatures are so proper for large burdens, and none so sure-footed. They are much stronger for draught than our horses, and are often as thick set as our dray horses, and will travel several months together, with six or eight hundred weight upon their backs. It is a wonder that these creatures are not more propagated in England, as they are so much hardier and stronger than horses, and are less subject to diseases, and will live and work to twice the age of a horse.

Those that are bred in cold countries are more hardy and fit for labour than those bred in hot; and those which are light made are fitter for riding than horses, as to the walk and trot; but they are apt to gallop rough, though these do it much less than the short-made ones.

They take so much after the mare they are bred from, that they may be procured of any kind, light, or strong, as the owner pleases. The general complaint we make against them, is, that they kick, and are stubborn: but this is only owing to our neglect in the breeding them; for they are as gentle as our horses in countries where they are bred with more care.

Mules generated between the horse and the she-ass, are the least valuable. They are commonly very dull, and take after the ass, and are not large; the other breed between an ass and a mare is therefore what is propagated chiefly in all countries where *mules* are used.

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he-ass must be procured for this breed; and in Spain, where *mules* are greatly esteemed, they will give fifty or sixty pounds for a fine he-ass, only to be kept as a stallion. They breed with this creature out of the finest and largest mares they have, giving the ass an advantage of height of ground, and putting the mare into a narrow pit raised on each side.

The *mule* seems to be the only animal which the confusion of species has rendered barren; and if so, there must necessarily be something particular in those animals that have engendered it, which is not found in others; and that it, perhaps as Aristotle thinks, the hardness of the matrix in mares and asses, which, like an earth, is rendered sterile by dryness; whereas that reason has no place in leopards, foxes, and the like, which animals are fruitful enough to transmit to their posterity the strong dispositions they have for generation, notwithstanding the resistance which the mixture of the species may bring with it.

If the ass destined to be bred on is suckled by a mare, or the mare suckled with an ass, it makes them much more familiar than they would otherwise be; and this may always be done, by taking away the colt that belongs to the dam, and putting the other in its place, keeping them in the dark ten days or a fortnight.

MULLE, among *barbers*. See SCRATCHEL.

MULLEIN, *Fairchild's*, in *Botany*. See DIANTHUS and MULLI, below.

MULLI's *fern*. See HEMIONITIS.

MULLI, among *Gardeners*, denote a sort of vegetable monsters produced by putting the farina fecundans of one species of plant into the pistil, or utricle of another.

The carnation and sweet-william being somewhat alike in their parts, particularly their flowers; the *farina* of the one will impregnate the other; and the seed so enlivened will produce a plant differing from either. An instance of this we first had in Mr. Fairchild's garden at Hoxton; where a plant is seen neither sweet-william, nor carnation, but resembling both equally: this was raised from the seed of a carnation that had been impregnated by the farina of the sweet-william. These couplings being not unlike those of the mare with the ass, which produce the *mule*, the same name is given them; and they are, like the others, incapable of multiplying their species.

This gives us a hint for altering the property and taste of any fruit, by impregnating one tree with the *farina* of another of the same class; e. gr. a codlin with a pearmain, which will occasion the codlin to impregnated, to fall a longer time than usual, and to be of a sharper taste. Or if the winter-fruits be fecundated with the dust of the summer kinds, they will ripen before their usual time. And from this accidental coupling of the *farina* of one with another, it may possibly be, that in an orchard where there is variety of apples, even the fruit gathered from the same tree differ in their flavour, and in the season of maturity. It is also from the same accidental coupling that the numberless varieties of fruits and flowers raised every day from seed proceed.

MULGRANOC, an English name for a small sea-fish caught on the Cornish and other shores, the *almodi* vel *cephalus* of Rondeletius, the *blennius pholis*, of Linnæus, and the GALERITO of other authors.

MULIEBRIA, a term sometimes used to signify the privities of women; or so much as is otherwise called *cunnus*. See *Fin. Abnot. (Eglantine) fig.* 9.

MULIER, in *Law*, signifies lawful issue born in wedlock, but begot before.

If a man have a son by a woman before marriage, which is a bastard and illegitimate; and he after marries the mother of the bastard, while with child of another, and they have another son; this second son is called *mulier*, and is lawful, and shall be heir to his father. These are sometimes also find with the additions *postnatus legitimus*, and *mulier puisne*.

Some derive the word from the Latin *melior*, or French *meilleur*, *better*; in regard the condition of a son born thus is better than that of an elder brother born before wedlock. Though, according to Glanvil, the lawful issue is rather called *mulier* than *melior*, because begotten on *mulierem*, and not on *concubinam*; for he calls such issue *filios mulierosos*; opposing them to bastards. Agreeable to which, Britton has *fecere mulieri*, i. e. the brother begotten of the wife; in opposition to *fecere bastardi*.

The like seems to obtain in Scotland, where, according to Skene, *mulieratus filius* is a lawful son, begot of a lawful wife.

MULIER was also anciently used as an addition for a wife; sometimes also for a widow. According to Coke, virgin is also included under the name *mulier*.

MULIERTY, the being or condition of a *mulier*, or lawful issue. Co. Litt. 352.

MULLEIN, *verbascum*, in *Botany*, a genus of the *pentandria monogynia* class. Its characters are these: the flower has a small permanent empalement of one leaf, cut into five parts; it hath one wheel-shaped petal, with a very short cylindrical tube; the brim cut into five oval obtuse segments; and five awl-shaped stamina, which are shorter than the petal, terminated by summits, compressed; each summit with a roundish germen, supporting a slender style inclining to the stamina; crowned by a thick, obtuse stigma; the germen afterwards becomes a roundish capsule with two cells, opening at the top, having an half oval receptacle fixed to the partition, filled with angular seeds. There are thirteen species; the common sort used in medicine, grows naturally on banks and highways. *Mullein* is accounted pectoral, being good for coughs, spitting of blood, and other affections of the breast: it is likewise good for griping and colic pains, arising from sharp humours. Outwardly used in fomentations and fumigations, it is reckoned a specific against pains and swellings of the haemorrhoids, or piles.

The leaves of *mullein*, Lyt Dr. Lewis, recommended as mild astringents, have a roughish drying kind of taste, and very little smell: the flowers have also a like astringent sliuess, with a considerable sweetness.

MULLER, or MULLE, denotes a stone flat and even at bottom, but round atop; used for grinding of waters on a marble.

The apothecaries use *mullers* to prepare many of their suffaceous powders; and painters for their colours, either dry or in oil.

MULLER is an instrument used by the glass-grinders; being a piece of wood, to one end whereof is cemented the glass to be ground, whether convex, in a bason; or concave, in a sphere or bowl.

The *muller* is ordinarily about six inches long, turned round: the cement they use is composed of ashes and pitch. See GRINDING.

MULLER, in *Ichthyology*, a name used by some for the fish called in Latin the CATAPHRACTES, and in English the mailed fish, or pogge.

MULLET, in *Ornithology*, a name by which the peasants in some counties of England called the *avis aerius Logi*. See DUEL.

MULLET, in *Ichthyology*, a name given in England indeterminately to several kinds of fish, of different genera; but the proper sense of the word is the same with that of the *mugil* or cephalus, of the generality of authors; the *cephalus* of Aristotle and the Greeks; and the *cestreus* or cestreus of Oppian and others.

In the Artedian system of ichthyology, the characters of the *mugil* are these: the branchiostege membranes on each side contain six crooked bones; the upper one being the broadest, and being laid under the covering of the gills, so that only five are discernible; the scales are large, and they cover the head, and the opercula of the gills, as well as the body of the *fish*; the head is of a depressed figure in its anterior part; and the body is oblong and compressed. According to these distinctions, there is only one known species of *mugil*, that is the *mugil* of Ovid and the ancients. It resembles the thynnalus in its external figure. Its jaws are tender and thin, and have no teeth in them; the tail is forked.

In the Linnæan system, the *mugils* a genus of the *abdominales*; and he reckons two species, viz. the *cephalus* and *capito*.

Rondeletius, and other authors, have described three or four different species of *mugil*; but they form rather varieties of the same fish, owing to age, place, and other accidents.

This fish in some degree resembles the dog or dare in shape. The nose is long; the belly a little bowed; the head plain and flattish; its scales are very large, and cover not only the body, but the membranes of the gills, and a great part of the head; the back is of a dusky bluish or greenish brown; the belly white, and the sides are variegated with longitudinal black and white lines running from the head to the tail: its mouth is toothless, but the tongue is somewhat rough. It is supposed to feed wholly on weeds and the like; and seems indeed to eat no fish. It is most frequently caught at sea; but at times comes up into rivers.

The *mullet* is a very well tasted fish; and of its spawn is made what we call BOTARGO.

Mullets are found in great plenty on several of the sandy coasts of our island, and haunt in particular those small bays that have influxes of fresh waters. They come in great shoals, and keep rooting like hogs in the sand or mud, leaving their traces in form of large round holes. They are very cunning, and when surrounded with a net, the whole shoal frequently escapes by leaping over it; for when one takes the lead, the others are sure to follow. This fish was sometimes made the instrument of a horri-

ble punishment for unfortunate gallants; and was in use both at Athens and Rome. *Leribus Athenienſium adulteri in ipſo deprehenſi pœna fuit pactaudorum. Raphani lacu utebantur nonnunquam muriâ pisces, interdum ſcorpiones.* Cauſabon. Animadv. in Athenæum. lib. i. Juvenal Satyr x. v. 316. and Horace Satyr ii. lib. i. v. 132. refer to this punishment. Pennant.

MULLET, *black*, *mugil niger*, a name given by authors to a fiſh of the *mullet* kind, but all over black, more uſually known by the name of the *portius piſcis*.

MULLET, *winged*, *mugil alatus*, a name given by ſome authors to the *hirundo piſcis*, or ſwallow-fiſh, as, excepting its wing-fins, it very much reſembles the *mullet* in ſhape. See FLYING-*fiſh*.

MULLET, or MOLLET, in *Heraldry*, a bearing in form of a ſtar, or rather of the rowel of a ſpur, which it originally repreſented.

The *mullet* has but five points; when there are ſix it is called a *ſtar*. Though others make this difference, that the *mullet* is, or ought to be, always pierced, which a ſtar is not. *Tab.* II. *Heraldry, fig.* 73.

The *mullet* is uſually the difference, or diſtinguiſhing mark, for the fourth ſon, or third brother, or houſe.

Though it is often alſo borne alone, as coat armour: thus, Ruby on a chief pearl, two *mullets* diamond, was the coat of the famous Lord Verulam, firſt Sir Francis Bacon.

MULLUS, in *Ichthyology*, the name of a fiſh properly of the cuculus-kind, of which there are two ſpecies; the one called *mullus imberbis*, the other *mullus ſuper*. Linnæus makes the *mullus* a diſtinct genus of the thoracic fiſhes, the characters of which are, that the head is compreſſed, declining and covered with ſcales: the branchioſtege membrane contains three bones; and the body is covered with large ſcales, which eaſily fall off. He enumerates three ſpecies.

The *mullus imberbis* is a very ſcarce ſea-fiſh, with a large head, ornamented with ſeveral ſmall figures of ſtars, large eyes, a ſmall mouth of a fine bright red within, and without teeth; the covering of the gills has ſeveral prickles pointing towards the tail; the whole body is of a reddiſh colour, and the gill-fins have near their end ſome filamentous fingered appendages; its belly is white; and there are two rows of pointed bones running from the head to the tail all along the back.

The other, or *mullus ſuper*, is a ſmall fiſh about the length and thickneſs of a finger, and of a beautiful red or ſomewhat purpliſh colour; and is covered with ſcales ſerrated at their extremities, and placed obliquely. Rondelet. de Piſc. p. 640.

MULLUS *barbatus*, in *Ichthyology*, the name of a fiſh of the cuculus or the gurnard-kind, and in the Linnæan ſyſtem a ſpecies of the *mullus*, caught in the Mediterranean, and reckoned an extremely delicate fiſh for the table. Its uſual ſize is about ſix or ſeven inches in length; its head is flatted and its body conſiderably thick; and the back flat, not ridged; from the head all the way to the tail, it becomes gradually ſmaller, ſo as to reſemble an obeliſk in figure; its ſcales are ſerrated at the edges, and are eaſily rubbed off; they are of a brownith olive colour; but the ſides, when they are off, look as if tinged with red lead; the eyes ſtand very high in the head, and it has two very long beards under its chin; it has no teeth in the jaws, and its tail is very forked.

MULLUS *imberbis*, in *Ichthyology*, the name of a ſmall fiſh of the *mullus* kind, according to Linnæus, caught in the Mediterranean and Archipelago, and called by many *ſex mullarum* and *re de triglia*. Its uſual ſize is about four or five inches in length; it is all over of a reddiſh hue, and is covered with very large ſcales; its belly is alſo ſomewhat prominent, by which it is diſtinguiſhed from all the other mullets; its eyes are large, its mouth very wide, and its jaws rough like a file; its tail is forked, and it has no beards.

MULSUM, MULSE, a liquor made of wine and honey; or even of honey and water. See HYDROMEL.

MULTA, MULTURA, *epiſcopi*, a fine, or final ſatisfaction anciently given the king by the biſhops, that they might have power to make their laſt wills; and that they might have the probate of other men's, and the granting of adminiſtrations.

MULTANGULAR, a figure, or body, which has many angles.

MULTIBONA, in *Botany*, a name given by ſome authors to parſley.

MULTIFIDUS *ſpinæ*, in *Anatomy*, a name given by Albinus to a *muſcle*, the ſeveral parts of which he ſays have been called by ſeveral different names by the generality of anatomical writers.

That part of it which is ſituated in the region of the loins, is called by Veſalius, the *decimus tertius* and *decimus quartus deſum movantium*, and by ſome the *tertius deſti muſculus*.

That which is ſituated in the back is called by Veſalius, *decimus quintus* and *decimus ſextus deſum movantium*, and by others, *quintus deſti muſculus*.

That part which is in the neck is called by Veſalius, the *ſeptimus* and *octavus deſum movantium*, and by many the *quartus cervicis muſculus*; and by Fallopius, *pars tertii paris muſculorum deſti*. That part of it which is in the loins and back is called by Fallopius the *quartum par muſculorum deſti*, and ſeems to be the *facies* of Riolanus.

That part which is in the neck is called by Riolanus alſo a part of the ſpinatus, and by ſome the *tranſverſalis colli*: and its diſtinct portions in the neck are called by Douglas the *inter ſpinales*.

MULTILATERAL, in *Geometry*, is applied to thoſe figures which have more than four ſides or angles, more uſually called POLYGONS.

MULTINOMIAL, or MULTINOMIAL *roots*, in *Mathematics*, are ſuch as are compoſed of many names, parts, or members; as, $a+b+c+d$, &c.

For the method of raiſing an infinite *multinomial* to any given power, or of extracting any given root out of ſuch a power, ſee a method of M. de Moivre, in Phil. Tranſ. N° 230.

MULTIPLE, MULTIPLEX, in *Arithmetic*, a number which comprehends ſome other ſeveral times.

Thus 6 is a *multiple* of 2, or, which is the ſame, 2 is a quota part of 6; 2 being contained in 6 three times. And thus 12 is a *multiple* of 6, 4, 3, and comprehends the firſt twice, the ſecond thrice, the third four times, &c.

MULTIPLE *ratio*, or *proportion*, is that which is between *multiple* numbers.

If the leſſer term of a ratio be an aliquot part of the greater, the ratio of the greater to the leſs is called *multiple*; and that of the leſs to the greater *ſub-multiple*.

A *ſub-multiple* number is that contained in the *multiple*. Thus the numbers 1, 2, and 3, are *ſub-multiples* of 6 and 9.

Duple, triple, &c. ratios; as alſo ſub-duples, ſub-triples, &c. are ſo many ſpecies of *multiple*, and *ſub-multiple* ratios.

MULTIPLE *ſuperparticular proportion*, is when one number or quantity contains another more than once, and a certain aliquot part; as 3 to 1.

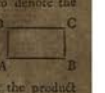
MULTIPLE *ſuperpartient proportion*, is when one number or quantity contains another's diverſe times, and ſome parts beſides; as 4 to 1.

MULTIPLE *echo*. See ECHO.

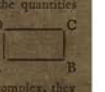
MULTIPLICAND, in *Arithmetic*, is one of the factors in the rule of multiplication being that number which is given to be multiplied by another called the *multiplicator*, or *multiplier*.

MULTIPLICATION, the act of *multiplying*, or increaſing the number of any thing.

Accurately ſpeaking, in every *multiplication*, the multiplicator muſt always be conſidered as a number; and it is eaſy to conceive a quantity of any kind multiplied by a number. But to talk of a pound multiplied by a pound, a debt by a debt, and a line by a line, &c. is unintelligible. However, by analogy, in the application of algebra to geometry, we meet with ſuch expreſſions, and nothing is more common than to find $AB \times BC$, to denote the rectangle ABCD, the length of which is AB, and the breadth BC. But this is only to be underſtood by analogy; becauſe, if the number expreſſing the meaſure of the ſide AB was multiplied by the number expreſſing the meaſure of BC, the product would expreſs the meaſure of ABCD.



The ſign of *multiplication* moſt commonly uſed among algebraiſts, is $\times$. But the Germans, after Leibnitz, only make uſe of a point placed between the quantities multiplying each other, thus; $a \cdot b$ is the ſame as $a \times b$ and $AB \cdot BC$, the ſame as $AB \times BC$, or the rectangle of AB into BC, that is the rectangle ABCD.



When the quantities to be multiplied are complex, they place them between a parenthеſis, inſtead of drawing a line over them, as we commonly do.

Thus they write $(a+b) \cdot (c+d)$ inſtead of $\overline{a+b} \times \overline{c+d}$, for the product of $a+b$ into $c+d$. Sometimes the point is omitted, thus: $(a+b)\ (c+d) = a+b \times c+d$.

An old ſtatute ſays, it is ordained and eſtabliſhed, that none from henceforth ſhall uſe to *multiply* gold, or ſilver, nor uſe the craft of *multiplication*; and if any the ſame do, he ſhall incur the pain of felony. Stat. 5 Hen. IV. cap. 4.

This ſtatute was made on preſumption that ſome perſons, ſkilful in chemiſtry, could *multiply* or augment thoſe metals by elixirs, or other ingredients; and change other metals into very gold and ſilver. Under Henry VI. letters patent were granted to certain perſons (who undertook to perform the ſame, and to find the philoſopher's ſtone),

ſtone), to free them from the penalty in the ſaid ſtatute. But the ſtatute has been ſince repealed. 1 Will. and Mar. cap. 30.

MULTIPLICATION, in *Arithmetic*, the act, or art of *multiplying* one number by another, to find the product.

Multiplication, which is the third rule in arithmetic, conſiſts of finding ſome third number, out of two others given; wherein one of the given numbers is contained as often as unity is contained in the other.

Or, *multiplication* is the finding what will be the ſum of any number added to itſelf, or repeated, as often as there are units in another. So that the *multiplication* of numbers is a compendious kind of addition.

Thus the *multiplication* of 4 by 5 makes 20, i. e. four times five amounts to twenty; which algebraiſts expreſs thus, $4\times5=20$.

In *multiplication*, the firſt factor, i. e. the number to be multiplied, or the multiplicand, is placed over that whereby it is to be multiplied; and the factum or product under both.

An example or two will make the proceſs of *multiplication* eaſy. Suppoſe I would know the product of 269 multiplied by 8, or 8 times 269.

Multiplicand	—	—	269
Multiplier	—	—	8
Factum, or product		—	2152

The factors being thus diſpoſed, and a line drawn underneath (as in the example), I begin with the multiplicator thus: 8 times 9 make 72, ſet down 2, and carry 7 tens, as in addition; then 8 times 6 make 48, and 7 I carried, 55; ſet down 5, and carry 5; laſtly, 8 times 2 make 16, and with 5 I carried 21, which I put down: ſo that coming to number the ſeveral figures placed in order, 2, 1, 5, 2, I find the product to be 2152.

Now ſuppoſing the factors to expreſs things of different ſpecies, viz. the multiplicand men, or yards, and the multiplier pounds; the product will be of the ſame ſpecies with the multiplicator. Thus the product of 269 men or yards, multiplied by 8 pounds or pence, is 2152 pounds or pence; ſo many of theſe going to the 269, at the rate of 8 a piece. Hence the vaſt uſe of *multiplication* in commerce, &c.

If the multiplicator conſiſts of more than one figure, the whole multiplicand is to be added to itſelf; firſt, as often as the right-hand figure of the multiplicator ſhews, then as often as the next figure of the multiplicator ſhews, and ſo on. Thus 421×23 is equal to 421×3, and alſo 421×20. The product ariſing from each figure of the multiplicator, multiplied into the whole multiplicand, is to be placed by itſelf in ſuch a manner, that the firſt or right-hand figure thereof may ſtand under that figure of the multiplicator from which the ſaid product ariſes. For inſtance:

Multiplicand	—	—	421
Multiplicator	—	—	23
Particular product of 421×3		—	1263
Particular product of 421×20		—	842
The total product		—	9683

This diſpoſition of the right-hand figure of each product follows from the firſt general rule; the right hand figure of each product being always of the ſame denomination with that figure of the multiplicator from which it ariſes.

Thus, in the example, the figure 2 in the product 842 is of the denomination of tens, as well as the figure 2 in the multiplicator. For 1×20 (that is, the 2 of 23)$=20$, or 2 put in the place of tens, or ſecond place.

Hence, if either of the factors have one or more cyphers on the right-hand, the *multiplication* may be performed without regarding the cyphers, till the product of the other figures be found: to which they are to be then affixed on the right. And if the multiplicator have cyphers intermixed, they need not be regarded at all. Inſtances of each follow:

32	358		1|0		24|00		8013
10	6|000		1|0		3|0		5006
320	2148000		10 0		72000		48078
							40065
							4011 3078

Thus much for an idea of *multiplication*, where the multiplicator conſiſts wholly of integers; in the praxis whereof, it is ſuppoſed, the learner is appriſed of the product of any of the nine digits multiplied by one another, eaſily learnt from the common table, or otherwiſe.

2

There are alſo ſome abbreviations of this art. Thus to multiply a number by 5, you need only add a cypher to it, and then halve it. To multiply by 15 do the ſame, then add both together. The ſum is the product.

Expedients for the more eaſy and expeditious multiplying large ſums are ſliding rules, and Neper's bones. The want of which may be ſupplied by tabulating the multiplicand.

Where the multiplicator is not compoſed wholly of integers, as it frequently happens in buſineſs, where pounds are accompanied with ſhillings and pence; yards with feet and inches; the method of procedure, if you multiply by a ſingle digit, is the ſame as in ſimple numbers, only carrying from one denomination to another, as the nature of each ſpecies requires. E. gr. to multiply 123*l.* 14*s.* 9*d.* 3*q.* by five: ſay, $5\times3q.=15q.$ that is, 3*d.* 3*q.* write down the 3*q.* and proceed, ſaying $5\times9=45d.$ that is, 3*s.* 9*d.* to which add 3*d.* ſet down 0, and proceed in the ſame manner through the reſt.

If you multiply by two or more digits, the methods of procedure are as follow: ſuppoſe I have bought 37 ells of cloth at 13*l.* 16*s.* 6*d.* per ell, and would know the amount of the whole. I firſt multiply 37 ells by the 13*l.* in the common method of *multiplication* by integers, leaving the two products without adding them; then multiply the ſame 37 ells by 16*s.* leaving, in the like manner, the two products without adding them. Laſtly, I multiply the ſame 37 by the 6*d.* the product whereof is 222*d.* which divided by 12 (ſee DIVISION), gives 18*s.* 6*d.* and this added to the products of the 16*s.* the ſum will be 610*s.* 6*d.* the amount of 37 ells at 16*s.* 6*d.* the ell. Laſtly, the 610*s.* 6*d.* are reduced into pounds by dividing them by 20 (ſee REDUCTION): upon adding the whole, the amount of 37 ells at 13*l.* 16*s.* 6*d.* will be found as in the following:

37 ells	37 ells	37 ells
At 13 pounds.	At 16 ſhillings.	At 6 pence.
111	222	222
37	37	
30 10 6	18 6	
Product 511 10 6	610 6	

Or thus: ſuppoſe the ſame queſtion; reduce the 13*l.* 16*s.* into ſhillings, the amount will be 276*s.* reduce 276*s.* into pence, adding 6, the amount will be 3318*d.* Multiply the 37 ells by 3318, the amount will be 122766*d.* which divided by 12, and the quotient 10230*s.* 6*d.* reduced into pounds by cutting off the laſt figure on the right, and taking half of thoſe on the left, yields 511*l.* 10*s.* 6*d.* the price of the 37 ells, as before.

Though by theſe two methods any *multiplication* of this kind may be effected, yet the operations being long, we ſhall add a third much ſhorter. Suppoſe the ſame queſtion: multiply the price by the factors of the multiplicator, if reſolvable into factors: if not, by thoſe that come neareſt it: adding the price for the odd one, or multiplying it by what the factors want of the multiplier. So, the work will ſtand thus; 37 ells at 13*l.* 16*s.* 6*d.* $6\times6=36+1=37$:

Therefore —

	82	19 0
	497	14 0
	13	16 6
	511	10 6

The price of the 37 ells.

But the moſt commodious is the fourth method, which is performed by aliquot and aliquant parts—where you are to obſerve by the way, that *aliquot parts* of any thing are thoſe contained ſeveral times therein, and which divide without any remainder; and that *aliquant parts* are other parts of the ſame thing compoſed of ſeveral aliquot parts.

To MULTIPLY *by aliquot parts*, is, in effect, only to divide a number by 2, 3, 4, 5, &c. which is done by taking a 2d, 4th, 5th, &c. from the number to be multiplied. Example: To multiply, v. gr. by 6*s.* 8*d.* Suppoſe I have 347 ells of ribband at 6*s.* 8*d.* per ell.

Multiplicand	—	347 ells.
Multiplicator	—	6*s.* 8*d.*
Product	—	115*l.* 13*s.* 4*d.*

The queſtion being ſtated, take the multiplicator, which, according to the table of aliquot parts, is the third; and ſay the third of three is 1, ſet down 1; the third of 4 is 1, ſet down 1, remains 1, that is 1 ten, which added to 7, makes 17; the third of 17 is 5; remain 2 units, i. e. two-thirds, or 13*s.* 4*d.* which place after the pounds. Upon numbering the figures 1, 1, and 5, integers, and

13*l.*

13*s.* 4*d.* the aliquot part remaining, I find the sum 115*l.* 13*s.* 4*d.*

For MULTIPLICATION *by aliquot parts*: Suppose I would multiply by the aliquot part 19. I first take for 10, half the multiplicand; then for 5, which is the fourth, and laſtly, for 4, which is the 5th. The products of the three aliquot parts that compoſe the aliquot part, being added together, the ſum will be the total product of the *multiplication*, as in the following example; which may ſerve as a model for *multiplication* by any aliquot part that may occur.

Multiplicand	——	356 ells.
Multiplier	——	19.
		178*l.* for 10.
		89*l.* for 5.
		71*l.* 4*s.* for 4.
Product	——	338*l.* 4*s.*

MULTIPLICATION, *for the proof of*. The operation is right when the product divided by the multiplier quotes the multiplicand; or divided by the multiplicand, quotes the multiplier. A readier way, though not abſolutely to be depended on (ſee ADDITION), is thus: add up the figures of the factors, caſting out the nines; and ſetting down the remainders of each; theſe multiplied together, out of the factum caſt away the nines, and ſet down the remainder: if this remainder agree with the remainder of the factum of the ſum, after the nines are caſt out; the work is right.

MULTIPLICATION, *craſs*, otherwiſe called *duodecimal arithmetic*, is an expeditious method of multiplying things of ſeveral ſpecies, or denominations, by others likewiſe of different ſpecies, &c. *e. gr.* ſhillings and pence by ſhillings and pence; feet and inches by feet and inches. This is much uſed in meaſuring, &c. The method is thus,

Suppoſe 5 feet 3 inches to be multiplied by 2 feet 4 inches: ſay, 2 times 5 feet is 10 feet, and 2 times 3 is ſix inches: again, 4 times 5 is 20 inches, or 1 foot 8 inches; and 4 times 3 is 12 parts, or 1 inch: the whole ſum makes 12 feet 3 inches. In the ſame manner you may manage ſhillings and pence, &c.

F.	I.
5	3
2	4
10	6
1	8
	1
12	3

MULTIPLICATION, in *Algebra*. To multiply algebraic quantities, we muſt attend not only to the quantities themſelves, but alſo to their ſigns.

The general rule for the ſigns is, that when the ſigns of the factors are like, (*i.e.* both + or both −) the ſign of the product is +; but when the ſigns of the factors are unlike, the ſign of the product is −.

Then if the quantities to be multiplied be ſimple quantities, find the ſign of the product by the laſt rule; after it place the product of the coefficients, and then ſet down all the letters after one another, as in one word.

If the factors be compound quantities, multiply every part of the multiplicand by all the parts of the multiplier, taken one after another, and then collect all the products into one ſum; which will be the product required. See Maclaurin, Saunderſon, Hammond, or any other elementary writers.

The reaſon of the rule here given for the ſigns of the product, viz. that + by +, or − by − give +, and that + by −, or − by + give −, is apt to perplex beginners. But if it be conſidered, that in all *multiplication* the multiplicator is, ſtrictly ſpeaking, a number, the difficulty ſoon vaniſhes; for, 1. When any poſitive quantity $+a$ is multiplied by any poſitive number $+n$, the meaning is, that $+a$ is to be taken as many times as there are units in n, and therefore the product is evidently $+na$ or an, the poſitive ſign being omitted.

2. When $-a$ is multiplied by n, then $-a$ is taken as often as there are units in n, and the product muſt be $-an$.

3. As *multiplication* by a poſitive number implies a repeated addition, *multiplication* by a negative implies a repeated ſubtraction; ſo that when $+a$ is to be multiplied by $-n$, the meaning is, that $+a$ is to be ſubtracted as often as there are units in n, therefore the product muſt be negative, being $-na$.

4. When $-a$ is to be multiplied by $-n$, then $-a$ is to be ſubtracted as often as there are units in n; but by the rules of ſubtraction, to ſubtract $-a$ is equivalent to adding $+a$, and conſequently the product is $+na$.

The ſecond and fourth caſes may be thus illuſtrated, by the import and meaning of the ſigns + and −, $+a-a$ muſt be $=0$. Therefore if we multiply $+a-a$ by n, the product muſt vaniſh, or be nothing; becauſe the factor $a-a=0$. The firſt term of the product is $+an$ by caſe 1. therefore the ſecond term of the product muſt be $-an$, which deſtroys $+an$; ſo that the whole product muſt $+an-an=0$. Therefore $-a$ multiplied by $+n$ gives $-an$.

In like manner, if we multiply $+a-a$ by $-n$, the firſt term of the product being $-an$, the latter term of the product muſt be $+an$, becauſe the two together muſt deſtroy each other, or their amount be $=$, ſince one of the factors $a-a=0$. Therefore $-a$ multiplied by $-n$, muſt give $+an$. See Maclaurin's Algebra, part i. chap. 4. Saunderſon's Algebra, vol. i. p. 37. And Barrow's Euclid. Schol. Prop. 10. Elem. 2.

EXAMPLES.

Mult.	$+a$	$-2a$	$+bc$	$-8x$	$+3ab$
By	$+b$	$+4b$	$-5a$	$-4x$	$-5ac$
Products	$+ab$	$-8ab$	$-30ax$	$+32ax$	$-15a^2bc$

$a+b$	$2a-3b$	$2x-4b$
$a+b$	$4a+3b$	$2x+4b$
a^2+ab	$8a^2-12ab$	$4x^2-8xb$
$+ab+b^2$	$+10ab-15b^2$	$+8xb-16b^2$
$a^2+2ab+b^2$	$8a^2-2ab-15b^2$	$4x^2-16b^2$

x^2-xz	a^2+ab+b^2
$x+a$	$a-b$
x^3-ax^2	$a^3+a^2b+ab^2$
$+ax^2-a^2x$	$-a^2b-ab^2-b^3$
x^3-a^3x	a^3-b^3

See EXPONENT.

MULTIPLICATION, in *Geometry*, or in *lines*, is effected by ſuppoſing a line *ab* (*Tab.* III. *Geometry*, *fig.* 61.) called the *deſcribent*, moving perpendicular along another *c*, called the *dirigent*.

For, by this means, the deſcribent forms the rectangle *adcb*; and if it be divided, together with the dirigent, into any number of equal parts, it will, by its motion, deſcribe as many little rectangles as the units in the deſcribent and dirigent will produce, when multiplied into one another, viz. 21. For when the line *ab* hath moved over one part of *ad*, it will, by its three parts, have deſcribed the three little rectangles in the firſt column; when it comes to 2, it will have deſcribed three more. And this is the reaſon why *multiplication*, in the Latin tongue, is uſually expreſſed by the word *ductus*, *drawn*; (and from hence alſo comes *product*) as if *ab* were multiplied by *bc*, they ſay, *ab ductus in bc*; becauſe the deſcribent is led, as it were, or carried along in an exact poſture upon the dirigent, and by that means deſcribes the rectangle; ſo that the rectangle and product are the ſame in geometry.

Now, as in all *multiplication* unity is to one factor as the other is to the product, *multiplication* in lines may be performed thus. Let *ab* (*fig.* 62.) be to be multiplied by *ad*. Make any angle at pleaſure; on one of the legs ſet off $ac=$ to unity, and on the ſame leg ſet off *ad*, the multiplicator (3); then ſet the multiplicand *ab* (2) from *a* on the other leg of the angle; draw *cb*, and parallel to it, through *d*, draw *de* (6). I ſay, *de*, or 6, is the product: for $ac : ab :: ad : de$.

MULTIPLICATION *of plants*. See FECUNDITY, and PLANTS.

MULTIPLICATIVES. See NUMERALS.

MULTIPLIER, in *Arithmetic*, the number multiplying, or MULTIPLICATOR.

MULTIPLICATOR, in *Arithmetic*, a number multiplying another called the *multiplicand*.

The largeſt number is ordinarily made the multiplicand, and placed above the ſmaller, or *multiplicator*; but the reſult is the ſame, which ſoever of the numbers be made multiplicand or *multiplicator*; 4 times 5, and 5 times 4, making the ſame ſum.

MULTIPLYING, in the *Animal Oeconomy*, the producing of one's like.

Mankind *multiplied* at a prodigious rate before the flood. Rabbets, fiſh, and moſt inſects, *multiply* incredibly; the ſingle milt of a cod, examined with M. Leewenhoeck's microſcope, was found to contain more ova than there are animals on the face of the earth. See *Fecundity of* FISH. M. Dodart has ſeveral diſcourſes on the multiplication of plants, in the Memoirs of the Royal Academy of Sciences. He has examined the beech-tree, particularly, with this view, and found its increaſe to ſurpaſs all imagination.

MULTIPLYING, in *Arithmetic*, is the finding a number which contains the multiplicand as often as there are units in the multiplier.

The rule of three conſiſts in *multiplying* the third term by the ſecond, and dividing the product by the firſt. See RULE *of three*.

MULTIPLYING-*glass*, a lens, or glass, in which objects appear increased in number.

A *multiplying-glass*, called also a *polyhedron*, is a glass formed or ground into several planes, or faces, making angles with one another; through which the rays of light, issuing from the same point, undergo different refractions, so as to enter the eye from every surface in a different direction; as if they came from several points.

And thus the same point is seen in several imaginary foci; and therefore appears *multiplied*. For the phænomena and laws of *multiplying-glasses*, see POLYEDRON.

MULTISILIQUOUS *plants* are the same with *corniculate plants*; viz. those which, after each flower, have divers distinct, slender, and frequently crooked, siliquæ, or pods, wherein their seed is contained; and which, when they ripen, open of themselves, and let the seeds drop.

MULTITUDE, *multitudo*, an assemblage, or collection, of a great number of things, or persons.

Multitude is properly the abstract whereby things are said to be *many*.

In which sense, *multitude* may be considered as *number*; and stands opposed to *unity*.

In law, some will have *multitude* to imply at least ten persons; but Sir Edward Coke says, he could never find it restrained, by the common law, to any certain number, but always left to the discretion of the judges.

MULTIVALVES, in *Natural History*, the name of a general class of shell-fish, distinguished from the univalves, which consist of only one shell, and the bivalves, which consist of two, by their consisting of three or more shells.

Of these there are much fewer species than either of the univalve or bivalve class. A late accurate French author has ranked all the species under six genera, which are these. 1. The *ecbinus*, or sea-eggs. 2. The *vermiculi*, or sea-worms. 3. *Balani*, or center-shells. 4. The *polithecæ*, or thimble-shells. 5. The *anatifer æ*, or goose-shells. And, 6. The *pholades*. Hill. Nat. Echaire. part ii. p. 135. All these are under their several heads.

A MULTO *fortiori*, *or a minore ad majus*, is a way of argumentation often used by Lyttelton, whose force is thus: if it be so in a small matter, much more is it so in a matter of an ancient right.

MULTONES *nummi*, in our *Ancient Writers*, an old coin of gold, having an *Agnus Dei*, sheep, or lamb, on the one side, and from that impression called *multones*. This coin was much common in France, and sometimes current in England. Patent 33 Edw. I. cited by the learned Spelman.

MULTUM, in *Arithmetic*. If A be one, B one, C one, D one, &c. and B, C, and D, be not the same with A; A, B, C, and D, are *multa*, or *plura*, *many*. Wallius.

MULTURA *spiscat*. See MULTA.

MULUD, in the *Materia Medica*, a word used by Avicenna and Serapion to express a sort of litharge, called by the Greeks *molybditis*, as seeming to partake of the nature of lead alone, not of gold or silver, or any other metal, as they thought the aggrites and chrysites did. This *molud*, or molybditis, was the least in esteem of all the kinds of litharge, and was of a dusky greyish white colour. It seems to be the same that Dioscorides means by *polia* and *polia*, and sometimes by *litharguros Sicelicus*, from the place whence it was brought.

MUM, a wholsome kind of malt liquor, chiefly prepared in Germany.

The process of making *mum*, as recorded in the townhouse of Brunswick, the place of most note for this liquor, is as follows.

Take forty-three gallons of water that has been boiled to the consumption of a third part; brew it with seven bushels of wheaten malt, one bushel of oat malt, and one bushel of ground beans; when it is tunned, let not the hogshead be too full at first; and as soon as it begins to work, put into it of the inner rind of fir three pounds, tops of fir and birch each one pound, carduus benedictus three handfuls, flowers of rota solis one handful or two; burnet, betony, marjoram, avens, pennyroyal, wild thyme, of each a handful and a half; of elder-flowers two handfuls, or more; seeds of carduus or blessed thistle thirty ounces, barberries bruised one ounce; put the herbs and seeds into the vessel when the liquor has worked a while; and, after they are added, let the liquor work over the vessel as little as may be; then fill it up. Lastly, when it is stopped, put into the hogshead ten new-laid eggs unbroken or cracked, stop it up close, and drink it at two years end.

Our English brewers use cardamom, ginger, and saffafras, instead of the inner rind of fir; and add also walnut-roots, madder, red saunders, and elecampane.

Every barrel of *mum* imported pays a duty of 25*s.* and by 12 Ann. stat. 1. c. 2. and 13 Geo. c. 7. every barrel of *mum* made or imported is liable to an additional duty of 10*s.*

MUMMING, from the Teutonic *mummen*, *to mimic*; antic diversions in the Christmas holidays, to get money or good cheer.

MUMMY, *mumia*, a carcase, or body, embalmed or dried in the manner of the ancient Egyptians.

Menage, after Bochart, derives the word *mummy* from the Arabic *mumia*; of *maar*, *myrr*; Salmasius, from *mumiam*, a kind of perfume; though others hold, that, in the Arabic tongue, the word *mumia* signifies a body embalmed, or aromatized.

Properly speaking, *mummy* is not the flesh of the deceased, but the composition wherewith it is embalmed; but, in common acceptation, *mummy* is also used for the body.

The preparation of *mummy* is of so old a standing, that it was in use in Egypt before the time of Moses. The coffin in which the *mummy* is contained was to be of sycamore wood, which *is* found to keep sound for the space of three thousand years; but the tree, properly thus called, was very different from our sycamore.

Mummy is said to have been first brought into use in medicine by a Jewish physician, who wrote, that flesh thus embalmed was good for the cure of divers diseases, and particularly for bruises, to prevent the blood's gathering and coagulating. The Turks prevent the exportation of *mummy* into Europe, as much as possible.

There are two kinds of bodies denominated *mummies*. The first are only carcases, dried by the heat of the sun, and by that means kept from putrefaction: these are frequently found in the dry sands of Libya. Some say, they are the bodies of deceased people buried there on purpose to keep them entire without embalming; others, that they are the carcases of travellers, &c. who have been overwhelmed with clouds of sand raised by the hurricanes frequent in those deserts. Be that as it will, these *mummies* are of no use in medicine, and are only preserved as curiosities.

The second kind of *mummies* are bodies taken out of the pits or catacombs near Cairo, wherein the Egyptians deposited their dead after EMBALMING. These constitute the *mummy* once so much valued, and to which such extraordinary virtues are ascribed.

It is said, that all the *mummy* sold in the shops, whether brought from Venice or Lyons, or even directly from the Levant by Alexandria, is factitious, and the work of certain Jews, who, knowing the value the Europeans set on the Egyptian *mummy*, counterfeit it by drying carcases in ovens, after having prepared them with powder of myrrh, caballin aloes, Jews pitch, black pitch, and other coarse or unwholsome drugs.

The French charlatans, it seems, have likewise got the art of preparing *mummies*. Their method is simple enough: out of the carcase of a person hanged, they take the brain and entrails, and dry the rest in an oven, flooping it in pitch, and other drugs; and this they sell for right Egyptian *mummy*.

There are found at this time in Poland a kind of natural *mummies*, or human bodies, preserved without the assistance of art. These lie in considerable numbers in some of the vast caverns in that country. They are dried, with the flesh and skin shrunk up almost close to the bones, and are of a blackish colour. In the wars which several ages ago laid waste that country, it was common for parties of the weaker side to retire into these caves, where their enemies, if they found it out, suffocated them by burning straw, &c. at the mouth of the cavern, and then left the bodies; which, being out of the way of injuries from common accidents, have lain there ever since.

Parœus has a very curious treatise of *mummies*, wherein he shews the abuses thereof; and makes it appear, that they can never be of any real medicinal use.

Matthiolus is of the same opinion, after Serapion. Both these authors take even the Egyptian *mummies* to be no more than bodies embalmed with pissasphaltum.

MUMMY, *mumia*, is more particularly used for the liquor or juice oozing from human bodies aromatized and embalmed, gathered in the sepulchres. This is the *mummy* chiefly spoken of among the ancient writers.

MUMMY also denotes a medicinal drug, or a viscous composition, partaking of bitumen and pitch, found in the mountains and forests of Arabia, and other hot countries in the East; much used in embalming of dead bodies.

Dioscorides speaks of *mummy* found on the sea-coast near Epidaurus, brought thither by the torrents from the Ceraunian mountains, and there dried by the sun into huge masses.

It smells like bitumen mixed with pitch. The people thereabouts call it *mineral wax*. In Latin, or rather Greek, it is called PISSASPHALTUS.

MUMMY, *mumia*, is also used, by some physicians, for a supposed implanted spirit, found chiefly in carcases, when the infused spirit is fled.

The infused spirit is sometimes also called *mummy* in li-

ing subjects; and both the one and the other are supposed to serve in TRANSPLANTATION.

A plant, for inſtance, bringing this *mumia* from one ſubject to another, the *mumia* joins and unites itſelf immediately with the *mumia* or ſpirit of the new ſubject; and from this union ariſes a natural and common inclination between the two ſubjects. And on this principle they account for ſympathetic or magnetic cures. But this whole doctrine is now deſervedly ridiculed and exploded.

MUMMY is alſo uſed, among *Gardeners*, for a ſort of wax uſed in the planting and grafting of trees.

Agricola directs the preparation thereof as follows: take one pound of common black pitch, and a quarter of a pound of common turpentine; put them together in an earthen pot, and ſet them on fire in the open air, having a cover ready to quench the mixture in time: the matter is to be thus alternately lighted and quenched, till all the nitrous and volatile parts be evaporated. To this a little common wax is to be added; and the compoſition is then to be fit by for uſe.

To apply it in the dreſſing of roots of trees, melt it, and dip in the two ends of the pieces of root, one after another; then put them in water, and plant them in the earth, the ſmall end downward, ſo that the larger may appear a little way out of the earth, and ſo may have the benefit of the air; then preſs the earth hard down upon them, that they may not receive too much wet. Miller.

MUNDANDIS *curis & curialis*. See VICIL.

MUNDIBURDUS. See ADVOCATE.

MUNDIC, a name for marcaſite; a kind of mineral globe, found in the tin-mines, and elſewhere; ſometimes white, yellow, or green; and ſometimes of a dark brown colour. It is of an arſenical nature. See Geoffroy, in Mem. Acad. Scienc. 1738, p. 107, edit. Par. It is frequently called *mixy*.

The *mundic ore* is eaſily diſtinguiſhed by its glittering, and ſometimes by its diſcolouring the fingers. Some ſay, it feeds the tin; and yet they allow, that, where there is much *mundic*, there is little or no tin.

What is called *mundic* in Cornwall, frequently contains a large portion of copper.

The fteams of the *mundic* are very troubleſome to the miners; yet it is found a good vulnerary; and the miners uſe no other remedy for wounds, but waſhing them in water that runs from the *mundic ore*. See MARCASITE.

MUNDIFICATIVES, or MUNDIFIERS, in *Medicine*, denote *cleanſers*, *purifiers*, or *detergents*.

Mundificative plaſters, or unguents, are ſuch as deterge and dry, and thus cleanſe ulcers of two kinds of matter, viz. *pus*, and *ſanies*.

The chief ingredients in *mundificative* unguents are, gentian, ariſtolochia, enula campana, and the vulnerary herbs.

MUNDUS, *world*. See WORLD.

MUNDI, *anima*. See ANIMA.

MUNDUS *patens*, among the Romans, a ſolemnity performed in a little temple of a round form; and dedicated to *Dis*, and the infernal gods.

It was opened only three times in a year, *viz.* on the day after the VULCANALIA, the fourth of October, and the ſeventh of the *Ides* of November, during which days the Romans believed that hell was open; and therefore they never offered battle on thoſe days, liſted no ſoldiers, never put to ſea, nor married.

MUNDUYGUACU, in *Botany*, a name of the *nux cathartica* of the Weſt Indies, a kind of great ricinus, or palma Chriſti.

MUNERARIUS. See DELIGNATOR.

MUNGATHIA, in *Zoology*, the name given by ſome to a ſpecies of Indian ferret, of a reddiſh grey colour, called alſo *mungo*.

MUNGO, in *Zoology*, the name of an American animal of the ferret kind, called by authors *viverra Indica ex griſeo-rufeſcens*, or the reddiſh grey Indian ferret. Some call it alſo *mungathia*.

MUNICIPAL, MUNICIPALIS, or MUNICEPS, compounded of *munus*, *office*, and *capio*, *I take*, or *hold*, an appellation given to the inhabitants of the municipia, or municipal cities.

In the Roman law, *municipal* denotes a perſon veſted with the rights and privileges of a Roman citizen.

This title the Romans frequently beſtowed on foreign cities and people; and, in effect, it was little more than a title.

MUNICIPAL *cities*, *municipia*, were thoſe whoſe inhabitants were capable of civil offices in the city of Rome.

Theſe, however, according to Mariana, came ſomewhat ſhort of the privileges of the colonies. They were towns or cities, which had the citizenſhip of Rome beſtowed upon them, and yet ſtill lived according to their own laws and conſtitutions; whereas the colonies were governed by the Roman laws.

They had no ſuffrages, or votes, at Rome, but were left to be governed by their own laws and magiſtrates. It is true, ſome few *municipal* cities, by particular merit, &c. obtained the liberty of votes; which occaſioned that received diſtinction of *municipium ſine ſuffragii*, & *municipium cum ſuffragio*.

They were ſo called, becauſe *munera ſunt honorarii participes*; but by *munus honorarium* was meant no more than the bare appellation of a Roman, whereby they were privileged to fight in a legion, as denizens; and not in auxiliary bands, as aſſociates. The firſt who had this honour were the Cerites.

MUNICIPAL, among us, is now applied to the cuſtomary laws, that obtain in any particular city or province, and which have no authority in the neighbouring places. See LAW.

MUNICIPAL *officers* are thoſe elected to defend the intereſts of cities, their rights and privileges, and to maintain order and good policy: as mayors, theriffs, bailiffs, bailiffs, &c.

In Spain, the *municipal* offices are bought; in England, they are obtained by election.

MUNIMENTS, or MUNIMENTS, the evidences, or writings, whereby a man is enabled to defend the title of his eſtate.

Wrangford ſays, the word *muniment* includes all manner of evidence, deeds, charters, &c.

MUNIMENT-*houſe*, a little ſtrong apartment in cathedral and collegiate churches, caſtles, colleges, or the like, deſtined for keeping the ſeal, evidences, charters, &c. of ſuch church, college, &c. called *muniments*, or *minuments*.

MUNIMINA, formed of the Latin *munio*, *I defend* or *ſtrengthen*, the grants or charters of kings and princes to churches; ſo called, becauſe *eam vis muniuntur* againſt all thoſe who would deprive them of thoſe privileges.

MUNIONS, in *Architecture*, the ſhort upright poſts, or bars, which divide the ſeveral lights in a window-frame.

MUNITION, or AMMUNITION, the proviſions wherewith any place is furniſhed, in order for defence, or wherewith a veſſel is ſtocked for a voyage; or thoſe that follow a camp for its ſubſiſtence. See AMMUNITION.

MUNITION-*bread* is the proportion of bread diſtributed every day to the ſoldiers of a garriſon, or army. Each officer is allowed ſo many rations of *munition-bread*.

MUNITION-*ſhips*, in the *Navy*, thoſe which have ſtores on board, to ſupply the neceſſaries to a fleet of men of war at ſea.

In the time of an engagement, all the *munition-ſhips* and victuallers attending the fleet are to take their places and proper ſtations in the rear of all the reſt, and not engage in the fight, but attend ſuch directions as ſhall be ſent unto them, at all times, by the admiral.

MUNNY-*ſtuff*, in *Natural Hiſtory*, a name given by the natives of the Eaſt Indies to a ſpecies of red orpiment, which they have plentifully there. It is of a glowing colour, and has a great many ſhining ſpangles in it. They give this in fevers, after it has been calcined: it firſt melts in the fire, and then emits copious white fumes, ſmelling like thoſe of arſenic. Theſe are ſuppoſed to contain the poiſonous parts of it, and it then becomes a ſafe internal medicine, and is given with great ſucceſs.

MUNTINGIA, in *Botany*, a genus of the *polyandria monogynia* claſs. Its characters are theſe: the empalement of the flower is cut into five ſegments; the flower has five heart-ſhaped petals inſerted in the empalement, which ſpread open like a roſe, and it has a great number of ſtamina; in the center is ſituated a roundiſh germen, having no ſtyle, but is crowned by a ſtigma, divided into many parts; the germen turns to a berry with five cells, filled with many ſeeds. Miller enumerates three ſpecies, natives of the Weſt Indies; but Linnæus mentions only one.

MUNYCHIA, *Μουνυχια*, in *Antiquity*, an anniverſary ſolemnity at Athens, upon the ſixteenth of the month *Munychion*, in honour of Diana, ſurnamed *Munychia*.

MUNYCHION, *Μουνυχιων*, in *Chronology*, the tenth month of the Athenian year. It contained twenty-nine days, and anſwered to the latter part of our March and beginning of April. See MONTH.

It had its name from the feſtival *Munychia*, kept in it.

MUPHTI, or MUFTI, the chief or patriarch of the Mahometan religion, reſiding at Conſtantinople.

The *muphti* is the ſovereign interpreter of the Alcoran, and decides all queſtions of the law.

He takes place of the baſhaws; and his authority is often terrible to the grand ſignior himſelf. It is he who girds on the ſword to the grand ſignior's ſide; which ceremony anſwers to the coronation of our kings.

MURÆNA, in the Artedian ſyſtem of *Ichthyology*, the name of a genus of fiſhes, the characters of which are theſe: they are of the malacopterygious or ſoft-finned kind; the branchioſtege membrane on each ſide contains

ten

ten slender and curved bones; but the skin is so thick, that these are not easily distinguished before that is pulled off: the foramina of the nostrils are two, and are placed in the very summit of the snout, one on each side: the body is long and cylindric; in some species there are three fins, in others two, and in others only one.

The species of *murænæ* enumerated by Artedi, are six. See EEL.

The *murænæ* in the Linnæan system is a genus of the *apodes*, distinguished by a smooth body, tubulous nostrils, ten bones in the branchiostege membrane, eyes covered with a skin, a roundish body, and spiracles near the head or pectoral fins, comprehending seven species.

It is to be observed, that the dictionaries usually give us the word lamprey, as the English of *muræna*; but the *muræna* and lamprey, called by the Latin authors *lampetra*, are two very different fishes. See LAMPREY.

Muræna is originally Greek, and is derived from the verb μυειν, *to flow*, or be slippery, and expresses the manner in which its slipperyness makes it roll about, and escape the catcher, by slipping through his fingers.

MURÆNA is used by Albertus for the common small lamprey, the *lampetra parva fluviatilis* of authors. This is one of the petromyzæ of Artedi, and is distinguished by the having only one row of very small teeth in the verge of the mouth, beside the larger lower ones.

MURAGE, *muragium*, in our *Customs*, a reasonable toll to be taken of every cart or horse coming laden into a city or town, for the building or repairing the walls thereof.

MURAL, something belonging to a *wall*; which the Latins call *murus*.

MURAL *crown*, among the ancient Romans. See CROWN.

MURAL *arch* is a wall, or walled arch, placed exactly in the plane of the meridian, i. e. upon the MERIDIAN *line*, for the fixing of a large quadrant, sextant or other instrument, to observe the meridian altitudes, &c. of the heavenly bodies.

Tycho Brahe was the first who used a *mural arch* in his observations; after him Hevelius, Mr. Flamsteed, De la Hire, &c. used the same means. See a description of the *mural arch* at Greenwich, constructed by Mr. Graham, in Smith's Optics, book iii. c. 7. with the improvements of Mr. Bird, in the Method of constructing *Mural* Quadrants, published by the commissioners of longitude, 1708.

MURDER. See MURTHER.

MURDERING *battery*. See BATTERY.

MURE, *counter*. See COUNTER-*mure*.

MURENGERS, two officers of great antiquity in the city of Chester; being two of the principal aldermen chosen yearly to see the walls kept in good repair, and to receive a certain toll and custom for the maintenance thereof.

MUREX, in *Natural History*, the name of a genus of shell-fish, of the *testacea* order of worms in the Linnæan system, the characters of which are these: it is an univalve spiral shell, beset with sharp spines and tubercles, with a rough clavicle exerted near the summit in most species, but in some depressed; the mouth is always expanded, and sometimes has teeth, sometimes not; the lip is sometimes thickened, sometimes elated or folded, or jagged; and the columella is sometimes rough, sometimes smooth. The animal inhabiting this shell is the limax. See *Tab. of Shells*, N° 13.

Notwithstanding that this is the general character of the *murex*, and that all the species have an oblong mouth, and the body covered with tubercles, there are, under this extensive character, four specific variations of figure, which are very observable. The first is seen in the aluted *murex*, which has no spines; the second is in the spider shell, which has very remarkable series of fingers or hooks; the third is the helmet-shell, which is a true triangular *murex*; the last is a furrowed *murex*, which has no wings, nor protuberances, nor spines, but has a flat head, and an oblong dentated mouth. Hist. Nat. Eclairc. p. 290. Aldrovand. Rondelet. Rumphius.

On the first examination of several of the species of helmet-shell, the outer coat of which is smooth, it would be natural to refuse them any place among the *murex* class; but when we see the oblong shape of the mouth, and find that it is furnished with teeth, and afterwards observe the rudiments of tubercles which are to be seen on the mouth side, we shall perceive that they are all true *murices*, though less prickly than the others.

The ancients were furnished with their finest purple dye from a fish of the *murex* kind, and therefore expressed the purple colour by the word *murex*.

The family of the *murex* being very extensive, it may be proper to divide them into some separate series from the general common marks of certain numbers of the species.

1. Some have remarkably eminent tubercles and spines.
2. Some are nearly smooth, but have a rough clavicle, and a crooked beak. 3. Some have digitated lips. And, 4. Some have aluted and laciniated lips. Linnæus enumerates no less than sixty-one species of the *murex*.

MUREX, among the ancient Romans, a caltrap or iron instrument with sharp points every way, used as a defence against the enemies horse.

MUREX *marinus*, a name given by some authors to the genus of shells, known at this time under the name of *porcelains* and *cowrie veneris*. See PORCELAIN *shell*.

MURINA, or MURINES, *vinum murinum*, in *Antiquity*, a delicious sweet wine, medicated with spices. It was a kind of HIPPOCRAS, and the usual drink of the ladies.

MURING, the walling, or raising the walls of a building. See WALL.

MURORUM *domificus*. See DOMESTICUS.

MURRA, among the *Ancients*, a fossile substance found in Parthia and Carmania, of a fine smell, and beautiful variety of colours.

It was thought to be some humour condensed in the earth by the heat of the sun. See MURRHINE.

MURRA was likewise a dry perfume, made of the *murra* reduced to powder.

MURRAIN, *gorgle*, a mortality, or contagious disease, among cattle.

Murrains are occasioned various ways, but principally by a hot, dry season; or rather by a general putrefaction of the air, which begets an inflammation in the blood, and a swelling in the throat, with other symptoms: the disease soon proves mortal, and is communicated from one to another.

The symptoms are, generally, a hanging down, or swelling, of the head, rattling in the throat, short breath, palpitation of the heart, staggering; abundance of gum in the eyes, &c. breath hot, and tongue flaming.

The most remarkable *murrains* we hear of, is that mentioned in the Philosophical Transactions; which spread itself through Switzerland and Germany, into Poland, &c.

The contagion seemed to propagate itself in form of a blue mist, which fell on the grass where the cattle grazed, insomuch that whole herds returned home sick; and being very dull, and forbearing their food, most of them died away in twenty-four hours time. On dissection, there were found large corrupted faleens, sphacelous and corroded tongues, &c. Those people who managed them, without a due regard to their own health, were infected by them, and died like the beasts.

Some imagine it had its rise from noxious vapours thrown out of the earth in three distinct earthquakes, perceived in the neighbourhood of the place where it began; though Dr. Stare rather thinks it owing to swarms of volatile insects. The antidote for the sound, and the medicine for the sick, were the same; viz. equal parts of soot, gunpowder, brimstone, and salt, with as much water as would wash it down: a spoonful was a dose. See OXEN.

MURRE, in *Zoology*, a name given in some parts of England to the razor-bill. See ALKA.

MURREY, in *Heraldry*, a kind of purple colour; called also *sanguine*.

MURRHINA, in *Antiquity*, a kind of sweet medicated wine.

MURRHINE, MURRHINUS, *Murrhæus*, in *Antiquity*, an appellation given to a delicate sort of ware, brought from the East, whereof cups and vases were made, which added not a little to the splendor of the Roman banquets.

Critics are divided concerning the matter of the *pocula*, or *vasa murrhina*, *murrina*, or *murrea*. Some will have them to have been the same with our porcelain, or china-ware.

The generality hold them to have been made of some precious kind of stone; which are found chiefly, as Pliny tells us, in Parthia, but more especially in Carmania. Arrian tells us, that there was a great quantity of them made at Diospolis in Egypt. This he calls another sort of *murrhina* work; and it is evident, from all accounts, that the *murrhina* of Diospolis was a sort of glass-ware, made in imitation of the porcelain or *murrha* of India. There is some difference in the accounts given by Pliny and Martial of the *murrhina vasa*. The first author says, that they would not bear hot liquors, but that only cold ones were drank out of them. The latter, on the other hand, tells us, that they bore hot liquors very well. If we credit Pliny's account, their porcelain was much inferior to our's in this particular. Some conjecture them to have been of agate, others of onyx, others of coral. Barnius, doubtless, was farthest out of the way, when he took them to be made of myrrh, congealed and hardened. Some have supposed these vessels to be made of crystal, but this is contrary to the account of all the ancients.

The Greeks had the words μυρρινος for crystal, and μυρρα for myrrh, very common among them, and therefore

fore if these vessels had been made of either of these substances, they would in some places have called them *murrhina et crystallina*. On the contrary, the most correct among them call them *murrhina et murrina*. The cups made of crystal, which were also in use at those times, were called *crystallina*, and these *murrhina* or *murrhea*, by way of keeping up the distinction; and Martial tells us, that the stone they were made of was spotted or variegated, calling them *picula maculosa murra*. And Statius mentions the crystalline and *murrhina* cups in the same sentence, but as different things, not the same. Arrian mentions also the λιθος μυρρινος, which his interpreters censure as an error of the copies, and would alter into *murrhea*, the name of the gum myrrh.

Pompey is recorded as the first who brought these *murrhina* vessels out of the East, which he exhibited in his triumph, and dedicated to Jupiter Capitolinus. But private persons were not long without them. So fond, in effect, did the Roman gentry grow of them, that a cup which held three sextaries was sold for seventy talents. T. Petronius, before his death, to spite Nero (or as Pliny expresses it, *ut morsum ejus exhæreret*), to disinherit his table), broke a basin, *trulla murrhina*, valued at three hundred talents, on which that emperor had set his heart.

MURROBATHRARII, among the Romans, a kind of perfumers. See MYRA.

MURTHER, or MURDER, the act of killing another with violence and injustice.

The word comes from the Saxon *morth*, *death*; which some will have to signify a violent death; whence the barbarous Latin *murdrum*, and *mordrum*.

Among the number of popular errors, is the notion which has obtained, that the dead body would bleed in the presence, or upon the touch, of the *murderer*.

The crime of *murder* is punished with death in almost all nations.

MURTHER, in our *Law*, is that species of criminal homicide, which denotes a wilful and felonious killing another upon prepensed malice, whether secretly or openly, and whether Englishman or foreigner, living under the king's protection.

In order to constitute the crime of *murder*, it must be committed by a person of sound memory and discretion; for a lunatic or infant are incapable of committing any crime: besides, the unlawfulness of this crime arises from the killing without warrant or excuse; and there must be also an actual killing to constitute *murder*; and this may be by poisoning, striking, starving, drowning, and a thousand other forms of death; the most detestable of which is POISON, because it is the least capable of being prevented either by manhood or forethought. There was also, by the ancient common law, one species of killing held to be *murder*, which is hardly to at this day, nor has there been any instance wherein it has been held to be *murder* for many ages past, i. e. by bearing false witness against another, with an express premeditated design to take away his life, so as the innocent person be condemned and executed. The Gothic laws punished in this case the judge, the witnesses, and the prosecutor; and, among the Romans, the *lex Cornelia, de Sicariis*, punished the false witness with death, as being guilty of a species of assassination. If a man does such an act, of which the probable consequence may be, and eventually is death; such killing may be *murder*, although no stroke be struck by himself. In order to make the killing *murder*, it is requisite that the party die within a year and a day after the stroke received, or cause of death administered; in the computation of which the whole day upon which the hurt was done shall be reckoned the first. Further, the person killed must be a reasonable creature in being, and under the king's peace, at the time of the killing; and, therefore, to kill an alien, a Jew, or an outlaw, who are all under the king's peace or protection, is as much *murder* as to kill the most regular born Englishman, except he be an alien-enemy, in time of war. To kill a child in its mother's womb, is now no *murder*, but a great misprision; but if the child be born alive, and dieth by reason of the poison or bruises it received in the womb, it is *murder* in such as administered or gave them. But as there is one case where it is difficult to prove the child's being born alive, namely, in the case of the *murder* of bastard children by the unnatural mother; it is enacted by 21 Jac. I. c. 27. that if any woman be delivered of a child, which if born alive should by law be a bastard, and endeavours privately to conceal its death, by burying the child or the like, the mother so offending shall suffer death, as in the case of *murder*, unless the can prove by one witness at least that the child was actually born dead. But it has been usual, upon trials for this offence, to require some sort of presumptive evidence that the child was born alive, before the other constrained presumption, that the child, whose death is concealed, was therefore killed by its parent, is admitted to convict the prisoner. Moreover, the killing must be committed with malice aforethought, to make it the crime of *murder*; and this malice prepense may be either express or implied in law. Express malice is, when one, with a sedate, deliberate mind, and formed design, doth kill another; which formed design is evidenced by external circumstances discovering that inward intention; as lying in wait, antecedent menaces, former grudges, and concerted schemes, to do him some bodily harm. This takes in the case of deliberate DUELLING. Also, if upon a sudden provocation one beats another in a cruel and unusual manner, so that he dies, though he did not intend his death, yet he is guilty of *murder* by express malice. Such is also a person's going deliberately with a horse used to strike, or discharging a gun, among a multitude of people. So if a man resolves to kill the next man he meets, and does kill him; it is *murder*, although he knew him not; for this is universal malice. And if two or more come together to do an unlawful act against the king's peace, of which the probable consequence might be bloodshed; as to beat a man, to commit a rape, or to rob a park, and one of them kills a man, it is *murder* in them all, because of the unlawful act, the *malitia præcogitata*, or evil intended beforehand. Further, the law will imply malice in many cases, where none is expressed; as, where a man wilfully poisons another, though no particular enmity can be proved; and in the case of a man's killing another suddenly, without any, or without a considerable provocation. Thus also if one kills an officer of justice, in the execution of his duty, or any of his assistants, knowing his authority, and the intention with which he interposes, the law will imply malice, and the killer shall be guilty of *murder*. And if one intends to do another felony, and undesignedly kills a man, this is also *murder*. In a word, we may take it for a general rule, that all HOMICIDE is malicious, and amounts to *murder*, unless where justified by the command or provision of the law; excused on a principle of accident or self-preservation; or alleviated into manslaughter, by being either the involuntary consequence of some act, not strictly lawful, or (if voluntary) occasioned by some sudden and sufficiently violent provocation.

Formerly, *murder* was restrained to a clandestine and treacherous killing. Thus, *Murdrum bonus anticipitat alicubator, absque interpellatione subsequitur, vel quamcumque effet secutus. Nunc autem illum vel, licet feritor quis murdrum fecerit, homicidium per predictum.* Leges Hen. I. *Murdrum autem propria manibus per insidiosum interfectio, postmodum mortis genere, quod Anglo murdrum appellamus.* Matth. Paris, an. 1216.

The punishment of *murder*, and that of MANSLAUGHTER, were formerly one and the same, both having the benefit of clergy; so that none but unlearned persons, who knew the guilt of it, were put to death for this enormous crime. But now, by 23 Hen. VIII. c. 1. & 1 Edw. VI. c. 12. the benefit of clergy is taken away from *murder* through malice prepense. See *Hanging in* CHAINS. Blackst. Comm. book iv. p. 194, &c.

MURTHER, *appeal of*. See APPEAL.

MURTHER, *felo*, is otherwise called *felonia de se*. See FELO *de se*.

MURTHERERS, or MURTHERING-*pieces*, are small pieces of ordnance, either of brass or iron, having chambers put in at their breeches.

They are mostly used at sea, at the half-decks of the forecastle, half-deck, &c. in order to clear the decks when an enemy boards the ship.

MURUCUJA, in *Botany*. See PASSION-*flower*.

MURZAROLT, in *Falconry*. See FALCON.

MUS, the *mouse*, in the Linnæan system of *Zoology*, makes a distinct genus of animals, of the order of the glires, and taking in the whole family of the mouse and rat-kind. The generical characters are, that the lower fore-teeth are awl-shaped; of which Linnæus enumerates twenty-one species.

Of this genus there are several distinct kinds. 1. The *common rat*, or *mus rattus* of Linnæus. This is a well known animal; its colour is a dusky brownish grey; its tail is composed of a multitude of rings, not less than a hundred and sixty. Rats destroy and devour one another; but their greatest enemy is the weasel.

2. The *water-rat*, or *mus amphibius* of Linnæus. This is much larger than the common *rat*, and is long what of a reddish brown colour; its feet have each five toes, but not webbed, as Ray and Linnæus imagined; its tail also is much shorter, and all the way of the same thickness, not tapering off, but seeming as if cut off in the middle, covered with short black hairs, and the tip whitish; its teeth are also much longer, and of a pale yellowish colour; it has a thick blunt nose, ears hid in its fur, and small eyes; it burrows on the banks of rivers and ponds,

and

and wet ditches; and feeds on small fish, and the fry of greater, on frogs, insects, and roots; and is itself the prey of the pike.

4. The *musk rat*. This, which is the *castor zibethicus* of Linnæus, is about the size of our common *rat*; its hair is long, and very thick set; its back black, and its sides and belly grey; the head is small, and the nose long and sharp, as if intended, like that of the hog, for digging up the earth; its mouth does not open very wide; its eyes are extremely small, and its jaws adorned with a number of long grey hairs all along the opening of the mouth; its tail is as long as its body, and is flatted and beset with a few scattered hairs; its feet are divided into five toes, the larger ones connected by a membrane to assist the creature in swimming, and the hinder legs are somewhat longer than the fore ones. This creature is common in Russia, and has a very strongly perfumed smell like that of musk. Ray's Syn. Quad. p. 217.

4. The common *mouse*, or *mus musculus* of Linnæus. This is too well known to need any description; but it is distinguished from the rest of the genus by its smallness, and its prominent large eyes. Its colour is a dusky grey on the back, and a whiter grey on the belly. This animal, when found white, is very beautiful; its full bright eye appearing to great advantage amidst the snowy fur.

5. The *larger mouse*. This is of twice the size of the common *mouse*, and is usually found in caverns of the earth in the fields, though sometimes also in houses; its back is of a mixed colour of black and tawny; its belly very white; and there is an even line drawn along each side, which separates the two colours; the head is longer than that of the common *mouse*, and the eyes larger and more prominent; the ears are rounder and wider; and the tail very long, and covered with short hairs, black on the upper part, and white underneath; the legs also are longer than in the common *mouse*; and there are six tubercles in the bottom of the foot.

6. The *great-headed field-mouse*, or *mus terrestris* of Linnæus. This is larger than the common *mouse*, and its head is remarkably large in proportion to its size; its nose is short and blunt; its eyes small, and not prominent; and its ears short, broad, and roundish, and almost entirely hid in the fur, which is much deeper than that of the common *mouse*. This has also a much longer body, and its tail is remarkably short, and is thinly covered with hairs; its legs also are very short; its back is of a very deep and dusky brown, with a mixture of yellow; and its belly is of a sort of lead colour, the points of all the hairs being white, and their bottoms black. It is common in dry pastures, and is abundantly distinguished from all the other kinds by the thickness of its neck and shoulders, and the shortness of its tail.

7. The *great long-tailed field-mouse*, or *mus sylvaticus* of Linnæus. This is very nearly of the size of a rat; its tail is very long, and its ears short and round; its head is thick, and the nose not sharp, as in most of these creatures, but short and rounded, and is of a deep brown, with some mixture of red at the sides; and it has a sort of beard of long hairs between the mouth and the eyes.

8. The *dormouse*, or sleeper, called *mus avellanarius* by many authors, and *glis* by Pliny. Of this there are two distinct kinds, a greater and a smaller. See DORMOUSE.

The other kinds are, 9. CITELLUS. 10. The CRICETUS. 11. The MARMOTTA. 12. The GUINEA *pig*. 13. The AGUTI. 14. PACA. 15. The *leming*, *fable* MOUSE, or Norway rat. 16. The GLIS. 17. The *Javan* HARE. 18. The *monax*, or American *marmotta*. 19. The *mus jaculus*, or JERBOA and KENGUROO. 20. The *mus pygargus*. 21. The *mus volans*, or SCIURUS. Beside these there is also another variegated kind, known by the name of the *striated Indian tree-mouse*, which is very rare, but is sometimes found in the cabinets of the curious.

MUS *Alpinus*, in *Zoology*, a name given by many authors to the mountain-rat, more commonly known by the name of the MARMOTTE.

MUS *araneus*. See SHREW.

MUS *marinus*. See APHRODITA.

MUS *Norwegicus*, in *Zoology*, the name given by authors to the Norway rat, commonly called the *leming*. See *Sable*-MOUSE, and *Norway* RAT.

MUS *Pharaonis*, *Pharaoh's rat*, a name given by the people of Egypt to the ICHNEUMON, a creature of the weasel kind, which they are very fond of for its destroying serpents, and kept tame about their houses, as we do cats.

MUS *terræ*, in *Botany*, a name given by some authors to the roots of the *bulbocastanum*, or earth-nut; it was probably at first *mus terræ radix*, the *earth-mouse's root*, and so called from the *earth-mice* or *field-mice* being very fond of them; but the word *radix* being left out, it stands only *mus terræ*.

MUSA, in *Botany*. See PLANTAIN-*tree*.

MUSADA, a name given by some chemical writers to sal *armoniac*.

MUSCA, the *fly*, in the *History of Insects*. See FLY.

MUSCA *crabroniformis* and *vespa*, names sometimes used for the hornet-fly. See ASILUS.

MUSCA *vespiformis*, the wasp-fly. See ASILUS.

MUSCA, in *Astronomy*. See APIS.

MUSCA, in *Antiquity*, a designation given to parasites, buffoons, &c. who intruded themselves into the company of those that despised them, or found means to be admitted to entertainments where they were not welcome.

MUSCADINE, a rich wine, of the growth of Provence, Languedoc, Cividad, &c.

The word, as well as the liquor, is French: some fetch its original from *musk*, the wine being supposed to have a little of the smell of that perfume: others from *mosca*, a *fly*, because the flies are extremely fond of its grapes; as the Latins had their *vinum apianum*, so called, *ab apibus*, from the bees which fed on the grapes it was made of.

The way of making *muscadine* at Frontignac is as follows: they let the *muscadine* grapes grow half dry on the vine; and, as soon as they are gathered, they tread and press them immediately, and run up the liquor, without letting it stand and work in the vat; the lee occasioning its goodness. Phil. Transf. abr. vol. ii. p. 657.

MUSCÆ is used for officers of the popish inquisition, who feign themselves of the sect of the prisoners, in order to draw a confession of their opinion from them, and thereby betray them; there being persons placed to overhear their conversation. See MUSCA.

MUSCÆ *volitantes*, in *Optics*, dark irregular veins and spots, seeming to fly before the eyes of many people, especially on looking at bright objects, such as white paper, the sky-light, the candle, &c. These have often the appearance of cobwebs, sometimes that of smoke, dust, &c. The resemblance of many of these spots to flies has given them the name of *muscæ volitantes*, q. d. *flies flying about*.

This phenomenon is not easy to account for. Some will have its cause to lie in the aqueous humour; others in the retina. Mons. de la Hire's account of them is this: they are of two sorts; some permanent, which, in fixing the eye upon a point of an object, appear always fixed in the same situation to that point; others seem to fly about, and to change their situation, though the eye be fixed. The shapes of both sorts are changeable: the first sort are commonly like a dark spot upon a white ground; the second sort appear like the knots of a deal board; some parts of them being very clear, and surrounded with dark threads, they are also attended with long tufts of irregular shapes, which are bright in the middle, and terminated on each side by parallel black threads. On fixing the eye upon an object, they appear to descend gradually; especially after shaking the head suddenly.

The spots that appear fixed in respect to the axis of the eye, must, for that reason, be caused by some disorder in a correspondent part of the retina, or in some part of the vitreous humour lying pretty close to the retina. For an opacity of the coats or humours in any part remoter from the retina, by intercepting some part of the rays of every pencil, could only cause an uniform obscurity or faintness of light in every place of the retina, and not a total defect of it in any particular place. Hence Mr. de la Hire attributes the cause of these permanent spots to small drops of extravasated blood upon the retina.

But he finds it more difficult to account for the moving spots. When the rays of the sun are transmitted through a piece of bad glass, and fall upon white paper, the shadows of the little sands, veins, and irregularities in it, appear not unlike those spots. He therefore imagines the aqueous humour is sometimes troubled with some little motherly, ropy substance; some parts of which, by the figures of their little surfaces, or by refractive powers, different from the humour itself, may cast their distinct images upon the retina. He supposes them in the aqueous humour, rather than the vitreous; because of its greater fluidity for a freedom of descent, and because they will then appear to descend, as being situated before the pupil, or at least before the place of the intersection of the pencils. But if this heterogeneous matter be in the vitreous humour, it must be lighter than this humour, so that after a sudden shake of the head, it may first descend a little, and then ascend gradually, to cause the gradual apparent descent above mentioned.

These spots are observed to change their figures, sometimes in two or three hours, at other times not in two or three days; and to appear more numerous at one time than another. Dr. Smith's Optics in the Remarks, art. 27, *seq.*

We have an instance in the Philosophical Transactions, N° 384. of those fixed spots above mentioned. A woman, who, in looking with the left eye only, at three

short words in print, could see the extremes, but not the middlemost; and, in looking with the right eye only, at the middle between four short words, could see but three of them; one of the two middlemost being covered with a dark round spot; but in looking with both eyes she could see them all.

Pitcairn denies the cause of the *muscæ volitantes* to lie in the aqueous humour, and says it is owing to, and a sign of, an internal inflammation of the vessels of the retina. Heister thinks them owing to some obstruction of those vessels; and both these authors, and many others, think them forerunners of a gutta serena, or a cataract; and propose a cure by mercurials and decoctions of guaiacum. See Pitcairn's Elem. Medic. & Heister's Compend. Medic. Practic. Plempius has given a description of the *muscæ volitantes*, in his Ophthalmographia.

Dr. Porterfield, in the Medical Essays of Edinburgh, observes, that these spots may proceed from some little extravasations, verrucose swellings, or other defects in the retina, which, by intercepting the rays, will occasion a defect in the picture; and by consequence a similar and correspounding defect or spot in the object. He observes also, that these spots commonly vanish, or at least become less sensible, when the object is brought nearer the eye, and within the limits of distinct vision. For the rays which are now exactly united upon the retina, by being more crowded, have their force augmented; by which means a sensible impression is made upon the retina through these extravasations. Hence these spots are most sensible to those who have a small pupil, and especially to those who are short, or long-sighted. Hence also, in a presbytical eye, the spots which were formerly very sensible, become faint when the object is viewed through a convex-glass; for by means of this glass more rays enter the eye, which being united exactly at its bottom, must strike the retina strongly enough to make a sensible impression through these extravasations, which will render the spots obscure.

The learned doctor farther observes, that what has been said with respect to these spots, when occasioned by extravasations, or defects in the retina, will also hold when they are occasioned by a callosity, or any degree of paralysis or insensibility in some parts of the retina, by which the impulse received from the rays is made less sensible.

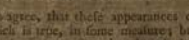
But, besides these defects in the retina, there is another cause which may give occasion to these spots, both in the *myopia* and *coloi fatuis*; and that is, certain small opaque marks in the cornea itself, or any where within the eye, which, by intercepting some of the rays, must occasion a defect in the picture, from which defect a kind of dark spot will be seen in the object. Thus, in the eye of a myops, if there be any opacity in the cornea, or within the eye which intercepts the rays B *b e*, C *c d*, and V L *o*, (*Tab.* V. *Optics*, *fig.* 81.) there will be a defect in the picture at *e*, *d*, and *o*; from whence also the external appearance will be defielent at the corresponding points E, D, and A; where by consequence, dark spots will be seen. For it is to be observed, that there is not one point in the picture which is formed by a plurality of rays which meet at the point, but every ray goes to a different point of the picture, both in myopical and presbytical eyes; and therefore, when any of the rays are intercepted, that part of the picture to which such rays belong will not be illuminated, which must occasion a corresponding *defect* in the appearance of the object. But in the perfect sight, where the rays which come from the several points of the object, are to refracted as to meet again at so many corresponding points in the retina, every point of the picture is formed by a cone of rays, whose base is the pupil; and therefore, though some of those rays be intercepted, yet no part of the picture will be darkened, and consequently no defect will be seen in the object from any such opacity in the cornea, or humours of the eye, unless that opacity be in the back part of the vitreous humour, where the pencil is narrow, and intercepts the whole pencil. This may be proved from the camera obscura, by sticking some small patches on the glass. These will not be perceived if the paper is placed at the due focal distance; but if the distance be greater or smaller, the spots will appear.

The doctor also observes, that these spots are not all of the same kind. He thinks that those which change not their place with respect to the axis of vision, proceed from some defect either in the retina or cornea, or in the vitreous and crystalline humours. As for those which are in constant motion, he supposes them to arise from some corpuscles floating in the aqueous humour.

Besides these dark spots, there is another kind often met with, more bright and luminous than the object itself before which they appear. These spots appear best by looking at distant bright objects, and are always of the same colour with the object. In the middle their colour is clear and strong, surrounded by a dark shady border. They are commonly accompanied with certain irregular veins, which proceed from each spot, and which as well as the spots themselves change their order and disposition. These veins are also of the same colour with the object, and being bright and luminous in the middle, are likewise terminated by a dark and obscure edge. These spots change their position with respect to the axes of vision, according as the eye is differently moved, being sometimes in the axis of vision itself, and at other times to the right or left of this same axis; but when the eye is kept fixed in the same direction, they, as well as the dark kind of spots first mentioned, commonly descend gradually.

As to the cause of these brighter spots and veins, it seems that, first, they must proceed from some corpuscles within the eye, which are at liberty to change their place, and which therefore must be supposed to float in the aqueous humour. Secondly, seeing these spots always descend when the eye is kept fixed, the corpuscles from which they arise must ascend; and are consequently lighter than the aqueous humour in which they swim. Thirdly, these spots being more bright and luminous than the object, they cannot be occasioned by any opaque corpuscles, which by intercepting the rays would cast a shade upon the retina. What therefore hath fairest for producing these brighter spots and veins, is some small, oily, diaphanous particles and filaments, which swim in the aqueous humour before the crystalline; for such, by their lightness, will ascend, when left to themselves; and by their greater refractive power, produce these luminous spots terminated by dark lines. That oily and sulphureous substances, though less denfe than water, have a stronger refractive power, is evident from the observations of Sir Isaac Newton. From which it follows, that the rays of light, which pass through these oily particles, will meet sooner behind the crystallines than the other rays; whence in a presbytical eye, the rays of light which come from the several points of the object will not converge to so many other points in the retina, but behind it, by which the picture in the retina will be rendered more dark and obscure; but the rays which pass through these oily grains, by having their refraction increased, will meet nearly at the retina, where they will form small luminous spots, surrounded with dark borders.

But we must here observe, that the same appearances happen to myopes; and this seems difficult to account for from this theory of the learned doctor.

Many medical authors have looked on the *muscæ volitantes* as forerunners of a cataract, or gutta serena. And we suppose it cannot be denied, that many who have fallen into those terrible disorders have had these appearances before their eyes; and hence they might have been taken for prognostics. But as it is no less certain, that many thousands have the same appearances, and yet preserve their sight very well to the last, there seems to be no great reason to be alarmed about them; and far less should people be running to quacks, and injuring their stomachs and constitutions by ill-judged physic on such occasions. St. Yves denies these appearances to be at all dangerous, and he thinks them owing to the separation of some parts of the retina from the choroid. However, as the disorder is troublesome and alarming to the patient, he advises purgatives from time to time, and nullepedes. We can say, from experience, that neither mercurials, nor sea-water, nor other purgatives, nor nullepedes, nor again Tunbridge or other chalybeate waters, have had any effect towards removing or diminishing these disorders. A greater dose of wine than usual has been known to increase it for a little time; and Plempius has made the like observation. We shall only add, that several of these flying appearances resemble little globules joined by threads, thus  and these globules appear in different numbers, and at different distances.

All authors agree, that these appearances change their figure, which is true, in some measure; but from our own observation we can say, that though they seem on a sudden looking to the sky, or other bright object, to vary in their figures; yet when they begin to descend, they return in one constant figure before we lose sight of them. On the whole it seems, this phenomenon is not yet fully accounted for. The vascular form of most of these appearances, their resemblances to small veins or arteries, make it difficult to conceive them floating in the humours of the eye; and, on the other hand, their seeming contortions, and change of figure, on suddenly looking up, or shaking the head, make it no less difficult to conceive them fixed and obstructed capillaries, as many authors suppose.

MUSCARI,

MUSCARI, in *Botany*. See *Muſk*, or *Grape* HYACINTH.

MUSCERDA, a name by which ſome authors have called mouſe-dung, a thing recommended by many as a purge for infants, and ſaid to be good in alopecias. Given in clyſters it is ſaid to be of ſervice in many diſorders of the bowels; and externally applied, to be of great uſe in condylomata of the anus.

MUSCICAPA, in *Ornithology*, a name by which Aldrovand and ſome others have called the STONE-*cracker*, making that bird, which is properly an ortanthe, one of the ſpecies of that genus of the fly-catchers.

MUSCICAPA. See FLY-*catcher*.

MUSCLE, *muſculus*, in *Anatomy*, a fleſhy, fibrous part of the body of an animal, deſtined to be the organ or inſtrument of motion.

The word is derived from the Greek μυς, or the Latin *mus*, a *mouſe*, on account of the reſemblance it is ſuppoſed to bear to a ſtunned mouſe. Dr. Douglas will have it from μυειν, *to ſhut*, or *contract*; that being the proper office of a *muſcle*.

The *muſcle* is a number of thin parallel plates; and is divided into a great number of faſciculi, or little *muſcles*, each incloſed in its proper membrane; from the internal ſurface whereof paſs an infinite number of tranſverſe filaments, which interſect the *muſcle* into ſeveral diſtinct areæ, filled with their reſpective faſciculi or fibres. See *Tab. Anat. Myolog. fig.* 1, 2, 3, 5, 7, &c.

A *muſcle* was uſually divided by the ancients into three parts, the *head*, the *tail*, and the *belly*. The *head* and *tail*, which are alſo called *tendons*, are the two extremes of the *muſcle*; whereof the firſt is fixed to the ſtable part, and the latter to the part intended to be moved. The *venter*, or *belly*, is the body of the *muſcle*, being a thick, fleſhy part, into which are inſerted arteries and nerves, and out of which iſſue veins and lymphæducts. However, the moderns, inſtead of the head and tail of a *muſcle*, uſe the terms of beginning or origin, and inſertion. Some of the moſt authors think it moſt proper to call one end of the *muſcle* the fixed point or fulcrum, and the other the moveable point. But Mr. Winſlow obſerves, that the beſt and moſt ſimple diviſion of a *muſcle* is into the body or fleſhy portion, which in ſome *muſcles* may be termed the belly, and the extremities, whether tendinous, aponeurotic, or fleſhy.

Theſe ſeveral parts of a *muſcle*, the belly and the tendons, are compoſed of the ſame fibres: their only difference conſiſts in this, that the fibres of the tendons are more cloſely and firmly bound together than thoſe of the belly, which are more looſe. Hence in the belly there is room for a ſufficient quantity of blood to give them an appearance of redneſs; and the whiteneſs of the tendons only proceeds from the blood's being in ſome meaſure excluded, by the tightneſs of their contexture. The diſference, then, between the belly and the tendons, ſeems to be the ſame as between a ſkein of thread, and a cord made of the ſame thread.

All the *muſcles* act by having their bellies inflated, or ſwelled; for by that means they are ſhortened, ſo as to draw, or pull the ſolid bodies to which they are to faſtened, according to the direction of their fibres. All the difficulty, then, in MUSCULAR *motion* is, to aſſign their fabric, and the cauſe of their ſwelling.

Every ſimple *muſcle*, then, conſiſts of one fleſhy belly, and two tendons; but it may be again divided into others, ſimilar, though leſs; and thoſe, again, into others, ſtill leſs, yet ſtill ſimilar to the great one; which diviſion may be carried on to a degree of ſubtilty that exceeds all imagination; though it is reaſonable to think it muſt have an end. That laſt, therefore, being ſimilar to the firſt, muſt, in like manner, have its belly and tendons; and this is what we ordinarily call a *muſcular fibre*; in an aſſemblage, or union, of ſeveral whereof, a *muſcle*, properly ſo called, conſiſts.

Some take the *muſcular fibres* to be productions of the arteries and veins, or the capillaries of thoſe veſſels inoſculated with, and continued to, each other; by the intumeſcence of whoſe contents, the extremities are drawn nearer each other, and, by conſequence, the bone to which the moveable part is fixed, approximated to the other. But that they are, in truth, neither venous nor arterious, nor lymphatic veſſels, is evident from the laſt obſervation. Whether they are veliculæ, or whether they only conſiſt of ſingle threads, may be ſtill a queſtion.

Dr. Boerhaave, from a conſideration that the nerves enter every *muſcle* along with its veins and arteries, and that there laying aſide their outer integument, they are ſo diſtributed through the whole body of the *muſcle*, as that no one point can be aſſigned wherein a part of them is not found; that thoſe nerves terminated here; and that in other parts of the body the extremities of the nerves are expanded, as it were, into membranes; concludes, that the *muſcular fibres* are nothing elſe but extremely ſlender expanſions of the nerves, ſtript of their integument, hollow within, and of the figure of a *muſcle*, and full of a ſpirit communicated by the nerve from its origin in the brain, or cerebellum, by the continual action of the heart. Or theſe fibres united are formed faſciculi, or bundles; which, again, have each their ſeveral membrane, wherein they are involved, and kept diſtinct from others. This membrane is extremely ſlender and porous within, and is full of oil (which is accumulated in time of reſt, and ſpent in motion), furniſhed by the arteries; and this oil, in conjunction with a ſmooth mucous juice, ſecreted by ſmall mucilaginous glands, interſperſed among theſe faſciculi, ſerves to lubricate the parts, and to preſerve the faſciculi from fretting on each other.

Now, beſides the nerves, there are arteries alſo carried into the *muſcles*, and thoſe in ſuch abundance, and of ſuch conſtexture, that a man might be inclined to think the whole body of the *muſcle* compoſed of them. Theſe are principally diſtributed among the faſciculi, and the membranes that ſeparate them, and, perhaps, alſo in the external ſurface of each fibrilla, where they terminate in reticular plexuſes, in little oily ſecretories, ſmall lymphatics, and, perhaps, in hollow fibrillæ, like nerves; which fibrillæ may again either terminate in the cavity of the nervous muſcular fibres, or make others like them. This, at leaſt, is clear, that every branch of an artery in the *muſcles* has its correſponding little vein, which, united to the other, increaſes its bulk; whence the blood-veſſels of the *muſcles* are alſo lymphatics.

Of two ſuch *muſcles* as have been deſcribed, ſaſtened in oppoſite ſituations to each other, conſiſt of the *muſcles*, or pairs of *muſcles*, we know of, conſiſt.

It has been already obſerved, that the tendon of a *muſcle* conſiſts of the ſame number of fibres with the *muſcle* itſelf; with this difference, that the cavities of the muſcular fibres diminiſhing, and loſing of their former diameter, they form one compact, hard, tough, dry, narrow body, which is but little vaſcular. From what has been ſaid, then, it appears, that the redneſs of a *muſcle* is owing to the blood; and its bulk to the fulneſs of the arteries, veins, oily cells, and lymphatics. Hence we ſee, why in old age, leanneſs, conſumptions, atrophies, conſtant feaſt, and hard labour, their redneſs, as well as bulk, are ſo diminiſhed; and yet in old age, leanneſs, &c. the motion remains. This may be effected when the *muſcles* have no redneſs left; as appears in inſects whoſe fleſh is not perceivable.

The fibres, faſciculi, arteries, and nerves, may be ſeparated from each other in a living or dead body, without breaking: they are always in a degree of tenſion, and are endued with a contractive force; ſo that when cut aſunder, the ends fly back from each other, and then they become ſhorter, their bulk is leſſened, and they contract themſelves into an undular kind of ſurface, and throw off their proper juices. Hence it appears, that they are always in a ſtate of violence, are ever oppoſing their elongation, and ever endeavouring to ſhorten themſelves, but more in a living body than in a dead one; and therefore they require antagoniſts.

If the brain be ſtrongly compreſſed, or have any violent contuſion; if it be ſuppurated, obſtructed, or torn, the voluntary action of all the *muſcles* immediately ceaſes, as well as all ſenſe and memory: however, the ſpontaneous action of the *muſcles* in the heart, lungs, the viſcera, and vital parts, remains. The ſame alterations being made in the cerebellum, the action of the heart, lungs, and life itſelf, ceaſes; when yet the vermicular motion continues a long time after in the ſtomach and inteſtines.

The nerve of any *muſcle* being compreſſed, tied up, corrupted, or cut, all the motion of that *muſcle*, both vital and voluntary, immediately ceaſes; and if a nervous trunk, ſending branches to ſeveral *muſcles*, be thus bound up, cut, &c. they are all affected in the ſame manner. The ſame things being done in any part of the ſpinal marrow, the action of all the *muſcles* whoſe nerves ariſe from the part affected, is deſtroyed; and the ſame thing being done to the artery which carries blood to one or more veſſels, the effect is the ſame.

The tendon of a *muſcle* in action does not undergo any ſenſible alteration; but the belly ſhortens, and becomes hard, pale, ſwoln, and protuberant; the tendons are approached nearer, and the more moveable part, faſtened to the tendon, is drawn towards the other leſs moveable; which action of a *muſcle* is called its *contraction*, which is much greater and ſtronger than that inherent contraction obſerved under the firſt phenomenon; and therefore is not natural, but ſuperadded. The tenſion of a *muſcle* not in action is ſtill the ſame; but the belly is ſofter, redder, laxer, longer, and flatter; and this ſtate of a *muſcle* is called its *relaxation*, though it is wholly owing to the contrary action of its antagoniſt; for that being fruſtrated, the contraction of the other continues, as not being balanced by the action of an antagoniſt.

If one antagoniſt remain at reſt while the other is in action,

tion, the member, in that caſe, will be bent; if both act at the ſame time, it will be fixed and immoveable; if neither act, it will be indifferent, and ready to be moved whither the leaſt exceſs ſhall carry it.

All which changes are performed in the ſmalleſt moment of time, and in the whole *muſcle* at once; ſo that they can paſs and repaſs reciprocally, without leaving any trace in the body behind them.

By injecting warm *water* into the artery of a quieſcent *muſcle*, even that of a dead carcaſe, its contraction is reſtored; and that long after death. The bulk of a *muſcle* is increaſed, rather than diminiſhed, by every experiment of its contraction. A limb being bent, by ſome external force, againſt the will, the *flexor muſcle* of that limb aſſumes the ſtate of contraction, as if acted by its proper motion, though not altogether ſo ſtrenuouſly.—The will remaining indifferent, all the voluntary *muſcles*, and all their veſſels, are equably full, and moved by the blood and ſpirits, equally conveyed to them, and that throughout the whole body at once.

For the application of this ſtructure of the *muſcles*, in accounting for the great phenomenon of *muſcular motion*, ſee MUSCULAR *motion*.

Mr. Winſlow, in his treatiſe on the *muſcles*, in his Expoſition anatomotique de la Structure du Corps humain, ſhews prodigious varieties in the actions of theſe organs of motion, which were never ſo much as hinted at before.

Dr. Walther us, after comparing the *muſcles* of the human body with the deſcriptions of them publiſhed by ſeveral authors, particularly by Mr. Winſlow, has made ſeveral accurate remarks on them, which may ſerve as a ſupplement to his Anatome teneriorum *muſculorum* recentita. Nov. Act. Erud. June 1733.

As to the muſcular fibres, or, which comes to the ſame, the faſciculi of muſcular fibres, they have not always the ſame ſituation with regard to each other, nor run in the ſame direction; but they ſometimes run parallel to themſelves and their tendons; and are ſometimes diſpoſed obliquely, both to their tendons and to each other, hence there ariſe two different kinds of *muſcles*; the one direct and parallel, which ſome call *ſimple muſcles*; the other inclined or oblique, called *compound muſcles*.

Under the firſt of theſe kinds are included ſeveral other ſpecies: for, firſt, either the fleſhy fibres run ſtrait from one extreme to the other, as in the *ſartorius*, &c. or they are turned into a circle, as in the *ſphincters* of the bladder and anus; or twiſted into a ſpiral, as in the *gaſtrocnemii*: and hence they come to be called *recti*, *orbiculares*, and *ſpirales*.

The ſecond kind alſo includes various ſpecies, according to the various angles which the oblique fibres make with the tendons; ſome inclining equally to each tendon, ſo as to form a rhombus, or acute-angled parallelogram, with them: whence the *muſcles* are called *rhomboidales*; others, ariſing from two parallel tendons, are inſerted obliquely into one common tendon, as in the biceps of the hand; laſtly, others, ariſing from the periphery of the circle, concur in a centre, and form *muſcles* called *radiati*.

There are divers others ſpecies and diviſions of *muſcles*. Some authors diſtinguiſh them into *muſcles of voluntary*, and of *involuntary* or *neceſſary motion*.

MUSCLES *of voluntary* or *neceſſary motion* have their contracting or extending powers within themſelves, and have no antagoniſt: ſuch are the heart and lungs ſuppoſed to be.

MUSCLES *of involuntary motion*, which we more peculiarly denominate *muſcles*, and which are thoſe we have here chiefly regard to, have each of them their antagoniſt *muſcles*, which act alternately in a contrary direction; the one being ſtretched and extended, while the other is contracted, at the inſtance of the will.

The *muſcles* have alſo different names from their different actions, ſituations, forms, &c. Thoſe which ſerve to move the ſame members contrary ways, are called *antagoniſts*; and thoſe that concur to the ſame action, *fellows* or *pairs*.

MUSCLES, *accelerators*. See ACCELERATOR.

MUSCLES, *digaſtric*, are thoſe which have two bellies. *Trigaſtrici*, thoſe with three.

MUSCLES, *ſphincter*, are thoſe deſtined to ſhut ſeveral apertures and paſſages in the body, as the *muſcle* at the neck of the bladder, and that of the anus; which have the ſame effect with the ſtring of a purſe, to cloſe thoſe parts.

Some *muſcles* have two or three heads, called *biceps* and *triceps*.

We call *elevators* thoſe which lift up or raiſe the parts; and *depreſſors*, thoſe which move them downwards.

Flexors, thoſe which bend them; *extenſors*, thoſe which ſtretch them out; *adductors*, thoſe which move the parts inwards; *abductors*, thoſe which move them outwards; and *rotators*, thoſe which move them round.

Muſcles have alſo different names, from their different figure; ſome reſembling a bat, and ſome a lizard: ſome are triangular, others ſquare, other ſcalenous, others pentagonal, others pyramidal, round, &c. whence the names of *deltoides*, *rhomboides*, *ſcalenus*, *trapezius*, &c.

Anatomiſts are not agreed on the number of *muſcles* in the human body: ſome reckon five hundred and twenty-nine; ſome four hundred and forty-ſix; and others only four hundred and thirty-five. The calculus, according to theſe laſt, is as follows: two of the forehead, two of the occiput, ſix of the eyelids, twelve of the eyes, ſeven of the noſe, eight of the external ear, four of the internal ear, thirteen of the lips, eight of the tongue, four of the palate, fourteen of the larynx, ſeven of the pharynx, ten of the os hyoides, twelve of the under-jaw, fourteen of the head, eight of the neck, eight of the omoplates, eighteen of the arms, twelve of the elbows, eight of the radii, twelve of the carpi, forty-eight of the fingers, fifty-ſeven of uſe in reſpiration, ſix of the loins, ten of the abdomen, two of the teſticles, one of the bladder, four of the penis, four of the anus, thirty of the thighs, twenty-two of the legs, eighteen of the feet, forty-four of the toes.

The following table of the names and offices of the ſeveral *muſcles* in the body, is taken from Dr. Keil.

Frontales ſerve to pull the ſkin of the forehead upwards.

Occipitales pull the ſkin of the hind-head upwards.

Attollens, *Deprimens* } *auricularum.*

Intrinſus malleoli diſtends the tympanum.

Externus malleoli relaxes the tympanum.

Obliquus malleoli.

Muſculus ſtapedis moves the ſtirrup.

Curvagator ſupercilii.

Rectus palpebræ ſuperioris lifts up the upper eye-lid.

Orbicularis palpebrarum ſhuts both the eye-lids.

Attollens, *Deprimens*, *Abductor*, *Adductor* } *oculorum.*

Obliquus major pulls the eye forwards, and obliquely downwards.

Obliquus minor pulls the eye forwards, and obliquely upwards.

Attollens, *Dilatans*, *Deprimens* } *nares.*

Inciſivus pulls the upper lip upwards.

Triangularis pulls it downwards.

Caninus, *Elevator labii inferioris* } pull the lower lip upwards.

Quadratus pulls it downwards.

Zygomaticus draws both lips obliquely to either ſide.

Orbicularis draws both lips together.

Buccinator thruſts the meat between our teeth.

Temporalis, *Maſſeter* } pull the jaw upwards.

Pterygoidæus internus draws the jaw to either ſide.

Pterygoidæus externus draws the jaw forwards.

Quadratus pulls the jaw and the cheek downwards.

Digaſtricus pulls the jaw downwards.

Periſtaphylinus internus pulls the uvula forwards.

Periſtaphylinus externus pulls the uvula backwards.

Styloglaſſus draws the tongue upwards.

Genioglaſſus thruſts it out of the mouth.

Ceratoglaſſus pulls it into the mouth.

Genioſyoidæus pulls the os hyoides and tongue upwards and forwards.

Sternohyoidæus pulls the os hyoides downwards.

Myolohyoidæus pulls it obliquely upwards.

Coracohyoidæus pulls it obliquely downwards.

Stylohyoidæus pulls it to either ſide, and ſomewhat upwards.

Stylopharingæus pulleth up and dilateth the pharynx.

Oſophagæus ſtraitens the pharynx.

Sternothyroidæus pulls the thyroides downwards.

Hyothyroidæus pulls the thyroides upwards.

Cricothyroidæus.

Cricoarytænoidæus poſticus.

Cricoarytænoidæus lateralis.

Thyroarytænoidæus dilates the glottis.

Arytænoidæus contracts the glottis.

Splenius, *Complexus* } move the head backwards.

Rectus major, *Rectus minor* } noil the head backwards.

Obliquus inferior, *Obliquus ſuperior* } perform the ſemicircular motion of the head.

Maſtoidæus

Rectus internus major } nod the head forwards.
Rectus internus minor }
Rectus lateralis nods the head on one side.
Intercostales interni & externi } pull the ribs upwards in inspiration.
Subclavius }
Serratus anticus major }
Serratus posticus superior }
Triangularis }
Serratus posticus inferior } make the motion of the ribs downwards, in expiration, the former.
Sacrolumbaris }
Diaphragma, used in inspiration and expiration.
Obliquus externus } compress the parts contained in the lower belly, assist the motion of the ribs downwards in expiration, and help to bend the vertebræ of the loins forwards.
Obliquus internus }
Transversalis }
Rectus }
Pyramidalis }
Longissimus dorsi moves the body erect.
Transversalis dorsi moves the body obliquely backwards.
Interspinalis draws the acute processes near one another.
Quadratus lumborum draws the vertebræ of the loins to one side.
Longus } bend the vertebræ of the neck.
Scalenus }
Psoas parvus helps to bend the vertebræ of the loins.
Cremaster draws up the testicles in the act of generation.
Erectores penis.
Transversales penis.
Accelerantes urinæ.
Erectores clitoridis.
Sphincter vesicæ contracts the neck of the bladder, that the urine may not run continually.
Levatores ani draw up the anus.
Sphincter ani shuts the anus.
Serratus anticus minor draws the shoulder-blade forwards.
Trapezius moves it upwards, backwards, and downwards.
Rhomboides pulls it backwards.
Levator scapulæ pulls the shoulder-blade upwards.
Deltoides }
Supra-spinatus } lift the arm upwards.
Coracobrachialis }
Teres major }
Latissimus dorsi } pull the arm downwards.
Pectoralis moves the arm forwards.
Infra-spinatus }
Transversalis } draw the arm backwards.
Subscapularis }
Biceps } bend the fore-arm.
Brachiæus internus }
Longus }
Brevis } extend the fore-arm.
Brachiæus externus }
Anconæus }
Rotundus } perform the motion of pronation, or turn
Quadratus } the palm of the hand downwards.
Longus } perform the motion of supination, or turn the
Brevis } palm of the hand upwards.
Cubitæus internus } bend the wrist.
Radiæus internus }
Cubitæus externus } extend the wrist.
Radiæus externus }
Palmaris helps the hand to grasp any thing closely.
Palmaris brevis makes the palm of the hand concave.
Sublimis } bend the fingers.
Profundus }
Extensor digitorum communis.
Lumbricales assist in bending the first joint of the fingers.
Interossei interni draw the fingers to the thumb.
Interossei externi draw the fingers from the thumb.
Flexor pollicis longus.
Flexor pollicis brevis.
Extensor primi }
——— *secundi* } *internodii pollicis.*
——— *tertii* }
Abductor draws the thumb from the fingers.
Adductor draws the thumb to the fingers.
Abductor indicis.
Extensor indicis.
Hypothenar draws the little finger from the rest.
Extensor carpi ulnaris.
Psoas }
Iliacus } bend the thigh.
Pectinæus }
Glutæus major }
Glutæus medius } extend the thigh.
Glutæus minor }
Triceps pulls the thigh inwards.
Pyriformis }
Gemini } move the thigh outwards.
Quadratus }
Obturatus internus } help to move the thigh obliquely and circularly.
Obturator externus }
Semitendinosus }
Semimembranosus } bend the leg.
Biceps }
Gracilis }
Rectus }
Vastus externus } extend the leg.
Vastus internus }
Cruræus }
Sartorius makes the legs cross one another.
Popliteus turns the legs somewhat inwards.
Membranosus turns it a little outwards.
Tibialis anticus } bend the foot.
Peronæus anticus }
Gastrocnemii }
Soleus } extend the foot.
Plantaris }
Tibialis posticus moves the foot inwards.
Peronæus posticus moves the foot outwards.
Profundus }
Sublimis } bend the four lesser toes.
Lumbricalis }
Longus }
Brevis } extend the four lesser toes.
Flexor pollicis.
Extensor pollicis.
Thenar draws the great toe from the rest.
Antithenar draws it to the rest.
Flexor pollicis longus.
——— *brevis.*
Abductor minimi digiti } draw the toes toward the great
Interossei externi } toe.
Interossei externi draw them from the great toe.
Transversalis brings all the toes close to one another.

MUSCLES, *insertion and force of the.* The all-wise Author of nature has furnished animals with limbs, moveable about the joints by means of muscular cords, inserted near the joint or center of motion; the great wisdom of which contrivance will appear, from supposing the insertion to be at E (*Tab.* V. *Mechanics, fig.* 82.) near the wrist B, the *muscle* D E being either loose and separate from the bones D A B, or bound down to it by some ligament or fascia R; in either of which cases the bone A B cannot be turned up quite to the situation A B, unless the *muscle* D E be contracted or shortened to D M, which would not only be troublesome but even impossible. It would be troublesome because the breadth and thickness of the arm would be vastly increased, so as to become as big as the belly of an animal. On the other hand, the structure of a *muscle* being such that it cannot be contracted but a little, seldom above two or three fingers-breadth; such an insertion as that at E, which requires a contraction of above a foot and a half, would be altogether impossible. Therefore, in fact, we find, the *muscles* inserted near the center of motion, as at I, *fig.* 83. In order to calculate the force of any *muscle*, we are to consider the bones as levers; and then the power or force of the *muscle* will be always to the resistance or weight it is capable of raising, as the greater distance of the weight from the center of motion is to the lesser distance of the power. Hence, it being found by experiments, that a robust young man is able to suspend a weight R (ibid. *fig.* 83.) equal to twenty-eight pounds, when the arm is extended in a supine and horizontal situation, we have this proportion, viz. the force of the *muscle* I D is to the weight R, = 28 lb, as the distance B C is to the distance I C. But it is found, that B C, the length of the cubit and hand, is more than twenty times greater than I C, the distance of the *muscle* from the center of motion. Therefore the force of the *muscle* I D must be more than twenty times greater than the weight R, or more than $28 \times 20 = 560$ lb.

Again, to find the force which the biceps and brachiæus *muscles* exert, when the humerus E A (ibid. *fig.* 84.) is perpendicular to the horizon, we are first to consider what weight a man is capable of sustaining in this posture, viz. R = 35 lb, and next the quantity of the distances C B, C I, which in this case are as 16 to 1. Therefore the force of these *muscles* is to the weight R = 35 lb, as the distance C B = 16 is to the distance I C = 1; or the force is equal to 560, as before.

But what appears most wonderful, is the force of the *muscles* that move the lower jaw; which, when taken altogether, do not in a man exceed the weight of 1 lb, and yet exert a force equal to 534 lb; and in mastiff dogs, wolves, bears, lions, &c. their force is vastly superior, so as to break large bones, as they practise daily in their feeding. See Borelli de Motu Animalium; and, for an abstract, Desaguliers Exp. Phil. vol. 2. p. 153, &c.

See MECHANICS.

The *muscles* in fishes are not placed lancellation, or one upon another in a longitudinal direction; but they are generally laid either transversely or somewhat obliquely one behind another, from the anterior part of the body to the origin of the tail. This structure is best seen in the spinose fishes.

These *muscles* of the spinose fishes may be conveniently divided, according to their situation, into the dorsal, pectoral, and ventral. After these, the inferior ones of that part of the body near the tail are to have their place; and, finally, the cephalic, or those of the parts about the head.

The dorsal *muscles* have an interstice in the middle of the length of the back, or are separated longitudinally from one another, and are terminated in the sides over-against the spina dorsalis. The pectoral and ventral *muscles* take their origin from the bans of the ribs, and they meet in the middle of the breast and belly. The *muscles* of the lower part of the body arise along the spina dorsi, and meet one another in the bottom of the belly. The cephalic *muscles* serve to the moving the eyes and the jaws, and are principally four: one is placed on each side under the eyes, and one on each side in the lower jaw. The two former are called the hypophthalmic *muscles*, and the two others the maxillary *muscles*; they are most evident in the gadi, &c.

Muscles *of vegetables.* The *muscles* in animal bodies have been the subject of numerous dissertations; but those in vegetables have been less regarded. Mr. Tournefort, however, has plainly proved, that many of the vessels of plants become in the drying fibres capable of tension; that in many plants there are great numbers of these fibres which have all the same direction, and always act all together, and can only shorten or contract themselves in one particular direction; wherefore the parts composed of these fibres are very properly compared to the *muscles* of animals. By the word *muscle* we understand a part composed of fibres so determinately arranged, that by their contraction they can only move the part in some certain and determinate manner; and in this, which seems the received sense of the word, there are many instances in which it may be applied to parts of plants, with the strictest justice.

All the pods of the leguminous plants, as peafe, &c. are composed each of two valves, more or less convex on the outside; these are placed evenly upon one another, and fastened together by means of a great number of very fine veffels; they are fastened much more firmly together at the back, than at the fore-rim; and the large veffels which carry nourishment both to the valves and feeds, are lodged there, and fend many ramifications to one and the other of the valves of the pod.

Each valve is formed of two ranges of fibres; the exterior arrangement is formed into a fort of net-work, and the threads which compofe it iffue from the back of the pod, and are propagated longitudinally and fomewhat obliquely through the furface of the valve, and finally terminate at the edge of the fore-rim of the pod, after they have entered into the fleshy part, with the net-like plexus of veffels, of which they make frequent anaftomofes.

The interior plan or arrangement of fibres croffes the exterior, in the fame manner as the interior intercoftal *muscles* in the human body crofs the exterior; and thefe form the inner membrane of the pod: thefe fibres arife like the others from the back of the pod, and run obliquely to the edge. A neceffary confequence of this ftructure is, that the arrangement of exterior fibres muft become dry before the others, as muft alfo the fleshy fubftance in which they lie; and the confequence of this is, that they muft contract and draw the edge of the valve to which they belong at once upward and outward, and endeavour to feparate it from the edge of the other valve, drawing with it the anterior arrangement of fibres; this therefore pulls open the pod, and the air, which is very hot at the feason when the feeds of thefe plants ripen, infinuating itfelf into the interftices of the internal arrangement of fibres which are expofed to it by the opening of the pod, foon acts upon them, and they begin to contract in their turn. Thefe fibres were once the veffels which conveyed the nutritive juice to the pods and feeds; but when that ufe as no longer neceffary for them, and when no more juices afcend, after the feeds have arrived at their deftined fize, they foon fhrink up, and no more perform the office of veffels, but become mere fibres. As thefe do not all dry up, and fuffer this change together, but neceffarily it happens firft to thofe which are fituated at the greateft diftance from the pedicle, and confequently thofe are the firft of the interior fibres which act by fhortening themfelves; this therefore begins at the extremity of the pod, and is continued up to the pedicle, and the effect is, that as thefe interior fibres are ftronger and more numerous than the exterior, which are at this time as far fhortened as they are capable of, they now draw backwards and inwards the lips of the edge of the pod towards the back. When the warm air acts upon thefe fibres to dry and contract them, it draws nearly equally at both their ends; and therefore, if the two arrangements of fibres were regularly tranfverfe, each valve of the pod muft be drawn by this action into a fort of tube, or pipe; but as they are placed in an oblique direction, and parallel to one another, the natural effect of thefe contraction muft be the drawing the valve into a fpiral form, which we fee is exactly the cafe. The lines which form the rim of each valve can make no refiftance to this contraction, becaufe they are fo dried up by the warm air, and want of juices, that they may be crumbled to powder between the fingers, and eafily break in any part with the fmalleft force. This clafs of plants gives numerous inftances of this fort of *muscles* in vegetables, and they are more obvious than moft others, being not only common in the hedges, but cultivated in gardens for the ufe of the kitchen, &c.—The ingenious author of the fyftem gives many other inftances in other plants. Mem. Acad. Par. 1708.

Muscles, in *lithology*, the Engliſh name of the *mytulus*, or *mytilus*, a genus of fhell-fifh, or, in the Linnæan fyftem, of the *vermes* clafs of worms; the characters of which are thefe: it is a bivalve fhell, of an oblong form, ending in a point, and having its two extremities equal. It is fometimes fmooth, fometimes rough; in fome fpecies flat, in other clute; and in fome has the beak cleft. The *tellina* and *pinna marina*, of each of which there are feveral fpecies, are property of this genus.

The characters of the *mytilus*, according to Linnæus, are thefe; that its animal is an *oyster*; that it is bivalve, and often affixed to fome fubftance by a beard; and that its hinge is without a tooth, marked by a longitudinal hollow line. He reckons twenty-three fpecies.

The three words of *mytulus*, *muscarus*, and *tellina*, may however be made of great ufe in the fubdiftinctions of the genus into certain feries.

In this fenfe, the word *mytulus* may expreſs all the large *muscles*, fuch as the *pinna marina*, and other *mufcli*, which are remarkably much elevated in their fhape, and have pointed beaks. The word *muscarus* may be ufed to fignify fuch *muscles* as are fmaller and more flat; and *tellina* to expreſs, as it ufually does with authors, a bivalve fhell of the *muscle* kind, but thinner and tenderer, and of an oblong figure, but not pointed.

The hinge of thefe fhells is not in the centre of the fhells, but towards one end, and they have ufually a kind of little beak at that part.

The *tellinæ* are attached to the fhell by two ligaments; the *muscles* only by one.

The largeft kind of *mytuli*, we know, is the PINNA *marina*, made a diftinct genus by Linnæus; of which fhell we have three kinds; one larger than the reſt, which is red within; this often produces pearls, but they are nearly of the fame reddifh colour with the lining of the fhell. There have been found fhells of this fpecies fo large as that the pair have weighed fifteen pounds. The fmall *pinnæ*, and the rough echinated *pinnæ* have their fhells thicker near the edge where they open, than at the cardo. Thefe *pinnæ marinæ* have a fort of filaments iffuing from the body of the fifh, and faftening it to ftones, or any other fubftances. Thefe the ancients called *byffus*, and wrought it into gloves and other things of that kind; and in fome places it is to this day put to the fame ufe. The common *muscles* have the fame property of forming thefe threads; and Lifter has hence called them *byffiferæ*. The filk of thefe common *muscles* is greatly inferior to that of the *pinna marina* in fineneſs and beauty. The *muscles* hold themfelves in the fame place, by means of their threads. The *pinna marina* ſticks its fharp end into the mud or fand, and all the reſt of the fhell remains at liberty to open in the water. Its filaments, which are propagated from the middle of its body, ſerve to draw up the mud and fand about it, on occafion, to defend it againſt the motion of the water in tempefts.

The fpecies of *muscles*, moſt known at prefent, are thirteen: of thofe known in cabinets under the name of *pinna marina*, we have eight: of thofe *mytuli*, which have a more clate figure, and equilateral, we have fix. See *Tab. Shells*, N° 30. Of the *tellinæ*, which are oblong and flat fhells, with equal extremities, we have ten; but of thofe which have the two ends unlike we have fourteen. Hift. Nat. Eclair. p. 226.

The common fex *muscles*, or *mytili edules* of Linnæus, diſtinguiſhed by a ſtrong fhell, ſlightly indented on one fide and angulated on the other; the end near the hinge being pointed, the other rounded, is of a deep blue colour, when the epidermis is taken off. Thefe are found in immenſe beds both in deep water and where

low water mark. They afford a rich food, but noxious to many constitutions.

Those who have eat *muscles* have sometimes, but very rarely, been affected with erysipelatous inflammations, cutaneous eruptions, insupportable itching all over the body, great restlessness and agitation; and though these complaints are easily removed, by oil, milk, and emetics, and have seldom or never proved mortal, yet they have an alarming aspect, and make the patient suffer grievously. Some authors have pretended, that these noxious effects never take place but between the vernal and autumnal equinox; and M. Beunie, physician at Antwerp, in a memoir on this subject, seems inclined to adopt this opinion; for he recommends abstinence from *muscles* during the months of May, June, July, and August. The cause of these noxious effects in the *muscle* is, according to this author, altogether accidental. They are occasioned, he says, by a kind of *stella marina*, a little sea insect, pretty common about the mouth of the Scheld, which sometimes lodges itself in the *muscle*, in quest of food, and whose sperm is so caustic and inflammatory, that, even when applied outwardly to the skin, it produces itching and swellings, that are painful and disagreeable in a high degree. The itching occasioned by touching the spawn of the *stella marina* is removed by vinegar; and this known fact induced Dr. Beunie to prescribe the internal use of vinegar, after bleeding, evacuations, and emetics. His method consists in recommending a large quantity of refreshing beverage, and, every hour, three ounces of vinegar diluted in water. This remedy, however, seems rather to confirm the opinion of those who impute the disorder in question to an unperceived commencement of putrefaction in the *muscle*; as vinegar is known to be a powerful antiseptic, and there is no sort of putrefaction more noxious and offensive than that of fish. Mem. de l'Academie Imp. & Roy. des Scienc. & Belles Lettres de Bruxelles, &c. vol. i. mem. 8.

The common *sea muscle* has, from its being always found fastened to the rocks, been supposed by many wholly incapable of progressive motion; but this is an erroneous opinion. It is a common practice in France at such seasons of the year as do not afford sun enough to make salt, to throw the common *sea muscles*, which the fishermen catch about the coasts, into the brine pits. They have an opinion that this renders their flesh the more tender and delicate, as the rain which falls at these seasons makes the water of the pits much less salt than the common sea water. The *muscles* are on this occasion thrown carelessly into several different parts of the pit; not, at whatever distances they have been thrown in, the fishermen, when they go to take them out, always find them in a cluster together; and as there is no current of water in these places, nor any other power of motion which can have brought the *muscles* together, it seems very evident that they must have moved from the places where they were at first, to have met thus together. This progressive motion is wholly performed by means of what we call the tongue of the *muscle* from its shape; but, from its use in this case, appears rather to merit the name of a leg, or an arm, as by laying hold of any distant substance, and then forcibly contracting itself again, it draws along the whole body of the fish; the same part, when it has moored the animal to a proper place, serves also to fix it there, being the organ by which it spins the thread which we call its beard, by which it is held to a rock, or to any other *muscle*. The motion of the *muscles*, by means of this part, is just the same with that of a man laid flat on his belly, who would draw himself along by laying hold of any thing with one hand, and then drawing himself to it. Mem. Acad. Par. 1701.

Muscles are well known to have a power of fastening themselves very firmly either to stones, or to one another's shells, in a very strong and firm manner; but the method of doing this was not well understood, till the observations of the accurate Mr. Reaumur explained it.

Every one who opens and examines a common *muscle* will find, that in the middle of the fish there is placed a little blackish or brownish body resembling a tongue; this in large *muscles* is near half an inch long, and a little more than a fixth at an inch in breadth, and is narrower at the origin than at the extremity; from the root of this tongue, or that part of it which is fastened to the body of the fish, there are produced a great number of threads, which when traced to any solid substance hold the *muscle* firmly to its places: these threads are usually from an inch to two inches in length, and in thickness from that of a hair to that of a hog's bristle. They issue out of the flesh in that part where it naturally opens, and fix themselves to any thing that lies in their way, to stones, to fragments of shells, or, which is the most common case, to the shells of other *muscles*; whence it happens, that there are usually such large parcels of *muscles* found together.

These threads are expanded on every side, and are usually very numerous; a hundred and fifty have been found issuing from one shell; they serve the office of so many cables, and each pulling in its proper direction, they keep the *muscle* fixed against any force that can be offered, from whatever part it come. The filaments are well known to all who eat *muscles*, who ever carefully separate them under the name of the beard; and Mr. Reaumur has found, that while the animal is living in the sea, if they are all torn away by any accident, the creature has a power of substituting others in their room; he found that if a quantity of *muscles* were detached from one another, and put into a vessel of any kind, and in that plunged into the sea, they in a little time there fastened themselves both to the sides of the vessel and to one another's shells, the extremity of each thread formed in this case to serve in the manner of a hand to seize upon any thing that it would fix to, and the other part, which was slenderer and smaller, to do the office of an arm in conducting it.

To know the manner of the *muscle's* performing this operation, this diligent observer put some *muscles* into a vessel in his chamber, and covered them with sea water; he there saw that they soon began to open their shells, and each put forth that little body before described by its resemblance to a tongue, and at the root of which these threads grow; they extended and shortened this part several times, and thrust it out every way, often giving it not less than two inches in length, and trying before, behind, and on every side with it, what were the proper places to fix their threads at: at the end of these trials they let it remain fixed for some time on the spot which they chose for that purpose, and then drawing it back into the shell with great quickness, it was easy to see that they were then fastened by one of these threads to the spot where it had before touched and remained fixed for a few minutes; and in repeating this workmanship the threads are increased in number one at every time, and being fixed in different places they fasten the fish as well against any common force.

The several threads were found to be very different from one another; the new formed ones being ever whiter, more glossy, and more transparent than the others; and it appeared on a close examination, that it was not, as might have been most naturally supposed, the effect of the tongue to convey the old threads one by one to the new places where they were now to be fixed, but that these in reality were now become useless; and that every thread we see now formed is a new one made at this time; and, in fine, that nature has given to some sea-fishes, as well as to many land insects, a power of spinning these threads for their necessary uses: and that *muscles* and the like fish are under water, what caterpillars and spiders are at land. To be well assured of this, however, Mr. Reaumur cut off all the beard or old threads of a *muscle* as close as he could, without injuring the part, and a proof of the opinion of their spinning new ones at pleasure was now brought to this easy trial, whether these *muscles*, so deprived of their old ones, could fix themselves as soon as others which were possessed of theirs, and could throw out their threads to as considerable distances. The experiment proved the truth of the conjecture, for those whose beards or old threads were cut off, fixed themselves as soon as those in which they were left, and spread their threads to as great a distance every way.

When the mechanism of this manufacture was thus understood, it became a natural desire to examine into the nature of the part by which it was performed: this has hitherto been mentioned under the name of the tongue, from its shape; but it is truly the arm of the fish, and whenever it happens to be loosened from its company, or fixed in a wrong place, it serves the animal to drag its whole body shell and all along, and to perform in several motions. It fixes itself to some solid body, and then strongly contracting its length, the whole fish must necessarily follow it, and be pulled forward to the place where it is fixed. This is an use, however, that this part is so rarely put to, that it is not properly to be esteemed a leg or an arm, for this, but, according to its more frequent employment, may much better be denominated the organ by which the threads are spun.

Though this body is for in the manner of a tongue for the greater part of its length, it is however, rounded or cylindric about the base or insertion, and it is much smaller there than in any other part: there are several muscular ligaments fastened to it about the root or base, which hold it firmly against the middle of the base of the shell: of these ligaments there are four, which are particularly observable, and which serve to move the body in any direction. There runs all along this body a slit or crack, which pierces very deeply into its substance,

and

and divides it as it were into two longitudinal sections: this is properly a canal, and along this is thrown the liquor which serves to form the threads; and it is in this canal or slit that these threads are moulded into their form. Externally, this appears only a small crack or slit, because the two fleshy sections of the parts almost meet and cover it, but it is rounded and deep within, and is surrounded with circular fibres. This canal is carried regularly on from the tip of the tongue, as it is called, to its base, where it becomes cylindric; the cylinder in this part being no other than a close tube or pipe, in which this open canal terminates. The cylindric tube contains a round oblong body, of the nature of the threads, except that it is much larger; and from the extremity of this all the threads are produced, this serving as a great cable to which all the other little cordages dispersed towards different parts are fixed. The tube or pipe in which this large thread is lodged, seems the reservoir of the liquor of which the other threads are formed; all its internal surface being furnished with glands for its secretion. Mem. Acad. Par. 1711.

The *muscle*, like many other sea fishes, abounds in this liquor: and if at any time a finger touches the base of this spinning organ, it draws away with it a viscous liquor in form of several threads, like those of the caterpillar, spider, and other spinning land animals. The threads fix themselves with equal ease to the most smooth and glossy, as to rougher bodies: if the *muscles* are kept in glass jars of sea water, they as firmly fasten themselves to the glass as to any other body.

Muscles, be they ever so young, have this property of spinning; and by this means they fasten themselves in vast numbers to any thing which they find in the sea. Mr. Reaumur has seen them when as small as musseleeds, spin plentifully, though their threads, proportioned to their own weight, are much finer and smaller than those of larger *muscles*.

It is a question yet undetermined whether the *muscle* has a power of breaking, or otherwise getting rid of its threads, in order to its removing from the place where it is once fixed; but it appears probable that they have not, and that they must remain where they have once fastened themselves, though their destruction be the consequence of it. Mr. Reaumur tried this experiment in his jars; when they had well fixed themselves to the sides of them, he poured off part of the salt water, so that it became the interest of the fish to leave their hold and go lower down, but they seemed to have no power to effect this. Mem. Acad. Par. 1711.

The common *muscle* affords the curious observer a very pleasing object of examination by the microscope. The transparent membrane, which immediately appears on opening the shell, shews the circulation of the blood for a long time together, through an amazing number of vessels. And Mr. Leewenhoek, in several which he dissected, discovered numbers of eggs and embryo *muscles* in the ovarium, appearing as plainly as if he had seen them by the naked eye, and all lying with their sharp ends fastened to the fixing of vessels by which they received nourishment. The minute eggs, or embryos, are by the parent placed in due order, and in a very close arrangement on the outside of the shell, where, by means of a gluey matter, they adhere very fast, and continually increase in size and strength, till becoming *perfect muscles* they fall off and shift for themselves, leaving the holes where they were placed behind them. Baker's Microscope. p. 242.

This abundance of *muscle* shells very plainly shew, when examined by the microscope, and sometimes they are to the number of two or three thousand on one shell; but it is not certain that these have been all fixed there by the *muscle* within; for these fish usually lying in great numbers near one another, the embryos of one are often affixed to the shell of another. The fringed edge of the *muscle*, which Mr. Leewenhoek calls the beard, has in every the minutest part of it such variety of motions as is inconceivable; for being composed of longish fibres, each fibre has on both sides a vast many moving particles.

MUSCLE, *horse*, a common English name for the fresh-water *muscle*, a large species of shell fish, very common in our fish ponds. Mr. Mery, of the Paris Academy, has been at the pains of making a number of curious observations on this animal. He observes that they are all hermaphrodites; and that, by a strange and before unheard-of method of generation, each individual is of itself capable of propagating its species, and annually does it without the intercourse of any other. This is extremely singular, because though we know many animals which are hermaphrodites, or in which each individual contains the parts of both sexes, yet in snails, earth-worms, and all the rest of these kinds, there is always a congress of two animals for the propagation of the species.

The shell of the fresh-water *muscle* is composed of several laminæ or beds of matter, in the manner of many of the sea-shells, and is lined within with an extremely delicate and thin membrane, which is not easily distinguished while the shell is recent, but when it becomes dry it usually separates from it and peels wholly off. This fish opens and shuts its shell by a very strong hinge, assisted by two strong muscles; the contraction of these shuts the shells firmly together, and a powerful spring or force in the animal opens them at pleasure. The part which performs this office is distinctly seen on the back of the fish, and is an inch and half long, and about a sixth of an inch broad. Mem. Acad. Par. 1710.

MUSCOVITE *Bible*. See BIBLE.

MUSCOVITE *coinage*. See COINAGE.

MUSCOVITE *ewer*. See COINS.

MUSCOVITE *glass*. See MICA.

MUSCOVITE *mariners*. See MEASURE.

MUSCULAR, or MUSCULOUS, something that relates to the muscles, or that partakes of the nature thereof. See MUSCLE.

In which sense we say, *muscular fibre*, *muscular coat*, *muscular flesh*, *muscular veins*, *muscular arteries*, &c.

MUSCULAR *arteries*, two *arteries* proceeding from the subclavians, and distributed among the hind-muscles of the neck. The same denomination is also given by some to certain arteries of the loins: these are divided into *upper* and *under*. *Musculares superiores*, the *upper-muscular*, proceed from the large artery, and lose themselves in the flesh.

The *under muscular*, *musculares inferiores*, are branches of the inner iliac arteries.

MUSCULAR, *muscular*, is also a name given to two arteries of the thigh, the one called the *external muscular*, as being distributed among the inner muscles of the thigh; the other the *external muscular*, because it proceeds to the outer part.

MUSCULAR *fibres* are the fine threads, or fibres, whereof the body of muscles is composed. See FIBRE.

MUSCULAR *flesh*. See *Muscular* FLESH.

MUSCULAR *membrane*, *membrana* MUSCULOSA, is a MEMBRANE, by some supposed to invest the whole body, immediately under the adipose membrane; called also PANNICULUS *carnosus*, and *membrana musculosa communis*.

MUSCULAR *motion*, is used for voluntary or spontaneous motion; thus called, because effected by means of the contraction and dilatation of the *muscles*.

The mechanism of a *muscle* we have delivered at large; but how this mechanism is employed to produce motion in animals, is matter of endless doubt. The generality of writers suppose the belly of the *muscle* to be swelled, and thus its extremes brought nearer; and consequently the part, it is fixed to, moved.

The structure of a *muscle* we have shewn to be such as renders it capable of being swelled and contracted, and by that means of having its extremities brought nearer each other, which is its proper action; but how the contraction is effected, is the point in dispute.

The generality account for it, from the influx of some fluid into the *muscular* fibres. Others solve it from the natural elasticity of those fibres. And the retainers to a fluid are subdivided as to the particular fluid employed for this purpose.

From the structure and phenomena of the *muscles* above laid down, we may gather the property of the hidden cause that moves the *muscles*; *viz.* 1st. that it may either be present or absent in a *muscle*; and therefore, 2dly, may enter into it, and go out again; i. e. 3dly, it is derived to it from some other place, and passes from it elsewhere: and, 4thly, all this, by an instantaneous direction of the will: 5thly, and in the same moment of time, wherein the *muscle* is contracted, it must pass from within outwards to every point of the surface of the *muscle*; that is, 6thly, it must be at once equally distributed throughout the whole belly of the *muscle*; and therefore, 7thly, it must fill and dilate the membranes of the fibres, change them from an oblong into a more spherical figure, lengthen their less diameter, and diminish their longer, and so draw the tendons nearer to each other: lastly, that it must have its rise from the cerebrum and cerebellum, the origin of the nerves, and be powerful enough to overcome those obstacles which here strongly resist it. On the whole, then, it must be a most fluid, subtile, active body; and must be applied with some energy within the *muscle*. Now all the fluids in the body that have any pretensions to these properties, that are any way qualified to produce the phenomena above, or that have been alledged as the cause of *muscular motion*, are the *animal spirits* (or, as our later writers call it, the *nervous power*) and the *blood*: but as each of these singly seems appears adequate to the effect, our authors have supposed them to mix in the *muscles*, and each to contribute to the action of the other. But

the animal ſpirits ſeem to have the greateſt number of advocates, though their exiſtence was never yet fully proved; beſides that the manner of their action as aſſigned by authors, ſeems to be arbitrary and precarious. Some, with the learned Dr. Willis, make the tendons a receptacle for the ſpirits, which are raiſed at the inſtigation of the will, and ſent thence into the belly of the *muſcle*; where meeting with the active particles of the blood, they ferment, and cauſe an intumeſcence, and ſo contract the *muſcle*.

Others, among whom are Deſcartes and his followers, allow no receptacle for them, but the brain, and ſend them thence through the nerves like lightning at every ſummons of the will; becauſe they cannot allow the tendons to be a proper lodgment, on account of the cloſeneſs of their contexture; nor can believe that the animal ſpirits ſhould remain there unactive. Others, among whom is M. du Verney, imagine this intumeſcence may be without fermentation, by the animal ſpirits, and a juice from the arteries running into the tendons and fleſhy fibres, and extending them; as ropes, &c. ſwell in moiſt weather. Dr. Cheyne, and others, maintain, that every *muſcular* fibre, beſides its vein, artery, and nerve, has alſo, from ſpace to ſpace, ſeveral little cavities, or pores of an oblong figure, when the *muſcle* is ſlack or flaccid; and that the blood, circulating through the *muſcle*, is continually depoſiting into thoſe pores a ſulphureous recrement abounding with alkaline ſalts; which meeting with the ſpirits that flow by the nerves into thoſe ſame oval pores, their nitro-aerial particles ferment with the ſaline ones of the ſulphureous recrement, and, by a kind of exploſion, ſo diſtend the pores, as to change the long oval figure into a round one: and thus the *muſcle* is contracted.

Borelli takes the fibres of a *muſcle* to conſiſt of a chain of rhombuſes or lozenges, whoſe areas are enlarged or contracted as the nervous juice, with the lympha and blood, is let into, or forced out of them, at the inſtance of the ſoul.

Dr. Croon ſuppoſes every fleſhy fibre to conſiſt of a chain of little bladders, or globules, communicating with each other; into which the nutritious juice, and one or two more liquors entering, do, by means of the natural heat, make an effervescence; by which the body of the *muſcle* is extended, &c.

Dr. Cheyne takes the ſmall fibrillæ of the *muſcles* to be ſo many ſlender elaſtic canals, bound about by ſmall tranſverſe parallel threads, which divide the hollow fibrillæ into ſo many elaſtic cyſtes or veſiculæ, which are orbicular, being formed of two concave ſegments of a ſphere; into every one of which veſiculæ, an artery, vein, and nerve enter: the two firſt to carry and bring back the blood, the laſt to carry thither the liquidum nervoſum, or nervous juice, which, mingling in the veſiculæ with the blood, does, by its acid pointed particles, prick and break the globules of the blood, ſo as to let out the impriſoned elaſtic air (contained in the globules) in thoſe little veſiculæ; whereby the elaſtic cells of the fibres will be blown up, and thereby their longitudinal diameters from cell to cell ſtraitened: and this muſt contract the length of the whole fibre, and ſo move that organ to which one of the tendons is fixed.

Dr. Keil, not contented with this theory, ſets up another, wherein the ſame ſtructure of the *muſcle* is ſuppoſed; and the ſame fluids, viz. the blood, and nervous juice, are allowed the agents or inſtruments of contraction: but inſtead of the pungent particles of the nervous juice piercing the globules of blood, and ſetting at liberty the impriſoned elaſtic aura, he reſolves the whole into the power of attraction.

According to this author, the diſtenſion of the veſicles of the fibres is not owing to their being filled with a greater quantity of blood and animal ſpirits than before their contraction; but to a rarefaction ariſing from the mixture of thoſe two fluids, by means whereof they come to poſſeſs a greater ſpace.

To account for this rarefaction of the blood and ſpirits in the veſicles of the muſcular fibres, he ſuppoſes a ſmall globule of air between the particles of a fluid, which particles have a ſtrong attractive force, whereby they endeavour to come together: by preſſing every way equally on the globule of air, they will hinder its eſcape from between them. But the force whereby they endeavour to come together, being vaſtly greater than that of gravity, the globule of air muſt be conſiderably condenſed; but the force of elaſticity being proportional to that of its condenſation, the force, wherewith the airy globule endeavours to expand itſelf, will likewiſe be vaſtly great: ſo that if the niſus of the particles of the fluid to come together ſhould be taken off, the air between them would expand itſelf with a conſiderable force. Now, if, upon the mixing of another fluid, the particles of the firſt fluid be more ſtrongly attracted to the particles of this other fluid than they were before to one another, their niſus to one another will then ceaſe, and give the incloſed globule of air liberty to expand itſelf; ſo that the whole fluid will take up a greater ſpace than it did before; but when the particles of the globules come to be united together, they will again incloſe the globule of air that lies between them; and by their mutual attraction, ſoon bring it to its former ſtate of condenſation. Now, that the blood contains a great number of globules of air, is evident from the great quantity that it yields in the air-pump; and that the particles of the blood have a ſtrong attractive force, cannot well be denied. Upon the meeting, then, of theſe two fluids in the veſicles of the fibres, the nervous juice, conſiſting of ſmaller particles than the blood, muſt, from what Sir Iſaac Newton has proved of the rays of light, attract the particles whereof they are compoſed more ſtrongly than thoſe do each other; and, conſequently, the niſus of thoſe particles to each other ceaſing, the condenſed globule of air will expand itſelf with a conſiderable force; whereby each veſſel of the fibre will be diſtended, and conſequently, therefore, ſhortened; i. e. the whole *muſcle* will be contracted: but when the particles of the blood are well mixed with the nervous fluid, they will both together incloſe the globule of air again, and compreſs it into as ſmall a ſpace as it was before: and the contraction of the *muſcle* muſt immediately ceaſe, till freſh blood and ſpirits, ſtill ſucceeding each other, continue the inflation of the veſicles. But, when a *muſcle* has been ſtrongly attracted for ſome time, the quantity of ſpirits ſpent being more than can be prepared in the ſpace of time by the glands which ſupply its nerves, the inflation of the veſicles muſt fall, and the *muſcle* grow feeble and weak. And thus that ingenious author conceives the veſicles to be diſtended, without any ebullition or effervescence; and their diſtenſion to ceaſe, without any precipitation or flying off of the aerial globules through the pores of the *muſcles*.

He proceeds to ſhew how artfully the mechaniſm of the fibres is contrived for the neceſſary contraction. It is a known experiment, that a bladder blown up, and diſtended as to its capacity, but contracted as to length, will raiſe a weight to ſome determined height: two bladders, therefore, thus blown up, and communicating with each other, he argues, will raiſe the weight double the height, and three bladders thrice the height, &c. ſo that, if there were a ſtring of bladders joined together, of equal bulk, and like figures, the ſpace through which the weight would riſe, would be proportionable to the number of bladders, i. e. to the length of the ſtring. Now, each fibre of a *muſcle*, conſiſting of an infinite number of ſmall veſicles, reſembles a chain or ſtring of bladders; ſo that the contraction of the *muſcle* is always proportionable to the length of its fibres. Farther, the veſicles, whereof the fibres conſiſt, being very ſmall, though one large bladder might raiſe a weight as high as ſeveral ſmall ones, yet the quantity of elaſtic fluid uſed in the inflation, would, in that caſe, be much greater than where the weight is raiſed by a ſtring of ſmall ones.

For, ſuppoſing two bladders of ſimilar figures, but the diameter of the one to be triple that of the other; then will the one require twenty-ſeven times the quantity of elaſtic fluid to expand it that the other does, and will alſo expand to twenty-ſeven times the ſpace; and yet three of the leſs bladders joined together (he goes on) will raiſe the weight to the ſame height that the bigger one does; but with nine times leſs expence of elaſtic fluid, and take up but a ninth part of the ſpace. By diminiſhing, therefore, the bigneſs of the veſicles, and increaſing their number, the force required to diſtend them, and the diſtenſion itſelf, may be diminiſhed in any given proportion, and may come at laſt to be inſenſible. Suppoſe a bladder, e. gr. of a determinate bigneſs, can raiſe a weight a foot; a hundred bladders, whoſe diameters are each a hundred part of the former, being blown up, will raiſe the weight to the ſame height; but the force required to inflate them, and the ſwelling of all put together, will be ten thouſand times leſs than of the large one.

Again, if a weight, of a determined bigneſs, can be raiſed to a certain height by a bladder, or one ſtring of bladders, to which the weight is tied; twice that weight may be raiſed by two ſuch bladders, or ſtrings; thrice by three, &c. and conſequently, the weight a *muſcle* can raiſe will be always as the number of its fibres, i. e. as its thickneſs, ſuppoſing the diſtenſion of the veſicles equal, and the abſolute ſtrength of one *muſcle* to that of another, as their bulks. Thus much for the once flouriſhing ſyſtem of the chain of bladders; which being liable to very great difficulties as to the geometricity of it, has of late given way to others.

Dr. Boerhaave, finding all the requiſites before laid down

for the action of the *muscles* in the nervous juice, or animal spirits, and in no other fluid in the body, thinks it needless to have recourse to a mixture of several liquors where one will do; and therefore makes no scruple to attribute the whole business to it alone. The manner of action he conceives thus:

Suppose the spirit, from any cause, to be moved more swiftly from the origin of some one nerve than through the rest; the influx will here be greater into the *muscular* fibre open to this nerve, than into another: this will therefore be more dilated, and the other phenomena, mentioned above, will succeed: the same cause continuing, the effect will be increased; so that in a moment of time, the whole will be swelled up, and while the same determination lasts, will remain contracted: and this obtaining in an infinite number of fibrillæ at once, the whole *muscle* will be inflated.

Hence it necessarily follows, that as the celerity is increased in one nerve, the motion will be less in another: this, therefore, being relaxed, the effort in contraction will be the stronger; for which reason all the turgid fibres of a *muscle* will compress the intermediate spaces and blood with a great force; whence the veins will be emptied, and the arteries, being compressed, will repel the grosser, that is, the red parts of the blood, but will drive the more subtile parts, by the force of the heart, and their own, into the most minute canals; and thus the cruor being expelled, the whole body of the *muscle* will be found to act by a subtile humour concurring from the nerves and arteries.

Thus are all the phenomena accounted for, without any other assumption than an accelerating force in the origin of the nerves; which is common to all hypotheses, and which cannot be traced any farther.

All other systems, therefore, Boerhaave absolutely rejects; nor makes the least account of Galen's incorporeal power inflating the *muscles*; the nitrous spirit of the nerves mixing with the oil of the blood, and so rarefying it; the acid parts of the nervous juice mixing with the alkalious ones of the blood; the ebullition of the air, and the arterious juice; and the increase or diminution of attractive force of the minute corpuscles of the humours; as repugnant to sense, experience, the laws of matter, and of mixtures, and to the phenomena of the *muscles*.

Dr. Astruc has gone a good way towards proving the nervous juice alone concerned in *muscular motion*; and that the blood has no share at all in it; by the following experiment, which he tried several times with the same success.

Cutting open the abdomen of a live dog, and removing the intestines out of the way, he bound up the aorta, where it divaricates into the iliac arteries, with a thread, so as to constringe each iliac and the hypogastric artery very closely; then, sewing up the epigastric *muscles*, he found the sensation and motion still as brisk and vivid in the dog's posteriors, as before: so that, when once set at liberty, he stood on all four, and walked with his usual ease and firmness; though, it is certain, there could not be one drop of blood conveyed to those hind parts.

Astruc, however, differs from Boerhaave in the manner wherein this nervous juice acts; nor will he allow that celerity, wherewith the *muscles* act at the command of the will, to be owing to the velocity of the juice sent through the nerve; but to an impression given to one extremity of the thread, and communicated through all the intermediate parts to the other extremity; supposing the nerves, in their natural state, to be turgid, and full of spirits: so that, if the extremity in the sensory be ever so little pressed by the accession of any new spirit, as much will be instantly expelled at the other extreme; and *vice versa*, a small impression given to the outer extremity of the nerve, will immediately move the other extreme open to the sensory; so that part of it will drop out: which accounts for sensation, as well as *muscular motion*. See SENSATION.

Lastly, Dr. Lower, and Mr. Cowper, and after them Dr. Morgan, and others of the latest writers on that subject, setting aside all adventitious fluids, account for *muscular motion* from the intrinsic elasticity of the nervous fibrillæ contracting and restoring themselves, against the stretching force of the circulating blood.

This system Morgan endeavours to evince from the following considerations: 1. All the vessels in an animal, consisting of flexible, distractile fibres, are in a state of tension, i. e. are both stretched transversely and longitudinally by their contained fluids: thus, e. gr. let a vein or artery be cut, and the opposite sides of the vessel will contract, and come nearly to a contact about the axis; while the two ends, receding both ways, leave a chasm: which shews, that the vessel, while in its natural state, was distended both ways; and, consequently, that contraction, in all their dimensions, is the natural intrinsic action of the vessels or fibres.

And the same might be deduced, *a priori*, from the growth of animals; for, by the increased quantity of the accumulated blood, the vessels must necessarily be enlarged every way. Now, against this distended power of the fluids, the solid *muscular* fibrillæ will continually exert a contractive or resilitive force, by which they are kept in their proper state of tension.

2. That this contractive power of the *muscular* fibres is a natural intrinsic property of the fibres themselves, and does not depend on any mixture, or mutual action of fluids, is evident from hence, that these fibres retain the same property, after they are taken out of the body, and dried, as we see in thongs, cat-gut, and other such like cords or strings cut out of the *muscular* coats and skins of animals, which may be stretched out to a considerable length beyond their natural state; and when the stretching force or weight is taken off, they will immediately contract again by their native spring.

3. While a *muscle* contracts, the blood is squeezed out; and, during its state of contraction, it is more hard and solid than before; that is, it contains less blood when contracted than when stretched; which shews, that the contraction cannot be by the addition of another fluid from the nerves, mixing with the blood in the *muscles*.

4. No such fluid in the nerves could ever be found, as, being mixed with the blood, would occasion such fermentation or expansion: but, supposing the *muscular* cells thus inflated, no such effect could follow, as shortening the *muscle* in length, and swelling it in thickness; but the consequence must be, that the *muscle* would be lengthened, as well as thickened; that is, it must increase its dimensions proportionably every way; which is the proper action of fluids on the solids.

If, then, it be said, that these bladders, when the *muscle* is stretched, are drawn into oblong spheroids; and when inflated by the mixture of the nervous fluid, reduced to a spherical figure, by which means their axes are shortened, and their conjugate diameters enlarged; it is answered, that those small vesicles are soft, flexible, distractile, and equally yielding every way; and, since an included expansive fluid must press its containing vessels equally yielding every way, and equally expansive, a vessel, notwithstanding such distension, must retain its natural figure, and be equally stretched in all directions.

Again, since the blood circulates freely through these *muscular* cells, it is plain, that, as soon as they begin to inflate, it must be immediately pushed forward with an increased velocity in the course of its circulation, which must prevent any such inflation in the *muscles*. Before these vesicles, therefore, can be distended in the manner supposed, the exit of the fluid must be hindered; that is, the circulation must be stopped. If *any* one doubt of this, let him try whether he can blow up a bladder, or other vessel, that is open at both ends, and where the expansive fluid has as free an egress as ingress.

Thus much premised, the natural action of a muscle will be easily explained. From its structure it follows, that, on the contraction of its transverse and spiral fibres, which are the ramifications of the nerves, the longitudinal, red, and fleshy fibres, or blood-vessels, which constitute the body of the muscle, must necessarily be squeezed and drawn together, as being compelled to follow the motion of these elastic cords; by which means the blood, being compressed, must be forced, with some impetuosity, through the muscle, and propelled forward in the course of its circulation.

Now, if the blood should hereupon stop, and return no more to the muscle, it is plain, the muscle must for ever remain in this contracted state, as its proper and natural state of quiescence, to which it tends, and where it would rest: but the blood, having received a fresh impetus by the contraction, and returning upon the muscle, in the course of its circulation, again rushes into the blood-vessels; which being enlarged in all their dimensions by the force of the returning blood, the transverse and spiral nervous fibres must be hereby stretched, and the muscle extended, till by this means, the blood-vessels being brought to their natural extent, and consequently the distending force of the blood ceasing, the contracting power of the nerves begins to act again, and restore them, with the same force by which they were extended, till the returning blood re-enters the muscle, and stretches it again.

Dr. Morton, in an inquiry into the cause of *muscular* motion, observes, that in every *muscle* there are numerous arteries, veins, and nerves; which are generally distributed together, or in the same course, by means of the connecting cellular substance, into every point of the fleshy fibres; that there is a circulation of blood, through the whole fleshy substance of a *muscle*; and that the *muscle* feels in every part. In order therefore, to the performance of voluntary *muscular* motion, besides the particular structure, there is required an absolute freedom

of

of the blood-veſſels and nerves. He farther obſerves, that *muſcular* motion is voluntary and involuntary: to the former ſubſerve almoſt all the *muſcles* of an animal body; the only complete inſtance of the latter is afforded by the heart. The contraction of the heart, he ſays, in its natural ſtate, in a living animal body, proceeds ſolely from, or is mechanically cauſed by, the warm blood, flowing into and filling its fleſhy ſubſtance in every part: and its ſubſequent relaxation is occaſioned by the removal of the blood. He farther ſhews, that a *muſcle* of voluntary motion, in its natural ſtate, in a living animal body, is contracted by the introduction of a warm mild fluid into its fleſhy ſubſtance in every part. He adds, that the nerves are the immediate inſtruments of ſenſation; and that the will hath a direct power of rendering more acute the ſenſations of the nerves univerſally: whence he infers, that the blood, which is preſent in every part of the contracting ſubſtance of a *muſcle*, and which aſſumes an increaſed heat and again parts with it at the command of the will, is the immediate mechanical cauſe, by which the *muſcle* does inſtantly contract, and is again relaxed. Phil. Tranſ. vol. xlvii. art. 47. p. 305, &c.

Dr. Brown Langrith endeavours to prove that the blood has no immediate effect in *muſcular motion*, by experiments of tying the crural and carotid arteries of dogs, who thereby did not loſe the action of any muſcles. He grants however, that when all the blood is intercepted, *muſcular motion* ceaſes in a few minutes. The chief uſe of the blood towards *muſcular motion*, is to keep the fibres warm, ſupple, diſtended, and ready for the influx of animal ſpirits into them, and by its motion to aſſiſt their's. The *muſcular* fibres are little hollow cylinders, not divided into cells; the animal ſpirits are near a-kin, or analogous to ſpirit of ſal armoniac, &c. and therefore, whenever they fly from the nerves into the *muſcular* fibres, they will increaſe the attractive quality of their component particles towards each other, ſo as to make them run nearer together, which will occaſion the coats of the fibres to be both thicker and ſhorter, and the muſcle will be contracted in all its dimenſions. The animal ſpirits are too ſubtile to be fixed, and therefore immediately make their eſcape through the fibres, and leave them in the ſame ſtate they found them in, as ſoon as the ſupply by the nerves is diſcontinued. There is a difference in the mechaniſm of the nerves ſent to the muſcles, which act by the influence of the mind, from thoſe of the muſcles which are ſaid to perform involuntary motions; the latter having no hindrance to the courſe of the animal ſpirits, unleſs ſometimes the parts through which they paſs have influence on them; whereas the nerves, which ſerve the muſcles of voluntary motion, have ſome little conſtrictions at their extremities, or elſewhere, which hinder the courſe of their fluids, except when their reſiſtance is overcome by the momentum of the ſpirits being increaſed by the will. The uſe of the ganglions is to prevent any communication of motion from one nerve to another, whereby in a ſtate of health, ſenſation is always performed diſtinctly. Eſſ. on Muſc. Motion.

Dr. Stuart having cut off the head of a frog, obſerved, that upon thruſting a probe into the *medulla ſpinalis*, the muſcles of the body were brought into convulſive contractions. And that the ſame happened to the muſcles of the head, when the probe was thruſt into the brain. From which he concludes, that the brain and nerves contribute to *muſcular motion*, in a high degree. Next he laid bare the crural artery, vein, and nerve of a dog, and placing a thread parallel to them, made two ligatures on them at four inches diſtance from each other; then cutting the veſſels through, beyond the ligatures, he took them out, and obſerved, that the nerve did not contract, though the blood-veſſels loſt three eighth parts of their length. From whence he infers, that what the nerves contribute in *muſcular motion*, cannot ariſe from, or be owing to elaſticity, but to the fluid they contain, which can be no other than a pure elementary water. Phil. Tranſ. N° 424. ſect. 5.

Dr. Prieſtley conjectures, that the ſource of *muſcular motion* is the electric matter, conſidered as a modification of PHLOGISTON: in ſupport of which he alledges, that the electric matter directed through the body of any *muſcle* forces it to contract; that the proper nouriſhment of an animal body, from which the ſource and materials of all *muſcular motion* muſt be derived, is probably ſome modification of phlogiſton; that vinous and ſpirituous liquors, which conſiſt very much of phlogiſton, inſtantly brace and ſtrengthen the whole nervous and *muſcular* ſyſtem, the phlogiſton in this caſe being, perhaps, more eaſily extricated, and by a leſs tedious animal proceſs than in the uſual method of extracting it from mild aliments; and that reſpiration and putrefaction affect common air in the ſame manner, and juſt as all other proceſſes diminiſh air and make it noxious, and which agree in nothing but the emiſſion of phlogiſton. Hence he infers, that animals have a power of converting phlogiſton, from the ſtate in which they receive it in their nutriment, into that ſtate in which it is called the electrical fluid; that the brain, beſides its other purpoſes, is the great laboratory and repoſitory for this purpoſe; that by means of the nerves, this great principle, thus extracted, is directed into the *muſcles*, and forces them to act in the ſame manner as they are forced into action, when the electric fluid is thrown into them *ab extra*. As to the manner in which the electric matter makes a *muſcle* contract, he only imagines that whatever can make the *muſcular* fibres recede from one another farther than the parts of which they conſiſt, muſt have this effect. Prieſtley on Air, vol. i. p. 176, &c.

MUSCULAR *conſumption*. See CONSUMPTION.

MUSCULAR is alſo an appellation given to ſeveral veins; two whereof come from the ſkin and the hind-muſcles of the thigh, and terminate in the ſubclavians.

There are three others in the loins alſo, called *muſculares*, and diſtinguiſhed into *upper*, *middle*, and *under*: the firſt terminates in the trunk of the vena cava, and the two others open into the external iliac vein.

MUSCULI *aliformes*. See ALIFORMES.

MUSCULI *amatorii*. See AMATORII.

MUSCULI *annuentes*. See ANNUENTES.

MUSCULI *capitis acceſſorii*. There is ſometimes found a ſmall *muſcle* fixed by one end to the extremity of the firſt tranſverſe apophyſis of the neck, near the inſertions of the two obliqui, from whence running up obliquely it is again inſerted behind the maſtoide apophyſis. This *muſcle* is commonly thought to be a third ſmall tranſverſalis, on that ſide where it is found; but it ſeems rather to be an additional *muſcle* to the obliquus ſuperior. The recti, and other obliqui, are alſo found ſometimes double. Winſlow.

MUSCULI *vermiformes*, &c. See VERMIFORMES, &c.

MUSCULOUS. See MUSCULAR.

MUSCULUS *faſcia latæ*. See MEMBRANOSUS and FASCIA *lata*.

MUSCULUS *latus*. See LATUS *muſculus*.

MUSCULUS is alſo a name by which ſome call the common ſea MUSCLE, more properly called *mytulus*.

MUSCULUS *myſticetus*, in *Ichthyology*, a name given by Gefner, and ſome other writers, to the common whale, or *balæna edentula* of authors. This is diſtinguiſhed from all the other cetaceous fiſhes by Artedi, by the name of the whale with the ſpiracle in the middle of the head, and with the back ſharp toward the tail. See WHALE.

MUSCULUS, among the Romans, a military machine, under cover of which the ſoldiers approached and undermined the walls of places beſieged, or filled the ditches.

MUSCUS, in *Botany*. See MOSS.

MUSCUS *arborescens marinus*, in *Natural Hiſtory*, a name given by count Marſigli to a very elegant ſpecies of marine ſubſtance, deſcribed by him as a ſea-plant. See CORALLINE.

It grows to the rocks at conſiderable depths under water, and is uſually of about three inches high; and is compoſed of ſeveral thick branches, furniſhed toward the tops with tranſparent leaves; the ſtalks are hollow, and it is all ſoft while in the ſea, but grows ſomewhat rigid when dried.

When examined by the microſcope, its ſurface appears to be granulated or covered with a ſort of ſmall glandules, which ſtand very near one another, and on cutting it tranſverſely the whole ſubſtance is ſeen to be hollow, and that general hollow to communicate with all theſe glandules, ſo that their office plainly is ſeverally to receive the ſea-water, and convey it it into this general cavity, where it is diſtributed throughout the whole plant for its nouriſhment and ſupport. The leaves of this plant being rubbed on blue paper, give it a yelloviſh green colour.

Count Marſigli has gone through the analyſis of this, and as by it we may be informed of the principles and properties of many other ſea-plants of the ſame genus, it may not be improper to give an abſtract of his obſervations.

Four and twenty ounces of this plant being put into a retort, there came over five ounces of phlegm of a ſweetiſh taſte, and of the colour of oil of almonds. The ſpirit was of a duſky earth colour, of a fixed nature, of an unctuous yet ſomewhat acrid taſte, and leaving a bitterneſs behind it: of this there were twelve ounces, and the remainder in the retort was ſix ounces and three drams. So that the whole produce being twenty-three ounces and three drams, there was only five drams of the whole loſt in the operation. The water does not alter the colour of blue paper, on ſteeping in it; being mixed with the decoction of mallow flowers it turns it to an aſh-colour. The decoction of galls becomes of a bluiſh colour, and a ſolution of copperas of a greeniſh aſh-colour with it:

the tincture of turnsol becomes of a bluish colour, tending to white. Spirit of nitre being added to it, causes a slight fume, and the decoction of mallow flowers being after this added, a fine red colour is produced. Spirit of vinegar turns this green; and no change at all is produced by any of the following liquors, spirit of salt, spirit of sal armoniac, lime-water, alum-water, oil of tartar: a solution of corrosive sublimate collects a quantity of white and gross particles, and precipitates them to the bottom. Marsigli, Hist. de la Mer. p. 73.

The spirit being examined with blue paper, makes no change in its colour on being steeped in it; the decoction of mallow flowers mixed with it become of a pale yellowish green; the decoction of galls changes with it to a dusky red; a solution of copperas becomes of a dirty yellow, and thick; the tincture of turnsol changes to an ash-colour. Spirit of nitre being mixed with it, causes a moderate fume without any ebullition, and the colour of the mixture is a reddish grey; on mixing the decoction of mallow flowers with this, it becomes of a yellowish red. Spirit of vinegar added, renders it more fluid and of a less dusky colour. Spirit of salt changes it to a reddish colour. Spirit of sal armoniac, and oil of tartar, make no change at all; but lime-water renders it more clear and fluid. Alum-water collects a quantity of white matter, and precipitates it; and a solution of corrosive sublimate, in like manner turns it white, and precipitates the gross parts. The *caput mortuum* yielded one dram and ten grains of fixed lixivial salt; the taste of this is but moderately acrid, and its colour a greyish white; being rubbed on blue paper it changes its colour to its own. The decoction of mallows on mixing this salt with it loses its blue colour, and becomes grey; and on frequently shaking the vessel, it finally becomes yellow. Spirit of nitre mixed with this salt does not so readily or violently effervesce with it, as with most other lixivial salts; and if a little turnsol be added to this, it becomes of the colour of red wine. Spirit of vinegar dissolves it very quickly, and becomes thick and turbid with it. Spirit of salt dissolves it very readily, but makes no fume, though a very considerable ebullition. Lime-water dissolves it slowly, and carries it to the surface; and alum-water, in like manner, on dissolving it, is covered with a thick scum at the top: corrosive sublimate added to this, precipitates the salt again, without altering its colour. Spirit of *sal armoniac*, and oil of *tartar*, make no change upon it. It is remarkable, that this plant contains no volatile salt.

MUSCUS *marinus latus*, the broad and flat sea *moss*, a sea-plant described by count Marsigli. It is found in several places at different depths, growing to the rocks and stones. Its upper surface is composed of a series of leaves of an auriculated figure, amassed together in an irregular manner; but its under-side is smooth and even, except that it is beset with a number of soft points or eminences, which are not easily distinguished by the naked eye. These, when a microscope is used, are found to be so many little white tubes of a cylindric figure; these are evidently the apertures by which the plant receives its nourishment; for in this, as in the other sea-plants in general, when the root fastens upon a rock or stone, it is not to extract nourishment from it, but only to fix itself firm in its place by it; for the whole surface of the plant takes in nourishment from the circumambient water, and every part acts as a root receiving supplies for the whole. See Moss.

MUSEAU, in *Natural History*, a term applied by Mr. de Reaumur to a sort of bladder, which the insects of the fly class are provided with, to make their way out of the shell, after their last transformation into the nymph state.

The word is French, and literally signifies a *snout* or *muzzle*.

The flies to whom nature has given this instrument, have it only during that short stage of their lives which is between their being inclosed in the membrane which covers them in the nymph state, and their first flying about at liberty. At this time, in order to their getting out of their shell, nature gives them a power of inflating and swelling out their head to a great size, and throwing out this sort of bladder from its anterior part, by which means the cap of the case or shell is thrown off, and the end of it opened by the two longitudinal lines giving way. The creature, after this, as it has no use for this singular piece of mechanism, to it has no power to exert it during the remainder of its life. Reaumur, Hist. Ins. vol. iv. p. 340. See TRANSFORMATION.

MUSERYTER, in *Zoology*, a name given by some to the fish called by authors *lucius*, a German fish, found in several parts of Germany, much approaching to our common dace.

MUSEIA, *Mouσεια*, in *Antiquity*, festivals in honour of the Muses at several places of Greece, especially among the Thespians, where solemn games were celebrated every fifth year.

The Macedonians had also a festival in honour of Jupiter and the Muses, which was celebrated with stage-plays and games, and lasted nine days, according to the number of the muses.

MUSEUM, *Mouσειον*, was originally used to signify a place in the palace of Alexandria, which took up, at least, a fourth part of the city; so called, as being destined and set apart to the *Muses*, and the sciences.

Here were lodged and entertained a great number of learned men, who were divided into companies or colleges, according to the sciences or sects whereof they were professors. And to each house or college was allotted a handsome revenue. This establishment is attributed to Ptolemy Philadelphus, who here fixed his library.

MUSEUM has hence passed into a general denomination, and is now applied to any place set apart as a repository for things that have some immediate relation to the arts, or to the Muses. See REPOSITORY and CABINET.

MUSEUM, *British*, the *museum* of the late Sir Hans Sloane, containing a great variety of the productions of nature and art, was purchased by the public at 20,000*l.* for the national use, and deposited in Montagu-house; where it may be rendered of no less general benefit to trade, than to the advancement of natural knowledge and experimental philosophy.

For the purchase of this *museum*, as well as the HARLEIAN collection of manuscripts, and the COTTONIAN *library*, an act of parliament passed in the twenty-sixth year of George II. which incorporates the trustees into a body politic, with a common seal, and empowers them to manage the concerns of this *Museum*.

The MUSEUM *at Oxford*, called the *Ashmolean Museum*, is a noble pile, erected at the expence of the university, for the promoting and carrying on several parts of curious and useful learning. It was begun in 1679, and finished in 1683, at which time a valuable collection of curiosities was presented to the university by Elias Ashmole, Esq. and the same day there repositted, and afterwards digested and put in a just order by Dr. Plot, who was constituted first keeper of the *Museum*.

Divers considerable accessions have been since made to the *Museum*; as of hieroglyphics, and other Egyptian antiquities, by Dr. Huntingdon; and of an intire mummy, by Mr. Goodyear; of a cabinet of natural curiosities, by Dr. Lister; also of divers Roman antiquities, altars, medals, lamps, &c.

Over the entrance of the *museum* in this inscription; MUSEUM ASHMOLEANUM, SCHOLA NATURALIS HISTORIÆ, OFFICINA CHYMICA.

MUSES, MUSÆ, *Mouσαι*, fabulous divinities of the ancient heathens, who were supposed to preside over the arts and sciences.

The word, according to Phornutus, is derived from the Greek, *μουσα*, which signifies the same with *ερευν, to search*: others derive it from *μαινεσθαι, similar*, or *alike*; all the sciences being bound and united together. Eusebius derives it from *μυειν, to initiate, to instruct*; Plato and Scaliger from *μωσθαι, obtervare*, because to them is attributed the invention of arts; and by them arts were produced. Lastly, Heinsius and Vossius derive it from the Hebrew מוסר, *mussar, severa, disciplina*. The *Muses* are called by various names; *Camenæ, Heliconiades, Parnassides, Aonides, Pierides, Pegasides, Aganippides, Thespiades, Libethrides*, and *Castalides*.

The ancients admitted nine *Muses*, and made them the daughters of Jupiter and Mnemosyne, or Memory. At first, indeed, their number was but three; viz. Melete, Mneme, and Aœde: Greek words signifying *meditation, memory*, and *singing*: but a certain sculptor of Sicyon, having orders to make three statues of the three *muses* for the temple of Apollo, and mistaking his instructions, made three several statues of each *Muse*: these, however, were found so beautiful, that they were all set up in the temple; and from that time they began to reckon nine *Muses*: to whom Hesiod afterwards gave names; viz. *Calliope, Clio, Erato, Thalia, Melpomene, Terpsichore, Euterpe, Polyhymnia*, and *Urania*.

Each of these were supposed to preside over their respective art; CALLIOPE over heroic poetry; CLIO over history; MELPOMENE over tragedy; THALIA over comedy; EUTERPE over wind-music; URANIA over astronomy; TERPSICHORE over the harp; ERATO the lute; POLYHYMNIA rhetoric.

They are painted as young, handsome, and modest; agreeably dressed, and crowned with flowers. Their usual abodes were about mount Helicon in Bœotia, and mount Parnassus in Phocis. Their business was, to celebrate the victories of the gods, and to inspire and assist the

the poets; and hence the cuſtom of invoking their aid at the beginning of a poem.

It muſt not, however, be imagined, that the deities, thus invoked, are conſidered, even by the ancient poets themſelves, as divine perſons, from whom they expect any real help. Under the name of *Muſe* they pray for the genius of poetry, and all the talents and circumſtances neceſſary for a happy execution of their undertaking.

Their addreſſes to the *Muſes* are mere allegories, and manners of expreſſing themſelves poetically: as when they make gods of ſleep, of fame, of revenge, and other natural and moral things.

Accordingly, the *Muſes* are of all ages, countries, and even of all religions: there are Chriſtian as well as heathen *Muſes*; Latin, Greek, Engliſh, and French, *muſes*. There are alſo *new Muſes*, who appear every day in favour of thoſe, who, diſdaining things too trite and common, chooſe to ſtrike out of the road.

When Virgil wrote his eclogues, he invoked the Sicilian *Muſes*, becauſe he imitated Theocritus: and the Sicilian poet having ſucceeded, the Roman begged for a genius as happy as that of this iſlander.

The *Muſes* of the poet Lucretius had never inſpired any perſon before him. It is plain, from the doctrine of his book, what kind of divinity it was he invoked. He addreſſes himſelf to Venus; but, at the ſame time, tells us, that none of the deities trouble themſelves with human affairs. His *Muſes*, therefore, muſt of neceſſity be mere allegories.

MUSHROOM, *fungus*, in *Botany*, the name of a genus of plants; the characters of which are theſe: it is a headed vegetable, compoſed of a pedicle crowned with a broad head, which is convex and ſmooth at the top, and hollow, foliated, lamelled or ſiſtulous on the other ſide. See *Tab.* II. and VII. *of Botany, claſs* 24. N° 4.

The ſpecies of *fungus*, enumerated by Mr. Tournefort, are ſeventy-three.

Linnæus has claſſed the *fungules* in general, the ſeveral ſpecies of the ferns, the moſſes, and algæ, under the character of *cryptogamia*; that is, ſuch plants as perform the great work of their fructification in ſecret, or at leaſt whoſe flowering and ſeeding are not obſerved ſo eaſily, as in thoſe plants which we uſually call the more perfect ones. In ſome of theſe the beſt microſcopes have not yet been able to inform us of the true manner in which this is performed, and many of the *fungules* or *muſhrooms* are of this number.

Under this order of *fungus* he enumerates four ſpecies, which are hairy, viz. *agaricus*, *boletus*, *hydnum*, and *phallus*; and ſix which are deſtitute of hair, viz. *clathrus*, *helvella*, *peziza*, *clavaria*, *lycoperdon*, and *mucor*.

Muſhrooms are plants more perfect than many people imagine; they have a regular root, a ſtalk conſiſting of ſeveral arrangements of fibres, the interſtices of which are filled up with a parenchymatous ſubſtance, leading from the root to the head or umbel; the under-ſide of this umbel is full of lamellæ or chives, every one of which is a regular pod or ſeed-veſſel. If theſe lamellæ are examined in their ſeveral ſtates, the ſeeds in them may be eaſily diſcovered, and are always found to be of a ſize and degree of maturity proportioned to the ſtate of the plant at that time; they have each of them alſo a ſiliquaceous aperture lengthwiſe, the ſeeds lying in rows ready to fall through it. The plant is eaſily and regularly propagated through theſe, and not only may be raiſed from ſeed, but, like many other plants, may be propagated by roots: the ſeveral filaments at the root producing tubercles, in the manner of the potatoe; from each of which there will ariſe new roots, and a new plant. The periods of vegetation in this plant are alſo ſufficiently regular; and the common opinion of its ſpringing up in a night, and periſhing in a day, has no foundation in reality. For, in the common way of raiſing them on hot beds, it is eaſy to find, that they often ſtand a fortnight or longer from their firſt appearance, before they are fit for the table. Phil. Tranſ. N° 472. p. 164.

Notwithſtanding that the ſeeds of ſome ſpecies of *muſhrooms* have been diſcovered, the accurate Buxbaum is of opinion, that very many plants of this genus propagate themſelves greatly by root, and are truly perennial; and this he ſupports by many ſolid arguments, draw from obſervations of the ſeveral ſpecies of *muſhroom*, or *fungus*, which are obvious, and under the eye of every obſerver, at many times of the year. Acta Petrop. vol. iii. p. 265. In ſeveral ſpecies of theſe plants there is placed round the ſtalk, at a ſmall diſtance from the head, a ſort of ring of a tough matter, reſembling the outer covering of the whole *fungus*; this uſually catches many of the ſeeds of the plant in their fall from the head when ripe, in order to the re-producing the ſpecies; and hence ſome have been of opinion, that it was placed there by the Author of Nature, in order to break the fall of the ſeeds, and preſerve them from the fury of the winds, in their falling from too great a height, in reſpect to their extreme lightneſs; but it rather appears, that the ſeeds often found on this *ring*, fall there only by accident, and are there detained by a viſcoſity with which that part of the plant abounds; and that the uſe of this ring is very different. Almoſt all the *muſhrooms* which have thick and fleſhy umbels, and fleſhy ſtems, have this ſort of ring round their ſtalk, from which, when the plant is young, and not yet in a flowering ſtate, there ariſes a membrane which connects the rim of the umbel to the ſtem, and preſerves the under part while in this ſtate; but when this time is over, the umbel, which was before an hemiſpherical figure, growing larger, and the membrane not giving way, it is torn off from the rim of the umbel, and adheres only to the ſtem. Soon after this the ſeeds ripen, and the umbel then loſing its former figure, commences almoſt a plane. This is the ſtate in which the plant is ſold in our markets under the name of *ſhops*.

When the umbel is of this figure, the ſeeds, being perfectly ripe, muſt fall upon the whole ſpace covered by the umbel, and as a part of this ſpace the ring muſt receive its ſhare of them; but there is no reaſon to believe that it receives more than are allotted to ſuch a part of the determinate ſpace on which they are to fall.

As to thoſe ſpecies of *muſhrooms* whoſe ſtems are ſlender, and their umbels thin, ſoft, and ductile, they never have this ring at all, and yet their ſeeds have often farther to fall than thoſe of the other kinds which have it, as they are uſually taller plants. The rims of the tender umbels in theſe kinds clap themſelves quite cloſe to the ſtalks, in the form of a contracted umbrella, and expand as the others do when the ſeeds are ripe; and the ſpecies of *fungules* of this kind are much more numerous than thoſe of the former, and propagate themſelves full as regularly.

Mr. Bradley mentions a hundred kinds of *muſhrooms* which he has ſeen in England, beſides thoſe very numerous ſmall ones which conſtitute the mouldineſs of liquors, fruits, &c. which laſt are ſuch quick growers, that they arrive at perfection in leſs than twelve hours.

The fungoides only differs from the *fungus* in its external form; the coralloides are alſo of the ſame ſpecies, though of a different name, as being branched like coral; and troffles come alſo under the ſame kind.

Matthiolus mentions *muſhrooms* which weighed thirty pounds each, and were as yellow as gold; Fer. Imperatus tells us, he ſaw ſome which weighed above a hundred pounds a-piece; and, to add no more, the Journal des Sçavans furniſhes us with an account of ſome, growing on the frontiers of Hungary, which made a full cart-load.

The poiſon of *muſhrooms* has been much talked of by ſeveral perſons; but there ſeems to be no certain account of any body's ever having been injured by eating the common *muſhroom*, unleſs by accident, as from the eating too many at once, and thereby over-loading the ſtomach; or by their being eaten by perſons who had a particular diſlike to them, as ſome perſons have to the moſt innocent aliments, particularly to cheeſe. If theſe *muſhrooms* had any poiſonous quality, it muſt have been often found out by the phyſicians in ſuch a place as London, where there are annually ſuch vaſt quantities of them conſumed, yet nothing of this kind is obſerved; and there ſeems, upon the whole, to be nothing hurtful in this ſpecies; though there may be many others which are truly poiſonous. Nor is it any more wonderful, that the different ſubjects of this claſs of vegetables ſhould differ in their virtues, than that thoſe of other kinds ſhould. The roots of carrots and parſnips are daily found a very wholeſome food, while thoſe of other plants of the ſame claſs, ſuch as the water-hemlock, the dropwort, and others of the umbelliferæ, are known to be poiſonous.

The ancients have taken great pains to diſtinguiſh the ſeveral kinds of *muſhrooms*, that the world might know the hurtful from the ſafe. The boletus mentioned by Juvenal, on account of the death of the emperor Claudius, is ſufficiently deſcribed by Pliny. Cluſius, among the moderns, has deſcribed a vaſt number of different ſpecies, every where diſtinguiſhing the eſculent and wholeſome from the poiſonous or pernicious kinds. The ſeveral authors who have treated of them ſince the time of Cluſius, have all mentioned the effects of ſome or other of the poiſonous kinds; and there are numerous inſtances of the miſchief done by them at one time or other. Some have been willing to aſcribe this miſchief to animalcules inhabiting the plant; but this ſeems erroneous, and particularly from the following inſtance: we have one kind of *muſhroom* growing in England, called the white acrid *fungus*. This is to extremely ſharp, that it ſtimulates the tongue, as if it had been touched with ſpirit of nitre: and Tournefort obſerves, that if rubbed

on blue paper, it turns it red in the ſame manner as that liquor, or any other of the violent acid ſpirits would: this cauſtic quality remains in the plant even after drying; and it is very evident, that we need look no farther than this for the origin of the poiſonous quality in this ſpecies.

There is another kind which is obſerved to kill the very flies as they ſettle upon it. It is not probable that ſuch plants as theſe ſhould be inhabited by any kind of animalcules, nor is it neceſſary to have recourſe to ſuch cauſes of the miſchief which enſues from the eating them, when their own juices ſeem ſo very able to have occaſioned it. Philoſ. Tranſ. N° 473 p. 54.

Mr Miller ſays, that the true eatable *muſhroom* is diſtinguiſhed from the poiſonous and unpleaſant kinds by theſe marks: when young it appears of a roundiſh form like a button, the ſtalk as well as the button being white, and the fleſhy part very white when broken, the gills within being livid. As they grow larger they expand their heads by degrees into a flat form, and the gills underneath are at firſt of a pale fleſh-colour; but as they ſtand long, become blackiſh.

In order to propagate *muſhrooms*, the meadows and paſtures ſhould be ſearched for them in Auguſt and September; and wherever they are found, the ground ſhould be opened all about the roots, where there will be found abundance of ſmall white knobs. Theſe are to be taken up with lumps of earth about them. The *muſhroom* beds ſhould be made of dung, in which there is good ſtore of litter; but this ſhould not be thrown in a heap to ferment, that dung which hath lain ſpread abroad for a month or longer is the beſt. Theſe beds ſhould be made on dry ground, and the dung laid upon the ſurface: their width at bottom ſhould be about two one-half or three feet, and length in proportion to the quantity of *muſhrooms* deſired; then lay the dung about a foot thick, covering it about four inches with ſtrong earth; upon this lay more dung about ten inches thick; then another layer of earth, ſtill drawing in the ſides of the bed, ſo as to form it like the ridge of a houſe, which may be done by three layers of dung and as many of earth; when the bed is finiſhed it ſhould be covered with litter or old thatch, to keep out the wet and prevent its drying: in this ſituation it may remain eight or ten days, by which time the bed will be in a proper degree of warmth to receive the ſpawn; the litter ſhould then be taken off, the ſides of the bed ſmoothed, and a covering of light rich earth, about an inch thick, ſhould be laid over the bed; upon this the ſpawn ſhould be put, laying the lumps two or three inches aſunder; then gently cover them about half an inch thick with the ſame light earth; and again put on the covering of litter. When theſe beds are made in the ſpring or autumn, as the weather is in thoſe ſeaſons temperate, the ſpawn will take much ſooner, and the *muſhrooms* will appear perhaps in a month after they are made; but thoſe beds which are made in ſummer when the ſeaſon is hot, or in winter, when the weather is cold, are much longer before they produce. The great ſkill in managing theſe beds is to keep them in a proper temperature of moiſture: during the ſummer ſeaſon, the beds may be uncovered to receive gentle ſhowers of rain at proper times; and in long dry ſeaſons, they ſhould be now and then gently watered: during the winter ſeaſon they muſt be kept as dry as poſſible, and ſo cloſely covered as to keep out cold. In froſty, or very cold weather, the growth of the *muſhrooms* will be promoted by laying over them ſome warm litter ſhaken out of a dung heap, interpoſing a covering of dry litter between the bed and this warm litter: and as often as the litter is found to decay, it ſhould be renewed with freſh; and as the cold increaſes, the covering ſhould be laid ſo much thicker. In this way plenty of *muſhrooms* will be produced all the year; and thoſe raiſed in beds will be much better for the table than any which are gathered in the fields. A bed thus managed, if the ſpawn takes kindly, will continue good for ſeveral months, and produce great quantities of *muſhrooms*: from theſe beds when they are deſtroyed, you ſhould take the ſpawn for a freſh ſupply, which may be laid up in a dry place until the proper ſeaſon of uſing it, which ſhould not be ſooner than five or ſix weeks, that the ſpawn may have time to dry.

The vaſt variety of known *fungoſes*, which are found regularly every ſeaſon in their proper ſoils, are not all that the naturaliſt has to enquire into the nature of; there are others whoſe productions are much more ſurpriſing. Theſe are ſuch as are only ſeen once or twice in an age, and that in places where it is very difficult to account for the manner of their production. One of theſe we had ſome years ago, which appeared upon an old piece of wood in a blackſmith's cellar in the Hay-market, and grew to twelve inches or more in height; and when cut down, appeared again at the ſame time the next year, and ſo on for ſeveral ſucceeding years, as if, contrary to the nature of the generality of theſe plants, it had a perennial root, and grew regularly from the old ſtock. This appeared to us a ſingular production, and a wholly new ſpecies; but ſo long ago as in the year 1692, Mr. Tournefort found ſuch a one growing on an old beam in the abbey at St. Germains. His deſcription of it is very accurate; and its reſemblance with our's as great as could be expected, in ſo looſe a growing plant as an irregular *fungus*. The beam on which this *muſhroom* grew was very firm and ſound in all other places, but juſt where it was rooted there was a crack, out of which moiſture ouzed; and probably the beam was in that part rotten, or worm eaten within. The ſmell of the plant was like that of others of the ſame kind, and an infuſion of a piece of it turned an infuſion of turnſol to a bright red; ſo that it manifeſtly abounded in acids.

It is not eaſy to account for the appearance of theſe plants which are ſeen ſo rarely, and that in places where no plant could be expected to grow: the only probable ſolution of the point ſeems this, that as the ſeeds of the *muſhroom* kind are all very minute, and generally in theſe ſpecies which have no lamellated heads, cover the whole ſurface of the leaves, the number of ſeeds produced by one ſuch plant muſt be numerous beyond all account, and at the ſame time light enough to float about in the air. Theſe muſt be at times thrown againſt a thouſand different bodies where there is no proper nouriſhment for them, and muſt therefore periſh; whereas, if any accidents are required to concur, to make a ſoil proper for it to grow in, wherever ſuch ſoil happens to be produced, as the air has free acceſs every where, it is not impoſſible but that, at one time or other, one of theſe ſmall ſeeds may happen to be properly depoſited. Mem. Acad. Par. 1692.

The Laplanders have a way of uſing *fungoſes*, or common toadſtools, as we call them, as the Chineſe and Japoneſe do the moxa, to cure pains. They collect the large *fungoſes* which they find on the bark of beech and other large trees, and dry them for uſe. Whenever they have pains in their limbs, they bruiſe ſome of this dried matter, and pulling it to pieces with their fingers, they lay a ſmall heap of it on the part neareſt to where the pain is ſituated, and ſet it on fire. In burning away, it bliſters up the part, and the water diſcharged by this means, generally carries off the pain. It is a coarſe and rough method, but generally a very ſucceſsful one, eſpecially when the patient has prudence enough to apply it in time, and reſolution enough to bear the burning to a neceſſary degree.

MUSHROOMS *growing out of ſtones*. Naturaliſts have of long time obſerved, that there are ſea *fungoſes* of a very different ſubſtance and ſtructure from any of the common kinds, growing on rocks, ſtones, and corals, or other marine ſubſtances, which ſeem wholly incapable of ſupplying them with any vegetable nouriſhment. Theſe have been ſuppoſed to be as it were all roots, and to take in their nouriſhment at every part of their ſurface from the circumambient water: but in the year 1730, Mr. Aleſeld obſerved a like ſort of *fungoſes* growing in places where they had no ambient fluid to afford them nouriſhment, except the air, and yet were fixed upon as unpromiſing a baſis for the ſupplying them with any, as thoſe of the ſea. Theſe were found on common flints on the ſurface of the earth. This gentleman obſerved, that a great many various ſpecies of flints which lay in part buried in the earth, and in part lying above its ſurface, were on this open part covered with a ſort of white duſt. This was in July, and in hot dry weather. Having the curioſity to examine this duſt with a microſcope, every particle of it was found to be a complete and perfect *fungus*, all of the ſame determinate figure, and much reſembling the common earth *muſhrooms*. They were white in colour, and had each a very ſhort pedicle, in many, ſcarce to be ſeen at all; their head was round and umbilicated, and very elegantly and evenly ſtriated on the upper part, the ſtriæ or furrows all running from the centre to the circumference; and the rim of each head being a little elevated. Upon the whole, they not unaptly reſembled in miniature a common tea-cup inverted, and the ſaucer inverted alſo, and placed upon it. The ſubſtance of theſe *fungoſes* was of two kinds, the one furniſhed a cortical part or covering, and the other filled up the whole internal ſpace.

The internal part was ſoft and ſpongy, and much like what the inſide of the common *muſhroom* is: this was white. The outer or cortical part was reddiſh, and rather repreſented a congeries of ſmall grains of ſand, collected into that form by ſome glutinous matter, than any ſolid or continuous body. The thin external coat of this being removed, there were ſeen within it a multitude of ſmall round globules of glaſſy ſurfaces, reflecting the light in manner of ſome of the ripe ſmooth ſummer fruits

fruits, such as the cherry, and the like. This was their appearance when freshly uncovered; but after they had been exposed some time to the air, they became flaccid, fell almost flat together, and were umbilicated, and marked with rays from a centre like those of a star.

These *fungusses*, if not injured by accidents, remain in their perfect state a long time upon the stones. Five months keeping produces no alteration in them; but at length they become flaccid, and wither, and in this state are not to be recovered by water, as many of the common land *fungusses* will, which swell, and for a time appear plump, on being wetted.

They grate harshly, like stony matter between the teeth, and resist the force of acid menstruums; they bear the great degrees of heat or cold without any injury; but if they are exposed to a flame, the outer covering of the head bursts and flies off, and these red globules come in full sight, while the rest of the *fungus* remains unaltered. The same effect is produced by plunging them into hot water; and if they be boiled in water, over a strong fire, the globules are dislodged and lost in it. If the stints, on which they are produced, are heated red hot, the *fungusses* are destroyed, and wholly disappear in the places where they were; only the fragments of the outer covering of the head remaining scattered, on different parts of the stone, like pieces of broken pots or glasses: these fragments lose their red colour, and are found grey. On the whole, it appears from these experiments, that the cortical part of this *fungus* is not of the nature of common vegetable matter, but is truly stony; so that the plant may be properly arranged among a set of *lithophyta*, or stone plants, properly so called. The author of this curious discovery observes, that he usually found many small red insects running about upon these stones, and among the clusters of *fungusses*. These afforded at least a proper retreat or asylum for them, if not food; for it is possible the internal part of the *fungusses* might be eaten by them. Act. Eruditor. ann. 1739.

Dr. Wolckamerus, in the Ephemerides of the curious, has described a stone, taken out of a mountain in Italy, which produced real *mushrooms* in the form of a bonnet, and called by the natives *fungus lucurius*. This stone is of the bigness of an ox's head, rough and uneven on its surface, and on which also are perceived some clefts and crevices. It is black in some parts, and in others of a lighter and greyish colour. Internally it is porous, and nearly of the nature of the pumice-stone, but much heavier, and it contains a small piece of flint, which is so incorporated with it as to appear to have been formed at the same time the stone itself received its form. This gives room to judge that those stones have been produced by a fat and viscid juice, which has the property of indurating whatever matter it filtrates into. The stone here spoken of, when it has been lightly covered with earth, and sprinkled with warm water, produces *mushrooms* of an exquisite flavour, which are usually round, sometimes oval, and whose borders, by their inflexions and different curvities, represent, in some measure, human ears. The principal colour of these *mushrooms* is sometimes yellowish, and sometimes of a bright purple; but they are always disseminated with different spots, of a deep orange colour, or red brown; and when these spots are recent, and still in full bloom, they produce a very agreeable effect to the sight. But what appears admirable, is, that the part of the stalk which remains adhering to the stone, when the *mushroom* has been separated from it, grows gradually hard, and petrifies in time, so that it seems that this fungites restores to the stone the nutritive juice it received from it, and that it thus contributes to its increase.

As to the form of these *mushrooms*, their root is stony, uneven, divided according to its longitudinal direction, and composed of fibres as fine as hairs, interwoven one with another. Their form on first shooting out resembles a small bladder scarce thin larger than the bud of a vine; and, if in this state they are squeezed between the fingers, an aqueous subacid liquor issues out. When they are at their full growth, their pedicle is of a finger's length, larger at top than at bottom, and becomes insensibly slenderer in proportion as it is nearer the earth. These *mushrooms* are also formed in an umbella, and variegated with an infinity of little specks situate very near one another. They are smooth and even on the upper part, but underneath leafy like the common *mushrooms*. Their taste is likewise very agreeable, and the sick are not debarred eating of them, when they have been dressed in a proper manner.

Upon a chemical analysis of this stone, it yielded by distillation, first an insipid water, and afterwards a spirituous liquor. When the retort was heated to a certain point, there arose an oil resembling in smell and taste that of guaiacum; and a very acrid salt was extracted from the ashes. Dr. Hill has also published an account of a similar stone, which, on being watered, produced excellent *mushrooms*.

MUSHROOM, *bastard*. See FUNGOIDES.

MUSHROOM, *pepper*. See PEPPER.

MUSHROOM *galls*, in *Natural History*, a name given by authors to a small species of galls very common on the leaves of the oak in September and October, and resembling the common esculent *mushroom*. They are placed on the upper surface of the leaf, and are often in great numbers on it. The leaves, which have considerable numbers upon them, make a very beautiful figure, and appear as if ornamented by art with a number of elegant figures. These galls are usually about a sixteenth, though sometimes a tenth of an inch in the diameter; they are composed of an orbicular head, which adheres to the leaf by a very short pedicle, so that its edges, which droop a little in the manner of those of the common *mushroom*, usually touch the surface of the leaf all round. These little galls are of various colours, according to their different degrees of maturity; they are of a greenish white at first, after that they become of a yellowish tinge, from which they pass through all the shades of orange and flame colour, to a very beautiful red, which is always their colour when perfectly mature. When they are observed by the microscope, their surface appears hairy, and the several hairs all stand near one another at their bases, and diverge at their points, as is the natural consequence of their standing on a convex body. Reaumur, Hist. Insects, vol. vi. p. 194.

The use, as well as the figure of this gall is very singular. Malpighi and Mr. Reaumur have both described it, and the former of these authors describes a cavity in the centre of the head; but this seems to have been done at random, and rather supposed from analogy, than seen in fact; for the latter author, who is perhaps one of the most accurate observers that ever wrote, could never find any cavity in any one of the great numbers he dissected; but he observed what was an use of the same kind with that of the other galls, in this, though performed in different manner; they are plainly all destined for the lodgment and security of small animals; not to be distinctly seen without the help of glasses; but they are of the nature of those worms which turn into two-winged flies.

The flies into which these worms are finally transformed, have not yet been discovered; but this is no wonder, since the animals themselves are so minute as to require glasses to view them. It is probable that they undergo their change into the chrysalis state in some other place, for they are never found in it under the galls; but this is common also to many other species.

MUSHROOM *worms*. The various species of *mushrooms* are subject to be eaten and destroyed by a great variety of insects. There is however one species which is more frequent than all the rest, and which has therefore obtained, among authors, the name of the *mushroom worm*. This is a white worm, with a hard scaly black head; it has some fleshy tubercles, which it throws out at pleasure from the under part of its several rings, and which serve it as legs. This is found indifferently in almost all the species of *mushrooms*; but in none so frequently as in the great wood-*fungus*, which is porous and greenish underneath. It is found to change to a tipula or long-legs, of no great beauty, being of a dusky brown colour, and middling size.

The other species of *fungusses* have also their worms; but there is one of a very singular nature which is found frequently on the agaric which grows on the stumps of oak trees, especially near the roots. This is a long and slender worm, somewhat flatted, and resembling a small leech, but that it has a hard and scaly head of a blackish colour. The body is composed of many rings, in the manner of the earth-worm, and looks very bright and glossy, being always covered with a viscous liquor. This creature is easily found, for it never eats into the substance of the *fungus*, but only crawls about its surface; the traces, wherever it has been, are marked with a coat of a shining varnish, and resemble the places over which snails have crept.

This worm makes a very beautiful object for a microscope. When young it is as transparent as glass, and the motion of its internal parts is very easily distinguished. When this creature is to pass into the chrysalis state, it does not remove from the *fungus*, but spins itself a web, and remains upon it. This web is composed of the same matter with the covering or habitation under which it usually resides, but it is thicker, more opake, and of a coarser structure.

The creature remains about a fortnight under this covering, and then comes forth in the form of a fly, which is evidently a species of tipula. It has very long legs, and a long and slender body; the body is brown, and the breast yellowish; the wings are long and slender, and the antennæ

antennæ are of a very singular and remarkable figure; they are broad and flat, and yet terminate in a point. Theſe are compoſed of ſeveral articulations, and make a very beautiful figure when examined by the microſcope.

Beſide theſe, this fly has, in the manner of the other tipulæ, a pair of beards placed on the anterior part of the head, which at pleaſure bends down over the face, and completely covers with them the longitudinal fiſſure, which is the mouth, ſituated in this as in the other tipulæ. Reaumur, Hiſt. Inſ. vol. ix. p. 23. ſeq.

MUSIC, *Μουσικη*, the ſcience of ſound, conſidered as capable of producing melody, or harmony; or, the art of diſpoſing and conducting ſounds, conſidered as grave and acute; and of proportioning them among themſelves, and ſeparating them by juſt intervals, pleaſing to the ſenſe.

The word is ſuppoſed originally formed from *muſa*; *muſe*; the Muſes being ſuppoſed to be the inventors thereof. Kircher, however, will have it take its name from an Egyptian word, as ſuppoſing its reſtoration after the flood to have begun there, by reaſon of the reeds, &c. on the banks of the Nile. Heſychius tells us, the Athenians gave the name *muſici*, *μουσικοι*, to every art.

Mr. Malcolm defines *muſic* a ſcience, that teaches how ſounds, under certain meaſures of tune and time, may be produced, and ſo ordered or diſpoſed, as that, either in conſonance, or ſucceſſion, or both, they may raiſe agreeable ſenſations.

Muſic, among the ancients, was taken in a much more extenſive ſenſe than among the moderns. What we call the ſcience of *muſic*, was by the ancients rather called HARMONICA.

MUSIC, *modern*, *muſica moderna*, may be divided into two parts: firſt, *antiqua-moderna*, which is generally a ſerious ſort of *muſic*, conſiſting of many parts; and which has been in uſe from Guido's time, to the beginning of the laſt century. Secondly, the *modern* which has been uſed in this and the laſt century: it is very different from the *antiqua-moderna*, being briſker, lighter, gayer, and more ſprightly.

Muſic naturally divides itſelf into *ſpeculative* and *practical*.

MUSIC, *ſpeculative*, is the knowledge of the *materia muſica*, or how to produce ſounds in ſuch relations of tune and time, as ſhall be agreeable in conſonance, or ſucceſſion, or both.

By which we do not mean the actual production of theſe ſounds by an inſtrument or voice, which is merely the mechanical or effective part; but the knowledge of the various relations of tune and time, which are the principles, out of which the pleaſure ſought is derived.

MUSIC, *practical*, is that, which ſhews how theſe principles are to be applied; or how ſounds, in the relations they bear to *muſic* (as thoſe are determined in the ſpeculative part), may be ordered, and variouſly put together in ſucceſſion and conſonance, ſo as to anſwer the end.

And this we call the art of *compoſition*, which is properly the practical part of *muſic*.

Some add a third branch, viz. *inſtrumental muſic*, or the knowledge of inſtruments; but, as this depends altogether on the firſt, and is only an application or expreſſion of it, it cannot come regularly under the definition, and conſequently is no part of the diviſion of the ſcience.

The *firſt* branch, which is the contemplative part, divides itſelf into theſe two; viz. the knowledge of the *relations and meaſures of tune*, and the *doctrine of time*.

The former is properly what the ancients call *harmonica*, or the doctrine of harmony in ſounds, as containing an explication of the grounds, with the various meaſures and degrees of the agreement of ſounds in reſpect of their tune.

The latter is what they called *rhythmica*, becauſe it treats of the number of ſounds or notes, with reſpect to time; containing an explication of the meaſures of long and ſhort, or ſwift and ſlow, in the ſucceſſion of ſounds.

The *ſecond* branch, or the practical part of *muſic*, as naturally divides into two parts, anſwering to the parts of the firſt.

That correſponding to the harmonica, the ancients called *melopœia*, becauſe it contains the rules of making ſongs, with reſpect to tune, and harmony of ſounds; though we have no reaſon to think the ancients had any thing like compoſition in parts.

That which anſwers to the rhythmica, they call *rhythmopœia*; containing rules for the application of their numbers and time.

We find a ſtrange diverſity in the ancient writers, as to the nature, office, extent, diviſion, &c. of *muſic*.

Hermes Triſmegiſtus defines *muſic* to be the knowledge of the order of all things; which is alſo the doctrine of the Pythagorean ſchool, and of the Platoniſts, who teach, that every thing in the univerſe is *muſic*. Agreeable to which wide ſenſe, ſome diviſe *muſic* into *divine* and *mundane*.

MUSIC, *divine*, is that reſpecting the order and harmony, which obtains among the celeſtial minds.

MUSIC, *mundane*, is that which reſpects the relations and order of every thing elſe in the univerſe.

Though Plato, by *divine muſic*, underſtands that which exiſts in the divine mind, viz. thoſe archetypal ideas of order and ſymmetry, according to which God formed all things. And, as this order exiſts in the mundane creatures, he calls it *mundane muſic*.

This laſt ſpecies the ancients again ſubdivided into four, viz.

MUSIC, *elementary*, or the harmony of the elements of things.

MUSIC, *celeſtial*, or the *muſic of the ſpheres*; comprehending the order and proportions in the magnitudes, diſtances, and motions, of the heavenly bodies, and the harmony of the ſounds reſulting from thoſe motions.

MUSIC, *human*, which conſiſts chiefly in the harmony of the faculties of the human ſoul, and its various paſſions; and is alſo conſidered in the proportion, temperament, and mutual dependence, of the parts of the body. Laſtly,

MUSIC, properly ſo called, which has for its object motion, conſidered as under certain regular meaſures and proportions, by which it affects the ſenſes in an agreeable manner.

Now, as motion belongs to bodies, and as ſound is the effect of motion, and cannot be without it, but all motion does not produce ſound; hence this laſt branch of *muſic* became farther ſubdivided.

Where the motion is without ſound, or as it is only the object of ſight, it was either called *muſica organica*, or *ſaltatoria*, which contains the rules for the regular motions of dancing: or *muſica hypocritica*, which reſpects the motions and geſtures of the pantomimes.

When the motion is perceived only by the ear, i. e. when ſound is the object of *muſic*, there were three ſpecies; viz. *Harmonica*, which conſiders the differences and proportions with reſpect to grave and acute. *Rhythmica*, which reſpects the proportion of the ſounds as to time, or the ſwiftneſs and ſlowneſs of their ſucceſſions. And *metrica*, which belongs properly to the poets, and reſpects the art of making verſes.

Ariſtides Quinctilianus, Bacchius, and ſome other ancient writers, define *muſic* the knowledge of ſinging, and of the things belonging thereto; which they explain by the motions of the voice and body: as if the ſinging conſiſted only in the different tones of the voice.

The ſame Ariſtides, conſidering *muſic* in the largeſt ſenſe of the word, divides it into *contemplative* and *active*. The firſt, he ſays, is either *natural* or *artificial*. The *natural* is either *arithmetical*, which conſiders the proportion of numbers; or *phyſical*, which examines the order of the things of nature.

The *artificial* he divides as above, into *harmonica*, *rhythmica*, and *metrica*.

The *active*, which is the application of the *artificial*, as either *enunciative* (as in oratory); *organical* (or inſtrumental performance); *odical* (for voice and ſinging); *hypocritical* (in the motions of the pantomimes.) To which ſome add *hydraulical*, though, in reality, no more than a ſpecies of the organical; in which water is uſed, for the producing or modifying of ſound.

Porphyry makes another diviſion of *muſic*, taking it in the limited ſenſe, as having motion, both dumb and ſonorous, for its object; and, without diſtinguiſhing the ſpeculative and practical, he makes its parts theſe ſix; viz. *rhythmica*, for the motions of dancing; *metrica*, for the cadence and recitation; *organica*, for the practice of inſtruments; *poetica*, for the numbers and feet of verſes; *hypocritica*, for the geſtures of the pantomimes; and *harmonica*, for ſinging.

Alypius alſo and Voſſius make the *harmonica*, *rhythmica*, and *metrica*, to be ſo many parts of *muſic*. Ariſtoxenus adds the *organica*. Voſſius alſo, to the three ſpecies of practical *muſic*, *harmonica*, *organica*, and *hydraulica*, adds a fourth, *orcheſtica*, or dancing.

The *muſical faculties*, as they call them are *melopœia*, which give rules for the tones of the voice or inſtrument; *rhythmopœia*, for motions; and *poeſis*, for making verſes. See POETRY.

Muſic appears to have been one of the moſt ancient of arts; and, of all others, *vocal muſic* muſt undoubtedly have been the firſt kind. For man had not only the various notes of his own voice to make his obſervations on, before any other art or inſtrument was found out, but had the various natural ſtrains of birds to give him occaſion to improve his own voice, and the modulations of ſounds it was capable of.

Of

Of many ancient authors, who agree in this conjecture, we shall only mention Lucretius, who says,

At liquidas avium voces imitarier ore
Ante fuit multo, quam levia carmina cantu
Concelebrare homines possent, aurisque juvare.

The firſt invention of ſtringed inſtruments, the ſame poet aſcribes to the obſervation of the winds whiſtling in the hollow reeds.

As for other kinds of inſtruments, there were ſo many occaſions for cords or ſtrings, that man could not be long in obſerving their various ſounds; which might give riſe to ſtringed inſtruments.

And for the pulſatile inſtruments, as drums and cymbals, they might ariſe from the obſervation of the naturally hollow noiſe of concave bodies.

Plutarch, in one place, aſcribes the firſt invention of *muſic* to the god Apollo; and, in another, to Amphion, the ſon of Jupiter and Antiope. This laſt, however, is pretty generally allowed to have been the firſt who brought *muſic* into Greece, and to have been the inventor of the lyre. The time he lived in is not agreed upon.

To him ſucceeded Chiron, the centaur; Demodocus; Hermes Trifmegiſtus; Olympus; Orpheus, whom ſome make the firſt introducer of *muſic* into Greece, and the inventor of the lyra; to whom add Phemius, and Terpander, who was contemporary with Lycurgus, and ſet his laws to *muſic*. To him ſome attribute the firſt inſtitution of *muſical* modes, and the invention of the lyre. Laſtly, Thales, and Thamyris, who is ſaid to have been the firſt inventor of inſtrumental *muſic* without ſinging.

Theſe were the eminent muſicians before Homer's time: others, of a later date, were, Laſus Hermionenſis, Melanippides, Philoxenus, Timotheus, Phrynis, Epigonius, Lyſander, Simmicus, and Diodorus; who were all conſiderable improvers of *muſic*. Laſus is ſaid to have been the firſt author who wrote on *muſic*, in the time of Darius Hyſtaſpis; Epigonius invented an inſtrument of forty ſtrings, called the *epigonium*; Simmicus alſo invented an inſtrument, called *ſimmicium*, of thirty-five ſtrings; Diodorus improved the *tibia*, by adding new holes; and Timotheus the *lyre*, by adding a new ſtring; for which he was fined by the Lacedemonians.

As the accounts we have of the inventors of *muſical* inſtruments among the ancients are very obſcure; ſo are alſo the accounts what thoſe inſtruments were; we ſcarce know any thing of moſt of them, beſides the bare name.

The general diviſion of inſtruments is, into *ſtringed inſtruments*, *wind inſtruments*, and thoſe of the *pulſatile* kind. Of *ſtringed inſtruments*, we hear of the *lyra*, or *cithara*, the *pſalterium*, *trigonum*, *ſambuca*, *pectis*, *magas*, *barbiton*, *teſtudo*, *epigonium*, *ſimmicium*, and *pandoura*; which were all ſtruck with the hand, or a *plectrum*; and which ſee in their places.

Of *wind inſtruments*, we hear of the *tibia*, *fiſtula*, *hydraulic organs*, *tuba*, *cornua*, and *lituus*.

The *pulſatile inſtruments* were, the *tympanum*, *cymbalum*, *crepitaculum*, *tintinnabulum*, *crotalum*, and *ſiſtrum*.

Muſic has ever been in the higheſt eſteem in all ages, and among all people; nor could authors expreſs their opinion of it ſtrongly enough, but by inculcating, that it was uſed in heaven, and was one of the principal entertainments of the gods, and the ſouls of the bleſſed.

The effects aſcribed to it, by the ancients, are almoſt miraculous: by means hereof, diſeaſes are ſaid to have been cured, unchaſtity corrected, ſeditions quelled, paſſions raiſed and calmed, and even madneſs occaſioned. Athenæus aſſures us, that anciently all laws, divine and civil, exhortations to virtue, the knowledge of divine and human things, lives and actions of illuſtrious men, were written in verſe, and publicly ſung by a chorus to the ſound of inſtruments; which was found the moſt effectual means to impreſs morality, and a right ſenſe of duty, on the mind.

Muſic made a very conſiderable part of the diſcipline of the ancient Pythagoreans, and was uſed by them to draw over the mind to laudable actions, and ſettle in it a paſſionate love of virtue. It was their doctrine, that the ſoul itſelf conſiſts of harmony; and therefore, by *muſic*, they pretended to revive the primitive harmony of its faculties. By this primitive harmony, they meant that, which, according to their dogma, was in the ſoul in its pre-exiſtent ſtate in heaven.

Dr. Wallis has endeavoured to account for the ſurpriſing effects aſcribed to the ancient *muſic*; and charges them principally on the novelty of the art, and the hyperboles of the ancient writers: nor does he doubt, but the modern *muſic*, *cæteris paribus*, would produce effects at leaſt as conſiderable as the ancient. The truth is, we can match moſt of the ancient ſtories of this kind in the modern hiſtories. If Timotheus could excite Alexander's fury with the Phrygian mode, and ſooth him into indolence with the Lydian; a more modern muſician is ſaid to have driven Eric, king of Denmark, into ſuch a rage, as to kill his beſt ſervants. Dr. Niewentyt tells us of an Italian, who, by varying his *muſic* from briſk to ſolemn, and ſo *vice verſâ*, could move the ſoul ſo, as to cauſe diſtraction and madneſs; and Dr. South has founded his poem, called Muſes Incantans, on an inſtance he knew of the ſame thing.

Muſic, however, is not only found to exert its force on the affections, but on the parts of the body alſo: witneſs the Gaſcon knight, mentioned by Mr. Boyle, who could not contain his water at the playing of a bag-pipe; the woman, mentioned by the ſame author, who would burſt out in tears at the hearing of a certain tune, with which other people were but a little affected. To ſay nothing of the trite ſtory of the TARANTULA, we have an inſtance, in the Hiſtory of the Academy of Sciences, of a muſician's being cured of a violent fever, by a little concert occaſionally played in his room.

Nor are our minds and bodies alone affected with ſounds, but even inanimate bodies are ſo. Kircher tells us of a large ſtone, that would tremble at the ſound of one particular organ-pipe; and Morhoff mentions one Peter, a Dutchman, who could break rummer-glaſſes with the tone of his voice. Merſenne alſo tells us of a particular part of a pavement, that would ſhake and tremble, as if the earth would open, when the organs played. Mr. Boyle adds, that ſcales will tremble at the ſound of organs; that he has felt his hat do ſo under his hand, at certain notes both of organs and diſcourſe; and that he was well informed, every well-built vault would thus anſwer to ſome determinate note.

There is a great diſpute among the learned, whether the ancients, or moderns, beſt underſtood and practiſed *muſic*? Some maintain, that the ancient art of *muſic*, by which ſuch wonderful effects were performed, is quite loſt; and others, that the true ſcience of harmony is now arrived to much greater perfection than was known or practiſed among the ancients.

This point ſeems no other way to be determinable but by comparing the principles and practice of the one with thoſe of the other. As to the theory or principles of harmonics, it is certain we underſtand it better than the ancients; becauſe we know all that they knew, and have improved conſiderably on their foundations. The great diſpute then lies on the practice; with regard to which it may be obſerved, that, among the ancients, *muſic*, in the moſt limited ſenſe of the word, included *harmony*, *rhythmus*, and *verſe*; and conſiſted of verſes ſung by one or more voices alternately, or in choirs, ſometimes with the ſound of inſtruments, and ſometimes by voices only. Their muſical faculties, we have already obſerved, were *melopœia*, *rhythmopœia*, and *poeſis*; the firſt whereof may be conſidered under two heads, viz. *melody*, and *ſymphony*. As to the latter, it ſeems to contain nothing but what relates to the conduct of a ſingle voice, or making what we call *melody*. The ancients do not appear to have ever thought of the concert, or harmony of parts; which is a modern invention, for which we are beholden to Guido Aretine, a Benedictine friar.

We would not, however, be here underſtood to mean, that the ancients never joined more voices or inſtruments than one together in the ſame ſymphony; but that they never joined ſeveral voices ſo as that each had a diſtinct and proper melody, which made among them a ſucceſſion of various concords, and were not in every note uniſons, or at the ſame diſtance from each other as octaves. This laſt indeed agrees to the general definition of the word *ſymphonia*; yet it is plain, that in ſuch caſes there is but one ſong, and all the voices perform the ſame individual melody. But when the parts differ, not by the tenſion of the whole, but by the different relations of the ſucceſſive notes, this is the modern art, which requires ſo peculiar a genius, and on which account the modern *muſic* ſeems to have much the advantage of the ancient. For farther ſatisfaction on the ſubject, ſee Kircher, Perrault, Dr. Wallis, Mr. Malcolm, the Jeſuit Cereeau, and others; who unanimouſly agree, that after all the pains they have taken to know the true ſtate of the ancient *muſic*, they could not find the leaſt reaſon to think there was any ſuch thing in their days as *muſic* in parts.

The ancient muſical notes are very myſterious and perplexed: Boethius and Gregory the Great firſt put them into a more eaſy and obvious method. In the year 1204, Guido Aretine, a Benedictine of Arezzo in Tuſcany, firſt introduced the uſe of a ſtaff with five lines, on which, with the ſpaces, he marked his notes by ſetting a point up and down upon them, to denote the riſe and fall of the voice; though Kircher mentions this artifice to have been in uſe before Guido's time.

Another contrivance of Guido's was to apply the six musical syllables, *ut, re, mi, fa, sol, la*, which he took out of the Latin hymn:

UT *queant laxis* RE*sonare fibris*
MI*ra gestorum* FA*muli tuorum*,
SOL*ve polluti* LA*bii reatum*,
O Pater Alme.

We find another application of them in the following lines:

UT RE*sidit* MI*sarum* FA*tum*, SOL*atosque* LA*bores*
Aevi sit dulcis musica, noster amor.

Besides his notes of *music*, by which, according to Kircher, he diſtinguiſhed the tones, or modes, and the ſeats of the ſemitones, he alſo invented the ſcale, and ſeveral muſical inſtruments, called *polyplectra*, as ſpinets and harpſichords.

The next conſiderable improvement was in 1330, when Joannes Muris, or de Muris, doctor at Paris (or as Bayle and Gefner make him, an Engliſhman), invented the different figures of notes, which expreſs the times or length of every note, at leaſt their true relative proportions to one another, now called *longs, breves, ſemi-breves, crotchets, quavers*, &c.

The moſt ancient writer of *muſic*, we have already obſerved, was Laſus Hermioenſis; but his works, as well as thoſe of many others both Greek and Roman, are loſt. Ariſtoxenus, diſciple of Ariſtotle, is the eldeſt author extant on the ſubject: after him came Euclid, author of the Elements; Ariſtides Quintilianus wrote after Cicero's time. Alypius ſtands next; after him Gaudentius the philoſopher, and Nicomachus the Pythagorean, and Bacchius. Of which ſeven Greek authors we have a fair copy, with a tranſlation and notes, by Meibomius.

Ptolemy, the celebrated mathematician, wrote in Greek of the principles of harmonics, about the time of the emperor Antoninus Pius. This author keeps a medium between the Pythagoreans and Ariſtoxenians. He was ſucceeded at a conſiderable diſtance by Manuel Bryennius.

Of the Latins we have Boethius, who wrote in the time of Theodoric the Goth; and one Caſſiodorus, about the ſame time; Martianus, and St. Auguſtine, not far remote.

Of the moderns, are Zarlin, Salinas, Vincenzo Galileo, Doni, Kircher, Merſenne, Paran, De Caux, Perrault, Wallis, Deſcartes, Holder, Malcolm, &c.

MUSIC, *chromatic*, *muſica chromatica*, among the Italians, is uſed to expreſs that kind of *muſic* in which there are many chromatic ſigns, as flats or ſharps, and intervals, &c. See CHROMATIC.

MUSIC, *diatonic*. See DIATONIC.

MUSIC, *didactic*, *muſica didactica*, that part of ſpeculative *muſic* which only conſiders the quantity, proportions, and different qualities of ſounds.

MUSIC, *dramatic*, *muſica dramatica*, *ſcenica*, *theatrale*, among the Italians, is uſed to denote ſuch compoſitions of *muſic* as are particularly made and fitted for theatres. See RECITATIVO.

MUSIC, *enharmonic*. See ENHARMONIC.

MUSICA *enunciativa*, or *enarrativa*, is uſed in much the ſame ſenſe as *muſica ſignatoria*.

MUSIC, *figurate*, *muſica figuralis*, *figurata*, or *colorata*. *Figurate muſic*, that wherein the notes are of different values, and the motions various, now ſlow, then quick, &c.

MUSIC, *harmonic*, *muſica harmonica*, among the Italians, is uſed for pieces conſiſting of many parts, which, though very different, yet, when played together, make an agreeable whole. This we call *muſic* in parts.

MUSIC, *hiſtorical*. See HISTORICAL.

MUSIC, *hypercbematic*, or *cborale*, is uſed by ſome authors for a ſort of *muſic* fit for ballads and dancing.

MUSIC, *inſtrumental*, is uſed to denote muſical compoſitions, made to be executed by inſtruments.

MUSIC, *melismatic*, or *melodia*, is uſed to denote a ſong, or ſingle part, merely for a voice or for an inſtrument. Broſſard. See MELODY.

MUSIC, *melopœtic*, is the ſcience or art of ranging and diſpoſing ſounds in ſucceſſion in an agreeable manner; or the art of making melody. See MELODY and MELOPŒIA.

MUSIC, *menſural*, *muſica miſurata*, among the Italian authors, a kind of *muſic*, the notes of which are unequal. It is contrary to *muſica plana*, or *chorale*.

MUSIC, *metabolic*, *muſica metabolica*, among the Italians, is properly *muſic* tranſpoſed, as when the piece goes out of its natural mode into a tranſpoſed one, the better to expreſs the words, or to diſtinguiſh ſome change in the action, paſſion, motion, &c.

MUSIC, *metric*, *muſica metrica*, is uſed, by Italian authors, to denote the harmonious cadence of the voice, heard when any one declaims, or repeats verſes; or it is an air compoſed to verſes.

MUSIC, *modern*. See ante.

MUSIC, *modulatory*, *muſica modulatoria*, among the Italians, that part of *muſic* which teaches to compoſe or modulate, i. e. that fixes rules for the uſe of modes, and teaches either to ſing or play well. See MODE, and MODULATION.

MUSIC, *odic*, *muſica odica*, among the Italians, is the ſame with *hypercbematic*, or *cborale*.

MUSIC, *organic*, *muſica organica*, among the Italians, is uſed to denote muſical compoſitions deſigned to be performed by inſtruments only.

MUSIC, *pathetic*, *muſica pathetica*, is a moving and affecting kind of *muſic*, that cauſes emotions in the mind, either of love, grief, or pity.

MUSIC, *poetic*, *muſica poetica*, is ſometimes uſed for the art of inventing ſongs, of modulating concords and diſcords together agreeably, and making what we call compoſitions, &c.

MUSIC, *recitative*, *muſica recitativa*, *ſcenica*, or *dramatica*, a ſort of *muſic* uſed in operas, &c. irregular as to time, being a declamation in ſinging, to expreſs the paſſions. From its being thus irregular in its time, the Italians often place the phraſe *a tempo giuſto*, when the recitative ends, and an air, be it minuet, jigg, or any other, follows, to ſhew that the time is then ſtrictly to be obſerved. See RECITATIVO.

MUSIC, *rhythmic*, *muſica rhythmica*, is uſed for the harmony or cadence of the words in proſe; or a ſong compoſed to words in proſe.

MUSIC, *ſcenic*, the ſame with *recitative*.

MUSIC, *ſignatory*, *muſica ſignatoria*, is uſed for that part of *muſic* which teaches the knowledge of the characters, notes, figures, paſſes, and all other ſigns and marks whatever, uſed in *muſic*.

MUSIC, *vocal*, *muſica vocalis*, or that compoſed for the voice, in oppoſition to organical or inſtrumental, which is intended to be played on inſtruments only.

MUSIC-*ſhell*, in *Natural Hiſtory*, the name of a ſpecies of ſhell-fiſh of the MUREX-kind, remarkable for its variegations, which conſiſt of ſeveral ſeries of ſpots placed in rows of lines, like the notes of *muſic*.

MUSIC, *academy of*. See ACADEMY.

MUSIC, *characters in*. See CHARACTERS.

MUSICAL *accent*. See ACCENT.

MUSICAL *faculties*. See MUSIC.

MUSICAL *glaſſes*. See ARMONICA.

MUSICAL *modes*. See MODE.

MUSICAL *notes*. See NOTE.

MUSICAL *numbers*, are 2, 3, and 5, together with their compoſites. They are ſo called, becauſe all the intervals of muſic may be expreſſed by ſuch numbers. See INTERVAL.

This is now generally admitted by *muſical* theoriſts. Mr. Euler ſeems to ſuppoſe, that 7 or other primes might be introduced; but he ſpeaks of this as a matter doubtful and difficult. It is to be obſerved, that 2 correſponds to the octave, 3 to the fifth, or rather to the twelfth, and 5 to the third major, or rather the ſeventeenth. From theſe three may all other intervals be found.

A table of *muſical* numbers within any propoſed limit may be thus expeditiouſly formed.

Place the terms of the progreſſion 1, 5, 25, 125, &c. in a column under each other; and multiply every term of this progreſſion by 3, continually, till you foreſee that the products will exceed the propoſed limit. Then if all the numbers thus found be doubled continually, till it be foreſeen that the doubled numbers would exceed the propoſed limit; all theſe products together, with the powers of 2, will give the *muſical* numbers required.

Thus if it were required to find all the *muſical* numbers within the compaſs of eleven octaves; that is, between 1 and 2048; form the column 1, 5, 25, &c. and multiply every term by 3, continually, as in the annexed example:

1. 3. 9. 27. 81. 243. 729, &c.
5. 15. 45. 135. 405. 1215, &c.
25. 75. 225. 675. 2025, &c.
125. 375. 1125, &c.
625. 1875, &c.
&c.

The numbers of which being doubled as often as poſſible within the limit 2048, and collected and ranged in order with the powers of 2, will give the following numbers, 1. 2. 3. 4. 5. 6. 8. 9. 10. 12. 15. 16. 18. 20. 24. 25. 27. 30, &c. as in the following table.

TABLE

TABLE of *musical* numbers, contained in eleven octaves.

Num.	Chord Asc.	Chord Desc.	Num.	Chord Asc.	Chord Desc.	Num.	Chord Asc.	Chord Desc.
2	F♭	B♭	144	G♭	A♭	750	B♯	F♭
3	F♭	B♭	150	G♯	A♭	768	B	E
4	C	E	160	A	G	800	C♯	E♭
5	F♭	B♭	162	A	G	810	C♯	E♭
6	A	G	180	B	F	864	D	D
8	C	E	192	C	E♭	900	D♯	D
9	F♭	B♭	200	C♯	E♭	960	E	C
10	G	A	216	D	D	972	E	C
12	A	G	225	D♯	D	1000	E♯	C
15	C	E	240	E	C	1024	F♭♭	B♭♭
16	E	C	243	E	C	1080	F♯	B♭
18	F♭	B♭	250	E♯	C	1125	F♯	B♭
20	G	A	256	F♭	B♭	1152	G	A
24	A	G	270	F♯	B♭	1200	G♯	A
25	C	E	288	G	A	1215	G♯	A
27	C♭	E♭	300	G♯	A	1250	G♯	A
30	D	D	320	A	G	1280	A	G
32	E	C	324	A	G	1296	A	G
36	F♭	B♭	360	B	F	1350	A♯	G
40	G	A	375	B♯	F	1440	B	F
45	A	G	384	C	E	1458	B	F
48	B	E	400	C♯	E♭	1500	B♯	F
50	C♯	E♭	405	C♯	E	1536	C	E
54	D	D	432	D	D	1600	C♯	E♭
60	E	C	450	D♯	D	1620	C♯	E♭
64	F♭	B♭	480	E	C	1728	D	D
72	G	A	486	E	C	1800	D♯	D
75	G♯	A	500	E♯	C	1875	D♯	D
80	A	G	512	F♭	B♭	1920	E	C
81	A	G	540	F♯	B♭	1944	E	C
90	B	E	576	G	A	2000	E♯	C
96	C	E	600	G♯	A	2025	E♯	C
100	C♯	E♭	625	G♯	A♭♭	2048	F♭♭	B♭♭
108	D	D	640	A	G			
120	E	C	648	A	G			
125	E♯	C	675	A♯	F			
128	F♭	B♭	720	B	F			
135	F♯	B♭	729	B	F			

To understand this table it is to be observed, that by dividing a given stretched string or chord, by means of a moveable bridge, the sounds produced by its parts will be higher in pitch than those produced by the given chord. And, on the contrary, if we multiply a chord, that is, by a moveable bridge lengthen the sounding part of a chord, we shall have sounds lower in pitch than the given chord. Hence we have the foundation of an ascending, and of a descending scale of *musical* sounds. The first column of each division of the table, marked *Num.* expresses the musical numbers; the second column, marked *Asc.* the names of the notes in the ascending scale; and the third column, marked *Desc.* the names of the notes of the descending scale. Thus if the given chord be unity, and called F, then will 15 be E in the fourth octave ascending of F; 45 will be B in the sixth octave of F, &c. In the descending scale unity will be B; 15 will be C in the fourth octave descending from B; and 45 will be F of the fifth octave, &c.

The reason why unity is marked F in the ascending scale, and B in the descending scale, is, because, according to the received notation of what is called the natural scale among musicians, F has no fourth in ascending, nor B a fourth in descending. Now it is plain that no aliquot division of a string can give a fourth, or any of its octaves ascending; nor can any multiple of a string give the fourth, or any of its octaves, in descending. For the fourth being expressed by $\frac{3}{4}$ in ascending, and by $\frac{4}{3}$ in descending, its octaves will be $\frac{3}{8}$, $\frac{3}{16}$, $\frac{3}{32}$, &c. in the first case, and $\frac{8}{3}$, $\frac{16}{3}$, $\frac{32}{3}$, &c. in the second case, none of which numbers can be multiples, or submultiples of a given string.

F and B being the given sounds, their octaves will be expressed by F', F'', F''', &c. and B', B'', B''', &c. which are, respectively, the first, second, and third octaves, above the F, and below B.

A dot marked over a letter shews that it signifies a sound higher by a comma than the sound expressed by the letter itself. And a dot placed below, denotes the sound to be lowered by a comma. Thus, in the table I find 81 to be A | G, which denotes that A, or the sharp in the seventh octave of F, ascending, is raised a comma; and that G, or the sharp third from B, descending, is lowered by the same interval.

If B in the descending scale be supposed to be a tritonus, that is, two tones major, and one tone minor above F of the ascending scale, then will A in one of these scales correspond or be denoted by the same numbers with G in the other scale; and C will correspond to E, but D in the ascending scale will not be expressed by the same numbers as in the descending scale: for in the former D will be a tone major above C, whereas in the latter D must by analogy be a tone major below E, and therefore only a tone minor above C, which is the reason why *D* is in *smaller* in the descending scale.

Mr. Henfling has mentioned the distinction between an ascending and a descending scale in the Miscel. Berolinens. He places unity in the ascending scale in F, as it ought; but in the descending scale he places unity in E, which disturbs the analogy of the two scales.

The trumpet and French horn, not having (commonly) a compass beyond four octaves; and their sounds being formed in a manner analogous to those produced by the division of a string, it follows, that all the true notes of these instruments will be represented by the musical numbers 1, 2, 3, 4, 5, 6, 8, 9, 10, 12, 15, 16, &c. This is a fact well known; and a confirmation of the truth of that theory which derives all musical proportions from the elements 2, 3, and 5. Phil. Trans. N° 195, and N° 481. See TRUMPET.

MUSICAL *proportion*. See PROPORTION.

MUSICAL *sound*. See SOUND.

MUSICAL *string*. See STRING.

MUSIMON, in *Natural History*, the name of an animal esteemed a species of sheep, described by the ancients as common in Corsica, Sardinia, Barbary, and the northeast parts of Asia. It has been suspected, whether the animal described under this name is now any where to be found in the world; not that it is to be supposed that any species of animal once created is become extinct, but that this probably was a spurious breed between two animals of different species, perhaps the sheep and goat, which, like the mule, not being able to propagate its species, the production of them may have been discontinued.

Belon styles this species of GOAT, which has large horns bending back, close at their base, distant at their points, with circular rugæ, the TRAGELAPHUS, from the mixture it seems to have of the goat and deer. Buffon supposes it to be the sheep in a wild state; and as such, described by Mr. Pennant. These animals live in the mountains, and run with great swiftness among the rocks. Those of Kamtschatka are so strong, that ten men can scarce hold one; and the horns are so large as sometimes to weigh thirty pounds, and so capacious, that young foxes often shelter themselves in the hollow of such as by accident fall off in the deserts.

MUSIVUM *argentum*. See ARGENTUM.

MUSK, *moschus*, derived from the Arabic *moscha*, *musk*; whence was formed the common Greek μοσχος, *mosch*, a kind of perfume, of a very strong scent; only agreeable when moderated by the mixture of some other perfume. *Musk* is found in a kind of bag, or tumour, growing about the bigness of a hen's egg under the belly, towards the genital parts of a wild beast of the same name; and appears to be nothing else but a kind of bilious blood there congealed, and almost corrupted.

The animal which produces it is pretty common in the kingdom of Bantan, Tonquin, and some others, as Cochin-China, &c. But the most esteemed are those in the kingdom of Tibet. See MOSCHIFERUM *animal*.

They inhabit the woods and forests, where the natives hunt them down: when the beast is killed, they cut out the bladder under the belly, separate the coagulated blood, and dry it in the sun, where it is reduced into a light friable substance almost of the nature of a powder, and of a dusky reddish colour, and acquires a very strong and disagreeable smell. It is then tied up again in bladders, and exported to other countries; and this is the *musk* which we use.

The *musk* itself is dry, with a kind of unctuosity; of a dark reddish brown, or rusty blackish colour; in small round grains, with very few hard black clots; perfectly free from any sandy, or other visible foreign matter. Chewed, and rubbed on paper, it looks bright, yellowish, smooth, and free from grittiness. Laid on a red-hot iron it catches flame, and burns almost entirely away, leaving only an exceeding small quantity of light greyish ashes: if any earthy substances have been mixed with the *musk*, the quantity of the residuum will discover them. From thirty grains of *musk*, water extracts twelve grains, and spirit of wine ten grains. Spirit of nitre and oil of vitriol totally dissolve it: the former destroys the whole

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of its ſmell, and the latter the greateſt part of it. Spirit of ſalt, diluted ſpirit of vitriol, and vinegar, have no effect upon it. Spirit of ſal ammoniac diſſolves a little of it. Oil of tartar ſcarce acquires any tinge from *muſk*, but extricates from it a volatile urinous ſmell. *Muſk* is not ſoluble in oils expreſſed or diſtilled. By diſtillation in a retort, it yields the animal principles, empyreumatic oil, volatile ſpirit, and ſalt. In the diſtillation of odoriferous waters and ſpirit, a ſmall portion of *muſk*, included in a linen cloth, is generally hung in a ſtill-head, the vapour of both liquors extracting its ſcent. Spirit, diſtilled with *muſk* immerſed in it, acquires little of its ſmell; but water by this method acquires both the ſmell and taſte. A minute portion of *muſk* greatly improves the fragrance of the diſtilled odoriferous waters, as thoſe of lavender and roſemary, and heightens the ſmell of other odoriferous ingredients, without communicating any of its own peculiar ſmell. The quantity of liquor, which may be flavoured by macerating a certain known proportion of *muſk* for a few days in rectified ſpirit of wine, appears to be the beſt criterion of the genuineneſs and goodneſs of this commodity; a commodity, which is not only ſaid to vary according to the ſeaſon of its being taken from the animal, but which is oftentimes ſo artfully ſophiſticated, that the abuſes cannot be diſcovered by any external characters, or by any other means than the degree of its ſpecific ſmell and taſte, which the above experiment affords the beſt method of eſtimating. Neumann and Lewis.

What the ancients have written of *muſk* is fabulous, viz. that it comes from the teſticles of a caſtor, which, to ſtop the purſuit of the hunter, caſtrates itſelf. The occaſion of their error may be owing to this, that among the Indians the *muſk* animal goes by the name of *caſtor*.

Muſk is in conſiderable uſe among the perfumers and confectioners, though much leſs now than it was formerly. It is ſuppoſed to fortify the heart and brain, and is good againſt deafneſs, and is now received in general practice in different convulſive diſorders; and its doſe has been increaſed with advantage to a ſcruple and half a dram, every four or ſix hours.

Muſk, and other perfumes of the ſame tribe, have been long celebrated as antiſpaſmodics, but were formerly ordered in ſuch ſmall quantities as to have little effect. Practitioners thought four or five grains a large doſe. But the Chineſe have taught us to be more bold; the tenth part of an ounce is an uſual doſe among them. The remedy in the Eaſt for the bite of the mad dog contains ſixteen grains of *muſk*, and this they repeat frequently. See MADNESS.

The effects of *muſk* are, eaſe from pain, quiet ſleep, and a copious diaphoreſis. Hence it has been found of great uſe in ſpaſmodic diſorders, petechial, malignant, putrid fevers, the gaol diſtemper, hiccoughs, *ſubſultus tendinum*, &c. For the particular caſes, we refer to the Philoſophical Tranſactions, N° 474. § 18. and vol. xliv. p. 75, &c. Inſtances occur in which it has been of very great benefit in convulſive diſorders, in the London Med. Obſ. &c. vol. iii. art. 24. 31.

It has alſo been found uſeful in ſpaſmodic diſorders, given by way of clyſter, as Dr. Wall obſerves, in that Tranſaction.

The operation of *muſk*, in ſome reſpects, reſembles that of opium; but is in this much preferable, that it does not leave behind it any ſtupor or languidneſs, which the latter often does. *Muſk* therefore ſeems likely to anſwer in thoſe low caſes where ſleep is much wanted, and opiates are improper.

It is ſaid to be beſt given in a bolus, and that thoſe who are moſt averſe to perfumes may take it in that form without inconvenience. For, as Etmuller, and others, have long ago obſerved, the ſmell of the perfume is often found to be of diſſervice, where the ſubſtance inwardly taken produces good effects.

It is pity that a medicine of this conſequence ſhould be ſo liable to adulterations, and that the criteria of its genuineneſs are ill ſettled.

In a paper read before the Royal Society, March 17, 1747-8, ſeveral cures performed by *muſk*, on diſtempered cows, were mentioned.

When *muſk* begins to decay, it is a practice uſed in the Eaſt Indies to put it into a bladder or bag, wherein many ſmall holes are made with a needle, and hang it in a neceſſary-houſe, but not low enough to touch the filth. Others keep it wrapped up in linen, well moiſtened with rank urine.

Mr. Boyle ſays, of his own knowledge, that *muſk* has greatly contributed to the preſervation of fleſh. Works abr. vol. i. p. 30.

MUSK-*ant*. See ANT.

MUSK-*boar*, in *Zoology*. See TAJACU.

MUSK *hyacinth*. See HYACINTH.

MUSK-*inſect*. See INSECT.

MUSK *julep*. See JULEP.

MUSK-*rat*. See RAT.

MUSK-*ſeed*, in the *Materia Medica*, the name of the ſeed of the *alcea Ægyptiaca villoſa*, or hoary Egyptian vervain mallow. See *Syrian* MALLOW.

It is a ſmall ſeed of about the bigneſs of a pin's head, of a greyiſh brown in colour, and of the ſhape of a kidney, and when freſh it has a perfumed ſmell. It is brought into Europe from Egypt, and from Martinico. The Egyptians uſe it internally as a cordial and provocative; but in Europe it is of very little uſe, being wholly neglected in medicine; but the perfumers in France and Italy uſe it among their compoſitions.

MUSKET, or MUSQUET, properly a fire-arm borne on the ſhoulder, and uſed in war; to be fired by the application of a lighted match.

The length of the *muſket* is fixed to three feet eight inches from the muzzle to the touch-pan, and its bore is to be ſuch as may receive a bullet of fourteen in a pound, and its diameter differs not above one fiftieth part from that of the BULLET.

Muſkets were anciently borne in the field by the infantry, and were uſed in England ſo lately as the beginning of the civil wars. At preſent they are little uſed, except in the defence of places; fuſees, or FIRE-*locks*, having taken their place and name.

MUSKET-*baſkets*, in *Fortification*. See BASKETS.

MUSKETEERS, ſoldiers armed with muſkets.

MUSKETOON, a muſket ſhorter, though thicker, than the ordinary muſkets. It is fired by the collision of a ſteel and flint in the lock; whereas the muſket is fired by a match. Its bore is a thirty-eighth part of its length, and carries five ounces of iron, or ſeven and a half of lead, with an equal quantity of powder. This is the ſhorteſt ſort of blunderbuſſes. See FIRE-*lock*.

MUSLIN, or MUSSELIN, a fine ſort of cloth, wholly cotton; ſo called, as not being bare, but having a downy knap on its ſurface reſembling moſs, which the French call *mouſſe*.

There are various kinds of *muſlins* brought from the Eaſt Indies, chiefly Bengal; beteilles, tarnatans, mulmuls, tanjebs, terrindams, doreas, &c.

Muſlins, on their importation, pay a duty of 2*l.* 10*s.* 7*d.* the piece, which is drawn back on exportation; and beſides this a duty of 15*l. per cent.* to be computed according to the groſs price at which they are publicly ſold by auction; but if they are exported, all drawn back is for 20*s.* value.

MUSQUETEERS, *mouſquetaires*, in France, are troopers who fight ſometimes on foot, ſometimes on horſeback; they are gentlemen of good families, and are divided into two troops, the one called the grey *mouſquetaires*, the other the black *mouſquetaires*, from the colour of their horſes.

MUSSA *mura*. See MOOR.

MUSSAHIR, in *Ornithology*, a bird mentioned by Arabian writers. It is ſaid that this creature, after having employed the day in ſeeking its food, ſpends the whole night in ſinging; its notes are ſaid to be ſo melodious, as to baniſh all thoughts of ſleep from thoſe that hear them.

MUSSLIN. See MUSLIN.

MUSSULMAN, or MUSULMAN, written in Arabic *muſlem*, *muſleman*, or *muſulman*, a title by which the Mahometans diſtinguiſh themſelves; ſignifying, in the Turkiſh language, *true believers*, or *orthodox*.

The appellation was firſt given to the Saracens; as is obſerved by Leunclavius. There are two kinds of *muſſulmani*, very averſe to each other; the one called *Sonnites*, and the other *Shiites*. The Sonnites follow the interpretation of the Coran given by Omar; the Shiites are the followers of Ali. The ſubjects of the king of Perſia are Shiites; and thoſe of the grand ſignior, Sonnites. See SONNA, and ALCORAN.

Some authors will have it, that the word *muſſulman* ſignifies *ſaved*, that is, predeſtinated; and that the Mahometans give themſelves the appellation, as believing they are all predeſtinated to ſalvation. Marmins is more particular as to the origin of the name; which he derives from the Arabic מסלם *muſalam*, *ſaved*, *ſnatched out of danger*: the Mahometans, he obſerves, eſtabliſhing their religion by fire and ſword, maſſacred all thoſe who would not embrace it, and granted life to all that did, calling them *muſſulmans*; q. d. *erepti e periculo*; whence the word, in courſe of time, became the diſtinguiſhing title of all thoſe of that ſect, who have aſſixed to it the ſignification of *true believer*.

MUST, *muſtum*, ſweet wine newly preſſed from the grape; or the new liquor preſſed from the fruit before it has worked or fermented.

MUST of *Rheniſh wine*. This is a liquor that, though drank by ſome, is found extremely to affect the brain; for not having paſſed the natural effervеſcence which it would have been ſubject to, in the making of wine, its

falts are locked up till the heat of the ſtomach ſetting them to work, they raiſe their effervescence there, and ſend up abundance of ſubtile vapours to the brain. The Rheniſh *muſt* is of two kinds, being made either with or without boiling. That made without boiling is only put up ſo cloſe in the veſſel, that it cannot work; this is called ſtumm-wine. That by boiling is thus prepared: they take ſtrong veſſels not quite filled, and putting them into a cellar they make a fire mild at firſt, but increaſed by degrees, and afterwards they gradually leſſen it again, that the boiling may ceaſe of itſelf. This operation is finiſhed in thirty-ſix or forty hours, according to the ſize of the veſſel; and the wine-boilers, inſtead of common candles, which would melt by the heat, uſe thin pieces of ſplit beech-wood. Theſe alſo ſerve for a double purpoſe, not only lighting them, but giving them notice of the boiling being enough; before that time, the quantity of vapours thrown up make them burn dim; but as ſoon as it is finiſhed, the vapours aſcend in leſs quantity, and the lights burn brisk and clear. About ſeven or eight days after this boiling, the *muſt* begins to work, and after this working it is called wine. They have alſo another kind of Rheniſh *muſt*, which is thus prepared: they boil the liquor to half the quantity, and put into it the medicinal ingredients they are moſt fond of; ſuch as orange-peel, elecampane-root, and juniper-berries, or the like; being thus medicated, the whole works much more ſlowly than it otherwiſe would. If the boiled *muſt* by too violent an effervescence caſt out its lees, it will on this become vapid and dead, unleſs this ſeparation is ſtopped by ſome fatty ſubſtance, ſuch as freſh butter or the like: they put this in upon a vine leaf, or elſe apply lard to the mouth of the veſſel.

A MUST *for artificial wine* may be thus made: take twenty pounds of fine ſugar, five gallons of water, four ounces of white tartar finely pulveriſed, or cream of tartar, and boil them in a large veſſel over a gentle fire.

MUSTACEUM, among the ancient Romans, a kind of cheeſe-cake. It was compoſed of cheeſe, aniſeed, cummin, and fuet added to flour, moiſtened with *muſtum*, or new wine.

MUSTARD, *ſinapi*, in *Botany*, a genus of the *tetradynamia ſiliquoſa* claſs. Its characters are theſe: the empalement of the flower is compoſed of four narrow leaves, placed in form of a croſs, which fall off; the flower has four roundiſh petals in form of a croſs, and four oval nectariums, one on each ſide of the ſtamina and the pointal; it has ſix awl-ſhaped erect ſtamina, two of which are oppoſite and as long as the empalement, the other four are longer; in the center is placed a taper germen, with a ſtyle the length of it, crowned by a headed ſtigma; the germen afterwards turns to an oblong pod, which is very rough at bottom, having two cells, opening with two valves, whoſe intermediate partition is large, compreſſed, and almoſt twice the length of the valves; the ſeeds are globular. Miller reckons ſix, and Linnæus twelve ſpecies.

The firſt ſort is the common white *muſtard*, which is generally cultivated as a ſallad herb for winter and ſpring uſe. The ſeeds of this are commonly ſown very thick in drills, either upon a warm border, or in very cold weather upon a moderate hot-bed, with creſſes and other ſmall ſallad herbs, which are commonly fit for uſe in ten days or a fortnight from the time of ſowing; for if they are large, and have rough leaves, they are too ſtrong to put into ſallads.

The ſecond ſort is the common *muſtard*, which is frequently found growing naturally in many parts of England, but is alſo cultivated in fields for the ſeed, of which the ſauce called *muſtard* is made. This ſort is cultivated only for the ſeeds; theſe ſhould be ſown in the ſame way as thoſe of the firſt, and the plants treated in the ſame manner; with this difference, of allowing the plants twice as much room, becauſe they grow much larger; ſo theſe ſhould be hoed out to the diſtance of eighteen inches; and as the ſeeds will not ripen ſo ſoon as the other, ſo the ground may require to be hoed three times over, but that may be eaſily ſeen by the growth of the weeds. The ſeeds of theſe two firſt ſpecies are ordered for medicinal uſe.

Muſtard ſeed is one of the ſtrongeſt of the pungent, ſtimulating, diuretic medicines, that operate without exciting much heat. It is ſometimes taken unbruiſed, to the quantity of a ſpoonful at a time, in paralytic, cachectic, and ſerous diſorders. It is applied alſo as an external ſtimulant, to benumbed and paralytic limbs; to parts affected with fixed rheumatic pains; and to the ſoles of the feet, in the low ſtage of acute diſeaſes, for raiſing the pulſe: in this intention, a mixture of equal parts of the powdered ſeeds and crumb of bread, with the addition, ſometimes, of a little bruiſed garlic, are made into a cataplaſm, with a ſufficient quantity of vinegar. See SINAPISM.

Muſtard ſeed yields upon expreſſion a conſiderable quantity of oil, which is by ſome recommended externally againſt rheumatiſms and palſies, though it has nothing of that quality by which the ſeeds themſelves prove uſeful in thoſe diſorders; the oil being mild and inſipid as that of olives, and the pungency of the ſeed remaining entire in the cake left after expreſſion; nor is any conſiderable part of the pungent matter extracted by rectified ſpirit. The bruiſed ſeeds give out readily to water nearly the whole of their active matter: added to boiling milk they curdle it, and communicate their pungency to the whey. The powder of *muſtard* ſeed may be made into the conſiſtence of a loch with warm water, in which a little ſea ſalt has been diſſolved. Of this a common ſpoonful, ſometimes two, diluted with tepid water, are given on an empty ſtomach; it operates well as an emetic, and proves an excellent remedy in moſt nervous diſorders, according to Mr. Monro, in Med. Eſſ. Edinb. vol. ii. art. 19. p. 303. not.

The third ſort grows naturally on arable land, in many parts of England. The ſeed of this is commonly ſold under the title of Durham *muſtard* ſeed. This is a common weed in moſt parts of England; and comes up early in the ſpring amongſt the corn, ſo flowers and ſeeds in May; therefore where it is not weeded out, the ſeeds will ſcatter long before the corn is ripe, and the ground will be ſtocked with the weed. The other three ſorts are preſerved in botanic gardens for variety, but are never cultivated for uſe; theſe may be treated in the ſame way as the two firſt ſpecies. Miller and Lewis.

MUSTARD, *baſtard*, in *Botany*. See CLYOME.

MUSTARD, *hackle*, or *baſtard mithridate muſtard*, *biſcutella*, in *Botany*, a genus of the *tetradynamia ſiliculoſa* claſs of plants. Its characters are theſe: the empalement of the flower is compoſed of four leaves, which are pointed; the flower hath four petals, placed in form of a croſs, which are obtuſe and ſpread open: it hath ſix ſtamina, four long and two ſhort; in the center is ſituated an orbicular compreſſed germen, which afterwards becomes a plain, compreſſed, erect, capſule, with two convex lobes, having two cells, terminated by the rigid ſtyle, which is joined to the ſide of the partition.—Linnæus reckons two, and Miller four ſpecies.

MUSTARD, *hedge*, *eryſimum*, in *Botany*, a genus of the *tetradynamia ſiliquoſa* claſs. Its characters are theſe: the empalement of the flower is compoſed of four oblong, oval, coloured leaves; the flower hath four petals placed in form of a croſs, and two nectarious glands ſituated between ſix ſtamina, four of which are the length of the empalement, the other two ſhorter; it hath a narrow four-cornered germen, which afterwards becomes a long, narrow, four-cornered pod, with two cells, filled with ſmall ſeeds. Linnæus reckons ſix, and Miller ſeven ſpecies.

The firſt ſort is uſed in medicine; it grows naturally on the ſide of foot-paths, and upon old walls in moſt parts of England, ſo is rarely cultivated in gardens; where, if it was once admitted, it would become a troubleſome weed. The ſecond and third ſorts alſo grow naturally on banks in many parts of England; they were formerly eaten in winter ſallads, before the Engliſh gardens were furniſhed with better plants; ſince which time they have been rejected, for they have a rank ſmell and are diſagreeable to the palate. The ſixth ſort grows naturally on the ſides of banks in many parts of England, ſo it is not ſuffered to have a place in gardens. This was formerly eaten as a ſallad herb by the poorer ſort of people, who gave it the title of ſauce alone. It hath a rank ſmell, and taſte of garlic, is very biting and hot on the palate; it is frequently preſcribed in medicine. The ſeventh ſort, called gilliflower with a dame's violet leaf, is ſometimes found growing naturally on old walls, in ſome parts of England, particularly about Cambridge and Ely. The other ſorts are kept in botanic gardens for variety.

Hedge muſtard is hot and dry, opening and attenuating, and by its warming quality is good to diſſolve thick, groſs, ſlimy humours of the lungs, to help a cough and ſhortneſs of breath, and is particularly recommended againſt an habitual hoarſeneſs, to recover a voice. Riverius praiſes a decoction of it in wine againſt the colic.

The only official preparation of this plant is the *ſyrupus de eryſimo*. It is recommended, by Dr. Stahl, for ſchirrocancrous tumours, taken internally, and alſo applied externally to the tumor. We have an account of its good effects, by Monſ. Bingert, in Art. Med. Berol. Dec. 3. vol. i. p. 59.

The ſeeds are conſiderably pungent, and appear to be of the ſame quality with thoſe of *muſtard*, but weaker.

MUSTARD, *mithridate*. See TREACLE *muſtard*.

MUSTARD, *rough podded*. See SYSIMBRIUM.

MUSTARD, *tower*, *turritis*, in *Botany*, a genus of the *tetradynamia ſiliquoſa* claſs. Its characters are theſe: the em-

palement of the flower is compoſed of four oblong oval leaves, which cloſe together; the flower has four oblong, oval, entire petals, in form of a croſs, and ſix erect awl-ſhaped ſtamina, the length of the tube, two of which are ſhorter than the other, terminated by ſingle ſummits, and a taper germen, a little compreſſed, having no ſtyle, but crowned by an obtuſe ſtigma: the germen afterward becomes a long four-cornered pod with two cells, which are divided by no intermediate partition, opening with two valves, and filled with ſmall, roundiſh, indented ſeed. Miller enumerates two, and Linnæus three ſpecies.

Theſe plants are kept in botanic gardens, for variety; but if their ſeeds are ſcattered upon an old wall or building, in autumn, ſoon after they are ripe, the plants will come up, and thrive without farther care, and their ſeeds will ſcatter on the wall and ſpread, ſo there will be no danger of the plants maintaining their ſituation, if they are not purpoſely deſtroyed.

The juice of this plant is recommended by ſome for curing ulcers in the mouth, and for killing worms.

MUSTARD, *baſtard tower-muſtard*, in *Botany*, a genus of the *tetradynamia ſiliculoſa* claſs. Its characters are theſe: the flower, which hath a four-leaved empalement, hath four petals in form of a croſs; at the bottom of each is ſituated a reflexed nectarium fixed to the empalement, and between theſe ariſe ſix upright ſtamina, two of which are no longer than the flower-cup, the other four are much longer; in the center is ſituated a taper germen, as long as the ſtamina, which becomes a narrow, long, compreſſed pod, opening length ways, having two valves and a thin partition, between which is lodged a row of flat ſeeds. Miller reckons four, and Linnæus nine ſpecies.

MUSTARD, *treacle*. See TREACLE *muſtard*, and CLYPEOLA.

MUSTELA, the *weaſel*, in the Linnean ſyſtem of *Zoology*, is a diſtinct genus of quadrupeds, of the order of *feræ*, in the claſs of *mammalia*, comprehending eleven ſpecies; viz. the ferret, polecat, ermin, otter, glutton, martin, &c.

The characters of this genus are, that it has ſix cutting teeth in each jaw; the upper are erect, acute, and ſeparate; the lower are more obtuſe, and the tongue is ſmooth. See *Tab.* III. *Quadrupeds*, N° 39. See WEASEL.

MUSTELA *Africana*, in *Zoology*, a name by which Cluſius has called an animal, properly of the ſquirrel kind, and known among others by the name of the Barbary ſquirrel.

MUSTELA, in *Ichthyology*, the name of a genus of fiſhes, of which there are ſeveral ſpecies; the moſt common of which is that called the *ſea-loche*, or whiſſle-fiſh. This reſembles the common eel, in figure, colour, and ſlipperyneſs to the touch; but is not half ſo long, in proportion to its thickneſs; and is ſomewhat flatter, and has a turgid belly. It is covered with extremely minute ſcales, and its mouth is large, and furniſhed with ſharp teeth, and has ſeveral ſeries of very ſmall teeth in many parts of its mouth; at the angle of the lower jaw it has one beard, and at the upper part of the noſtrils in the upper jaw it has two; it has two pair of fins under its belly, and on the back, beſide the common fin reaching half the length and almoſt to the tail; it has at ſome ſmall diſtance from the head a cavity in which is a membrane edged with filaments.

The different ſpecies of this fiſh are of three colours; one is not ſpotted, and of the colour of a tench; another is ſpotted with white; and the third with reddiſh black ſpots; and beſide theſe there are the *muſtela viviparus* of Schonfeldt, commonly known by the name of *aelyuappe*, and the *muſtela foſſilis*, called *peiſker*, and the *eel-pout*. All which ſee under their ſeveral heads.

MUSTELA *fluviatilis*, in *Ichthyology*, a name by which ſeveral authors have called the common *lampetra* or *lamprey*.

MUSTELA *lumpen*, in *Ichthyology*, a name given by Artedi, from Ray and others, to that ſpecies of blennus, called ſimply *lumpen* at Antwerp, and by Geſner *galea*.

It is diſtinguiſhed, by Artedi, from the other blenni, by a ſpecific name, expreſſing that it has four bifid cirri or beards growing under the throat, and tranſverſe arcolæ or ſtreaks on the back. See BLENNUS.

MUSTELA *marina*, in *Ichthyology*, a name given by Bellonius and others to that fiſh which we call in Engliſh the *ſhoat-fiſh*, the *glanus* and *glanis* of Pliny and the old authors.

It is diſtinguiſhed, by Artedi, by the name of the *ſilurus*, with four beards near the mouth. By this character it is evidently diſtinguiſhed from the fiſh called the *lake*, which, though a genuine ſpecies of ſilurus, has only one beard.

MUSTELINUM *genus*, in *Zoology*, the name of a claſs of animals, ſo called from their general likeneſs to the weaſel in ſhape; they are all carnivorous animals, and are diſtinguiſhed from the other quadrupeds of that ſort by their ſmallneſs, the length of their bodies, and the ſmallneſs and narrowneſs of their heads. Their feet are ſmall, and their legs ſhort, whence they are formed for running into holes and crannies; their teeth are leſs numerous than in many quadrupeds; in the dog-kind there are forty, and in theſe but thirty-two. Their inteſtines are ſhort and ſimple; they have no colon nor cæcum, nor any diſtinction of great and ſmall guts. Ray.

MUSTELUS, in *Ichthyology*, a name given by Gaza, and ſome other writers, to the fiſh called GALEUS *aſterias*, and *ſtellaris* by modern authors. This only accidentally differs from the common *galeus lævis*, the ſmooth or unprickly hound. Both are accounted the ſame ſpecies, by Artedi, and are expreſſed by the ſame name, the SQUALUS with obtuſe or glandulous teeth.

MUSTELUS *lævis*, a name by which Aldrovandus, and ſome others have called the fiſh, diſtinguiſhed by others by the name of GALEUS *lævis*, the ſmooth hound-fiſh.

MUSTELUS *lævis*, in *Ichthyology*, a name of a kind of ſhark, called alſo the CANIS *galeus*, and *canſa*.

MUSTER, a review of a body of military forces under arms, in order to take account of the numbers, condition, accoutrements, arms, &c.

The word is formed of the French, *monſtre*, *ſpecimen*. See REVIEW.

MUSTER, *falſe*. See FALSE.

MUSTER-*maſter-general*, or *Commiſſary-general of* MUSTERS, is an officer in the army, who takes account of every regiment, their number, horſes, arms, &c. See COMMISSARY.

MUSTER *rolls* are liſts of the ſoldiers in every troop, company, regiment, &c. delivered by the captains to the commiſſary: by which they are paid, and the ſtrength of the regiment known.

MUSTERED *of record* (Stat. 18. Hen. VI.) denotes a being inrolled in the number of the king's ſoldiers.

MUSTERING, in *Sea Language*, is the act of calling over a liſt of the whole ſhip's company, or any particular detachment thereof, who are accordingly ſummoned to anſwer by their names on the occaſion.

MUSTUS *fluviatilis*, in *Ichthyology*, a name given by Bellonius to that ſpecies of CYPRINUS which we know by the name of the barbel.

MUSTUS is alſo a word uſed by ſome authors to expreſs the white eaſs of urine.

MUTABILIS *lapis*, in *Natural Hiſtory*, a name given by ſome to the ſemi-pellucid gem, more commonly called OCULUS *mundi*.

MUTABILITY is oppoſed to IMMUTABILITY.

MUTARE *arma*. See ARMA.

MUTATION, the act of changing, or ſometimes the change itſelf.

It is one of the laws of nature, that the *mutation* of motion is ever proportional to the moving force impreſſed. See NATURE, and MOTION.

MUTATION, in the *Ancient Muſic*, is applied to the changes or alterations that happen in the order of the ſounds which compoſe the melody.

Ariſtoxenus repreſents *mutation* as a kind of paſſion in the order of the melody.

The changes are, 1. in the genera; when the ſong begins in one, as the chromatic, and paſſes into another, as the diatonic. 2. In the ſyſtem; as when the ſong paſſes out of one tetrachord, as meſon, into another, as diezeugmenon; or more generally, when it paſſes from a high place of the ſcale to a lower, or contrarily, i. e. part of it is ſung high, and part low. 3. In the mode or tone, as when the ſong begins in one, as the Doric, and paſſes into another, as the Lydian. 4. In the melopœia, that is, when the ſong changes the very air, ſo as from gay and ſprightly to become ſoft and languiſhing, or from a manner that expreſſes one paſſion or ſubject to the expreſſion of ſome other.

MUTATIONES, among the Romans, poſt ſtages, or places where the public couriers were ſupplied with freſh horſes.

The *mutationes* were wholly deſigned for the uſe of theſe couriers, or meſſengers of ſtate; in which reſpect they differed from *manſiones*.

MUTCHKIN, a liquid meaſure uſed in Scotland; it contains four gills, and is the fourth part of a Scotch pint. See PINT, MEASURE, &c.

MUTE, *dumb*, denotes a perſon that cannot ſpeak, or has not the uſe of ſpeech.

Mutes and dwarfs make their fortune in the grand ſignor's ſeraglio. The *mutes* ſerve as executioners to take off perſons of the firſt rank.

MUTE, in *Law*, a perſon that ſtands dumb or ſpeechleſs, when he ought to anſwer or plead.

A prisoner may stand *mute*, two ways. 1. When he speaks not at all: in which case it is inquired, whether he stand *mute* of malice, or by the act of God; if by the latter, then the judge, *ex officio*, ought to inquire whether he be the same person; and of all other pleas, which he might have pleaded if he had not stood *mute*. 2. When he pleads not directly, or will not put himself upon the inquest to be tried. If he be found to be obstinately *mute*, then, if it be on an indictment of high treason, it is clearly settled that standing *mute* is equivalent to a conviction; and he shall receive the same judgment and execution. So likewise, in petit larceny, and in all misdemeanors, standing *mute* is equivalent to conviction. But in appeals or indictments for other felonies, or petit treason, it was the custom till of late not to consider him as convicted, so as to pass judgment for the felony; but for his obstinacy he was to receive the terrible sentence of penance, or PEINE *forte et dure*. Before this was pronounced, the prisoner was allowed not only *tribus admonitis*, but also a convenient respite for a few hours, and the sentence was distinctly read to him, that he might know his danger; and, after all, if he continued obstinate, and his offence was clergyable, he was allowed the benefit of his clergy, even though he is too stubborn to pray it. But in this respect the law is now altered; for by 12 Geo. III. cap. 20. standing *mute* in felony or piracy is made a conviction.

To advise a prisoner to stand *mute* is an high misprision, a contempt of the king's court, and punishable by fine and imprisonment.

MUTE, in *Grammar*, a letter which is not sounded, or heard in the pronunciation; or a letter which yields no sound of itself, and without a vowel.

The consonants are ordinarily distinguished into *mutes*, and *liquids* or semi-vowels. See CONSONANT, LIQUID, &c.

The *mutes* in the English alphabet are eleven; viz. B, C, D, F, G, J, K, P, Q, T, V. They are called *mutes*, because a liquid cannot be sounded in the same syllable before them, as ra, ro; but a *mute* may be pronounced in the same syllable before a liquid, as bra.

MUTEFERRIRA, a body of horse kept up in Egypt, for the service of the grand signor; these, with the chaouses, were originally the guards of the sultans of Egypt. This is a body of the greatest dignity, and is expressed by the word which signifies a chosen people.

MUTILATED *corniche*. See CORNICHE.

MUTILATED *medals*. See MEDAL.

MUTILATED *roof*. See ROOF.

MUTILATION, the retrenching, or cutting away, any member of the body. See MAIM.

The use of the word is also extended to statues, and buildings, where any part is wanting, or the projecture of any member, as a cornice, or an impost, is broken off.

MUTILATION is sometimes also used in a more immediate manner, for CASTRATION.

MUTILLA, in the Linnæan system of *Natural History*, a genus of insects of the order of *hymenoptera*: the characters of which are, that in most there are no wings, that the body is covered with short hair or down, that the hinder part of the thorax is obtuse, and that the sting is hidden and pointed. Of this genus there are ten species.

MUTILUS, in *Natural History*, the name given by some to the common MUSCLE.

MUTINY, in a *Military Sense*, denotes an insurrection against authority.

An act is annually passed by parliament, called the *mutiny* act, to punish *mutiny* and desertion, and for the better payment of the army and their quarters.

This regulates the manner in which they are to be dispersed among the several inn-keepers and victuallers through the kingdom, and establishes a law martial for their government. By this, besides other things, it is enacted, that if any officer or soldier shall excite, or join any *mutiny*, or, knowing of it, shall not give notice to the commanding officer; or shall desert, or list in any other regiment, or sleep upon his post, or leave it before he is relieved, or hold correspondence with a rebel or an enemy, or strike or use violence to his superior officer, or shall disobey his lawful commands; such offender shall suffer such punishment as a court martial shall inflict, though it extend to death itself.

MUTU, in *Ornithology*, a name by which some call a large Brasilian bird, of the gallinaceous kind, more usually called MITU.

MUTUAL, a relative term, denoting something that is reciprocal between two or more persons.

Thus we say, *mutual assistance, mutual aversion, &c.*—There are *mutual* or reciprocal duties, offices, &c. between superiors and inferiors; as the king and his subjects, the master and his servants, &c.

Vangelas makes a distinction between *mutual* and *reciprocal*: *mutual*, according to him, is understood of what is between two only; and *reciprocal* of what is between more than two: but this distinction is little regarded in common use.

MUTUAL *testament* is that made by two persons who leave their effects reciprocally to the survivor.

MUTULE, *mutulus*, in *Architecture*, a kind of square modillion in the Doric frieze.

The chief difference between *mutule* and modillion consists in this, that the former is used in speaking of the Doric order, and the latter in the Corinthian, &c. See DORIC, &c.

The *mutules* in the Doric answer to the triglyphs, which are under them; whence some make *guttæ* or drops to hang.

Le Clerc makes *mutules* in the entablature of the Doric order, not only to distinguish it the more from other entablature, but also because they agree very well with the noblenels of this order, and add something of a masculine beauty to it.

Mutules are commonly made of the same breadth with the triglyphs; but the same author thinks it would be much better if they were made of the same breadth with the capitals of the triglyphs. Nor does he run his *mutules* so near the extremity of the larmier of drip, as is usually done; leaving a space of three or four minutes between the two, that the profile may appear the more distinctly.

MUTUUM, in the *Civil Law*, denotes a loan simply so called; or a contract introduced by the law of nations, whereby a thing consisting in weight, as suppose bullion; in number, as money; or in measure, as corn, timber, wine, &c. is given to another, upon condition that he shall return another thing of the same quantity, nature, and value, on demand.

This, therefore, is a contract without reward: so that where use or interest arises, there must be some particular article in the contract whereon it is founded.

MUZZLE *of a gun or mortar*, the extremity of the cylinder, where the powder and ball is put in. The metal which surrounds the extremity of the cylinder, is likewise called the *muzzle*.

MY.—*Per* MY *& per tout*. See PER *my*.

MYA, in *Natural History*, a genus of the *testacea* class of worms. Its characters are, that its animal is an *ascidia*, that it is a bivalve shell gaping at one end, and that the hinge for the most part is furnished with a thick, strong, and broad tooth, not inserted in the opposite valve.—Linnæus enumerates seven species. One of these is noted for producing great quantities of pearl: it is found in great rivers, especially in those which water the mountainous parts of Great Britain; and there have been regular fisheries for this shell in several of our rivers: sixteen have been found within one shell. They are said to be the disease of the fish, analogous to the stone in the human body. On being squeezed, they will eject the pearl, and often cast it spontaneously in the sand of the stream. The Conway was noted for them in the days of Camden: the Irt, in Cumberland, also produced them.

In the last century, several of great size were procured in the rivers of the counties of Tyrone and Donegal, in Ireland. Suetonius, Vit. Jul. Cæs. cap. 44. reports that Cæsar was induced to undertake his British expedition for the sake of our pearls: and we are told by Pliny and Tacitus, that he carried home a buckler made with British pearl, which he dedicated to, and hung up in the temple of Venus Genetrix.

MYAGRUM, in *Botany*. See GOLD *of pleasure*.

MYCETITES, in *Natural History*, the name of a species of sea-coral, which is usually of a conic shape and striated texture; always small, and usually found adhering to sea-shells, or large corals. See FUNGITE.

MYCETITES *difformis*, in *Natural History*, a name given by Dr. Woodward to those kinds of fossile coralloide bodies which the generality of writers had called, after Dr. Plot, *porpitæ*. These are usually small, and of roundish, but flatted figure; they are hollowed on one side with a sort of umbilicus, and striated on the other; they are found on the ploughed lands in Oxfordshire, and some other of our midland counties, and in other places, buried in the solid strata of stone; they are sometimes yellowish, sometimes brownish, and are from the breadth of an inch to a fourth part or less of that size; when broken, they are usually found to consist of a kind of spar, not unlike that of which the shelly coats of the echinitæ, or the lapides judici, and other spines of echini consist in their fossile state; and in some of them the ridges and striæ are thick set with little knobs and tubercles. The basis in some of these is flat, as it is in others rising in form of a circular elevation from the umbilicus, and others have

have a circular cavity in the same place. See *Tab. of Fossils*, class. 7.

MYCONOIDE, an epithet used by some chirurgical writers for some ulcers which are found continually filled with a thick mucous matter.

MYCTERIA, in *Ornithology*, a genus of the *grallæ*, of which there is one species, called by Marcgrave JABIRUGUACU.

MYDESIS, a word used by the ancient physicians to express a general corruption of any part, from a great redundance of moisture. Galen has appropriated it to the eye-lids.

MYDRIASIS, a name used by authors to express a disease of the eye, consisting in a dilatation of the pupil, and a consequent dimness of sight.

MYDROS, a word used by Hippocrates to express a ball of iron or stone, which was used to be heated in the fire, and thrown into urine, intended as a fomentation.

MYGDAOTH, in the *Jewish Antiquities*, a kind of mitre worn by the priests. See CIDARIS.

MYGDONIUM *marmor*, a name given by the ancients to a species of marble much used in their larger buildings. It was white variegated with black; but that black rather disposed in clouds and spots than veins. It is confounded with the *decimenum marmor*, by some writers; but that was always of a pure white, without the least variegation.

MYIAGRUS *Deus*, in the *Heathen Mythology*, a name given sometimes to Jupiter, and sometimes to Hercules, on occasion of their being sacrificed to for the driving away the vast numbers of flies which infested the sacrifices on certain public occasions. The word is usually spelt *Myagrus*; but this must be an error, as this word does not express the *fly-destroyer*, but the *mouse-destroyer*; and we have it sufficiently testified by the ancients, that flies were the only creatures against whom this deity was invoked. Pliny calls this deity also *Myiodes*, and tells us, that the flies which used to pester the Olympic rites went away in whole clouds, on the sacrificing a bull to this god. We find in Athenæus also, that this sacrificing to the god of flies, at the Olympic games, was a constant custom. Some distinguish these two deities, and tell us, that the latter, or MYIODES, used to visit the nations in vengeance, with a vast multitude of flies; and that, on paying him the due honours of a sacrifice, they all went away again; and this seems to agree with what Pliny tells us in some places.

At the time of the Olympic games, Jupiter was worshipped under the name of the *Apomyos*, or *Myiagrus Deus*, to supplicate the destruction of those troublesome creatures. This happened only once in many years, when the sacrifices were performed there; but the Elians worshipped him continually under this name, to deprecate the vengeance of heaven, which usually sent, as they expressed it, an army of flies, and other insects, toward the latter end of the summer, that infested the whole country with sickness and pestilence.

MYIODES *Deus*, in the *Heathen Mythology*, a name given sometimes to Hercules, but more frequently to Jupiter, to whom a bull was sacrificed, in order to make him propitious in driving away the flies that infested the Olympic games.

MYLASSENSE *marmor*, in the works of the ancients, a name used for a species of marble, dug near a city of that name in Caria. It was of a black colour, but with an admixture of purple; the purple not disposed in veins, but diffused through the whole mass: it was much used in building among the Romans.

MYLE, a word used by some authors as a name for the *pastilla* or *limpet*, and by others to express what we call a mole, or false conception in the uterus.

MYLOGLOSSI, in *Anatomy*, a pair of muscles, thus called because arising about the backside of the molares, or grinding-teeth, and inserted into the ligament of the tongue; helping to pull it upwards.

These are the same with what Mr. Cowper calls STYLOGLOSSI.

MYLOHYOIDEUS, in *Anatomy*, a broad, but short muscle, lying immediately under the biventer muscle of the jaw, and which, springing from the lower margin on each side the under jaw, is inserted into the basis of the OS HYOIDES.

It is made up of two equal fleshy portions, one lying on the right side, the other on the left, both on the same plane, and joined to a small middle tendon, which is inserted anteriorly in the middle of the basis of the os hyoides, and from thence runs directly forward, diminishing gradually in its course. This is therefore a true digastric muscle, and cannot be divided into two. Each portion is lined by fleshy fibres to the internal lateral part of the lower jaw, between the oblique prominent line and the basis under the first four *dentes molares* and the *coronus*; the anterior and greatest part of the other fibres of each portion run obliquely from before, backward to the middle tendon, in which they are regularly fixed, the anterior fibres being the shortest, and a small triangular void space being formed between them and the symphysis of the chin. The posterior fibres of each portion, which make about a fourth part of the whole, run likewise on each side of the os hyoides, and are inserted along the lower edge of its anterior or convex side, and from thence a little upward. Winslow's Anatomy, p. 254.

It has its name from the os hyoides, and the Greek μυλος, the *dentes molares*.

Besides the common use ascribed to this muscle, which is to move the hyoides, the tongue, and the larynx, both upwards, inwards, and sideways, its series of transverse fibres have a farther use when it is at rest; and that is, to compress the glands under the tongue, and by this means promote the discharge of saliva into the mouth from the lower salival ducts: whence it is we use this muscle when we want saliva in the mouth.

MYLON, in *Surgery*, is used for the largest tumors of the staphylomatous kind in the corner and uvea of the eyes. See STAPHYLOMA.

MYOCEPHALON, μυοκεφαλον, formed of μυια, *fly*, and κεφαλη, *head*, in *Medicine*, a little part of the tunica uvea, protended over the sight of the eye; occasioned by an ulceration of the part: so called, as resembling the head of a fly.

MYOCEPHALUS, a name given by some authors to the distemperature of the eyes, commonly known by the name of a STAPHYLOMA.

MYOCTONUM. See ACONITE.

MYODES *platysma*, a name given by some anatomical writers to what is called by others the quadratus genæ; it is a muscular expansion in the neck.

MYOLOGY, formed of μυς, μυος, *a muscle*, and λογος, *discourse*, in *Anatomy*, a description of the muscles; or the knowledge of what relates to the muscles of the human body. See *Tab. Anat. (Myol.)* See also MUSCLE.

MYOMANCY, a kind of divination, or method of foretelling future events by means of mice.

Some authors hold *myomancy* to be one of the most ancient kinds of divination; and think it is on this account that Isaiah, lxvi. 17. reckons mice among the abominable things of the idolaters. But, beside that it is not certain, that the Hebrew word עכבר used by the prophet, signifies a *mouse*, it is evident it is not the divination by that animal, be it what it will, is here spoken of; but the eating it.

MYOPARO, among the Romans, a kind of ship, which partly resembled a merchant-ship, and partly a ship of war, and was that which pirates mostly used.

MYOPIA, or MIOPIAS. See SHORT *sightedness*.

MYOPS, *myops*, a person who is short-sighted; or, as we popularly call it, *purblind*.

The word is Greek, μυωψ, compounded of μυς, *mouse*, and ωψ, *eye*; because, we suppose, the same conformation of the eye is observed in mice.

Myopes are properly such as see remote objects confusedly, and near ones distinctly. Those who labour under the opposite defect are called *presbytæ*.

The defect of *myopes* is not in the optic nerve, the pupil, or the like; but in the form of the cornea or crystalline, or the distance of the retina from the same. The crystalline or cornea being rounder or more convex than ordinary, the rays will be rendered more convergent than ordinary in passing through the same. See REFRACTION. By this means they will be brought to meet or concur at a less distance from the crystalline; so that if the retina be at its usual distance, they will concur before they reach it. It is the too great nearness, then, of the retina to the crystalline, that constitutes the *myopia*.

MYOPS, in *Natural History*, the *ear-fly*, an insect usually confounded with the breeze-fly, but really differing very much from it. This is common in woods and about path-ways, and never fixes on any other creatures except oxen. It has a long and somewhat flat body, and is of a blackish grey colour.

MYOSOTIS, in *Botany*. See MOUSE-*ear*.

MYOSURUS, in *Botany*. See MOUSE-*tail*.

MYOTOMY, *myotomia*, an anatomical dissection, or demonstration of the muscles. See MUSCLE.

MYRACOPON, a name used by some authors for an ointment intended to be used to the whole body to prevent lassitude. It is described by Galen.

MYRIAD, the number of ten thousand. Whence *myriarchus*, a captain or commander of ten thousand men.

MYRICA,

MYRICA, in *Botany*, See CANDLE-*berry tree*.

MYRINX, a word uſed by ſome to expreſs the membrane of the tympanum in the ear.

MYRIOPHYLLUM, in *Botany*, the name of a genus of plants of the *monoecia polyandria* claſs; called by others *pentaspermophyllum*. The characters are theſe: it produces both male and female flowers diſtinct on the ſame plant; in the male flower the perianthium is compoſed of four oblong and erect leaves, the exterior one being large, the interior one much ſmaller; there is no corolla; the ſtamina are eight capillary filaments, which are longer than the cup; theſe are of a looſe flaccid ſtructure; the antheræ are oblong; the female flowers always ſtand below the male; the perianthium is divided into a number of ſegments; the piſtil has four germina of an oblong figure; there are no ſtyles, but the ſtigmata are hoary; the ſeeds are placed four together, and are of an oblong figure. There are two ſpecies.

MYRMECIA, in *Medicine*, a kind of wart, by Latin writers called FORMICA.

MYRMECIAS *lapis*, the *wart-ſtone*, in *Natural Hiſtory*, a name given by ſome authors to a ſtone covered on the ſurface with wart-like excreſcences: it is a name of a very vague ſignification, ſome of the ſtones called by it being mere flints, and others owing their protuberances to coralloide bodies, the wires of aſteriæ, or other of the extraneous foſſils contained in them, and ſo lodged, that their ends juſt ſtand out.

MYRMECITES, in *Natural Hiſtory*, a name given by ſome authors to a ſmall ſtone, with ſome imaginary reſemblance of an ant in its ſhape. Others have alſo made it the name of ſuch pieces of amber as contain an ant, or the legs, wings, or other fragment or remains of that little animal.

MYRMECOPHAGA. See ANT-*eater*, and FOURMILIER.

MYRMELION, in *Natural Hiſtory*, a genus of the *neuroptera* INSECTS; the characters of which are, that the mouth is formed with jaws and furniſhed with two teeth; the palpi are four, and elongated; there are no ſtemmata; the tail of the male is a forceps, conſiſting of two ſtrait ſubulæ; the antennæ are elevated, and of the length of the thorax; and the wings deflexed. Linnæus enumerates five ſpecies.

MYRMIDONS, *Myrmidones*, in *Antiquity*, a people of Theſſaly, fabled to have ariſen from ants, or pilmires, upon a prayer put up for that purpoſe, by king Æacus, to Jupiter, after his kingdom had been diſpeopled by a ſevere peſtilence. In Homer and Virgil the *Myrmidons* are Achilles's ſoldiers.

MYRMILLO, among the Romans, a kind of Gallic armour uſed in theatrical ſhews: but ſome will have it to be the ſame that Achilles's *Myrmidones* wore; whence it had this name.

MYRMILLONES, a kind of gladiators in ancient Rome; called alſo *murmillones*, ſuppoſed by Lipſius to be an order that fought completely armed. See GLADIATOR.

Turnebus derives the name from the Myrmidons.

MYROBOLANS, *myrobalani*, a kind of medicinal fruit, brought from the Indies, much more uſed in the Arabic than the Greek pharmacy, and more among the ancients than the moderns, and ſtill more abroad than in England.

The word comes from the Greek μυρον, *medicament*, and βαλανος, *acorn*, as being ſomewhat in form of acorns, and uſed in medicine.

It is very evident from the writings of the ancient Greeks, that what we at this time call the *myrobalan* was not known to them under that name, and perhaps what they called ſo is not known to us at this time; our *myrobalans* being a ſort of plums, and their's being a dry fruit, rather of the nut-kind, and uſed in perfumed unguents, and other compoſitions of that kind, to give them a ſcent.—This variation from the original ſenſe of the word is not new, however; and the authors who began it are ſo far back, that it ſeems to have been an error of as old a date as any of this kind.

There are five kinds of *myrobalans*, or *purging Indian plums*: the firſt called *citrini*, of a yellowiſh red, hard, oblong, and the ſize of an olive. The ſecond called *black* or *Indian myrobalans*, of the bigneſs of an acorn, wrinkled, without ſtone. The third, *chebulic myrobalans*, the ſize of a date, of a yellowiſh brown, pointed at the end. The fourth *emblici*, round, rough, the ſize of a gall, of a dark brown. The laſt called *bellerici*, hard, yellow, round, the ſize of an ordinary prune, leſs angular than the reſt.

All the *myrobalans* have an unpleaſant, bitteriſh, auſtere taſte; and ſtrike an inky blackneſs with ſolution of chalybeate vitriol: they are ſaid to have a gently purgative, as well as an aſtringent and corroborating virtue; and are directed to be given in ſubſtance from half a dram to four drams, and in infuſion or ſlight decoction from four to twelve drams; but they have long been diſcarded from practice in this country.

MYROBATINDUM, in *Botany*, a name given by Vaillant to a genus of plants, which, with the *camara* of Plumier, and the *pſeudobalaurum* of Rivinus, is included by Linnæus under one general character, by the name LANTANA.

MYRRH, *myrrh*, from μυρω, of μυω, *I run or trickle*, a kind of gum reſin, iſſuing, by inciſion, and ſometimes ſpontaneouſly, from the trunk and larger branches of a tree growing in Arabia, Egypt, and eſpecially in Abyſſinia.

Authors are not agreed about the tree which produces this gum: it is true, they all make it ſmall and thorny; but they diſagree about the form of its leaves. In ſeveral reſpects it reſembles the *acacia vera*.

The inciſions are made twice a year, and the *myrrh*, oozing out, is received on ruſh-mats, diſpoſed underneath.

The druggiſts ſell two kinds of *myrrh*, viz. *myrrh in tears*, which they call *ſtacte*; the other *unguilata*, or in nails.

Of the firſt kind, the beſt is bright, yellow, and in tranſparent drops, friable, light, of a ſtrong diſagreeable ſmell: but this is very rare, and moſt of that in uſe is the *unguilated myrrh*, ſo called from little white ſpots obſerved thereon, much like thoſe on the nails of the fingers.

The beſt is in little maſſes, or tears, reddiſh and tranſparent; the fineſt pieces of *myrrh*, when broken, are ſometimes found to contain a kind of unctuous liquor, the moſt precious part of the *myrrh*, and the real *ſtacte* of the ancients.

But though Pliny and Dioſcorides ſpeak of *ſtacte* as if it was freſh or liquid *myrrh*, it is ſaid by a late traveller into Abyſſinia, that they could never ſee *myrrh* in that ſtate; becauſe it is ſaid by the natives to harden on the tree inſtantly as ſoon as it is expoſed to the air; and, therefore, the *ſtacte*, he ſuppoſes, muſt have been a compoſition of *myrrh* and ſome other ingredient. The quality of *myrrh* depends on the age and health of the tree, the manner of making the inciſion in it, the time of gathering the *myrrh*, and the circumſtances of the climate where it was gathered.

In order to have *myrrh* of the firſt or moſt perfect ſort, the ſavages chuſe a young vigorous tree, whoſe bark is without moſs, or any paraſite plant; and, above the firſt large branches, they give the tree a deep wound with an axe. The *myrrh*, which flows the firſt year, through this wound, is *myrrh* of the firſt growth, and never in very great quantity. This operation is performed ſome time after the rains have ceaſed, or from April to June; and the *myrrh* is produced in July and Auguſt. The ſap, once accuſtomed to iſſue through this gaſh, continues ſo to do ſpontaneouſly, at the return of every ſeaſon; but on account of the tropical rains, which lodge water and dirt in the gaſh, the tree has begun to rot, and become foul in the wounded part, and the *myrrh*, iſſuing in the ſecond year, is of a ſecond quality; and ſells at Cairo about a third cheaper than the firſt. The *myrrh*, alſo, produced from the gaſhes near the roots, and in the trunks of old trees, is of the ſecond growth and quality, and ſometimes worſe. This is, however, the good *myrrh* of the Italian ſhops, every where but in Venice: it is of a blackiſh red, foul colour, ſolid and heavy, loſing little of its weight by being long kept; and it is not eaſily diſtinguiſhed from that of Arabia Felix. The third and worſt kind is gathered from old wounds or gaſhes, formerly made in old trees; or *myrrh*, that, paſſing unnoticed, has hung upon the tree ungathered for a whole year; black and earth-like in colour, and heavy, with little ſmell and bitterneſs; and is apparently the *caucalis* of the ancients. Mr. Bruce farther obſerves, that the greaſineſs of *myrrh* is owing to the ſavages uſing goat-ſkins, anointed with butter, for ſtopping them, in which they put their *myrrh* when gathered; in which ſkins it remains, and is brought to market; ſo that this is a mark that *myrrh* is freſh gathered, which is the beſt quality that *myrrh* of the firſt ſort can have. Phil. Tranſ. vol. lxv. pt. 2. art. 40. p. 408.

Myrrh diſſolves almoſt totally in boiling water, but as the liquor cools, a portion of reſinous matter ſubſides. By evaporating the aqueous infuſion, an extract is obtained; and by diſtillation, with a boiling heat, the whole of its flavour ariſes, partly impregnating the diſtilled water, and partly collected and concentrated in the form of an eſſential oil; which is in ſmell extremely fragrant, in taſte remarkably mild, and ſo ponderous as to ſink in the aqueous fluid; whereas the oils of moſt, perhaps of all, of the other gummy reſins ſwim. If ſome powdered *myrrh* be incloſed in the white of a hard boiled

egg, and set in a moist cellar, the liquor, into which the egg will be gradually resolved, will extract nearly all the smell and taste of the *myrrh*. This liquor, which is commonly called *oil of myrrh, per deliquium*, may be precipitated and coagulated by spirit of wine: and this coagulum is soluble by water. Rectified spirit dissolves less of this concrete than water, but extracts more perfectly that part in which its bitterness, flavour, and virtues reside.

Tinctures of *myrrh*, made by digesting three ounces of the concrete in a quart of rectified or proof spirit, are kept in the shops, and given sometimes internally from fifteen drops to a tea-spoonful; but oftener used among us externally for cleansing ulcers, and promoting the exfoliation of carious bones. The extract, obtained by inspissating the tincture, is a fragrant, bitter, very tenaceous resin, amounting to one third or more of the weight of the *myrrh*.

This bitter, aromatic, gummy resin enters a great number of medicinal compositions: it is a warm corroborant, deobstruent, and antiseptic: it is given from a few grains to a scruple and upwards, in uterine obstructions, cachexies, putrid fevers, &c. and often employed also as an external antiseptic and vulnerary. Lewis.

Its bitterness renders it good for the stomach, and against worms; and it is chewed to prevent infection from contagious diseases. Dr. Quincy says, it is excellent to cleanse and strengthen the womb, and against tickling rheums; a good detergent; and, as such, much used externally in unguents for the healing of wounds: it makes the principal ingredient in embalming.

It is an apophthegm of chemists, derived from Van Helmont, that whoever can make *myrrh* soluble by the human body, has the secret of prolonging his days. And Boerhaave owns there seems to be truth in this from its resisting putrefaction. He himself, and other chemists before him, have given methods for making solutions of *myrrh*, but only by means of alcohol. It seems not a little surprising that such great chemists should never find out that *myrrh* is soluble in common water.

MYRRHIN, in *Antiquity*. See MURRINE.

MYRRHIS, in *Botany*. See CHERVIL.

MYRRHITES *lapis*, in *Natural History*, a name used by many of the ancient authors for a semi-pellucid stone of the nature of the agates; and seeming to have been the yellow cornelian of the moderns.

MYRSINE, in *Botany*. See *African* BOX-*tree*.

MYRTIDANON, a word used by the old Greek writers on medicine, but in a different sense by different authors. Hippocrates calls it a round fruit, which the Persians in his time called pepper, and which probably had all the heating qualities of that fruit. Dioscorides expresses it by an excrescence common on the trunk of the myrtle, and which, as he observes, is more astringent than the myrtle itself. *Myrtidanum vinum* also signified wine impregnated with myrtle.

MYRTIFORM *glands*. See GLAND.

MYRTIFORMES *carunculæ*, in *Anatomy*. See CARUNCULÆ, and *Tab. Anat. Splanchn. fig.* 9. *lit. f. f.*

MYRTIFORMIS *nasi*, in *Anatomy*, a name given by Santorini, and some others, to one of the muscles of the face, called by Albinus, *depressor alæ nasi*, and by Cowper and others, *depressor labii superioris, constrictor alæ nasi*.

MYRTILLUS, in *Botany*, a name by which some authors have called the black whortle berries: the *vitis idæa aculeata* of other authors.

MYRTITES, the name of a composition in the ancient pharmacy, made of fine honey, and the depurated juice of myrtle berries boiled up together to a consistence.

MYRTLE, *myrtus*, in *Botany*, a genus of the *icosandria monogynia* class. Its characters are these: the empalement of the flower is of one leaf cut into five points; the flower has five large oval petals, which are inserted in the empalement, and a great number of small stamina, which are also inserted in the empalement, terminated by small summits; the germen is situated under the flower, supporting a slender style, crowned by an obtuse stigma, and turns to an oval berry, with three cells crowned by the empalement, each cell containing two or three kidney-shaped seeds. Miller reckons nine, and Linnæus thirteen species.

There are several species of this plant preserved in our gardens; they are all easily propagated from cuttings. The best season for this is July; and the straitest and most vigorous young shoots are to be chosen. These should be cut off about six or eight inches long, and the leaves of the lower part stripped off to two inches high, and that part of the stalk twilled which is to be placed in the ground; they are to be planted in pots of light rich earth, at about two inches distance from each other, observing to close the earth very well about them, and give them a gentle watering: they are then to be removed under a common hot-bed frame, plunging them either into some old dung or tanners bark, and shaded and watered once in two or three days, till they have taken root: in about six weeks time, they will be rooted, and will begin to shoot, and must then be inured by degrees to the air; and in August, or the beginning of September, they should be removed into the open air, but placed in a warm situation, and sheltered from the winds; they should stand here till the middle of October, and then be removed into a green-house, where they should be placed so as to have as much air as possible. During the winter season, they must be frequently but gently watered, and if any decayed leaves appear, they should be constantly plucked off. In the spring following, they should be removed into separate pots of rich earth, preserving a ball of earth to the roots of each of them, watering them to settle the earth to their roots, and placing them under a frame, till they have taken root; and in May set out to the open air, in a warm and well defended place. They will require, in the summer, frequent waterings, and the dead leaves should be carefully picked off: they should be placed where they may have the benefit of the morning sun. As they advance in growth, they are to be shifted annually into pots of a larger size; and this should be done either in April or in August; and towards the end of October, they should always be removed into the green-house. Miller's Gard. Dict.

In Cornwall and Devonshire, where the winters are more favourable than in most other parts of England, there are large hedges of *myrtle*, which have been planted for several years, and are very thriving and vigorous; some of which are upward of six feet high.

MYRTLE, *candle-berry*. See CANDLE-*berry tree*.

The common *Dutch myrtle* grows wild in waste watery places, and abounds in the isle of Elv: the leaves, flowers, and seeds of this plant have a strong fragrant smell, and a bitter taste. They are said to be used among the common people for destroying moths, and cutaneous insects; internally, in infusions, as a stomachic and vermifuge; and as a substitute for hops, for preserving malt liquors, which they render more inebriating, and consequently less salubrious: which quality is said to be destroyed by boiling. Lewis.

MYRTLE-*berries*, *myrtilli*, the fruit of the *myrtle*, with which we are supplied from the southern parts of Europe. The fruit is at first green, but becomes black gradually: within it is a white seed, in form of a crescent, solid, hard, and of an astringent taste; while the fruit continues on the trees, it is succulent and smooth, and only becomes hard and wrinkled, because dried in the sun for the convenience of carriage.

Myrtle-berries are rough and astringent, and are chiefly recommended in alvine and uterine fluxes, and other disorders from relaxation and debility; and appear to be among the milder restringents and corroborants, in the way of syrup, as a strengthener against fluxes and abortion.

The perfumers likewise use them in their perfumes, and draw an essence from them. The German dyers make a blue colour from them. In some places the leaves and branches are also used in the tanning of leather.

A *myrtle* crown was worn by the general to whom an OVATION was decreed, the reason of which, according to Plutarch, in his life of Marcellus, was, that as an ovation was decreed for some remarkable success obtained by treaty, or without much bloodshed, it was proper that the general, at his public appearance, should be crowned with the tree sacred to Venus, who, of all the deities, was supposed to be most averse to the horrors of war.

MYRTLE *sumach*. See SUMACH.

MYRTOCHEILIDES, a name given by some authors to the nymphæ in the female pudenda.

MYRTUS, the *myrtle*, in *Botany*. See MYRTLE.

MYRTUS *sylvestris*, the *wild myrtle*, in *Botany*, a name given by some authors to *ruscus*, or BUTCHER'S *broom*, from some faint resemblance of its leaves to those of the *myrtle*.

MYRUS, in *Zoology*, a kind of sea-serpent, a fish of the eel class, supposed by some to be the male murœna, but erroneously. Its snout is very long and sharp-pointed; its body black, slender, and round, without scales, and free from spots; the cavity for the gills is only one on each side; near the neck there are some small yellow dots to be seen, while the creature is alive; but these are scarce visible after it is dead: its flesh is tender and delicate.

MYS, in *Ichthyology*, a name given by Ælian, Appian, and many others, to the fish called *asprisucus* by the later writers; the *asper* and *aburus* of others of the ancients. See GOAT-*fish*.

MYSIA, *μυσια*, in *Antiquity*, a feſtival in honour of Ceres. For the origin and ceremonies obſerved in it, ſee Potter, Archæol. Græc. lib. ii. cap. 20. tom. i. p. 415.

MYSTERY, *myſterium*, ſomething ſecret, or hidden; impoſſible or difficult to be comprehended.

The word comes from the Greek *μυστηριον*; and that, according to ſome etymologiſts, from *μυω, claudo, taceo, I ſhut, I am ſilent*, and *στομα, mouth*; but then whence comes the *τ*? Muſt the *υ* in *στομα* be converted into an *τ*? The word ſeems derived, with more propriety, from the Hebrew סתר *ſater, to hide*; whence is formed מסתר *miſtar, a hidden thing*.

Myſtery is primarily uſed in ſpeaking of certain truths revealed in Scripture, into the full underſtanding whereof human reaſon cannot penetrate. Such are ſaid to be the doctrines of the *Trinity*, the *Incarnation*, &c.

We have an epitome of the *myſteries of faith*, or the *myſteries of Chriſtianity*, in the ſymbols or creeds, compiled by the apoſtles, the council of Nice, and St. Athanaſius. See CREED.

In ſome of theſe, mention is made of the *myſtery* of the Trinity; the *myſteries* of the incarnation of the Son of God, his death and paſſion, and his deſcent into hell for the redemption of mankind; of his reſurrection the third day, his aſcenſion into heaven, his ſitting on the right hand of God, and his coming again to judge the world; of the divinity, and conequality of the Holy Ghoſt with the Father and the Son; of the unity of the church; of the communion of ſaints; the participation of the ſacraments; and the general reſurrection. Such are the principal *myſteries of faith*; which the church declares neceſſary to be known and believed, in order to ſalvation.

From the earlieſt ages there have been particular feſtivals inſtituted in honour of theſe *myſteries*; to return thanks to God for having revealed them, and to oblige the miniſters and paſtors to inſtruct the people therein.

Such are the feaſt of the *myſtery of the Incarnation*, called alſo *Chriſtmas*; thoſe of the *Circumciſion*, *Paſſion*, *Reſurrection*, &c. See INCARNATION, CIRCUMCISION, EASTER, and EPIPHANY.

The heathens alſo had their *myſteries*, particularly thoſe of Ceres (ſee ELEUSINIA), the *Bona Dea*, &c. The Egyptian prieſts concealed the *myſteries* of their religion and philoſophy under hieroglyphics. Thoſe who revealed the *myſteries* of the *Bona Dea* were ſeverely puniſhed; and none were truſted with them but thoſe ſolemnly initiated, and ſworn to ſecrecy.

But theſe were not called *myſteries*, as being incomprehenſible, or raiſed above the power of reaſon; but becauſe they were covered and diſguiſed under types and figures, to raiſe the greater veneration in the people.—The *myſteries* of paganiſm were uſually celebrated in caves and grottos, fitter to conceal crimes than to celebrate *myſteries* in.

Each of the pagan gods had, ſays biſhop Warburton, beſides the public and open, a ſecret worſhip paid them; into which none were admitted but thoſe who had been ſelected by preparatory ceremonies, called initiation. This ſecret worſhip was termed the *myſteries*. The firſt and original *myſteries*, of which we have any account, were thoſe of Iſis and Oſiris in Egypt; from whence they were derived to the Greeks, under the preſidency of various gods, as the inſtituter thought moſt for his purpoſe. He obſerves, that the nature and end of all theſe *myſteries* were the ſame, viz. to teach the doctrine of a future ſtate. And he repreſents the deſign of them in general to have been, to engage men to a holy and virtuous practice, to give them juſt notions of religion, and to detect the error of the vulgar polytheiſm. And he concludes his account of the *myſteries* with obſerving, that there were three things about which they were principally concerned: viz. 1. The riſe and eſtabliſhment of civil ſociety. 2. The doctrine of a future ſtate of rewards and puniſhments. 3. The error of polytheiſm, or the principle of the unity. Which latter was the object of the greater *myſteries*, in which the whole deluſion of paganiſm was diſcloſed, and the initiated were inſtructed, that Jupiter, Mercury, Venus, Mars, and the whole rabble of licentious deities, were only deified mortals: and that God alone was the Creator of the univerſe, who pervaded all things by his virtue, and governed all by his providence: whereas in the leſſer *myſteries*, which were preparatory to the other, the general belief of a providence, and future ſtate, and its conſequent engagements to a virtuous life were inculcated. But as theſe *myſteries*, according to the biſhop's hypotheſis, were an inſtitution of the ſtate for the benefit of the people, it is natural to inquire into the reaſons of their being kept ſecret: which, he ſays, were the following; nothing ſtimulates curioſity like that which retires from obſervation, and ſeems to forbid ſearch; and yet there was a neceſſity of teaching ſome things to the initiated, not expedient for others to know: hence he obſerves, that the ſecret in the leſſer *myſteries* was ſome hidden rites and ſhews, to be kept from the people, only to inrige their curioſity; and that the ſecret in the greater was ſome hidden doctrines to be kept from the people for the contrary purpoſe. Beſides, as the legiſlators had been principally concerned in the riſe of the vulgar polytheiſm, this circumſtance furniſhed another reaſon for the ſecrecy attending theſe *myſteries*. And that theſe *myſteries* were invented, eſtabliſhed, and ſupported by the legiſlature, he argues from the place of their origin, which was Egypt, where all religious worſhip was formed and propagated by ſtateſmen, and directed to political ends: becauſe the ſages who brought them out of Egypt, and propagated them in Aſia, Greece, and Britain, were all kings or legiſlators; becauſe the ſtate preſided in the *myſteries*; becauſe, according to their original inſtitution, neither ſlaves nor foreigners, who had no concern, no property, and no country, were to be admitted into them; becauſe an inſtitution, which taught the neceſſity of a ſtrict and holy life, muſt be the invention of legiſlators to whoſe ſcheme virtue and the proſpect of immortality were ſo neceſſary; and hence they were actually of infinite uſe to the ſtate: and finally from the expreſs teſtimony of Plutarch, who, in his Treatiſe of Iſis and Oſiris, aſcribes them to this original. However, theſe *myſteries* in proceſs of time, greatly degenerated; one cauſe of their corruption ſeems to have been the ſeaſon in which they were performed, and the profound ſecrecy obſerved in them; for the night gave opportunity to wicked men to attempt evil actions; and the ſecrecy, encouragement to perpetrate them. Another cauſe of their depravation was their being ſometimes under the patronage of thoſe deities, who were ſuppoſed to inſpire and preſide over irregular paſſions, ſuch as Bacchus, Venus, and Cupid; to which the biſhop adds, the hierophant's withdrawing himſelf from the care and inſpection of the civil magiſtrate.

Such is the ingenious and plauſible ſcheme largely diſcuſſed and maintained by Dr. Warburton, in his Divine Legation, &c. book ii. ſec. 4.

However, other learned writers have advanced a very different opinion on this ſubject. Dr. Leland, in particular, has very accurately examined the origin and ends of the inſtitution of *myſteries*. According to this writer they ſeem to have been originally deſigned to tame and civilize the rude and barbarous people, to form and poliſh their manners, and by ſhews and repreſentations, which were fitted to ſtrike the imagination, to bring them to a greater awe and veneration for the laws and religion of their country; which among the pagans was always regarded as a neceſſary ingredient in a virtuous character. On this account they are highly commended by Cicero, de Leg. lib. ii. cap. 14. as they tended to reclaim men from a rude and ſavage life; and they were called *initia*, becauſe they furniſhed the firſt principles of a human and civilized life. But whatever was the original intention of theſe *myſteries*, there is great reaſon to apprehend, that upon the whole they proved rather detrimental than advantageous to the cauſe of virtue; and the conception of them ſeems to have been owing to a fundamental defect in their original conſtitution.—Dr. Leland farther examines whether and how far the *myſteries* were deſigned to detect the error of polytheiſm, and to inſtruct the initiated in the knowledge of the one true God. With reſpect to this point he maintains, that the whole evidence, produced by the biſhop, amounts only to this; that in the *myſteries* the initiated were inſtructed that the popular deities had been once men; but no proof is brought, that the *αποφθεγματα* overthrew the vulgar polytheiſm, the worſhip of dead men; nay, the inſtitutors of the *myſteries*, whilſt they taught the initiated, that the gods, commonly received, had been once men, took care that the public religion ſhould not ſuffer by it, by letting them know, that, notwithſtanding this, they ought to be regarded as gods, and to have that divine worſhip and honour rendered to *them*, which ancient tradition and the laws required. The Chriſtians, indeed, argued from the hiſtory of the heathen gods to diſprove their divinity: and this was probably the reaſon why the myſtagogues were very careful in their entrance on the celebration of the *myſteries*, that no Chriſtian ſhould be preſent at them.

Dr. Leland farther contends, that the doctrine of the unity was not taught in the *myſteries*. With this view he examines the teſtimonies adduced by the biſhop, which, he ſays, afford no ſufficient evidence that they taught the doctrine of the unity. Beſides, there is great reaſon to think that the notion given of the Deity in the *myſteries* was not very right and juſt: and moreover, if they had taught juſt notions of God, theſe could be of no great uſe, becauſe they taught this part of the ſe-

tret doctrine of the *mysteries* to very few perſons. It is farther urged, that the legiſlators and civil magiſtrates, who firſt inſtituted the *myſteries*, and who regarded not truth but utility, could never in good earneſt attempt to draw the people off from that polytheiſm, which they themſelves had encouraged and eſtabliſhed for the welfare of the ſtate, and to keep the people under a greater veneration for the laws. And the *myſteries* ſeem to have been deſigned, not to diſcard the worſhip of the deities, to whom they were appropriated, but to add a greater ſolemnity to it. To which it may be added, from fact and experience, that, though the *myſteries* were generally celebrated in almoſt all the heathen nations, and eſpecially throughout the whole Roman empire, no effect of them appeareth to the contrary of the people from their polytheiſm or idolatry: nor is it conceivable, if the deſign of the *myſteries* were as laudable as Dr. Warburton repreſents, that the ancient Chriſtian writers ſhould have ſo univerſally exclaimed againſt them. See Leland's Advantage and Neceſſity of the Chriſtian Revelation, vol. ii. pt. 1. chap. 9.

MYSTERY, in *Scripture Language*, is uſed with ſome latitude. Sometimes it denotes any thing not to be known without divine revelation.

MYSTERY is alſo uſed to denote the ſecret things which God has diſcovered by his miniſters, the prophets, Jeſus Chriſt, and the apoſtles.

Mathematicians have been accuſed of introducing *myſteries* into geometry, which ought to have none. See the Analyſt; and Mr. Maclaurin's Fluxions, in the Introduction and other places. See alſo PARADOX.

MYSTERY, in *Engliſh Antiquity*, is a term formerly applied to our dramatic exhibitions. It is well known, ſays Mr. Percy, in his Reliques of Ancient Engliſh Poetry, that dramatic poetry in this and moſt other nations of Europe, owes its origin, or at leaſt its revival, to thoſe religious ſhews, which in the dark ages were uſually exhibited on the more ſolemn feſtivals. At thoſe times they were wont to repreſent in the churches, the lives and miracles of the ſaints, or ſome of the more important ſtories of ſcripture. And as the moſt myſterious ſubjects were frequently choſen, ſuch as the incarnation, paſſion, and reſurrection of Chriſt, &c. thoſe exhibitions acquired the name of *myſteries*. At firſt they were probably a kind of dumb ſhows, intermingled, perhaps, with a few ſhort ſpeeches: at length they grew into a regular ſeries of connected dialogues, formally divided into acts and ſcenes. Specimens of theſe, in their moſt improved ſtate, may be ſeen in Dodſley's Old Plays, and in Oſborne's Harleian Miſcellany. As the old *myſteries* frequently required the repreſentation of ſome allegorical perſonage, ſuch as Death, Sin, Charity, Faith, and the like, by degrees the rude poets of thoſe unlettered ages, towards the ſixteenth century began to form complete dramatic pieces, conſiſting entirely of ſuch perſonifications. Theſe they intitled moral plays, or moralities. The *myſteries* were very inartificial, repreſenting the ſcripture ſtories ſimply according to the letter. But the moralities are not devoid of invention; they exhibit outlines of the dramatic art; containing ſomething of a fable or plot, and even attempting to delineate characters and manners.

MYSTERY, *additions of*. See ADDITION.

MYSTES. See HYDROMYSTES.

MYSTICAL, *nutrisse*, MYSTIC, ſomething *myſterious*, or allegorical. See MYSTERY, ALLEGORY, &c.

The commentators on the Scripture, beſides a literal, find alſo a *myſtical*, and a moral meaning. The Bible, they contend, is a book written both within-ſide and without-ſide: within-ſide, in reſpect to the *myſtical*, internal, ſublime, and hidden ſenſe; and without-ſide, in reſpect to the literal and grammatical ſenſe, immediately expreſſed by the words.

In effect, ſeveral of the ancient fathers, and doctors of the church, underſtand the books mentioned in Ezek. ii. 10. and in the Apocalypſe, v. 1. *which were written both within-ſide, and without*, of the Scriptures; and take the literal and *myſtical* ſenſe to be here fairly intimated.

The ſenſe of Scripture, ſay they, is either that immediately ſignified by the words and expreſſions in the common uſe of language: or it is mediate, ſublime, typical, and *myſtical*; wherein the things themſelves ſignified are made to ſignify ſtill other and farther things, according to the particular deſign and intention of God, and of the prophets and apoſtles inſpired by him.

The literal ſenſe they again divide into *proper* literal, which is contained in the words taken ſimply and properly: and *metaphorical* literal, where the words are to be underſtood in a figurative and metaphorical ſenſe: as, *where the right eye is commanded to be plucked out*, &c.

Wherever the proper literal ſenſe contains any thing abſurd or indecent, there recourſe muſt be had to the metaphorical literal ſenſe.

All Scripture has a true literal ſenſe, but it has not always a *myſtical* one. We muſt ever underſtand it in the literal ſenſe, when it ſpeaks immediately of any of the laws of nature, of charity, of doing good; when it gives us inſtructions for the conduct of life, for regulating our manners; and when it relates any matter of fact, or point of hiſtory.

The ſame paſſage of Scripture has ſometimes ſeveral ſenſes, expreſſed and ſignified immediately by the words taken in their proper, and their figurative ſenſe, and which appear to have been all intended, by the inſpired perſon who ſpoke them, as having been ſo underſtood by others likewiſe inſpired. As thoſe words in Pſalm ii. *Thou art my Son, this day have I begotten thee*; which St. Paul underſtands, according to the ſtrict letter, in Heb. i. 5 of the generation of Jeſus Chriſt in time: and in Acts xiii. 33. he takes them in a metaphorical ſenſe, and applies them to our Saviour's reſurrection. Thus, in Hoſea xi. 1. the words of the prophecy, *I have called my Son out of Egypt*, are underſtood literally of the children of Iſrael, whom God brought out of Egypt, under the conduct of Moſes; and yet in Matt. ii. 15 they are underſtood metaphorically of Jeſus Chriſt.

The *myſtical ſenſe* of Scripture is that which the things expreſſed by the words do farther ſignify; or it is a ſecond ſignification held forth or ſignified by the firſt: this ſecond being expreſſed immediately by the firſt, and mediately by the words themſelves.

Writers allow of three kinds of *myſtical* ſenſes in the Word of God: the firſt correſponding to faith, and called *allegorical*; the ſecond to hope, called *anagogical*; and the third to charity, called the *tropological ſenſe*.

The four ſenſes, and their applications, are included in the Latin diſtich,

Litera geſta docet, quid credas allegoria,
Moralis quid agas, quo tendas anagogia.

Sometimes the ſame word in Scripture is to be taken in all the four ſenſes. Thus the word *Jeruſalem* literally ſignifies the capital of Judæa; allegorically, the church militant; tropologically and morally, a believer; and anagogically, heaven.

So, that paſſage in Geneſis, *Let there be lights, and there were lights*, ſignifies, according to the letter, corporeal light; by the allegory, the Meſſiah; in the tropological ſenſe, grace; and anagogically, beatitude, or the light of glory.

MYSTIC *theology* denotes a refined and ſublime kind of divinity, profeſſed by the *myſtics*.

It conſiſts in a knowledge of God, and divine things, not acquired in the common way, but infuſed immediately by God, and which has the power to move the ſoul in an eaſy, calm, devout, effective manner; to unite it ultimately to God; to illumine the underſtanding, and to warm and enliven the will, in an extraordinary manner.

Among the writings attributed to Dionyſius the Areopagite, is a diſcourſe of *myſtic theology*. Several others have written on the ſame ſubject, both ancients and moderns.

MYSTICS, *myſtici*, a kind of religious ſect, diſtinguiſhed by their profeſſing pure, ſublime, and perfect devotion, with an entire diſintereſted love of God, free from all ſelfiſh conſiderations.

The *myſtics*, to excuſe their fanatic ecſtaſies, and amorous extravagances, alledge that paſſage of St. Paul; *The Spirit prays in us by ſighs and groans that are unutterable*. Now, if the Spirit, ſay they, pray in us, we muſt reſign ourſelves to its motions, and be ſwayed and guided by its impulſe, by remaining in a ſtate of mere inaction.

Paſſive contemplation is that ſtate of perfection to which the *myſtics* all aſpire.

The authors of this *myſtic* ſcience, which ſprung up towards the cloſe of the third century, are not known; but the principles from which it was formed are manifeſt.—Its firſt promoters proceeded from the known doctrine of the Platonic ſchool, which was alſo adopted by Origen and his diſciples, that the divine nature was diffuſed through all human ſouls, or that the faculty of reaſon, from which proceeds the health and vigour of the mind, was an emanation from God into the human ſoul, and comprehended in it the principles and elements of all truth, human and divine. They denied that men could by labour or ſtudy excite this celeſtial flame in their breaſts, and, therefore, they diſapproved highly of the attempts of thoſe, who, by definitions, abſtract theorems and profound ſpeculations, endeavoured to form diſtinct notions of truth, and to diſcover its hidden nature. On the contrary, they maintained that ſilence, tranquillity, repoſe, and ſolitude, accompanied with ſuch acts as might tend to extenuate and exhauſt the body, were the means by which the hidden and internal word was excited to produce its latent virtues, and to inſtruct men in the knowledge of divine things. For thus they reaſoned:

those who behold with a noble contempt all human affairs, who turn away their eyes from terrestrial vanities, and shut all the avenues of the outward senses against the contagious influences of a material world, must necessarily return to God, when the spirit is thus disengaged from the impediments that prevented that happy union. And in this blessed frame, they not only enjoy inexpressible raptures from their communion with the Supreme Being, but also are invested with the inestimable privilege of contemplating truth undisguised and uncorrupted in its native purity, while others behold it in a vitiated and delusive form.

The number of the *mystics* increased in the fourth century, under the influence of the Grecian fanatic, who gave himself out for Dionysius the Areopagite, disciple of St. Paul, and probably lived about this period: and by pretending to higher degrees of perfection than other Christians, and practising greater austerity, their cause gained ground, especially in the Eastern provinces, in the fifth century. A copy of the pretended works of Dionysius was sent by Balbus to Lewis the Meek, in the year 824, which kindled the holy flame of mysticism in the Western provinces, and filled the Latins with the most enthusiastic admiration of this new religion.

In the twelfth century, these *mystics* took the lead in their method of expounding Scriptures; and, by searching for mysteries and hidden meaning, in the plainest expressions, forced the word of God into a conformity with their visionary doctrines, their enthusiastic feelings, and the system of discipline, which they had drawn from the excursions of their irregular fancies. In the thirteenth century, they were the most formidable antagonists of the schoolmen; and towards the close of the fourteenth, many of them resided and propagated their tenets almost in every part of Europe. They had, in the fifteenth century, many persons of distinguished merit in their numbers: and in the sixteenth century, previous to the Reformation, if any sparks of real piety subsisted under the despotic empire of superstition, they were only to be found among the *mystics*.

The principles of this sect were adopted by those called QUIETISTS in the seventeenth century: and, under different modifications, by the QUAKERS and METHODISTS.

MYSTOCEROS, in *Ichthyology*, a name given by Gesner and some others to that species of the silurus which we call the sheat-fish. It is the glanis of Pliny, and the rest of the old authors; the silurus of Rondeletius and others. It is distinguished by Artedi by the name of the silurus with four beards under the chin. It is plainly to be known from the fish called the *lake*, by this character, that having only one beard; it is a genuine species of SILURUS.

MYSTRUM, among the *Ancients*, a liquid measure, which was the fourth part of the cyathus.

It weighed about two drams and a half of oil; and of water or wine, two drams two scruples. It was much about our small spoonful.

MYSTUS *fluviatilis*, in *Ichthyology*, a name by which some writers, particularly Bellonius, have called the common *barbel*. See BARBUS.

MYSTUS *marinus*, the *sea-barbel*, the name of a fish caught in the Adriatic, and common in the markets of Venice. It is of an oblong figure, and in colour of a silvery white, variegated on each side with ten obliquely transverse black lines; its belly is very white; its tail is forked, and its head long; its back fin has part of its rays prickly, part soft to the touch; its eyes are not large, and their irises are yellow; its lips are prominent, thick, and soft, and only serrated in the place of teeth; but in the hinder part of its mouth it has several rows of short and large *molares* or grinders; its scales are large, and adhere firmly to the flesh. It is a very well tasted fish.

MYSTUS *Niloticus*, in *Ichthyology*, a name given by Bellonius to a fish of the barbel kind, caught in the Nile. Its body is thick and short, and its belly very broad; it grows to so large a size as to weigh twenty pounds. Probably this may be no other than the common barbel growing to a larger size, as we see many fish will in some places more than others.

MYTACISM, *Μυταχισμος*, in *Rhetoric*, the too frequent repetition of the letter M, thus *mammam ipsam amo, quasi meam animam*.

MYTHOLOGY, *μυθολογια*, signifying a discourse or description of fables, from *μυθος*, *fabula*, and *λογος*, *sermo*, *discourse*, the history of the fabulous gods and heroes of antiquity; with the explanation of the mysteries or allegories couched therein.

Lord Bacon thinks that a great deal of concealed instruction and allegory was originally intended in most parts of the ancient *mythology*; he observes, that some fables discover a great and evident similitude, relation, and connection with the thing they signify, as well in the structure of the fable as in the meaning of the names, whereby the persons or actors are characterised.

The same writer thinks it may pass for a farther indication of a concealed and secret meaning, that some of these fables are so absurd and idle in their narration, as to shew an allegory even afar off: but the argument of most weight upon this subject, he takes to be this, that many of these fables appear by no means to have been invented by the persons who relate them: he looks on them not as the product of the age, nor invention of the poets, but as sacred relics as he terms them, genre whispers, and the breath of better times, that from the tradition of more ancient nations, came at length into the flutes and trumpets of the Greeks. He concludes, that the knowledge of the early ages was either great or happy: great, if they by design made this use of trope and figure; or happy, if, whilst they had other views, they afforded matter and occasion to such noble contemplations. See THEOLOGY.

MYTILUS, in *Natural History*. See MUSCLE.

MYTIS, a name used by some writers to express the black juice found in the mouth of the sepia or cuttle-fish, with which it colours the water when in danger of being taken, and by this means often makes its escape. It is also used by Hippocrates as the name of a sea-fish different from the sepia.

MYTTOTON, a word used by the ancients to express a mixt sort of country food, made of garlic, onions, eggs, cheese, oil, and vinegar. It was much eaten by the labouring people among the ancients, and accounted a very wholesome dish.

MYURUS, *μυουρος*, in *Medicine*, denotes a pulse which is continually weakening by insensible degrees, so that the second beat is fainter than the first, the third than the second, &c. See PULSE.

The word is compounded of *μυς*, *mouse*, and *ουρα*, *tail*; the diminution of the pulse being supposed like that of the thickness of the tail of that animal, which grows less from the root to the tip.

MYULITES *lapis*, in *Natural History*, a name given by some authors to a fossile body, part of an ASTEROPODIUM, which they have thought in single joints somewhat resembled the ears of a mouse.

MYXA, or MYXARIA, in the *Materia Medica*, a name used by some authors for the SEBESTENS, a sort of plum of Ægypt and Asia.

MYXINE, in *Natural History*, a genus of the *intestina* class of worms; the characters are, that the body is round and carinated in the lower part; the mouth is cirrous; the jaws are pinnated, and furnished with many sharp teeth; and it has no eyes. There is only one species, called by Linnæus the glutinous *myxine*.

MYXOLYDIAN, in *Ancient Music*, the first species of the DIAPASON.

MYXON, in *Ichthyology*, the name of a fish of the mullet-kind, called by others BAUCHUS.

It much resembles the common MULLET; but its head is less pointed, and its body is covered beside the scales with a mucous matter: it has a remarkable irregularity in the manner of its swimming, and looks red about the lips and covering of the gills.

N.

N, A liquid conſonant, or ſemi-vowel, and the thirteenth letter of the Greek, Latin, Engliſh, &c. alphabets.

The *N* is a naſal conſonant: its ſound is that of a d, paſſed through the noſe: ſo that when the noſe is ſtopped by a cold, or the like, it is uſual to pronounce d for *n*. M. l'Abbe de Dangeau obſerves, that in the French the *n* is frequently a mere naſal vowel, without any thing of the ſound of a conſonant in it. He calls it the Sclavonic vowel. The Hebrews call their *N*, *Nun*, which ſignifies *child*, as being ſuppoſed the offspring of M; partly on account of the reſemblance of ſound, and partly on that of the figure. Thus from the m, by omitting the laſt column, is formed *n*: and thus from the capital *N*, by omitting the firſt column, is formed the Greek minuſcule ν. Hence, for Biennius, &c. the Latins frequently uſe Binus, &c. and the ſame people convert the Greek ν at the end of a word into an m; as, *omnino*, *pharmacum*, &c. See M.

N before p, b, and m, the Latins change into m, and frequently into l and r, as in ludo, illudo; in rigo, irrigo, &c. in which they agree with the Hebrews, who, in lieu of Nun, frequently double the following conſonant; and the Greeks do the ſame, as when for Manlius, they write Μαλλιος, &c.

The Greeks, alſo, before κ, γ, χ, ξ, changed the ν into γ: in which they were followed by the ancient Romans, who for Angulus wrote Aggulus; for anceps, aggeps, &c. The Latins retrench the *n* from Greek nouns ending in ων as Ἀρης, *Ares*; βρασων, *brason*. On the contrary, the Greeks add it to the Latin ones ending in *o*: as Κατων, Νερων, for *Cato*, *Nero*.

In Engliſh, *N* has an invariable ſound: as *no*, *name*, &c. After *m* it is ſometimes almoſt loſt, as *condemn*, &c.

N, among the *Ancients*, was a numeral letter, ſignifying 900; according to the verſe in Baronius,

N quoque nongentos numero deſignat habendos.

And when a line was ſtruck over it N, nine thouſand.

Among the ancient lawyers, *N. L.* ſtood for Non liquet, i. e. the cauſe is not clear enough to paſs ſentence upon.

N. P. was uſed among the Romans for notarius publicus; *N. C.* for Nero Ceſar, or Nero Claudius. *N. B.* is uſed for Nota bene. In marine language, *N* ſtands for North.

N. or N°, in *Commerce*, &c. is uſed as an abbreviation of numero, number. Thus alſo, in *Medicine*, caryophyllorum, N° vi. ſignifies ſix cloves. *N* on the French coins, denotes thoſe ſtruck at Montpelier.

NAAM, or NAM, NAMIUM, in *Law*, the taking or diſtraining another man's moveable goods.

This is either *lawful*, or *unlawful* and prohibited.

NAAM, *lawful*, is a reaſonable diſtreſs, proportionable to the value of the thing diſtrained for; and anciently called either *vif* or *mort*, as it was made of quick, or dead chattel.

Lawful *Naam* is ſo either by the common law; as when a man takes another's beaſts doing damage in his ground; or by a man's particular fact, as on account of ſome contract, &c.

NAAM, *unlawful*, *vetitum namium*. See NAMIUM.

NABATHÆA *ſiliqua*, in the *Materia Medica*, a name given by the interpreters of Avicenna, and other of the Arabian phyſicians, to the *jembut*, or *aſſembut*, of thoſe authors.

It appears, from the accounts they have given us of this drug, that it was a long and ſlender pod, produced on a thorny tree. It has been generally ſuppoſed to be the ſame with the *carob*, or *ſiliqua dulcis*, but very erroneouſly. The ſame authors who mention this *aſſembut*, or *nabathæa ſiliqua*, mention that alſo under the name of the *almohati*, or *Syrian ſiliqua*, as it is by interpreted.

The *Syrian ſiliqua*, they ſay, purges, and is good in coſtiveneſs. The *nabathæan* they recommend to us, as an aſtringent in hæmorrhages. It is plainly to be inferred from this, that the *nabathæa ſiliqua* is different, in the greateſt degree from the Syrian pod, or *carob* fruit; and by its virtues, and the deſcription they give us of the thorny tree which produces it, it ſeems very probable that it was the pod of ſome ſpecies of the *acacia*.

NABCA, in *Botany*, a name by which ſome authors have called the tree more uſually deſcribed under the name of *amomum*, or the great jujube tree.

NABECH, in *Botany*, the name given by the Arabian writers to the fruit of the tree SADAR, which is the *lotus* of Dioſcorides, and the *acanthus* of Virgil. The fruit of this, which is round, and like a cherry, only ſmaller, was firſt called by this name *nabech*, or *nabuc*, but afterwards the tree was alſo called by it.

NABLUM, in Hebrew, *nebel*, an inſtrument of muſic among the Hebrews. The Seventy, and the Vulgate, tranſlate it ſometimes by *nablum*, and at other times by *pſalterium*, or *lyra*, or even *cithara*.

The *nablum* was a ſtringed inſtrument, very near of the form of a Δ, which was played upon by both hands, and with a kind of bow. See Calmet's Diſſertation concerning the Inſtruments of Muſic of the ancient Hebrews, prefixed to the ſecond volume of his commentary upon the Pſalms.

Kircher ſuppoſes that it was the ſame with the PSALTERY. See *Tab. Muſic. fig.* 7.

NABO, or NEBO, in *Mythology*, a deity of the Babylonians, who poſſeſſed the next rank to Bel. It is mentioned by Iſaiah, ch. xlviii. Voſſius apprehends that Nabo was the moon, and Bel the ſun; but Grotius ſuppoſes that Nabo was ſome celebrated prophet of the country, which opinion is confirmed by the etymology of the name, ſignifying, according to Jerom, one that preſides over prophecy.

NABOB, the name of a viceroy or governor of one of the provinces of the Mogul's empire in India.

NABONASSAR. The æra of NABONASSAR is famous: we know but little of the hiſtory of that prince; only that he was king of Babylon, and was alſo called Beleſus; though ſome will have him the Baladan mentioned in Iſaiah xxxix. 1. and 2 Kings xx. 12. Some even conjecture that he was a Mede; and that he was ſet on the throne by the Babylonians, upon their ſhaking off the government of the Medes.

The beginning of this prince's reign is of great importance in chronology; becauſe Ptolemy aſſures us, there were aſtronomical obſervations made by the Chaldæans from *Nabonaſſar* to his time; and Ptolemy, and the other aſtronomers, account their years from that epocha. See ASTRONOMY.

From the obſervations quoted by Ptolemy, it follows, that the firſt year of this æra is the 747th year before Jeſus Chriſt; and the 3967th of the Julian period. See EPOCHA.

The years of this epocha are Egyptian years, of three hundred and ſixty-five days each; commencing on the 29th of February, and reckoned, according to the computation of aſtronomers, from noon.

NABOTH, *ark of*, in *Anatomy*, a kind of ovary near the neck of the womb, diſcovered by *Naboth*, profeſſor of medicine in the univerſity of Leipſick.

NACRE, in *Natural Hiſtory*. See PINNA.

NADAB, the ſovereign pontiff, or high prieſt of the Perſians, whoſe dignity is the ſame as that of the muſti among the Turks; with this difference only, that the *nadab* may diveſt himſelf of his eccleſiaſtical office, and paſs to civil employment, which the muſti is not allowed to do. See MUFTI.

The *mofaib* takes place next after the mufti dulet, or prime minifter; he has two judges under him, called the feeik and the cafi, who decide all religious matters, grant divorces, and are preſent at contracts and public acts, and theſe have deputies in all the cities of the kingdom.

NADIR, in *Aſtronomy*, a point in the heavens diametrically oppoſite to the ZENITH.

The word is pure Arabic, where it ſignifies the ſame.

The *nadir* is that point directly under our feet; or a point in a right line drawn from our feet through the centre of the earth, and terminating in the under-hemiſphere.

The zenith and *nadir* are the two poles of the horizon, each being 90° diſtant from it, conſequently each in the meridian.

NADIR, *ſun's*, is the axis of the cone projected by the ſhadow of the earth; thus called, becauſe that axis being prolonged, gives a point in the ecliptic diametrically oppoſite to the ſun.

NADIR-*ibrihſun*, in the *Turkiſh Offices*, the ſuperintendant over the wardrobe.

NÆNIA, in *Mythology*, a goddeſs who preſided over lamentations and funerals; and who had a temple near Rome.

Nænia is alſo uſed for a funeral dirge or ſong, ſung on funeral occaſions.

NÆVUS, or NEVUS, in the *Animal Oeconomy*, denotes an excreſcence of fleſh in various parts of the bodies of children, ſuppoſed to have been occaſioned by frights, diſappointments, &c. of the mother, while the infant was in the womb. Theſe tumors ariſe in all parts of the body; they are of all figures and of all ſizes, and are ſometimes of the common colour of the ſkin, ſometimes black, red, &c. Many of them, both in ſhape and colour, reſemble fruits of ſeveral kinds, as mulberries, ſtrawberries, and the like; or animals, as mice, or ſpiders. They are to be removed, as warts, by ligature, cautery, or extirpation with the knife. But if they have large veſſels near their roots, if they are ſtrongly fixed to the bone, or if they ſeem to have a cancerous diſpoſition, it is much beſt for the ſurgeon to let them wholly alone; and where they are ſeated in the neighbourhood of arteries or large veins, if preſſed to extirpate them, he ſhould never be without cauteries, ſtyptics, bandages, and other neceſſary apparatus, in caſe of hæmorrhages. Heiſter's Surgery, p. 323.

See theſe accounted for under MONSTER. See alſo FOETUS, and IMAGINATION.

NAG. See HOBBY.

NAGEMULUS, in *Ichthyology*, a name given by ſome of the German authors to the fiſh called by Willughby and others, the *lucioperca*, or *pike-pearch*. It is truly a ſpecies of PEARCH, and is diſtinguiſhed from the common pearch, principally by having two long teeth on each ſide of the mouth.

NAHUM, or, *the Prophecy of* NAHUM, a canonical book of the Old Teſtament. *Nahum*, the ſeventh of the twelve leſſer prophets, was a native of Elkoſhai, a little village of Galilee. The ſubject of his prophecy is the deſtruction of Nineveh, which he deſcribes in the moſt lively and pathetic manner: his ſtyle is bold and figurative, and can hardly be exceeded by the moſt perfect maſters of oratory. This prophecy was verified at the ſiege of that city, by Aſtyages, in the year of the world 4378, ſix hundred and twenty-two years before Chriſt.

The time of *Nahum*'s death is unknown; the Greek menologies, and the Latin martyrologies place his feſtival on the firſt day of December.

NAIA, in *Zoology*, the name of 2 ſpecies of COLUBER, the ſcuta of whoſe abdomen are one hundred and ninety in number, and the ſquamæ of the tail ſixty.

NAIAS, in *Botany*, the name given by Linnæus to a genus of plants of the *dioecia monandria* claſs; called by Vaillant and Micheli *hydatis*. The characters are theſe: it produces male and female flowers diſtinct; in the male flowers, the perianthium is compoſed of one leaf of a cylindric figure, and truncated at the baſe, growing ſmaller at the top, and having at the mouth two oppoſite ſegments which bend backwards; the flower is compoſed of only one petal and is a tube of the length of the cup; its verge is divided into four ſegments, which are rolled backwards; there are no ſtamina, but the middle of the flower produces one oblong erect anthera; in the female flower there is no cup, nor any petal, but a piſtil whoſe germen is of an oval figure, and terminates in a bender ſtyle; the ſtigmata are ſimple; the fruit is an oval capſule, containing one oblong oval ſeed. There is only one ſpecies.

NAIADS, or NAIDS, NAIADES, derived from ναω, *I flow*, or from ναω, *I inhabit*, in *Mythology*, a ſort of nymphs, or heathen diviniti[illegible], ſuppoſed to preſide over fountains and rivers.

Strabo ſays, the *Naiads* were prieſteſſes of Bacchus.

What we learn of them in general is, that they were ſuppoſed to live in the palaces of the preſiding deities of fountains, lakes, and rivers. We have the names of no leſs than ſixteen of theſe deities, given us by Virgil, Georg. iv. ver. 336 to 340; and 343 to 345; in his account of Cirene's apartment only, in the watery palace of Peneus: and Ovid, lib. iii. el. 6. ver. 64. ſpeaks of a hundred, at leaſt, in the river Anio. They had often a name from the particular river they inhabited. They are deſcribed with long, bright hair, flowing down their ſhoulders; their faces ſhould have a ſhining, humid look, not unlike the Venus Anadyomene, of Apelles: their ſhape ſhould be fine, and their limbs well turned. Their robes, when they wear any, for they are moſt commonly quite naked, ſhould be of a greenith caſt; varied at pleaſure, ſome into lighter, and ſome into darker ſhades; and ſo thin, that you might diſcover all the turn of their limbs, and the fineneſs of their ſkin through them. They have ſometimes little flying veils, in gems of the ancients, over their heads; like thoſe goddeſſes of the air, which the Romans called Auræ, and which we call Sylphs. It was the uſual employment of the *Naiads* to attend at feaſts and they ſeem to have been little better than ſo many domeſtics to the preſiding water-deities. Spence.

NAIANT, or NATANT, q. d. ſwimming; a term in *Heraldry*, uſed in the blazoning of fiſhes, when drawn in a horizontal poſture; feſs-wiſe, or tranſverſely, acroſs the eſcutcheon; that being their natural ſwimming poſture.

NAILING *of cannon*, the driving of a nail, or iron ſpike, by force into the touch-hole of a piece of artillery; ſo as to render it for ſome time uſeleſs to the enemy.

NAILS, in *Anatomy*, a kind of horny excreſcences, growing over the ends of the fingers and toes of men, and ſeveral other animals; much of the ſame nature with the hoofs of others.

Hoofs are nothing elſe but a number of ſmall huſks, anſwering to ſo many papillæ of the ſkin; and it may be concluded, that *nails* are no more than the covers or ſheaths of the papillæ pyramidales of the ſkin, on the extremities of the fingers and toes, which dry, harden, and lie upon one another.

Their uſe is to ſtrengthen and defend the ends of the fingers in handling any hard and rugged bodies; that part being exceedingly ſenſible, by reaſon of the great number of nerves which terminate here for the ſenſation of feeling.

The *nails* are formed, and grow, after the ſame manner as the reſt of the body; their nouriſhment they receive from their roots, as is eaſily obſervable from the white ſpecks ſometimes ſeen on them, and which conſtantly recede from the root.

Dr. Pozzi endeavours to prove, that the *nails* grow out of the tendons, which are ſpread upon the laſt phalanx of the fingers and toes.

The Romans were very curious in the cutting and forming the *nails*, and had it done by artiſts, who made an employment of it.

The Chineſe doctors and literati pique themſelves on the exceſſive length of their *nails*. F. le Compte ſays, ſome of them wear *nails* near as long as their fingers.

NAILS, in *Building*, &c. are little metalline members, ſerving to bind or faſten the parts together, &c.

The ſeveral kinds of *nails* are very numerous. As *hack nails*; made with flat ſhanks to hold faſt, and not open the wood. *Clamp nails*, thoſe proper to faſten the clamps in buildings, &c. *Claſp nails*, whoſe heads are flatted, and claſping and ſticking into the wood, render the work ſmooth, ſo as to admit a plane over it: the moſt common in building are diſtinguiſhed by *10d. 20d. 2s.* &c. *Clench nails*, thoſe uſed by boat, barge, &c. builders, with boves or nuts, and often without: for fine work, they are made with claſp heads, or with the head beat flat on two ſides. *Clout nails*, thoſe ordinarily uſed for nailing on of clouts to axle-trees; they are flat headed *nails*, and iron work is uſually fixed with theſe *nails*. *Deck nails*, thoſe proper for faſtening of decks in ſhips, doubling of ſhipping, and floors laid with planks. *Dog nails*, or *jobent nails*, proper for faſtening of hinges to doors, &c. *Flat points* are of two kinds, viz. *long*, much uſed in ſhipping, and proper where there is occaſion to draw and hold faſt, yet no neceſſity of clenching; and *ſhort*, which are fortified with points, to drive into oak or other hard wood. *Lead nails*, uſed to nail lead, leather, and canvas, to hard wood: theſe are *clout nails* dipped in lead or ſolder. *Port nails*, commonly uſed to nail hinges to the ports of ſhips. *Ribbing nails*, uſed to faſten the ribbing, to keep the ribs of ſhips in their place in building. *Roſe nails* are drawn four-ſquare in the ſhank, and commonly in a round tool. *Rother nails*, chiefly uſed to faſten rother-irons to ſhips. *Scupper nails*, much uſed to faſten leather and canvas to wood. *Sharp nails*, much uſed, eſpecially in the Weſt-Indies, made with

with sharp points and flat shanks. *Sheathing nails*, used to fasten sheathing-boards to ships: the rule for their length is, to have them full three times as long as the board is thick. *Square nails*, of the same shape as *sharp nails*; chiefly used for hard woods. BRADS, long and slender, without heads, chiefly used for thin deal work, to prevent splitting. To which may be added *tacks*; the smallest serving to fasten paper to wood; middling, for wool-cards and oars; and larger, for upholsterers and pumps. They are distinguished by the names of white *tacks*, 2*d* 3*d*. and 4*d*. *tacks*.

Nails are said to be toughened, when too brittle, by heating them in a fire-shovel, and putting some tallow or grease among them.

Nails are sold six score to the hundred.

NAIL, in the *Manege*. The different position of the *nails* of the bridle, or left hand of the horseman, gives the horse a facility of changing hands, and forming his departure, and stop; by reason that the motion of the bridle follows such a position of the *nails*. To give a horse head, you must turn the *nails* downwards. To turn the horse to the right, you must turn them upwards, moving your hand to the right. To change to the left you must turn the *nails* down, and bear to the left. To stop the horse you must turn them upwards, and lift up, or raise your hand.

NAIL is also a sort of long measure, chiefly used in the commerce of cloths; containing the sixteenth part of a yard.

NAIRANGIA, formed from the Arabic *nairun*, the plural of *nur*, *light*, a kind of divination, in use among the Arabs, drawn from the several phenomena of the sun and moon.

NAIRES, NAHERS, or NAYERS, in *Modern History*, a name which is given by the Malabarians to the military of their country, who form a very numerous class or tribe, out of which the sovereigns of Malabar chuse their body-guard.

NAISSANT, in *Heraldry*, is applied to a lion, or other animal, shewing only the head, shoulders, fore-feet, and legs, with the tip of the tail; the rest of the body lying hid under the shield, or some charge, or ordinary thereon; from which it appears to be issuing or arising. See *Tab. Heraldry, fig.* 28.

Naissant differs from ISSUANT, as the animal in the former case issues out at the middle, and in the latter at the bottom of the shield or charge.

F. Menestrier says, *naissant* is only used for animals, which shew the bare head as arising out of the extremity of the chief, or from above the fesse.

NAKED, in *Architecture*. NAKED of a wall, &c. is the surface, or plane, from whence the projectures arise; or which serves as a ground to the projectures. See *Tab. Architect. fig.* 24.

Thus, we say, a pilaster ought to exceed the *naked* of the wall by so many inches; and that the foliages of a capital ought to answer to the *naked* of the COLUMN.

A flooring is said to be *naked*, before the boards are laid over the joists: the *naked* roofing or carcasing is applied to the roof before the tiles are laid on the rafters.

NAKED *fire*, is a term used by chemists for an open fire; or one where the containing vessel is immediately exposed to the FIRE.

NAKED *seeds*, in *Botany*, are such seeds of plants as are not inclosed in any pod, or case.

NAKED *stalk*, or *leaf*, among *Botanists*. See STALK and LEAF.

NAKIB, in the *Oriental Dignities*, the name of an officer who is a deputy to the cadilisker, or, as he may be called, the lord high chancellor of Egypt, appointed by the grand signior. His office is to carry the standard of Mahomet.

NAKIR, a word used by some medical writers to express a violent flatulence which passes from one limb to another, and is always attended with pain.

NAKOUS, an Egyptian musical instrument, made like two plates of brass, and of all sizes, from two inches to a foot in diameter; they hold them by strings fastened to their middles, and strike them together so as to beat time. They are used in the Coptic churches, and in the Mahometan processions.

NAL *la appella*, in *Botany*, a name used in the Horius Malabaricus to express an Indian shrub, or tree, from the roots of which they obtain an oil of a gold-yellow colour, and very agreeable smell, called *appel* oil. It is of a bitterish and sharp taste, and is in great esteem among them in pains of the head.

NAM. See NAAM.

NAMA, in *Botany*, a genus of the *pentandria digynia* class: the characters of which are, that the calyx is composed of five leaves; the corolla is divided into five segments; and the fruit is a single-celled capsule, with two valves. There are two species.

NAMAMTIA, in *Ichthyology*, a name given by the French to the *manati*, or SEA *cow*.

NAMATION, NAMATIO, in *Law*, the act of distraining or taking a DISTRESS. See NAAM.

In Scotland the word is particularly used for impounding. See POUND.

NAME, denotes a word whereby men have agreed to express some idea; or which serves to denote or signify a thing or subject spoken of.

This the grammarians usually call a NOUN, *nomen*, though their *noun* is not of quite so much extent as our *name*.

Seneca, lib. ii. de Beneficiis, observes, that there are a great number of things which have no *name*; and which, therefore, we are forced to call by other borrowed *names*. *Ingens est*, says he, *rerum copia sine nomine, quas cum propriis appellationibus signare non possumus, alienis accommodatis utimur*: which may shew why, in the course of this Dictionary, we frequently give divers senses to the same word.

It was Adam that first gave things their *names*, Genesis, ii. 19.

Names are distinguished into *proper* and *appellatives*.

NAMES, *proper*, are those which represent some individual thing or person; so as to distinguish it from all other things of the same species. As Socrates, which represents a certain philosopher.

NAMES, *appellatives*, or *general*, are those which signify common ideas; or which are common to several individuals of the same species,—as, horse, animal, man, oak, &c.

Proper names are either called *Christian*, as being given by us at baptism; or *surnames*: the first, imposed for distinction of persons; answering to the Roman prenomen.

The second, for the distinction of families, answering to the nomen of the Romans, and the patronymicum of the Greeks.

Originally, every person had but one *name*; as among the Jews, Adam, &c. among the Egyptians, Busiris; among the Chaldees, Ninus; the Medes, Astyages; the Greeks, Dionysius; the Romans, Romulus; the Gauls, Divitiacus; the Germans, Ariovistus; the Britons, Cassibelan; the English, Hengist, &c. and thus of other nations, except the savages of mount Atlas, whom Pliny and Marcellinus represent as anonymi, *nominis*.

The Jews gave the *name* at the circumcision, viz. eight days after the birth: the Romans to females the same day, and to males on the ninth; at which time they held a feast, called *nomenclatio*.

Since Christianity has obtained, most nations have followed the Jews, baptizing, and giving the *name*, on the eighth day after the birth, though this is far from being an uniform practice; our English ancestors generally baptized, and gave the *name*, on the birth-day.

The first imposition of *names* was founded on different views, among different people; the most usual was to mark the good wishes of the parents, or to intitle the children to the good fortune a happy *name* seemed to promise. Hence, Victor, Castor, Faustus, Statorius, Probus, &c.

Accordingly, we find such *names*, by Cicero called *bona nomina*, and by Tacitus, *fausta nomina*, were first first inrolled, and ranged in the Roman musters; first called to serve at the first sacrifices in the foundation of colonies, &c. And on the contrary, Livy calls Atrius Umber, *abominandi ominis nomen*: and Plautus, on occasion of a person named Lyco, i. e. Greedy wolf, says;

Visast nunc facite conjecturam, caterum
Quid id sit hominis, cui Lyco nomen sit.

Hence, Plato recommends it to men to be careful in giving happy *names*; and the Pythagoreans taught expressly, that the minds, actions, and successes of men, were according to their *names*, genius, and fate. Thus, Panormitan, *Ex bono nomine oritur bona præsumptio*; and thus the common proverb, *Bonum nomen bonum omen*: and hence the foundation of the Onomomantia.

Hence Camden takes it for granted, that the *names*, in all nations and languages, are significative, and not simple sounds, for mere distinction sake. This holds not only among the Jews, Greeks, Latins, &c. but even the Turks; among whom Abdalla signifies God's servant; Soliman, peaceable; Mahomet, glorified, &c. And the savages of Hispaniola, and throughout America, who, in their languages, *name* their children, Glittering Light, Sun-bright, Fine Gold, &c. And they of Congo, by the *names* of precious stones, flowers, &c.

To suppose *names* given without any meaning, however by the alteration of languages their signification may be lost, that learned author thinks, is to reproach our ancestors; and that contrary to the sense of all ancient writers. Porphyry notes, that the barbarous names, as

he

he calls them, were very emphatical, and very concise: and accordingly, it was esteemed a duty to be *agnomina*, or *sui nominis conditores*, as Severus, Probus, and Aurelius are called *sui nominis imperatores*.

And it was the usual way of giving *names*, to wish the children might discharge their *names*. Thus when Gunthram, king of France, named Clotharius at the font, he said *Crescat puer & hujus sit nominis executor*.

The ancient Britons, Camden adds, generally took their *names* from colours; because they painted themselves; but these names are now loft, or remain hid among the Welsh. When they were subdued by the Romans, they took Roman *names*; some of which ftill remain, corrupted; though the greateft part are become extinct, upon the admiffion of the Engliſh Saxons, who introduced the German *names*, as Cridda, Penda, Oſwald, Edward, &c. The Danes, too, brought with them their *names*; as Swayne, Harold, Knute, &c.

The Normans, at the Conqueſt, brought in other German *names*, as originally ufing the German tongue; ſuch as Robert, William, Richard, Henry, Hugh, &c. after the ſame manner as the Greek *names*, Afpafius, Boethius, Symmachus, &c. were introduced into Italy, upon the diviſion of the empire. After the Conqueſt, our nation, which had been averſe to foreign *names*, as deeming them unlucky, began to take Hebrew *names*, as Matthew, David, Samſon, &c.

The various *names* anciently, or at preſent, obtaining among us, from what language or people ſoever borrowed, are explained by Camden in his Remains.

Of late years it has obtained among us to give *ſurnames for Chriſtian names*; which ſome diſlike, on account of the confuſion it may introduce. Camden relates it as an opinion, that the practice firſt began in the time of Edward VI. by ſuch as would be godfathers, when they were more than half-fathers. Upon which, ſome were perſuaded to change their *names* at confirmation; which, it ſeems, is uſual in other countries. Thus, two ſons of Henry II. of France, chriſtened Alexander and Hercules, changed them at confirmation into Henry and Francis.

In monaſteries, the religious aſſume new *names* at their admittance; to ſhew they are about to lead a new life, and have renounced the world, their family, and even their *names*: v. g. Siſter Mary of the Incarnation, Brother Henry of the Holy Sacrament, &c.

The popes alſo change their *name* at their exaltation to the pontificate; a cuſtom firſt introduced by pope Sergius, whoſe *name*, till then, as Platina informs us, was Swinefnout. But Baronius refers it to pope Sergius I. and Onuphrius to John XII. or XIII. and at the ſame time adds a different reaſon for it from that of Platina, viz. that it was done in imitation of St. Peter and St. Paul, who were firſt called Simon and Saul. Indeed pope Marcellus, of late, refuſed to change his *name*.

In Italy, it is frequent to join the *name* of ſome ſaint, in a kind of devotion to the Chriſtian *name*; as Joannes Baptiſta Spinola, &c.

Among the ancients, thoſe deified by the heathen conſecrations had new *names* given them; as Romulus was called Quirinus, Melicertes, Portunus, or Portumnus, &c. New *names* were alſo given in adoptions, and ſometimes by teſtament: thus L. Æmilius, adopted by Scipio, took the *name* of Scipio Africanus; and thus Auguſtus, who at firſt was called C. Octavius Thurinus, being adopted by the teſtament of Julius Cæſar into his *name* and family, took the *name* of Caius Julius Cæſar Octavianus. *Names* were alſo changed at enfranchiſements into new cities. Thus Lucumo, at his firſt being made free of Rome, took the *name* Lucius Tarquinius Priſcus, &c. and ſlaves, when made free, uſually aſſumed their maſters *names*.

Thoſe called to the equeſtrian order, if they had baſe *names*, were always new-named, *nomina ingenuorum accipiunt Romanorum*. And among the primitive Chriſtians, it was the practice to change the *names* of the catechumens: thus the renegado Lucianus, till his baptiſm, was called Lucius.

NAME, *generical*. See GENERICAL.

NAME, *ſpecific*. See SPECIFIC.

NAME, *of the*, is a phraſe, frequent among *Hiſtorians* and *Genealogiſts*, to denote perſons of the ſame quality, and *name*. It is near nine hundred years ſince the emperors of the Weſt firſt began to diſtinguiſh themſelves in this manner by their number: and in the Italia Sacra of Ughellus, we meet with a charter of the emperor Louis le Debonnaire, ann. 818, wherein that prince ſtyles himſelf the firſt *of the name*. Le Blanc mentions a charter of the year 1084, wherein the emperor Henry III. ſtyles himſelf King of Italy, the fourth *of the name*, and emperor the third *of the name*.

Some French writers obſerve, that in a manuſcript preſerved in the king's library, their Lewis XI. is only ſtyled the ninth *of the name*; Louis the Debonnaire, and Louis the Stammerer, not being then reckoned in the number, becauſe they were emperors, as well as kings of France: on which footing, the preſent king, inſtead of the ſixteenth, ſhould only be the fourteenth *of the name*.

NAMIUM, NAAM, in *Law*. See NAAM.

NAMIUM *vetitum*, or *prohibitum* NAAM, is an unjuſt taking the cattle of another, or driving them to an unlawful place, pretending damages done by them.

Such, e.g. is that when the bailiff of a lord diſtrains beaſts or goods, and the lord forbids his bailiff to deliver them, when the ſheriff comes to replevy them; and to that end, drives them to places unknown. Or when, without any words, they are ſo cloſe-hid, as that they cannot be replevied. Divers lords of hundreds, and courts-baron, have power to hold plea de *namio vetito*.

In ſuch caſe, the owner of the cattle may demand ſatisfaction for the injury, which is called *placitum de namio vetito*.

NAMUR *marble*. See LUCULLEUM *marmor*.

NANDI *arvatum*, in *Botany*, the name of a ſmall ſhrub which grows in the Eaſt Indies, the whole of which is baleſcent. The juice expreſſed from it, mixed with oil, eaſes pains of the eyes, if the head is anointed therewith; the root maſticated, and held in the mouth, eaſes the tooth-ach; and the ſame boiled in oil, makes a good ointment for all indiſpoſitions of the head, eſpecially pain; bruiſed, and taken in water, it kills worms; bruiſed with the juice of lemon, and put into the eyes, it removes ſpilms.

NANTES, or *ſcumming*, in the Linnæan ſyſtem, is the name of an order of animals under the claſs of AMPHIBIA; the characters of which are, that they are pinnated, and breathe by lateral branchiæ or gills. This order comprehends fourteen genera, and ſeventy-ſix ſpecies. To this order belong the PETROMYZON, RAJA, SQUALUS, &c.

NANTES, *edict of*, in *Eccleſiaſtical Hiſtory*, a famous edict drawn up at *Nantes* in the year 1598, by which Henry IV. granted to the profeſſors of the reformed or Proteſtant religion, the liberty of ſerving God according to their conſciences, and a full ſecurity for the enjoyment of their civil rights and privileges, without perſecution or moleſtation from any quarter. This edict reſtored and confirmed, in the fulleſt terms, all the favours that had ever been granted to the Proteſtants by other princes, and particularly by Henry III. To theſe privileges others alſo were added, which had never been granted, nor even demanded before: ſuch as free admiſſion to all employments of truſt, honour, and profit; the eſtabliſhment of courts and chambers, in which the profeſſors of the two religions were equal in number; and the permitting the children of proteſtants to be educated, without any moleſtation or conſtraint, in the public univerſities. This edict was revoked by Lewis XIV. at the inſtigation of the biſhops and Jeſuits, in the year 1685; the conſequence of which event was very beneficial to almoſt all the proteſtant countries of Europe; and more eſpecially to the commerce of Holland and England. The number of refugees, who on this occaſion fled from France, and carried their ſkill and induſtry in various manufactures to other countries, was, at a moderate computation, more than half a million.

NAPÆA, in *Botany*, a genus of the *monadelphia polyandria* claſs. Its characters are theſe: it hath male and hermaphrodite flowers on diſtinct plants; the male flowers have pitcher-ſhaped empalements of one leaf; the flowers have five oblong petals, which are connected at their baſe; and have many hairy ſtamina, which are joined at the bottom into a ſort of cylindrical column; the hermaphrodite flowers have the like empalement, petals, and ſtamina, as the male; and have a conical germen, ſupporting a cylindrical ſtyle, divided at the top into ten parts crowned by ſtigmas; the germen turns to an oval fruit, incloſed in the empalement, divided into ten cells, each containing one kidney-ſhaped ſeed. There are two ſpecies, natives of North America.

NAPE is uſed for the hind-part of the neck; by reaſon, perhaps, of the ſoft ſhort hair growing thereon, like the nap of cloth.

NAPELLUS. See ACONITE.

This plant is poiſonous in ſome places, and innocent in others. Its mortal quality increaſes with the heat of the climate, and goes off where that is ſmall. In the ſouth of France, it is a fatal poiſon; in Bretagne, they find the roots inoffenſive to the moſt tender conſtitutions; and farther north, they eat the leaves among their ſallad herbs, to get them an appetite, and find them a ſafe and wholeſome food.

It is ſaid the *napellus* may be ſo corrected by volatile ſalt of tartar, as to become innocent.

Dr. Hill makes the *napellus* a species of aconite.

NAPESCA, a name given by some to a species of *jujube*.

NAPHA, a name given by many of the writers in pharmacy to *orange-flower water*.

NAPHTHA, in *Natural History*, the name of a genus of fluid fossils, the characters of which are, that they are of a thin consistence, bright and pellucid, of a strong smell, very readily inflammable, and, when pure, burning away, without leaving any residuum.

The word in the original Chaldee signifies *filtrare, to ooze*, or *drip*; *naphtha*, according to Pliny, running like a kind of bitumen.

Of this genus there are only two species, the one commonly known by the name of *naphtha*, the other by that of PETROLEUM. The first is a pure and clear mineral fluid, of a much thinner consistence than any of the expressed oils of vegetables, and something thinner than the finer of the distilled ones; it is of a pale yellow, with a faint cast of brown among it, and is, indeed, of the very colour of the common brown amber used by the apothecaries. It is of a brisk, penetrating smell, something like that of the chemical oil of amber, but not so offensive; it is extremely inflammable, and is found floating on the waters of certain springs which break out at the sides of hills in Persia, Tartary, China, and other parts of the East, as in Chaldæa, particularly the place where stood the ancient Babylon; and found also in some provinces of Italy and France, particularly Auvergne, and near Ragusa.

Naphtha is found swimming on the surface of the water of some springs. It is usually of a black colour; though that found in certain springs about Babylon is said to be whitish.

That of France is soft and black, like liquid pitch, and of a fetid smell; that of Italy is a kind of petrol, or a clear oil, of various colours, oozing out of a rock, situate on a mountain in the duchy of Modena.

It seems very practicable, by means of this mineral fluid, and a proper acid, to make a sort of artificial amber, this being only a kind of fluid amber.

The second kind, commonly known by the name of *petroleum*, is a thin, subtile, and penetrating fluid, much thinner than the yellow *naphtha*, and as fine as the clearest distilled oils of vegetables. It is of a very strong and penetrating smell, and is of various colours; it is naturally of a clear, fine, and bright white, and nearly as pellucid as the purest spring water; but it is more frequently found brown, reddish, or blackish. It is produced in almost all parts of the world; England, France, and Germany, afford it in many places, but it is most plentifully found in Italy.

Naphtha is esteemed penetrating, resolutive, and vulnerary; but its virtues are but little known in medicine: its chief use is in lamps, &c. on account of its inflammability.

The Turks call the *naphtha earth fakin, black muscle*, to distinguish it from pitch. Vossius has an express treatise on *naphtha*, ancient and modern: he says, it is a flour of bitumen, and of more virtue than any other bitumen.

Naphtha has much the same medical virtues with PETROLEUM, only in a more remiss degree. In Persia, it is used externally on many occasions, and also given inwardly in colics, a few drops being the dose.

NAPIER'S, or NEPER'S *bones*. See NEPER'S *bones*.

NAPLES *yellow*, the common name in the colour shops of London, and among our painters, for the substance called GIALLOLINO.

NAPUS, *navew*, in *Botany*, a species of the *brassica*, or CABBAGE, of which there are two varieties, viz. the garden, or sweet *navew*, and the wild *navew*, or rape.

The roots of the garden *navew* are warmer and more grateful than those of the common turnep, and are said to afford, in their decoction, a liquor beneficial in disorders of the breast; as coughs, asthmas, and consumptions.

The seeds are roundish, of a reddish colour, and of an acrid and biting taste. They are accounted detersive, incisive, aperitive, and digestive, and said to be good in malignant fevers, and the small pox, and are an ingredient in the Venice treacle. In their quality they nearly resemble mustard-seed, to which they are inferior. See COLE-*seed*.

Nape, or *rapeseed*, is made from the seed of the *napus folesseris hibernis*, which grows on dry banks, and among corn, often called NAVETTE, and the oil *navetta oil*.

NAPUS, in *Natural History*, a name given to a species of *volutes*, approaching to the nature of the famous admiral shell, and more commonly known by the name of the *false admiral*, or *bastard* ADMIRAL.

NAPUT, in *Botany*, the name given by the Norwegians to a plant whose root is an excellent remedy for the colic. It grows plentifully in the northern parts of Norway, and is the constant remedy used by the miners for their colics, which are particularly severe. The taste is said to be agreeable, being at first chewing somewhat like a radish, but afterwards having the flavour of the garden angelica. Phil. Trans. N° 114.

NARCAPHTHON, in the *Materia Medica*, the name given by many to the bark called CASCARILLA.

NARCE, νάρκη, a torpor, stupor, or dullness of sensation; used either for a natural stupidity, or for that stupefaction of the senses brought on by medicines, to alleviate the violence of pains.

NARCISSITES, in *Natural History*, a name given by some authors to a species of ASTEROPODIUM, from its supposed resemblance to the flowers of the narcissus; others have called some of the coralloide fungites by that name, and others a species of echinites of the pileated kind.

It is, however, a name that none of them have any title to, since the resemblance will appear very small when nicely considered.

NARCISSOLEUCOIUM, in *Botany*. See SNOW-*drop*.

NARCISSUS, the *daffodil*, in *Botany*, a genus of the *hexandria monogynia* class. Its characters are these: the flowers are included in an oblong compressed spatha, or sheath, which tears open on the side, and withers; the flowers have a cylindrical funnel-shaped empalement of one leaf, which is spread open at the brim; they have six oval petals on the outside of the nectarium, which are inserted above their base, and six awl-shaped filamina fixed to the tube of the nectarium, terminated by oblong summits; they have a three-cornered, roundish, obtuse germen, situated below the flower, which afterwards turns to an obtuse, roundish, three-cornered capsule, with three cells filled with globular seeds.

Linnæus reckons thirteen species, and Miller more, comprehending a great number of varieties, which are much esteemed for their strong sweet scent; though it often proves too strong for some constitutions, and should not therefore be planted too close to habitations, nor the flowers be placed in rooms where company is entertained.

The common sorts of daffodil are generally placed in borders, where they afford an agreeable variety with other bulbous-rooted flowers. They are hardy, and will thrive in almost any soil or situation.

NARCOS, in *Ichthyology*, a name given by Joannes Cuba, and other writers, to the TORPEDO, or cramp-fish: a species of raia, distinguished by Artedi by the name of the *raia laevis*, the wholly smooth raia.

NARCOSIS, a stupefaction or insensible state, whether brought on by medicines, or happening from natural causes.

NARCOTICS, from the Greek ναρκωτικος, or ναρκωτικα, *narcotica*, in *Medicine*, opiates, or medicines that excite drowsiness and sleep. See OPIATE.

Narcotics, called also *hypnotics*, and *soporifics*, act by calming and diminishing the motion of the blood and spirits.

Authors are of various opinions as to the manner wherein *narcotics* operate: the ancients tell us, it is by their being cold in nature, whereby they stupify and deaden the spirits. Etmuller, after Willis, takes the animal spirits to be composed of a fluid, volatile salt; and thinks they are dissolved by the mixture of sulphurs and oils, wherewith *narcotics* abound. M. Andry's opinion is, that the salt of *narcotics* dissolves in any liquor whatever; and that their ramous branches, becoming thus disengaged from the salts, are embarrassed among one another, and thus stop the course of the blood and spirits. Others think, that *narcotics* close the orifices of the nerves, and thus block up the passage of the spirits. Lastly, Linden, in his treatise de Venenis, thinks, that the operation of *narcotics* is not the same in all; drowsiness being producible from a great variety of different causes. See SLEEP.

In disorders of the stomach and intestines, all things which induce a stupor are very cautiously, or never at all, to be exhibited; because no kind of medicines is so pernicious and injurious to the tone and motion of the nervous parts. To preserve health, and prevent diseases, nothing is so effectual as to maintain the tone, strength, and motion of what they call the *primæ viæ*, or first passages, because that most salutary excretion which is performed by stool, and discharges the fæces, which are the recrements remaining after digestion, or are collected from all parts of the body, depends chiefly thereon. Where this evacuation is suppressed, or else performed after a slow and remiss manner, a deluge of vicious humours is soon collected, and becomes the cause, as well as fomenter, of diseases. Now there is nothing which so effectually diminishes the peristaltic motion of the intestines, and suppresses intestinal excretion, as sedatives and anodynes, the truth of which is attested by experience; for as all remedies, so especially those which are

of

of a drastic quality, exert their efficacy first and principally upon the stomach and intestines.

NARDINUM *unguentum, ointment of spikenard*, an ointment greatly celebrated among the ancient writers in medicine. It seems to have been variously prepared, but always with a great number of aromatic ingredients, and always with *spikenard* for the basis.

Dioscorides says, that the *malabathrum*, or Indian leaf, was sometimes an ingredient in it, but that it was also sometimes made without it. It was generally, however, mixed with the *oleum balaninum*, or *ompbacinum*, impregnated with an addition of schœnanth; and to increase its fragrancy there were added, costus, amomum, myrrh, and balm of Gilead.

The finest was accounted that which was of a thin consistence, and very fragrant smell. It was said to be attenuating and detersive, but somewhat acrimonious; and was sometimes, for particular uses, reduced to a solid consistence with resin.

NARDUS, in *Botany*. See SPIKENARD.

NARDUS *rustica*, in *Botany*, a name attributed by some authors to the *asarabacca*, and by others to the *bacchoris Monspeliensium*.

NARES *piscium*. The *nostrils* in fish are placed so very variously, and have so many differences in number, figure, situation, and proportion, that they make a very essential series of characters, for distinguishing the genera and species one from another. In regard to number: 1. Some fish have them not at all, as the petromyzons. 2. Many fish have one *nostril* on each side, placed in the manner of those of birds and of quadrupeds, as the chamæpterus, &c. 3. Many have them placed two on each side, as the cyprini, perca, &c.

In regard to figure, they are, 1. In some round, as all four are in the gadi, and the two anterior ones in the conger, mackrel, &c. 2. Some are oval, as the posterior pair in the conger, &c. And, 3. Many are oblong.

As to their situation, they also differ much. 1. Some are placed very near the snout or rostrum, as the clupeæ; and the anterior tubulose foramina, in the conger or eel, are also of this kind. 2. In many kinds of fish they are placed near the eyes, as in the pike, the pearch, and the like. And, 3. In some they are placed as it were at a middle distance between the eyes and the end of the snout, as in the ammodytæ, or sand-eels, &c.

The *nares* of fish differ also in proportion: in those fishes which have two pairs of these holes, they are, 1. In some very near one another, so as almost to touch: they are thus placed in the cyprinus and clupea, &c. 2. They are placed at great distances, which is the case in the conger, the pearch, and many others. According to these variations, the *nostrils*, though a part in general very little attended to, yet become of notable use in distinguishing the species. Artedi.

NARIPUSORIA, a name given by authors to such medicines as were meant to be instilled into the nostrils, for disorders of the head and eyes.

NARINARI, the Brasilian name of a fish of the *aquila marina* kind, called by the Dutch *pijlstert* and *sticle*.

It is very large and flat, and the figure of its body is nearly triangular, its sides or wings being very broad, and larger; the head is very large, and has a furrow down its middle; the mouth is somewhat triangular, but rounded at the corners; it has no teeth; but in the place of them has a bone in the under part of its mouth in the shape of a tongue, of four fingers long, and a finger and half broad, and a smaller bone of the same shape in the upper part; between these it crushes its prey; the body is usually a foot and a half long, and the tail four feet; its flesh is finely flavoured.

The bones of this and the like fishes mouths, are the fossile *linguæ serpentis*.

NARIS *externus alius*, in *Anatomy*, a name given by Riolanus to one of the muscles of the nose, the use of which, he says, is to dilate the ala of the nose, without any elevation of the nose itself. It is called by Albinus the *compressor naris*, and by Winslow *the transversalis*, or *inferior nasi*. Cowper calls it the *elevator alæ nasi*, and Santorini the *transversus nasi*.

NARONICÆ *radix*, in the *Materia Medica*, a name given by some authors to the IRIS root.

NARRATION, in *Oratory* and *History*, a recital, or rehearsal of a fact as it happened, or as it is supposed to have happened.

Narration is of two kinds: either *simple*, and *historical*; as where the auditor or reader is supposed to hear or read of a transaction at second-hand: or *artificial*, and *fabulous*; as where their imaginations are raised, and the action is, as it were, re-acted before them.

The *narration*, according to the writers of rhetoric, makes the second part of a just speech, or harangue; viz. that immediately following the exordium.

It makes the whole of a history; abating for the occasional reflections, episodes, and digressions.

Cicero, Orat. Part. c. 9. requires four properties in a good *narration*; viz. perspicuity, probability, brevity, and sweetness.

The *narration* is rendered perspicuous, by observing the order of time, by using none but proper and known terms, with short, though full and explicit sentences, joined by proper particles, shewing their connection and dependence, and by reciting the action uninterruptedly, and with suitable transitions.

It is rendered probable, by the credibility of the narrator, by the simplicity and openness of the *narration*, by avoiding every thing far remote from the common sense and opinion of mankind, and by a precise detail of circumstances.

It is rendered brief, by taking it up no higher than is just necessary; nor fetching it back, as that impertinent author in Horace. *Ab ovo bellum Trojanum orditur ab ovo*; and by avoiding trivial circumstances.

Lastly, it is rendered sweet, pleasant, or entertaining, by using smooth, numerous, and well-sounding words; by arranging them, so as to avoid any hiatus, or gaping; by the greatness, novelty, and unexpectedness of the things related; and by enriching it with tropes and figures: as, frequent admirations, exclamations, interrogations, expectations, suspenses, surprising events, by grief, joy, fear, &c. See NUMBERS, CADENCE, and TROPE.

NARRATION, in *Poetry*, is used more particularly for the action, or event, that makes the subject of an epic poem.

P. Bossu observes, that the actions in poetry are equally susceptible of the two kinds of oratorial *narration*, and that each constitutes a particular species of poetry.

Those under the artificial, or active form, are now called *dramatic*.

And those only related by the poet, who here personates an historian, are called *epic*.

In the drama, the *narration* is the whole of the piece; in the epopœa, it is only a part, though in effect it is the principal part, and the main body of the poem. It is preceded by the proposition and invocation, which Bossu calls the preludes; and is frequently interrupted by the poet's speaking in person, demanding pardon, favour, &c.

The *narration* includes the whole action, episodified, with all its circumstances, and its ornaments.

It is in this part that the action is to be begun, carried on, and ended. It is this, which is to shew the causes of all that is related: in this the difficulties are to be proposed and resolved, and the persons, both human and divine, are here to shew their interests, their manners, and their qualities, by their actions, and their discourse; and all this is to be described with the beauty, the majesty, and force of verse, style, sentiments, comparison, and other ornaments proper to the subject in general, and to each thing in particular.

The qualities of the epic *narration* are, that it be agreeable, probable, moving, surprising, and active.

Horace speaks of the utile and dulce as on the same footing.

Bossu looks on the utile as an essential property; and the dulce as no more than an additional quality.

NARROW, in the *Manege*. A horse is said to *narrow*, when he does not take ground enough, or does not bear far enough out to the one hand or to the other. If your horse *narrows*, you must assist him with the inside rein, that is, you must carry your hand to the outside, and press him forward upon straight lines with the calves of your legs.

NARROW is also a term among bowlers. See BOWLING.

NARWAL, a name given to a fish of the whale kind, more frequently called the *sea*-UNICORN.

NASAL, something belonging to the nose, *nasus*. As, the nose-piece of a helmet, anciently called the *nasale*.

NASAL, in *Grammar*, &c. is applied to those sounds, or letters, in whose formation the nose is the principal organ; and particularly where the sound formed is passed through the nose.

In most English words, the sounds expressed by the characters *an*, *en*, *in*, *on*, *un*, are simple sounds, and proper *nasal* vowels. See M, N, &c.

NASALIA, in *Medicine*, a sort of remedies to be taken by the nose; called also ERRHINES.

NASAMMONITES, in *Natural History*, a name given by the ancients to a stone, which Pliny describes to have been of a blood-colour, variegated with veins of black. We know no stone which answers to this character at present, unless it be some of the agates, in a variegated state.

NASCALE, a sort of pessary, made of wool, cotton, or the

like, and introduced into the vagina, after being impregnated with proper ingredients.

NASDA, a word used by some medical writers for *napiform*, and seemingly a corruption of that word.

NASEBERRY-*tree*, in *Botany*. See *Star*-APPLE.

NASI *os*, in *Anatomy*, a thin bone, making the upper part of the NOSE.

NASITAS, a word used by some authors to express a speaking through the nose.

NASTOS, in *Botany*, a name by which Clusius and some other authors have called the reed, of which the common walking canes are made, which is the *arundo fortis* of other writers.

NASTURTIUM, in *Botany*. See CRESSES.

NASTURTIUM *aquaticum*. See MINT.

NASTURTIUM *Indicum*. See *Indian* CRESSES.

NASUS, in *Ichthyology*, the name of a fresh-water fish, common in the Rhine, the Danube, and most of the large rivers in Germany, though unknown in England, and called by different authors the *fimus*, *favetta*, and *phoxy-rynchos*.

Its general size is between six and twelve inches in length; in shape and colour it much resembles our chub. It is a loose and insipid-tasted fish, and very full of bones; they spawn in May, at which time the males are rougher than at any other season, and have their heads speckled with white spots, like the English rudd. At this time also they swim together in immense shoals, and the fishermen have sometimes caught two or three thousand of them in one night.

NATALIS, NATALIS *dies*, *or* NATALITIUM, properly signifies a man's birth-day. See NATIVITY.

The word was first used among the heathens, to signify the feast held on the anniversary of the birth-day of an emperor; whence it came, in time, to signify any sort of feast. And, accordingly, in the Fasti, we meet with *natalis Solis*, *natalis Isidis*, &c.

The primitive Christians, finding the word thus established, used it in the same manner; and hence we meet in the ancient martyrologists with *natalis cœnæ*, for the feast of the Supper, or Maundy-Thursday; *natalis cathedræ*, for the postification of St. Peter; *natalis* or *natalitium*, of such a church, for the feast of the dedication.

The word *genethlion* is used by the Greeks in the same sense as *natalis*, or *natalitium*, among the Latins.

NATALITII, *lusi*, NATALE *games*, were games introduced on the anniversaries of the birth-days of great men.

NATAL *ring*, *annulus* NATALITIUS, was a ring only worn on the birth-day.

NATANT *leaf*, in *Botany*. See LEAF.

NATES, in *Anatomy*, a term expressing those two fleshy posterior parts of the body, popularly called the *buttocks*; by the Latins *clunes*, or *nates*.

NATES *cerebri*, are two circular protuberances of the BRAIN, situate on the back-side of the MEDULLA *oblongata*, near the cerebellum.

NATION, a collective term, used for a considerable people, inhabiting a certain extent of ground, inclosed within fixed limits, and under the same government.

Each *nation* has its peculiar character; and it is proverbially said, *Light as a Frenchman*, *Wary as an Italian*, *Grave as a Spaniard*, *Serious as an Englishman*, *Fierce as a Scotchman*, *Drunken as a German*, *Idle as an Irishman*, *Deceitful as a Greek*, &c.

NATION is also used, in some universities, for a distinction of the scholars, and professors of colleges.

The faculty of Paris consists of four *nations*; viz. that of France, that of Normandy, that of Picardy, and that of Germany; which are again, excepting that of Normandy, distinguished into tribes; and each tribe has its deacon.

The German *nation* comprehends all foreign *nations*, English, Italian, &c.

When the procureur of the French *nation* speaks in public, his style is, *Honoranda Gallorum natio*; he of Picardy says, *Fidelissima Picardorum natio*; he of Normandy, *Veneranda Normannorum natio*; he of the *nation* of Germany, *Constantissima Germanorum natio*.

NATIONS, *law of*. See LAW.

NATIONAL *debt*, is the debt due by the state to the public, on account of monies borrowed and funded for defraying the charges of government.

In order to trace the origin of this debt, it is proper to be considered, that after the Revolution, when our connections with Europe introduced a new system of foreign politics, the expences of the nation, not only in settling the new establishment, but in maintaining long wars, as principals on the continent, for the security of the Dutch barrier, reducing the French monarchy, settling the Spanish succession, supporting the house of Austria, maintaining the liberties of the Germanic body, and other purposes, increased to an unusual degree; insomuch that it was not thought advisable to raise all the expences of any one year by taxes to be levied within that year, lest the unaccustomed weight of them should create murmurs among the people. It was, therefore, the policy of the times to anticipate the revenues of their posterity, by borrowing immense sums for the current service of the state, and to lay no more taxes upon the subject than would suffice to pay the annual interest of the sums so borrowed; by this means converting the principal debt into a new species of property, transferrable from one man to another at any time, and in any quantity; a system which seems to have had its original in the state of Florence, A. D. 1344, which government then owed about 60,000*l.* sterling; and being unable to pay it, formed the principal into an aggregate sum, called metaphorically a mount or bank, the shares whereof were transferrable like our stocks, with interest at 5 *per cent.* the prices varying according to the exigencies of the state. This laid the foundation of what is called the *national debt*; for a few long annuities created in the reign of Charles II. will hardly deserve that name. And the example then set has been so closely followed during the long wars in the reign of queen Anne, and since, that the capital of the *national debt* (including a valuation of the long and short and life-annuities, and the unfunded debt) amounted in 1761, to at least two hundred and eighteen millions, to pay the interest of which, and the charges for management, amounting annually to upwards of seven millions and a half, the extraordinary revenues mentioned under the article REVENUE (excepting only the land-tax, and annual malt-tax) are in the first place mortgaged, and made perpetual by parliament; but still redeemable by the same authority that imposed them; which, if it at any time can pay off the capital, will abolish those taxes, which are raised to discharge the interest. See FUND. Blackft. Comm. book i. p. 328.

NATIONAL *synod*. See SYNOD, and CONVENTION.

NATIVE is applied to a person considered as born in a certain place, or deriving his origin from it.

The more accurate writers distinguish between a *native* of a place, and one *born* there. Born signifies no more than the having been there produced, or brought into the world, whether that were the proper country or habitation of the parents, or whether they were there only by accident, as strangers, &c. Whereas *native* refers to the proper mansion or residence of the parents, and the family, and where the person has his education.

And hence a person may be a *native* of one place, and born at another: thus Jesus Christ is called a Nazarite, and Galilean, as a *native*, though he was born at Bethlehem in Judah.

NATIVE, *nativi*, in our *Ancient Law Books*, signified a person who was born a slave or villain.

By which he differed from one who had sold himself, or became a slave by his own deed, who was called a *homo*. See VILLAIN.

NATIVI *tenentes*, in our *Old Law-Books*, are those freemen who hold *native* land; i. e. land subject to the services of *nativi*. Spelm.

NATIVI *de stipite*, were villains or bond-men by birth or family. There were also *nativi conventionarii*, who were villains by contract or covenant. *Servi nimis alti natura, alii facti, alii empliones, alii redemptione, alii sua vel alterius datione.* LL. Hen. I. cap. 76

In Cornwall it was a custom, that if a freeman married *nativam* (that is, a neif) and brought her *ad liberum tenementum, & liberum herum*, and had two daughters, one of them was free, and the other a villain. Bract. l. 4. c. 21. See NEIF.

NATIVITY, *nativitas*, or *natal day*; the day of one's birth. The term is chiefly used in speaking of saints, &c. The *Nativity* of St. John Baptist, celebrated in the Romish church with great solemnity on the twenty-fourth of June; the *Nativity* of the Holy Virgin, a feast established by pope Sergius I. who was advanced to the see of Rome, in 687, and observed on the eighth of September, &c. When we say absolutely the *Nativity*, it is understood of that of Jesus Christ, or the feast of Christmas. See FEAST, CHRISTMAS, &c.

NATIVITY, *nativitas*, in *ancient Law Books*, signifies bondage, or servitude.

NATIVITY, in *Astrology*, the theme or figure of the heavens, and particularly of the twelve houses, at the moment when a person was born; called also the HOROSCOPE.

Casting the *nativity*, or by calculation seeking to know how long the queen should live, &c. was made felony, an. 23 Eliz. c. 2.

NATIVO *habendo*, in *Law*, a writ directed to the sheriff, for a lord who claimed inheritance in any villain, when his villain was run away from him, for the apprehending and restoring him to the lord.

NATIX, in *Natural History*, a name given by some old writers to the *neritæ*.

NATRIX,

NATRIX, in *Botany*, the name given by Rivinus to a genus of plants, nearly allied to the anonis, and comprehended with it in one genus by Linnæus, under the name of anonis. See REST-*harrow*.

NATRIX, in *Zoology*, the name of the common or water-snake, called also *torquata*, from the ring about its neck. It is much longer and larger than the viper, and is no water animal, properly speaking, but a land one, which being able to swim very well, often takes the water to hunt about for frogs, which are its principal food. It grows to be much longer and larger than the viper, and does not bring forth five young ones, but great numbers of eggs, which it lays in dunghills to be hatched by the warmth of the place, or by the heat of the sun.

It is very common in bushy places, and near waters, and in winter finds holes in the banks of ditches, or about the roots of trees, where it lies torpid the whole winter. It has no poison, and may be safely taken up and played with, never so much as attempting to bite. It feeds on many small insects, sometimes on vegetable substances, and oftener on frogs, mice, &c.

Its back is of a sort of dusky earth colour, and its belly variegated with black and a bluish white, but near the head almost wholly white, having only a few small spots of black at the sides, the colour growing darker toward the end of the tail; and near the end, the middle part of all the scales is black, and their extremities only of a bluish white; the whole belly is covered with long parallel scales, placed transversely. The back and sides are covered with small scales, and are variegated with several streaks and spots of black; there are more than eighty transverse black lines running from the back to the sides, and beside these, two other rows of smaller, in form of spots, near the middle of the back; the head is covered with large scales of a duskier colour than those of the rest of the body, and the upper jaw is white on each side, with four or five slight lines of black running across it; its chin is yellow, and is composed of two large spots of that colour, placed one on each side of the neck, or at each angle of the jaws, between which is placed a large triangular spot of a deep black, with its top directed toward the tail; it has none of those long canine teeth of the viper and other poisonous serpents, by means of which the poison is conveyed into the wound, but only two rows of small serrated teeth, designed by nature for no other use than eating its food.

It may not be judged improper to have been thus particular in the description of this species, as it is well to know what of the snake kind are, and what are not to be feared; and as the apothecaries and others, for want of these characters, often buy this common snake under the name of the viper. Ray.

NATRON, or ANATRON, in *Natural History*, a brownish kind of salt, taken out of a lake of stagnant water, in the desert of Nitria, in Egypt.

It is much of the nature of nitre; whence it is by many called *Egyptian nitre*, and is supposed to be the proper nitre of the ancients.

The lake whence it is obtained, is six or seven acres in extent, and lies about thirty miles west-and-by-south from Terana, and about the same distance north from the pyramids: from the bottom of this lake the salt called *natron* arises to the surface of the water, and is there condensed, by the heat of the sun, into the hard and dry form in which it is sold.

If four ounces of the water of the *natron* be examined by evaporation in a glass vessel, placed in a sand-heat, there will arise, as soon as it becomes warm, a sort of scum to the top; this being taken off, another instantly succeeds, and so on, so long as any water remains in the glass.

The salt, thus scummed off, is the same in all respects with the *natron*, or the Smyrna soap earth; being a fixed alkali, fermenting with acids, and boiling into soap with oil. This icy scum is the same as that called by Pliny *flos salis*, and seems to be the same with that which Herodotus says the Egyptians made use of in the preparation of their mummies. The ancients have attributed great virtues to the salt of this lake; and this being called *nitrum*, as a short name for *nitrium sal*, we have had some who have supposed the salt which we call *nitre*, to be the same, and these people have wondered that they did not find the same virtues in our *nitre*.

The mineral waters of all parts of the world seem to contain more or less of this salt, and to owe their virtues in a great degree to it; and, probably, it might be no small improvement to physic, to bring it more into the present practice. Molenbroch recommends it greatly in the stone; and it may be the more probably used, as all alkali salts are known to be good in that distemper. Some add to this, that it seems qualified to dissolve stony substances, it being of so piercing and penetrating a spirit, than no rock, or stone, is found about the lake from the waters of which it is procured. Phil. Trans. N° 160.

We learn from the account of the Voyages to the South Seas, published by Dr. Hawkesworth, that this salt, which is thought to be the true *natrum*, or nitrum of the ancients, is found in large quantities on the top of the mountain Teneriffe.

It is used in the whitening of linen; but it burns them, if not corrected by a mixture of ether.

The *natron* of Egypt, as described by Pliny, Matthiolus, and Agricola, is an alkali salt perforated in manner of a sponge, and of a lixivial taste.

Its principles Dr. Leigh takes to be chiefly two; viz. a sea-salt, and an urinous salt.

The first, he takes it for granted, it receives from the earth; the second, from air.

Dr. Huntington, who was on the spot, says the *natron* is thought to rise from the bottom of the lake; where, by the heat of the sun, it is condensed, and hardened into the form we see it in; but his opinion is, that it is rather separated by the sun from the water.

M. de la Chambre adds, that three or four days before the Nile begins to overflow, there falls a certain dew, of a fermentative virtue, insomuch as to deserve a place exposed to it; and that at the same time the *natron* dies.

Hippocrates, Galen, Matthiolus, Dioscorides, &c. mention it as of use in physic; and M. de Clos is even of opinion, all the mineral waters of France are impregnated with this kind of nitre; and that it is hence they derive their medicinal virtues.

It is of singular efficacy in fertilizing of ground; which Dr. Leigh accounts for, by supposing its volatile particles heated by some subterraneous fire, or by the warmth of the sun; and thus readily made to ascend up the minute tubes of plants, and carry with them the juices of the earth.

This nitre is distinguished from the common nitre, or saltpetre, by its fermenting with acids, which saltpetre will not do; by its volatile spirit, by its lixivial smell, and the clammy insipid substance it yields, &c. It agrees with saltpetre, in that, by dropping spirit of sulphur upon it, it shoots into pyramidal crystals. Dr. Leigh thinks it comes nearer sal ammoniac than saltpetre.

It is naturally of a dusky white; but is sometimes found of a brown colour, and sometimes of a fine deep red. This is its purest state; but besides this, it is frequently found in form of powder mixed with dirt, and arising in little hillocks on the surface of the ground. It is of an acrimonious pungent taste, and is more like the alkaline salts produced by burning vegetables, than any of the native salts. It dissolves in a very small quantity of water, and ferments violently with aqua fortis, or any other weaker acid menstruum.

It is found in great plenty in Sindy, a province in the inner part of Asia, and in many other parts of the East, and might be had in any quantities. Perhaps it would be worth considering as a branch of commerce, as it would supply the place of pot-ashes in the making soap and glass, as the same author has tried.

The characters recorded of the *nitre* of the ancients are, 1. That it would ferment with vinegar; and, 2. That it had an abstersive quality. These we have from the scriptures; and the rest were, that it was of an acid taste; that it was found native in the eastern parts of the world; that it served in the place of soap; and that with sand it would make glass. All these properties this salt has; and it may be added, that no other native salt has them. Hill's Hist. of *Foss.* p. 386 to 389.

It is a very remarkable property of this salt, that though in itself an alkali, and fermenting very violently with acids in its native dry state, yet in solution it does not ferment with them at all. If indeed oil of vitriol, or some other acid, be added to the solution of *natron* while turbid, that is, while some of the particles of the salt remain yet whole in it, the two liquors will ferment violently; but if the solution be set by till wholly clear, the same acid will cause no effervescence in it; but the same solution, evaporated to a third part, will again ferment with that or any other acid, the particles of the salt at that time being got together again, and meeting the acid as in their solid form.

This salt contains a volatile alkali, absorbed from the air, and embodied in it. Its other principle seems a marine salt, which it may receive either from the earth, or from salt springs, or sea water, according to the different places where it is found.

NATTA, or NATA, alias written *nasa*, *nadis*, and *nappa*, in *Surgery*, a large fleshy excrescence or tumor arising in several parts of the body.

Blancard defines it, a large, soft, painless, colourless tu-

ther, arising usually on the back, sometimes on the shoulders, and other parts. Its root is very small; yet it grows so prodigiously, that it sometimes equals a melon, or gourd.

Nurse often eft appear on the neck, much after the manner of ruptæ.

They are of the œdematous kind, and are to be extirpated by incision, and their return prevented by red precipitate vitriol, or burnt alum, strewed on the place.

Bartholine mentions a lady, who cured herself of a *nurse*, by biting it off.

NATURAL, fomething that relates to nature; that arifes from a principle of nature; or is conformable to the ordinary courfe and order of nature.

When a ftone falls downwards, we vulgarly fay it does it by a *natural* motion; but if it be thrown upwards, its motion is faid to be violent.

Water fufpended in a fucking pump is faid to be out of its *natural* place: cures wrought by medicines, are *natural* operations; but the miraculous ones wrought by Chrift, *fupernatural*. See MIRACLE, &c.

NATURAL *cauſe*. See CAUSE.

NATURAL *children*, are thofe born out of lawful wedlock. See BASTARD.

NATURAL *day*. See DAY.

NATURAL *year*. See YEAR.

NATURAL *faculty*. See FACULTY.

Quincy defines *natural faculty* to be that power arifing from the blood's circulation, which is conſpicuous in all the ſecretions performed within the body; that ſecretion alone excepted, which is made at the origin of the nerves.

NATURAL *functions*, in the *Animal Oeconomy*. See FUNCTION.

NATURAL *hiſtory*, a deſcription of the natural products of the earth, water, or air; viz. beaſts, birds, fiſh, metals, minerals, and foſſils; together with ſuch extraordinary phenomena as at any time appear in the material world; as meteors, monſters, &c.

Beſides *General Natural Hiſtories*, as thoſe of Pliny, &c. there are *particular* ones; and thoſe of two kinds. The firſt, thoſe which only conſider one kind of things; ſuch as the Hiſtory of Shells, by Dr. Liſter; of Fiſhes, by Willughby; that of Birds, by the ſame; that of Plants, by Ray; thoſe of Inſects, by Swammerdam, and Mouffet; that of Animals, by Gefner; that of Foſſils, by Agricol, Mercatus, &c.

The ſecond, thoſe which conſider the ſeveral kinds of natural things found in particular countries, or provinces; as the *Natural Hiſtory* of Dauphiné, by Chorier; the *Natural Hiſtory* of the Antilles, by F. Du Tertre, and M. Loüvilliers De Poincy; thoſe of Oxfordſhire, and Staffordſhire, by Dr. Plott; that of Lancaſhire, by Leigh; of Northamptonſhire, by Morton; that of the Weſtern Iſlands, by Martin, &c.

The *natural hiſtory* only of one particular place, is a ſubject very extenſive in its materials, and not to be ſet about without great care and circumſpection. Mr. Boyle has favoured the world with a liſt of the heads under which to arrange things, and what to enquire after on ſuch an occaſion.

The general heads under which he comprehends the articles of this hiſtory are four; the things which regard the heavens, the air, the waters, and the earth.

Of the firſt claſs are the longitude and latitude of the place; the length of the longeſt and ſhorteſt days and nights; the climates, parallels, &c. what fixed ſtars are ſeen, and what are not ſeen there.

About the air may be obſerved, its temperature, as to the firſt four qualities, and the meaſure of them; its weight, clearneſs, refractive power; its ſubtlety or coarſeneſs; its abounding with or wanting an eſurine ſalt: its variations according to the ſeaſons of the year, and the times of the day: what duration the ſeveral kinds of weather uſually have: what meteors it is moſt or leaſt apt to breed; and in what order they are generated, and how long they generally laſt: what winds it is moſt ſubject to; whether any of them ſtated or ordinary: what diſeaſes are ſaid to be epidemical, or depending on the ſtate and condition of the air: what other diſeaſe it is ſubject to; wherein the air may be ſuppoſed to have ſome ſhare: what is the moſt ſalubrity and inſalubrity of it, and what ſorts of conſtitutions it agrees with, what it does not.

About the waters, it may be proper to obſerve the ſea, its depth, tides, current, ſaltneſs, and other qualities: next, the rivers will come under conſideration, their depth, length, courſe, inundation, and the goodneſs or badneſs of their waters, with their gravity, and other peculiar qualities. After theſe, the lakes, ſprings, ponds, &c. are to be conſidered, eſpecially the mineral waters, their kinds, qualities and virtues, and the manner of trying them. The inhabitants of the waters may follow here; and the particular kinds of fiſh that are found there, whether of the ſea or rivers, are to be mentioned, with an account of their ſtores, bigneſs, goodneſs, ſeaſons of perfection, haunts, peculiarities of any kind relating to them, and the manner of taking them, eſpecially when there is any thing ſingular in it.

The things relating to the earth, are laſt to be examined: theſe are, firſt the earth itſelf, then its inhabitants and its various productions, whether external or internal. In the earth itſelf may be obſerved, its dimenſions, ſituation eaſt, weſt, north, and ſouth; its figure; its plains and valleys, their extent; its hills and mountains, and the height of the talleſt, both in reference to the neighbouring valleys and plains, and to the level of the ſea; as alſo whether the mountains lie ſcattered, or are diſpoſed in ridges; and, if of the latter kind, whether they run eaſt, weſt, north, or ſouth. What promontories alſo, and what fiery or ſmoking hills it has, if any; whether the country be coherent, or much broken into iſlands; what the magnetical declination is in ſeveral places, and the variation of that declination in the ſame place; and if thoſe be conſiderable, what may be conjectured as the occaſions of them, whether the vicinity of iron-mines, of ſubterranean fires, or what elſe. What the nature of the ſoil is, whether clayey, ſandy, or of good mold; and what vegetables, plants, and trees beſt agree with it and ſucceed in it, what worſt. By what particular contrivances the inhabitants improve the advantages, or remedy the diſadvantages of the ſoil; and what hidden qualities the ſoil may have. The inhabitants of the earth are then to be conſidered, both natives, and ſtrangers that have been long ſettled there; and in particular, their ſtature, colour, features, ſtrength, agility, or defects of theſe; and their complexion, hair, beauty, and the like; their diet, inclinations, and cuſtoms, ſo far as they are not owing to education: the fruitfulneſs or barrenneſs of the women; their hard or eaſy labours: the diſeaſes they are moſt ſubject to, and any remarkable ſymptoms attending them.

As to the external productions of the earth, the enquiries are to be theſe: what graſſes, grains, and fruit it beſt produces: the herbs, flowers, and timber trees; and the coppices, groves, foreſts, and woods the country has, or wants: what peculiarities are obſervable in any of them; what ſoils they moſt like or diſlike, and with what culture they thrive beſt. Then what animals the country has or wants; both as to wild beaſts and birds of prey, and as to poultry and cattle of all ſorts; and particularly, if they have any animals that are not common, or any thing particular in thoſe they have. After thoſe, the ſubterranean ſtores are to be examined; what minerals the earth affords, and what it wants: then what quarries of ſtone, and in what manner they lie: what clays and earths are found there; as, clays, marles, fuller's earths, earths for tobacco-pipes, earth for potter's wares, medicinal earths: what other mineral productions it yields, whether coals, ſalt mines, or ſalt ſprings, alum, vitriol, ſulphur, &c. What metals the country yields, with a deſcription of the mines of them; their depths, numbers, ſituations, figns, waters, damps, quantities of ores, goodneſs of the ores, and the ways in uſe for reducing them to metals.

To theſe general heads ſhould be added, inquiries into traditions in the country, of any thing relating to it, whether peculiar to it, or only more common there than elſewhere; and where theſe require learning or ſkill in the anſwerer, the utmoſt care is to be taken to put the people in a way to give their accounts in a ſatisfactory manner; for a falſe or bad account of any thing is always much worſe than no account at all. Phil. Tranſ. N° 11.

NATURAL *horizon*, is the ſenſible or phyſical HORIZON.

NATURAL *inclination*, are thoſe tendencies or motions of the mind, towards things ſeemingly good, which are common in a greater or leſs degree, to all mankind. See APPETITE.

Natural inclination, according to F. Malebranche, is the ſame thing, with regard to minds, that motion is with regard to bodies: and as all the varieties in the material world ariſe from the ſeveral motions of bodies, ſo do all thoſe of the intellectual world from inclinations: and as all motions are the reſult of impreſſions immediately communicated by the finger of the Creator; ſo all inclinations are certainly nothing elſe but continual impreſſions of the will of the Creator on that of the creature; and muſt therefore, of neceſſity, be agreeable to him; and therefore can naturally have no principal end but his glory; nor any ſecondary one but their own preſervation, and

that of others, both ſtill with regard to his will, who gave them being.

Now as, properly ſpeaking, there is but one love in God: viz. that of himſelf; ſo he only impreſſes one love or deſire in us; which is that of good in the general. It is this general love, or deſire, is the principle of all our particular ones; as, in effect, it is the will itſelf; the will being defined to be a continual impreſſion of the Author of nature, which carries the mind of man to good in general.

But the impreſſion towards good in the general doth not only proceed from God, but alſo all our inclinations to particular goods; as, v. gr. ſelf-preſervation, &c.

NATURE, *laws*. See *Laws of* NATURE.

NATURAL *liberty*. See *Civil* LIBERTY.

NATURAL *magic* is that which only makes uſe of natural cauſes. See MAGIC.

NATURAL *philoſophy*, that ſcience which conſiders the powers of nature, the properties of *natural* bodies, and their mutual action on one another: this is otherwiſe called *phyſics*.

NATURAL, in *Heraldry*, is uſed where animals, fruits, flowers, &c. are blazoned with the colours they naturally have, though different from the common colours of heraldry: and this is to prevent the armory's being accuſed of falſity, when blazoned with the names of colours unknown in heraldry.

NATURAL, in *Muſic*, is ſometimes uſed for DIATONIC.

It is alſo applied to a ſong, the notes whereof move eaſily and gracefully, giving the performer as little trouble as poſſible; and when it is not carried too high, or ſunk too low, whereby the voice or inſtrument is in no wiſe forced or ſtrained.

NATURAL is alſo ſometimes uſed for phyſical. In which latter ſenſe, *natural muſic* is that performed by *natural* organs, or vocal muſic; in contradiſtinction to artificial, or inſtrumental. See MUSIC.

Natural muſic is more peculiarly uſed to denote a ſong that proceeds in the *natural* order of the notes, without flats or ſharps.

NATURAL *ſcale* is that produced by the natural and eſſential chords of the mode. See HARMONY.

NATURAL *note* is uſed in oppoſition to flat and ſharp notes, which are called *artificial notes*. See NOTE, SCALE, &c. The *natural note* B, is uſed to contradiſt thoſe flats and ſharps that are ſet at the beginning of a ſtaff; and, in ſuch caſe, you muſt take the *natural note* as it is in the gamut.

NATURAL is alſo uſed for ſomething coming immediately out of the hands of nature. In which ſenſe it ſtands oppoſed to factitious or artificial, which ſignifies ſomething wrought by art.

Biſhop Wilkins obſerves, that there appears a world of difference between *natural* and artificial things, when viewed with microſcopes: the firſt ever appear adorned with all imaginable elegance and beauty; the latter, though the moſt curious in their kind, infinitely rude, and unhewn. The fineſt needle appears a rough bar of iron, and the moſt accurate engraving, or imboſſment, as if done with a mattock, or trowel.

NATURALIST, a perſon who has ſtudied nature, and is well verſed in natural bodies, eſpecially in what relates to metals, minerals, ſtones, vegetables, and animals.

Ariſtotle, Ælian, Pliny, Solinus, and Theophraſtus, were the greateſt *naturaliſts* among the ancients; but they fell into abundance of errors, which have been corrected by the happy induſtry of the moderns. Aldrovandus is the moſt copious, but not the moſt accurate, of the modern *naturaliſts*: his work is in thirteen volumes in folio. The characters and works of Linnæus are well known.

NATURALIZATION, in *Law*, the act of naturalizing an alien, or putting him into the condition of a naturalborn ſubject, and inſtilling him to the rights and privileges thereof.

In France, *naturalization* is the king's prerogative: in England, it is only done by act of parliament.

But no perſon can be *naturalized*, unleſs they have received the ſacrament within one month before the bringing in of the bill, and taken the oaths of allegiance and ſupremacy in the preſence of the parliament. A perſon who is naturalized may have lands by deſcent, as heir at law, as well as obtain them by purchaſe; but he is diſabled from being a member of the privy council, or parliament; as from holding offices, 7 Jac. I. cap. 2. 12 Will. III. cap. 2. All children born out of the king's dominions, whoſe fathers were or are ſubjects of this kingdom at the time of their birth, are adjudged to be naturalborn ſubjects of this realm, except children of parents attainted of treaſon, or that are in the actual ſervice of a foreign prince at enmity with us. 4 Geo. II. cap. 21. Every foreign ſeaman who, in time of war, ſerves two years on board an Engliſh ſhip, is, *ipſo facto*, *naturalized*, 13 Geo. II. cap. 3. And all foreign Proteſtants and Jews, upon their reſiding ſeven years in any of the American colonies, without being abſent above two months at a time, or ſerving two years in a military capacity there, are, upon taking the oaths, *naturalized* to all intents and purpoſes, as if they had been born in this kingdom; and therefore are acceſſible to all ſuch privileges and no other, as Proteſtants or Jews born in this kingdom are intitled to.

In France, Swiſs, Savoyards, and Scots, need not any *naturalization*; being reputed regnicoles, or natives.

NATURALS, *les* NATURELS, in *Medicine*. In every animal, however ſick and diſeaſed, there is ſtill remaining ſome degree of life and ſtrength; and the cauſes and effects of each. Theſe are called *naturals*, natural things, or things according to nature; and ſometimes barely nature; in contradiſtinction to *non-naturals*.

NATURE, NATURA, is a term variouſly uſed. Ariſtotle has a whole chapter wrote expreſly to enumerate the various acceptations of the Greek word φύσις, rendered, in Engliſh, *nature*: and, among Latin writers, the different acceptations are ſo many, that a certain author reckons up fourteen or fifteen. Mr. Boyle in a peculiar treatiſe of the vulgarly received notion of *nature*, gives us eight principal ones.

NATURE, then, is ſometimes uſed for the ſyſtem of the world; the machine of the univerſe; or the aſſemblage of all created beings.

In which ſenſe we ſay, the Author of *nature*: the ſun is called the eye of *nature*, becauſe he illuminates the univerſe; and the father of *nature*, becauſe he warms the earth, and makes it fruitful. And thus we ſay of the phœnix, or a chimera, that *there* is no ſuch thing in *nature*.

Inſtead of the word *nature* in this ſenſe, Mr. Boyle, to avoid ambiguity, and abuſe of the word, wiſhes to have WORLD, or *univerſe*, ſubſtituted.

NATURE, in a more confined ſenſe, is applied to each of the ſeveral kinds of beings, created and increated; ſpiritual and corporeal.

In which ſenſe, we ſay, human *nature*, meaning all men together who poſſeſs the ſame ſpiritual, reaſonable ſoul; angelical *nature*; the divine *nature*, &c.

In this ſenſe, the ſchoolmen ſay, *natura naturans*, & *natura naturata*, ſpeaking of God, who is the *natura naturans*, as giving being and *nature* to all others; in oppoſition to the creatures, who are the *natura naturata*, as receiving their *nature* from the hands of another.

NATURE, in a ſtill more reſtrained ſenſe, is uſed for the eſſence of a thing; or that which ſchoolmen call the quiddity thereof, that is, the attribute which makes it what it is.

In which ſenſe, the Carteſians ſay, it is the *nature* of the ſoul to think; and that the *nature* of matter conſiſts in extenſion.

And here the word *eſſence* Mr. Boyle would have obtain, in lieu of *nature*.

NATURE is more particularly uſed for the eſtabliſhed order and courſe of material things; the ſeries of ſecond cauſes; or the laws which God has impoſed on the motions impreſſed by him.

In which ſenſe it is we ſay, phyſics is the ſtudy of *nature*; *nature* makes the night ſucceed the day; *nature* has rendered reſpiration neceſſary to life, &c.

Thus St. Thomas defines *nature* a kind of divine art, communicated to beings, which carry them to the end they are determined for. In which ſenſe, *nature* is nothing elſe but that concatenation of cauſes and effects, or that order and œconomy which God has eſtabliſhed in the parts of his creation.

In this ſenſe, too, we ſay, miracles are effects above the powers of *nature*: art is ſaid to force or ſurpaſs *nature*, by means of machines; in regard theſe produce effects which exceed what we find in the common courſe of things.

NATURE, again, is taken for an aggregate of powers belonging to any body, eſpecially a living one.

In which ſenſe phyſicians ſay, *nature* is ſtrong, weak, or ſpent; or that, in ſuch a diſeaſe, *nature* left to herſelf will perform the cure.

NATURE is ſtill more ſtrictly uſed for the action of providence, the principle of all things; or that ſpiritual power, or being, which is diffuſed throughout the creation, and moves and acts in all bodies, and gives them certain properties, and produces certain effects.

In this, which Mr. Boyle conſiders as the moſt uſual ſenſe, *nature* is nothing elſe but God, acting himſelf, and according to certain laws he himſelf has fixed.

This ſeems pretty agreeable to the opinion of many of the ancients, who make *nature* the god of the univerſe, Thales, who preſides over, and governs all things; though others owned this an imaginary being, and by *nature* meant

meant no more than the qualities, or virtues, which God has given his creatures, and which their poets and orators took occasion of personifying.

F. Malebranche says, that the *nature* so much talked of in the schools is fit for nothing but to lead us back to idolatry; the ancient heathens fiercely understanding something, which, without being God, acts continually throughout the universe.

Thus the idol *nature* must be an actual principle, which, in concurrence with God, is the next and immediate cause of all the changes which befal matter. Which seems to fall in with the opinion of the *anima mundi*; as if *nature* were a substitute of God, or a collateral cause with God, or a middle being between God and created things. See PLASTIC.

Aristotle defines *nature, principium & causa motus & eius in quo est primo per se, & non per accidens*: a definition so obscure, that none of his commentators, with all their glosses, have been able to render it intelligible.

This principle, which the Peripatetics called *nature*, they supposed to act necessarily; and to be therefore destitute of knowledge, or liberty. See NECESSITY.

Thus, also, the Stoics conceived *nature* as a certain spirit or virtue diffused throughout the universe, which gave every thing its motion; so that all must be dragged away by the invariable order of a blind *nature*, and an inevitable necessity.

In speaking of the action of nature no more is to be understood, but that bodies act on one another, in a manner agreeable to the general laws of *motion* which the Creator has established.

In this lies the mystery of that great word, which is only a compendious way of expressing the action of all bodies: but the mechanism of bodies would, perhaps, better express what is here meant by *nature*.

Some, Mr. Boyle observes, will have the *nature* of a thing to be only the law that it receives from the Creator, and according to which it acts on all occasions. But this is an improper and figurative expression.

The same author proposes a notion of *nature* as more fit than any yet given, to pass from the principal one of *nature*; with regard to which many axioms and expressions relating to that word may be conveniently understood. In order to this, he distinguishes between *general* and *particular nature*.

NATURE, *general*, he defines the aggregate of the bodies which make up the world in its present state, considered as a principle by virtue whereof they act and suffer, according to the laws of motion prescribed by the Author of all things.

NATURE, *particular*, of any subordinate, or individual, consists in the general *nature* applied to a distinct portion of the universe. Or it is a convention of the mechanical properties (as magnitude, figure, order, situation, and local motion) of parts convenient and sufficient to constitute, or intitle to its particular species or denomination, the particular body they make up; the concourse of all these being considered as the principle of motion, rest, &c.

NATURE, *laws of*. See LAW.

NATURE, *laws of*, are axioms, or general rules, of motion, and rest, observed by natural bodies in their actions on one another; and in all the changes which befal them in their natural state.

The *laws of nature* and *of motion*, are, in effect, the same: custom, indeed, has made some difference; and we find authors call the particular cases of motion, laws of motion; which see under MOTION. The more general, and comprehensive ones, and those from which, as from axioms, the others are deduced, they call *laws of nature*.

Of these, Sir Isaac Newton has established three:

1. That every body perseveres in the same state, either of rest, or uniform rectilinear motion; except so far as it is forced to change that state by some foreign force.

Thus projectiles persevere in their motions, except so far as they are retarded by the resistance of the air, and gravity: and thus a top, whose parts, by their cohesion, are continually drawing one another out of their rectilinear motion, only ceases to run round because resisted by the air, and the friction of the plane on which it moves.

And thus the larger bodies of the planets and comets preserve their progressive and circular motions a long time undiminished, in regions void of all sensible resistance.

A body is passive in receiving its motion, and the direction of its motion, so it retains them or perseveres in them, without any change, till it be acted upon by something external. See *Vis insertia*, RESISTANCE, and MEDIUM.

2. The change of motion is ever proportional to the moving force whereby it is effected, and in the direction of the right line wherein that force is impressed.

If a certain force produce a certain motion, a double force will produce double the motion; a triple force triple the motion; whether it be impressed all at once, or successively, and by degrees. And this motion (since it is ever directed to the same point with the generating force), if the body were in motion before, is either to be added to it, as where the motions conspire; or subtracted from it, as where contrary; or added obliquely, as where oblique: and is compounded with it, according to the determinations of each.

3. Re-action is always contrary and equal to action; or the actions of two bodies upon one another are always mutually equal, and directed contrary ways: and are to be estimated always in the same right line.

Whatever presses or pulls another, is equally pressed or pulled thereby. Thus, if I press a stone with my finger, the finger is equally pressed by the stone: if a horse draw a weight by a rope, the horse is equally drawn back towards the weight: for the rope being equally stretched each way, will, with an equal endeavour to relax itself, drive the horse toward the stone, and the stone toward the horse; and will hinder the progress of the one, as much as it promotes that of the other.

Again, if any body, by striking on another, do in any manner change its motion, it will, itself, by means of the other, undergo also an equal change in its own motion, by reason of the equality of the pressure.

When two bodies meet, each endeavours to persevere in its state, and resist any change: and because the change which is produced in either may be equally measured by the action which it excites upon the other, or by the resistance which it meets with from it, it follows that the changes produced in the motions of each are equal, but are made in contrary directions. The one acquires no new force but what the other loses in the same direction; nor does this last lose any force but what the other acquires: and hence, though by their collisions, motion passes from the one to the other, yet the sum of their motions, estimated in a given direction, is preserved the same, and is unalterable by their mutual actions upon each other.

In these actions the changes are equal; not those, we mean, of the velocities, but those of the motions, the bodies being supposed free from any other impediments. For the changes of velocities, which are likewise made contrary ways, inasmuch as the motions are equally changed, are reciprocally proportional to the bodies.

This law also obtains in attractions. See ATTRACTION.

NATURE, in *Mythology*, is used by the poets sometimes for the mother, sometimes for the daughter, and at other times for the companion of Jupiter. She is described by the symbols of the DIANA of Ephesus.

NATURE, in *Prosody*. A syllable is said to be long or short by *nature*, to signify that it is so originally, and independently of any rule of grammar, which might render it so by position or otherwise.

NAVAGIUM, in our *Old Writers*, a duty incumbent on tenants to carry their lord's goods in a ship. *Lib. 9. fol. ab omne carragio, navagio, &c.*

NAVAL, something relating to SHIPS, or NAVIGATION. In this sense we sometimes say, *naval strength*, a *naval* combat, &c.

NAVAL *crown*, *corona navalis*, among the ancient Romans, a crown adorned with figures of prows of ships, conferred on persons who, in sea-engagements, first boarded the enemy's vessel.

Though A. Gellius seems to speak in the general, where he says the *naval crown* was adorned with prows of ships. Lipsius distinguishes two kinds of *naval crowns*; the one he calls *simple*, the other *restricted*.

The first he supposes plain, and given to the common soldiers, &c. The latter, much more glorious, adorned with prows of ships, and only given to generals, or admirals, who had gained some important victory at sea. See CROWN.

NAVAL *stores*, comprehend all those particulars made use of, not only in the royal navy, but in every other kind of navigation: as timber and iron for shipping, pitch, tar, hemp, cordage, sail-cloth, gun-powder, ordnance, and fire-arms of every sort, ship-chandlery wares, &c.

Persons stealing or embezzling any of the king's *naval stores* to the value of 20*s.* are guilty of felony, without benefit of clergy. 22 Car. II. cap. 5. And the treasurer and commissioners of the navy are impowered to inquire of *naval stores* embezzled, and appoint persons to search for them, &c. who may go on board ships, and seize such *stores*; and the commissioners, &c. may imprison the offenders, and fine them double value, the *stores* being under the value of 20*s.* 1 Geo. I. cap. 25.

None but the contractors with the commissioners of the navy, shall make any *stores* of war, *naval stores*, &c. with the marks commonly used to his majesty's *stores* upon

pain of forfeiting 200*l*. And persons in whose custody such stores shall be found concealed, are liable to the same penalty. 9 & 10 Will. III. cap. 41. There have been several statutes successively enacted for regulating the purchase and conveyance, and encouraging the importation of *naval* stores from America and North Britain; the recital of which is neither expedient nor necessary in this work. See *Art of* NAVIGATION.

NAVALIA, among the Romans, were docks or ports where ships used to be laid up after building.

NAVALIA likewise signified the wharfs or keys at Rome, where the ships used to load and unload their goods, all which were near the Sublician bridge.

NAUCLEA, in *Botany*, a genus of the *pentandria monogynia* class; the characters of which are, that the corolla is funnel-shaped; that it has a single bilocular seed; and that the common receptacle is globose. There is only one species.

NAUCRARI, Ναυκραροι, among the Athenians, a designation given to the chief magistrates of the δημοι, boroughs or townships, which were likewise called ναυκρατιαι, because each of them were obliged, besides two horsemen, to furnish out one ship for the public service.

NAVE, in *Architecture*, NAVIS *ecclesiæ*, denotes the body of a church; or the place where the people are seated, reaching from the rail, or baluster, of the choir, to the chief door.

Balus derives the word from the Greek νεως, *temple*; which Salmasius brings further from νεος, *ship*; by reason the vault or roof of a church bears resemblance to a ship. The ancient Greeks called the *nave*, *pronaos*; the Latins frequently called it *cella*.

The *nave* of the church belongs to the parishioners: it belongs to them to repair it, &c.

NAVE *of a wheel*, is that short thick piece in the centre of the wheel, which receives the end of the axle-tree, and in which the ends of the spokes are fixed; it is bound at each end with hoops of iron, called the *nave-bands*: it has likewise in each end of the hole, through which the end of the axle-tree goes, a ring of iron called the *box*, or *boxier*, which fixes the hole of the *nave* from wearing.

NAVE-*lines*, in *Sea-Language*, is a sort of small tackle, depending from the head of the main-mast and fore-mast, and fastened to the middle of the parrel, immediately behind the mast, and communicating with the gears. It is used to keep the parrel directly opposite to the yard, and particularly whilst hoisting or lowering, as it would otherwise hang under the yard, and prevent it from being sufficiently braced.

NAVEL, a part in the middle of the belly, by anatomists called UMBILICUS. See *Tab. Anat. (Splanch.) fig.* 3. *lit. c. fig.* 16. *lit. c.*

NAVEL-*string* by anatomists is called *funiculus* UMBILICALIS.

It is a method universally received by prudent surgeons and midwives, to make an exact ligature upon the umbilical cord or *navel-string* of the new-born infant, lest it should bleed to death through the vessels which compose it. This ligature is to be made, as soon as the infant and after-burthen are delivered, with a strong thread of about an ell long, folded together four times; and having made a knot at one end, it is then to be passed twice round the *navel-string*, at about two or three fingers breadth from the abdomen, and afterwards tied with a double knot: this done, the cord leading to the placenta may be divided with a pair of scissars below the ligature, and the wounded part belonging to the infant, dressed with lint, after which it may be left to the nurse till it becomes dry, and falls off of itself.

There have been instances of some children receiving no harm from cutting the *navel-string*, without the ceremony of the ligature; but as there have also been too many instances of their dying by the omission, and as the operation is so easy, the midwife is unpardonable who omits it. Heister.

Dr. Schulze contradicts the common opinion concerning the umbilical vessels: he endeavours to prove, that the *navel* is not formed by the ligature which the midwives make, or by animals gnawing the *navel-string* of their young with their teeth, but by nature; and that the umbilical vessels separate spontaneously, or with very little force, from the interior surface of the skin; after which the umbilical vessels within the young creature's body contract and shrivel, their extremity by which they adhered to the navel becoming black and pointed, as if they had been burnt, and at last disappearing altogether: for, says he, what are commonly described, as these vessels changed into ligaments, are no other than the sheaths in which they were formerly contained. From this doctrine he concludes, that it is unnecessary to make any ligature upon the *navel-string* after birth. In confirmation of this, Dr. Eller relates several instances of the *navel-string* of children being left untied after they were cut, without being attended with any haemorrhage, or other bad consequence. Commerc. Norimb. 1733. Hebd. 28. sect. 2.

Mr. Monro is of opinion, that the fœtus in viviparous animals receives its nutrition from the umbilical vessels alone. See FŒTUS.

It has been observed, that in blowing into the placenta by the umbilical vessels, the air and the blood were easily forced out of it, by that surface of the placenta which is affixed to the uterus; but that they could by no means be driven out at the other surface which is towards the fœtus. Hence it is to be observed, that the uterus appears not to be covered by any membrane within, and that the placenta also has none on that side where it adheres to the womb, so that there is nothing to prevent the blood from readily flowing from the uterus into the placenta, and thence to the child. What we usually understand by the word membrane is a covering of so close a texture, as to keep out air, or fluids; and it is very evident to reason, that the placenta ought to have no such on that part where it is to communicate with the uterus; neither can the eye discover any such there, though on the other side it is easy to distinguish one.

The *navel-string*, beside its vein, and its two arteries, is composed of a spongy substance, in which these vessels are lodged; this spongy substance is composed of a number of cellules which communicate with one another, and contain a glutinous liquor, which is usually found in them in great abundance: if we consider the *navel-string* as a cylinder, the blood-vessels run in a spiral round its axis, and are laid one over another, but that differently in different subjects; hence it is that the *navel-string* is tortuous.

When the vessels have run through the whole length of the *navel-string*, in the same diameter, they break into a number of branches, and enter the placenta, where they afterwards divide themselves into capillary ramifications. The diameter of the vein is all the way double to that of both the arteries; so that it contains twice as much blood as the two arteries together. If the *navel-string* were only composed of these three vessels, the fœtus, in moving, might easily compress them in such manner, as to stop the current of the blood, and its inevitable death must be the consequence of this; but nature having provided this spongy, or cellular substance, for their lodgement, this is able to give way to them, when pressed in any direction, and enables them, therefore, to bear a considerable force, without the current of the blood being stopped by them in it; nor is the glutinous liquor, of which those cells are full, of little use in lubricating these vessels. Mem. Acad. Par. 1724.

NAVEL-*boods*, in *Ship-Building*, large pieces of stuff fitted into the hawse-holes, to keep the cables from wearing them.

NAVEL-*wort*, *cotyledon*, in *Botony*, a genus of the *decandria pentagynia* class. Its characters are these: the flower, which hath a small empalement of one leaf, divided into five parts at the top, has one petal, which is funnel-shaped, cut into five parts at the brim; and five germina, which have each a squamous concave nectarium at the base, and ten erect stamina; the germina afterwards become so many oblong swelling capsules, opening longitudinally with one valve, and filled with small seeds. Miller enumerates ten, and Linnæus eight species.

The *cotyledons*, when not in flower, may usually be known by having thick, tuberose roots, and thick or fatty roundish leaves. These, however, are found to be no certain characters, as there are plants truly of this genus, which have long leaves, and fibrose roots.

The greater *navel-wort*, with hooded leaves, sharply indented and growing alternate, and a branching stalk, with erect flowers, used in medicine, grows upon old walls and buildings, in many parts of England, particularly in Shropshire and Somersetshire, and is reckoned gently cooling and moistening, refrigerating and astringent; useful in hot distempers of the liver: it provokes urine, and takes off the heat and sharpness of it. The juice of it outwardly applied, helps the shingles, St. Anthony's fire, the pain and inflammation of the piles; and is useful against kibes and chilblains: it is an ingredient in the *unguentum pæpileon*.

NAVEL-*wort*, *bastard*. See CRASSULA.

NAVEL-*wort*, *Venus's*, the name of a genus of plants, called by authors, *umbilicus*. See HOUND'S *Tongue*.

NAVEL-*wort*, *water*, a name sometimes given to the *hydrocotyle* of botanists. See *Marsh* PENNY-*wort*.

NAVETTE, the name by which most of the European nations call the *napus*, or *bunias sylvestris* of Lobel, the plant from the seeds of which the oil which we call rape oil, and the French and others *navette* oil, is expressed. The plant is cultivated in many parts of England, and in

other countries, for the sake of the seed; the oil drawn from this is used by many artificers, and is of a fine yellow colour, and the smell is not offensive. The cake, remaining after the expression of the oil, retains, like that of mustard, the acrimony of the seeds.

NAVEW, in *Botany*. See NAPUS.

NAVICULA, in *Natural History*, a name given by a late French author to the class of shells called by us the *nautili*. See NAUTILUS.

NAVICULARE *os*, in *Anatomy*, the third bone in the foot, between the astragalus, and the ossa cuneiformia. It is thus called from *navis*, *a ship*, to which it bears some resemblance; for which reason, likewise, it is sometimes called *cymbiforme*, from *cymba*, *a boat*; and *schaphoides*, from a Greek word of the like import.

The *os naviculare* has behind it a large sinus, which receives the anterior convex head of the first bone; and before it is convex. It is divided into three heads, which are received into the sinuses of the ossa cuneiformia.

NAVIGATION, the art or act of sailing, or of conducting a vessel from one place to another, in the safest, shortest, and most commodious way.

This art, in the full latitude of the word, comprehends three parts: 1. The art of constructing and building ships. 2. The loading of ships. And, 3. The conducting and guiding of ships through the sea; which is, in a peculiar sense, called *navigation*, or SAILING.

In this restrained sense of the word, *navigation*, is either *common*, or *proper*.

NAVIGATION, *common*, usually called COASTING, is where the ports are on the same, or very neighbouring coasts; and where the vessel is seldom out of sight of land, or out of reach of sounding.

In this, little else is required but an acquaintance with the lands, the compass, and sounding-line; each of which see in its place, COMPASS, and SOUNDING.

NAVIGATION, *proper*, is where the voyage is long, and pursued through the main ocean.

In this, besides the requisites in the former, are likewise required use of the Mercator's chart, azimuth, and amplitude compasses, log-line, and other instruments for celestial observations; as quadrants, forestaffs, &c. See each instrument, &c. in its place.

Navigation turns principally on four things; two whereof being known, the rest are easily found from them by the tables, scales, and charts.

These four things are, the difference of latitude, difference of longitude, the reckoning or distance run, and the course or rhumb sailed on.

The latitudes are easily found, and that with sufficient accuracy. See LATITUDE.

The course and distance are had by the log-line, or dead reckoning, and the compass. See LOG, COMPASS, COURSE, and DISTANCE.

Nor is there any thing wanting to the perfection of *navigation*, but to determine the longitude. The mathematicians of many ages have applied themselves, with the utmost assiduity, to supply this grand desideratum, but not with the success that was desireable, considering the importance of the object, and the magnificent rewards of several princes and states to the discoverer.

For the various methods that now occasionally obtain at sea, for this purpose, and an account of the discoveries that have been made, see LONGITUDE.

The poets refer the invention of the art of *navigation* to Neptune, some of the ancients to Bacchus, others to Hercules, others to Jason, others to Janus, who is said to have made the first ship. Historians ascribe it to the Æginetes, the Phœnicians, Tyrians, and the ancient inhabitants of Britain. Some will have it, the first hint was taken from the flight of the kite; others, as Oppian de Piscibus, lib. i. from the fish called nautilus: others ascribe it to accident.

Scripture refers the origin of so useful an invention to God himself, who gave the first specimen thereof in the ark built by Noah. For the raillery the good man underwent on account of his enterprize, shews, evidently enough, the world was then ignorant of any thing like *navigation*; and that they even thought it impossible.

However, history represents the Phœnicians, especially those of their capital, Tyre, as the first *navigators*; being urged to seek a foreign commerce by the narrowness and poverty of a strip of ground they possessed along the coasts; as well as by the conveniency of two or three good ports; and by their natural genius for traffic.

Accordingly, Lebanon, and the other neighbouring mountains, furnishing them with excellent wood for ship-building, in a short time they were masters of a numerous fleet; with which constantly hazarding new *navigations*, and settling new trades, they soon arrived at an incredible pitch of opulency and populousness; having rendered themselves masters of several commodious harbours toward the bottom of the Arabian gulph, and, after the example of the Egyptians, established a regular intercourse with Arabia and the continent of India on the one hand, and with the eastern coast of Africa on the other: so that they were in a condition to send out colonies, the principal of which was that of Carthage; which, keeping up their Phœnician spirit of commerce, in time not only equalled Tyre itself, but vastly surpassed it; pursuing the course which the Phœnicians had opened, and sending its merchant-fleets through Hercules's Pillars, now the Streights of Gibraltar, along the western coast of Africa, to the south, almost to the tropic of Cancer, having discovered the Fortunate Islands, now known by the name of the Canaries, which were the utmost boundary of ancient *navigation* in the western ocean; and to the north along the coast of Europe, visiting particularly, Spain, Gaul, and Britain: and even, if we believe some authors, to America itself; the discovery whereof, so many ages afterwards, has been so glorious to the Spaniards.

The progress of the Phœnicians and Carthaginians was not owing merely to the desire of extending their trade from one country to another: voyages were undertaken, the sole object of which was to discover new countries, and to explore unknown seas. Such, during the prosperous age of the Carthaginian republic, were the famous *navigations* of Hanno and Himilco. Both their fleets were equipped by authority of the senate, and at the public expence. Hanno was directed to steer towards the south, along the coast of Africa, and he seems to have advanced much nearer the equinoctial line than any former navigator. Himilco had it in charge to proceed towards the the north, and to examine the western coasts of the European continent. Of the same nature was the extraordinary *navigation* of the Phœnicians round Africa. A Phœnician fleet, we are told (Herod. lib. iv. cap. 42.) fitted out by Necho, king of Egypt, took its departure, about 604 years before the Christian æra, from a port in the Red Sea, doubled the southern promontory of Africa, and after a voyage of three years, returned by the streights Gades, to the mouth of the Nile. Eudoxus of Cyzicus, is said (Plin. Nat. Hist. lib. ii. cap. 67.) to have held the same course, and to have accomplished the same arduous undertaking. However, long after this *navigation* of the Phœnicians and of Eudoxus round Africa, Polybius, the most intelligent and best informed historian of antiquity, affirms, that it was not known, in his time, whether Africa was a continued continent, stretching to the south, or whether it was encompassed by the sea. Polyb. Hist. lib. iii. And it appears from the testimony of Pliny, (Hist. Nat. lib. ii. cap. 68.) Strabo, (lib. ii. p. 155. lib. xvii. p. 1180) Ptolemy (Geogr. lib. iv. cap. 9.) that the accounts of those voyages were not fully credited. Robertson's Hist. America, vol. i. p. 13. p. 354. ed. 8vo.

Tyre, whose immense riches and power are represented in such lofty terms, both in sacred and profane authors, being destroyed by Alexander the Great, its *navigation* and commerce were transferred by the conqueror to Alexandria, a new city, admirably situated for those purposes, proposed for the capital of the empire of Asia, which Alexander then meditated. And thus arose the *navigation* of the Egyptians, which was afterwards so cultivated by the Ptolemies, that Tyre and Carthage (which last, after having a long time disputed empire with the Romans, was at length subdued) were quite forgot.

Egypt being reduced into a Roman province after the battle of Actium, its trade and *navigation* fell into the hands of Augustus; in whose time Alexandria was only inferior to Rome: and the magazines of the capital of the world were wholly supplied with merchandizes from the capital of Egypt.

At length, Alexandria itself underwent the fate of Tyre and Carthage, being surprised by the Saracens; who, in spite of the emperor Heraclius, overspread the northern coasts of Africa, &c. whence the merchants being driven, Alexandria has ever since been in a languishing state, though still it enjoys a considerable part of the commerce of the Christian merchants, trading to the Levant.

The fall of Rome, and its empire, drew along with it not only that of learning, and the polite arts, but that of *navigation*; the Barbarians, into whose hands it fell, contented themselves with the spoils of the industry of their predecessors.

However, one circumstance prevented commercial intercourse with distant nations from ceasing altogether. Constantinople, though often threatened by the fierce invaders, who spread desolation over the rest of Europe, was so fortunate as to escape their destructive rage. In that city, the knowledge of ancient arts and discoveries was preserved; and commerce continued to flourish there, with the taste for elegance, and the luxuries of foreign countries, when it was almost extinct in every other part of Europe. The citizens of Constantinople did not confine their trade to the islands of the Archipelago, or to the adjacent coasts of Asia: they took a

wider

wider range, and following the courſe which the ancients had marked out, imported the commodities of the Eaſt Indies from Alexandria. When Egypt was torn from the Roman empire by the Arabians, the induſtry of the Greeks diſcovered a new channel, by which the productions of India might be conveyed to Conſtantinople. They were carried up the Indus, as far as that great river is navigable; there they were tranſported by land to the banks of the river Oxus, and proceeded down its ſtream to the Caſpian ſea. There they entered the Volga, and ſailing up it, were carried by land to the Tanais, which conducted them into the Euxine ſea, where veſſels from Conſtantinople waited their arrival.

But no ſooner were the more brave among thoſe nations well ſettled in their new provinces, ſome in Gaul, as the Franks; others in Spain, as the Goths; and others in Italy, as the Lombards; but they began to learn the advantages of *navigation* and commerce, and the proper methods of managing them, from the people they ſubdued; and this with ſo much ſucceſs, that in a little time ſome of them became able to give new leſſons, and ſet on foot new inſtitutions, for its advantage.

Thus it is to the Lombards we uſually aſcribe the invention and uſe of banks, book-keeping, exchanges, rechanges, &c.

It does not appear which of the European people, after the ſettlement of their new maſters, firſt betook themſelves to *navigation* and commerce. Some think, it began with the French; though the Italians ſeem to have the juſteſt title to it, and are accordingly ordinarily looked on as the reſtorers hereof; as well as the polite arts, which had been baniſhed together, from the time the empire was torn aſunder.

The people of Italy, then, and particularly thoſe of Venice and Genoa, have the glory of this reſtoration; and it is to their advantageous ſituation for *navigation*, they in a great meaſure owe their glory.

In the bottom of the Adriatic were a great number of marſhy iſlands, only ſeparated by narrow channels, but thoſe well fenced, and almoſt inacceſſible, the reſidence of ſome fiſhermen, who here ſupported themſelves by a little trade of ſalt and ſalt, which they found in ſome of theſe iſlands. Thither, then, the Veneti, a people inhabiting that part of Italy along the coaſts of the gulph, retired, when Alaric, king of the Goths, and afterwards Attila, king of the Huns, ravaged Italy.

Theſe new iſlanders, little imagining that this was to be their fixed reſidence, did not think of compoſing any body politic; but each of the ſeventy-two iſlands of this little Archipelago continued a long time under its ſeveral diſtinct maſters, and each made a diſtinct commonwealth. When their commerce was become conſiderable enough to give jealouſy to their neighbours, they began to think of uniting into a body: and it was this union, firſt begun in the ſixth century, but not completed till the eighth, that laid the ſure foundation of the future grandeur of the ſtate of Venice.

From the time of this union, their fleets of merchantmen were ſent to all the parts of the Mediterranean; and at laſt to thoſe of Egypt, particularly Cairo, a new city, built by the Saracen princes on the eaſtern bank of the Nile, where they traded for their ſpices, and other productions of the Indies.

Thus they flouriſhed, increaſed their commerce, their *navigation*, and their conqueſts on the terra firma, till the famous league of Cambray, in 1508, when a number of jealous princes conſpired to their ruin; which was the more eaſily effected, by the diminution of their Eaſt India commerce, of which the Portugueſe had got one part, and the French another.

Genoa, which had applied itſelf to *navigation* at the ſame time with Venice, and that with equal ſucceſs, was a long time its dangerous rival, diſputed with it the empire of the ſea, and ſhared with it the trade of Egypt, and other parts both of the Eaſt and Weſt.

Jealouſy ſoon began to break out; and the two republics coming to blows, it was three centuries almoſt continual war, before the ſuperiority was aſcertained; when, towards the end of the fourteenth century, the fatal battle of Chiona ended the noble ſtrife; the Genoeſe, who till then had uſually the advantage, having now loſt all: and the Venetians, almoſt become deſperate, at one happy blow, beyond all expectation, ſecured to themſelves the empire of the ſea, and ſuperiority in commerce.

The CRUSADES contributed in a great meaſure to the revival, or at leaſt to the more rapid progreſs of commerce and *navigation*; for the Genoeſe, the Piſans, and Venetians, furniſhed the tranſports, which carried thoſe vaſt armies, compoſed of all the nations in Europe, into Aſia, upon this wild enterprize; and likewiſe ſupplied them with proviſions and military ſtores.

Other travellers, beſides thoſe whom religious zeal ſent forth to viſit Aſia, ventured into remote countries, from the proſpect of commercial advantage, or from motives of mere curioſity. The firſt and moſt eminent of theſe was Marco Polo, a Venetian of a noble family, about the year 1269: he was ſucceeded about half a century after by Sir John Mandeville, an Engliſhman. But the preſent art of *navigation* owed its riſe to the invention of the mariner's COMPASS, in the beginning of the fourteenth century; and made conſiderable progreſs during the voyages that were begun in the year 1418, by Henry, duke of Viſeo. This learned prince, brother to Edward, king of Portugal, was particularly ſkilled in coſmography, and employed a perſon from the iſland of Majorca, to teach navigation, and to make inſtruments and charts for the ſea. Theſe voyages, being greatly extended after the diſcovery of Porto Santo and Madeira, the art was improved under the ſucceeding monarchs of that nation: eſpecially that Roderic and Joſeph, phyſicians to king John II. together with one Martin de Bohemia, a Portugueſe native of the iſland of Fayal, ſcholar to Regiomontanus, about the year 1485, calculated for the uſe of the ſailors tables of the ſun's declination, and recommended the aſtrolabe, for taking obſervations at ſea. About this time, Columbus, a native of Genoa, having thoroughly acquainted himſelf with the diſcoveries and obſervations of the Portugueſe, and having alſo acquired conſiderable experience in the art of *navigation*, made a propoſal to king John II. of exploring a paſſage to India, by ſailing directly towards the weſt, across the Atlantic ocean. John rejected this propoſal in a very diſhonourable manner: and Columbus inſtantly quitted the kingdom, and landing in Spain towards the cloſe of the year 1484, he reſolved to propoſe his plan to Ferdinand and Iſabella, with whom, after repeated application and long delay, he ultimately ſucceeded. In Auguſt, 1492, Columbus, furniſhed with a ſmall armament of three ſhips, ſet ſail, and ſteered directly for the Canary iſlands; from thence holding his courſe due weſt, he ſtretched away into unfrequented and unknown ſeas. After many difficulties, he at length arrived at Guanahani, one of the large cluſter of iſlands, called the Lucaya, or Bahama iſles. He alſo diſcovered Cuba, Hiſpaniola, and ſeveral other ſmall iſlands, and having left a ſmall colony in a fort at Hiſpaniola, returned to Spain, in March, 1493. In September following, he ſet out on his ſecond voyage, and ſailed by the Leeward iſlands to Hiſpaniola: in a third voyage, undertaken in the year 1498, he diſcovered the continent of America. In the ſame year, Vaſco de Gama returned to Liſbon, from a voyage to the Eaſt Indies by the Cape of Good Hope. Columbus, it is ſaid, before he attempted the diſcovery of America, conſulted Martin de Bohemia, as well as others, and during the courſe of his voyage, inſtructed the Spaniards in *navigation*; for the improvement of which art, the emperor Charles V. afterwards founded a lecture at Seville. This art was conſiderably improved by the diſcovery of the VARIATION of the compaſs, and by the uſe of the CROSS-*ſtaff*. At length there were publiſhed in Spaniſh, two treatiſes, containing a ſyſtem of the art, which were in great eſteem: the firſt by Pedro de Medina, at Valladolid, in 1545, called Arte de Navegar; the other at Seville, in 1556, by Martin Cortes, under the title of Breve Compendio de la Sphera, y de la Arte de Navegar, con nuevos Inſtrumentos y Reglas. This is ſaid to have been compoſed at Cadiz, in 1545; and a tranſlation of it was publiſhed in London, in 1561, which paſſed through ſeveral impreſſions. Beſides the improvement which the art of *navigation* received from the propoſals of Werner, and Gemma Friſius, for finding the LONGITUDE, it was much promoted by Pedro Nunez, or Nonius, who compoſed a treatiſe on this ſubject, ſo early as 1537, in the Portugueſe language, which thirty years after was printed at Baſil in Latin, with additions, under the title of De Arte et Ratione Navigandi. In this work, the errors of the plane chart are expoſed, and the problem of determining the latitude, from two obſervations of the ſun's altitude, and the intermediate azimuth, is reſolved. In 1577, Mr. William Bourne publiſhed his treatiſe, intitled A Regiment for the Sea, and intended as a ſupplement to that of Cortes. See LOG.

The miſtakes of Medina were well expoſed by Michael Coignet, a native of Antwerp, who, in 1581, publiſhed a ſmall treatiſe intitled, Inſtruction Nouvelle des Points plus excellents and neceſſaires touchant l'Art de Naviger. In the ſame year Mr. Robert Norman publiſhed his diſcovery of the DIPPING-*needle*, in a pamphlet called the New Attractive; to which is always ſubjoined Mr. William Burrough's Diſcourſe of the Variation of the Compaſs. In 1594, Captain John Davis publiſhed a ſmall treatiſe, intitled the Seaman's Secrete, which was much eſteemed in its time. The writers of this period com-

complained much of the errors of the plane chart, which continued ſtill in uſe, though they were unable to diſcover a proper remedy: ſtill Gerrard Mercator contrived his univerſal map, (ſee *Mercator's* CHART) which he publiſhed in 1569, without clearly underſtanding the principles of its conſtruction: theſe were firſt diſcovered by Mr. Edward Wright, who ſent an account of the true method of dividing the meridian from Cambridge, where he was a fellow, to Mr. Blundeville, with a ſhort table for that purpoſe, and a ſpecimen of a chart ſo divided. Theſe were publiſhed by Blundeville in 1594, among his Exerciſes; to the later editions of which was added his diſcourſe of Univerſal Maps, firſt printed in 1589. However, in 1599, Mr. Wright printed his Correction of certain Errors in *Navigation*, in which work he ſhews the reaſon of this diviſion, the manner of conſtructing his table, and its uſes in *navigation*. A ſecond edition of this treatiſe, with farther improvements, was printed in 1610, and a third edition by Mr. Moxon, in 1657. The method of approximation, by what is called the middle latitude, now uſed by our ſailors, occurs in Gunter's Works, firſt printed in 1623. About this time LOGARITHMS began to be introduced, which were applied to *navigation* in a variety of ways by Mr. Edmund Gunter; though the firſt author who applied the logarithmic tables to the caſes of ſailing, was Mr. Thomas Addiſon, in his Arithmetical *Navigation*, printed in 1625. In 1633 Mr. Henry Gellibrand printed a Diſcourſe Mathematical on the Variation of the Magnetical Needle, containing his diſcovery of the changes to which the VARIATION is ſubject. In 1631 Mr. Richard Norwood publiſhed an excellent Treatiſe of Trigonometry, adapted to the invention of logarithms, particularly in applying Napier's general canons; and for the farther improvement of *navigation*, he undertook the laborious work of meaſuring a DEGREE of the meridian, for examining the diviſions of the *Log-line*. Of this affair he has given a full and clear account in his Seaman's Practice, firſt publiſhed in 1637; where he alſo deſcribes his own excellent method of letting down and perfecting a ſea-reckoning, &c. This treatiſe, and that of trigonometry, were continually reprinted, as the principal books for learning ſcientifically the art of *navigation*. What he had delivered, eſpecially in the latter of them, concerning this ſubject, was contracted as a manual for ſailors in a very ſmall piece, called his Epitome, which has gone through innumerable editions. About the year 1645, Mr. Bond publiſhed, in Norwood's Epitome, a very great improvement in Wright's method, by a property in his meridian line, whereby its diviſions are more ſcientifically aſſigned than the author himſelf was able to effect; which he deduced from this theorem, that theſe diviſions are analogous to the exceſſes of the logarithmic tangents of half the reſpective latitudes augmented by forty-five degrees above the logarithm of the radius: this he afterwards explained more fully in the third edition of Gunter's Works, printed in 1653; and the demonſtration of the general theorem was ſupplied by Mr. James Gregory of Aberdeen, in his Exercitationes Geometricæ, printed at London in 1668, and afterwards by Dr. Halley, in Phil. Tranſ. N° 219, and by Mr. Cotes, Phil. Tranſ. N° 388. In 1700, Mr. Bond, who imagined that he had diſcovered the longitude, by having found out the true theory of the magnetic variation, publiſhed a general map, on which were delineated curve lines, expreſſing the paths where the magnetic needle had the ſame variation. The poſitions of theſe curves will indeed continually ſuffer alterations; but they ſhould be corrected from time to time, as they have already been for the years 1744 and 1756, by Mr. William Mountaine, and Mr. James Dodſon. The allowances proper to be made for LEE way are very particularly ſet down by Mr. John Buckler, and publiſhed in a ſmall tract firſt printed in 1702, intitled, a New Compendium of the whole Art of *Navigation*, written by Mr. William Jones.

As it is now generally agreed that the earth is a ſpheroid, whoſe diameter at the poles is ſhorter than the other, Dr. Murdoch publiſhed a tract in 1721, wherein he accommodated Wright's ſailing to ſuch a figure; and Mr. Maclaurin in the ſame year gave a rule, in the Phil. Tranſ. N° 361, for determining the meridional parts of a ſpheroid, which ſpeculation he has farther proſecuted in his Fluxions, printed at Edinburgh in 1742.

The principal foreign writers on *navigation* are Bartholomew Creſcenti, of Rome, in 1607; father George Fournier, at Paris, in 1633; John Baptiſt Riccioli, at Bologna, in 1661; father Millet Dechales, in 1674 and 1677; the ſieur Blondel de Auhin, in 1671 and 1673; M. Deſnier, in 1683; M. Sauveur, in 1692; M. John Bouguer, in 1698; father Peranas, in 1733 and 1741; and M. Peter Bouguer, who, in 1753, publiſhed a very elaborate treatiſe on this ſubject, intitled, Nouveau Traité de Navigation; in which he gives a variation-compaſs of his own invention, and attempts to reform the LOG, as he had done in the Memoirs of the Academy of Sciences for 1747. He is alſo very particular in determining the lunations more accurately than by the common methods, and in deſcribing the corrections of the dead reckonings. This book was abridged and improved by M. de la Caille, in 1760: to theſe we may add Don George Juan of Spain, in 1757. For an account of the ſeveral ſteps that have been purſued for the diſcovery of the longitude, ſee LONGITUDE. For an account of Hadley's quadrant, and its uſe in nautical obſervations, ſee QUADRANT. For the method of making artificial magnets, and their uſe, ſee MAGNET, COMPASS, and NEEDLE.

Thoſe who are deſirous of peruſing a fuller account of the progreſs of *navigation*, may conſult Dr. James Wilſon's preface to Dr. Robertſon's Elements of *Navigation*, in two volumes, octavo, 1732; a work deſervedly held in the higheſt eſtimation.

But to return to the hiſtory of *navigation* in its connection with commerce. About the ſame time that *navigation* was retrieved in the ſouthern parts of Europe, a new ſociety of merchants was formed in the North; which not only carried commerce to the greateſt perfection it was capable of, till the diſcovery of the Eaſt and Weſt Indies, but alſo formed a new ſcheme of laws for the regulation thereof, which ſtill obtain, under the name of *Uſes and cuſtoms of the ſea*.

This ſociety is that famous league of the HANSE-*towns*, commonly ſuppoſed to have begun about the year 1164.

For the modern ſtate of *navigation* in England, Holland, France, Spain, Portugal, &c. ſee COMMERCE, COMPANY, &c.

We ſhall only add, that, in examining the reaſons of commerce's paſſing ſucceſſively from the Venetians, Genoeſe, and Hans-towns, to the Portugueſe and Spaniards, and from thoſe again to the Engliſh and Dutch, it may be eſtabliſhed as a maxim, that the relation between commerce and *navigation*, or, if we may be allowed to ſay it, their union, is ſo intimate, that the fall of the one inevitably draws after it the other; and that they will always either flourith or decline together.

Hence ſo many laws, ordinances, ſtatutes, &c. for its regulation; and hence, particularly, that celebrated act of *navigation*, which an eminent foreign author calls the Palladium, or tutelar deity, of the commerce of England; which is too important not to be here mentioned; as it is the ſtanding rule, not only of the Engliſh among themſelves, but alſo of other nations with whom they traffic.

NAVIGATION, *act of Engliſh*, is a ſtatute whereby the parliament of England have ſettled divers matters relating to the *navigation* and commerce of this kingdom.

Till this act, all nations were at liberty to import into England all kinds of merchandizes, whether of their own growth, or laden elſewhere, and that on board their own veſſels.

For, though by the ſtatute 5 Ric. II. cap. 3. for augmenting the navy of England, then greatly diminiſhed, it was ordained, that none of the king's liege people ſhould ſhip any merchandize out of or into the realm, but only in ſhips of the king's ligeance, on pain of forfeiture; yet in the next year, by 6 Ric. II. cap. 8. this wiſe proviſion was enervated, by only obliging the merchants to give Engliſh ſhips (if able and ſufficient) the preference. And though by 4 Hen. VII. cap. 10. it was enacted, that no Gaſcoign or Guienne wines, &c. ſhould be imported into this realm, except in Engliſh veſſels, and that none ſhould freight any merchandize in any ſtranger's ſhip, if he could have ſufficient freight in a denizen's ſhip, under the penalty of forfeiting all merchandize not thus ſhipped, to be divided between the king and the ſeizer; yet this act, ſo far as it related to the above wines, was repealed by the ſtatute 32 Hen. VIII. cap. 14. and a rate was ordered of what ſhould be paid for the freight of the ſeveral ſorts of merchandize in ſhips, from the port of London to other places, and from thence to London. By 1 Eliz. cap. 13. it was enacted, that if the owner of any merchandize ſhould, in the time of peace, embark or unload any part thereof (malts, pitch, tar, and corn, only excepted) out of, or into any foreign ſhip, he ſhould pay cuſtom as an alien. Cromwell, firſt, perceiving the prejudice the liberty above mentioned did to the Engliſh commerce, which was now almoſt wholly in the hands of foreigners, chiefly the Dutch, whom he hated, animated the Engliſh, by ſeveral acts of parliament, to retrieve their trade into their own hands; and, particularly, paſſed an act, prohibiting the Dutch from importing any merchandizes, except thoſe of their own growth, or manufacture, which were very few.

This act, framed in 1650, and intended to mortify the ſugar iſlands, which were diſaffected to the parliament, and

and held out for Charles II. forbid all ships of foreign nations from trading with any Engliſh plantations, without licence from the council of ſtate. In 1651 the prohibition was extended alſo to the mother-country; and no goods were ſuffered to be imported into England, or any of its dependencies, in any other than Engliſh bottoms; or in the ſhips of that European nation of which the merchandize imported was the genuine growth or manufacture.

Upon the Reſtoration, the firſt parliament Charles II. called, diſtinguiſhing in Cromwell the politician from the uſurper, condemned the memory of the one, and followed the plan of the other with regard to *navigation* and commerce, by paſſing that celebrated bill, or act, for the encouraging and increaſing of ſhipping, and of *navigation*, which ſtill ſubſiſts in its full latitude, and in ancient rigour. Its date is from the firſt of December, 1660, 12 Car. II. cap. 18. Its chief articles follow.

1. That no goods or commodities ſhall be imported or exported to or from any of the Engliſh colonies in Aſia, Africa, or America, but on veſſels built within the dominions of England, or really belonging to Engliſhmen, and whoſe maſters, and at leaſt three-fourths of the crew, are Engliſh, on pain of forfeiture of the goods and veſſel.

Under the name *Engliſh* here, are comprehended all the king's ſubjects of England, Ireland, and the plantations; as was explained in a ſubſequent act, 13 & 14 Car. II. cap. 11.

2. That no perſon born out of the ſubjection of England, or not naturaliſed, ſhall exerciſe any commerce in thoſe colonies for himſelf, or others.

3. That no merchandizes of the growth of Aſia or America ſhall be imported into any of the dominions of England, on any other than Engliſh veſſels.

4. That no goods of foreign growth or manufacture that ſhall be brought into England, Wales, Ireland, iſlands of Jerſey or Guernſey, or town of Berwick on Tweed, in Engliſh-built ſhipping, or other ſhipping belonging to the foreſaid places, and *navigated* by Engliſh mariners, as aforeſaid, ſhall be ſhipped or brought from any other place or country, but only from thoſe of the growth or manufacture thereof.

5. That all kinds of dried and ſalted ſea-fiſh, train-oils, blubber, and whale-fins, not caught by Engliſh veſſels, imported into England, ſhall pay double duties.

6. That the commerce from port to port in England and Ireland ſhall be carried on wholly by Engliſh veſſels, and Engliſh merchants; the crew to be always three-fourths Engliſh.

7. That none but Engliſh veſſels ſhall reap the benefit of the diminutions made, or abatements to be henceforth made, in the cuſtoms.

8. All veſſels are prohibited importing into England and Ireland any of the commodities of Muſcovy, or even any maſts, or other timber, foreign ſalt, pitch, reſin, hemp, raiſins, prunes, oil of olive, any kind of corn or grain, ſugars, aſhes, and ſoap, wine, vinegar, or brandy, except veſſels whereof Engliſh are owners or part-owners, and where the maſter and three-fourths of the mariners are Engliſh. And that no currans, or other commodities, the growth or manufacture of the Turkiſh empire, ſhall be imported, but in veſſels of Engliſh build, and *navigated* as aforeſaid; except only ſuch veſſels as are of the build of the country or place whereof ſuch commodities are the growth or manufacture, or of ſuch port where ſuch goods are uſually ſhipped for tranſportation, and unleſs the maſter and three-fourths of the crew be natives of the country where they are laden.

9. All timber, maſts, boards, ſalt, pitch, tar, reſin, hemp, flax, raiſins, figs, prunes, olive-oils, corn or grain, of any kind, ſugar, pot-aſhes, brandies and wines, and all goods of the growth and manufacture of Muſcovy, all currans and Turkiſh goods imported into England, &c. in other than ſuch ſhipping, and ſo navigated, ſhall be deemed aliens goods, and ſhall pay accordingly.

10. That, to prevent frauds in buying and diſguiſing foreign veſſels, the proprietors ſhall take an oath, that they really belong to them, and that no alien has any part in them.

11. That Engliſh veſſels, and *navigated* by Engliſh, may import into the dominions of England any merchandizes of the Levant, though not taken up in the places where they grow, or are manufactured; provided it be in ſome part of the Mediterranean beyond the Streights of Gibraltar. And the ſame in underſtood of commodities brought from the Eaſt Indies, provided they be taken up in ſome port beyond the Cape of Good Hope; and thoſe from the Canaries, and other colonies of Spain; and the Azores, and other colonies of Portugal; which are allowed to be ſhipped, the one in Spaniſh ports, the other in Portugueſe.

12. Theſe penalties, prohibitions, and confiſcations, not to extend to goods taken, by way of reprizal, from the enemies of England; nor to fiſh caught by the Scots, or their corn, and ſalt, which may be imported into England by the Scotch-built ſhips.

13. Five ſhillings per ton duty is impoſed on every French veſſel arriving in any port of England, ſo long (and even three months longer) as fifty ſols per ton lies on the Engliſh veſſels in France.

Laſtly, That ſugars, tobacco, and other commodities of the growth of the Engliſh colonies, ſhall not be imported into any other part of Europe, but the dominions of England; and that veſſels going out of the ports of the ſame crown for the Engliſh colonies, ſhall give 1000*l.* ſecurity, if under one hundred tons, and 2000*l.* if above, before they depart, that they will import their cargo into ſome port in the ſaid dominions; and the like, before they quit thoſe colonies, that they will land their whole cargo in England.

The 22 & 23 Car. II. cap. 11. alſo ordains, that where any goods ſhall be laden on board any Engliſh ſhip of the burden of two hundred tons, or upwards, and mounted with ſixteen guns, or more, if the maſter yields up ſuch ſhip or goods to any Turkiſh veſſel, or any pirate, without fighting, upon proof thereof in the admiralty, he ſhall be incapable of taking charge of any Engliſh veſſel; and maſters of Engliſh ſhips, though not of that burden, nor mounted as aforeſaid, that ſhall yield without fighting to a Turkiſh ſhip or pirate, that has not at leaſt double the number of guns, ſhall be liable to the penalties of this act. If any inferior officers or mariners of a ſhip, ſhall refuſe to fight when commanded, or utter words to diſcourage others, they ſhall loſe all their wages due, and be impriſoned not exceeding ſix months; and mariners laying violent hands on their commanders, to hinder them from fighting in defence of their ſhips, ſhall ſuffer death as felons. When any Engliſh ſhip ſhall have been defended by fight, and brought to her port, in which fighting any of her men have been wounded or ſlain, the judge of the admiralty, or his ſurrogate, &c. where the ſhall arrive, upon the petition of the maſter and ſeamen, may call ſo many as he ſhall be informed are the adventurers and owners, and by adviſing with them, levy upon the reſpective owners ſuch ſums as he himſelf, and the major part of them preſent, ſhall judge reaſonable, not exceeding two *per cent.* of the ſhip and goods; which money ſhall be diſtributed among the maſter, officers, and ſeamen, or the widows and children of the ſlain, according to the direction of the judge, with the approbation of three or more of the adventurers.

By the 5th and 6th of William and Mary, cap. 24. every perſon who ſhall build, or cauſe to be built, any ſhip of three decks, containing 450 tons, and mounted with thirty-two pieces of ordnance, having ammunition, &c. proportionable, ſhall for the firſt three voyages which the ſaid ſhip ſhall make to any foreign parts, receive a tenth of the cuſtoms called the ſubſidy of tonnage and poundage, payable for merchandize exported and imported in ſuch ſhips; but if after the end of the three firſt voyages, ſhips ſo built ſhall be altered ſo as to become leſs defenſible than they were at firſt, then they ſhall be forfeited and loſt.

By 2 Ann. cap. 9. owners of ſhips might navigate during the war with France, with maſters and only one half of the mariners Engliſh; and by 3 and 4 Ann. cap. 13. any ſhips might be navigated by foreign ſeamen; and foreigners ſerving on board any Engliſh ſhip for two years, were to be deemed natural-born ſubjects, &c.

By 4 Geo. I. cap. 12. and 11 Geo. I. cap. 29. if any officer or mariner belonging to any ſhip or veſſel, ſhall wilfully caſt away, burn or deſtroy the ſhip to which he belongeth, or in any-wiſe direct or procure the ſame to be done, with intent to prejudice a perſon that ſhall have granted any inſurance thereon, or any merchant who ſhall load goods therein, or any owner of ſuch veſſel, the perſons offending ſhall on conviction be adjudged guilty of felony without benefit of clergy.

The 5th of Geo. II. cap. 20. enacts, that no commander of any ſhip outward-bound ſhall receive on board any gunpowder, either as merchandize or ſtores for the voyage, except for his majeſty's ſervice, before ſuch ſhip ſhall be at Blackwall, in the river Thames; and all maſters of ſhips coming into the river, ſhall put on ſhore all powder either before the arrival of their ſhips at the ſaid place, or within twenty-four hours after they come to anchor there, upon pain of forfeiting 5*l.* for every fifty pounds weight of gunpowder on board, and in the like proportion for a leſs quantity. And no guns ſhall be kept loaded with ſhot in merchant-ſhips between London-bridge and Blackwall, or fired before the riſing, or after the ſetting of the ſun, under the penalty of 5*l.* and for every gun ſo fired, 10*l.* And if any pitch, tar, roſin, or

other combuſtible matter, ſhall be heated or melted by fire in any ſhips, every perſon ſo offending, ſhall, for every offence, forfeit 5*l.* And ſhips are liable to be ſearched by an elder brother, appointed by the maſter, wardens, and aſſiſtants of the Trinity-houſe at Deptford. In caſe any ſhip ſhall be moored in the mouth or any other part of St. Saviour's dock, except ſuch ſhips as ſhall be loading or delivering their cargoes, and others, not exceeding two at a time, that ſhall lie at Shipwright-yard, at the north-weſt corner of the ſaid dock, during the time they ſhall be repairing, the maſter of ſuch ſhip ſhall forfeit 20*s.* for every day ſhe ſhall continue to be laid up and moored.

By 6 Geo. II. cap. 29. maſters of ſhips lying in the river Thames, who have occaſion for ballaſt, ſhall pay 1*l.* per ton colliers, other ſhips 1*l.* 3*d.* and foreign ſhips 1*l.* 7*d.* per ton, to the corporation of the Trinity-houſe at Deptford; who ſhall pay ballaſt-men 5*d.* a ton, for raiſing and carrying it, &c. and it ſhall be lawful for any maſter of a ſhip to appoint two perſons to go on board any lighter bringing ballaſt to ſuch ſhip, to inſpect the marks thereof; and every ballaſt-man ſhall immediately before the delivery of ballaſt to any ſhip, trim ſuch lighter, ſo as to make it ſwim at equal marks at the ſtem and ſtern, and pump all the water out, &c. and the maſter, wardens, and aſſiſtants of the Trinity-houſe, are to make good to the maſter the quantity or value of the ballaſt which ſhall be found deficient, or forfeit 30*l.* one moiety to the poor, and the other to the perſon ſuing for it.

The 7th of Geo. II. cap. 15. ordains, that no owners of ſhips ſhall be liable to any loſs by reaſon of embezzlement by the maſter or mariners, of any goods or merchandize ſhipped on board, or for any act done by them, without the privity or knowledge of ſuch owners, farther than the value of the ſhip, and amount of the freight during the voyage, in which ſuch embezzlement of the maſter or mariners ſhall be committed; and if ſeveral perſons ſhall ſuffer damage by the means aforeſaid, and the value of the ſhip and cargo ſhould not be ſufficient to make compenſation; then the freighters ſhall receive ſatisfaction in average, in proportion to their reſpective loſſes, to be aſcertained on a bill in equity, exhibited for a diſcovery thereof, and of the value of ſuch ſhip and freight. But nothing in this act ſhall diſcharge any remedy, which any perſon may have againſt the maſter and mariners, in reſpect of an embezzlement.

NAVIGATION, *ſub marine*, or the art of ſailing under water, is mentioned by Mr. Boyle as the deſideratum of the art of *navigation*. This was attempted, and ſucceſsfully according to him, by Cornelius Drebbel; ſeveral perſons who were in the boat breathing freely all the time. See DIVING-*bell*.

NAVIGATION, *inland*. See CANAL.

NAVIGATOR, in the *Sea-language*, uſually denotes a perſon capable of carrying or guiding a ſhip to any place deſired.

NAVIS, *Argo* NAVIS, or the ſhip *Argo*, in *Aſtronomy*, a conſtellation of the ſouthern hemiſphere. See ARGO.

NAULIUM, in *Antiquity*, a muſical inſtrument otherwiſe called NABLIUM.

NAULUM, among the Romans, properly ſignified *freight*; whence it is uſed to denote a piece of money put into the mouth of a perſon deceaſed, to pay Charon the ferryman for his paſſage: this piece was to be of the current coin of the emperor then reigning; ſo that from it the time of the perſon's death may be known.

NAUMACHIA, *naumachy*, from ναυς, *ſhip*, and μαχη, *fight*, a ſpectacle, or ſhew, among the ancient Romans, repreſenting a ſea-fight.

NAUMACHIA is alſo uſed, by ſome, for a circus encompaſſed with ſeats and porticos; the pit whereof, ſerving as an arena, was filled with water, by means of pipes, for the exhibiting of ſea-fights.

There were ſeveral of theſe *naumachias* at Rome: three built by Auguſtus, one by Claudius, and another by Domitian. Nero's *naumachia* ſerved for the reverſe of his medals.

NAUPLIUS, in *Natural Hiſtory*, a name by which ſome authors have called the NAUTILUS, as well the papyraceous as the chambered kind.

NAUSEA, ναυτια, in *Medicine*, a reaching, or propenſity and endeavour to vomit; ariſing from a loathing of food, excited by ſome viſcous humour that irritates the ſtomach, and urges it to diſcharge itſelf; and accompanied with anxiety about the præcordia, and ſalivation of the mouth.

The word is formed from the Greek ναυτια, of ναυς, ναυτις, *ſhip*; becauſe, people, at the beginning of their voyages, are uſually liable to this diſorder.

A *nauſea* is, when the thoughts or ſight of proper food create a ſickneſs in the ſtomach, and a tendency to vomit.

Nauſea and vomiting only differ from one another, as more or leſs violent. The *nauſea* is properly the effort the ſtomach makes to vomit, which has not always the effect.

Boerhaave defines a *nauſea*, anatomically, to be a retrograde ſpaſmodic motion of the muſcular fibres of the œſophagus, ſtomach, and inteſtines; attended with convulſions of the abdominal muſcles, and the ſeptum tranſverſum.

The uſual cauſes of a *nauſea* and anorexia, are, hard drinking, great heat, a fever, conſumption, laxneſs of the ſtomach occaſioned by tea, &c. alſo narcotics; as tobacco, paſſions of the mind, ſuppreſſion of evacuations inducing a plethora, foul ſtomach, tenacious humours lodged therein, and certain ſwimming or undulatory motions.

NAUTICAL *planiſphere*, a deſcription of the terreſtrial globe upon a plane, for the uſe of mariners. See PLANISPHERE, and *Sea*-CHART.

NAUTICAL *chart*. See *Sea*-CHART.

NAUTICAL *compaſs*. See COMPASS.

NAUTICUS, in *Anatomy*, a muſcle, called alſo TIBIALIS *poſticus*.

NAUTILUS, in *Natural Hiſtory*, the name of a genus of ſhell-fiſh, the characters of which are theſe: it expreſſes, in general, in every ſpecies, the figure of a boat, or veſſel, made for ſwimming on the water; but in the different ſpecies it is of very different figures, roundiſh or oblong, thin or thick, furrowed or ſmooth, and ſometimes is auriculated, ſometimes not. Bonani obſerves, that this genus of ſhell-fiſh is very well named from the Greek ναυτος, which ſignifies both a *fiſh*, and a *ſailor*, for that the ſhells of all the *nautili* carry the appearance of a boat, or ſhip, with a very high poop.

Different authors, among the ancient and modern, have called the *nautilus* by the names of *pompilus*, *nauplius*, *nautilus*, *vinum ſapit*, *polypus teſtaceus*, and the French call it *le coillier*. It is ſuppoſed that men firſt learned the method of ſailing in veſſels, from what they ſaw practiſed by this creature.

We at preſent know two diſtinct genera of *nautilus*, the thin and the thick-ſhelled *nautilus*. The firſt is called *nautilus papyraceus*, and its ſhell ſeems indeed no thicker, or ſtronger, than a piece of paper, when out of the water. This ſpecies is not at all faſtened to its ſhell; but there is an opinion as old as the days of Pliny, that this creature creeps out of its ſhell, and goes on ſhore to feed. When this ſpecies is to ſail, it extends two of its arms on high, and between theſe ſupports a membrane, which it throws out on this occaſion; this ſerves for its ſail, and the two other arms it hangs out of the ſhell, to ſerve occaſionally either as oars, or as a ſteerage; but this laſt office is generally ſerved by the tail. When the ſea is calm, it is frequent to ſee numbers of theſe creatures diverting themſelves with ſailing about in this manner; but as ſoon as a ſtorm ariſes, or any thing gives them diſturbance, they draw in their legs, and take in as much water as makes them ſomewhat heavier than the ſea-water in which they ſwim, and they then ſink to the bottom. The manner of their voiding this abundant water when they would riſe again, is by a number of holes, of which their legs are full.

The other *nautilus*, whoſe ſhell is thick, never quits that habitation. This ſhell is divided into forty or more partitions, which grow ſmaller and ſmaller as they approach the extremity, or center of the ſhell: between every one of theſe cells, and the adjoining ones, there is a communication, by means of a hole in the center of every one of the partitions. Through this hole there runs a pipe, which is of the whole length of the ſhell. It is ſuppoſed by many that the fiſh occaſionally changes the place of its reſidence, by moving from one to another of theſe cells, through this pipe in the little hole; but this is by no means probable, as the body of the fiſh muſt neceſſarily be cruſhed to death, if it were poſſible to make it paſs through ſuch a hole. It ſeems, therefore, much more probable, that the fiſh occupies always the largeſt chamber in its ſhell, that is, it lives in the cavity between the mouth and the firſt partition; and that it never removes out of this, but that all the apparatus of cells, and a pipe of communication, which we ſo much admire, ſerve only to admit occaſionally air, or water, into the ſhell, in ſuch proportion as may ſerve the creature in its intentions of ſinking or ſwimming.

Some authors call this ſhell *concha margaritifera*; but this can be only on occaſion of the fine colour of its inſide, which is more beautiful than any other mother of pearl; for it has not been obſerved that this ſpecies of fiſh ever produced pearls.

It muſt be obſerved that the polypus is by no means to be confounded with the paper-ſhelled *nautilus*, notwithſtanding the great reſemblance in the arms and body of

the enclosed fish; nor is the cornu ammonis, so frequently found foſſile, to be confounded with the thick-shelled *nautilus*, though the concamerations, and general ſtructure of the ſhell, are alike in both; for there are great and eſſential differences between all theſe genera. See CORNU *ammonis*, &c.

The three principal differences of the *nautilus* claſs are, that ſome are papyraceous, ſome are auriculated, and ſome are umbilicated.

The ſeveral known ſpecies of *nautilus* are theſe: 1. The great, ſmooth, and thick *nautilus*. 2. The little *nautilus*, with a ſmooth and thick ſhell. 3. The ſmooth, and thick, umbilicated *nautilus*. 4. The common, concamerated *nautilus*. 5. The furrowed, and empty *nautilus*, with no diaphragms, or ſeparation within. 6. The thin, and flatted, papyraceous *nautilus*. 7. The auriculated *nautilus*, with a wider ſhell. 8. The undulated, and furrowed *nautilus*, with dents on each ſide the edge. 9. The *nautilus*, with a ridged and ſerrated back. This laſt ſpecies is often found in the cabinets without its outer coat, and the ſhell then looks all over like the moſt beautiful mother of pearl. Hiſt. Natur. Eclair. part ii. p. 249. See *Tab. of Foſſil, Claſs* 9. and *Tab. of Shells*, N° 8.

NAVY, the fleet or ſhipping of a prince or ſtate. See FLEET.

Several articles and orders for the government of the *navy* are eſtabliſhed by 13 Car. II. c. 9. and 22 Geo. II. c. 33. which are as follow:

1. Officers are to cauſe public worſhip, according to the liturgy of the church of England, to be ſolemnly performed in their ſhips, and take care that prayers and preaching by the chaplains be performed diligently, and that the Lord's day be obſerved. 2. Perſons guilty of profane oaths, curſing, drunkenneſs, uncleanneſs, &c. to be puniſhed as a court martial ſhall think fit. 3. If any perſon ſhall *give* or *hold intelligence to* or with an enemy *without leave*, he ſhall ſuffer *death*. 4. If any letter or meſſage from an enemy be conveyed to any in the fleet, and he ſhall not in *twelve hours* acquaint his ſuperior officer with it, or if the ſuperior officer being acquainted therewith, ſhall not reveal it to the commander in chief, the offender ſhall ſuffer *death*, or ſuch puniſhment as a court martial ſhall impoſe. 5. Spies and perſons *endeavouring to corrupt any one in the fleet*, ſhall ſuffer *death*, or ſuch puniſhment as a court martial ſhall impoſe. 6. No perſon ſhall relieve an enemy with money, victuals, or ammunition, on like penalty. 7. All papers taken on board a prize ſhall be ſent to the court of admiralty, &c. on penalty of forfeiting the ſhare of the prize, and ſuch puniſhment as a court martial ſhall impoſe. 8. No perſon ſhall take out of any prize any money or goods, unleſs for better ſecuring the ſame, or for the neceſſary uſe of any of his majeſty's ſhips, before the prize ſhall be condemned; upon penalty of forfeiting his ſhare, and ſuch puniſhment as ſhall be impoſed by a court martial. 9. No perſon on board a prize ſhall be *ſtripped* of his cloaths, *pillaged*, *beaten*, or *ill treated*, upon pain of ſuch puniſhment as a court martial ſhall impoſe. 10. Every commander, who, upon ſignal or order of fight or fight of any ſhip which it may be his duty to engage, or who, upon likelihood of engagement, ſhall *not make neceſſary preparations* for fight, and *encourage the inferior officers and men to fight*, ſhall ſuffer *death*, or ſuch puniſhment as a court martial ſhall deem him to deſerve. And if any perſon ſhall *treacherouſly or cowardly* yield or cry for quarter, he ſhall ſuffer *death*. 11. Every perſon who ſhall *not obey the orders* of his ſuperior officer, *in time of action*, to the beſt of his power, ſhall ſuffer *death*, or ſuch puniſhment as a court martial ſhall deem him to deſerve. 12. Every perſon, who, in time of action, ſhall *withdraw* or *keep back*, or *not come into the fight*, or do his utmoſt to take or deſtroy any ſhip which it ſhall be his duty to engage, and to aſſiſt every ſhip of his majeſty or his allies, which it ſhall be his duty to aſſiſt, ſhall ſuffer *death*. 13. Every perſon, who through cowardice, &c. ſhall forbear to purſue the chace of an enemy, &c. or ſhall not aſſiſt or relieve *a known friend in view*, to the utmoſt of his power, ſhall ſuffer *death*. 14. If any perſon ſhall delay or diſcourage any action or ſervice commanded, upon pretence of arrears of wages, or otherwiſe, he ſhall ſuffer *death*, or ſuch puniſhment as a court martial ſhall deem him to deſerve. 15. Every perſon who ſhall *desert to the enemy*, or *run away with any ſhip, ordnance*, &c. to the weakening of the ſervice, or yield up the ſame cowardly or treacherouſly to the enemy, ſhall ſuffer *death*. 16. Every perſon who ſhall *desert*, or *entice others* ſo to do, ſhall ſuffer *death*, or ſuch puniſhment as a court martial ſhall think fit. If any commanding officer ſhall receive a deſerter, after diſcovering him to be ſuch, and ſhall not with ſpeed give notice to the captain of the ſhip to which he belongs, or if the ſhip is at a conſiderable diſtance, to the ſecretary of the admiralty, or commander in chief, he ſhall be caſhiered. 17. Officers and ſeamen of ſhips appointed for convoy of merchant ſhips, or of any other, ſhall diligently attend upon that charge according to their inſtructions; and whoſoever ſhall not faithfully perform their duty, and defend the ſhips in their convoy, or refuſe to fight in their defence, or run away cowardly, and ſubmit the ſhips in their convoy to hazard, or exact any reward for conveying any ſhip, or miſuſe the maſter or mariners, ſhall make reparations of damages, as the court of admiralty ſhall adjudge, and be puniſhed criminally by death, or other puniſhment, as ſhall be adjudged by a court martial. 18. If any officer ſhall receive or permit to be received on board any goods or merchandiſe, other than for the uſe of the ſhip, except gold, ſilver, or jewels, and except goods belonging to any ſhip which may be ſhipwrecked, or in danger thereof, in order to the preſerving them for the owners, and except goods ordered to be received by the lord high admiral, &c. he ſhall be caſhiered, and rendered incapable of farther ſervice. 19. Any perſon making or endeavouring to make any mutinous aſſembly, ſhall ſuffer *death*. Any perſon uttering words of ſedition or mutiny ſhall ſuffer *death*, or ſuch puniſhment as a court martial ſhall deem him to deſerve. If any officer, mariner, or ſoldier, in or belonging to the fleet ſhall behave himſelf with contempt to his ſuperior officer, *being in the execution of his office*, he ſhall be puniſhed according to the nature of his offence by the judgment of a court martial. 20. Any perſon concealing any traiterous or mutinous practice or deſign, ſhall ſuffer *death*, or ſuch puniſhment as a court-martial ſhall think fit. Any perſon concealing any traiterous or mutinous words, or any words, practice, or deſign, *tending to the hindrance of the ſervice*, and not forthwith revealing the ſame to the commanding officer; or being preſent at any mutiny or ſedition, ſhall not uſe his utmoſt endeavours to ſuppreſs the ſame, ſhall be puniſhed as a court-martial ſhall think he deſerves. 21. Any perſon finding cauſe of complaint of the unwholeſomeneſs of victuals, or upon other juſt ground, he ſhall *quietly* make the ſame known to his ſuperior, who, as far he is able, ſhall cauſe the ſame to be preſently remedied; and no perſon upon any ſuch or other pretence ſhall attempt to ſtir up any diſturbance, upon pain of ſuch puniſhment as a court martial ſhall think *fit to inflict*. 22. Any perſon ſtriking any his ſuperior officer, or drawing or offering to draw or lift up any weapon againſt him, *being in the execution of his office*, ſhall ſuffer death. And any perſon preſuming to quarrel with any his ſuperior officer, *being in the execution of his office*, or diſobeying any lawful command of any his ſuperior officer, ſhall ſuffer *death*, or ſuch other puniſhment as ſhall be inflicted upon him by a court martial. 23. Any perſon quarrelling or fighting with any other perſon in the fleet, or uſing reproachful or provoking ſpeeches or geſtures, ſhall ſuffer ſuch puniſhment as a court martial ſhall impoſe. 24. There ſhall be no waſteful expence or embezzlement of any powder, ſhot, &c. upon penalty of ſuch puniſhment as by a court martial ſhall be found juſt. 25. Every perſon burning or ſetting fire to any magazine, or ſtore of powder, ſhip, &c. or furniture thereunto belonging, not then appertaining to an enemy, ſhall ſuffer death. 26. Care is to be taken that through wilfulneſs or negligence no ſhip be ſtranded, run upon rocks or ſands, or ſplit or hazarded; upon pain of *death*, or ſuch puniſhment as a court martial ſhall deem the offence to deſerve. 27. No perſon ſhall ſleep upon his watch, or negligently perform his duty, or forſake his ſtation, *upon pain of death*, or ſuch puniſhment as, &c. 28. Murder. 29. And buggery or ſodomy ſhall be puniſhed with *death*. 30. Robbery ſhall be puniſhed with *death*, or otherwiſe, as a court martial ſhall find meet. 31. Every perſon *knowingly* making or ſigning, or commanding, counſelling, or procuring the making or ſigning any falſe muſter, ſhall be caſhiered, and rendered incapable of farther employment. 32. Provoſt martial refuſing to apprehend or receive any criminal, or ſuffering him to eſcape, ſhall ſuffer ſuch puniſhment as a court martial ſhall deem *him* to deſerve. And all others ſhall do their endeavours to detect and apprehend all offenders, upon pain of being puniſhed by a court martial. 33. If any flag-officer, captain, commander, or lieutenant, ſhall behave in a ſcandalous, infamous, cruel, oppreſſive, or fraudulent manner, *unbecoming his character*, he ſhall be diſmiſſed. 34. Every perſon in actual ſervice and full pay, guilty of mutiny, deſertion, or diſobedience, in *any* part of his majeſty's dominions on ſhore, when in actual ſervice, relative to the fleet, ſhall be liable to be tried by a court martial, and ſuffer the like puniſhment as if the offence had been committed at ſea. 35. Every perſon in actual ſervice and full pay, committing upon ſhore, in *any* place out of his majeſty's dominions, any crime puniſhable

able by these articles, shall be liable to be tried and punished as if the crime had been committed at sea. 36. All other crimes not capital, not mentioned in this act, shall be punished according to the laws and customs used at sea. No person to be imprisoned for longer than two years. Court martial not to try any offence (except the 35th, 34th, and 35th articles) not committed upon the main sea, or in great rivers beneath the bridges, or in any haven, &c. within the jurisdiction of the admiralty, or by persons in actual service and full pay, except such persons and offences, as in 5th article; nor to try a land officer or soldier on board a transport ship. The lord high admiral, &c. may grant commissions to any officer commanding in chief any fleet, &c. to call courts martial, consisting of commanders and captains. And if the commander in chief shall die or be removed, the officer next in command may call courts martial. No commander in chief of a fleet, &c. of more than five ships, shall preside at any court martial in foreign parts, but the officer next in command shall preside. If a commander in chief shall detach any part of his fleet, &c. he may impower the chief commander of the detachment to hold courts martial during the separate service. If five or more ships shall meet in foreign parts, the senior officer may hold courts martial and preside thereat. Where it is improper for the officer next to the commander in chief to hold or preside at a court martial, the third officer in command may be impowered to preside at or hold a court martial. No court martial shall consist of more than *thirteen*, or less than *five* persons. Where there shall not be less than three, and yet not so many as five of the degree of a port captain, or superior rank, the officer who is to preside may call to his assistance as many commanders under the degree of a port captain, as together with the port captains, shall make up the number five, to hold the court martial. After trial begun, no member of a court martial shall go on shore, until sentence, except in case of sickness, upon pain of being cashiered. Proceedings shall not be delayed, if a sufficient number remain to compose the court, which shall sit from day to day (except Sunday), till sentence be given. The judge advocate, and all officers constituting a court martial, *shall be upon oath*. Persons refusing to give evidence may be imprisoned. Sentence of death within the Narrow Seas (except in case of mutiny) shall not be put in execution till a report be made to the lord high admiral, &c. Sentence of death beyond the Narrow Seas, shall not be put in execution but by order of the commander in chief of the fleet, &c. Sentence of death in any squadron, detached from the fleet, shall not be put in execution (except in case of mutiny) but by order of the commander of the fleet, or lord high admiral, &c. And sentence of death passed in a court martial, held by the senior officer of five or more ships met in foreign parts (except in case of mutiny) shall not be put in execution but by order of the lord high admiral, &c. The powers given by the said articles shall remain in force with respect to crews of ships wrecked, lost, or destroyed, until they be discharged or removed into another ship, or a court martial shall be held to inquire of the causes of the loss of the ship. And if upon inquiry it shall appear, that all or any of the officers and seamen did their utmost to save the ship, and behaved obediently to their superior officers, their pay shall go on: as also shall the pay of officers and seamen taken by the enemy, having done their best to defend the ship, and behaved obediently. If any officer shall receive any goods on board, contrary to the 18th article, he shall farther forfeit the value of such goods, or 500*l.* at the election of the informer; one moiety to the informer, the other to Greenwich hospital. For other regulations relating to the *navy*, see MARINERS.

For the method of supplying the navy, see MANNING *the fleet.*

The royal *navy* of Great Britain is conducted, under the direction of the lords of the admiralty, by the following principal officers, who are commissioners, and compose the board for managing the business thereof. 1. *Comptroller* of the *navy*, who attends and comptrols the payment of all wages, is to know the rates of stores, &c. 2. *Surveyor* of the *navy*, who is to know the state of all stores, to supply what is wanting, to estimate repairs, charge boatswains, &c. with the stores they receive, &c. There have been generally two joint-surveyors. 3. *Clerk of the acts*, whose business is to record all orders, contracts, bills, warrants, &c. 4. *Comptroller* of the treasurer's accounts. 5. *Comptroller* of the victualling accounts. 6. *Comptroller* of the store-keeper's accounts. 7. One extra commissioner. The annual appointment of each commissioner is 500*l.* In time of war, or great naval exertion, there are other additional extra commissioners; and now, viz. in 1781, there are two, exclusive of those above enumerated. There are also three commissioners for the out-ports, residing at Portsmouth, Plymouth, and Chatham; and in time of war commissioners are appointed to reside at some of the principal yards abroad. The *treasurer* of the *navy*, who has an appointment of 2000*l.* a year, and whose business is to receive money out of the exchequer, and to pay all the charges of the *navy*, by warrant from the principal officers. Each of these commissioners and officers have a number of subordinate clerks, with various salaries.

The *navy* was anciently victualled by contract; but the victualling is now under commissioners, who keep their office on Tower-hill. See VICTUALLING-*office*.

For the several yards belonging to his majesty's navy, see DOCK-*yards.*

NAVY, or *victualling bills*, are bills or orders for the payment of money, issued by the commissioners of the *navy*, and other boards in that department, on the treasurer of the *navy*, for stores purchased, &c. These bills are not payable at any fixed time, but bear interest at the rate of 4 *per cent.* after six months, from the date of their being registered at the respective offices; and they have generally been paid off within eighteen months, or two years, from the time of their being issued.

The NAVY-*office* is the place where the chief business of the *navy* is transacted by the officers and commissioners.

NAVY denotes also the collective body of officers employed in his majesty's service.

NAZAREATE, or NAZARITESHIP, the state and condition of a Nazarite or Nazarean among the Jews. See NAZARITE.

The *Nazareate* was a state of separation from the rest of mankind; particularly in three things. 1. In that the person devoted hereto drank no wine. 2. In that they did not shave their heads, but let the hair grow. 3. In avoiding the touch of dead people, which they held a defilement.

The *Nazareate* was of two kinds; the one temporary, or for a certain number of days; the other for life. The rabbins inquire what the term of the temporary *Nazareate* was, and determine it by the Cabbala: for since, in Scripture, Numbers vi. 5. where it is said, *Domino sanctus erit*, the Hebrew verb יִהְיֶה *erit*, consists of four letters; the first and third whereof, taken as numeral letters, do each make 10, and the rest each 5, all together 30; the term of the *Nazareate*, say they, was 30 days.

NAZARITE, or NAZARENE, in the *Old Testament*, is used for a person distinguished and separated from the rest, by something extraordinary, either his sanctity, dignity, or vows.

The word comes from the Hebrew נָזַר *nazar*, *to distinguish*, *separate*; in which it differs from Nazarean, an inhabitant of the country called *Nazareth*, which comes from נָצַר *notzar*, *or natzar*, *to save*, *preserve*.

In the book of Numbers, chap. vi. we find the vow of a *Nazarite* described, i. e. the vow wherby a man or woman separated themselves to the Lord; and the conditions or effects thereof as to abstinence, &c.

NAZARITES, NAZARENES, or NAZAREANS, were likewise a kind of sectaries in the church, in the first ages thereof.

St. Epiphanius tells us, the *Nazareans* were the same with the Jews in every thing relating to the doctrine and ceremonies of the Old Testament; and only differed from them in this, that they added Christianity to those; professing to believe, that Jesus Christ was the Messiah.

There were two kinds of *Nazareans*; the one *pure*, who kept the law of Moses and Christianity together, and who were not placed by the ancient Christians in the register of heretics, but first ranked in this class by Epiphanius, in the fourth century; the other, real EBIONITES.

Ecclesiastical writers tell us, that St. Matthew preached the Gospel to the Jews at Jerusalem, and the rest of Palestine, in their own language; and that accordingly they had his Gospel written in the Hebrew of that time. And St. Epiphanius adds, that this Gospel was preserved entire among the *Nazareans*; only he doubts whether they might not have retrenched the genealogy of Jesus Christ, which was not in the copy of the Ebionites. St. Jerom, who translated it out of Hebrew into Greek and Latin, says, a great many people took the Hebrew Gospel, used by the *Nazareans* and Ebionites, to be the original of St. MATTHEW.

Hence Baronius, in his Annals, says, if the Vulgate Latin version were to be reformed, it should rather be done by the Hebrew original, than by the Greek, which is but a copy. Casaubon treats this opinion of Baronius as highly impious; as not being able to conceive how the authority of the Greek version should depend on a text quite lost. He adds, that it was never used by any but the *Nazareans*, Ebionites, and some other heretics; and

that it was full of fables, as having been altered and corrupted by those heretics.

The reader will find an accurate and satisfactory account of this Gospel in Mr. Jones's Method of settling the canonical Authority of the New Testament.

Mosheim observes, that the term *Nazarenes* was not originally the name of a sect, but that which distinguished the disciples of Jesus in general. Nevertheless, those who, after their separation from their brethren, retained the title of *Nazarenes*, differed much from the true disciples of Christ, to whom that name had been originally given. They held that Christ was born of a virgin, and was also in a certain manner united to the divine nature; they refused to abandon the ceremonies prescribed by the law of Moses, but were far from attempting to impose the observance of these ceremonies upon the Gentile Christians; they rejected also those additions that were made to the Mosaic institutions by the Pharisees, and the doctors of the law; and from hence we see the reason why the greatest part of the Christians treated the *Nazarenes* with a more than ordinary degree of gentleness and forbearance. Mosheim's Eccl. Hist. vol. i. p. 173, 8vo edit.

NE ADMITTAS, a writ directed to the bishop, in behalf of the plaintiff, or defendant, in a cause where a quare impedit, or affize of darrein presentment, is depending; when either party fears, that the bishop will admit the other's clerk during the suit between them.

This writ should be brought within six months after the church becomes void, before the bishop may present by lapse; and upon granting it, another writ is issued to the chief justice of the common pleas, to certify the king in chancery, whether there be any plea before him and the other justices, between the parties, &c.

NEALED, at *Sea*, is used when the sounding is deep water close to the shore: it is then said to be *nealed to*; as also when the shore is sandy, clayey, oozy, or foul and rocky.

NEALING, or rather ANNEALING, a term used for the preparing of several matters, by heating or baking them in an oven, or the like.

NEALING *of glass* is the baking of glass, to dry, harden, and give it the due consistence, after it has been blown, and fashioned into the proper works.

This is usually performed in a kind of tower, called the *leer*, built over the melting furnace. See GLASS.

NEALING *of glass* is also used for the art of staining glass with metalline colours.

One fine use of silver, says Mr. Boyle, was only discovered since the art of *annealing* upon glass came to be practised. For prepared silver, or even the crude metal, being burnt on a glass plate, will tinge it of a fine yellow, or golden colour. And there are several mineral earths, and other coarse matters, of use in this art, which, by means of fire, impart transparent colours to glass, and sometimes very different ones from those of the bodies themselves.

NEALING *of steel*, is the heating it in the fire to a blood-red heat; and then taking it out, and letting it cool gently of itself.

This is done to make it softer, in order to engrave or punch upon it. See TEMPERING, and ENGRAVING.

NEALING is also used for the act or act of burning or baking earthen or other ware in an oven.

The miners at Mendip, when they meet with a rock they cannot cut through, *anneal* it, by laying on wood and coal, and contriving the fire so that they quit the mine before the operation begins; it being dangerous to enter it again before it be quite cleared of the smoke. Phil. Trans. N° 39. p. 769.

NEALING *of tile* is used in ancient statutes, for the burning of tile.

The word is formed of the Saxon *onælinz*, *accendere*, *to light*, *burn*.

NEAP, or NEEP-*tides*, are those tides which happen when the moon is in the middle of the second and fourth quarters.

The *neap-tides* are low tides, in respect of their opposites, the spring-tides.

As the highest of the spring-tides is three days after the full or change, so the lowest of the *neap* is four days before the full or change. On which occasion the seamen say, that it is *deep neap*. See TIDE.

NEAPED, when a ship wants water, so that she cannot get out of the harbour, off the ground, or out of the dock; the seamen say, *She is neaped*, or *beneaped*.

NEAPOLITAN *disease*, a name given by many authors to the venereal disease; and from hence came the name of the *Neapolitan* ointment, which is a mixture of quicksilver, and other things, into an ointment, intended as a cure for it.

NEAR, or NE NEAR, at *Sea*, a word of command from him that conds the ship, to the man at the helm, requiring him to let her fall to the leeward.

NEAT, or NET *weight*, the weight of a commodity alone, clear of the cask, bag, case, and even filth. See NET, and WEIGHT.

NEBEL, or NEVEL, in the *Jewish Antiquities*, a kind of musical instrument. See *Tab. Musica, fig.* 7. See NABLUM.

NEBRITES, in *Natural History*, a name given by the ancients to a stone held sacred to Bacchus. It was of the brownish yellow colour of the skin of the young fawn, with some variegations, and was semi-pellucid: it seems to have been the same with some of our agates, with a yellow ground; the ancients, however, do not appear to have been very determinate in their accounts of it; for Pliny mentions another kind of it, which was black.

NEBRUS, in *Natural History*, a name given by the ancients to the *hinnulus*, a deer of one year old. In the next year it is called *pastalon*; in the third *dicrota*; and in the fourth *eladia*; the word *cerastes* was used as the name of this animal when of a greater age than this.

NEBULGEN, a word used by some of the chemical writers, to express what they call a salt generated by the moisture of the air falling upon stones in the fields, and there indurated by the heat of the sun into the form of a dry salt.

NEBULOUS, *cloudy*, in *Astronomy*, a term applied to certain of the fixed stars, which shew a dim, hazy light; being less than those of the sixth magnitude, and therefore scarce visible to the naked eye, to which, at best, they only appear like little dusky specks or clouds.

Through a moderate telescope, these *nebulous* stars plainly appear to be congeries or clusters of several little stars.

In the *nebulous* star, called *Præsepe*, in the breast of Cancer, there are reckoned thirty-six little stars, three of which Mr. Flamsteed gives us in his Catalogue.

In the *nebulous* star of Orion are reckoned 21. F. le Compte adds, that in the Pleiades are 403; 12 in the star in the middle of Orion's sword; in the extent of two degrees of the same constellation, 500; and 2500 in the whole constellation. See ORION, &c.

NEBULY, *nebulee*, in *Heraldry*, when a coat is charged with several little figures, in form of clouds, running within one another; or, when the outline of a bordure, ordinary, &c. is indented, or waved; as represented in *Tab. Herald. fig.* 32. See NUBECULA *linea*.

NECESSARIANS denote those who are advocates for the doctrine of *philosophical* NECESSITY.

NECESSARIO, in the *Italian Music*. The word is prefixed to certain parts in musick, as *a doi violini necessario*, i. e. *that must be played by two violins*; *canto necessario* is used to signify much the same as CONCERTANTE.

Every mode has certain chords, which may be called its necessary, or essential chords.

NECESSARY, in a philosophical sense, that which cannot but be, or cannot be otherwise.

The schoolmen make a great many kinds or divisions hereof: as, *necessary in existing*; when there is a cause from which an effect must necessarily follow: *necessary in predicating*; *necessary in being*, &c.

There is also a *logical necessary*; *physical necessary*; and there are *metaphysical* and *moral necessaries*.

NECESSITY, what is done by a necessary cause, or a power that is irresistible.

In this sense *necessity* stands opposed to LIBERTY.

Necessity is usually confounded with constraint; yet, in effect, *necessity*, according to Rochefoucault, differs from constraint in this, that the former is joined with the pleasure and inclination of the will, to which constraint is contrary.

Simplicius, after Plato and Epictetus, distinguishes two kinds of *necessity*; the one *violent* or *coactive*, which is opposite to liberty; the other *spontaneous* or *voluntary*, very consistent with it: this latter, adds he, is that which necessitates all things to act according to their nature, as being connatural to them; since ἀυτόματον, a thing that is self-moved, must of *necessity* be moved according to its own nature, i. e. spontaneously. This distinction is admitted by many of the divines, particularly by St. Augustine, who urges it against the Pelagians, as is shewn by Jansenius.

The schools distinguish a *physical necessity*, and a *moral necessity*; and a *simple*, *absolute necessity*, and a *relative* one.

NECESSITY, *physical*, is the want of a principle, or of a natural means necessary to act; which is otherwise called a *physical* or *natural impotence*.

NECESSITY, *moral*, is only a great difficulty; such as that arising from a long habit, a strong inclination, or violent passion.

NECESSITY, *simple*, or *absolute*, is that which has no dependence on any state or conjuncture, or any particular situation of things, but is found every where,

and in all the circumſtances in which the agent can be ſuppoſed.

Such is in a blind man the *neceſſity* he is under of not diſtinguiſhing colours.

NECESSITY, *relative*, is that which places a man in a real incapacity of acting, or not acting, in thoſe circumſtances, and that ſituation he is found in; though in other circumſtances, and another ſtate of things, he might act, or not act.

Such, in the opinion of the Janſeniſts, is the *neceſſity* of doing evil in a man, who, with a violent paſſion, has only a feeble grace to reſiſt it; or the *neceſſity* of doing well in a man, who, having grace of ſeven or eight degrees of ſtrength, has only concupiſcence of two or three degrees to withſtand.

All theſe kinds of *neceſſity* are oppoſite to liberty; ſince, even in the laſt, it is as impoſſible for a man to act, or not act, as if he were in a ſtate of *abſolute, ſimple*, and *phyſical neceſſity*.

The ſchoolmen admit other ſpecies of *neceſſity*; *antecedent, concomitant, conſequent*, &c.

NECESSITY, *antecedent*, is that ariſing from an antecedent cauſe, neceſſarily operating. Such is the *neceſſity* of the ſun's riſing to-morrow morning.

NECESSITY, *concomitant*, ariſes from an antecedent and neceſſary cauſe, but depends on the circumſtances of the effect; the effect all the while being free. Thus it is neceſſary Peter ſit, ſuppoſing he is ſitting.

NECESSITY, *metaphyſical* or *philoſophical*, is a term that has been much uſed by modern writers; and which ſome have defined to be, that by which a thing cannot but be, or whereby it cannot be otherwiſe. But a much approved author on this ſubject objects againſt this definition, and obſerves, that *philoſophical neceſſity* is really nothing elſe than the full and fixed connection between the things ſignified by the ſubject and predicate of a propoſition, which affirms ſomething to be true; ſo that it is in no reſpect different from their certainty. When there is ſuch a connection, then the thing affirmed in the propoſition is neceſſary in a philoſophical ſenſe; whether any oppoſition or contrary effort be ſuppoſed or ſuppoſable in the caſe, or no. When the ſubject and predicate of the propoſition, which affirms the exiſtence of any thing, either ſubſtance, quality, act, or circumſtance, have a full and certain connection, then the exiſtence of that thing is ſaid to be neceſſary in a metaphyſical ſenſe.

Thoſe that are commonly called *Neceſſarians* allow no other liberty to man, that is not reſtrained by this kind of *neceſſity*: and when they conſider intelligent beings as the ſubjects of it, ſome of them diſtinguiſh it into *moral* and *natural neceſſity*. *Moral neceſſity* is uſed in a variety of ſenſes: ſometimes for a *neceſſity* of moral obligation; and often for great obligation in point of intereſt: ſometimes by *moral neceſſity* is meant that apparent connection of things, which is the ground of moral EVIDENCE; and ſo it is diſtinguiſhed from *abſolute neceſſity*, or that ſure connection of things, that is a foundation for infallible certainty: and ſometimes by *moral neceſſity* is meant that *neceſſity* of connection and conſequence, which ariſes from ſuch moral cauſes, as the ſtrength of inclination or motives, and the connection, ſubſiſting in many caſes, between theſe and certain volitions and actions. By *natural neceſſity*, as applied to men, they underſtand ſuch *neceſſity* as men are under, through the force of natural cauſes; in contradiſtinction to thoſe that are called moral cauſes, ſuch as habits and diſpoſitions of the heart, and moral inducements and motives.

Mr. Hobbes, who is ſaid to have been the firſt who underſtood and maintained the proper doctrine of *philoſophical neceſſity*, gives the following account of it, in his Leviathan, p. 108. Liberty and *neceſſity* are conſiſtent: as in the water, that hath not the liberty, but a *neceſſity* of deſcending in the channel; ſo likewiſe in the actions which men voluntarily do; which, becauſe they proceed from their will, proceed from liberty; and yet, becauſe every act of man's will, and every deſire and inclination, proceedeth from ſome cauſe, and that from another cauſe, in a continual chain (whoſe firſt link is in the hand of God, the firſt of all cauſes), proceed from *neceſſity*: ſo that to him, who could ſee the connection of thoſe cauſes, the *neceſſity* of all men's voluntary actions would appear manifeſt: and, therefore, God, that ſeeth and diſpoſeth all things, ſeeth alſo, that the liberty of man, in doing what he will, is accompanied with the *neceſſity* of doing that which God will, and no more or leſs: for though men may do many things, which God does not command, nor is, therefore, the author of them, yet they can have no paſſion, will, or appetite to any thing, of which appetite God's will is not the cauſe; and did not his will aſſure the *neceſſity* of man's will, and conſequently of all that on man's will dependeth, the liberty of men would be a contradiction and impediment to the omnipotence and liberty of God.

Mr. Collins, one of the moſt admired writers on the ſubject of *neceſſity*, has ſtated the queſtion concerning human liberty in the following manner: man, he ſays, is a neceſſary agent, if all his actions are ſo determined by the cauſes preceding each action, that not one paſt action could poſſibly not have come to paſs, or have been otherwiſe than it hath been; nor one future action can poſſibly not come to paſs, or be otherwiſe than it ſhall be. But he is a free agent, if he is able, at any time, under the circumſtances and cauſes he then is, to do different things; or, in other words, if he is not unavoidably determined, in every point of time, by the circumſtances he is in, and cauſes he is under, to do that one thing he does, and not poſſibly to do any other. According to this ſtate of the queſtion, he undertakes to prove, that man is a neceſſary agent; and that there neither is nor can be ſuch thing as liberty. 1. He appeals to experience; alledging, that, though the vulgar urge this in proof of liberty, it is not a proof it: that many celebrated philoſophers and theologers, both ancient and modern, have given definitions of liberty, that are conſiſtent with fate or *neceſſity*: that ſome great patrons of liberty do, by their conceſſions in this matter, deſtroy all arguments from experience: that all the actions of men may be ranked under the four heads of perception, judging, willing, and doing as we will; and that experience does not prove any of theſe to be free; and that experience not only does not prove liberty, but, on the contrary, men may ſee by experience, that they are neceſſary agents. It is, ſays he, matter of experience, that man is ever determined in his willing; we experience perfect *neceſſity*; and they, who think liberty a matter of experience, yet allow that the will follows the judgment of the underſtanding, and that, when two objects are preſented to a man's choice, one whereof appears better than the other, he cannot chuſe the worſt. 2. Man is a neceſſary agent, becauſe all his actions have a beginning; for whatever has a beginning muſt have a cauſe, and every cauſe is a neceſſary cauſe: and if any action whatſoever can be done without a cauſe, then effects and cauſes have no neceſſary relation; and, conſequently, we ſhould not be neceſſarily determined in any caſe at all. 3. Liberty would not be a perfection, but an imperfection; whereas, on the contrary, *neceſſity* is an advantage and a perfection. 4. Liberty is inconſiſtent with the divine preſcience; for if God foreknows the exiſtence of any things, as it depends on its own cauſes, that exiſtence is no leſs neceſſary, than if it were the effect of his decree: for it no leſs implies a contradiction, that cauſes ſhould not produce their effects, than that an event ſhould not come to paſs, which is decreed by God.

This argument for *neceſſity* has been urged by a variety of writers; and the advocates for liberty have felt its force, and endeavoured to obviate it. Some have actually given up the divine preſcience: ſome have allowed the ſeeming contradiction, implied in the foreknowledge of a contingent event, and have acknowledged themſelves incapable of removing it: others have endeavoured to reconcile the foreknowledge of God and the liberty of man, by alledging, that there is a great difference between God's foreknowledge and his decrees, with regard to the *neceſſity* of future events; for God's preſcience has no influence at all on our actions: his infallible judgment, concerning contingent truths, does no more alter the nature of the things, and cauſe them to be neceſſary, than our judging right, at any time, concerning a contingent truth, makes it ceaſe to be contingent; or, than our ſenſe of a preſent truth is any cauſe of its being true or preſent.

In the argument, ſays Dr. Clarke, drawn againſt liberty from the divine preſcience, it muſt not firſt be ſuppoſed that things are in their own nature neceſſary; but from the divine preſcience or power of judging infallibly (which power is as much more extenſive and infallible than in man, as the divine nature and underſtanding are ſuperior to our's), concerning free events, it muſt be proved, that things otherwiſe ſuppoſed free, will, therefore, unavoidably become neceſſary; which can no more be proved, than it can be proved that an action, ſuppoſed at this preſent time to be free, is yet (contrary to the ſuppoſition) at the ſame time neceſſary; becauſe, in all paſt time, whether foreknown or not foreknown, it could not, upon that very ſuppoſition of its being now freely done, but be future.

In another place, he acknowledges, that, though it is impoſſible for us to explain diſtinctly the manner how God can foreſee future events, without a chain of neceſſary cauſes, yet we may form ſome general notion of it. For, as a man, who has no influence over another perſon's actions, and yet often perceives before hand what

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that other will do; and a wiſer and more experienced man will ſtill, with greater probability, foreſee what another, whoſe diſpoſition he is perfectly acquainted with, will in certain circumſtances do; and an angel, with ſtill much leſs degree of error, may have a farther proſpect into men's future actions: ſo it is very reaſonable to apprehend, that God, without influencing men's wills by his power, yet by his foreſight cannot but have as much more certain a knowledge of future free events than either men or angels can poſſibly have, as the perfection of his nature is greater than that of their's. The certainty of foreknowledge, ſays this excellent writer, does not cauſe the certainty of things, but is itſelf founded on the reality of their exiſtence; nor does it imply any other certainty than ſuch as would be equally in things, though there was no foreknowledge; nor again does this certainty of event, in any ſort, imply *neceſſity*. To the ſame purpoſe, Origen has long ago obſerved, that preſcience is not the cauſe of things future, but their being future is the cauſe of God's preſcience that they will be.

It cannot reaſonably be diſputed, that there is an eſſential difference between the foreknowledge and permiſſion of events, and the preordination and production of them: and the ſcheme of *neceſſity* ſeems directly to charge God with being the efficient cauſe or author of thoſe vices and evils, which ariſe from circumſtances and connections of his previous and abſolute appointment. Indeed, many of the advocates of this ſcheme will not admit the conſequence that ſeems to be fairly deducible from their opinion; however, Dr. Prieſtley very candidly allows it. It certainly (ſays he) ſounds harſh to vulgar ears to ſay, that in all thoſe crimes that men charge themſelves with, and reproach themſelves for, God is the agent; and that, in ſuch caſes, they are in reality no more agents, than a ſword is an agent when employed to commit a murder. It does require ſtrength of mind not to ſtartle at ſuch a concluſion; but then it requires nothing but ſtrength of mind; i. e. ſuch a view of things as ſhall carry us beyond firſt and fallacious appearances.

5. Another argument in favour of *neceſſity* is the following: if man was not a neceſſary agent, determined by pleaſure and pain, there would be no foundation of rewards and puniſhments, which are the eſſential ſupports of ſociety. Theſe would be uſeleſs, becauſe if men were free or indifferent to pleaſure and pain, they could be no motives to a man to do or forbear any action.

6. Another argument of the ſame kind is deduced from the nature of morality: for if man was not a neceſſary agent, determined by pleaſure and pain, he would have no notion of morality, or motive to practiſe it; and if he were indifferent to pleaſure and pain, he would have no rule to go by, and might never judge, will, and practiſe right. Every act of the will, it is ſaid, is excited by ſome motive, which motive is the cauſe of that act: and if volitions are properly the effects of motives, then they are neceſſarily connected with their motives: whence it is inferred, that volition is neceſſary, and doth not proceed from any ſelf-determining power in the will. This argument has been illuſtrated and urged in all its force by many modern writers, from M. Leibnitz to Dr. Prieſtley, the laſt and moſt zealous advocate for *neceſſity*: and it has often been anſwered by Dr. Clarke and others, who have ſtrenuouſly maintained, that liberty is perfectly conſiſtent with men's acting from a regard to motives.

Suppoſing, ſays Dr. Price, a power of ſelf-determination to exiſt, it is by no means neceſſary that it ſhould be exerted without a regard to any end or rule: on the contrary, it can never be exerted without ſome view or deſign. Whoever acts, means to do ſomewhat. The power of determining ourſelves, by the very nature of it, wants an end or rule to guide it; and no probability or certainty of its being exerted agreeably to a rule can have the leaſt tendency to infringe or diminiſh it. All that ſhould be avoided here is the intolerable abſurdity of making our reaſons and ends, in acting, the phyſical cauſes or efficients of action. This is the ſame with aſcribing the action of walking, not to the feet, or the power which moves the feet, but to the eye, which only ſees the way. The perception of a reaſon for acting, or the judgment of the underſtanding, is no more than ſeeing the way; it is the eye of the mind, which informs and directs; and whatever certainty there may be, that a particular determination will follow, ſuch determination will be the ſelf-determination of the mind; and not any change of its ſtate ſtamped upon it, over which it has no power, and in receiving which, inſtead of being an agent, it is merely a paſſive ſubject of agency. Although the views and ideas of beings may be the occaſions of their acting; yet it is a contradiction to make them the mechanical efficients of their actions: ſo neceſſary and important is the diſtinction inſiſted upon by Dr. Clarke, between the operation of phyſical cauſes and the influence of moral reaſons.

Upon the whole, the queſtion concerning liberty is not, whether the views or ideas of beings influence their actions, but what is the nature of that influence. If we ſay, that it is ſome kind of mechanical or phyſical efficiency; or, with Dr. Prieſtley, after Hobbes and Leibnitz, that man has no other liberty, in following motives, than water has in running down hill, or than the arms of a ſcale, preſſed by weights, have in riſing and falling; then it muſt follow, that man never acts; and it muſt be folly to applaud or reproach ourſelves for our conduct; and there is an end of all moral obligation and accountableneſs.

However the Neceſſarians do not allow theſe conſequences; but, on the contrary, maintain, that the doctrine of the neceſſary influence of motives upon the mind of man, makes him the proper ſubject of diſcipline, reward, and puniſhment, praiſe and blame, both in the common and philoſophical uſe of the words; and that the doctrine of ſelf-determination, independently of the influence of motives, entirely diſqualifies a man from being the proper ſubject of them.

Mr. Edwards, an acute writer on this ſubject, has endeavoured to prove, that liberty of indifference is not only not neceſſary to virtue, but utterly inconſiſtent with it; and that all habits and inclinations, whether virtuous or vicious, are inconſiſtent with the Arminian notions of liberty and moral agency. And Dr. Prieſtley obſerves, that the ſenſe of ſelf-reproach and ſhame is excited by our finding that we have a diſpoſition of mind leading to vice, and on which motives to virtue, in particular caſes, have had no influence. If we aſk, whence proceeds that diſpoſition, and how it comes to paſs, that motives to virtue had not a greater influence, we muſt ultimately aſcribe the ineffiacy of the one, and the evil tendency of the other to God, who made us what we are, and placed us in the ſituation which we occupy. Dr. Prieſtley overcomes this difficulty by alledging, that the diſtinction between things natural and moral entirely ceaſes in the ſcheme of *neceſſity*; that the vices of men come under the claſs of common evils, producing miſery for a time, but, like all other evils, in the ſame great ſyſtem, ultimately ſubſervient to greater good. In this light, he ſays, every thing without diſtinction may be aſcribed to God. However, he acknowledges, that this is a view of moral evil, which, though innocent and even uſeful in ſpeculation, no wiſe man can or would chuſe to act upon himſelf, becauſe our underſtandings are too limited for the application of ſuch a means of good; though a being of infinite knowledge may introduce it with the greateſt advantage. If there be any foundation for the doctrine of *neceſſity*, i. e. if all events ariſe from preceding ſituations, and the original ſituations of all things, together with the laws by which all changes of ſituation take place, were fixed by the Divine Being, there can be no difference whatever, with reſpect to his cauſation of one thing more than another, and even whatever takes place in conſequence of his withholding his ſpecial and extraordinary influence, is as much agreeable to his will as what comes to paſs in conſequence of the general laws of nature. But our ſuppoſing that God is the author of ſin (as by the ſcheme of *neceſſity* he muſt in fact be the author of all things), by no means implies, that he is a ſinful being; for it is the diſpoſition of mind, and the deſign which conſtitute the ſinfulneſs of an action. If, therefore, his diſpoſition and deſign be good, what he does is morally good. To the ſame purpoſe he obſerves, that the proper foundation, or rather the ultimate object of virtue is general utility; ſince it conſiſts of ſuch conduct as tends to make intelligent creatures the moſt truly happy in the whole of their exiſtence; though, with reſpect to the agent, no action is denominated virtuous, that is not voluntary, or that does not proceed from ſome good motive. And this reaſoning he applies to the Deity, who purſues the happineſs of his creatures by ſuch means as are beſt calculated to ſecure that end, and which are ſanctified by it. And he farther adds, that the Deity may adopt ſome things, which he would not have choſen on their own account, but for the ſake of other things, with which they were neceſſarily connected.

The ſcriptures, according to this laſt writer, are favourable to the doctrine of *neceſſity*: though he does not think, that the ſacred writers were, ſtrictly ſpeaking, Neceſſarians, for they were not philoſophers: but their habitual devotion led them to refer all things to God, without reflecting on the rigorous meaning of their language: and very probably, had they been interrogated on the ſubject, they would have appeared not to be apprized of the proper extent of the Neceſſarian ſcheme, and would have anſwered in a manner unfavourable to it.

The reader, who is desirous of being farther acquainted with the reasoning of different writers on this subject, may consult the Collection of Papers between Leibnitz and Clarke, 1717. Collins's Philosophical Inquiry concerning Human Liberty, 1735, 3d Ed. with Clarke's Answer. Edwards on the Freedom of the Will, 8vo. 1775, 4th Ed. Priestley's Doctrine of Philosophical Necessity, 8vo. 1777. Correspondence between Dr. Price and Dr. Priestley, 8vo. 1778. Hartley's Observations on Man, 8vo. 1749. See LEIBNITZIAN *philosophy*, and LIBERTY.

NECK, a part in the human body, and in that of several other animals, between the head and the thorax, or trunk of the body. See *Tab. Anat. (Osteol.) fig.* 3. *n.* 1. 1. *fig.* 7. *n.* 14. 14.

All animals have *necks*, which have lungs and voice, excepting frogs, and one class of fishes, whose characteristic it is, vocem aliquam emittere.

The upper part before it is called the *throat*; and the lower part the *pomum Adami*. The hole between the two clavicles is called the *jugulum*, by the Greeks σφαγη, *murder*; it being very easy to kill in this part. The hind part of the *neck* is called *cervix*; and the hole between the first and second vertebra, the *nape*; and that underneath, *epomis*.

Its lateral parts commence from the bottom of the ears, and are called *parotides*.

The inner parts of the *neck* are seven vertebræ, the trachea, larynx, pharynx, part of the œsophagus, jugular, cervical, and vertebral veins, carotid, vertebral, and cervical arteries, the intercostal nerve, the eighth, ninth, and tenth pair, the seven cervical pairs, the greater sympathetic nerves, the portio dura of the auditory nerves, and several muscles. See each part under its proper article.

NECK, *Derby*. See BRONCHOCELE.

NECK, *fracture of the*. The processus dentatus of the second vertebra is tied to the skull by a ligament, and kept close to the fore part of the first vertebra by another in that vertebra, that it may not bruise the spinal marrow: when either this ligament or process is broken, it makes that sort of fractured *neck*, whose consequence is sudden death.

NECK, *luxation of the*. A luxation between the head and upper vertebra is immediate death, on account of the pressure on the medulla oblongata, or medulla spinalis. But the *neck* is generally dislocated partially, in which case it swells, the countenance is bloated, the chin lies upon the breast, and the face is usually turned towards one side. To reduce this luxation, the patient is to be immediately laid flat on the ground or floor, then the surgeon, laying hold of his head, is to extend it strongly, gently moving it from side to side, till he finds that the *neck* is restored to its natural posture. Mr. Petit mentions another method by means of slings; but Heister gives the preference to the former method, both as being more simple, and because the patient can be relieved much sooner.

NECK, *wry*, a deformity, usually brought into the world with people; but sometimes occasioned by accidents afterwards. When it is from the birth, there is very little reason to expect relief, because the vertebræ of the *neck* are rendered crooked by that posture, while the bones are in a soft and pliable state. There are, however, in the writings of surgeons, some instances of this disorder, even in these circumstances, being cured after twelve, fifteen, or eighteen years.

When this disorder comes on adults, it is occasioned generally either by the contraction of the skin from a burn on one side, or from a strong spasmodic contraction of one of the mastoide muscles, which will at length become shorter and indurated, by continuing in that posture; or it may proceed from a relaxation of one or more of those muscles, in consequence of which the *neck* will be contracted by the stronger antagonist muscle, on the opposite side; or lastly, it may proceed from a preternatural ligament drawing down the head. And when either of these is the occasion of the disorder, there is hope of a cure; especially if the patient be young, and if this disorder be not of long standing.

If this disorder be recent, and caused by a defluxion of humours, evacuating medicines, with mild sudorifics, and heat, may be of service: but when it arises from a contraction of the skin or muscles, by burning, the repeated use of oils, ointment, and fomentations, may relax so far as to make a cure; a proper firm bandage must likewise be applied to pull the head toward the natural posture, and a steel collar may be contrived, by which the patient shall be suspended very frequently till the *neck* recover its proper position: but when all these fail, the manual assistance of the surgeon is to be called in. If the skin is contracted by a burn, it must be carefully incided transversely in several places, and the incisions dressed so as to keep them open and dilated, and the head pulled to its proper position by a bandage, till the new flesh, filling up these incisions, gives room for the head to stand even: but if the *wry neck* proceeds from a contraction of one of the mastoide muscles, or from some ligament, they are to be divided by a transverse incision in their lower part, near the clavicle or sternum.

NECK, *wounds of the*. There are several sorts of wounds in the *neck*; sometimes the seat of the wound is only in the common integuments, and muscular flesh; this is attended with very little danger: but the most dangerous, and indeed generally incurable wounds, are those of the larger blood-vessels in these parts: such are those of the jugular veins, and carotid and vertebral arteries; or where the aspera arteria is wounded, or the gula, the medulla spinalis, the nerves that descend by the *neck*, or when several of these parts are wounded at the same time.

Wounds of the arteries of the *neck* are scarce ever to be remedied. The patient usually bleeds to death, before a surgeon can be had in these cases; but even if a surgeon were present at the instant the wound was inflicted, the largeness of the arteries, their vicinity to the heart, and the impossibility of making a sufficient pressure upon the wounded vessel, in this part, give but little hope of relief.

Wounds in the external jugular veins are not of great danger, if a surgeon be applied to in time; but wounds in the internal jugulars are very dangerous, partly from their size, which is of the thickness of one's finger, and partly from their situation, which is so deep that no proper application can reach them to any advantage.—Wounds in this vein are usually esteemed mortal, but it is sometimes possible to save life in this case.

Wounds of the aspera arteria, or windpipe, are usually deemed mortal, where the windpipe is entirely divided, or is wounded in its lower part, within the cavity of the thorax, or joined with a wound of the carotid arteries, or internal jugulars, which is frequently the case; but if the windpipe is only wounded in its fore part, and the neighbouring vessels remain unhurt, it is usually found curable.

Wounds of the gula, or œsophagus, afford very little hopes of recovery, where it is much wounded, or entirely divided, because, in this case, not only the office of deglutition is cut off, but the part is so situated, that it is impossible almost to wound it, without injuring, at the same time, some of the neighbouring nerves, and blood-vessels: but when the gula only is wounded, and the wound small, there is some hope of recovery.

Wounds in the medulla spinalis, in one part, are very dangerous, but more particularly so when inflicted on that part of it which presses through the *neck*. It is no wonder, therefore, that scarce any recover after a considerable wound of this kind; which it is impossible should happen without wounding the vertebral veins and arteries at the same time; and the situation of the part is such, that it is impossible to convey proper remedies to them. Nor are wounds of the large nerves of the *neck* less dangerous than these; for, if they are divided, the parts of the thorax and abdomen, to which nature has determined them, immediately lose their assistance, and of consequence become unequal to the offices for which they were intended.

For the cure of wounds in the *neck*, the method is as different as the nature of those wounds. Where the integuments and muscular flesh alone are wounded, the common method of curing slight wounds takes place. Where the external jugular is hurt, the same methods used after bleeding in that vein prove sufficient. When the internal jugular has received a small wound, the hæmorrhage will be easily stopped by filling the wound well with dry lint; or with the puff ball, or dusty mushroom, lodging, over these applications, square bolsters, and securing all with a bandage, drawn as tight as the nature of the part will admit: where this method does not take place, the surgeon should make a proper pressure on the wounded part with his finger, till the hæmorrhage is entirely stopped. The same methods must be used to the wounds of the vertebral veins; and when the hæmorrhage is once stopped, the dressings applied are not to be removed for three days, and then a vulnerary balsam and plaister applied to heal the wound.

In large wounds, or an entire division of the internal jugular, the surgeon, if present in time, should make a firm pressure with his finger, on the wounded part, and make incisions lengthways, above the wound, till he can get at the vessel, and then make a firm ligature upon it, by means of a crooked needle.

In case of a wound of the carotid artery, a surgeon, if present in time, should use the same method as in those of the internal jugular vein. This method is more

likely

likely to have ſucceſs in wounds of the upper and middle part of that veſſel, than in thoſe of the lower part of it; and where the wound is not in the trunk of the artery, but in one of its branches near the head, you ſhould fill up the wound with lint dipt in ſome ſtyptic liquor, and then cover it up with thick compreſſes, ſecuring all with a tight bandage, and ordering an aſſiſtant to make a preſſure upon the part with his hand, for ſome time after: and, in theſe caſes, the dreſſings are not to be removed till the third or fourth day.

In curing the wounds of the aſpera arteria, the ſurgeon ought to clean the wound, and then endeavour to unite the parts by the help of ſticking plaſters; or, where the wound is large, by making two ſtitches with a crooked needle, drawing up the wound afterwards in the uſual manner, and enjoining the patient to keep his head in a proper ſituation, that is, ſomewhat bending downwards. The wound, thus treated, if it has been made either by puncture, or by the cutting of a ſharp inſtrument, will eaſily heal; but if it has been made by a bullet, and any part of the aſpera arteria is carried away, the future is to no purpoſe; wounds of this kind are only to be dreſſed with the vulnerary balſams. If the aſpera arteria is entirely divided, and the lower end of it has ſhrunk into the cavity of the thorax, ſo that it cannot be laid hold on, there can be no remedy.

When the œſophagus is wounded, what is taken in at the mouth comes out through the wound, and the patient is uſually affected with hiccoughs and vomitings. Where this is entirely divided, there is no remedy; but where it is only perforated or wounded in part, the cure may be attempted by dreſſing it with the vulnerary balſams, endeavouring to unite it by means of ſticking plaſters, and enjoining the patient a ſtrict abſtinence for ſome days, and giving nouriſhing glyſters of broth, milk, &c. If nouriſhment muſt be taken at length by the mouth, the wound muſt be perfectly cleaned every time afterwards, and be dreſſed daily till it heals. Wounds of the medulla ſpinalis are beſt dreſſed with balſam of Peru, or medicines of a like nature, mixed with a ſmall quantity of honey of roſes, and ſpread upon pledgits, and applied moderately warm. Slight wounds of this kind are ſometimes healed by this means; but large ones in this part always bring on certain death. Heiſter's Surg. p. 84.

In the Memoirs de l'Acad. Royale des Sciences, ann. 1730. we have ſome curious obſervations, by Mr. Winſlow, on the motions of the *neck*, and alſo on thoſe of the head and ſpine.

NECK, *the, of quadrupeds*, Dr. Derham obſerves, are always equal to the length of their legs: this is contrived by nature, to enable them to reach the ground for their food, without ſtooping the body.

Indeed, the elephant is an exception from the rule: its *neck* is very ſhort; but then it has a peculiar proviſion by a proboſcis, or trunk.

Another thing remarkable in the *necks* of graminivorous quadrupeds is a ſtrong, tendinous, and inſenſible aponeuroſis, or ligament, braced from the head to the middle of the back; by means whereof they are enabled conſtantly to hold down the head, though very heavy, to gather their food without pain or labour.

NECKS, *the, of birds* are longer than thoſe of any other animals; and longer in ſuch as have long legs than in thoſe that have ſhort, either for gathering up their meat from the ground, or ſtriking their prey in the water, except in web-footed fowl, which are, by reverſing their bodies, deſtined to ſearch for food, at the bottom of waters: birds, eſpecially thoſe that have long *necks* have the power of retracting, bending, or ſtretching them out, in order to change their center of gravity, from their legs to their wings.

NECK *verſe*, the Latin ſentence, *Miſerere mihi Deus*, was thus called, becauſe the reading of it was made a teſt, by which to diſtinguiſh thoſe, who, in preſumption of law, were not qualified, in point of learning, and admiſſible to benefit of clergy: but this ground of diſtinction was ſet aſide by 5 Ann. cap. 6. See CLERGY.

NECK, in the *Manege*. See CARRYING.

NECK, *of the caſſoket*, in *Artillery*, is that part betwixt the breech mouldings and the *caſſoket*.

NECK *of a gun* is that part betwixt the muzzle mouldings and the cornice-ring.

NECKIB-*elhoſſeraf*, in Egypt, the head of the ſherif, or relations of Mahomet, who has the great cognizance of their actions, and the power of inflicting puniſhments upon them.

NECKLACE *beads*. See SNAKE.

NECOPHORON, in *Botany*, a name uſed by Pliny, and other authors, for the *ſmilax aſpera*, or *rough bindweed*.

NECROLIUM, a word uſed by ſome of the alchemical writers to expreſs a remedy almoſt always capable of averting death, and continuing life to its utmoſt period.

NECROLOGY, *necrologium*, formed of νεκρος, *dead*, and λογος, *diſcourſe* or *enumeration*, a book anciently kept in churches and monaſteries; wherein were regiſtered the benefactors to the ſame, the time of their deaths, and the days of their commemoration; as alſo the deaths of the priors, abbots, religious, canons, &c.

This was otherwiſe called *calendar* and *obituary*.

NECROMANCY, formed from νεκρος, *dead*, and μαντια, *ſoothſayment* or *divination*, the art, or act of communicating with devils, and doing ſurpriſing feats by their aſſiſtance; particularly of calling up the dead, and extorting anſwers from them. See MAGIC.

NECROSIS, νεκρωσις, in *Medicine*, a complete mortification of any part; called alſo *ſideratio*, and SPHACELUS.

NECTAR, νεκταρ, among the *Ancient Poets*, the drink of the fabulous deities of the heathens. See AMBROSIA.

NECTAR, is alſo uſed, by ſome of the ancients, to expreſs HONEY: this ſignification of the word was owing to the ſuppoſition that honey was the drink of the bees, as they eſteemed the yellow matter collected on their thighs to be their food. They called the latter ambroſia. It ſeems that the ancients have been more in the right as to their opinion of the ambroſia than other authors, who have uſually eſteemed that yellow ſubſtance to be true wax: but it appears from experiments, that it is not really ſo; nor can wax be ſeparated from it by any of the known proceſſes of chemiſtry. It ſeems rather that the bees eat it, agreeably to the opinion of the ancients, and that after having ſerved them as nouriſhment, it is converted in the bowels into the ſubſtance we call wax.

NECTARINE, a fruit greatly eſteemed for its delicious flavour, and ſuppoſed to have its name from the nectar of the Gods, in heathen ſtories.

It differs in nothing from the peach, but in having a ſmoother ſkin and a firmer pulp.

We have ten kinds of *nectarine* cultivated by the curious in gardening; viz. Fairchild's early *nectarine*, ripening in the end of July; the Ebruge, Newington, ſcarlet, Brugnon or Italian, and Roman, which ripen in Auguſt; the murry, golden, and Temple's, which ripen in September; and the Peterborough, or late green *nectarine*, which ripens about the middle of October.

The inſects in *nectarines* may be deſtroyed in the ſame manner as thoſe of PEACH *trees*.

The pruning, planting, and whole culture of this plant, are the ſame with that of the PEACH.

NECTARIUM, among *Botaniſts*, expreſſes what is only a part of the corolla, ſometimes, though more rarely the whole. It is a part deſtined for the reception of the honey juice of the plant; and is very various in its figure. Sometimes, it is only a hollow in a petal; ſometimes it is a little ſquamma; ſometimes a tubercle; and ſometimes a plain tube.

NECUIA, in *Botany*, a name given by the ancient Greeks to a ſpecies of MULLEIN.

The Greeks and Romans both uſed the ſtalks of a peculiar kind of *mullein*, called *thryallis* by Nicander. For the making of wicks of lamps, we have a kind of *mullein*, called *lychnites*, and candlewick *mullein*, from the λυχνιτις of Dioſcorides; but it is not certain that our's is the ſame plant.

The ancients uſed the ſtalks of many different plants for the wicks of their candles and lamps. The ruſh, ſtripped of its bark, was as commonly in uſe with them as with us for this purpoſe; and they alſo uſed the nettle, this *mullein*, and many other plants, whoſe ſtalks were compoſed of tough filaments, for the ſame purpoſe; beating them out like hemp, and when dry, dipping them in melted reſin, and other ſuch inflammable ſubſtances. When thus prepared, they are readily inflammable, like our flambeaux, and this *mullein*, having ſtalks more long and large, and more firm than all the others, was uſed to make thoſe lights with which they ſet fire to the funeral pile for conſuming the aſhes of their dead friends.

NECYDALIS, in the *Linnæan Syſtem*, is a genus of the *coleoptera* order of *inſects*, diſtinguiſhed by having the antennæ ſetaceous, the exterior wings, ſmaller, ſhorter, and narrower than the interior, and a ſimple tail. There are eleven ſpecies.

NEEDLE, a very common little inſtrument, or uteníil, made of ſteel, pointed at one end, and pierced at the other; uſed in ſewing, embroidery, tapeſtry-work, &c.

Needles make a very conſiderable article in commerce; and the conſumption thereof is almoſt incredible. The ſizes are from N° 1, the largeſt, to N° 25, the ſmalleſt. There is ſcarce any commodity cheaper than *needles*;

which will appear ſomething extraordinary to the reader, after he has been ſhewn the great number of operations they undergo, before they are brought to perfection.

NEEDLES, *manufacture of.* German and Hungarian ſteel is of moſt repute for *needles*. The firſt thing is to paſs it through a coal fire, and under a hammer, and to bring it out of its ſquare figure into a cylindrical one: this done, it is drawn through a large hole of a wire-drawing iron; returned into the fire, and drawn through a ſecond hole of the iron, ſmaller than the firſt; and thus ſucceſſively from hole to hole, till it has acquired the degree of fineneſs required for that ſpecies of *needles*; obſerving every time it is to be drawn, that it be greaſed over with lard, to render it the more manageable. The ſteel, thus reduced into a fine wire, is cut in pieces of the length of the *needles* intended. Theſe pieces are flatted at one end, on the anvil, in order to form the head and eye: they are then put into the fire, to ſoften them farther; and thence taken out and pierced at each extreme of the flat part, on the anvil, by the force of a puncheon of well-tempered ſteel, and laid on a leaden block, to bring out, with another puncheon, the little piece of ſteel remaining in the eye.

The corners are then filed off the ſquare of the heads, and a little cavity filed on each ſide the flat of the head. This done, the point is formed with a file; and the whole filed over.

They are then laid to heat red-hot, on a long, flat, narrow iron, crooked at one end, in a charcoal fire; and, when taken out thence, are thrown into a baſon of cold water to harden. On this operation a good deal depends; too much heat burns them, and too little leaves them ſoft; the medium is only to be learnt by experience.

When they are thus hardened, they are laid in an iron ſhovel, on a fire more or leſs brisk, in proportion to the thickneſs of the *needles*; taking care to move them from time to time. This ſerves to temper them, and take off their brittleneſs; great care, here too, muſt be taken of the degree of heat. They are then ſtraitened, one after another, with the hammer; the coldneſs of the water, uſed in hardening them, having twiſted the greateſt part of them.

The next proceſs is the poliſhing. To do this, they take twelve or fifteen thouſand *needles*, and range them in little heaps againſt each other, on a piece of new-buckram, ſprinkled with emery-duſt. The *needles*, thus diſpoſed, emery-duſt is thrown over them, which is again ſprinkled with oil of olives: at laſt, the whole is made up into a roll, well bound at both ends.

This roll is then laid on a poliſhing-table, and over it a thick plank, loaded with ſtones, which two men work backwards and forwards, a day and half, or two days ſucceſſively: by which means, the roll, thus continually agitated by the weight and motion of the plank over it, the *needles* within-ſide, being rubbed againſt each other, with oil and emery, are inſenſibly poliſhed.

In Germany, inſtead of hands, they poliſh with water-mills.

After poliſhing, they are taken out, and the filth waſhed off them, with hot water and ſoap: they are then wiped in hot bran, a little moiſtened, placed, with the *needles*, in a round box, ſuſpended in the air by a cord, which is kept ſtirring till the bran and *needles* be dry.

The *needles*, thus wiped in two or three different brans, are taken out, and put in wooden veſſels, to have the good ſeparated from thoſe, whoſe points or eyes have been broken, either in poliſhing or wiping: the points are then all turned the ſame way, and ſmoothed with an emery-ſtone, turned with a wheel.

This operation finiſhes them; and there remains nothing but to make them into packets of two hundred and fifty each.

NEEDLES, *ſurgeons*, are generally made crooked, and their points triangular: however they are of different forms and ſizes, and bear different names, according to the purpoſes they are uſed for.

The largeſt are *needles for amputation*; the next, *needles for wounds*; the fineſt, *needles for ſutures*. They have others, very ſhort and flat, for tendons; others, ſtill ſhorter, and the eye placed in the middle, for tying together of veſſels, &c. See *Tab. Surgery, fig.* 11 and 12.

Needles for couching CATARACTS are of various kinds; all of which have a ſmall, broad, and ſharp point or tongue; and ſome with a ſulcus at the point. Surgeons have ſometimes uſed two *needles* in this operation, one with a ſharp point for perforating the coats of the eye, and another with a more obtuſe point for depreſſing or couching the opake cryſtalline lens: but care ſhould be taken in the uſe of any of theſe, that they be firſt well poliſhed, with cloth or leather, before they are applied to the eye.

Mr. Warner obſerves, that the blade of the couching *needle* ſhould be at leaſt a third part larger than thoſe generally uſed upon this occaſion, as great advantages will be found in the depreſſing of the cataract, by the increaſed breadth of the blade of that inſtrument. The handle, alſo, if made ſomewhat ſhorter than uſual, will enable the operator to perform with greater ſteadineſs, than he can do with a larger handled inſtrument. See *Tab. III. Surgery, fig.* 33.

It is to be obſerved, that *needles* of ſilver pierce more eaſily in ſtitching arteries after an amputation, than thoſe made of ſteel. Monro. in Med. Eſſ. Edinb. vol. v. art. 41.

NEEDLE, *magnetical*, in *Navigation*, denotes a *needle* touched with a loadſtone, and ſuſtained on a pivot or center, on which, playing at liberty, it directs itſelf to certain points in or under the horizon. See MAGNET.

Magnetical *needles* are of two kinds; viz. *horizontal* and *inclinatory*.

NEEDLES, *horizontal*, are thoſe equally balanced on each ſide the pivot which ſuſtains them; and which, playing horizontally, with their two extremes point out the north and ſouth points of the horizon. For their application and uſe, ſee COMPASS.

NEEDLE, *conſtruction of an horizontal*. A piece of pure ſteel is procured, of a length not exceeding ſix inches, leſt its weight impede its volubility; very thin, to take its verticity the better; and not pierced with any holes, or the like, for ornament ſake, which prevent the equable diffuſion of the magnetic virtue.

A perforation is then made in the middle of its length, and a braſs cap or head ſoldered on, whoſe inner cavity is conical, ſo as to play freely on the ſtyle or pivot, headed with a fine ſteel point.

The north point of the *needle*, in our hemiſphere, is made a little lighter than the ſouthern, the touch always deſtroying the balance, if well adjuſted before; and rendering the north end heavier than the ſouth, and thus occaſioning the *needle* to dip.

Now to give the *needle* its verticity, or directive faculty, it is to be rubbed leiſurely on each pole of a magnet, from the ſouth pole towards the north; firſt beginning with the northern end, and going back at each repeated rub toward the ſouth. A rub in a contrary direction takes away the power communicated by the former.

Compaſs *needles* may acquire the magnetic virtue by means of magnetic bars in the following manner: lay two *needles* of equal length, about an inch aſunder, with the north end of one and the ſouth end of the other pointing the ſame way, and apply two conductors in contact with their ends: then, with two magnetic hard bars, one in each hand, and held as nearly horizontal as can be, with the upper ends, of contrary names, turned outwards to the right and left, let a *needle* be ſtroked or rubbed from the middle to both ends at the ſame time, for ten or twelve times, a north end of a bar going over the ſouth end of the *needle*, and the ſouth end of a bar going over the north end of a *needle*: then, without moving from the place, change hands with the bars, or, in the ſame hands, turn the other ends downwards, and ſtroke the other *needle* in like manner, and they will both be magnetical: but to make them ſtill ſtronger, repeat the operation three or four times from *needle* to *needle*; and at laſt turn the lower ſide of each *needle* upwards, and repeat the operations of rubbing them, as on the other ſides.

In the rubbings or touchings to procure magnetiſm, the hand ſhould not return directly back the way it came, but ſhould return in a kind of oval figure, carrying the hand about ſix or eight inches beyond the point, where the touch ended; but not beyond, on the ſide where the touch begins.

If, after touching, the *needle* be out of its equilibrium, ſomething muſt be filed off from the heavier ſide, till it balance evenly.

The *needles*, that were formerly applied to compaſſes, on board our merchant ſhips, were formed of two pieces of ſteel wire; each of which was bent in the middle, ſo as to make an obtuſe angle; and their ends being applied together made an acute one; ſo that the whole repreſents the form of a lozenge. Dr. Knight, to whom we are indebted for the improvement of the compaſs, found, by repeated experiments, that theſe *needles* not only varied from the true direction, but from one another, and from themſelves: and he has ſhewn that theſe irregularities were owing to their ſtructure: for the wires of which the *needle* was compoſed were hardened only at their ends; now if thoſe ends are not equally hard, or if one end be hardened higher up than the other, when they come to be put together, in fixing them to the card, that end which is hardeſt will deſtroy much of the virtue of the other; by which means the hardeſt end will have the greateſt power in directing the card, and conſequently

make

make it vary towards its own direction: and as the wires are diſpoſed in the form of a lozenge, theſe cards can have but little force: ſo that they will often, when drawn aſide, ſtand at the diſtance of ſeveral degrees on either ſide the point from whence they are drawn; for all magnetical bodies receive an additional ſtrength by being placed in the direction of the earth's magneriſm, and act proportionably with leſs vigour when turned out of it. Therefore, when *needles* of this kind are drawn aſide from their true point, two of the parallel ſides of the lozenge will conſpire more directly than before with the earth's magneriſm, and the other two leſs in that direction: by this means the two former ſides will very much impede its return, and the two latter will have that impediment to overcome, as well as the friction, by their own force alone.

The *needles* formerly uſed on board the men of war, and ſome of the larger trading ſhips, were made of one piece of ſteel, of a ſpring temper, and broad towards the ends, but tapering towards the middle. Every *needle* of this form is found to have ſix poles inſtead of two, one at each end, two where it becomes tapering, and two at the hole in the middle. This inconvenience is owing to their ſhape; for the middle part, being very ſlender, has not ſubſtance enough to conduct the magnetic ſtream quite through from one end to the other. In order to avoid theſe inconveniences and errors, the *needle*, contrived by Dr. Knight, for his compaſs, is quite ſtrait and ſquare at the ends, and conſequently has only two poles, although the curves are a little confuſed about the hole in the middle. *Needles* of this conſtruction, after vibrating a long time, will always point exactly in the ſame direction; and if drawn ever ſo little on one ſide, will return to it again, without any ſenſible difference. Hence, Dr. Knight concludes, that a regular parallelopiped is the beſt ſhape for a *needle*, as well as the ſimpleſt; with the holes for the caps as ſmall as can be well contrived; or if it can be made to anſwer the purpoſe, without any hole at all, it will be ſtill more perfect.—There is a peculiar advantage attending Dr. Knight's *needles*; for as they are tempered much higher than uſual, they are able to contain a much greater quantity of the magnetic force. See COMPASS.

Mr. Michell ſuggeſts, that it would not be amiſs to cover the *needles*, made uſe of in the ſea-ſervice, with a very thin coat of ſinfeed oil, or ſome kind of varniſh, that may keep them from ruſting, which is generally reckoned to injure all magnetical bodies, that are liable to it. *Needles* may be touched through ſuch a coat, by applying a great number of bars, if not according to the common method of making MAGNETS. He alſo apprehends, that coated *needles* may retain a greater degree of magnetiſm, than they otherwiſe would do.

Mr. Michell alſo propoſes to increaſe the weight and length of mariners *needles*; and he obſerves, that long *needles*, properly hung, traverſing to a greater degree of exactneſs than the ſhort ones, may be of conſiderable ſervice on many occaſions: particularly in mines for diſcovering the bearing of one place from another, that they may be able to ſink a ſhaft from above, over any place at pleaſure. In many ſorts of mines, eſpecially thoſe of coal, there are often ſmall quantities of magnetical iron ore, which draw the *needle* out of its proper direction: now the long *needles* are leſs liable to be diſturbed by any ſmall things, already magnetical, than ſhorter ones. Michell on Magnets, p. 42, &c.

A *needle*, on occaſion, may be prepared without touching it on a loadſtone: for a fine ſteel *needle*, gently laid on the water, or delicately ſuſpended in the air, will direct itſelf to the north and ſouth.

Thus alſo a *needle*, heated in the fire, and cooled again in the direction of the meridian, or even only in an erect ſituation, acquires the ſame faculty.

The *needle* is not found to point preciſely to the north, except in very few places; but deviates from it, more or leſs, in different places, and that too at different times; which deviation is called the *declination*.

NEEDLE, *declination of the*, is the VARIATION of the horizontal *needle* from the meridian; or the angle it makes with the meridian, when freely ſuſpended in an horizontal plane.

NEEDLES, *Cleopatra's*. See PORPHYRY.

NEEDLES, *inclinatory*, or *dipping*. See DIPPING *needle*.

NEEDLE *fiſh*, the Engliſh name of the SYNGNATHUS, with the middle of the body hexangular, and the tail pinnated.

It is the ſame fiſh with the ACUS *Ariſtotelis ſpecies altera major*.

NEEDLE *ſhell*, the Engliſh name of a ſpecies of CENTRONIA, or ECHINODERMA.

NEEDLE *ſhell* is alſo the Engliſh name of a ſpecies of TURBO, which is ſlender, and has ventricoſe ſpires, and a ſmall mouth.

NEEDLES, *touch*. See TOUCH *needles*.

NEEDLE, *ſhepherd's*, the name by which ſome writers call the *ſcandix*, or *Venus's comb*. See SHEPHERD'S *needle*.

NE EXEAT REGNO, in *Law*, is a writ to reſtrain a perſon from going out of the kingdom, without the king's licence. F. N. B. 85. It may be directed to the ſheriff, to make the party find ſurety that he will not depart the realm: and on refuſal, to commit him to priſon: or it may be directed to the party himſelf; and if he then goes, he may be fined. 3 Inſt. 178. And this writ is granted on a ſuit being commenced againſt a man in the chancery, when the plaintiff fears the defendant will fly to ſome other country; and thereby avoid the juſtice and equity of the court; which hath been ſometimes practiſed: and when thus granted, the party muſt give bonds to the maſter of the rolls, in the penalty of 1000 l. or ſome other large ſum, for yielding obedience to it; or ſatisfy the court, by anſwer, affidavit, or otherwiſe, that he hath no deſign of leaving the kingdom, and give ſecurity.

NEEP *tides*. See NEAP *tides*.

NEFASTUS, a Latin term. The Romans uſed the appellation, *dies nefaſti*, for thoſe days wherein it was not allowed to adminiſter juſtice, or hold courts; nor for the prætor to pronounce the three ſolemn words or formulas of the law, *Do, dico, addico, I give, I appoint, I adjudge*. See FASTI.

Theſe days were diſtinguiſhed in the calendar by the letter, N. or by N. P. *nefaſtus primo*, as when the day was only *nefaſtus* for the firſt part thereof.

NEGATION, in *Logic*, an act whereby the mind ſeparates one idea from another; or affirms the one to be different from the other: as the ſoul is not matter.

NEGATION is alſo applied by logicians to not-being, as it has relation to modes, and denotes the abſence of that which does not naturally belong to the thing ſpoken of, or which has no right, obligation, or neceſſity to be preſent with it. In this ſenſe it is oppoſed to PRIVATION, and was denominated in the ſchools *abſentia habitus*.

NEGATIVE, a term that denies, or implies a denial of any thing.

Logicians, &c. ſay, a *negative* cannot be proved but by converting it into an affirmative.

NEGATIVE *heretics*, in the language of the inquiſition, are thoſe, who, being accuſed of hereſy, by witneſſes whoſe evidence they do not deny, ſtill keep on the *negative*, make open profeſſion of the catholic doctrine, and declare their abhorrence of hereſy.

There are alſo *negative ſchiſms*, as well as poſitive ones.—In the *negative*, it is ſufficient to reject the errors of a church without ſeparating from it, or ſetting up a diſtinct ſociety.

NEGATIVE *penalties*, the laws whereby certain perſons are excluded from honours, dignities, &c. without inflicting any direct and poſitive pains on them.

NEGATIVE *power*, in *Algebra*. See POWER.

NEGATIVE *pregnant*, in *Law*, a *negative* which implies or brings forth an affirmative.

As if a man, being impleaded to have done a thing on ſuch a day, in ſuch a place, denies he did it, *modo & forma declarata*; which implies, nevertheleſs, that he did it in ſome ſort.

NEGATIVE *quantity*, in *Algebra*. See QUANTITY.

NEGATIVE *ſign*. The uſe of the *negative ſign*, in *Algebra*, is attended with ſeveral conſequences that at firſt ſight are admitted with difficulty, and has ſometimes given occaſion to notions that ſeem to have no real foundation. This ſign implies that the real value of the quantity repreſented by the letter to which it is prefixed, is to be ſubtracted; and it ſerves, with the poſitive ſign, to keep in view what elements or parts enter into the compoſition of quantities, and in what manner, whether as increments or decrements (that is, whether by addition or ſubtraction), which is of the greateſt uſe in this art.

In conſequence of this, it ſerves to expreſs a quantity of an oppoſite quality to the poſitive, as a line in a contrary poſition; a motion with an oppoſite direction; or a centrifugal force in oppoſition to gravity; and thus often ſaves the trouble of diſtinguiſhing, and demonſtrating ſeparately, the various caſes of proportions, and preſerves their analogy in view. But as the proportions of lines depend on their magnitude only, without regard to their poſition; and motions and forces are ſaid to be equal, or unequal, in any given ratio, without regard to their directions; and, in general, the proportion of quantity relates to their magnitude only, without determining whether they are to be conſidered as increments or decrements; ſo there is no ground to imagine any other proportion of $-b$ and $+a$ (or of -1 and 1) than that of the real magnitudes of the quantities repreſented by b and a, whether theſe quantities are, in any particular caſe, to be added or ſubtracted. It is the ſame thing to ſubtract a decrement as to add an equal increment

ment, or to subtract $-b$ from $a-b$, as to add $+b$ to it: and because multiplying a quantity by a *negative* number implies only a repeated subtraction of it, the multiplying $-b$ by $-n$, is subtracting $-b$ as often as there are units in n; and is therefore equivalent to adding $+b$ so many times, or the same as adding $+nb$. But if we infer from this, that 1 is to $-n$ as $-b$ to nb, according to the rule, that unit is to one of the factors as the other factor is to the product, there is no ground to imagine that there is any mystery in this, or any other meaning than that the real magnitudes represented by 1, n, b, and nb are proportional. For that rule relates only to the magnitude of the factors and product, without determining whether any factor, or the product, is to be added, or subtracted. But this likewise must be determined in algebraic computations; and this is the proper use of the rules concerning the signs, without which the operation could not proceed. Because a quantity to be subtracted is never produced in composition, by any repeated addition of a positive, or repeated subtraction of a *negative*, a *negative* square number is never produced by composition from the root. Hence $\sqrt{-1}$, or the square root of a *negative*, implies an imaginary quantity; and, in resolution, is a mark or character of the impossible cases of a problem, unless it is compensated by another imaginary symbol, or supposition, when the whole expression may have a real signification. Thus $1+\sqrt{-1}$, and $1-\sqrt{-1}$ taken separately, are imaginary, but their sum is 2; as the conditions that separately would render the solution of a problem impossible, in some cases destroy each other's effect, when conjoined. In the pursuit of general conclusions, and of simple forms representing them, expressions of this kind must sometimes arise where the imaginary symbol is compensated in a manner that is not always so obvious.

By proper substitutions, however, the expression may be transformed into another, wherein each particular term may have a real signification as well as the whole expression. The theorems that are sometimes briefly discovered by the use of this symbol, may be demonstrated without it, by the inverse operation, or some other way; and though such symbols are of some use in the computations by the method of fluxions, its evidence cannot be said to depend upon arts of this kind. See Maclaurin's Fluxions, book ii. chap. 1.

NEGATIVELY, NEGATIVE, in the school philosophy, is variously used in contradistinction to positive. See POSITIVE.

NEGROES, a kind of black slaves, which make a considerable article in the modern commerce.

The *Negroes*, also called *Blacks* and *Moors*, are a people of Africa, whose country extends on each side of the river *Niger*, and is called *Nigritia*: though, whether the people communicated their name to the river, &c. or received it therefrom, is not easily determined.

The origin of *Negroes*, and the cause of that remarkable difference in complection from the rest of mankind, has much perplexed the naturalists; nor has any thing satisfactory been yet offered on that head.

Mr. Boyle has observed, that the heat of the climates cannot be the true cause of the colour of *Negroes*: for though the heat of the sun may darken the colour of the skin, yet experience does not show that heat is sufficient to produce a true blackness, like that of *Negroes*. In Africa itself, many nations of Æthiopia are not *Negroes*, nor were there any blacks originally in the West Indies. In many parts of Asia, under the same parallel with the African regions, inhabited by blacks, the people are but tawny. He adds, that there are *Negroes* in Africa, beyond the southern tropic, and that a river sometimes parts nations, one of which is black, and the other but tawny. Boyle's Works Abr. vol. ii. p. 42. 44.

Dr. Barrere alledges that the gall of *Negroes* is black, and being mixed with their blood, is deposited between their skin, and scarf skin. Diss. on the Phys. Cause of the Colour of *Negroes*.

We have a dissertation on this head by Dr. John Mitchell, of Virginia, in the Philosophical Transactions, N° 476. sect. 4. where he advances these propositions, and enters into a learned detail to support them.

1. The colour of white people proceeds from the colour which the epidermis transmits; that is, from the colour of the parts under the epidermis, rather than from any colour of its own.

2. The skins of *Negroes* are of a thicker substance, and denser texture, than those of white people, and transmit no colour through them.

3. The part of the skin which appears black in *Negroes*, is the *corpus reticulare cutis*, and external lamella of the epidermis: all other parts are of the same colour in them with those of other people, except the fibres which pass between those two parts.

4. The colour of *Negroes* does not proceed from any black humour, or fluid parts contained in their skins; there being none such in any part of their bodies, more than in white people.

5. The epidermis, especially its external lamella, is divided into two parts by its pores and scales, two hundred times less than the particles of bodies on which their colours depend.

This is founded on Leeuwenhoek's observation, that a portion of the epidermis no bigger than what can be discerned by the naked eye, is divided into 125000 pores, and these pores must divide such a portion of the skin into as many particles. But the particles of bodies on which their colours depend, are, by Sir Isaac Newton's Optics, lib. ii. p. 3. prop. 7. 600 times less than those which can be discerned by the naked eye. Therefore, the particles of the skin must be about 200 times less than these; since $125000 \times 200 = 208^3$. It may also be observed that such a small portion of the epidermis is divisible into 250 scales, which must increase the number of its parts.

6. From these propositions, and from Sir Isaac Newton's theory of light and colours, the doctor thinks he may conclude, that the proximate cause of the colour of *Negroes* is threefold; viz. The opacity of their skin, proceeding from the thickness and density of its texture, which obstructs the transmission of the rays of light, from the white and red parts under the skin, together with its greater refractive power, which absorbs these rays; and the smallness of the particles of this skin, which hinders it from reflecting any light.

7. The influence of the sun in hot countries, and the manner of life of their inhabitants, are the remote causes of the colour of *Negroes*, Indians, &c. And the ways of living in use amongst most nations of white people, make their colours whiter than they were originally, or would be naturally.

In support of this proposition, the doctor observes, that the skin is deprived of its white colour, by the force and influence of the sun, four ways. 1st. By being rendered opaque, from a dissipation of its more aqueous, and pellucid juices. 2dly. By a concretion of its vessels and glandules, from this dissipation of their aqueous contents, which renders the skin both thicker and denser, or more callous and rigid. 3dly. By a new accretion of many new membranes, which render it thick and opaque. 4thly. By increasing those parts or principles, in the composition of the epidermis, which have the greatest refractive power; as the terrestrial and fixed saline; but especially the tenaceous sulphureous, which refract and absorb light more strongly than any other substances; while the more transparent and pellucid principles, as the aqueous, spirituous, and volatile saline, are evaporated by the heat, which causes the other more fixed principles to be accumulated; and these particles being likewise more comminuted by the sun, will, on this account, be black; as happens to oil when well boiled. These causes, with those first mentioned, may, the doctor thinks, by conspiring, make the skin quite black; especially if we add another effect of the sun's power, a peculiar necrosis of the epidermis, occasioned by the forcible vibrations, contractions, and exsiccations of its fibres by the sun-beams, which cause it to turn black, as these, or other parts do, by the heat of an inflammation, or a fever, in gangrenes, black tongues, &c.

We cannot pretend to follow the author in all the detail of his observations on this subject, nor of his answer to a material objection already mentioned from Mr. Boyle, that the sun cannot be the cause of the colour of *Negroes*, because several nations, in the same latitude with those *Negroes*, are not made black by it. He seems to think the heat of Africa greater than that of other parts of the world. Whether it be so, or not, is, we apprehend, not easy to determine; but it would be a strong confirmation of his doctrine, if we could see any people, originally white, become black and woolly by transplantation, or vice versa.

Negroes are brought from Guinea, and other coasts of Africa, and sent into the colonies in America, to cultivate sugar, tobacco, indigo, &c. and Peru and Mexico to dig in the mines.

This commerce, which is scarce defensible on the principles either of religion, or humanity, is now carried on by all the nations that have settlements in the West Indies; particularly by the English, Dutch, Spaniards, and Portuguese. See ASSIENTO.

The Spaniards, indeed, have few *Negroes* at first hand; but have treated with other nations to furnish them therewith: thus they were formerly furnished by the company of the Grilles, established at Genoa; since, by the Assiento in France; and after the peace of Utrecht, by the English South-sea company.

By the peace of Aix-la Chapelle, in 1748, the Assiento

treaty

treaty between the English and Spaniards, was abolished: but, during its continuance, the South Sea Company furnished the American dominions of Spain with four thousand eight hundred *Negroes*, who, on their arrival, were separated into four claſſes: the firſt claſs conſiſted of all in perfect health, from fifteen to thirty years of age, who were charged with a duty of 33¼ piaſtres each, or per head; the ſecond claſs was compoſed of the old and ſick, each of whom was rated at ½ of a head; the children, from ten to fifteen years old, formed the third claſs, and were reckoned at three for two heads; and thoſe from five to ten compoſed the fourth claſs, and were rated at two for one head; and the duty was paid accordingly.

There are various ways of procuring theſe *Negroes*: ſome, to avoid famine, ſell themſelves, their wives, and children; to their princes, or great men, who have wherewithal to ſubſiſt them. Others are made priſoners in war; and great numbers ſeized in excurſions made for that very purpoſe by the petty princes upon one another's territories; in which it is uſual to ſweep away all both old and young, male and female.

The *Negroes* make a frequent practice of ſurpriſing one another while the European veſſels are at anchor, and dragging thoſe they have caught to them, and ſelling them in ſpite of themſelves; and it is no extraordinary thing to ſee the ſon ſell, after this manner, his father or mother, and the father his own children, for a few bottles of brandy, or a bar of iron.

As ſoon as the ſhip has its complement, it immediately makes off; the poor wretches, while yet in ſight of their country, falling into ſuch deep grief and deſpair in the paſſage, that a great part of them languiſh, fall into ſickneſs and die: while others of them ſtarve themſelves. The only ſure means to preſerve them, is to have ſome muſical inſtrument play to them, be it ever ſo mean. But this exceſſive love for their country abates as they get farther off.

It has been calculated that upwards of one hundred thouſand ſlaves have for many years been exported by the *Europeans* from the coaſt of *Africa*.

By the laws of Virginia, *Negro* ſervants are ſaleable; and where a *Negro* is ſold here, in action *indebitat aſſumpſit*, for the money, the declaration ought to be, that the defendant was indebted to the plaintiff for the *Negro* ſold here at *London*, but the ſaid *Negro* at the time of the ſale was in Virginia, and that by the laws and ſtatutes of Virginia, *Negroes* are ſaleable as chattels. Per Holt. C. J. 2 Salk. Rep. 666. In action of trover for a *Negro*, and verdict and damages for the plaintiff, it was moved in arreſt of judgment, that trover lay not for a *Negro*, for the owner had not an abſolute property in him; but the court ſeemed to think, that in treſpaſs, *quare captivum ſuum cepit*, the plaintiff might give in evidence that the party was his *Negro*, and he bought him. Ibid. ſee ſtat. 13 Geo. I. cap. 9.

It is now laid down, that a ſlave or *Negro*, the inſtant he lands in England, becomes a freeman; that is, ſo far as that the law would protect him in the enjoyment of his perſon and property. But with regard to any right which the maſter may have acquired to the perpetual ſervice of John or Thomas, this will remain exactly in the ſame ſtate as before. Hence alſo it follows, that the infamous and unchriſtian practice of with-holding baptiſm from *Negro* ſervants, leſt they ſhould thereby gain their liberty, is totally without foundation, as well as without excuſe; for the ſlave is intitled to the ſame protection in England before, as after baptiſm, and whatever ſervice the heathen *Negro* owed to his American maſter, the ſame he is bound to render, when brought to England and made a Chriſtian. Blackſt. Com. b. 1. p. 424.

NEGRO, in *Ornithology*, the name of a large bird, approaching to the crane kind, and more uſually known among authors by its Braſilian name JABIRU.

NEGRO *oil*, in *Botany*. See PALM-*tree*.

NEHEMIAH, a canonical Book of the Old Teſtament, ſo called from the name of its author. *Nehemiah* was born at Babylon, during the captivity, and ſucceeded Ezra in the government of Judah and Jeruſalem. He was a Jew, and was promoted to the office of cup-bearer to Artaxerxes Longimanus, king of Perſia; when the opportunities he had of being daily in the king's preſence, together with the favour of Eſther, the queen, procured him liberty to repair and fortify the city of Jeruſalem, in the ſame manner as it was before its deſtruction by the Babylonians. On his going to Jeruſalem, he finiſhed the rebuilding of the walls in fifty-two days, and dedicated the gates of the city with great ſolemnity. He then reformed ſome abuſes which had crept in among his countrymen. The hiſtory of theſe tranſactions is the ſubject of this book.

NEIF, *native*, in our *Ancient Cuſtoms*, a bond woman, or ſhe villain, born in one's houſe. 9 Rich. II. cap. 2.

Anciently, lords of manors, ſold, gave, or aſſigned their *neifs*, and natives. See SLAVE, VILLAIN, &c.

NEIFTY, *writ of*, is an ancient writ, whereby the lord claimed ſuch a woman for his *neif*.

NE INJUSTE *vexes*, a writ founded on *Magna Carta*, cap. 10. which lies for a tenant in fee ſimple or fee tail, the lord, forbidding him to diſtrain on the tenant, for more ſervice than he ought to perform; particularly when he has formerly prejudiced himſelf by doing or paying more than he needed.

NELANJENUM, in *Natural Hiſtory*, the name of a curious and peculiar foſſile ſubſtance, found in the Eaſt Indies.

It has much the appearance of ſome of our ſteel-grained lead ores, and is very ponderous, but it does not contain any lead: in this it approaches to the nature of that ſubſtance common in Europe, and called blende, or mock lead; but this laſt is foliated, and reſembles the plated lead ores, whereas this reſembles the cloſe ground ores. It is found in the beds of rivers in many places; they calcine it, and, reducing it to powder, mix it with the juice of herbs, and uſe it in ulcers.

NELLA *curcuidum*, in *Natural Hiſtory*, a name given by the people of the Eaſt Indies to a very hard ſtone which they uſe as we do emery.

It is of a talcky nature, being compoſed of flaky ſpangles, and a coarſer matter interminxed. They dig it at the foot of ſome mountains, and in ſome other places. It lies ſo near the ſurface that the rice fields abound with it; and it is ſeen on ſtirring the ground. It is always found in nodules, or detached maſſes, and is uſually of a ſort of iron colour, though ſubject to ſome variations. It is uſed by the common people to ſcour arms, and other iron works; and by the lapidaries, among them, to poliſh rubies and other ſtones. For this laſt purpoſe they grind it with ſtick lac, and make it into a ſort of cement, with which they daub over the face of the poliſhing machine.

NELLON, in *Botany*, a name given by ſome to rice. It is an Indian word, and properly ſignifies the grain of rice taken off from the ſtalks, but covered with its proper pellicle. The firſt operation to be performed upon this, is the beating it with large ſtones, or other more manageable tools, till this ſkin flies off. Then it is to be dried in the ſun, and, after that bear a ſecond time, to get off its thin, internal, reddiſh coat: when this is done, it is in a ſtate to be uſed, and it is then only that the Indians call it *arriſ*, the word from which we formed our word rice.

NELUMBO, in *Botany*, the name of a genus of plants, uſually confounded with the nymphæa.

The characters of the *nelumbo* are theſe; the flower is like that of the nymphæa, but the fruit wholly different, not only in ſhape, but in ſtructure, being not divided into ſeveral cells, but having the ſeeds placed irregularly, at diſtances from one another in it.

There is only one known ſpecies of this genus, which is the *nelumbo* of the Ceyloneſe, called by others the *Indian nymphæa*, and *faba Ægyptiaca*, the *Egyptian bean*.

NEMÆAN, or NEMEAN *games*, one of the four great kinds of games, or combats, celebrated among the ancient Greeks.

Some ſay, they were inſtituted by Hercules, on occaſion of his killing the *Nemean* lion; and that it was hence they took their name, as alſo the place of celebration, the foreſt of *Nemea*.

Others relate, that the ſeven chiefs ſent to Thebes, under the conduct of Polynices, being extremely oppreſſed in their journey with thirſt, met with Hypſipyle of Lemnos, who had in her arms Opheltes, ſon of Lycurgus, prieſt of Jupiter, and Eurydice. They begging her to ſhew them ſome water, ſhe laid the child down on the graſs, and conducted them to a well. In her abſence, a venomous ſerpent killed the child; upon which the nurſe, out of an exceſs of grief, grew deſperate. The chiefs, at their return with her, killed the ſerpent, buried the young Opheltes, and, to divert Hypſipyle, inſtituted the *Nemean games*.

Ælian ſays, they were indeed the ſeven chiefs going to the ſiege of Thebes, that inſtituted them; but he adds, that it was in favour of Pronax.

Pauſanias refers the inſtitution of them to Adraſtus; and their reſtoration to his deſcendants.

Laſtly, Hercules, on his victory over the *Nemean* lion, augmented the games, and conſecrated them to Jupiter Nemeus.

The games were opened with ſacrificing to *Nemean* Jove, appointing him a prieſt, and propoſing a reward for ſuch as ſhould be victors in the games.

They were held every three years, in the month called *Panemus* by the Corinthians, and *Bucatius* by the Athenians.

The Argians were the judges, and ſat clothed in black,

to express the origin of the games. As they were instituted by warriors, none at first were admitted to them but military men, and the games themselves were only equestrian and gymnic; at length they were open to the people, and other kinds of sports were introduced.

The conquerors were crowned with olive, till the time of the war with the Medes; when a blow they received in that war, occasioned them to change the olive for the smallage, a funeral plant: though others maintain, that the crown was originally smallage, on account of the death of Opheltes, otherwise called Archemorus; this plant being supposed to have received the blood, which ran from the wound made by the serpent.

NEMESIA, in *Antiquity*, a religious solemnity in memory of deceased persons, so called from the goddess *Nemesis*, who was thought to defend the relics and memories of the dead from injuries.

NEMINE *contradicente*, i. e. none contradicting it; a term chiefly used in parliament, or any public assembly, when any matter is carried with the content of all the members.

NENIA, or NÆNIA, in the *Ancient Poetry*, a kind of funeral song, sung to the music of flutes, at the obsequies of the dead.

The word comes from the Greek νηνεμος; on which Scaliger observes, that it should be written in Latin *Nenia*, not *Nœnia*.

Authors represent them as bad compositions, sung by hired women-mourners, called *præficæ*. The first rise of these *nenia* is ascribed to the Phrygians.

Guichart notes, that *nenia* was anciently the name of a song, sung by nurses, to lull children asleep; and conjectures it to come from the Hebrew נין *nin*, *child*.

In the heathen antiquity, the goddess of tears and funerals was called *Nenia*, whom some suppose to have given that name to the funeral song; and others to have taken her name from it. Some will have the one, and some the other, formed by onomatopœia, from the sound or voice of those that weep.

NENUPHAR. The ancient writers on the materia medica have all mentioned a peculiar species of this plant, under the name of *nenuphar indicum*. The roots of this they call BEL, and Avicenna says, that they have the same virtues with the mandrake.

NENUPHAR, in *Botany*, is also a name used by some authors for the *water*-LILY.

NENUPHARINI, a name given by the adepts to a kind of imaginary spirits which they suppose to inhabit the air, and to direct and govern many things on earth.

NEOCORI, Νεωκοροι, among the *Ancients*, persons whose business it was to take care of temples, and other consecrated places. They were otherwise called ÆDITUI.

NECENIA, Νεωνια, in *Antiquity*, a festival celebrated in honour of Bacchus, when the new wine was first tasted.

NEOMENIA, Νεομηνια, in *Antiquity*. See NUMENIA.

NEOMENIA, in *Chronology*, &c. a term used for the new moon.

Some say, the Jews reckoned two kinds of *neomenia*, or new moons; the first on the day of her conjunction with the sun; the second on that of her apparition or phasis; and add, that they celebrated two passovers, on account of the uncertainty which of these days it should be held on.

P. Hardouin, on the contrary, maintains, they had no other *neomenia* but that of the moon's conjunction with the sun; which it was easy to ascertain by astronomical calculation: whereas the other was liable to mistakes; the moon sometimes not shewing herself till four or five days after conjunction.

NEOPHYTES, Νεοφυτοι, in the *Primitive Church*, were new Christians; or the heathens newly converted to the faith.

The word signifies *a new plant*; being formed of the Greek νεος, *new*; and φυω, *I produce*; q. d. *newly-born*; baptism, whereby they commenced *Neophytes*, being a kind of new birth.

The fathers never discovered the mysteries of their religion to the *Neophytes*.

The term *Neophyte* is still applied to the converts which the missionaries frequently make among the infidels. The Japonese *Neophytes*, in the latter end of the fifteenth and beginning of the seventeenth century, are said to have shewn prodigies of courage and faith, equal to any known in the primitive church. See CATECHUMEN.

NEOPHYTES has formerly likewise been used to denote new priests, or those first admitted into orders; and sometimes, the novices in monasteries.

NEOPTOLEMIA, Νεοπτολεμια, in *Antiquity*, a festival celebrated by the Delphians with much pomp and splendor, in memory of Neoptolemus, the son of Achilles, who was slain in an attempt to sack Apollo's temple, which he undertook in revenge of his father's death, to which that god was accessary.

NEOTTIA, in *Botany*, the name given by some to the plant called by Tournefort and others NIDUS *avis*, and by Rupius *corallorhiza*. Linnæus makes both the *nidus avis* and *corallorhiza*, distinct species of the OPHRYS.

NEP, NEPETA, in *Botany*. See CATMINT.

NEPA, a word used by naturalists sometimes to express a *scab*, sometimes for a *scorpion*, and sometimes for a plant, called by the botanists *genista Spartium*.

NEPA, in the Linnæan system of *Zoology*, is a genus of the *hemiptera* class of insects; distinguished by an inflated back; four wings that are complicated in form of a cross, and in the fore part coriaceous; and the anterior feet are cheliform; and the other four ambulatory. There are seven species.

NEPENTHE, or NEPENTHES, Νηπενθης, formed of the privative νη, *non*, or *absque*, and πενθος, *luctus*, *dolor*, in *Antiquity*, a kind of magic potion, which made persons forget all their pains and misfortunes.

The *nepenthe*, mentioned in ancient authors, was the juice or infusion of a plant, now unknown: Homer says it was a plant of Egypt; and adds, that Helena made use of it to charm her lords, and make them forget their pains.

Some authors say it was the plant we call *bolonium*, others, *bugloss*, whose juice infused in wine has this effect. M. Petit has a dissertation on the ancient *nepenthe*.

NEPENTHE, in *Pharmacy*, is a name given to a kind of opiate, contrived by Theo. Zwingerus, from the great opinion he had of its giving ease in all manner of pain.

NEPENTHES, in *Botany*, the name given by Linnæus to a genus of plants of the *gynandria tetrandria* class, the characters of which are these: the perianthium is divided into four roundish segments; there are no petals, and scarce any stamina: but four antheræ are affixed to the stylus near its top; the pistil has an extremely slender germen; the style is pointed and of the length of the cup; and the stigma is obtuse; the fruit is an oblong, columnar, truncated capsule, faintly quadrangular, consisting of four cells, and made up of four valves. The seeds are numerous, pointed, and of a chaffy structure, and are shorter than the capsule.

NEPER's, NAPIER's, or NAPIER's *bones*, an instrument, whereby multiplication and division of large numbers are much facilitated and expedited; so called from its inventor J. Neper, baron of Merchiston, in Scotland.

Construction of NEPER's *bones*. Five rods, plates, or lamellæ, are provided of wood, metal, horn, pasteboard, or other matter (*Tab. Algebra, fig.* 12.), of an oblong form, and divided each into nine little squares; each of which is resolved into two triangles by diagonals.

In these little squares are written the numbers of the multiplication-table; in such manner as that the units, or right-hand figures, are found in the right-hand triangle; and the tens or the left-hand figures, in the left-hand triangle; as in the figure.

Use of NEPER's *bones in multiplication*. To multiply any given number by another; dispose the lamellæ in such manner, as that the top figures may exhibit the multiplicand; and to these, on the left-hand, join the lamellæ of units: in which seek the right-hand figure of the multiplicator; and the numbers corresponding thereto, in the squares of the other lamellæ, write out, by adding the several numbers occurring in the same rhomb together, and their sums. After the same manner write out the numbers corresponding to the other figures of the multiplicator; let them be disposed under one another, as in the common multiplication, and lastly, add the several numbers into one sum.

For example; suppose the multiplicand 5978, and the multiplicator 937. From the outermost triangle on the right-hand (*Tab. Algebra, fig.* 12.) which corresponds to the right-hand figure of the multiplicator 7, write out the figure 6, placing it under the line. In the next rhomb, towards the left, add 9 and 5; their sum being 14, write the right-hand figure, viz. 4, against 6; carrying the left-hand figure, 1, to 2 and 3, which are found in the next rhomb. The sum 8, join to 46, already put down; after the same manner, in the last rhomb, add 6 and 5, the latter figure of the sum 11, put down as before, and carry 1 to the 3 found in the left-hand triangle; the sum 4 join, as before, on the left of 1846: thus you will have the factum of 5978 into 7; and after the same manner will you have the factum of the multiplicand, into the other figures of the multiplicator: the whole added together gives the whole product.

Use of NEPER's *bones in division*. Dispose the lamellæ so, as that the uppermost figures may exhibit the divisor; to these, on the left hand, join the lamellæ of units. Defcend under the divisor, till you meet those figures of the dividend, wherein it is first required, how oft the divisor is found, or at least the next less number, which

is to be subtracted from the dividend; the number corresponding to this, in the place of units, write down for a quotient. By determining the other parts of the quotient after the same manner, the division will be completed.

For example; suppose the dividend 56013806937
5601380, and the divisor 5978; 53802
since it is first asked how often 5978 is found in 560138, descend 22118
under the divisor (*Vid. Algeb. fig.* 12.) till in the lowest series 17934
you find the number 53802, approaching nearest to 56013; the 41846
former whereof is to be subtracted out of the latter, and 41846
the figure 9 corresponding 00000
thereto in the lamella of units write down for the quotient. To the remainder 2011, join the following figure of the divisor 8; and the number 17934 being found, as before, to be the next less number thereto, the corresponding number in the lamella of units, 3, is to be written down for the quotient: and the subtraction to be continued as before. After the same manner the third and last figure of the quotient will be found to be 7; and the whole 937.

NEPETA, in *Botany*. See CATMINT.

NEPHALIA, among the Greeks, a festival called the feast of sober men, at which the Athenians offered to the sun and moon, to Aurora and Venus, a drink made of water and honey. They burnt all sorts of wood on the occasion, except the vine and fig tree.

NEPHEW, a term relative to uncle and aunt; signifying a brother's or sister's son, who according to the civil law, is in the third degree of consanguinity; but, according to the canon law, in the second.

The word is formed from the Latin *nepos*; which in the corrupt ages of that language signified the same: though anciently and properly it denoted a grandson.

NEPHRITIC, NEPHRITICUS, *nephriticus*, formed of *νεφρος*, *ren*, *kidney*, something that relates to the kidneys. See KIDNEY.

NEPHRITIC *colic*. See COLIC.

NEPHRITIC *stone*, *lapis* NEPHRITICUS, a sort of precious stone; so called from its extraordinary virtues against the stone and gravel in the kidneys.

It is a species of JASPER, commonly of an uniform dusky green colour; but sometimes variegated with white, black, or yellow. It seems only to differ from jasper in its being harder, and always without any thing of red.

It is brought chiefly from New Spain, where it is sometimes found in pieces large enough to make moderate cups. There is some, likewise, found in Old Spain, and Bohemia.

This stone was once very dear, by reason of the wonderful virtues ascribed to it. A cup made of it was sold for 1600 crowns, in the time of the emperor Rudolphus II.

The best for medicinal use is of a greyish green, fat and unctuous, like talc of Venice.

The Indians of New Spain, who first discovered its use, and taught it the Europeans, wear it hung about their necks, after having cut it in various figures, chiefly of the beaks of birds: whence some charlatans take occasion to counterfeit it, by cutting other green stones into like figures, and sell them at great prices, to those who have an opinion of their *nephritic faculty*.

NEPHRITIC *wood*, *lignum* NEPHRITICUM, a kind of medicinal wood growing in New Spain, chiefly in the kingdom of Mexico; called by the Indians *coalt* and *tlapalcepatli*, as being reputed *sovereign* against *nephritic* pains.

Dr. Lewis says, he has never known its being given medicinally, and that it is not received in practice.

It must be chosen well cleared of its bark and rind; it is of a bitter taste, and a dusky yellow colour: but when infused in cold water, gives it a sky-blue tincture, when viewed by a false light, and a gold colour by a true one: a little of any acid being mixed with the tincture, both these colours disappear; but a little oil of tartar restores its sky-blue.

Some substitute ebony, and others red Brasil wood, for *lignum nephriticum*; but the deceit becomes apparent by infusing it in water. See TRANSMUTATION *of Colours*.

NEPHRITICS, *Nephrica*, medicines proper for diseases of the kidneys, particularly the stone.

Such, particularly, are the roots of althæa, dogs-grass, asparagus, *tagia*, pellitory of the wall, mallows, pimpinella, red chick-peas, peach-kernels, turpentine, lapis nephriticus, and lignum nephriticum, which see.

NEPHRITIS, or NEPHRITICUS *dolor*, *νεφριτις*, q. d. *disease of the reins*, formed from *νεφρος*, *ren*, in *Medicine*, a name given to a painful disease, occasioned by the stone or gravel in the kidneys.

NEPHRITIS, in *Medicine*, is likewise used for an inflammatory affection of the kidneys, owing its origin to a sanguinary congestion of blood in them, which nature seems to have intended to direct to the internal, hæmorrhoidal vessels, thence to be discharged to ease her of the load of a plethora.

The simple *nephritis* is thus carefully to be distinguished from the calculose one; for the former may, for a long time, affect a patient without any thing of a stone being in the case; and, on the contrary, a stone may be long lodged in the kidneys, without its bringing on any such complaint as the *nephritis*.

In the simple *nephritis* there is always a sensation of pain and heat about the loins, which is plainly perceived to lie deep within the flesh, but is never very acute. On the contrary, in the calculose *nephritis*, the pain is violently sharp.

In the simple *nephritis*, the urine, after it has stood some time, shoots to the sides of the pot pellucid crystals of a reddish colour. But, in the calculose, the heavy matter immediately precipitates itself to the bottom, and is fabulous and gritty; and the simple *nephritis* is always greatly relieved by a gentle motion of the body, as walking, or the like; whereas all motion of the body exasperates the calculose *nephritis*.

The *nephritis* is distinguished also from the ischiatic pains, which sometimes run up to the same parts, by its being evidently perceived to lie deep within the flesh, whereas those pains affect the external muscles; yet there is such a connection and consent of parts in these cases, that not unfrequently the one is taken for the other.

Signs of it. The inflammation begins with a pain in the region of the loins, which does not usually affect both, but only, or at least principally, one side, usually the left; often shooting down by the ureters to the bladder, and by the spermatic cord to the testicle. The pain is at first tensive and dull, but afterwards becomes more acute; in the beginning it is often attended with a chillness, and general trembling, which is succeeded by a heat, and acrid gnawing, scarce to be supported; and this is usually attended with a want of appetite, and loss of strength, and a continual, though not violent thirst. The sleep is unsound, and there usually is either a dull pain in the head, or a vertiginous complaint, more or less violent; and very frequently nausea, and reachings to vomit, attend the fits, or prognosticate the access of them. The patient lies most easily on the affected side, and feels great uneasiness when he endeavours to walk or sit upright.

The pain never extends itself down the whole thigh, nor is that ever wholly numbed, or rendered torpid by it; and the disorder does not seem continual, but attacks the patient at different times, and these after considerably long intervals, if he live regularly. The bowels are usually costive at the time of the fits, and there is a frequent want of making water, though very little is voided at a time, and that thin, when the pain is violent; when it is more obtuse, the urine is commonly thick, and has, as it were, threads in it, of a sort of mucilaginous matter; and to this it is to be added, that sometimes the spermatic vessels which run to the testes become hard and tumid.

Men are more subject to this disease than women, and of those, such principally as are plethoric; and people in the middle and later periods of life, are, in general, more subject to it than those who are younger. In general, young people are not subject to this disease, unless it be from an hereditary disposition, or some very powerful, and violent, external causes.

None so often fall into it as those who have omitted the usual evacuations, and afterwards fall into violent exercises; and finally, people who have the gout and the sciatica, are usually also *nephritic*.

Causes of it. These are principally the suppression of natural evacuations; or the omission of habitual artificial ones; the abuse of hot medicines of the diuretic kind, such as the oils of turpentine, and juniper, and the balsam of sulphur; as also the too frequent use of venery, and the taking medicines to provoke to it; violent passions, or fatiguing exercise; external injuries by blows, falls, or the like; and the use of a too hot diet, and too much of strong liquors.

It may likewise proceed from lying too soft, too much on the back, involuntary contractions or spasms in the urinary vessels, &c. and from any of those causes that produce an inflammatory fever.

Prognostics. The simple *nephritis* may usually be cured, if properly treated, but the calculous one scarce ever can; and though all inflammations of the internal parts are justly accounted very dangerous, yet this is the least so of all others, because the urine continually passing through the part, absterges and cleanses it, and prevents corruption,

ruption, or gatherings of matter. The greatest danger is in such as have a disposition to generate calculous matter, and to hectics. In these cases the disease is apt soon to change from its simple nature.

It is very rare that both kidneys are seized with this distemper, but usually the left alone suffers by it: the more inflammatory the state of the body is, the worse it is with persons afflicted with this disease, and the more they are subject to it: thus young people who have often a turgescence of blood, are more frequently subject to this disease than old persons, and are with more difficulty cured of it: and it is an observation as old as Hippocrates, that the coming on of hæmorrhages from the internal hæmorrhoids cures this disease.

If the disease is protracted beyond the seventh or eighth day, and there is a stupor or heaviness of the part, with frequent returns of chillness and shivering, &c. there is reason to suspect that matter is forming in the kidneys, and that an abscess will ensue.

Method of cure. In the time of the fit, the first thing to be done is to bleed; and if the pain and inflammation continue, the operation may be repeated. The belly should be opened by a clyster of the emollient kind, prepared of milk or broth, to which, if necessary, may be added a little salt and honey, or manna. Simon Pauli expressly directs, from repeated experience of its good effects, a decoction of the herb veronica, or speedwell, with some oil, and a little salt. After this powders of nitre, cinnabar, and tartarum vitriolatum should be taken every three hours; and, towards the evening there should be mixed with one of these doses, eight grains of diaphoretic antimony, and four of crab's eyes. Emulsions of the cold seeds in the cooling simple waters, are also of great use; and to the common seeds used on this occasion, may be added those of poppies, and of carduus Mariæ. In the mean time external applications may also be used with some success; such as cloths dipped in warm water, or bladders filled with it; or with a decoction of chamomile flowers, adding a little saffron, and mixed with about a third part of new milk; or bags of chamomile, melilot, and fenugreek seed dry, and heated at the fire; as also the spirits of serpyllum, and the like, and the soap plaister: to all these may be added the use of leeches, applied to the hæmorrhoidal veins, which are, indeed, a great relief in all the distemperatures of the urinary parts; and, finally, during the whole course of the cure, refrigerating and diluting liquors are to be drank in large quantities, as clear whey, or balm tea sweetened with honey, decoction of marshmallow roots, with barley and liquorice, &c. And the food must be thin and light, as panada, small broths, with mild vegetables, and the like.

The same general course is to be followed, when gravel or a stone is lodged in the kidney; but when they are lodged in the ureter, it will be proper, beside the fomentations, to rub the part with a little sweet oil, and to give gentle diuretics; as juniper-water, sweetened with the syrup of marshmallow; a tea-spoonful of the sweet spirits of nitre, with a few drops of laudanum, may be occasionally mixed with the patient's drink. He should also take exercise on horseback, or in a coach, if he be able to bear it.

After the fit, the necessary treatment to prevent a return, is to bleed regularly, spring and autumn; to take, at times, gentle purges of rhubarb, sena, and the like; to keep the hæmorrhoidal discharges in their proper state; and the habitual costiveness which usually attends people in this disease is to be taken off by a moist and lubricating diet; and wine and strong liquors are to be avoided.

Those that are subject to this disorder, should use moderate exercise, and neither lie too hot, nor too much on their back.

When matter in the urine shews, that an ulcer is formed in the kidney, the patient must carefully abstain from all acrid, sour, and salted provisions; and live chiefly on mild mucilaginous herbs and fruits, and broth of young animals. His drink may be whey, and buttermilk that is not sour; which some have reckoned a specific remedy in ulcers of the kidney: chalybeate waters have been likewise found beneficial. Junker Consp. Med. p. 216, &c. Bechan's Dom. Med. p. 328, &c.

The Greeks also gave the name *nephrites*, to the first vertebra of the loins, from its neighbourhood to the kidneys.

NEPHROMETRA, a name given by some authors to the muscles of the loins, called by the generality of medical authors *psoæ*.

NEPHROTOMY, formed of νεφρος, *kidney*, and τομη, *section*, in *Surgery*, the cutting into the kidneys, in case of the stone being lodged there, and taking it out in the same way as from the bladder.

This is an operation which has been very little practised, and usually supposed to be attended with great danger: few authors who have treated of these diseases have so much as mentioned this operation, and the few that have named it, have generally condemned it. Simibaldus fancying that it was an operation anciently practised, strove very earnestly, indeed, to have it revived. He has called in the opinion of Hippocrates to support his account of its having been done with safety, and advises the surgeons to try their hands on brutes first, and accustom themselves to the operation, and then not to fear it in regard to men.

It is certain that a stone in the kidney is so terrible a disease, that it is very much to be wished that some safe operation could be invented to cure it; but it is making too free with Hippocrates, to say that he countenances or directs such an operation in general. His words seem to express only the making an incision near the kidney; but even if they are to be understood as directing the cutting into it, it is under such restrictions, that opportunities will very seldom offer; and when they do, a common surgeon would not scruple performing all that is directed, without either consulting Hippocrates, or trying his skill upon brutes. Hippocrates only advises it in case of a swelling and impostumation, where there is matter formed, and the tumor manifests itself upon the surface. In this case every surgeon would know it was his business to make an incision. Phil. Trans. N° 223. p. 334.

Cases requiring this are frequent, and not even without a stone.

The general opinion of authors is against the operation; and the most famed among those who have treated of wounds of the kidneys say, that any wound which enters into the pelvis is mortal. Yet this opinion, though general, is not certain or determinate; and we have an account in the Philosophical Tranfactions, of the operation of *nephrotomy* being performed with success, by Marchetti, of Padua, on Mr. Hobson, the English consul at Venice. Phil. Trans. N° 223. p. 337.

NEPOTISM, a term used in Italy, in speaking of the authority which the pope's nephews and relations have in the administration of affairs; and of the care the popes take to raise and enrich them.

Many of the popes have endeavoured to reform the abuses of *nepotism*: at present, *nepotism* is said to be abolished. Leti has wrote expressly on this subject, *Il Nepotismo*.

NEPTA, a name used by some authors for the *asphaltum*. It seems a corruption of *naphtha*.

NEPTUNALIA, feasts held among the ancients, in honour of Neptune.

The *Neptunalia* differed from the *Consualia*, in that the latter were feasts of Neptune, considered particularly as presiding over horses, and the manege. Whereas the *Neptunalia* were feasts of Neptune in general, and not considered under any particular quality. They were celebrated on the 10th of the calends of August.

NEPTUNE, in *Mythology*, the son of Saturn and Rhea, and brother of Jupiter and Pluto. He is commonly represented standing, with his trident in his right hand, which was his peculiar sceptre, as lord of the Mediterranean seas, and seems to have been used by him chiefly to rouse up the waters; for we find sometimes that he lays it aside, when he is to appease them; but he resumes it, when there is any occasion for violence. Virgil, *Æn.* 1. v. 612. makes him shake Troy from its foundations with it; and in Ovid, Met. 1. v. 284, it is with the stroke of this, that the waters are let loose for the general deluge. The dolphin is in his left hand, and he treads on the beak of a ship; to shew that he presided over the seas, or more particularly, over the Mediterranean sea; which was the great, and almost the only scene for navigation, among the old Greeks and Romans. The poets have described this god, as passing over the calm surface of the waters, in his chariot drawn by sea-horses. The fine original description of this is in Homer; from whom Virgil, *Æn.* 1. v. 155. and Statius Achil. 1. v. 60. have copied it. A triton is sometimes represented on each side, as guiding those that draw the chariot of *Neptune*. His aspect in all the best figures of him is majestic and serene. The lower sort of artists exhibit him sometimes with an angry and disturbed air: and one may observe the same difference in this particular, between the great and inferior poets, as there is between the good and bad artists. Thus Ovid. Met. 2. v. 272. describes *Neptune* with a sullen look; whereas Virgil, *Æn.* 1. v. 139. expressly tells us, that he had a mild face, even when he is reprehending him in a passion. *Neptune* had a great number of temples erected to his honour, as well as feasts and games established in token of his respect, both in Greece and Italy. Spencer's Polymetis, p. 65. p. 215, &c.

NEPTUNE's *cup*, a name given by naturalists to a remarkable species of marine insects, which is never found affixed to any solid body, but always loose, and rolling about at the bottom of the sea. Its usual size is about five inches in height, and six or seven in diameter at the base. It gradually becomes narrower from the top to

the ſummit, where it terminates in a round end, ornamented with cluſters of a foliaceous ſort of ſubſtances, reſembling a cock's comb, but of the ſame matter with the reſt of the plant.

Its internal ſurface is very different from this: it is lightly furrowed down the ſides, and beſet with a number of ſmall protuberances, with obtuſe points. Some of theſe, when ſmall, are found with a pedicle growing to them. This is always of a very briſtle like ſubſtance, and it is probable that all thoſe found looſe had originally ſuch pedicles, by which they adhered to ſome ſolid body, in the manner of the corals, and other marine like ſubſtances; but that its extreme briſtleneſs occaſions it to be ſoon broken off, by the motion of the water, after which the plant rolls looſe about, and takes in its nouriſhment at its ſeveral pores, by means of the water which every way ſurrounds it.

It is not probable that theſe and the like marine ſubſtances are nouriſhed only by ſea water; but that there is in the ſea a ſort of mud continually formed out of the decayed particles of animals, and the ſofter vegetables, which may be ſuppoſed much to reſemble the common vegetable mold in its uſes, as it has much the ſame origin; and this, or at leaſt its finer and lighter parts, may be conveyed by water into the pores of theſe ſuppoſed plants, and nouriſh them. Mem. Acad. Par. 1700.

NEPTUNINS, in *Mythology*, were ſea-nymphs, ſo called, becauſe they were the deſcendants of NEPTUNE.

NERANTZIUM, in *Botany*, a name given by ſome of the Greek writers to the citron tree. The ancient Greeks were not acquainted with the word, and it ſeems to have been formed in the barbarous ages from the word *naranga*, the name by which the Arabian phyſicians called the ſame fruit.

NEREIDS, NEREIDES, ſea-nymphs, or fabulous deities of the ancients, ſuppoſed to inhabit the ſea.

The *Nereids* were fifty in number, all the daughters of Nereus, by the nymph Doris. Their names and genealogies are deſcribed by Heſiod. See NYMPH.

NEREIS, in *Zoology*, a genus of inſects of the *gymnarthra* kind, the body of which is of a cylindric figure; the tentacula are four in number, but two of them are uſually very ſhort. Hiſt. Inſect. p. 92.

Authors have deſcribed this genus under the name of SCOLOPENDRA *marina*.

NEREIS, in the Linnæan ſyſtem of *Zoology*, is a genus of the *mollioſa* order of worms, the body of which is creeping, oblong, and linear, the lateral tentacula are pencilled, the mouth is unguiculate, and above it there are plumoſe tentacula. There are eleven ſpecies.

NERFLING, in *Zoology*, the name of a freſh water fiſh of the leather-mouthed kind, common in ſome of the lakes in Germany, and there called alſo the *ruff* or *ſterve*, and ſeeming to be the ſame with the common Engliſh RUDD.

There are two kinds of this fiſh, the fleſh of the one of which, when dreſſed, is white, and that of the other yellowiſh or reddiſh. The latter kind is moſt valued.

NERION, in *Botany*. See OLEANDER.

NERITA, a genus of ſhell *fiſh*, of the nature of the ſemicircular-mouthed cochlear, and comprehended under the general term *cochlea* SEMILUNARES. See *Tab. of Foſſils, claſs* 9.

NEROPHIDION, in *Ichthyology*, a name given by Schoneveldt, and ſome others, to that ſpecies of the *acus* or *ſyngnathus* of Artedi, which is called by that author the hexagonal-bodied *ſyngnathus* with the pinnated tail; and by others, the *acus ariſtotelis*, and *acus ſecunda ſpecies*, and *rydii*; by ſome alſo, *blennus*.

NERVE, NERVUS, in *Anatomy*, a round, white, long body, like a cord, compoſed of ſeveral threads, or fibres, deriving its origin from the brain, or the ſpinal marrow, and diſtributed throughout all parts of the body; ſerving for the conveyance of a peculiar juice, by ſome called *animal ſpirits*, for the performance of ſenſation, and motion.

NERVES, *origin of the*. From every point of the cortex of the brain there ariſe minute medullary fibres; which, in their progreſs, uniting together, at length become ſenſible; and thus conſtitute the medulla of the brain, and the ſpine.

Hence they are continued, and, in their farther progreſs, become diſtinguiſhed, or ſeparated, by coats which are detached to them from the dura and pia mater, into ſeveral diſtinct faſciculi, or *nerves*, reſembling in the poſition of their component fibrillæ, ſo many horſes tails, wrapped up in a double tunic.

It is probable, that the medullary fibres of the cerebellum, riſing up toward the fore-parts of the medulla oblongata, do part of them join the *nerves* ariſing thence, but ſo as ſtill to retain their ſeparate origin, progreſs, and functions: the reſt of the fibres of the cerebellum are ſo mixed with thoſe of the brain, as that there is, perhaps, no part of the whole medulla oblongata, or ſpinalis, where there are not found the fibres of each kind; and thus, to conſtitute the body of each *nerve*, both kinds of fibres contribute, though the end and effect of each be quite different.

The *nerves* thus formed, and ſent from the medulla oblongata, and ſpinalis, while within the cranium, are ten pair, though very improperly ſo accounted; inaſmuch as moſt of them do, in reality, conſiſt of ſeveral diſtinct very large *nerves*: from the ſpinal marrow continued without the cranium there ariſe, after the like manner, thirty pair; to which may be added another pair, ſent from the vertebræ of the neck, augmented in its progreſs by branches from the ſecond and third pair, and at laſt joined to the eighth pair.

All theſe, while within the medulla, are pulpous; as ſoon as they quit it, they acquire a ſheath, or caſe, wherewith being defended, they proceed to the dura mater, which is perforated into an open vagina, reaching as far as the foramina of the cranium, deſtined for the tranſmiſſion of the *nerves*; where the nine firſt pair, and the acceſſory pair, aſſuming this vagina, or caſe, paſs ſafely out of the cranium.

The other thirty and one pair deſcend through ſpaces between the commiſſures of the apophyſes of the vertebræ; whence, firm, hard, and well clothed as they are, they are diſperſed through all, even the ſmalleſt points of the ſolid parts of the body yet known.

The coats, or covers, of theſe *nerves*, are every where inveſted with blood-veſſels, lymphatics, and other veſicles of a very tight texture, which ſerve to collect, ſtrengthen, and contract the fibrillæ; and from which many of the phenomena of the *nerves*, and of diſeaſes, are accountable.

As ſoon as the laſt extremities of the *nerves* are about to enter the parts to which they belong, they again lay aſide their coats, and become expanded, either into a kind of thin membranula, or into a ſoft pulp.

Now upon conſidering, firſt, that the whole vaſcular medulla of the brain goes to the conſtituting of the fibrillæ of the *nerves*; nay, is wholly continued into, and ends in them: ſecondly, that, upon compreſſion, tearing, diſperſion, putrefaction, &c. of the medulla of the brain, all the actions uſed to be performed by the *nerves* ariſing thence, are immediately aboliſhed, even though the *nerves* continue entire, and untouched: thirdly, that the *nerves* themſelves are every where found lax, pendulous, crooked, retrograde, and oblique, yet affect motion and ſenſation almoſt inſtantaneouſly: fourthly, that, when cloſe bound or compreſſed, though in all other reſpects entire, they loſe all their faculty in thoſe parts between the ligature and the extremes to which they tend, without loſing any in thoſe parts between the ligature and the medulla of the brain, or cerebellum; it evidently appears, that the nervous fibrillæ do continually take up an humour, or juice, from the medulla of the brain, and tranſmit it, by ſo many diſtinct canals, to every point of the whole body; and, by means thereof alone, perform all their functions in ſenſation, muſcular motion, &c. which humour is what we popularly call ANIMAL *ſpirits*, or the *nervous juice*.

Nor does there appear any probability in that opinion maintained by ſome; viz. that the *nerves* perform all their action by the vibration of a tenſe fibrilla; which is inconſiſtent with the nature of a ſoft, pulpous, flaccid, crooked, wavy *nerve*, and with that nice diſtinctneſs wherewith the objects of our ſenſes are repreſented, and muſcular motions performed.

Now after the ſame manner as the arterial blood is perpetually carried into all the parts of the body furniſhed with thoſe veſſels, ſo we conceive a juice prepared in the cortex of the brain and cerebellum, conveyed thence every moment through the *nerves* to every point of the ſolid body. The ſmallneſs of the veſſels in the cortex, as exhibited in Ruyſch's injections, which yet are only arterious, and therefore incredibly thicker than the laſt emiſſary derived thence, ſhew how ſlender theſe hollow nervous ſtamina muſt be; but the great bulk of the brain, compared with the exceeding ſmallneſs of each fibrilla, ſhews, that their number muſt be great beyond the limits of all imagination.

And again, the great quantity of juice conſtantly brought hither, and violently agitated, will occaſion a conſtant plenitude, openneſs, and action, of theſe little canals. But as freſh juice is every moment prepared, and the laſt is continually protruding the former, as ſoon as it has done its laſt office, it ſeems to be driven out of the laſt filaments into the ſmalleſt lymphatic venulæ, both about the glands, and elſewhere; thence into the lymphatics ſomewhat larger; and again, from theſe to the common lymphatic veſſels with the valves of veins, and, at length, into the veins, and the heart: and thus, like the other

ſuices of the body, does it make its circuit round the body.

Upon the whole, if we conſider the great bulk of the brain, cerebellum, medulla oblongata, and medulla ſpinalis, with regard to the bulk of the reſt of the ſolids of the body; the great number of *nerves* diſtributed hence throughout the whole body; that the brain and carina, that is, the ſpinal marrow, are the baſis of an embryo, whence, according to the great Malpighi, the other parts are afterwards formed; and, laſtly, that there is ſcarce any part of a body but what feels or moves; it will appear very probable, that all the ſolid parts of the body are woven out of nervous fibres, and conſiſt wholly of them.

The ancients only allowed of ſeven pairs, or conjugations, of *nerves*, proceeding from the brain; which, with their functions, they compriſed in theſe two Latin verſes:

Optica prima, oculos movet altera, tertia ſuffat
Quartaque; quinta audit, vagus ſexto eſt, ſeptima linguæ.

But the moderns, as before obſerved, reckon ten, which are as follow:

NERVES *of the brain*, or *cerebrum*, are, the

NERVES, *auditory*, *ſeventh pair*. See AUDITORY *nerves*, and *Seventh pair of* NERVES.

NERVES, *olfactory*, *par olfactorium*, or *firſt pair*. See OLFACTORY *nerves*.

NERVES, *optic*, or *ſecond pair*. See OPTIC *nerves*.

NERVES *which move the eyes*, *oculorum motorii*, or *third pair*, ariſe from the crura of the medulla oblongata, near the annular protuberance; whence they proceed between two branches of the cervical artery; and, paſſing out of the ſkull at an irregular oblong hole, immediately under the former, are ſpent on thoſe muſcles of the eyes called *attollent*, *depriment*, *adducent*, and *obliquus inferior*; except ſome ſmall fibres, ſpent in the muſcles of the upper palpebra. See *Tab. Anat. (Oſteol.) fig.* 5. *lit.* k k.

NERVES, *pathetic*, or *fourth pair*. See PATHETICI.

NERVES, *fifth pair of*, called *nervi innominati trigemini*, the largeſt of all thoſe coming from the brain, have their uſe, as well as diſtribution, more extenſive; ſerving both for ſenſe and motion, for touch and taſte. They ſend branches not only to the eyes, noſe, palate, tongue, teeth, and moſt parts of the mouth and face, but alſo to the breaſt, lower venter, præcordia, &c. by means of the intercoſtals, which are partly compoſed of branches of theſe *nerves*; whence ariſes a conſent, or ſympathy, between thoſe ſeveral parts of the body. See *Tab. Anat. (Oſteol.) fig.* 5. *lit.* n n.

The *nerves* of this pair ariſe anteriorly from the lateral parts of the tranſverſe protuberance of the medulla oblongata, by a great number of filaments cloſely united together, which afterwards form two large flat trunks, one on each ſide. Each trunk runs toward the apex of the neighbouring os petroſum, where it perforates the dura mater, a little below the edge of the extremity of the anterior portion of the ſeptum tranſverſum of the brain. Having detached ſome filaments to the apex of the apophyſis petroſa, it enters the ſinus cavernoſus; and having ſent ſome other filaments to the dura mater, it expands in the ſinus, and forms a kind of plexus, or flat irregular ganglion. The trunk is afterwards divided into three large branches, more or leſs flatted, which run through the cavernous ſinus, and are diſpoſed laterally on one vertical plane. The *firſt branch*, commonly called *nervus ophthalmicus Willisii*, is the ſmalleſt and longeſt of the three, and enters the orbit through the ſphenoidal fiſſure; on which account Winſlow has called it *nervus orbitarius*. This branch is then divided into three ſubordinate rami, or branches, one ſuperior or frontal, one internal or naſal, and one external or lachrymal; and communicates by a filament or two with the *nerve* of the ſixth pair, and with the intercoſtal *nerve*. The *ramus ſuperior* is the moſt conſiderable, and runs along the ſuperior part of the orbit, cloſe to the membrane which lines it, ſending filaments to the fat which ſurrounds the globe of the eye, to the neighbouring membranes, and to the muſculus levator palpebræ. Afterwards it paſſes through the foramen ſuperciliare, and being divided towards each ſide, is ſpent on the neighbouring portions of the muſculus frontalis, orbicularis, and integuments; communicating with a neighbouring ramus of the portio dura of the auditory *nerve*. The *ramus naſalis* runs towards the noſe; firſt of all obliquely over the optic *nerve*, and under the two muſculi levatores; then between the muſculus rectus internus and obliquus major, along the inſide of the orbit, ſending filaments in its paſſage to the ganglion above mentioned, to the muſculi levatores, and through the internal orbitary hole. It afterwards paſſes over the muſculus rectus internus to the great angle of the eye, where it is diſtributed to the

caruncula and ſacculus lacrymalis, to the neareſt portions of the muſculus orbicularis, ſuperciliaris, pyramidalis naſi, and to the integuments. The *ramus lacrymalis* goes chiefly to the glandula lacrymalis, upon which it is diſtributed, and from whence it has its name. Before it reaches the gland, it ſends a ſmall branch to the external lateral part of the orbit.

The *ſecond branch* of the fifth pair, called *nervus maxillaris ſuperior*, goes out of the cranium between the foramen ovale and fiſſure of the os ſphenoidale, paſſing through the foramen rotundum, or maxillare ſuperius of the ſame bone. Immediately after its paſſage, it ſends a filament to the outſide of the orbit, which, having perforated the os malæ, is diſtributed to the parts which cover that bone; communicates with a neighbouring branch of the portio dura of the auditory nerve; and ſends ſmall filaments to the fat in the lower part of the orbit, ſoon afterwards, it is divided into three rami; the firſt of which, called by Winſlow *ſuborbitarius*, is the moſt conſiderable. This runs in the canal of the inferior portion of the orbit, and goes out by the exterior orbitary hole. In its paſſage it ſends ſmall filaments, which, entering the ſinus maxillaris, are diſtributed to the membrana pituitaria in that ſinus, to the ſubſtance of the bone, to the alveoli, to the anterior dentes molares, and to the dentes canini and incifores. It alſo gives a filament to the poſterior molares, and one, which runs along the upper ſide of the arch of the palate, to the union of the oſſa maxillaria. When this ramus has paſſed out of the bony canal, through the foramen ſub-orbitarium anterius, it is diſtributed to the muſculus orbicularis palpebrarum, to the neighbouring muſcles of the noſe and lips, and to the integuments, communicating with a ramus of the portio dura of the auditory *nerve*. The ſecond ramus of the ſuperior maxillary *nerve*, called *palatinus*, runs down before the pterygoide apophyſes of the os ſphenoides, in the canal formed by the os maxillare and os palati; and having paſſed out of that canal, through the foramen palatinum poſterius, it is diſtributed by ſeveral filaments to the glandular coat of the palate, to the ſeptum palati, and muſcles belonging to that part. It alſo ſends filaments to the muſculus pterygoidæus externus, to the peri-ſtaphylini, and to the arch of the pharynx; and others through the ſmall holes in the poſterior part of, or tubercle of the os maxillare, to the ſinus maxillaris, and poſterior dentes molares. The third ramus, called ſphæno-palatinus, paſſes through the bony hole of the ſame name, and is diſtributed to the muſculus pterygoidæus internus, to the poſterior part of the nares, to the neighbouring ſinus ſphenoidalis, and to the tuba Euſtachiana. It alſo ſends a filament through the foramen pterygoides, which joins the inferior maxillary *nerve*. The third branch of the fifth pair, called *nervus maxillaris inferior*, is larger at its origin than the other two: it goes out of the cranium by the foramen ovale of the ſphenoidal bone, and runs between the two muſculi pterygoidæi, below the great ſinus of the lower jaw, where it enters the bony canal of that jaw. As ſoon as it leaves the cranium, it ſends off four principal branches, and before it enters the canal of the lower jaw, it gives off another to the tongue. The firſt branch runs up to the temporal muſcle, on the inſide of which, and between its fibres it is diſtributed. The ſecond branch runs behind the condyle of the lower jaw, where it divides into two filaments, which communicate with the neighbouring ramus of the portio dura of the auditory *nerve*, behind the outſide of the condyle. At the origin of theſe filaments, it ſends off a ſmall ramus, which runs up before the external ear toward the temples, giving filaments to the concha of the ear in its paſſage. The third branch paſſes between the two apophyſes of the lower jaw, perforates the lower part of the temporal muſcle, and gives it ſeveral filaments. Afterwards it bends downward upon the muſculus maſſeter, to which it is chiefly diſtributed, giving filaments to the neighbouring integuments, and communicating with the portio dura of the auditory *nerve*, on the ſide of the os malæ. It terminates by filaments, which go to the muſculus buccinator, to the muſcles of the under lip, and to the integuments of theſe parts. The fourth branch is often no more than a ramus of the third branch, which goes off near its origin. It paſſes over the muſculus pterygoidæus internus, to which it gives filaments, and is diſtributed to the pterygoidæus internus, and to the neareſt portion of the temporalis. It is likewiſe diſtributed to the muſculus buccinator, to the glands of the mouth and muſcles of the lips; and ſometimes ſends off a filament, which runs up upon the concha of the external ear. The branch that goes to the tongue, which may be called nervus lingualis, or hypogloſſus minor, is detached from the maxillaris inferior, as it paſſes between

the

the muſculi-pterygoidæi, and ſometimes a little ſooner. This conſiderable branch leaves the trunk a little above the canal of the lower jaw, runs over the pterygoidæus internus, and gives it ſome filaments. Near its origin, it communicates with the trunk by a ſhort collateral branch, which is ſometimes plexiform: here it ſuſtains a particular filament, which, according to the common opinion, ariſes from it, and goes to the internal ear. This filament has been ſuppoſed to be a recurrent, running up backward through the tympanum, and joining the portio dura of the auditory *nerve*. But Winſlow thinks it comes from the internal ear to that nerve. This lingual ramus paſſes under the lateral part of the tongue, and over the glandula ſublingualis, giving filaments to the neighbouring portions of the muſcles of the tongue, and to thoſe of the os hyoides and pharynx. Having communicated by ſeveral filaments with the extremities of the *nerve* of the ninth pair, it enters the ſubſtance of the tongue, and terminates near its apex. The inferior maxillary *nerve*, before it enters the canal of the lower jaw, ſends filaments to the neighbouring portions of the muſculus pterygoidæus, internus, digaſtricus, &c. It likewiſe detaches a filament or two along the periоſteum, to be diſtributed to the muſculus mylo-hyoidæus, and glandula ſublingualis. After it has entered the canal of the lower jaw, it runs under the alveoli, and diſtributes filaments to each tooth, all the way to the hole near the chin, where it ſends another ramus forward into the diploe, which is diſtributed to the other teeth that lie between that hole and the ſymphyſis of the chin. Winſlow.

NERVES, *ſixth pair of*, the *guſtatorii*, or *motores externi*, are ſmall, but yet a little larger than thoſe of the fourth pair, called the PATHETICI. They ariſe from the union of the medulla oblongata, between the great tranſverſe protuberance and the corpora olivaria; whence they advance to the dura mater, and enter it on the extremity of the production of the os occipitis behind, and a little on one ſide of the ſymphyſis of that bone with the os ſphenoides. Each of theſe *nerves* runs afterwards in the cavernous duplicature of the dura mater, on one ſide of the bottom of the ſella ſphenoidalis, and of the carotid artery, to which it adheres very cloſely, and it there communicates with a branch of the fifth pair, by one or two ſhort filaments. Immediately after, and behind this communication, the motor externus ſends down a filament, which at firſt appears to run from before backward like a recurrent, and preſently enters the large bony canal of the apophyſis petroſa, on one ſide of the internal carotid artery. This nervous filament, which is ſometimes double, is commonly taken for the root or origin of the intercoſtal *nerve*; but Winſlow obſerves, that, as it makes an acute angle, in an oppoſite direction with the *nerve* of the ſixth pair, it ſeems rather to run up with the carotid artery, and to join that *nerve*, than to ariſe from it. The *nerve* of the ſixth pair, which is ſometimes double, or ſplit into two parts, before it enters the dura mater, paſſes afterwards through the ſphenoidal, or ſuperior orbitary fiſſure, to the muſculus rectus externus of the eye. See *Tab. Anat. (Oſſeol.) fig.* 5. *lit.* o o. Winſlow.

NERVES, *the ſeventh pair*, or *auditory*, ariſing from the lateral and poſterior part of the great tranſverſe protuberance of the medulla oblongata, and paſſing out of the ſkull, through a hole of the os petroſum, ſeparate into two branches, or portions, a hard, and a ſoft one.

The hard portion, entering a little ſinus in the upper part of the bone that conſtitutes the barrel of the ear, ſends off a twig, which diſtributes itſelf into the dura mater, except ſome ſmall twigs which go to the membrane that lines the ear, to the internal muſcles that line the ear, and the fine membrane that clothes the inſide of the cavity of the apophyſis mammillaris: after this, the hard branch ſends off two other twigs, one to the eighth pair, the other to the tympanum, whoſe cord it forms; whence, creeping over the malleolus, it goes out of the ear, and ſends a ramification to the tongue. See *Tab. Anat. (Oſſeol.) fig.* 5. *lit.* p p.

The ſame hard branch, coming out of the proceſſus mammillaris, ſends ſome twigs to the maſſeter, and others to the glands about the ear, where it divides into two other ramifications; the interior beſtowed on the glands, the cheek, and the upper lips; the reſt on the lower palpebra, and the external part of the face. The exterior ramification, beſtowing ſome fibrillæ on the glands, out of which it iſſues, divides into two; the upper diſtributed into the quadratus, and outer parts of the under jaw; the lower ſpent on the integuments of the fore and lateral part of the neck, ſome muſcles of the lower jaw, and the maſtoidal muſcle. This portion of the auditory *nerve* is denominated by Winſlow *nervus ſympatheticus minor*.

The ſoft and larger portion of this pair divides into three ramifications; the upper whereof paſſes through a ſmall foramen into the concha, where, expanding, it forms a fine membrane, which lines its inner ſurface: the ſecond and third ramifications are alſo ſpent on the inner parts of the concha, and ſemicircular ducts, which they furniſh with membranes, the immediate organs of hearing. See AUDITORY *nerves*.

NERVES, *eighth pair of*, or the *par vagum*, denominated by Winſlow *nervi ſympathetici medii*, ariſe from the poſterior part of the medulla oblongata, from the great tranſverſe protuberance, and from the anterior part of the corpora olivaria, by ſeveral ſeparate filaments, which are afterwards collected in a faſciculus, that runs towards the anterior part of the foramen lacerum of the baſis cranii, where it perforates the dura mater, immediately before the extremity of the great lateral ſinus. See *Tab. Anat. (Oſſeol.) fig.* 5. *lit.* q q.

This, in its progreſs, is joined by the par acceſſorium, and, a little farther, by a twig of the hard part of the ſeventh pair; and, at the ſecond vertebra of the neck, by the *nerves* that iſſue from the cervical marrow; and detaches ſeveral twigs to the muſcles of the larynx, gula, neck, &c. particularly from a ganglifform plexus, formed by its union with a branch of the intercoſtal. Hence deſcending to the thorax, it makes another plexus under the clavicle, whence ariſes the recurrent *nerve* on the right ſide, as on the left it has its riſe from the trunk of the *nerve* itſelf. The right recurrent is reflected at the axillary artery; the left at the deſcending branch of the aorta; each, running alide the trachea, impart ſome twigs to it, and terminate in the muſcles of the larynx. Their uſe is in the formation and modulation of the voice. Againſt the origin of the aorta it ſends off a branch towards the heart, which dividing into two, the leſſer twiſts about the pulmonary vein; the bigger proceeds to the pericardium, and heart, after having ſent off a twig, which, with others from the intercoſtals, makes the plexus cardiacus ſuperior: proceeding ſtill farther, it ſends out ſeveral ramifications, which, meeting together, make the plexus pneumonicus, whence ariſe fibres that conſtringe the veſſels and veſicles of the lungs. In its paſſage downwards it diſtributes ſeveral branches to the œſophagus, along which it runs.

About the lower vertebræ of the neck the trunk divides into two branches, the external and internal, communicating all along by ſeveral ramifications, and at length reuniting. The reſt of this pair joins with the intercoſtals in the formation of the ſeveral plexuſes in the lower venter, and in them ſeems to terminate.

Along with theſe, and wrapped up in the ſame coat from the dura mater, paſs the

NERVES, *acceſſory*, *par acceſſorium*, which has its origin from the medulla contained in the vertebræ of the neck. Soon after its return out of the ſkull, it leaves the par vagum again, and is diſtributed into the muſcles of the neck and ſhoulders. See *Tab. Anat. (Oſſeol.) fig.* 5. *lit.* r r.

NERVES, *intercoſtal*, called by Winſlow *ſympathetici majores*, or *maximi*, conſiſt of nervous filaments, derived partly from the brain; viz. the branches of the fifth and ſixth pair; and partly from the ſpinal marrow, by thoſe branches they receive from the vertebral *nerves*.

It has been the common opinion, that theſe *nerves* begin by a filament from the ſixth pair belonging to the medulla oblongata, and by two filaments from the fifth pair; and that theſe filaments do at firſt compoſe a very ſmall *nerve*, which runs backward, to go out of the cranium, through the bony canal of the apophyſis petroſa, and increaſes gradually in its courſe downward. But Mr. Winſlow is of opinion, that theſe filaments aſcend from the baſis of the cranium with the internal carotid, and run from behind forward to join the fifth and ſixth pairs; and he has found the angle formed by this union to be turned forward, and ſo very acute, that theſe *nerves* cannot be looked upon as recurrents. The ſituation of theſe *nerves*, in general, is on the lateral parts of the whole twenty-four vertebræ, immediately before the roots of the tranſverſe apophyſes, and likewiſe on the lateral parts of the inſide of the os ſacrum. Through this large extent, they appear like two ropes divided, and in a manner interſected at different diſtances, by many ganglifform tubercles, by means of which they communicate backward with the ganglions of the medulla ſpinalis, by ſhort collateral filaments; and produce forward all their particular ramifications.

In each trunk of theſe *nerves*, before it arrives at the thorax, are two cervical plexuſes, the upper whereof receives a branch from each trunk of the par vagum; the other ſends out ſeveral ramifications to the œſophagus, and aſpera arteria, and particularly a large one to the recurrent *nerve*. From the ſame plexus deſcend two other ramifications to the cardiac plexus, which are joined a little

little lower by a third, from which the intercostal *nerve*, descending to the clavicles divides into two, and embraces and constringes the subclavian artery; thence entering the thorax, it receives three or four twigs from the upper vertebral *nerve*, together with which it constitutes the intercostal plexus; and thence descending along the sides of the vertebræ, and receiving a nervous twig from each of them, to the os sacrum, and entering the abdomen, it forms several considerable plexuses; viz. the lienaris, hepaticus, the two renales, mesentericus magnus, and two little ones in the pelvis. See INTERCOSTAL.

NERVES, *ninth pair of, motrii linguæ, par linguale*, or *nervi hypoglossi externi seu majores*, arise from the middle of the centrum ovale, by three or four small twigs, and go out of the skull near the process of the occiput, and send their branches to the tongue. See *Tab. Anat. (Osteol.) fig.* 5. *lit.* ll.

They may be likewise called *gustatorii*, as they contribute, together with the branches of the fifth and sixth pair, to the sensation of tasting.

NERVES, *tenth pair of*, or *sub-occipital nerves*, arise by two or three branches from the medulla oblongata, just below the corpora pyramidalia and olivaria, or rather at the beginning of the medulla spinalis; whence, reflecting a little backwards, they go out of the skull between the first vertebra of the neck, and the process of the occiput. See *Tab. Anat. (Osteol.) fig.* 3. *lit.* tt.

These are spent on the external muscles of the head and ears.

NERVES *from the spinal marrow*. The *spinal nerves* (i. e. those springing from the medulla after its egress out of the skull, where it lays aside the name *oblongata*, and assumes that of *spinalis*) are thirty pair; of which, seven are reckoned as belonging to the neck, as having their origin thence, and called *cervical nerves*; twelve to the dorsum, or back, and called *dorsal*, or *costal nerves*; five to the loins, called *lumbal nerves*, and five or six that pass out through the os sacrum. See *Tab. Anat. (Osteol.) fig.* 6. *lit.* bb.

NERVES, *cervical*. See CERVICAL.

NERVES, *dorsal*, are in number twelve: these, excepting what the two upper pair contribute to the *brachial nerves*, are generally distributed into the intercostal and abdominal muscles, the pleura, and external parts of the thorax. See *Tab. Anat. (Osteol.) fig.* 6. *lit.* ll.

NERVES, *lumbal*, are five pair: the first of which sends two branches to the lower side of the diaphragm; the second, some twigs to the genital parts, and others, as well as the three following, give the first roots to the *crural nerves*; the rest of the branches of the *lumbal nerves* are distributed into the muscles of the loins, and adjacent parts. See *Tab. Anat. (Osteol.) fig.* 6. *lit.* gg.

NERVES *of the os sacrum* are six pair; the first three or four pair whereof are bestowed wholly on the *crural nerves*, the rest on the muscles of the anus, vesica, and genital parts.

NERVES, *brachial*, are the offspring, partly, of the cervicals, and partly of the dorsals: these, after the several branches whereof they are composed have been variously complicated and united, run but a little way in a trunk before they divide again into several branches, variously distributed into the muscles of the skin and arms. See *Tab. Anat. (Osteol.) fig.* 6. *lit.* ee.

NERVES, *diaphragmatic*, are likewise the offspring of the cervicals: these two, after joining in a trunk, run through the mediastinum undivided, till they arrive near the diaphragm, into which they send off several branches; some into the muscular, others into the tendinous part of it.

NERVES, *crural*, consist of an union of six or seven pair; viz. the three last of the lumbal, and three or four first of the os sacrum: these, after having spent their upper branches on the muscles of the thigh and skin, as far as the knee, proceed in a trunk downwards, which sends its branches to the extremities of the toes, supplying, as it goes, the muscles and skin of the leg and foot: this is the largest and firmest nervous trunk in the body.

NERVE, *sciatic*, is formed of the last two pair of the lumbar, and the first three pair of the nerves of the os sacrum, and runs obliquely backward under the great sinus of the os ilium, and under the musculus pyriformis. As it goes out of the pelvis, it gives a branch to the anus, perinæum, genital parts, &c. Below the trochanter, it is sometimes called *nervus sciatico-cruralis*, and when it has reached the ham, *nervus popliteus*. In the course of its passage along the leg and foot, to the various parts of which it sends several branches, it acquires the appellation of *sciatico-tibialis*, *sciatico-peræus*, *plantaris internus*, and *externus*.

The ancients found, that by cutting, tying, or compressing any *nerve*, or any other way intercepting its communication with the brain, the parts to which it belonged were immediately deprived of all sense and motion. One remarkable instance of this is, the making an animal dumb by tying the *nerves* near the wind-pipe. We read in Galen of a boy who became quite dumb by having both the recurrent *nerves* divided.

The experiment of cutting these *nerves* in brute animals, was repeated and confirmed by Vesalius; and Dr. Martin assures us, he tried it successfully on a pig; nor did the animal recover its voice, as some have suspected it might. As the voice depends on a proper aperture of the glottis, it seems likely that when the recurrent *nerves* are cut, the glottis will always stand open, and be incapacitated from being that at the will of the animal. See Med. Eff. Edinb. vol. ii. art 8.

An anonymous physician offers what he calls an *experimentum crucis*, in proof of the *nerves* being composed of cylindrical canals, containing a fluid: it is the demonstration of the optic *nerve* inflated and dried, which appears canular to the naked eye.

NERVES, *ganglion of the*. See GANGLION.

NERVES, *wounds of the*. Upon the division of a *nerve*, the limb to which that *nerve* was extended becomes instantly rigid, void of sensation, and withers; so that it is no wonder that a man instantly expires, upon the division of those *nerves* which are sent to the heart or diaphragm: a wound also is attended with great danger where the *nerve* is only partially wounded, and not entirely divided; for the wounded fibres contract themselves, and those which remain undivided suffer too great extension, which will bring on most violent pain, spasms, convulsions, inflammations, and gangrenes, and sometimes death itself. Heister's Surg. p. 27.

NERVES *microscopically examined*. Mr. Leeuwenhoeck endeavoured by his microscope to discover the structure of the *nerves* in the spinal marrow of an ox: he saw there with great delight, minute hollow vessels of an inconceivable fineness, invested with their proper membrane, and running out in length parallel to one another, and making up their composition; and though some hundreds of these vessels go to the formation of the least *nerve* that can be examined, he not only discerned the cavities in them, which he computed to be three times less than their diameters, but in some perceived the orifices as plainly as the holes in a pricked paper are to be seen when looked at against the sun. It requires, however, great dexterity and expedition to make this examination with success; for after a thin slice of the spinal marrow is placed before the microscope, in less than a minute's time it becomes dry, and the whole appearance vanishes. Baker's Microscope, p. 145.

NERVES, *capillaments of the*. See CAPILLAMENT.

NERVES, in *Architecture*, denote the mouldings of projecting arches of vaults, or those arising from the branches of ogives, and crossing each other diagonally in Gothic vaults; serving to separate the pendentives.

NERVES, in *Botany*, are long, tough strings, running either across, or lengthwise of the leaves of plants.

NERVINES. See NEUROTICS.

NERVOSA *corpora*, in *Anatomy*. See CAVERNOSA *corpora*.

NERVOSE *leaf*. See LEAF.

NERVOUS *colic*. See COLIC.

NERVOUS *fever*. See FEVER.

NERVOUS *disorders* compose a very numerous class of the diseases incident to mankind. These, whilst under various forms and modes of attack, they exhaust the strength of the body, impair the vigour of the mind, and its power of self-enjoyment. Disorders of this kind proceed from any cause that contributes to relax the body, or depress the spirits; such are excess of study, and want of proper exercise, drinking weak watery liquors, frequent bleeding, purging, vomiting, immoderate venery, great fatigue, want of sleep, anxiety and grief, unwholesome air, &c.

Nervous diseases commonly begin with windy inflations of the stomach and intestines, bad appetite and digestion, vomiting, excruciating pains about the navel, with a rumbling noise in the bowels, costiveness, very unequal discharges of urine, difficulty of breathing, palpitations of the heart, sudden flushings of heat, and at other times sensation of cold, flying pains in the arms and limbs, pains in the back and belly, variable pulse, yawning, sighing, unsound sleep, &c. As the disorder increases, the patient is troubled with head-ache, cramps, and fixed pains in various parts of the body; the eyes are clouded, and often painful; the ears are dull of hearing, and the mind is subject to inquietude, and distressing apprehensions, on the most trivial occasions. But it is observed, that nothing is more characteristic of this disease than a dread of death. As to the regimen which persons labouring under this disorder should use, though they ought never to fast long, they should be careful to avoid all excess

cefs both in eating and drinking; their food should be ſolid and nouriſhing, but of eaſy digeſtion; wine and brandy mixed with water may be drunk with ſafety, and even with advantage, but all weak and warm liquors, as tea, coffee, punch, &c. are hurtful; becauſe they weaken the ſtomach and hurt digeſtion, and thus increaſe the malady. Exerciſe by walking or riding, long ſea-voyages, change of place and company, are of principal importance and uſe in *nervous* complaints; rubbing the body often with a fleſh-brush, or a coarſe linen cloth, is likewiſe beneficial, as it promotes the circulation and perſpiration. Perſons of weak nerves ſhould riſe early, and uſe exerciſe before breakfaſt; they ſhould, as much as poſſible, breathe a cool and dry air, and be kept eaſy and cheerful. They ſhould avoid a coſtive habit, by the occaſional uſe of a little rhubarb, or ſome other mild purgative: an infuſion of ſenna and rhubarb in brandy will ſerve for this purpoſe; and if the digeſtion is bad, and the ſtomach relaxed, the following infuſion will give relief: take of Peruvian bark, an ounce; gentian root, orange-peel, and coriander-ſeed, of each half an ounce; bruiſe theſe ingredients in a mortar, and infuſe them in a bottle of brandy five or ſix days. A table-ſpoonful of the ſtrained liquor may be taken in half a glaſs of water an hour before breakfaſt, dinner, and ſupper. Cold bathing is very ſerviceable in ſtrengthening the *nervous* ſyſtem, unleſs there are particular ſymptoms which forbid the uſe of it. Dr. Buchan ſtrongly recommends to patients afflicted with wind the acid elixir of vitriol; which, he ſays, taken in the quantity of fifteen, twenty, or thirty drops, twice or thrice a day, in a glaſs of water, will expel wind, ſtrengthen the ſtomach, and promote digeſtion. Upon the whole, the ſtricteſt attention ſhould be paid to diet, air, exerciſe, and amuſements, and the medicines ſhould be adapted to the nature and degree of the diſeaſe under which the patient labours. Buchan's Dom. Med. Chap. 43. See HYPOCHONDRIAC and HYSTERIC *affection*.

NERVOUS *ſpirit*, or *juice*, denotes a pure, ſubtile, volatile, humour, better known by the name of *animal ſpirits*; ſecreted from the arterious blood in the cortical part of the brain, collected in the medulla oblongata, and thence driven, by the force of the heart, into the cavities of the nerves; to be conveyed by them throughout the body, for the purpoſes of ſenſation, and animal motion.

Gliſſon, Wharton, and Willis, firſt mentioned the *nervous* juice; but many of our modern phyſicians deny the exiſtence of this juice. See ANIMAL *ſpirits*.

NERVOUS *parts, conſent of the*. See CONSENT.

NEST. See NIDUS.

NESTLINGS, a name given to Canary birds brought up by hand. See CANARY-*bird*.

NESTORIANS, a ſect of ancient Chriſtians, ſtill ſaid to be ſubſiſting in ſome parts of the Levant; whoſe diſtinguiſhing tenet is, that Mary is not the mother of God.

They take their name from Neſtorius, a Syrian, who, of a monk, became a prieſt, and a celebrated preacher; and was at length, after the death of Siſinnius in 428, raiſed by Theodoſius to the ſee of Conſtantinople.

As ſoon he ſhewed a great deal of zeal againſt hereſy, in his ſermons before the emperor; but, at length, taking the liberty to ſay, that he found in ſcripture, that Mary was the mother of Jeſus, but that he no-where found, that Mary was the mother of God; his auditory was ſhocked, and a great part of them retired from his communion.

His writings were ſoon ſpread through Syria, Egypt, and Perſia, where he made many converts, notwithſtanding the vigorous oppoſition of St. Cyril.

But nothing tended ſo much to propagate with rapidity the doctrine of Neſtorius, as its being received in the famous ſchool which had for a long time flouriſhed at Edeſſa. For the doctors of this celebrated academy not only inſtructed the youth in the *Neſtorian* tenets, but tranſlated from the Greek into the Syriac language the books of Neſtorius, of his maſter Theodorus of Moſſueſtia, and the writings alſo of Diodorus of Tarſus, and ſpread them abroad throughout Aſſyria and Perſia.

One of the chief promoters of the *Neſtorian* cauſe was Barſumas, created biſhop of Niſibis A. D. 435. Such was his zeal and ſucceſs, that the *Neſtorians*, who ſtill remain in Chaldæa, Perſia, Aſſyria, and the adjacent countries, conſider him alone as their parent and founder. By him, Pherozes, the Perſian monarch, was perſuaded to expel thoſe Chriſtians who adopted the opinions of the Greeks, and to admit the *Neſtorians* in their place, putting them in poſſeſſion of the principal ſeat of eccleſiaſtical authority in Perſia, the ſee of Seleucia, which the patriarch of the *Neſtorians* has always filled even down to our time. Barſumas alſo erected a ſchool at Niſibis, from which proceeded thoſe *Neſtorian* doctors, who, in the fifth and ſixth centuries, ſpread abroad their tenets through Egypt, Syria, Arabia, India, Tartary, and China.

His capital tenet was, that there are two perſons in Jeſus Chriſt; and that the Virgin was not his mother as God, but only as man.

This doctrine was condemned in the council of Epheſus, ſummoned by Theodoſius the younger, A. D. 431, at which above two hundred biſhops aſſiſted, and Cyril preſided; and Neſtorius was anathematized, without being heard, and depoſed from his ſee.

Neſtorius was not the author of this opinion, but borrowed it at Antioch, where he had ſtudied; and though he was the ſuffering and perſecuted party from the beginning of the controverſy to his death, the flame was firſt kindled by the preſbyter Anaſtaſius. Theodorus Moſſueſtanus, whoſe diſciple he was, had taught the ſame before him.

The abettors of this doctrine refuſe the title *Neſtorians*; alledging, that it had been handed down from the earlieſt times of the Chriſtian church.

In the tenth century the *Neſtorians* in Chaldæa, whence they are ſometimes called Chaldæans, extended their ſpiritual conqueſts beyond mount Imaus, and introduced the Chriſtian religion into Tartary, properly ſo called, and eſpecially into that country called *Kara*, and bordering on the northern part of China. The prince of that country, whom the *Neſtorians* converted to the Chriſtian faith, aſſumed, according to the vulgar tradition, the name of John, after his baptiſm, to which he added the ſurname of Preſbyter, from a principle of modeſty; whence it is ſaid, his ſucceſſors were each of them called Preſter John, until the time of Gengis Kan. But Moſheim obſerves, that the famous Preſter John did not begin to reign in that part of Aſia before the concluſion of the eleventh century. The *Neſtorians* formed ſo conſiderable a body of Chriſtians, that the miſſionaries of Rome were induſtrious in their endeavours to reduce them under the papal yoke. Innocent IV. in 1246, and Nicolas IV. in 1278, uſed their utmoſt efforts for this purpoſe, but without ſucceſs. Till the time of pope Julius III. the *Neſtorians* acknowleged but one patriarch, who reſided firſt at Bagdat, and afterwards at Moſoul; but a diviſion ariſing among them, in 1551, the patriarchate became divided, at leaſt for a time, and a new patriarch was conſecrated by that pope, whoſe ſucceſſors fixed their reſidence in the city of Ormus, in the mountainous part of Perſia, where they ſtill continue, diſtinguiſhed by the name of Simeon; and ſo far down as the laſt century, theſe patriarchs perſevered in their communion with the church of Rome, but ſeem at preſent to have withdrawn themſelves from it. The great *Neſtorian* pontiff, who form the oppoſite party, and look with a hoſtile eye on this little patriarch, have, ſince the year 1559, been diſtinguiſhed by the general denomination of Elias, and reſide conſtantly in the city of Moſoul. Their ſpiritual dominion is very extenſive, takes in a great part of Aſia, and comprehends alſo within its circuit the Arabian *Neſtorians*, and alſo the CHRISTIANS *of St. Thomas*, who dwell along the coaſt of Malabar. It is obſerved, to the laſting honour of the *Neſtorians*, that of all the Chriſtian ſocieties eſtabliſhed in the Eaſt, they have been the moſt careful and ſucceſsful in avoiding a multitude of ſuperſtitious opinions and practices that have infected the Greek and Latin churches. About the middle of the ſeventeenth century the Romiſh miſſionaries gained over to their communion a ſmall number of *Neſtorians*, whom they formed into a congregation or church; the patriarchs or biſhops of which reſide in the city of Amida, or Diarbeker, and all aſſume the denomination of Joſeph. Nevertheleſs, the *Neſtorians*, in general, perſevere, to our own times, in their refuſal to enter into the communion of the Romiſh church, notwithſtanding the earneſt intreaties and alluring offers that have been made by the pope's legate to conquer their inflexible conſtancy. Moſheim.

NET, *in Fiſhing and Fowling*, a contrivance by which to catch fiſh or fowl. See FISHING.

The taking fowls by *nets* is the readieſt and moſt advantageous of all others, where numbers are to be taken.

The making the *net* is very eaſy, and what every true ſportſman ought to be able to do for himſelf. All the tools neceſſary to it are wooden needles, of which there ſhould be ſeveral of different ſizes, ſome round, and others flat; a pair of round-pointed flat ſciſſars, and a wheel to wind off the thread. The packthread is to be of different ſtrength and thickneſs, according to the ſort of birds that are to be taken; and the general ſize of the meſhes, if not for very ſmall birds, is two inches from point to point.

The *net* ſhould be made neither too deep nor too long, for they are then difficult to manage; and they muſt be verged on each ſide with twiſted thread. The natural

colour of the thread is too bright and pale, and is therefore to be altered in many cases, according to the occasion.

The moſt uſual colour is the ruſſet: this is to be obtained by plunging the *net*, after it is made, into a tanner's pit, and letting it lie there till it be ſufficiently tinged; this is of a double ſervice to the *net*, preſerving the thread very greatly, as well as altering the colour. The green colour is given by chopping ſome green wheat, and boiling it in water, then ſoaking the *net* in this green tincture till it have ſufficient colour. The yellow colour is given in the ſame manner, with the decoction of celandine: this gives a pale and faint ſtraw colour, which is the colour of ſtubble in the harveſt time, and is juſt what is wanted. The brown *nets* are intended to be uſed on ploughed fields; the green on graſs grounds, and the yellow on ſtubble lands.

Great care is neceſſary in the preſerving of *nets*; and the principal thing to be conſidered in regard to this is, that all wet rots the threads: whenever they have been uſed in dew or rain, they muſt be hung up to dry in the ſun; and if there is any rent or breach made, it muſt be mended as ſoon as it is diſcovered. In the drying, they muſt be hung as far as may be from the walls, that they may be out of the way of mice and rats, which are very apt to deſtroy them. The utmoſt depth that ſhould be allowed to a *net* for fowl, is two fathom, and the utmoſt length ſix fathom.

The places for uſing fowling *nets* to moſt advantage, are the morning and evening haunts, where the birds come to feed. The ſportſman is to be at the place at leaſt two hours before the time of their coming, and the *net* muſt immediately be ſpread flat and even upon the ground, and the two ends faſtened down with ſtakes. At the lower part there is to be a long cord fixed to the upper edge of the *net*, by means of which it may be immediately raiſed, and pulled over. The ſportſman is to hide himſelf behind ſome natural or artificial ſhelter, at the extremity of this line, and ſome cut graſs muſt be ſtrewed all over the *net*, as it lies on the ground, to hide it from the fowl; and ſome live bird, that has been taken before, ſhould be ſtaked down before the *net*, by way of a ſtall, to draw in the others.

As ſoon as a ſufficient number of birds are within the compaſs of the *net*, it is to be pulled ſwiftly over them, and the fowler having taken thoſe that are under it, may ſtake down two or three more live ones, and ſpread the *net*, covering it with graſs as before. This ſort of ſport may be continued from as ſoon as it is light in the morning till an hour after ſun-riſe; but after that time, the birds have done feeding ravenouſly, and the ſport is over for that day.

NET, *cinque-port*, in *Fiſhery*, a name given to a ſort of ſquare *net*, reſembling a cage, and having five entrances into it, from whence it has the name.

It is a very ſerviceable *net* in any pond or river, and is equally good in ſwift or ſtanding water. In order to make this *net*, there muſt be provided four large and ſtrait poles, anſwerable in length to the depth of the water. The ends of theſe muſt be ſharpened in the manner of ſtakes, and there muſt be notches within a foot of the ſharp part to faſten the *net* to; and at a convenient diſtance, on the poles, there muſt be another ſet of notches, for the faſtening the other ends of the *net*.

The bottom of this *net* is four-ſquare, without any entrance. A boat muſt be taken out with this *net*, to place it properly. The four poles muſt be fixed in the bottom in ſuch a manner, that each may anſwer to the other in a direct line; and they muſt ſtand at ſuch diſtances, that the *net* may be drawn out as ſtiff as poſſible between them. If the *net* is to be fixed in a ſtanding water, this method alone will do very well; but if it be a ſmooth ſtream, ſomething more is neceſſary, otherwiſe the motion of the water will keep the *net* playing about, and this will frighten away the fiſh. To prevent this, four ſtrong ſticks are in this caſe to be faſtened along the tops of the others, ſo as to make a ſort of frame, to ſtreighten and ſtrengthen the others, and keep all tight.

When the *net* is perfectly fixed, it repreſents a cage, and the ſides, top, and bottom are kept ſo firm, that the fiſh do not regard them, but ſeem to take them for weeds; but going in at the entrances, there is no returning, and in rich places great numbers are taken.

NET, *clap*. See CLAP-*net*, and DORING.

NET, *crow*, in *Birding*, a name given to a ſort of *net* contrived for the catching of wild fowl in the winter ſeaſon. This *net* may be uſed in the day-time, and is to be made of double thread, or of fine packthread, and the meſhes are to be two inches wide. The length of the whole ſhould be about ten yards, and the depth about three; it ſhould be verged on the ſides with a ſtrong cord, and ſtretched out in length very ſtiff upon long poles, prepared for that purpoſe. When this *net* is brought to the place where it is to be uſed, it muſt be opened, and ſpread at full length and breadth; then its lower end is to be faſtened all along the whole length to the ground, ſo that it only can be moved up and down; the upper end of the *net* muſt ſtand extended on the long cord, the farther end of it being firſt ſtaked to the earth by a ſtrong cord, about five yards diſtant from the *net*, and ſtanding in an even line with the bottom of the *net*; the other end of the cord muſt reach at leaſt five and twenty yards, to ſome natural or artificial ſhelter, by means of which the ſportſman is to lie concealed from his prey. The *net* muſt be placed in ſuch exact order, that it will play upon the leaſt jerk of the cord, and that muſt always be given ſuddenly, leſt the prey eſcape. This *net* is principally uſed for crows and pigeons, on new-ſown cornfields, and it may alſo be uſed in ſtubble-fields, where the ſtubble will hide the *net* from the fowl. If the meſhes are made ſmaller, it may be uſed at barn-doors and the like for ſmall birds; and a bait of chaff will bring them together under it. But the great uſe of the *crow-net*, is to ſpread it in mornings and evenings where the haunts of wild fowl are, which in hard weather fly in great flocks to and from land, with and againſt the wind, and then fly cloſe to the ground, in open countries and low lands, where there are few hedges. When a whole covey of theſe are within the reach of the *net*, it is to be let go over them, and they will be taken in great numbers at one caſt.

NET, *fold*. See FOLD.

NET, *iramel*. See TRAMEL.

NET, *tunnel*. See TUNNEL.

NET, *water-fowl*. See *Water*-FOWL.

NET, *wolf*. See WOLF.

NET, NEAT, in *Commerce*, ſomething pure, and unadulterated with any foreign mixture.

Thus, wine is ſaid to be *net*, when not falſified or ſophiſticated; and coffee, rice, pepper, &c. are *net*, when the filth and impurities are ſeparated from them.

A diamond is ſaid to be *net*, when it has no ſtains or flaws; a cryſtal, when tranſparent throughout.

NET is alſo uſed for what remains after the tare has been taken out of the weight of any merchandize; i. e. when it is weighed clear of all package.

Thus we ſay, a barrel of cochineal weighs 450 pounds; the tare is 50 pounds, and there remains *net* 400 pounds.

NET-*meaſure*, in *Building*, is when no allowance is made for finiſhing; and in artificer's work, when no allowance is made for waſte of materials.

NET-*produce*, a term uſed to expreſs what any commodity has yielded, all tare and charges deducted.

The merchants ſometimes uſe the Italian words *netto proceduto*, for *net produce*.

NET-*maſonry*. See MASONRY.

NETE, in the *Ancient Muſic*, was a general name for one of the extreme chords of a tetrachord. Some ſay it was the higheſt, and others the loweſt ſound. But perhaps the truth of the matter is, that it was the higheſt or loweſt ſound, according as the aſcending or deſcending ſcales were conſidered. Vide Phil. Tranſ. N° 481. p. 269. See HYPATE.

When the *nete* is ſaid to be one of the extremes of a tetrachord, it is to be underſtood of a tetrachord conſidered by itſelf; for, when tetrachords were combined, the *nete* ſometimes took another name, as appears from the Greek ſcale inſerted under DIAGRAM.

NETE *hyperbolæon*, in the *Ancient Muſic*, the name of the higheſt and moſt acute of the chords of the lyre, or the ancient ſcale, or diagramma.

The word is compoſed of νετη, and ὑπερβολαιων, q. d. *the laſt of the higheſt*; where is underſtood the word *chords*. It anſwered to the A, mi, la, of the third octave of the organ, or the modern ſyſtem.

NETE *diezeugmenon*, in the *Ancient Muſic*, was one of the chords of the lyre, or ſyſtem of the ancients.

The word comes from νετη, and διεζευγμενων, *laſt of the ſeparate*; where is underſtood the word *chords*.

It anſwers to the E, fa, mi, of the third octave of the organ, or modern ſyſtem.

NETE *ſynnemenon*, in the *Ancient Muſic*, the name of the higheſt chord of a tetrachord of the Greek ſyſtem; added to make the b mollis fall between the meſe and parameſe, i. e. between the la and fa.

The word comes from νετη, and συνημμενων, *the laſt of the added*; where is underſtood the word *chords*.

The chord had the ſame ſound with the *paranete diezeugmenon*, or our la by b mollis.

NETHER *vert*. See VERT.

NETHINIMS, among the *Jews*, the poſterity of the Gibeonites, who were condemned by Joſhua to be hewers of wood and drawers of water for the houſe of God.

NETOPION, Νητοπιον, a name given by the ancients to a

very

very fragrant and coſtly ointment, conſiſting of a great number of the fineſt ſpicy ingredients. Hippocrates, in his Treatiſe of the Diſeaſes of Women, frequently preſcribes the *nitrum* in diſeaſes of the uterus; and in other places he ſpeaks of its being poured into the ear as a remedy for deafneſs; theſe compoſitions, by their attenuating qualities, dividing the viſcous and thick humours. The word *nitrum* is alſo ſometimes uſed to expreſs the *unguentum Ægyptiacum*, and ſometimes ſimply for oil of almonds.

NETTINGS, in a *Ship*, are a ſort of grates made with ſmall ropes, and ſeized together with rope-yarn, and are laid in the waiſt of a ſhip, ſometimes, to ſerve inſtead of GRATINGS.

NETTING-*cloth*, in a *Ship*. See SAIL.

NETTLE, *urtica*, in *Botany*, a genus of the *monœcia tetrandria* claſs. Its characters are theſe: it has male and female flowers at remote diſtances, ſometimes on the ſame, and at other times on different plants; the male flowers have empalements compoſed of four roundiſh concave leaves, and have a pitcher-ſhaped nectarium in the center of the flower, and four awl-ſhaped ſpreading ſtamina, terminated by ſummits, with two cells; the female flowers have an oval permanent empalement with two valves, without either petals or ſtamina, but have an oval germen without any ſtyle, crowned by a hairy ſtigma; the germen afterward turns to an oval compreſſed ſeed, which ripens in the empalement. Miller enumerates nine, and Linnæus nineteen ſpecies.

The roots of the common *nettle* are much recommended in medicine: they are powerful diuretics, and are ſaid to have great virtues againſt the ſtone and gravel, and looſen the belly; they cleanſe the blood, and are ſaid to be of great ſervice in hæmorrhages of all kinds, particularly in ſpittings of blood, and overflowings of the menſes. Authors add to this, that they are ſpecifics, by way of antidote, againſt the poiſon of henbane and hemlock; but this we are not ſo well aſſured of. The young ſhoots of the plant are eaten in the ſpring, as good againſt ſcorbutic complaints.

The ancients ſeem to have deſpiſed this plant, from its being common; and, though poſſeſſed of great virtues in medicine, neither the Greeks nor Latins have ſaid much about it; nor have the Arabians, who abound in the imaginary virtues of plants, thought the real ones of this herb worth their conſideration.

It has, however, been more honoured lately, and notwithſtanding its being now the moſt vile and abject plant among us, as well as the leaſt regarded by the ancients, Johannes Frances, an author of conſiderable fame, has publiſhed a treatiſe ſolely upon it; in this he has treated at large on its hiſtory and virtues. He deſcribes its ſtings in a very judicious manner, according to the preſent doctrine of the microſcope, and gives the hiſtory of certain worms of ſingular kinds which feed upon it; and adds its uſe in our own foods as a wholeſome and agreeable pot-herb: in our drink as a ſubſtitute for hops, being as well capable of preſerving it as theſe, and its great ſervice to the farmer in fattening hens.

John Melchiore Dreſchler, in the year 1717, ſuſtained alſo a theſis on the virtues and uſes of this plant, which has been ſince printed, ornamented with ſeveral cuts. In theſe two authors we find the whole account of the ſeveral uſes this common plant has been put to, and may be put to in our manufactures, our domeſtic and medicinal uſes; and, if what they ſay be true, we muſt wonder to ſee ſo much value overlooked in a herb, only becauſe it is common.

An ingenious manufacturer at Leipſic has lately contrived to make ropes and cloth of *nettle*. The ſpecies he uſes for this purpoſe is the *urtica urens maxima*, or great ſtinging *nettle*; and the proceſs of preparing it as follows: having gathered a quantity of the ſtalks ſtill green, though half withered, he dried them over his ſtove; and when the moiſture was entirely exhauſted, bruiſed them ſo as to be able to ſeparate the wood from the bark; by this operation he procured a kind of green hards, which was rubbed and prepared like flax. This new matter being ſpun, he obtained a greeniſh brown thread, very uniform and clear, ſomewhat reſembling worſted. The manufacturer afterwards boiled this thread, when it yielded a greeniſh juice, and became more white, uniform, and ſtrong; ſo that by continuing the preparation, there is reaſon to hope that an excellent thread may be made, and conſequently a ſtrong and laſting cloth; and that it may be employed with advantage, not only by rope-makers, but even by weavers, in making fine ſtuffs.

NETTLE, *dead, lamium*, in *Botany*. See ARCHANGEL.

NETTLE, *ſea*. See MEDUSA, ACTINIA, *Animal Flowers*, and UTICA *marina*.

NETTLE, *ſtinking*. See *Stinking Dead* NETTLE.

NETTLE, *ſtrawberry, fragaria, potentilla*, in *Botany*, a genus of the *didynamia gymnoſpermia* claſs. Its characters are theſe: the flower hath a bell-ſhaped empalement of one leaf, divided into two lips; the upper lip ends in three acute points; the lower lip is cut into two parts; the flower is of the lip-kind; it hath one petal; the upper lip is oval, erect, and indented at the end; the lower lip is reflexed, and ends in three points, the middle one being broadeſt; it has four awl-ſhaped ſtamina under the upper lip, two of which are ſhorter than the other, having oblong ſummits on their ſides, and a four-pointed germen, ſuſtaining a ſlender ſtyle, the length of the ſtamina, crowned by a bifid ſtigma; the germen afterward becomes four berries, each containing a ſingle roundiſh ſeed. There are two ſpecies.

A plant or two of each of theſe ſpecies may be allowed to have a place where there are collections of the different ſorts of evergreen ſhrubs, for the ſake of variety, eſpecially where the different ſorts of ciſtus, phlomis, tree-wormwood, and medicago, are admitted, becauſe they are equally hardy. Miller.

NETTLE, *ſtinking dead, galeopſis*, in *Botany*, a genus of the *didynamia gymnoſpermia* claſs. Its characters are theſe: the flower is of the lip-kind, the chaps broad, and from the baſe to the under lip it is on both ſides ſharply indented; the upper lip is concave, and fawed at the top; the under lip trifid, the middle ſegment being the largeſt, which is crenated; it has four ſtamina, two being ſhorter than the other; in the center is ſituated a quadrifid germen, which becomes four naked ſeeds, ſitting in the rigid empalement. Miller reckons ſix ſpecies, all of them common weeds. Linnæus deſcribes only three ſpecies.

NETTLE-*tree, celtis*, in *Botany*, a genus of the *polygamia monœcia* claſs. Its characters are theſe: it has male and hermaphrodite flowers on the ſame tree; the hermaphrodite flowers, whoſe empalement is divided into five parts, are ſingle, and ſituated above the male, which have no petals, but five ſhort ſtamina; in the center is ſituated an oval germen, which becomes a round berry with one cell, including a roundiſh nut; the male flowers have their empalements divided into ſix parts, and have no germen or ſtyle, but in other parts are like the hermaphrodite. Miller reckons four, and Linnæus three, ſpecies.

The *celtis*, with black fruit, grows in France and Italy; the fruit, which is uſed in medicine, is aſtringent, and binds the belly, but has leaſt of theſe qualities when ripe; the decoction thereof is good for a dyſentery, and for women labouring under an immoderate flux of the menſes.

NEVILLI *oſſa*. See TESTA.

NEURADE, in *Botany*, a name given by Linnæus to a genus of plants of the *decandria decagynia* claſs, called by Juſſieu *ſenebalfrum*. The characters are theſe: the perianthium is very ſmall, and ſtands upon the germen of the piſtil; it is compoſed of one leaf, divided into five ſegments; the flower conſiſts of five equal petals, larger than the leaves of the cup; the ſtamina are ten filaments, of the length of the cup; the antheræ are ſimple; the germen of the piſtil ſtands under the cup, and is of a gibbous figure; the ſtyles are ten in number, and are of the length of the ſtigmata; the ſtigmata are ſimple; the fruit is an orbicular capſule, of a depreſſed figure on the ſurface, and convex underneath, and is every way ſurrounded with prickles; the inner part is divided into ten cells, in every one of which is lodged a ſingle ſeed. There is only one ſpecies.

NEURIS, in the *Writings of the Ancients*, the name given to a ſpecies of marble, otherwiſe called *alaboniſcum*, and *proconneſium*. It was much uſed by the Roman ſtatuaries, and was dug in a ſmall iſland that lay between Paros and Cyzicus. It was of a duſky or bluiſh white, and was variegated with fine and ſlender veins of black, often beautifully diſpoſed, and in the bodies of the naked ſtatues reſembling the courſe of the veins.

NEURITICS, or NERVINES, formed from νευρον, *nervus*, in *Medicine*, remedies proper for diſeaſes of the nerves, and nervous parts; as the membranes, ligaments, &c. Such are betony, lavender, roſemary, ſage, laurel, marjoram, and others among the CEPHALICS.

NEUROBATES, in *Antiquity*, a rope-dancer. See DANCER.

NEUROGRAPHIA, in *Anatomy*, a deſcription of the nerves.

Raim. Vieuſſens, a phyſician of Montpelier, has an excellent treatiſe in Latin, under the title *Neurographia Univerſalis*; where he ſhews, that there are more ramifications of the nerves in the ſkin than in the muſcles and all the other parts.

Duncan, another phyſician of the ſame place, has alſo a treatiſe, called *Neurographia Rationalis*.

NEUROLOGY, Νευρολογια, a diſcourſe of the nerves.

Neurology ſeems to be of leſs extent than *neurography*, inaſmuch as the latter may be underſtood not only of diſcourſes on the nerves, but alſo of figures and engravings, repre-

representing them; whereas the former is restrained to discerning alone. Willis has given a fine *neurology*, in his Anatome Cerebri.

NEUROPHYLLON, in *Natural History*, a name given by Mr. Hayd to a species of *fossile* PLANT, remarkable for the ribbes on the leaf.

NEUROPTERA, in *Zoology*, the name by which Linnæus and Dr. Hill call a class of four-winged insects, from their wings being membranaceous with nerves, and being disposed in a reticulated form. In the Linnæan system there are seven genera comprehended under this class.

NEUTER, a person indifferent, who has espoused neither party, and is neither friend, nor foe.

NEUTER, in *Grammar*, denotes a sort of GENDER in nouns which are neither masculine, nor feminine.

NEUTER, *verb*. See VERB.

NEUTHA, a name given by authors to a pellicle covering the eyes or the ears of a child in the birth, and sometimes the whole face.

NEUTRAL *salts*, among *Chemists*, are a sort of intermediate salts between acids and alkalis; partaking of the nature of both.

Formerly those only were called *neutral* salts, which were composed of acids and alkalis united together to the point of saturation, so that they had no acid or alkaline property, and thence they were called *neutral*. But now this name is commonly extended to combinations of acids with all substances, with which they can so unite, that they lose entirely or mostly their acid qualities; as, for instance, when they are united with earthy or metallic substances.

Mr. Boyle also gives the appellation *neutral* to a sort of spirits, differing, in divers qualities, both from vitious, acid, and urinous spirits. These he also calls *anonymous* and *acidiphorous* spirits.

NEUTRALITY, the state of a person or thing that is *neutral*.

NEW *moon*, *menmenia*, that state of the moon a little before, and a little after, her conjunction with the sun.

NEWEL, in *Architecture*, the upright post which stairs turn about; being that part of the staircase which sustains the steps.

The *newel* is, properly, a cylinder of stone, which bears on the ground, and is formed by the ends of the steps of the winding-stairs.

There are also *newels* of wood, which are pieces of timber placed perpendicularly, receiving the tenons of the steps of wooden stairs into their mortices, and wherein are fixed the shafts and rests of the staircase, and the shafts of each story.

NEWS, *false*. See FALSE *news*.

NEWT, in *Zoology*. See EFT, and LACERTA *aquatica*.

NEWTONIAN *philosophy*, the doctrine of the universe, and, particularly, of the heavenly bodies; their laws, affections, &c. as delivered by Sir Isaac Newton.

The term *Newtonian philosophy* is applied very differently; whence have sprung divers confused notions relating to it.

Some authors, under this *philosophy*, include all the corpuscular philosophy, considered as it now stands corrected and reformed by the discoveries and improvements made in several parts thereof, by Sir Isaac Newton. In which sense it is that s'Gravesande calls his Elements of Physics, Introductio ad Philosophiam Newtonianam. And in this sense the *Newtonian* is the same with the new philosophy; and stands contradistinguished to the Cartesian, the Peripatetic, and the ancient corpuscular.

Others, by *Newtonian philosophy*, mean the method or order which Sir Isaac Newton observes in philosophizing, viz. the reasoning, and drawing of conclusions directly from phenomena, exclusive of all previous hypotheses; the beginning from simple principles; deducing the first powers and laws of nature from a few select phenomena, and then applying those laws, &c. to account for other things. See *Law of* NATURE. And, in this sense, the *Newtonian philosophy* is the same with the experimental philosophy; and stands opposed to the ancient corpuscular.

Others, by *Newtonian philosophy*, mean, that wherein physical bodies are considered mathematically; and where geometry and mechanics are applied to the solution of phenomena. In which sense, the *Newtonian* is the same with the mechanical and mathematical philosophy.

Others, again, by *Newtonian philosophy*, understand, that part of physical knowledge which Sir Isaac Newton has handled, improved, and demonstrated, in his Principia.

Others, lastly, by *Newtonian philosophy*, mean, the new principles which Sir Isaac Newton has brought into philosophy; the new system founded thereon; and the new solutions of phenomena thence deduced; or that which characterises, and distinguishes his philosophy from all others; which is the sense wherein we shall chiefly consider it.

As to the history of this philosophy, we have but little to say: it was first made public in the year 1686, by the author, then a fellow of Trinity college, Cambridge; and in the year 1713, republished, with considerable improvements. Several other authors have since attempted to make it plainer; by setting aside many of the more sublime mathematical researches, and substituting other more obvious reasonings, or experiments, in lieu thereof; particularly Whiston, in his Prælect. Phys. Mathemat. s'Gravesande in Element. & Inslit. and Dr. Pemberton in his View, and Maclaurin, in his excellent work, intitled, an Account of Sir Isaac Newton's Philosophical Discoveries.

Notwithstanding the great merit of this philosophy, and the universal reception it has met with at home, it gained ground, at its first publication, but slowly abroad; *Newtonianism* had scarce two or three adherents in a nation; but Cartesianism, Huygenianism, and Leibnitianism, maintained their ground, till the force of truth prevailed. And it is now held in the utmost veneration both at home and abroad.

The philosophy itself is laid down principally in the third book of the Principia. The two preceding books are taken up in preparing the way for it, and laying down such principles of mathematics as have the nearest relation to philosophy; such are the laws and conditions of powers. And these, to render them less dry and geometrical, the author illustrates by schelia in philosophy, relating chiefly to the density and resistance of bodies, the motion of light and sounds, a vacuum, &c.

In the third book he proceeds to the *philosophy* itself; and from the same principles deduces the structure of the universe, and the powers of gravity, whereby bodies tend towards the sun and planets; and from these powers, the motions of the planets and comets, the theory of the moon, and the tides.

This book, which he calls De Mundi Systemate, he tells us, was first written in the popular way; but considering, that such as are unacquainted with the said principles, would not conceive the force of the consequences, nor be induced to lay aside their ancient prejudices; for this reason, and to prevent the thing from being in continual dispute, he afterwards digested the sum of that book into propositions, in the mathematical manner; so as it might only come to be read by such as had first considered the principles; not that it is necessary a man should master them all; many of them, even the brightest mathematicians, would find a difficulty in getting over. It is enough to have read the definitions, laws of motion, and the three first sections of the first book; after which, the author himself directs us to pass on to the book De Systemate Mundi.

The several articles of this *philosophy* are delivered under their respective heads; as SUN, MOON, PLANET, COMET, ETHER, AIR, CENTRIPETAL *force*, RESISTANCE, MEDIUM, MATTER, SPACE, ELASTICITY, GRAVITY, &c. A general idea, or abstract of the whole, we shall here lay before the reader, to shew in what relation the several parts stand to each other.

The great principle on which the whole philosophy is founded, is the power of gravity. This principle is not new: Kepler, long ago, hinted it in his Introduct. ad Mot. Martis. He even discovered some of the properties thereof, and their effects in the primary planets; but the glory of bringing it to a physical demonstration was reserved to the English philosopher. See GRAVITY.

His proof of the principle from phenomena, together with the application of the same principle to the various other appearances of nature, or the deducing those appearances from that principle, constitute the *Newtonian* system; which, drawn in miniature, will stand thus:

I. The phenomena are, 1. That the satellites of Jupiter do, by radii drawn to the center of the planet, describe areas proportional to their times; and that their periodical times are in a sesquiplicate ratio of their distances from its centre. 2. That the observations of all astronomers agree. 2. The same phenomenon holds of the satellites of Saturn, with regard to Saturn; and of the moon with regard to the earth. 3. The periodical times of the primary planets about the sun are in a sesquiplicate ratio of their mean distances from the sun. But, 4. The primary planets do not describe areas any way proportional to their periodical times, about the earth; as being sometimes seen stationary, and sometimes retrograde with regard to it.

II. 1. The powers whereby the satellites of Jupiter are constantly drawn out of their rectilinear course, and retained in their orbits, do respect the center of Jupiter, and are reciprocally as the squares of their distances from the same center. 2. The same holds of the satellites of Saturn

Saturn with regard to Saturn; of the moon with regard to the earth; and of the primary planets with regard to the ſun.

III. The moon gravitates towards the earth, and by the power of that gravity is retained in her orbit; and the ſame holds of the other ſatellites with reſpect to their primary planets; and of the primaries with reſpect to the ſun. See GRAVITY, and MOON.

As to the other ſecondary planets, their phenomena, with reſpect to their primary ones, being of the ſame kind with thoſe of the moon about the earth, it is argued by analogy, that they depend on the ſame cauſes; it being a rule or axiom which all philoſophers agree to, that effects of the ſame kind have the ſame cauſes. Again, attraction is always mutual, i. e. the reaction is equal to the action: conſequently, the primitive planets gravitate towards their ſecondary ones; the earth towards the moon, and the ſun towards them all. And this gravity, with regard to each ſeveral planet, is reciprocally as the ſquare of its diſtance from its center of gravity.

IV. All bodies gravitate towards all the planets; and their weights towards any one planet, at equal diſtances from the center of the planet, are proportional to the quantity of matter in each.

For the law of the deſcent of heavy bodies towards the earth, ſetting aſide their unequal retardation from the reſiſtance of the air, is this, that all bodies fall equally in equal times; but the nature of gravity or weight, no doubt, is the ſame on the other planets, as on the earth. Suppoſe, e. gr. ſuch bodies raiſed to the ſurface of the moon, and together with the moon deprived at once of all progreſſive motion, and dropped towards the earth; it is ſhewn, that in equal times they would deſcribe equal ſpaces with the moon; and, therefore, that their quantity of matter is to that of the moon, as their weights to its weight. Add, that ſince Jupiter's ſatellites revolve in times that are in a ſeſquiplicate ratio of their diſtances from the center of Jupiter, and conſequently at equal diſtances from Jupiter, their accelerating gravities are equal; therefore, falling equal altitudes in equal times, they will deſcribe equal ſpaces, juſt as heavy bodies do on our earth. And the ſame argument will hold of the primary planets with regard to the ſun. And the powers whereby unequal bodies are equally accelerated, are as the bodies; i. e. the weights are as the quantities of matter in the planets. And the weights of the primary and ſecondary planets towards the ſun are as the quantities of matter in the planets and ſatellites. And hence are ſeveral corollaries drawn reſulting to the weights of bodies on the ſurface of the earth, magnetiſm, and the exiſtence of a vacuum; which ſee under VACUUM, WEIGHT, and MAGNETISM.

V. Gravity extends itſelf towards all bodies, and is in proportion to the quantity of matter in each.

That all the planets gravitate towards each other, has been already ſhewn; likewiſe, that the gravity towards any one, conſidered apart, is reciprocally as the ſquare of its diſtance from the center of the planet: conſequently, gravity is proportional to the matter therein. Farther, as all the parts of any planet, A, gravitate towards another planet, B; and the gravity of any part is to the gravity of the whole, as the matter of the part to the matter of the whole; and reaction equal to action; the planet B will gravitate towards all the parts of the planet A; and its gravity towards any part will be to its gravity towards the whole, as the matter of the part to the matter of the whole.

Hence we derive methods of finding and comparing the gravities of bodies towards different planets; of finding the quantities of matter in the ſeveral planets, and their denſities; ſince the weights of equal bodies revolving about planets are as the diameters of their orbits, directly; and as the ſquares of the periodical times, inverſly; and the weights at any diſtance from the center of the planet are greater or leſs in a duplicate ratio of their diſtances, inverſly; and ſince the quantities of matter in the planets are as their powers at equal diſtances from their centers: and, laſtly, ſince the weights of equal and homogeneous bodies towards homogeneous ſpheres are, at the ſurface of the ſpheres, as the diameters of thoſe ſpheres; and conſequently, the denſities of heterogeneous bodies are as the weights at the diſtances of the diameters of the ſpheres.

VI. The common center of gravity of the ſun, and all the planets, is at reſt; and the ſun, though always in motion, yet never recedes far from the common center of all the planets.

For the matter in the ſun being to that in Jupiter as 1033 to 1; and Jupiter's diſtance from the ſun to the ſemidiameter of the ſun in a ratio ſomewhat bigger; the common center of gravity of Jupiter, and the ſun, will be found a point a little without the ſun's ſurface. And, by the ſame means, the common center of Saturn and the ſun will be found a point a little within the ſun's ſurface; and the common center of the earth, and all the planets, will be ſcarce one diameter of the ſun diſtant from the center thereof. But the center is always at reſt: therefore, though the ſun will have a motion this and that way, according to the various ſituations of the planets, yet it can never recede far from the center. So that the common center of gravity of the earth, ſun, and planets, may be eſteemed the center of the whole world.

VII. The planets move in ellipſes that have their foci in the center of the ſun, and deſcribe areas proportional to their times.

This we have already laid down *à poſteriori*, as a phenomenon; and now, that the principle of the heavenly motions is ſhewn, we deduce it therefrom *à priori*. Thus, ſince the weights of the planets towards the ſun are reciprocally as the ſquares of the diſtances from the center of the ſun; if the ſun were at reſt, and the other planets did not act on each other, their orbits would be elliptical, having the ſun in their common umbilicus, and they would deſcribe areas proportional to the times; but the mutual actions of the planets are very ſmall, and may be well thrown aſide. Therefore, &c.

Indeed, the action of Jupiter on Saturn is of ſome conſequence; and hence, according to the different ſituations and diſtances of thoſe two planets, their orbits will be a little diſturbed.

The ſun's orbit too is ſenſibly diſturbed by the action of the moon; and the common center of the two deſcribes an ellipſis round the ſun placed in the umbilicus; and with a radius drawn to the center of the ſun, deſcribes areas proportional to the times.

VIII. The aphelia and nodes of the planets are at reſt; excepting for ſome inconſiderable irregularities ariſing from the actions of the revolving planets and comets. Conſequently, as the fixed ſtars retain their poſition to the aphelia and nodes, they, too, are at reſt.

IX. The axis, or polar diameter, of the planets is leſs than the equatorial diameter.

The planets, had they no diurnal rotation, would be ſpheres, as having an equal gravity on every ſide; but, by this rotation, the parts receding from the axis endeavour to riſe towards the equator, which, if the matter they conſiſt of be fluid, will be affected very ſenſibly. Accordingly Jupiter, whoſe denſity is found not ſo much to exceed that of water on our globe, is obſerved by the aſtronomers to be conſiderably leſs between the poles, than from eaſt to weſt. And on the ſame principle, unleſs our earth were higher at the equator than towards the poles, the ſea would riſe under the equator, and overflow all near it.

But this figure of the earth Sir Iſaac Newton proves likewiſe *à poſteriori*; from the oſcillations of pendulums being ſlower, and ſmaller, in the equatorial, than the polar parts of the globe.

X. All the moon's motions, and all the inequalities in thoſe motions, follow from theſe principles: e. gr. her unequal velocity, and that of her nodes, and apogee in the ſyzygies and quadratures; the differences in her eccentricity, and her variation, &c. See MOON, QUADRATURE, SYZYGY, &c.

XI. From the inequalities in the lunar motions, we can deduce the ſeveral inequalities in the motions of the ſatellites.

XII. From theſe principles, particularly the action of the ſun and moon upon the earth, it follows, that we muſt have TIDES; or that the ſea muſt ſwell and ſubſide twice every day.

XIII. Hence likewiſe follows the whole theory of COMETS; as, that they are above the region of the moon, and in the planetary ſpaces; that they ſhine by the ſun's light reflected from them; that they move in conic ſections, whoſe umbilici are in the center of the ſun; and by radii drawn to the ſun, deſcribe areas proportional to the times; that their orbits, or trajectories, are very near parabolas; that their bodies are ſolid, compact, &c. like thoſe of the planets, and muſt therefore acquire an immenſe heat in their perihelia; that their tails are exhalations ariſing from them, and encompaſſing them like atmoſpheres.

The objections raiſed againſt this philoſophy are chiefly aimed at the principle, gravity; which ſome condemn as an *occult quality*; and others as a *miraculous* and preternatural cauſe; neither of which have any longer room in ſound philoſophy. Others, again, ſet it aſide, as deſtroying the notion of vortices; and others, as ſuppoſing a vacuum. But theſe are all abundantly obviated under GRAVITY, ATTRACTION, VORTEX, VACUUM, and QUALITY.

NEXI, among the Romans, perſons free-born, who, for debt, were delivered bound to their creditor, and obliged to ſerve him, till they could pay the debt.

NEXT *taker*, among *Miners*, is he that hath the next meer in poſſeſſion.

NEXUS *of matter*. See COHESION.

NHAMBUGUACU, in *Botany*, a name of the great American *vicinus*, or *palma Chriſti*.

NHAMDIA, in *Ichthyology*, the name of a fiſh caught in the rivers of many parts of America, and of a fine taſte. It is of the anguilliform kind, and has a long and fat body, becoming ſmaller toward the tail; its belly is ſoft; its head flat; and its mouth of a parabolic figure, and armed with ſmall teeth; it is uſually of about eight or ten inches long; its tail is forked, and its head is covered with a ſtrong ſhelly coat; this is of a duſky brown; its back and ſides are of a bluiſh grey; the larger back-fin is of the ſame colour; all the reſt are black; and on each ſide there is a red line reaching lengthways from the gills to the tail.

NHANDIROBA, in *Botany*, a name given by Plumier to a genus of plants, the ſame with the PEVILLEA of Linnæus.

NHANDUAPOA, the name of a Braſilian bird, called alſo *jabirunacu*, but more frequently known by its Dutch name SCURVOGEL.

NHANDUGUACU, in *Ornithology*, the name of a Braſilian bird of the emeu, or caſſowary kind, a ſpecies of the *ſtruthia*, or OSTRICH, in the Linnæan ſyſtem, but ſmaller than the common or African caſſowary. Its body is conſiderably large; its neck long and ſtrong; its legs very long and thick; its wings extremely ſhort, and unfit for flying, but aſſiſting it in running; its feathers are grey, and, on the back, are conſiderably long; it commonly carries its neck bent like a ſwan; its head is ſhaped like that of a gooſe; its back feathers cover the rump, and make a ſort of tail; it runs as ſwift as a greyhound, and feeds on fleſh and fruits.

NHAQUUNDA, in *Ichthyology*, the name of a ſmall fiſh caught in the American rivers. Its body is oblong, and every where nearly of the ſame thickneſs; its head and mouth are like thoſe of the pike; and its uſual length is about four inches; it can extend its upper lip, and round the opening of its mouth; it has no regular teeth, but its jaws are rough like a file; its tail is covered with a hard ſhelly cruſt; its body is covered with moderately large ſcales, and its back and ſides are of a ſilvery grey; its belly white; it has on each ſide a ſingle row of round black ſpots, of the bigneſs of a pea, and among theſe a number of ſmall blue ones.

NIAGARA, in *Geography*, a prodigious cataract in Canada, in North America, between the lakes Erie and Ontario, where the water falls from high rocks a hundred and thirty-ſeven feet high, and half a league broad; the water runs to it with ſuch violence, that all the beaſts that attempt to croſs it a quarter of a league above, are ſwallowed up; and it tumbles off the precipice with ſuch fury, that it makes an arch under which ſhrce men may paſs abreaſt without danger or damage, except a few drops of water falling upon them. The miſt which this fall occaſions may be ſeen at fifteen miles diſtance, ariſing as high as the clouds, and forming a beautiful rainbow. See CATARACT.

NICENE *creed*. See CREED.

NICETERIA *Athenæ*, NIKETERIA *Athenæ*, in *Antiquity*, an Athenian ſolemnity in memory of Minerva's victory over Neptune, when they contended which of them ſhould have the honour of giving a name to the city afterwards called Athens.

NICHE, in *Architecture*, a cavity, or hollow place, in the thickneſs of a wall, to place a figure or ſtatue in.

The word comes from the Italian *nicchio*, *ſhell*; becauſe the ſtatue is here incloſed in a ſhell; or, perhaps, by reaſon of the ſhell wherewith the tops of ſome of them are adorned. See *Tab. Architecture, fig. 40. lit. Z.*

Niches are made to partake of all the ſegments under a ſemicircle. They are ſometimes at an equal diſtance from the front, and are parallel or ſquare on the back with the front-line; in which caſe they are called ſquare receſſes, or ſquare *niches*.

The larger *niches* ſerve for groups of figures; the ſmall ones for ſingle ſtatues, and ſometimes only for buſts.

Great care muſt be taken to proportion the *niches* to the figures; and that the pedeſtal of the figures be proportioned to the *niches*.

Niches are ſometimes made with ruſtic-work.

NICHE, *round*, is that whoſe plan and circumference are circular.

NICHE, *ſquare*, that where they are ſquare.

NICHE, *angular*, that formed in the corner of the building.

NICHE, *ground*, that which, inſtead of bearing on a maſſive, has its riſe from the ground; as the *niches* of the portico of the Pantheon at Rome. Their ordinary proportion is to be two diameters in height, and one in width.

NICHE, *capital of a*. See CAPITAL.

NICHE, *cul de four of a*. See CUL.

NICHED *column*. See COLUMN.

NICHILIANISTÆ, in *Church Hiſtory*, heretics who maintained that Chriſt had no being.

NICHILS. See NIHILS.

NICHILS, *clerk of the*. See CLERK.

NICKAR-*tree*, in *Botany*. See GUILANDINA.

NICKEL, in *Natural Hiſtory*, is a ſemi-metal, firſt deſcribed by Mr. Cronſtedt, in the Swediſh Memoirs for the years 1751 and 1754. The properties there attributed to it are, 1. That it is of a white colour, inclining to red. 2. Its texture is ſolid, and ſhining in its fractures. 3. Its ſpecific gravity is to that of water as 8000 to 1000. 4. It is conſiderably fixed in the fire. 5. It is calcinable, and its calx is green. 6. This calx is not very fuſible, but it nevertheleſs tinges glaſs of a tranſparent reddiſh brown, or jacinth colour. 7. It diſſolves in aqua fortis, aqua regia, and marine acid, but with difficulty in vitriolic acid: all theſe ſolutions have a deep green colour; the vitriol formed of it is alſo of the ſame colour; and the colcothar of this vitriol, and alſo the precipitates from the ſolutions, are rendered by calcination of a light green colour. 8. Theſe precipitates are ſoluble by ſpirit of ſal ammoniac, and the ſolution has a blue colour; but no copper can be produced by a reduction of the precipitates. 9. It ſtrongly attracts ſulphur. 10. It unites with all metallic ſubſtances, excepting ſilver, quickſilver, and zinc. 11. Its attraction to regulus of cobalt is the ſtrongeſt, next to which is that to iron, and then to arſenic. 12. It retains its phlogiſton a long time in the fire, and its calx is reducible by a very ſmall quantity of inflammable matter. It requires, however, a ſtrong red heat before it can be fuſed, and melts a little ſooner, or as ſoon as gold or copper. *Nickel* is contained in the mineral, called *Kupfer*, or KUPFER-*nickel*.

NICOL, in *Natural Hiſtory*, a word uſed by the miners in Germany to expreſs a greeniſh cruſt, covering ſeveral of the ſpecies of marcaſites and cobalt: it emits fumes that ſmell of garlic in the calcination, and is very injurious to the workmen, cauſing contractions of their limbs, and other diſorders. It is ſometimes found in maſſes alone, but that more rarely.

NICOLAI *Catholicon*. See CATHOLICON.

NICOLAS, *Saint, Argonauts of*. See ARGONAUTS.

NICOLAITANS, or NICOLAITES, one of the moſt ancient ſects in the Chriſtian church; thus denominated from Nicolas, a perſon ordained a deacon of the church of Jeruſalem, together with St. Stephen.

The diſtinguiſhing tenet of the *Nicolaitans*, as repreſented by eccleſiaſtical hiſtorians, is, that all married women ſhould be common; to take away all occaſion of jealouſy.

Other authors tax Nicolas with other impurities; but Clemens Alexandrinus imputes them all to his diſciples, who, he ſays, abuſed their maſter's words.

In the charge urged againſt the *Nicolaitans* (Rev. ii. 6, 14, 15,) they are not reproached with erroneous opinions concerning the Deity, but with the licentiouſneſs of their practice, and the contempt of that ſolemn law, which the apoſtles had enacted, (Acts xv. 29.) againſt fornication, and the uſe of meats offered to idols. It is, however, certain, that the writers of the ſecond and the following centuries, Irenæus, Tertullian, Clemens, and others, affirm, that the *Nicolaitans* adopted the ſentiments of the GNOSTICS, concerning the two principles of all things, the æons, and the origin of this terreſtrial globe.

The authority of theſe writers, ſays Moſheim, would be entirely ſatisfactory in this matter, were there not ſome reaſon to imagine, that they confounded, in their narrations, two ſects very different from each other, viz. that of the *Nicolaitans*, mentioned in the Revelations; and another, founded by a perſon named Nicolaus, in the ſecond century, upon the principles of the Gnoſtics Cerdon, Holleman, Vitringa, and Mauis, take the name *Nicolaitan* to be coined, to ſignify a man addicted to pleaſure and debauchery; adding, that it has nothing to do with Nicolas one of the ſeven deacons.

NICOMIA, in *Natural Hiſtory*. See CHERT.

NICOTIANA, or *herba Nicotiana*, a name given to TOBACCO; from Nicot, the French ambaſſador, at the court of Portugal, who ſent it into France, in 1560, and gave it his own name, as he himſelf tells us in his dictionary.

NICTITATING *membrane*, in *Anatomy*, a thin membrane, which covers the eyes of ſeveral creatures, and ſhelters them from duſt, or too much light; yet is ſo thin, that they can ſee indifferently well through it.

This *nictitating membrane* is chiefly found in the bird and fiſh kind.

This membrane, in the eagle's eye, is remarkably cloſe and firm, inſomuch as to be accounted as a ſecond eye-lid;

lid: and hence that remarkable firmneſs of the eagle's ſight in viewing the ſun.

NIDDUI, in the *Jewiſh Cuſtoms*, is uſed to ſignify ſeparated or excommunicated. This, according to ſome, was to be underſtood of the leſſer ſort of excommunication in uſe among the Hebrews. He that had incurred it was to withdraw himſelf from his relations, at leaſt to the diſtance of four cubits: it commonly continued a month. If it was not taken off in that time, it might be prolonged for ſixty, or even ninety days: but if, within this term, the excommunicated perſon did not give ſatisfaction, he fell into the *cherem*, which was a ſecond ſort of excommunication; and thence into the third ſort called *ſhammatha*, or *ſhemata*, the moſt terrible of all. But Selden has proved that there were only two kinds of excommunication, viz. the greater and leſs; and that theſe three terms were uſed indifferently.

NIDUS, *neſt*, a repoſitory, wherein certain animals, particularly fowls, inſects, and reptiles, lodge their eggs, for incubation; and wherein, when hatched, they nurſe their young, till they become able to ſhift for themſelves. The word is Latin, and is ſuppoſed to be derived from *nidor*, *a rank or ill ſmell*; in regard the neſts of animals uſually ſtink.

Mr. Derham ſays, he has often wondered how waſps, hornets, and other inſects, that gather dry materials (as the duſt of wood ſcraped for that purpoſe), ſhould find a proper glutinous matter to cement and glue their combs, and line their cells: but he adds, that, in all probability, it is in their own bodies; as in the tinea veſtivora, the cad-worm, &c.

Goedart obſerves of his eruca, that fed on leaves, that they made their cells of leaves glued together with their own ſpittle.

NIDUS *avis*, in the Linnæan ſyſtem of *Botany*, the name of a ſpecies of OSBECK.

NIECE, a term relative to uncle and aunt, ſignifying a brother's or ſiſter's daughter; which, in the civil law, is the third degree of conſanguinity; and, in the common law, the ſecond.

NIEKE *corunde*, in the language of the Ceyloneſe, the name of a ſpecies of cinnamon. The tree which produces it reſembles the *nieke*, another tree very common there. This is a very bad kind of cinnamon, and has very little taſte or ſmell. It is very ſeldom ſold as cinnamon, but is much in eſteem among the natives for its medicinal virtues. They obtain a water, and an oil from it, by roaſting, which they anoint themſelves with, to preſerve them from noxious fumes, and infections of any kind; and uſe the expreſſed juice of the leaves to cool the head, and ſtrengthen the brain, rubbing it on externally. Phil. Tranſ. N° 409.

NIENT *compoſe*, in *Law*, an exception taken to a petition, as unjuſt; becauſe the thing deſired is not in that act or deed whereon the petition is grounded.

Thus a perſon deſiring of the court to be put in poſſeſſion of a houſe formerly adjudged to him among other lands; the adverſe party pleads, that this petition is not to be granted; by reaſon though the petitioner had a judgement for certain lands and houſes, yet this houſe is *nient compriſe*, not comprized therein.

NIGELLA, in *Botany*. See FENNEL *flower*.

NIGHT, that part of the natural day, during which the ſun is underneath the horizon: or, *night* is that ſpace of time wherein the ſun is out of our hemiſphere.

Under the equator, the *nights* are always equal to the days. Under the poles, the *night* continues half a year.

The ancient Gauls and Germans divided their time not by days, but *nights*; as appears from Tacitus and Cæſar; and the people of Iceland, and the Arabs, do the ſame at this day. See DAY, HOUR, &c.

The ſame is alſo obſerved of our Saxon anceſtors.

Thus, in the council of Cloveſhoe, anno 824, we read, *Ibi ſtatuta & proſcripta contentione coram epiſcopo poſt* 30 *noctes, illum juramentum ad Weſtminſter deducturum eſt.*— Whence our cuſtom of ſaying, *ſevennight*, *fortnight*, &c.

NIGHT, *ſignals by*. See SIGNALS.

NIGHT-*crow-lyng*, *third*. See THIRD.

NIGHT-*mare*. See INCUBUS.

NIGHTSHADE, *ſolanum*, in *Botany*, a genus of the *pentandria monogynia* claſs. Its characters are theſe: the empalement of the flower is permanent of one leaf, cut half through into five acute ſegments; the flower has one wheel-ſhaped petal, having a very ſhort tube; the brim is large, ſpreading, and five-pointed; it has five awl-ſhaped ſtamina, terminated by oblong ſummits, which ſtand together; and a roundiſh germen, ſupporting a ſlender ſtyle, longer than the ſtamina, and crowned by an obtuſe ſtigma; the germen afterwards turns to a roundiſh berry, with two cells, having a convex fleſhy receptacle, filled with roundiſh compreſſed ſeeds. There are thirty-ſix ſpecies. Miller. See MAD-*apple*.

The garden *nightſhade* of the ſhops, with black berries, is annual, grows ſpontaneouſly in cultivated grounds, and flowers in Auguſt. The leaves are uſed in external applications, and are ſaid to act as refrigerants, reſolvents, and diſcutients; taken internally, in the quantity of not many grains, they are highly deleterious; in very ſmall doſes, as an infuſion in boiling water of half a grain or a grain of the dried leaves, they occaſion a warmth over the whole body, which is often followed by a ſweat, or an increaſe of the urinary diſcharge, or ſome looſe ſtools, or a ſickneſs and vomiting, and often by a head-ach, giddineſs, dimneſs of the ſight, and other paralytic ſymptoms. In ſome cancerous, ulcerous, and hydropic caſes, theſe infuſions have been repeated at bed-time, every two or three nights, or oftener, and the quantity of the leaves in each doſe increaſed gradually to five or ſix grains or more, with apparent benefit; but their operation is ſo irregular, and their effects on the nervous ſyſtem ſo alarming, that the uſe of them is juſtly laid aſide. It is obſerved, that their beneficial effects depend on the evacuations they produce; and that, when they do not act as evacuants, they generally aggravate the complaints. The roots and berries are much of the ſame nature with the leaves; though Geſner reports, that the expreſſed juice of the latter, boiled with ſugar, to the conſiſtence of a ſyrup, proves, in doſes of a teaſpoonful, an effectual and ſafe anodyne; but he cautions againſt exceeding this doſe. Lewis.

NIGHTSHADE, *American*, *phytolacca*, in *Botany*, a genus of the *decandria pentagynia* claſs. Its characters are theſe: the flower hath no empalement, according to ſome, and no petals, though the cover of the parts of generation, being coloured, is by ſome termed petals, there are five of theſe, which are concave, open, and permanent; it has for the moſt part ten ſtamina, which are of the ſame length as the petals, terminated by roundiſh ſummits, and ten compreſſed, orbicular germina, joined together on their inſide, but divided on their outſide; upon which ſit ten very ſhort ſtyles, which are reflexed; the germina afterward turn to an orbicular depreſſed berry, with ten longitudinal deep furrows, having ten cells, each containing a ſingle ſmooth ſeed. Miller reckons three, and Linnæus four ſpecies.

Parkinſon ſays, that the inhabitants of North America make uſe of the juice of the root of American *nightſhade*, with large fruit, commonly called Virginian poke, as a familiar purge; two ſpoonfuls of the juice will work ſtrongly. Of late there have been ſome quacks, who pretend to cure cancers with this herb; but no inſtance is known of its having been ſerviceable in that diſorder. The inhabitants of North America boil the young ſhoots of this plant, and eat it like ſpinach. The juice of the berries ſtains paper and linen of a beautiful purple colour, but it will not laſt long: if there could be a method of fixing the die it might be very uſeful. Miller.

NIGHTSHADE, *baſtard*. See RIVINA.

NIGHTSHADE, *climbing*, or *Malabar*. See BASELLA.

NIGHTSHADE, *deadly*, *atropa*, in *Botany*, a genus of the *pentandria monogynia* claſs. Its characters are theſe: the flower is bell-ſhaped, hath a permanent empalement of one leaf, cut into five parts, and is divided into five equal parts; it hath five ſtamina riſing from the baſe of the petal; in the center is ſituated an oval germen, which becomes a globular berry, having two cells ſitting on the empalement, and filled with kidney-ſhaped ſeeds. Miller reckons two and Linnæus five ſpecies.

This plant ſhould not be ſuffered to grow in any places where children reſort, for it is a ſtrong poiſon; ſeveral inſtances having happened where children have been killed by eating the berries.

There is a remarkable inſtance of the direful effects of this plant, recorded in Buchanan's Hiſtory of Scotland; wherein he gives an account of the deſtruction of the army of Sweno, when he invaded Scotland, by mixing a quantity of the juice of theſe berries with the drink, which the Scots, by their truce, were to ſupply them with: this ſo intoxicated the Danes, that the Scots fell upon them, in their ſleep, and killed the greateſt part of them; ſo that there were ſcarcely men enough left to carry off their king. See, on this article, Phil. Tranſ. vol. lx. part i. p. 62.

NIGHTSHADE, *enchanter's*, *circæa*, in *Botany*, a genus of the *octandria monogynia* claſs. Its characters are theſe: the flower hath a double-leaved empalement and two heart-ſhaped petals, and has two erect hairy ſtamina; the germen is ſituated under the flower, and the empalement becomes an oval capſule, with two cells opening lengthways, each containing a ſingle oblong ſeed. There are two ſpecies.

NIGHTSHADE, *three-leaved*. See *Herb* PARIS *of Canada*.

NIGHTSHADE, *Virginian*. See *American* NIGHTSHADE.

NIGHTSHADE, *woody*, called *bitter-ſweet*, *dulcamara*, and

amara

amara dulcis, is a species of *solanum*, which grows by the side of hedges, and in moist ditches, climbing upon the bushes with winding, woody, but brittle stalks. It is perennial, and flowers in June and July. The roots and stalks of this species, which, on first chewing them, yield a considerable bitterness, that is soon followed by an almost honey-like sweetness, have been commended in different disorders, as high resolvents and deobstruents. Their sensible operation is by sweat, urine, and stool: the dose from four to six ounces of a tincture made by digesting four ounces of the twigs, in a quart of white wine.

Experience, says Dr. Lewis, has shewn, that they are by no means equally deleterious with deadly *nightshades*; that they act more regularly and uniformly; and that, without producing nervous complaints, they produce more considerable evacuations, especially by stool: but, he adds, that their virtues, in particular cases, have not yet been sufficiently ascertained. Mat. Med.

NIGHTINGALE, *luscinia* or *philomela*, in *Ornithology*, the brownith grey *motacilla*, with the annules of the knees grey.

The *nightingale* derives its name from *night* and the Saxon word *galan*, *to sing*. It is in size equal to the red-start; but longer bodied and more elegantly made. The head and back are a pale tawny, dashed with olive; the tail is of a deep tawny red; the throat, breast, and upper part of the belly of a light glossy ash-colour; the lower belly almost white; the exterior webs of the quill-feathers are of a dull reddish-brown; the interior of brownish ash-colour; the insides are hazel; the eyes remarkably large and piercing; and the legs and feet of a deep ash-colour.

Mr. Hunter found, by dissection, that the muscles of the larynx are stronger in the *nightingale*, than in any other bird of the same size.

This bird, the most famed of the feathered tribe, for the variety, length, and sweetness of its notes, visits England in the beginning of April, and leaves us in August; and during its continuance with us, its range is confined to a part of this island: it is not found in Scotland, Ireland, or North-Wales, nor in any of the northern counties, except Yorkshire: and it does not migrate so far to the West as Devonshire and Cornwall. *Nightingales* form their nests of oak leaves, a few bents, and reeds. The eggs are of a deep brown. They begin their song in the evening and continue it the whole night. Pennant.

NIGHTINGALE, *Virginian*, in *Ornithology*, the common, but improper name of a bird of the gross-beaked kind, called by authors *fringilla cucullo nuchâ cristâ Indica cristata*.

It is a little smaller than our blackbird; it has a black ring, surrounding the eyes and nostrils; the beak is very large and thick, but not altogether so large as in the common gross-beak; and its head is ornamented with a very high and beautiful creft, which it moves about very frequently; it is all over of a very fine, and lively red, but paler on the head and tail than elsewhere; it is brought to us from Virginia, and is much valued in England, for its beauty, and delicate manner of singing; it is very fond of almonds and the like fruits.

NIGHTINGALE, *wood*. See BLACK-CAP.

NIGHTWALKERS, in a legal sense, are such persons as sleep by day and walk by night, being oftentimes pilferers or disturbers of the peace.

5 Ed. III. cap. 14. Constables are authorized by the common law, to arrest *nightwalkers*, and suspicious persons, &c. Watchmen may also arrest *nightwalkers*, and hold them until morning: and, it is said, that a private person may arrest any suspicious *nightwalker*, and detain him till he give a good account of himself. 2 Hawk. P. C. 61. 80. One may be bound to the good behaviour for being a *nightwalker*; and common *nightwalkers* and haunters of bawdy-houses are to be indicted before justices of peace, &c. But it is held not lawful for constable, &c. to take up any woman, as a *nightwalker*, on bare suspicion only of being of ill fame, unless she be guilty of a breach of the peace, or some other unlawful act.

NIGHTWALKERS, in a physical sense. See NOCTAMBULATIO.

NIGRINA, in *Botany*, a genus of the *pentandria monogynia* class. Its characters are that the flower is funnel-shaped, the empalement is inflated, the stigma is obtuse, and the fruit is a double celled capsule. There is only one species.

NIGRITIES *ferri*, among the ancients. See CARIES.

NIHIL, *nihilum*, *nothing*, among the school philosophers, is what has no real effe, and which is only conceived negatively, and denominated by a negative.

NIHIL *capiat per billam*, or *per breve*, in *Law*, is a form used when judgment is given against the plaintiff, to bar his action, or overthrow his writ or bill.

NIHIL or NIL *debet*, is the usual plea in an action of debt; but it is no plea in an action of covenant, or breach assigned for non-payment of rent, &c.

NIHIL *dicit* is a failing of a defendant to put in an answer to the plaintiff's plea by the day assigned; on which omission judgment is given against him of course, *quod nihil dicit*, because he alledges nothing to the contrary.

NIHIL or NIHILI *album*. See POMPHOLYX.

NIHILS, or NICHILS, issues which the sheriff, that is appointed in the exchequer, says are nothing worth, and ileviable; from the insufficiency of the parties that should pay them.

NIHILS, *clerk of the*, *nihilorum clericus*. See CLERK and EXCHEQUER.

NIL, in *Botany*, a name given by the Arabians to two very different seeds, which are often, by this means, mistaken in their writings, one for another. Avicenna tells us first that *nil* is the seed of a creeping plant, of the bind-weed kind, and that this plant had blue flowers, like the campanulæ, or bell flowers: but, in another place, he tells us, that *nil* is the name of a plant used in dying, which seems to be the same with our *isatis*, or woad.

It is probable, that the convolvulus, or bind-weed, called *nil*, obtained this name only from its flowers being of the same colour with the fine blue pigment obtained from the other *nil*, or woad.

NIL *habuit in tenementis*, in *Law*, a plea to be brought in an action of debt only, brought by a lessor against a lessee, for years, or at will, without deed.

NILACUNDI, in *Natural History*, a name given to a stone of the gem kind, which is half a SAPPHIRE and half a RUBY.

The word *nilla* is the Indian name for the sapphire, derived from the word *nil*, the name of indigo, and given to this gem because of its fine blue colour, which approaches to the tinge of that pigment. The latter part of the word is not easily accounted for, without making a little variation in the spelling, but with that, is very clear and easy. *Jaun*, or *jaunti*, and, as some speak it, *jacunti*, is the name given by the Indians to the ruby, and it is only supposing the word to be properly *nillacunti*, and it expresses, in their own language, exactly what we understand by it, a stone, part sapphire and part ruby.

NILAHUMATU, in *Botany*, a name given by several authors to the smooth-fruited HYRAMONIUM of Malabar.

NILIACUM *mel*, a name by which the ancients expressed the very finest honey.

NILICANARAM, in *Botany*, the name by which some authors call the tree whose fruit is the myrobalan used in medicine.

NILOMETER, or NILOSCOPE, an instrument used among the ancients, to measure the height of the water of the river Nile, in its overflowings.

The word comes from Νειλος, *Nile* (and that from νεα, *nea*, *new mud*, or, as some others will have it, from νειν, *I flow*, and ιλυς, *mud*), and μετρον, *measure*. The Greeks more ordinarily call it Νειλοσκοπιον.

The *nilometer* is said, by several Arabian writers, to have been first set up, for this purpose, by Joseph, during his regency in Egypt: the measure of it was fifteen cubits, this being the height of the increase of the Nile, which was necessary to the fruitfulness of Egypt.

From the measure of this column, Dr. Cumberland deduces an argument, in order to prove that the Jewish and Egyptian cubit were of the same length. Scripture Weights and Measures, p. 18.

In the French king's library is an Arabic treatise on *Nilometers*, intitled, Neil fi alnal al Nil; wherein are described all the overflowings of the Nile, from the first year of the Hegira to the 875th.

Herodotus mentions a column erected in a point of the island Delta, to serve as a *Nilometer*; and there is still one of the same kind in a mosque of the same place.

As all the riches of Egypt arise from the inundations of the Nile, the Egyptians used to supplicate them at the hands of their Serapis; and committed the most execrable crimes, sacrifices, forfeits, of religion, to obtain the favour. This occasioned Constantine expressly to prohibit these sacrifices, &c. and to order the *Nilometer* to be removed into the church; whereas, till that time, it had been in the temple of Serapis. Julian the Apostate had it replaced in the temple, where it continued till the time of the great Theodosius. See, on the subject of *Nilometers*, the *Acta Eruditorum* Lipsiæ anno 1688, p. 147.

NILUFAR, in *Botany*, a name given by the ancient writers to the common *water-lily*. They distinguished this plant by that name from the Indian *nymphæa*, whose root was of a cold and soporific virtue, like that of the mandrake. This they call always *nenufar*.

NIMBUS, among the Romans, a scarf embroidered with gold, which women wore on their foreheads.

NIMBUS was likewise used for the money thrown among the people, on any public occasion.

NIMBUS, in *Antiquity*, a circle observed on certain medals, around the heads of some emperors; answering to the areolæ, or circles of light, drawn around the images of saints.

The *nimbus* is seen on the medals of Maurice, Phocas, and others even of the upper empire.

NIMETULAHITES, a kind of religious among the Turks; so called from *Nimetulahi*, their institutor.

When a Turk would be admitted into the order, he is to shut himself up close in a chamber forty days, restricted to four ounces of food per day. The term expired, the *Nimetulahites* take him by the hand, and lead him a Moorish dance, accompanied with an infinity of ridiculous gesticulations, till the violence of the exercise, with his former regimen, throw him down on the ground. This fall is construed an extacy, during which he is supposed to have a vision.

The *Nimetulahites* meet every Monday in the night-time, and sing hymns to God, &c.

NIN-O, in *Chronology*, is the name of the æra most commonly used among the Japanese. It commences with the reign of Sin-mu, the founder of their monarchy, 660 years before the Christian æra.

NINSI, in *Botany*. See GIN-SENG.

NINTH, in *Music*, one of the dissonant intervals in music. It is properly the second doubled; but it is differently used. When an upper part syncopates, the second is accented, and treated as a *ninth*; i.e. it is resolved by an eighth, and accompanied by a third and fifth, and often a syncopated seventh: but when the lower part syncopates, the second is not thus used, but is accompanied by the fourth and sixth. In thorough bass, as the *ninth* has always, or at least commonly, an eight placed after it thus, 9 8, to shew that that is resolved by descending to the octave.

NINTH *pair of nerves*. See NERVES.

NINTIPOLONG, in *Zoology*, the Ceylonese name of a species of serpent called also *serpens tupuoticus*. It is a very poisonous species, and its bite brings a sleep upon the person, which terminates in death. It is of a deep, blackish brown, variegated with small specks of white.

NINZIN, in the *Materia Medica*, a name used by some authors for the famous Chinese root, commonly called GINSENG.

NIPPERS, in the *Manege*, are four teeth in the forepart of a horse's mouth, two in the upper, and two in the lower jaw. A horse puts them forth between the second and third year.

NIPPERS is also an instrument in use among smiths, and farriers, being a kind of pincers, wherewith, in shoeing a horse, they cut the nails before they rivet them. It is also used in taking off a shoe.

NIPPERS, in a ship, are pieces of flat braided cordage, used to fasten the cable to the voyal, in a ship of war, when the former is drawn into the ship, by mechanical powers applied to the latter. These *nippers* are usually six or eight feet in length, according to the size of the cable: and five or six of them are commonly fastened about the cable and voyal at once, in order to be heaved in by the capstern. Those which are farthest aft are always taken off, as the cable approaches the main hatchway; and others are at the same time fastened on, in the fore part of the ship, to supply their place. The persons employed to bind the *nippers* about the cable and voyal, are called *nipper*-men: they are assisted, at this office, by the boys of the ship, who always supply them with *nippers*, and receive the ends of those which are fastened, to walk aft with them, and take them off at the proper place, in order to return them to the *nipper*-men. Falconer.

NIPPLE, *papilla*, in *Anatomy*, a prominence arising from the middle of the breast or mamma. See BREAST.

The colour of the *nipple* is various; in different states, and stages of life it is reddish, bluish, and blackish; it is encompassed with a pale brownish or reddish circle, called *areola*.

The lacteal tubes, coming from the several parts of the breasts, terminate in the papillæ, with several nervous, or spongious emissaries which communicate with each other by anastomosis, through which, in sucking, the milk is drawn.

The *nipples* of women, in their first lying in, are frequently so small, and sunk into their breasts, that the infant cannot get at them to suck its nourishment. The readiest method, in this case, is to apply an infant somewhat older, and which can draw stronger; or, if this does not succeed, to let a woman, who has been practised in the art, attempt to suck.

When these do not succeed, it is common to have recourse to a glass pipe, and the poorer people in some places usually make a tobacco-pipe serve the turn. Others apply a small cucurbite, made of ivory, in the form of a hat, which they suck strongly in their mouth. The common sucking-glass is also, when properly applied, of very signal service. To do this, the small hole at the side is to be stopped with wax, and the glass heated with warm water; or, by holding it before the fire, so as to rarefy, and in part, expel the air: it is then to be applied to the *nipple*, which, in this case, will not only be pulled out, but will discharge a large quantity of milk, so as to take down the inflammation and tumor in the breast. When the sucking power of the glass is grown weak, the hole at the side is to be opened, and the milk poured out; the glass is then to be heated again, and the hole being stopped again, it is to be a second time applied, and so on, till the intention is fully answered. Heister's Surgery, part ii. p. 11.

NIPPLE-*wort*, *lapsana*, in *Botany*, a genus of the *syngenesia polygamia æqualis* class. Its characters are these: the flower is composed of several hermaphrodite florets, included in one common imbricated empalement; the flowers have one tubulous petal, stretched out at the top, in shape of a tongue; these have each five short hairy stamina; the germen is situated at the bottom of the flower, which afterward becomes an oblong three-cornered seed, situated in the scale of the empalement. There are four species. Miller.

The common *nipple-wort*, which is a weed, growing by the side of foot-paths and hedges, is esteemed excellent for curing ulcerated nipples, whence it obtained its name. It is said to be drying, detergent, and digestive. The leaves and stalks may be boiled and eaten. James.

NIQUI, in *Ichthyology*, the name of a fish of the cucullus kind, approaching to the figure of that species commonly called *ocrace*, and *araneus marinus*, and in English the *weever*. It is common about the American shores, and is eatable when the liver and gall are taken out, otherwise it is said to be poisonous. See *Trans.* III. *of Essays*, N° 29.

NIR, in the *Materia Medica*, a name given by the Arabian physicians to the pigment, or colour, made from the *glastum*, or woad.

NISAN, a month of the Hebrews, answering to our March, and which sometimes takes from February, or April, according to the course of the moon. It was made the first month of the sacred year, at the coming out of Egypt. *This month shall be unto you the beginning of months, it shall be the first month of the year to you.* Exod. xii. 2. It was the seventh month of the civil year. Moses calls it *Abib*. The name *Nisan* is only since the time of Ezra, and the return from the captivity of Babylon.

NISI PRIUS, in *Law*, a judicial writ, which lieth in cases where the jury being impanelled and returned before the justices of the bench, one of the parties requests to have such writ, for the ease of the county, whereby to will the sheriff to cause the inquest to come before the justices in the same county, at their coming thither.

It is called a writ of *nisi prius*: and its effect is, that the sheriff is hereby commanded to bring to Westminster the men impannelled, at a certain day, before the justices, *nisi prius justiciarii domini regis ad assisas capiendas venerint*; that is, unless the justices go before that day, into such county to take assises. This they are sure to do, in the variations preceding each Easter and Michaelmas terms, and there dispose of the cause; which saves much expence and trouble to the parties, the jury, and the witnesses.

NISI PRIUS and *assise, courts of*, are composed of two or more commissioners, who are twice in every year sent by the king's special commission, all round the kingdom (except only London and Middlesex, where courts of *nisi prius* are holden in and after every term, before the chief or other judge of the several superior courts), to try, by a jury of the respective counties, the truth of such matters of fact as are then under dispute in the courts of Westminster-hall.

NISI PRIUS, *justices of*. See JUSTICES.

NISSOLIA, in *Botany*, a genus of the *diadelphia decandria* class. Its characters are, that the calyx is divided into five segments, and that the fruit is a monospermous capsule. There are two species.

NISUS, in *Ornithology*, a name by which many authors call the *accipiter fringillarius*, or *sparrow*-HAWK.

NISUS is also a name used by some old naturalists for the HALIAETUS, or *aquila marina*, called in English the *sea*-EAGLE, or *osprey*.

NISUS is likewise a name given by the barbarous writers of the middle ages to *dialophus*.

NITEDULA, in *Zoology*, the field-mouse. See MUS.

NITIDUM *folium*, among *Botanists*. See LEAF.

NITRARIA, in *Botany*, a genus of the *dodecandria monogynia* class. Its characters are, that the flower has five petals; the empalement is divided into five segments; the stamina are fifteen; and the fruit is a monospermous drupe. There is only one species.

NITRE, *nitrum*, in *Natural History*, a bitter sort of salt, thus called by the ancients; by the moderns, more usually, *saltpetre*.

Naturaliſts differ as to the point, whether our ſaltpetre be the *nitre* of the ancients; but it certainly is not.—G. C. Schelhammer has a particular treatiſe on this ſubject, De *Nitro*, tum veterum, tum noſtro, Commentarius. See NATRON.

NITRE, or SALTPETRE, is a neutral ſalt, compoſed of nitrous acid, ſaturated with fixed vegetable alkali. It is found immerſed in imperceptible particles, in earthy ſubſtances, as the particles of metals in their ores, and is diſcoverable in theſe bodies by an acrid and pungent taſte, and a ſenſation of coldneſs with which it affects the tongue: ſometimes alſo it is found native and pure, in form of an efflorefcence, or ſhapeleſs ſalt, either in its ore, or on old walls, and yields after ſolution hexaedral priſmatic cryſtals.

Nitre is found naturally cryſtallized in India, and as it is ſwept from earths or ſtones with brooms, it is called the ſweepings of *nitre*, or of ſaltpetre. A *nitre* may alſo be obtained from ſeveral plants: and theſe are the two kinds of natural *nitre*. All other *nitre* is begun by nature but art is required to extract and purify it.

Many have been of opinion, that *nitre* was, in part at leaſt, an animal ſalt, and that where it was found on old walls, it was owing to the effluvia of animal bodies once inhabiting the place; but we find it now in vaſt quantities in ſeveral of the marly earths of the Eaſt Indies, and ſome other places, which, however, though they abound with it, when they are in the naked cliffs, expoſed to the air, in a proper ſituation, yet when dug up from any depths in the earth, the ſame ſubſtances are not found to contain any of this ſalt.

This marly earth is frequent in China, Perſia, and many parts of the Eaſt, and is choſen for working from places where it ſtands in barren cliffs, on hills facing the northern or eaſtern winds. The manner of their ſeparating *nitre* from this earth, is as follows: they dig large pits, which they coat over on the inſide with a ſtiff and firm clay; this they fill half full of water, and into it throw the earth. When the water has ſtood ſome days to imbibe the ſalt, they draw it off into other pits, defended by ſlight walls on all but the north-eaſt ſide. Here the ſun exhaling the water, the ſalt which it had imbibed aſſixes itſelf to the ſides of the pit in ſmall, brownith, white, hexaedral, but very imperfect cryſtals, which are what we receive from the Eaſt Indies, under the name of rough *nitre*.

This is the way the greateſt quantity of this ſalt is made, but it is alſo procured from divers other materials, and by many other methods.

The method of manufacturing ſaltpetre in Podolia, related by Dr. Wolf, is as follows: the earth or mould, which they make uſe of for this purpoſe, is of a deep black; and they make choice of a place for their operation not far from a ſpot rich enough in *nitre* to keep them conſtantly at work, at leaſt during a whole ſummer, and ſuch as can ſupply them with water and wood at an eaſy expence. The utenſils, uſed in this manufacture, are a large copper boiler, containing about 60 amphors of 6 gallons, or about 54 lb of water each, which is fixed in the ground, with its brim level with the ſurface; 100 wooden tubs, with a hole bored near the bottom, each of which holds a car of earth, or about 4 or 5 amphors; 2 very large caſks of about 100 amphors each; about 32 wide troughs or coolers, holding about an amphor each; and a ſufficient number of amphors for fetching water.

In the manufacture, the firſt operation is to beat the nitrous earth to a coarſe powder with iron ſpades, and to clear it of all hard ſubſtances. If it be very rich in *nitre* (indicated either by its fatneſs or its downy efflorefcence), they mix with it ſome of a poorer ſort, in equal quantity, but very black and old: and, laſtly, they add aſhes, commonly thoſe of the aſh, which moſt abounds, to the amount of about a fifth part of the whole, and mix them well together. If they have a quantity of urine at hand, they throw it in, but never any quick lime: they then put one car of the prepared nitrous earth into one of the tubs, fill up the veſſel with cold water, and ſtir the whole well with a wooden ſtaff; and after it has ſtood twenty-four hours, with occaſional ſtirring, they ſuffer the ley to run out at the hole near the bottom, and put it into two large caſks. In this decoction of the *nitre*, what they call the *mother of nitre* is abſolutely neceſſary. This is the inſpiſſated lixivium remaining after the cryſtallization of *nitre*, which cannot itſelf be made to cryſtallize, and they keep it from one year to another. Of this mother of *nitre*, they pour one or two tubs into the boiler, to which they add the new ley, collected in the great caſks, till the boiler is full, and keep the contents boiling near twenty-four hours. As ſoon as they perceive any marks of cryſtallization on the ſurface, they remove the ley, thus decocted and inſpiſſated, into the thirty-two wooden coolers, and let it remain there twenty-four hours; in which time the cryſtallization being completed, they drain off the mother of *nitre*, and return it into the boiler. The cryſtals are taken out and dried; but as they never prove clean, they are again diſſolved in clean water, filtered through a flannel bag, and boiled up again, in a leſs boiler, to a requiſite thickneſs, and then cryſtallized again, which brings them to be fit for ſale. In this manner, the proceſs is repeated through the ſummer, till the winter's froſt puts a ſtop to it.

A ſingle pound of ſalt petre is ſold, in time of war, on the ſpot where it is made, for four rubles, or ſeventeen ſhillings; but, in time of peace, it is much cheaper.

The earth thus cleared of its *nitre*, is caſt out in heaps about four feet high, and thus left for four years, and the ſame quantity of *nitre* is got out of this earth as before. Upon a third working, after ſeven years more, it will yield ſome *nitre*, but ſcarce enough to defray the charges. This method of making ſaltpetre, ſays Dr. Wolf, came hither from the Eaſt; and there, Dr. Wolf apprehends, it is performed by a ſimilar proceſs.

In many of the eaſtern nations, the ruins of old buildings expoſed to the north-eaſt winds, and ſheltered from rain, have their walls covered with the efflorefcences of a nitrous ſalt, which is uſually thrown with the earth into the *nitre* pit. Earths moiſtened with the excrements of animals, as the earths of pigeon-houſes, and the like, all afford more or leſs *nitre*, and, in France, vaſt quantities are annually made from lime rubbiſh, and the ruins of old buildings.

In Virginia, they prepare the floors of their tobacco-houſes, for attracting *nitre*; the method of making it, in this way, by Mr. Jeremiah Brown, has been publiſhed, in Virginia, by order of the truſtees for the improvement of arts and manufactures, and, in England, by order of the ſociety for the encouragement of arts, manufactures, and commerce. See an account of this method in the Annual Regiſter, for 1763, vol. vi. p. 121.

At Paris, where they have ſeventeen ſaltpetre works, there is a company of perſons employed in making ſaltpetre, in number about twenty. They were incorporated ſo long ago as the reign of Charles IX. and are regulated by ſeveral ſtatutes. The quantity made annually is from 6 to 700,000 lb. They are obliged to deliver it in rough to the royal arſenal, where they receive for it ſeven ſous, or about 3½ *d.* per lb. It is there purified, undergoing three lixiviations, and is then ſold at ten, fifteen, and eighteen ſols per lb.

The method uſed in a conſiderable manufacture is as follows: M. Bouret, who makes every year from 35 to 36,000 lb. employs 6 men night and day, 2 rooms, 20 large caſks, and 3 horſes. The caſks are half filled with old plaſter, which is changed every time of pouring on water, and the lower half with wood aſhes, which are changed but once in five lixiviations. The water poured on ſoaks through both the plaſter and aſhes, and is five times paſſed through freſh plaſter. It is then boiled down in a copper pan, ſo placed, that the flame paſſes quite round its ſides. The fire is made of wood. The lixivium, when properly evaporated, is ſet to cryſtallize, and the cryſtals to drain. The ſcum taken off in the boiling is thrown upon the plaſter, which the longer it lies in heaps (wetted from time to time) becomes the ſtronger; and likewiſe in proportion to the putrid matter thrown upon it. The plaſter uſed in the buildings, at Paris, is made of that gypſeous earth, called plaſter of Paris, and found in the neighbourhood of that city. In general, no lime is mixed with it; and if this be the caſe, the *nitre* is neither ſo good, nor produced in ſo great a quantity. It is known, when the old plaſter is worth being collected and employed, by the ſaltiſh taſte of it. *Nitre* is alſo made in other great towns in France.

The moſt favourable places (ſays the author of the Chemical Dictionary) for the production of *nitre* are the habitations of men and animals, and particularly ſuch as are low and moiſt, as cellars, kitchens, ſtables, houſes of office, and others of that kind, which are apt to be impregnated with vegetable and animal matters, and alſo to have an habitual moiſture, which is favourable to putrefaction; and, laſtly, which are ſheltered from rain, which might otherwiſe diſſolve and carry off the *nitre*, as ſoon as it is formed.

Theſe buildings are true *nitre*-beds. When they are old, their rubbiſh and plaſter are full of *nitre*; but this *nitre* is only a *nitre* with an earthy baſis, which is not ſuſceptible of cryſtallization or detonation, which are the two eſſential qualities in *nitre* for the principal uſes to which it is applicable, and which it cannot poſſeſs but by being joined to a baſis of fixed alkali. Beſides, the *nitre* of rubbiſh is mixed with much common ſalt, which comes alſo from the vegetable and animal matters, and from ſome heterogeneous ſubſtances, which alter its purity. The chief intention, therefore, of the operation upon rubbiſh,

rubbiſh, to obtain a perfect *nitre*, is to furniſh this ſalt with a baſis of fixed alkali, and to diſengage it from the heterogeneous matters which alter its purity. Theſe views are accompliſhed in the following manner.

The rubbiſh containing *nitre* is to be broken to ſmall pieces, and mixed with nearly an equal quantity of wood-aſhes. This mixture is to be put into caſks ranged along each other, placed vertically on one of their ends, and ſupported at the height of two feet above the ground. At the bottom of each caſk is a hole, filled with ſtraw. Water is to be poured into the firſt caſk; and this water, when impregnated with all the ſaline matter in the mixture, flows into a bucket placed under the caſk for its reception. This ſame water is poured ſucceſſively into the other caſks, and thus becomes impregnated with more and more ſaline matter. The makers of ſaltpetre obſerve always to paſs the ſtrongeſt lixiviums through caſks filled with new matter; and before they throw away the matter of a caſk when almoſt exhauſted, they paſs through it the firſt water yet unimpregnated. By theſe operations, which are well contrived, they obtain a lixivium as much impregnated as it can be, and they at length entirely exhauſt the rubbiſh of all the *nitre* it contained.

The lixivium of *nitre*, thus prepared, is carried to great copper cauldrons, in which it is boiled and evaporated, till it is ſufficiently ſtrong for the cryſtallization of the ſalts. As the two cryſtallizable ſalts contained in this lixivium are *nitre* and common ſalt, and as the latter of theſe ſalts is cryſtallizable by evaporation only, and the ſecond by cold only; the common ſalt cryſtallizes firſt during the evaporation, and forms ſmall cubical cryſtals which ſubſide to the bottom of the cauldrons. The ſalt-petre makers call it the *grain*. They take it out with large ladles, and put it in a baſket hung over the cauldrons to drain. This evaporation is continued, and the grain is to be taken away as faſt as it is formed, till the liquor be ſo much evaporated, that, when it is cold, much *nitre* will be cryſtallized in it; and in order to diſcover when it is ſufficiently evaporated for that purpoſe, a ſmall quantity of it is to be taken out from time to time. When they perceive, upon cooling the liquor, that a ſufficient quantity of *nitre* is formed in it, they remove the liquor from the cauldron into large copper baſons, which they carry to a place deſigned for the cryſtallization.

As this liquor contains much *nitre*, and as it is quickly cooled, the greateſt part of the ſalt is coagulated at the bottom of the baſons in unſhapely maſſes, compoſed of many ſmall needle-like cryſtals of *nitre*, and ſometimes of large regular cryſtals upon their ſurfaces. Theſe are called *ſticks of nitre*.

In the baſons remains a large quantity of liquor, the *nitre* contained in which cannot be cryſtallized but by a ſecond evaporation, which is therefore performed in the ſame manner as at firſt, and more *nitre* is obtained. This operation is repeated till no more *nitre* can be formed by cooling the evaporated liquor, which then becomes very red and acrid, and is called the *mother-water of nitre*.

This mother-water is compoſed almoſt entirely of *nitre* and common ſalt with earthy baſes, which certainly proceed from too ſmall a quantity of aſhes having been mixed with the lixivium of the nitrous rubbiſh. This mother-water may therefore be avoided, by mixing a ſufficient quantity of aſhes with the nitrous rubbiſh, to decompoſe all the ſalts with earthy baſes which it contains; and thus, after the ſeveral evaporations and cryſtallizations, nothing would remain but a ſmall quantity of red liquor impregnated with unctuous matter.

When only the uſual quantity of aſhes is employed, the baſis of the earthy ſalts contained in the mother of *nitre* may be precipitated by adding an alkaline lixivium. This precipitate is white, and is called the *magneſia of nitre*; and, at the ſame time, the *nitre* with earthy baſis in the mother-water, being changed into a *nitre* with baſis of fixed alkali, is eaſily obtainable by cryſtallization: but the ſaltpetre-makers do not employ any of theſe methods with their mother-water, which they throw upon the nitrous rubbiſh after it has been exhauſted of its ſalt by lixiviation. Some time afterwards, they lixiviate this rubbiſh in the ſame manner as they did at firſt, that is, with the addition of aſhes, and obtain from it more *nitre*.—We may eaſily perceive that this operation is preciſely upon the ſame principles as one of thoſe we have propoſed.

The *nitre* obtained by theſe cryſtallizations is red, and ſoiled by the liquor in which it was diſſolved, which has alſo that colour. Farther, although common ſalt does not cryſtallize by cold alone, yet a certain quantity of it always cryſtallizes along with the *nitre*; both becauſe the evaporation continues while the liquor cools, and becauſe the *nitre*, during its cryſtallization, always takes with it a portion of common ſalt.

This *nitre*, which the manufacturers call *nitre of the firſt boiling*, is therefore impure, and mixed with common ſalt, and with ſalts with earthy baſes, by which it is rendered unfit for many of the uſes to which *nitre* is applied; as we ſhall afterwards ſee. It is purified by diſſolving it in pure water, and by proceeding to a ſecond cryſtallization by cold; and as in this ſecond cryſtallization, the proportion of *nitre* to common ſalt, and to ſalts with earthy baſes, is infinitely greater than at firſt; ſo that when the liquor is at the point of the cryſtallization of the *nitre*, it is very far from being ſo much evaporated that the common ſalt can cryſtallize at that time; and therefore the *nitre* obtained in this ſecond operation is infinitely purer than that of the former. It is alſo white; and is called by the manufacturers *nitre of the ſecond boiling*. This is the *nitre* employed by diſtillers of aquafortis for the ordinary aquafortis.

But this *nitre* is not yet ſufficiently pure for the preparation of good gun-powder; and it muſt therefore be purified by a third boiling or cryſtallization. This is the pureſt *nitre* that is ſold, or that is kept in ſhops. It is very beautiful and white; but it is not yet ſufficiently pure for certain delicate operations in chemiſtry, and muſt therefore undergo a fourth purification.

By which ever of theſe methods *nitre* is procured, it is ever in all reſpects the ſame ſalt. Its cryſtals are of a hexaedral priſmatic form, terminated by hexaedral pyramids. It diſſolves in a moderate heat, even much leſs than what is neceſſary to make it red, and does not flame, unleſs a coal, or ſome other ſulphureous body fall in. If *nitre* thus melted be left to cool and fix, it coagulates into a ſolid, ſonorous, ſemitranſparent maſs, and is then called mineral cryſtal. It is ſoluble in eight times its weight of very cold water; in leſs than thrice its weight of water temperately warm, and, as it is ſaid, in one third its weight of boiling water. The origin of *nitre*, or of that acid which forms its characteriſtic part, has been the ſubject of controverſy among chemiſts and naturaliſts. Some have imagined, that, as *nitre* is commonly obtained from ſubſtances long expoſed to the air, the nitrous acid exiſted ready formed, like the other two mineral acids, and that it is ſucceſſively depoſited in matters proper for its reception. But this opinion is now generally rejected; becauſe it is not found in fact, that *nitre* is ever obtained by a long expoſure of the moſt proper ſubſtances for the reception and retention of the nitrous acid, as fixed alkali, to the air; and that *nitre* is never found except in ſubſtances capable of being impregnated with vegetable or animal juices.

Mr. Lemery the younger, having obtained perfect *nitre*, by analyſing many vegetable and animal ſubſtances, concludes from thence, that this ſalt exiſts naturally ready formed in the individuals of theſe two kingdoms, which, according to him, are the only ſource of it. To this opinion it is objected, that the peculiar ſubſtances of which vegetables and animals are compoſed, conſiſt of principles extracted from the air and the earth, whence, it may be alleged, that the *nitre* found in them originally proceeds.

Another more probable opinion, concerning the origin of *nitre*, is that of Stahl. This chemiſt apprehends, that the nitrous acid is only the vitriolic acid metamorphoſed by the union it contracts with phlogiſton; and that putrefaction is the means employed by nature to combine this acid with the inflammable matter of putrefying ſubſtances, in the proportion and manner proper for giving it the ſpecific character of nitrous acid. See Dictionary of Chemiſtry, art. NITRE.

This ſalt gives the greateſt of all proofs of the effects of ſynthetical, or recompoſing chemiſtry. It is firſt ſeparated, or analyſed, in the following manner: take two pounds of refined ſaltpetre in fine powder; pour upon it one third of its weight of oil of vitriol, diſtil it in a glaſs retort, in a ſtrong ſand heat, and there will be produced a ſtrong acid ſpirit of *nitre*, which cannot, by any experiment, be found to participate at all of the nature of the oil of vitriol uſed in its preparation. Then take a pound of freſh *nitre*, melt it in a crucible, and throw into it, at times, pieces of charcoal, till it will no longer keep in fuſion with the ſame degree of fire; then increaſe the fire, and melt it, and then pour it into a proper veſſel; leave it to cool of itſelf: this is fixed *nitre*, and is an alkali. Now diſſolve this fixed *nitre* in water, and exactly ſaturate that water with the acid ſpirit of *nitre* before diſtilled; this compound liquor will, by ſtanding, ſhoot into true and perfect cryſtals of *nitre*. And the experiment ſucceeds as well, if a ſolution of pot-aſhes, or any other fixed alkali, be uſed inſtead of that of fixed *nitre*. Shaw's Lectures, p. 170.

Of all the ſalts which afford us thoſe ſtrong liquors commonly known by the name of the mineral diſſolvents, ſaltpetre, or *nitre*, is the only one which yields red va-

pours

pours, or whose ſpirit riſes in form of red vapours, as ſoon as it is ſeparated by means of fire; but the reaſon of this fact has never been accounted for, till Mr. Hellot explained it to the Academy at Paris, in one of his memoirs.

Of the chemiſts who have before treated of it, ſome imagined that the redneſs of the vapours was owing to ſome part of the ſulphureous ſubſtances which the ſalt had imbibed from the urine and dung of animals, where it was formed; others, that this colour was owing to particles of fire carried up with the vapours in their aſcent. But theſe are weak conjectures; ſince, if the firſt were the caſe, the mixtures of ſal ammoniac with common ſalt of vitriol, ought to yield red vapours in diſtillation, which never is the caſe; and if the latter be ſuppoſed, it is not eaſy to ſay, why oil of vitriol does not ariſe in the ſame coloured vapours; ſince it requires a more violent, and longer continued fire to raiſe it.

Vitriol is added to *nitre* in the diſtillations which yield theſe red vapours, and it is the firſt point to be determined in inveſtigating this phenomenon, whether the vapours owe their colour truly to the *nitre*, or whether they borrow it from the additional vitriol. Baldwin, Stahl, and many others, are of opinion, indeed, that the red vapours are owing to the vitriol, and eſſential to it, and call them the *anima nitri*; and they prove the aſſertion by the known obſervation that *nitre*, melted with a tender white glaſs, turns it to purple, or ſome ſhade of red; whereas neither alum, common ſalt, nor the fixed alkalis give this colour: and it is probably ſome portion of an ammoniacal urinous ſalt, mixed in the *nitre*, which gives the colour, ſince ſal ammoniac will give the ſame colour when fuſed with glaſs. What is it, however, in the ſal ammeniac which has this effect? not its volatile alkali, for that is diſſipated in the mixture by the firſt efforts of the fire; neither can it be the acid ſpirit of ſea ſalt, ſince experiment proves that it can have no ſuch effect, when employed alone.

A little crocus martis, or any calx of iron, does the ſame thing to glaſs, and ſometimes even the ſmoak of the furnace will do it, when woods of too reſinous a kind are employed as fuel; many a large quantity of what was meant for pure cryſtalline glaſs having been tinged red, or purple, in this manner, and wholly ſpoiled; and all that we can judge on the whole, as to *nitre*, or ſal ammoniac tinging them, is, that it is a fatty, or unctuous matter in thoſe ſalts which produces the colour: and, in all probability, *nitre* contains, beſides a quantity of urinous or ammoniacal ſalt, a ſmall quantity of a ferrugineous matter, in extremely minute and imperceptible particles.

Mr. Lemery has proved that all the ſaltpetre made in Europe has been originally an ammoniacal ſalt; and, indeed, if *nitre* be rubbed for a conſiderable time in a glaſs mortar made warm, with a quantity of a fixed alkali ſalt, it will afford an urinous ſmell. It is not eaſy to prove that all ſal ammoniac contains ferrugineous matter; but when we conſider that iron is always found in the aſhes of vegetables, and that it, therefore, evidently aſcends in extremely minute particles, with the juices of plants; and that ſal ammoniac is prepared from a ſoot made of the excrements of thoſe animals which feed on plants, we ſhall find it no impoſſibility that iron ſhould be there; and we well know that iron, in any ſtate, cannot but give that colour to glaſs, which *nitre*, in a ſmaller quantity, and ſal ammoniac, in a larger, are able alſo to give. Memoirs Acad. Scienc. Paris, 1736.

All obſervations and experiments would ſeem to prove that the red colour given to glaſs by *nitre*, can only be owing to ferrugineous, or ammoniacal matter contained in it; and it is no very raſh conjecture, to ſuppoſe that the ammoniacal matter contained in the ſaltpetre, rarifying, and extremely dividing the ferrugineous matter, during the time of the diſtillation, may diſtribute it, in its diſjunct molecules, to all that matter, or thoſe particles, which form thoſe vapours, and tinge them red by its diſtribution of them.

It is to be obſerved, however, that the vapour of ſpirit of *nitre*, or of aqua fortis, are not always red, but only are ſo when the fire is great enough to raiſe with the vapours the matter which colours them; for if ſpirit of *nitre* be made with the addition of alum calcined, with dry ſaltpetre, and with filings of zinc, mixed together, there will be obtained, with a ſmall degree of fire, a ſpirit of *nitre*, which does not come over in red fumes.

If the fire be raiſed to a greater degree of violence, there will afterwards be obtained a ſecond ſpirit of *nitre*, which will come over in red fumes; but the firſt of theſe will ſhew the great experiment of taking fire on mixture with oil of turpentine, or the European oils of vegetables, better and more readily than the other.

It is therefore no eſſential character of ſpirit of *nitre* to riſe in red vapours, ſince the firſt riſes without; and this is truly the pure ſpirit of *nitre*; while the ſecond, which riſes in red fumes, is impure, being coloured by ferrugineous, or other foreign matter, raiſed in vapour with the reſt, by the great violence of the heat.

It is obſervable, that if vitriol, calcined to a redneſs, be uſed with the *nitre*, for drawing the ſpirit, the vapours riſe of a perfect blood-red. In the common way of diſtilling what is called ſimply ſpirit of *nitre*, the cuſtom is to put into the retort, with the ſaltpetre, a very large quantity of a vitriolic earth; and in the making that ſpirit called aqua fortis, green vitriol or Engliſh copperas is mixed with the *nitre*. This is abundantly known to contain a great deal of iron. Here, therefore, is in each caſe a quantity of ferrugineous matter added; and we well know that this can give a red colour to the vapours, with which it is compelled by violence of fire to riſe.—Repeated trials of ſpirit of *nitre*, with mercurial preparations alſo, prove, beyond contradiction, that there is ferrugineous matter in that ſpirit. Many of the common mercurial precipitates, when made with aqua fortis, or with plain ſpirit of *nitre*, may have evidently iron ſeparated from them; and the chemiſts know well that this is not to be ſuppoſed to have been lodged in the mercury, ſince it is very difficult to conceive how that metal ſhould become amalgamated with it; but there can be no difficulty of ſuppoſing it ſeparated from the menſtruum, ſince it is evident, that there is iron contained in the matters uſed in the diſtillation of it, and even in the ſalt itſelf, from which it is originally drawn.

It would be very natural to ſuppoſe, that the ferrugineous matter was raiſed only from the additions of pure vitriol, or a vitriolic earth; but it is evident, from the experiment of *nitre* alone turning glaſs red, that there is certainly alſo ferrugineous matter in that ſalt itſelf; nor is it at all difficult to conceive how iron comes to enter the body of that ſalt; ſince, if we conſider it as made in Europe, from the rubbiſh of old buildings, and the cleanſings of ſtables, &c. it is eaſy to conceive that pieces of iron of ſeveral kinds may have been ruſted away, and conſumed there, and ſo mixed among the matter from which the ſalt was afterwards made. The addition of wood aſhes, always uſed in the making of it, may have alſo lodged ferrugineous matter among it, ſince it has been often proved that the aſhes of all vegetables contain true iron. Memoirs Acad. Scienc. Par. 1736.

It may ſeem a difficult thing to conceive, however, in what manner ſo ſmall a quantity of iron, as there can be ſuppoſed to be in *nitre*, is able to colour ſo large a body of vapours as are ſeen to riſe in the diſtillation. But if we conſider the extreme diviſibility of the particles of metals into colouring matter, and the vaſt quantity of water that a ſingle grain of copper is capable of tinging blue, when diſſolved in an alkali, we ſhall be the leſs ſurpriſed at it; eſpecially if it be conſidered alſo that it has been proved already, that there is true ſal ammoniac in all *nitre*; and it is well known, that this ſalt is capable of rareſying, and extremely dividing the particles of that or any other metal; and if as much ſal ammoniac as can be diſſolved in aqua fortis be added to that ſpirit, it is well known alſo that it will make it ſend up vapours much redder than before, which can only be owing to the ſal ammoniac raiſing a larger quantity than ordinary of the ferrugineous matter contained in the aqua fortis than would naturally have been raiſed from it.

The moſt ready way of reducing *nitre* to powder is to diſſolve a quantity of it in as little water as may be, and evaporate the water over a gentle fire, continually ſtirring it till dry, by which means the *nitre* will be found in form of a very dry white powder. This is the method uſed by the gunpowder-makers.

The curious in the hiſtory of *nitre*, and its preparation from vegetables, &c. and the purifying it for gunpowder, and other uſes, may conſult the works of Glauber, Stahl, and Clark, on the ſubject of this ſalt, and compare them with the diſcourſe of the younger Lemery, on the origin of *nitre*.

The uſe of *nitre* is very extenſive in medicine, in the arts, and in chemiſtry.

Dr. Shaw, on this occaſion, obſerves, that if the medicinal virtues of *nitre* were to be enumerated, as they ſtand confirmed by ſufficient experience, perhaps they would prove more numerous than thoſe of any one known medicine beſides. It is ſerviceable in the ſtone and ſtoppages of urine, in deſirums, malignant fevers, diarrhœas, the ſmall pox of the confluent kind, &c. ſo as to prove almoſt a general remedy. And all theſe excellent qualities are in this ſalt joined to that deſireable property of being innocent, or ſcarce any way prejudicial to the body. The uſual doſe of *nitre*, among us, is from two or three grains to a ſcruple; though in many caſes it may be given with ſafety, and to better advantage, in larger quantities. From ſome experiments on the effects of

nitre taken internally, related in Mr. Alexander's Experimental Essay, it appears, that *nitre* has a power of almost instantly retarding the velocity of the circulation of the blood, and of surprisingly diminishing the number of arterial pulsations; and that its effects are much more powerful when newly dissolved in water than when it has remained dissolved during some hours. As this difference must have proceeded from the cold which is produced by *nitre* during its solution, probably a much greater effect would be produced by procuring that solution in the stomach. For the various medicinal preparations of *nitre*, see the following articles and references.

In chemistry, besides the nitrous acid obtained from *nitre*, which is one of its most powerful agents, *nitre* itself is also used in many chemical operations. And in the arts, its properties of detonating with bodies containing phlogiston, of accelerating their calcinations, and especially the calcination of the imperfect metals, render it useful for the purification of gold and silver, when they are alloyed with other metals. As *nitre* is quickly and easily alkalised, it enters into the composition of reducing fluxes, or of simple fluxes, to assist fusion and vitrification. It may also be employed by its detonation to discover the presence of the inflammable principle in substances. But the most considerable use of *nitre* is for the preparation of GUN-*powder*. See also AQUA *fortis*, AQUA *regia*, ÆTHER, CRYSTAL *mineral*, SAL-*polychrest*, &c.

NITRE, *alkalised*, is the fixed alkali remaining after the nitrous acid has been destroyed by its detonation with any inflammable matter. This alkali is generally called FIXED NITRE.

NITRE, *ammoniacal*, is a neutral salt resulting from the combination of the nitrous acid, to the point of saturation, with volatile alkali. The acid, in the most concentrated state in which it is commonly met with, saturates about five-sixths its weight of vegetable fixed alkali.

NITRE, *antimoniated*. See *Diaphoretic Nitre of* ANTIMONY.

NITRE, *calcareous*, is a neutral salt, compounded of the nitrous acid combined to saturation with a calcareous earth; and generally called *nitre with an earthy base*. This salt is very deliquescent, but incapable of a true crystallization. It has a poignant, acrid, and bitter taste. See NITRUM *Calcarium*.

NITRE, *cleyssus of*. See CLEYSSUS.

NITRE, *cubic, or quadrangular*, is a neutral salt, formed by the nitrous acid when saturated with mineral alkali. This crystallizes not into a prismatic but a cubical figure, and sometimes into parallelopipedons, with rhomboidal faces. It is inferior to ordinary *nitre*, and never used.

NITRE, *decoction of*, is prepared by boiling half an ounce of *nitre*, and two ounces of fine sugar, with a scruple of cochineal as a colouring material, in 2½ pints of water, till half a pint is wasted, and after standing to settle, the clear purplish red liquor is poured off for use.

NITRE, *detonation of*. See DETONATION; under which article, the reader will find Mr. Macquer's hypothesis, that has been thought to be the most satisfactory; with a hint of another solution of the phenomenon by Dr. Priestley. In a work since published, he has applied the doctrine of dephlogisticated air more particularly to the explication of this process. It appears, he says, that the nitrous acid cannot be heated to a certain degree, in contact with any earthy matter, without producing dephlogisticated air; by the help of which all combustible substances burn with the greatest violence, much more than they can be made to burn with in common air. Here then he supposes that the moment the acid of *nitre*, contained in the *nitre*, and the earth of the coal, for example, thrown into it become red hot, in contact with each other, dephlogisticated air is produced; and in this air the remainder of the charcoal, being likewise red hot, burns with the violence that is observable in the experiment; while, at the same time, other portions of the nitrous acid are forming, with other parts of the same decomposed charcoal, the union that constitutes more dephlogisticated air; and thus the detonation continues, till all the charcoal, or all the *nitre*, is consumed; the acid not being *fixed*, as some chemists express it, but entering into the composition either of the dephlogisticated air, or of some other kind of air, that may be generated in the process.

NITRE, *diaphoretic, of antimony*. See ANTIMONY.

NITRE, *fixed by arsenic*, is the alkali of *nitre*, the acid of which has been expelled in an open fire by means of arsenic, of which some portion is retained by the alkali. This may be employed as a flux, as it greatly assists vitrification.

NITRE, *fixed by coals*. See FIXED *Nitre*.

NITRE, *fixed by metals*, is the alkali of *nitre* separated from its acid, and mixed with the earth of the calcined metals.

NITRE, *fixed by tartar*, is the alkali of *nitre* and that of tartar mixed together by means of detonation. This is called the *white flux*.

NITRE, *Glauber's spirit of*. See SPIRIT.

NITRES, *metallic*, a general denomination that comprehends all neutral salts composed of the nitrous acid united with a metallic substance; the several kinds of which may be thus distinguished, viz. *nitre* of SILVER, called *lunar* CRYSTALS, *nitre* of LEAD, *nitre* of MERCURY, &c. The acid acts in general powerfully upon all metallic substances, but with remarkable differences, depending on the peculiar natures of the metals. It dissolves zinc, iron, copper, bismuth, lead, mercury, and silver, the most readily of all the acids; tin it dissolves imperfectly; regulus of antimony it only corrodes: gold and platina cannot be dissolved by nitrous acid alone, without the concurrence of marine acid.

NITRE, *nitred*. See NITRUM *nitratum*.

NITRE, *purified*. See NITRUM *purificatum*.

NITRE, *spirit of*. See SPIRIT.

NITRE, *troches of*, are made by grinding one part of the purified salt with three parts of fine sugar, and making up the mixture with mucilage of gum tragacanth.

NITRE, *vegetating*. See NITRUM *Vegetans*.

NITRE, *vitriolated*. See NITRUM *Vitriolatum*.

NITRO-AERIAL *spirit*, a term invented by Mayow, and since used by many others, to express a very active principle in the air, causing great changes in the bodies absorbing it, and exposed to it.

The acid spirit of nitre is produced, according to Mr. Boyle, partly by the air, and partly by a terrestrial matter making up the rest of the body of that salt. And he further supposes, that igneous particles of the air reside in nitre, and constitute its most active part, and that by these the flame of kindled nitre is produced.

Hence it is inferred, that the aerial particles of nitre are truly no other than the igneo-aerial matter of it, and that this aerial matter is evidently lodged in the acid spirit of it, not in the fixed salt. This acid spirit is, according to Mayow, composed of a terrene matter, which is flexile and humid, and of ethereal particles, which are rigid and dry, active and igneous, and proceeding from the air. These igneous particles are common to nitre and to air, and are therefore called *nitro-aerial*; and the spirit of nitre derives, according to this system, from these particles its active and corrosive quality, which makes it a sort of potential fire; and on this the form of nitre chiefly, if not only, depends.

Now as this *nitro-aerial* or igneous spirit resides in the acid spirit of nitre, it is thence inferred, that the *nitro-aerial* spirit is of a nitro-saline nature, obtaining rather the nature of an acid than a fixed salt; considering also, that the effects of fire in general answer to those of a very subtile and corrosive salt. Fire in general, on these principles, is easily proved to depend principally upon the said *nitro-aerial* principle put into motion.

This *nitro-aerial* spirit makes the most active, and, indeed, the principal part of the salt which we call *nitre*. Its terrestrial and acid parts make up the rest of the mass; and these are rather of use to form the whole into a body, and give it form and consistence, than to add to any of its fat.

NITROUS *acid*. See ACID and NITRE, *spirit*.

NITRUM, is used by the poet Martial to express that sort of foulness in crystal, which Pliny, and other of the ancient Roman authors, distinguish by the name of SAL.

NITRUM *calcarium*, in *Natural History*, a name given by Dr. Lister to a peculiar species of neutral salt, which he first publicly described in his book on the medicinal waters of England. He very improperly calls it *nitre*; because it has none of the properties or qualities of *nitre*, but only a sort of general resemblance in its external form. He observes that this salt, though very little known, was abundantly the most copious of all the sorts afforded by the mineral waters in general; and says its crystals were long and slender, and consisted of four sides, and were terminated by a point composed of two triangular planes. He adds, that this salt doubtless had its origin from a mixture of the acid of sulphur, and a calcareous earth of an alkaline nature.

This salt is found in almost all the mineral waters of Germany, and is very justly observed by Hoffman to be of the nature of Glauber's salt: that it is not *nitre* is evident from this, that it is not inflammable, nor will yield aqua fortis by distillation. It seems, indeed, true Glauber's salt, composed of the acid of vitriol, or sulphur, for this is in both the same, and of that alkaline earth which is the basis of sea salt: this is its origin, in the vessels of the chemist, as well as in the bowels of the earth, and probably the figure of the crystals of that observed by Dr. Lister, was the same in the point, as well as in the body, both being quadrilateral columns terminated by pyramids composed of a number of triangular planes. Hoffman Opera, tom. v. p. 139.

The medicinal waters in the neighbourhood of Paris contain it also in a very considerable quantity, though less than this. It is the opinion of Hoffman, that when any

water before impregnated with a vitriolic acid, in its current under ground, paſſes over this calcareous earth, it as readily joins a part of it with it, as the vitriolic acid does with the ſea ſalt, or its baſis, in making the common Glauber's ſalt, and thence produces a bitter purging ſalt, of the ſame nature with that; and, indeed, if the acid of ſulphur be mixed with any alkaline ſubſtance, a bitter neutral ſalt is produced, ſomewhat analogous to this, and to the Glauber's ſalt.

NITRUM *nitratum*, in *Chemiſtry*, the name of a preparation of *nitre*, made by adding a ſufficient quantity of ſpirit of *nitre* to a lixivium of pure *nitre*, and afterwards evaporating it to a pellicle, and ſetting it by to ſhoot. The cryſtals formed by this liquor are perfectly nitrous in their figure, but they will be of an acid taſte.

We ſee, by this, that it is poſſible to alter a ſalt, and to reduce it into the appearance of a different body, by means of ſubſtances before ſeparated from itſelf; and, in this caſe, the alteration is made, in almoſt any degree, at pleaſure; the ſalt produced being more or leſs acid, as more or leſs of the acid ſpirit is uſed: but it is to be obſerved, that the more acid there is uſed, the more difficultly the ſalt dries, and the more difficultly it is kept dry, it being always ſubject to run in the air. This preparation of *nitre* is a good medicine in burning fevers.

NITRUM *purificatum*, *purified nitre*, is thus prepared: take *nitre*, or common ſaltpetre, one pound; pure water three quarts and a pint; ſet them on the fire together, and diſſolve the ſalt perfectly by boiling: then ſtrain the hot lixivium through a double flannel, and ſet it over the fire again in an earthen veſſel. Evaporate it gently, till on taking out a little of the liquor in a ſpoon as it cools, there are ſeen threads as it were ſhooting in it; in this ſtate the ſalt is ready to concrete. Set it in a cool place, putting clean ſticks across the veſſel, and the ſalt will form itſelf into extremely pure and beautiful cryſtals on the ſide of the veſſel, but principally on the ſticks. Theſe dried in a colander are fit for uſe. See NITRE, *ſupra*.

This is the beſt of all the preparations of *nitre*, for medicinal uſe, in its native form. It diſſolves immediately on entering the body, where it wonderfully cools, and thins the blood, giving it a fine florid colour. In all inflammatory diſeaſes attended with condenſations of the blood, this ſalt proves excellently cooling and attenuating. It is given from four or five grains to ten, twelve, or fifteen at a doſe. Some give more at a time, but it is more adviſeable to have the doſes ſmaller, and oftner repeated. It is alſo good in the ſmall-pox, and ſuppreſſions of urine. It is alſo ſaid to be given by many in hæmorrhages with ſucceſs. If there be any caſe in which caution is required, it is in a conſumption where the lungs are ulcerated. Of this purified *nitre*, a ſafe and powerful alterant is readily and eaſily prepared in the following manner: take an ounce of the *nitre*, and two ſcruples of cochineal, in fine powder; boil theſe in five or ſix ounces of water; filter the liquor, and afterwards evaporate it to a dryneſs, ſtirring it continually, as it thickens, and a fine purple powder will be then produced, fit to be given in the form of bolus, pills, powder, &c.

NITRUM *vegetans*, a name given by the chemiſts to a preparation of *nitre*, which very readily ſhoots out into beautiful cryſtallizations. If, in making Glauber's ſpirit of *nitre*, there are uſed four parts of *nitre*, and one of oil of vitriol, and the ſpirit be entirely driven off, the white ſalt remaining dry in the retort, on being expoſed to the open air, will ſoon be covered with a thick and long down, as if it grew; but if this ſalt be diſſolved in water, and then ſtrained, and evaporated to a dryneſs, in a cylindrical glaſs, and kept expoſed to the open air, its upper ſurface will often appear covered with beautiful branching little plants, all which will diſſolve away upon the application of heat, and leave the ſurface even; but upon expoſing the veſſel again to the open air, in a quiet place, they will grow again as before, thus ſeveral times exhibiting the reſuſcitation of plants, as it were, from their own aſhes.

Some chemiſts have formed ſeveral fables upon ſome ſuch baſis as this; and very probably, the whole ſecret of their operations was no more than a concealed fraud of this kind, this having nothing to do with vegetation.

NITRUM *vitriolatum*, a preparation of *nitre* made as follows; diſſolve the maſs left in the retort after diſtillation of a ſpirit of *nitre*, in about eight times its weight of water; filtrate the ſolution, and, when perfectly clear, evaporate the liquor to ſuch a ſtandard, that the ſalt will no longer be ſuſtained in it; then ſet it in a cool place, and collect the ſalt as it ſhoots, laying it in an earthen colander to dry. This is of much the ſame virtues with TARTAR *vitriolated*, and is frequently ſold under its name.

NITTLES, in *Sea-Language*. See KNITTLE.

NIVALIS *avis*, or *emberiza nivalis* of Linnæus. See SNOW-*bird*.

NIURI, in *Botony*, the name of a genus of plants, called by Linnæus PHYLLANTHUS.

NOAH's *ark ſhell*, in *Natural Hiſtory*, the name of a kind of ſea ſhell, which authors were always puzzled about referring to any genus, till a late French author has referred it to a new genus he has made under the title *cardiformis*, taking in the bucardia, and triangular heart-ſhells. The cabinets of the curious afford us three ſpecies of this ſhell; the common kind, a yellow and white kind, with broad irregular lines, and a variegated kind.

We have another ſhell of this genus, which no one ever doubted to belong to it, which yet is of an oblong figure, and ſo much reſembles the *Noah's ark*, as to plainly ſhew they ought both to be reckoned ſpecies of the ſame genus. This is the oblong bucardium, or ox-heart ſhell, commonly called the *baſtard Noah's ark*.

NOACHI *columba*, in *Aſtronomy*. See COLUMBA.

NOBILIARY, a collection, or hiſtorical account, of the noble families of a province, or nation.

Chorier has publiſhed a *nobiliary* of Dauphiné; and Caumarin, another of Provence. The Germans are particularly careful of their *nobiliaries*, to keep up the purity of their families.

NOBILISSIMUS, in *Antiquity*, a title, or quality, given to the princes of the imperial family.

F. Doucine advances, that the title *nobiliſſimus* was firſt given under the emperor Juſtin; others find the title *nobilis Cæſar*, or *N. C.* that is, *Nobiliſſimus Cæſar*, on medals long before that time, even as early as Trajan. Spanheim and Joubert, indeed, ſee this title on medals no higher than the time of Philip the Younger; though it appears earlier in ſome inſcriptions; to that even M. Tillemont is miſtaken, where he ſays, the quality of *nobiliſſimus* is not to be found in hiſtory before the time of Conſtantine the Great, who firſt gave it to his two brothers; after which it was attributed to ſuch of the emperors children as were not Cæſars. See CÆSAR.

Triſtan adds, that the Cæſars bore the title of *nobiliſſimi* in all ages; but that *the nobiliſſimate* firſt became a diſtinct independent dignity in the time of Conſtantine the Great.

NOBILITY, a quality that dignifies, or renders a thing noble; particularly, that raiſes a perſon poſſeſſed thereof above the rank of a peaſant or commoner.

In England, indeed, the term *nobility* is reſtrained to degrees of dignity above knighthood. Every where elſe, *nobility* and gentility, or gentry, are the ſame. See GENTLEMAN.

Some refer the origin of *nobility* in Europe to the Goths; who, after they had ſeized a part of Europe, rewarded their captains with titles of honour, and called them *nobles*, *nobiles*, to diſtinguiſh them from the common people.

Nobility, in England, is only conferred by the king, and that by writ or patent, in virtue whereof it becomes hereditary. In other countries there are other ways of acquiring it.

Thus, in France, v. gr. there are ſeveral offices which convey perſonal *nobility*, and ſuch as deſcends to poſterity. Such are all offices of the crown, thoſe of counſellor of ſtate, &c. others they have which only communicate an acceſſory, or perſonal *nobility*, which dies with the perſon. Thus, a counſellor in parliament enjoys all the rights and exemptions of *nobility*; yet his ſon is never reputed noble: unleſs there have been a ſucceſſion of them, and both father and grandfather have been noble; which they call *pere & aieul nobles*.

They have a third kind of *nobility*, called *nobility of the bell*, *de la cloche*; which is what the mayors and ſheriffs of certain cities, as Lyons, Bourges, Rochelle, Poitiers, &c. acquire in virtue of their magiſtracy.

The *nobility* of England is called the *peerage of England*. Its degrees are only five; viz. that of a duke, a marquis, earl or count, viſcount, and baron. See under DUKE, MARQUIS, &c.

The privileges of the Engliſh *nobility* are very conſiderable: they are all eſteemed as the king's hereditary counſellors, and are priviledged from all arreſts, unleſs for treaſon, felony, breach of peace, condemnation in PARLIAMENT, and contempt of the king. No ſupplicavit can be granted againſt them; no capias, or exigent, ſued againſt them for action of debt, or treſpaſs; and no eſſoign lies againſt them: in criminal caſes, they are only to be tried by a jury of peers, who are not put to their oath; but their verdict upon their honour ſuffices. They alſo anſwer to bills in chancery upon their honour, and not upon their oath; but when they are examined as witneſſes either in civil or criminal caſes, they muſt be ſworn. In their abſence from parliament, they are allowed a proxy to vote for them; and in all places of truſt they are allowed to conſtitute deputies, by reaſon of the neceſſity the law ſuppoſes them under of attending the king's perſon. See PEERS and PARLIAMENT.

Guillim

Guillim obſerves, that if an APPEAL of murder, or felony, be ſued by a commoner againſt a peer, he ſhall be tried by commoners, not peers.

No peer may go out of the kingdom without the king's leave: if any have leave, he is to return upon the king's writ, or to forfeit goods and chattels.

Anton. Matthæus obſerves, that *nobility*, among the Romans, was a quite different thing from what it is among us. The nobles, among the Romans, were either thoſe raiſed to the magiſtrature, or deſcended from magiſtrates: there was no ſuch thing as *nobility* by patent.

Bartoli ſays, that doctors after they have held a profeſſor's chair in an univerſity for twenty years, become *noble*; and are intitled to all the rights of counts.

But this claim is not admitted at court, &c. though Bartoli's ſentiments be backed with thoſe of ſeveral other authors, particularly Chaſſanæus in his Conſuetudin. Burgundiæ; Boyer ſur la Coutume de Berry; Faber C. de Dig. Def. 9. &c. which laſt, however, reſtrains Bartoli's rule to doctors in law, and princes phyſicians.

By an edict of the French king, in 1669, it is declared, that trade ſhall not derogate from *nobility*, provided the perſon do not ſell by retail.

In Bretagne, by ancient cuſtom, a nobleman loſes nothing by trading even in retail: but he reaſſumes all his rights as ſoon as he ceaſes traffic, his *nobility* having ſlept all the time.

In Germany, a woman, not *noble* by birth, doth not become, v. gr. a counteſs, or baroneſs, by marrying a count, or baron: a lady of the higher degree, indeed, becomes a princeſs by marrying a prince; but this doth not hold of a lady of the lower *nobility*.

On the coaſt of Malabar, children are only capable of being *noble* by the mother's ſide; it being allowed them to take as many huſbands as they pleaſe, and to quit them whenever they think good.

NOBLE, NOBILIS, a perſon who has a privilege which raiſes him above a commoner, or peaſant, either by birth, by office, or by patent from his prince.

The word comes from the Latin *nobilis*; formed from the ancient *noſcibilis*, *diſtinguiſhable*, *remarkable*.

In England, the word *noble* is of a narrower import than in other countries; being confined to perſons above the degree of knights; whereas, abroad, it comprehends not only knights, but what we ſimply call *gentlemen*.

The *nobles* of England are alſo called *pares regni*, as being *nobilitatis pares*, though *gradu impares*.

The Venetian *nobleſſe* is famous: it is in this that the ſovereignty of the ſtate reſides. It is divided into three claſſes. The firſt only comprehends twenty-four families.

The ſecond includes the deſcendants of all thoſe who were entered in the golden book, in 1289, and deſtined to govern the ſtate, which then began to be ariſtocratic.

The third conſiſts of ſuch as have bought the dignity of *noble* Venetians.

This laſt claſs is only admitted to the inferior employs; the two former, to all indifferently.

The title of *noble* Venetians is ſometimes alſo given to foreign kings, princes, &c.

NOBLE alſo denotes a money of account, containing ſix ſhillings and eight pence.

The *noble* was anciently a real coin, under the denomination of ROSE-*noble*.

Authors obſerve, that there has not been any piece of gold or ſilver of this name, coined with us ſince 9 Hen. V. They were firſt coined by Edw. III. in 1334. See GOLD *coin*.

The *noble* contained 80*d.* the ſame with the preſent money of account. Its half was called *ob'lus*, containing 40*d.* its fourth part the quadrans, or farthing in thoſe days, 10*d.*

NOCERIANA *terra*, *earth of Nocera*, in the *Materia Medica*, a white earth, being a ſpecies of bole, uſed in medicine in Germany, Italy, and ſome other parts of the world, but not known in the Engliſh ſhops. It is found at *Nocera*, in Umbria, whence its name. It is now dug principally about Macerata, a city in the marquiſate of Ancona, in the pope's territories, and is in great eſteem in malignant fevers, and againſt the bites of venomous animals.

It is a denſe earth, of a greyiſh white, very hard, and of an inſipid taſte, and does not effervеſce with acid menſtruums.

NOCTAMBULATIO, compounded of *nox*, *night*, and *ambulo*, *I walk*, *walking in the ſleep*. This is a very remarkable diſtemperature of the imagination, and, in different perſons, differs greatly in degree. Thoſe who are but moderately affected with it, only repeat their actions of the day, and getting out of the bed, go quietly to the places they frequent at other times; but thoſe who are afflicted with it in the moſt violent degree, go up to dangerous places, and do things that would terrify them to think of, when awake: theſe are by ſome called lunatic *night-walkers*, becauſe, as ſome have imagined, fits are obſerved to return with moſt frequency, and violence, at the changes of the moon.

Cauſes of it. The only material cauſe that can be aſſigned in this caſe is a plethora, or over-fulneſs of blood; but this is influenced by an immaterial one, that is, by the fancy, which is buſily employed in dreams about particular objects.

Method of cure. The primæ viæ are firſt to be cleared of all their foulneſſes by a ſtrong purge; after this it is proper to bleed in the foot, taking away eight or ten ounces; then powders compoſed of nitre, cinnabar, and crab's eyes, ſhould be taken three or four times a day, and particular regard, it is ſaid, ſhould be had to the changes of the moon. It will be proper to ſet a veſſel of water by the bed-ſide, in ſuch a manner that the perſon will naturally ſtep into it on getting out, and be awaked by that means; and if theſe things fail, a perſon ſhould be ſet up to watch him, and beat him every time it happens. Junker's Conſp. Med p. 698.

NOCTANTER, in *Law*, is the name of a writ iſſuing out of the Chancery, and returnable in the King's Bench; given by the ſtatute Weſtm. 2. 13 Edw. I. cap. 46. by virtue of which ſtatute, where any one having right to approve waſte ground, &c. makes and erects a ditch or a hedge, and it is thrown down in the night time, and it cannot be known by a verdict of aſſize or a jury, by whom; if the neighbouring vills will not indict ſuch as are guilty, they ſhall be diſtrained to make again the hedge or ditch at their own coſts, and to anſwer damages. The word *noctanter* is ſo neceſſary in an indictment of BURGLARY, that it hath been adjudged inſufficient without it.

NOCTIBO, in *Ornithology*, the name given by the Portugueſe to a ſmall Braſilian bird, a ſpecies of the *goat-ſucker*, or *churn-owl*, more known among naturaliſts by its Braſilian name IBIJAU.

NOCTILUCA, among *Naturaliſts*, a ſpecies of phoſphorus, ſo called, becauſe it ſhines in the night, without any light being thrown on it: ſuch is the phoſphorus made of urine.

By which it ſtands diſtinguiſhed from ſome other ſpecies of phoſphorus, which before they ſhine, muſt be expoſed to the ſun-beams; ſuch is the BONONIAN-*ſtone*, &c.

Mr. Boyle, in a particular treatiſe on the ſubject, gives an account of three *noctilucæ*. The firſt, invented by Kraſft, he calls the *conſiſtent*, or *gummous noctilucæ*, as being of a texture not unlike that of a cherry-gum. This, on account of its uninterrupted action, was, by the Germans, called the *conſtant noctilucæ*; among us it is now known under the denomination of the *ſolid phoſphorus*. The ſecond is liquid, invented by the ſaid Kraft: this is only a diſſolution of the former in a convenient liquor. The third kind was prepared by Mr. Boyle himſelf; and was of a different nature from both the other; for it would not ſhine of itſelf, like either of them, but required the contact of the air (though not any external rays or heat) to make it produce light, which would be very durable, in a well ſtopped veſſel. Add, that it was not the body that ſhone, but an exhalation, or effluvium, mixed with the air; on which account the inventor gives it the denomination of the *aerial noctilucæ*.

The ſame Mr. Boyle, afterwards, prepared another ſort; which, from the little peſſucid fragments or cruſtals therein, he denominated the *icy noctilucæ*. See PHOSPHORUS.

NOCTUA *aurita*, in *Ornithology*, a name by which ſome have called the ſmaller ſpecies of the *horned-owl*, more uſually diſtinguiſhed by the name OTUS.

NOCTUA *canora*, in *Ornithology*, a name given by Nieremberg to a bird of the Spaniſh Weſt Indies, called by the natives CHICUATLI, and ſometimes kept by the Spaniards in cages.

NOCTUA *minor*, in *Ornithology*, the name given by Mr. Ray to the *kraunith*, or, as others call it, the SCHAPELIT, a very beautiful little bird of the owl kind, and not exceeding the ſize of the common thruſh.

NOCTUINI *oculi*, a name given by ſome to grey eyes, from their reſembling thoſe of the *noctua*, or *owl*.

NOCTUOLENT, among *Botaniſts*, a name given to ſuch plants as ſmell ſtrongeſt in the night-time. See DOG-*roſe*.

NOCTURNAL, ſomething that relates to night, *nox*; in contradiſtinction to diurnal. In this ſenſe we ſay, *nocturnal* aſſemblies; *nocturnal* walks; *nocturnal* pollutions, &c.

NOCTURNAL *pains* are a frequent concomitant of venereal diſorders, which can only be palliated with narcotics: nothing but a mercurial courſe, or a long-continued uſe of diet-drinks, can entirely remove them.

NOCTURNAL *arch*, in *Aſtronomy*, the arch of a circle deſcribed by the ſun, or a ſtar, in the night.

*Semi-*NOCTURNAL *arch of the ſun* is that portion of a circle he paſſes over between the lower part of our meridian, and the point of the horizon wherein he ſets; or between the point of the horizon wherein he ſets, and the lower part of our meridian.

NOCTURNAL, or NOCTURLABIUM, is more particularly uſed for an inſtrument, chiefly uſed at ſea, to take the altitude or depreſſion of ſome of the ſtars about the pole, in order to find the latitude, and the hour of the night.

There are *nocturnals* of various contrivances, ſome of them projections of the ſphere; ſuch as the hemiſpheres, or planiſpheres, on the plane of the equinoctial: thoſe ordinarily uſed by the ſeamen are two; the one adapted to the polar ſtar, and the firſt of the guards of the Little Bear; the other to the pole-ſtar, and the pointers of the Great Bear.

NOCTURNAL, *conſtruction of the*. The inſtrument conſiſts of two circular plates (*Tab. Navigation. fig.* 15.) applied on each other. The greater, which has a handle to hold the inſtrument, is about 2½ inches diameter, and is divided into twelve parts, agreeing to the twelve months; and each month ſubdivided into every fifth day: and ſo, as that the middle of the handle correſponds to that day of the year, wherein the ſtar here regarded has the ſame right aſcenſion with the ſun.

If the inſtrument be fitted for two ſtars, the handle is made moveable. The upper left circle is divided into twenty-four equal parts, for the twenty-four hours of the day, and each hour ſubdivided into quarters, as in the figure. Theſe twenty-four hours are noted by twenty-four teeth; to be told in the night. Thoſe at the hours twelve are diſtinguiſhed by their length. In the centre of the two circular plates, is adjuſted a long index, A, moveable upon the upper plate. And the three pieces, viz. the two circles and index, are joined by a rivet which is pierced through the centre, with a hole two inches in diameter for the ſtar to be obſerved through.

NOCTURNAL, *uſe of the*. Turn the upper plate till the longeſt tooth, marked 12, be againſt the day of the month on the under plate; then, bringing the inſtrument near the eye, ſuſpend it by the handle, with the plane nearly parallel to the equinoctial; and viewing the pole-ſtar through the hole of the centre, turn the index about, till, by the edge coming from the centre, you ſee the bright ſtar or guard of the Little Bear (if the inſtrument be fitted to that ſtar): then that tooth of the upper circle, under the edge of the index, is at the hour of the night, on the edge of the hour-circle: which may be known without a light, by accounting the teeth from the longeſt, which is for the hour 12.

NOCTURNAL *pollution*. See POLLUTION.

NOCUMENTI *aſſiſa*. See ASSISA.

NODATED *hyperbola*, a kind of hyperbola, which, in turning round, decuſſates or croſſes itſelf.

NODE, NODUS, in *Surgery*, denotes a tumor ariſing on the bones; and uſually proceeding from ſome venereal cauſe.

Node amounts to the ſame with what is otherwiſe called *exoſtoſis*.

It ſeems generated of a thick, cold, viſcid humour, which is often found very difficult to reſolve. They frequently apply to it a leaden plate, covered with mercury.

The cure is frequently alſo attempted by *emplaſt. de vanis cum mercurio*; which failing, ſome mercurial unguent is now and then rubbed on them; and afterwards mercurial plaſters made of cinnabar, &c. are applied.

Some give the denomination *nodes* to all tumors formed by a coagulation of viſcous matter in the external parts of the body.

NODE is more particularly applied to the tumors or protuberances ariſing on the joints of old gouty people; called alſo *tophi*.

They are ſuppoſed to be formed of a thick, crude, heavy, viſcid, indigeſted matter, mixed with a hot, ſharp, bilious juice, the groſſer and more terreſtrial part whereof, being detained, grows into a ſtony ſort of concretion.

NODES, in *Aſtronomy*, the two points wherein the orbit of a planet interſects the ecliptic.

Such are the two points C and D (*Tab. Aſtron. fig.* 33.) whereof the *node* C, where the planet aſcends northwards above the plane of the ecliptic, is called the *aſcending node*, the *northward node*, ☊, and the *head of the dragon*; and is thus marked, ☊.

The other *node* D, where the planet deſcends to the ſouth, is called the *deſcending node*, the *ſouthward node*, or the *dragon's tail*; thus marked, ☋. See DRAGON'S *head* and *tail*.

The right line DC, wherein the two circles interſect, is called *the line of the nodes*.

It appears from obſervation, that the line of the *nodes* of all the planets conſtantly changes its place, and ſhifts its ſituation *in antecedentia*; i. e. from eaſt to weſt, contrary to the order of the ſigns.

Thus, by a retrograde motion, the line of the moon's *nodes* finiſhes its circuit in eighteen years two hundred and twenty-five days; in which time, after having receded from any point of the ecliptic, it returns to the ſame.

Sir Iſaac Newton has not only ſhewn, that this motion ariſes from the action of the ſun, but has calculated, with great ſkill, all the elements and varieties in this motion, from its cauſe.

In order to underſtand the action of the ſun in this caſe, we muſt conceive the plane of the moon's motion to paſs always through the centre of the earth and the centre of the moon, and to be a plane in which the right line forming their centres, and the right line that is the direction of the moon's motion, or the tangent of her orbit, are always found. It is certain, that if the earth and moon were always acted on equally by the ſun, they would deſcend equally towards the ſun; the plane determined always by theſe two lines, would deſcend with them, keeping always parallel to itſelf, ſo that the moon would appear to us to revolve in the ſame plane conſtantly, with reſpect to the earth. But the inequalities in the action of the ſun (ſee MOON) will bring the moon out of this plane to that ſide of the plane on which the ſun is, in the half of her orbit that is neareſt the ſun, and towards the other ſide, in the half of her orbit that is fartheſt from the ſun. Whence we ſhall have this general rule for judging of the effect of the ſun on the *nodes*: that while the moon is in the half of her orbit that is neareſt the ſun, the *node* towards which ſhe is moving, is made to move towards the conjunction with the ſun; and while the moon is in the half of her orbit which is fartheſt from the ſun, the *node* towards which ſhe is moving is made to move towards the oppoſition; but when the *nodes* are in conjunction with the ſun, its action has no effect upon them. In the firſt caſe, the moon is brought into a direction which is on the ſame ſide as the ſun is, of that direction which ſhe would follow of herſelf; and the interſection of a plane paſſing through this direction and through the centre of the earth, will cut the ecliptic, on that ſide towards which the moon moves, in a point nearer the conjunction than if there was no action of the ſun to diſturb her motion. In the other caſe, the action of the ſun has a contrary direction, and for the ſame reaſon makes the enſuing *node* move towards the oppoſition. When the line of the *nodes* produced paſſes through the ſun, then the ſun, being in the plane of the moon's motion, has no effect to bring her to either ſide; and therefore, in that caſe, the *nodes* have no motion at all. By applying this reaſoning, it appears, that in every revolution of the moon, the retrograde motion of the *nodes* exceeds the direct motion, excepting only when the line of the *nodes* paſſes through the ſun, when there is no motion of the *nodes* at all. Sir Iſaac Newton finds, from the theory of gravity, that the *nodes* ought to move backward about 19° 18′ 1″ in the ſpace of a year, and the aſtronomical tables make this motion 19° 21′ 21″, whoſe difference is not $\frac{1}{1000}$ of the whole motion of the *nodes* in a year. By a more correct computation of this motion from its cauſe, the theory and obſervation agree within a few ſeconds. The inclination of the moon's orbit to the ecliptic is alſo ſubject to many variations. When the *nodes* are in the quarters, while the moon moves from one quarter to the conjunction, the action of the ſun diminiſhes the inclination of the plane of her orbit; the inclination of this plane is leaſt of all when the moon is in the conjunction; it increaſes again as ſhe moves from the conjunction to the next quarter, and is there reſtored nearly to its firſt quantity. When the line of the *nodes* paſſes through the ſun, the inclination of the moon's orbit is not affected by the action of the ſun; becauſe, in that caſe, the plane of her orbit produced, paſſes through the ſun, and, therefore, the action of the ſun can have no effect to bring the moon out of this plane to either ſide. In this laſt caſe the inclination of the moon's orbit is greateſt; it decreaſes as the *nodes* move towards the quarters; and it is leaſt of all when the *nodes* are in the quarters, and the moon either in the conjunction or oppoſition. Newton has calculated theſe irregularities from their cauſes, and finds his concluſions agree very well with the obſervations of aſtronomers.

When the moon is in the *node*, ſhe is alſo in the ecliptic, viz. twice in each period; when ſhe is at her greateſt diſtance from the *nodes*, viz. in the points E, F, ſhe is ſaid to be in her greateſt north or ſouth latitude, according as ſhe is then on the north or ſouth ſide of the ecliptic.

The moon muſt be in or near one of the *nodes* when there is an eclipſe, either of the ſun or moon.

NODULE, NODULUS, in *Pharmacy*, a bag of medicinal ingredients put into beer, or wine, to give its tincture thereto.

Nodules are ſometimes alſo parcels of odoriferous ſimples, tied up in a piece of ſilk, for the patient to be frequently ſmelling to.

NODUS, See KNOT.

NODUS, in *Poetry*, &c. See INTRIGUE and PLOT.

NODUS, or NODE, in *Dialling*, denotes a point or hole in the gnomon of a dial, by the ſhadow or light whereof, either the hour of the day in dials without furniture, or the parallels of the ſun's declination, and his place in the ecliptic, &c. in dials with furniture, are ſhewn.

NODUS is also used for a hole in the ceiling of a room, or in the window, for the making of a dial on the floor, wall, or the like.

NOERA, a word used by some chemists for the head of an alembick, or the cover of a cucurbit, or any other vessel used in distillation.

NOETIANS, disciples of Noetus, an Ephesian, the author of Sabellianism.

They only allowed of one person in the godhead; viz. the Father; and some highly taught, that it was God the Father that suffered on the cross. An error, says Epiphanius, who wrote a hundred years after Noetus, never heard of before; though it is certain there had been other PATRIPASSIANS in the church before him.

Being reprehended by his superiors, Noetus made them this answer: What harm have I done? I adore only one God. I own none but him. He was born, suffered, and is dead.

NOFESCH, in *Natural History*, a word of Hebrew origin, used as the name of a precious stone. There has been much dispute among the commentators on the Old Testament, what stone it was. It seems derived from the word *fuch*, which signifies the ruby or carbuncle, and as the positive of that word, it must be supposed to express a red stone, but one of any other colour. As the ruby is signified by *fuch*, this cannot mean the same stone, and therefore must by means the garnet, they having no other name that we know of, for that stone, and it being very like the ruby.

NOCHETZLINOPALLI, or NOCHEZNOPATLI, in *Botany*, a name by which some authors have called the OPUNTIA, on which the cochineal insect loves to feed.

NOISETIER, in *Botany*, the name by which the French call the several species of HAZEL and filberd-trees.

NOLA, in *Botany*, a name used by some authors for the GOSSYPIUM.

NOLANA, in *Botany*, a genus of the *pentandria monogynia* class. Its characters are, that the flower is campanulated; the style is between the germina; and it has five seeds like berries, which are bilocular. There is only one species.

NOLI *me tangere*, *q. d. touch me not*, a malignant eruption in the face, occasioned by an extremely sharp corrosive humour: thus called, either because it infects those who touch it, or because the more it is touched, the worse it grows, and the further it spreads.

The *noli me tangere* is a species of HERPES *exedens*; by some referred to the CANCER, by others to the LEPROSY.

NOLI *me tangere* is chiefly used among us for an external ulcer in the ala of the nose, proceeding often from a venereal cause, though sometimes the effect of a scrophulous constitution.

It does not always confine itself to the ala, but will spread and corrode the very substance of the nose. The cure is difficult, especially when it arises from a bad constitution. M. Daniel, late acallist to the French king, observes, that abscess of the eyelids, nose, and adjacent parts, have all their rise in the periosteum and pericranium, and that we cannot hope for a thorough cure, without taking them entirely off. In this way he has succeeded in several instances, which are related in the Phil. Trans. vol. xlix. p. 18, &c.

NOLI *me tangere*, among *Botanists*, is a name of a plant so denominated from a singular property it has, of darting out its seed when ripe, upon the first approach of the hand to touch its pods. See BALSAMINE.

NOLI *me tangere*, is also a name given to the SOLANDRICA.

NOLLE *prosequi*, is used in Law, where a plaintiff in any action will proceed no further, and may be before or after a verdict, though it is usually before; and it is then a nonsuit against the plaintiff than a nonsuit, which is only a default in appearance; but this is a voluntary acknowledgment that he has no cause of action.

NOMADES, Νομάδες, from νέμω, *I feed*, a name given in *Antiquity* to several nations of people, whose whole occupation was to feed and tend their flocks; and who had no fixed place of abode, but were constantly shifting, according to the convenience of pasturage.

The most celebrated among the *Nomades* were those of Africa, who inhabited between Africa, properly so called, to the east, and Mauritania to the west. They are also called *Numidæ*, or *Nasamones*. Sallust says, they were a colony of Persians sent into Africa with Hercules.

The *Nomades* are included in the tents of the Cappadocians.

The *Nomades* of Scythia were the inhabitants of Little Tartary, who still retain the ancient manner of living.

NOMENTUM, in *Architecture*, is a space between the aliper-part and bilicy and the fore part of a triple-boat, which was laid boat is plowed upon the beams, as in a deeper-called vessel. These beams are laid from the forecastle nearly to the quarter-deck, where their ends are usually fastened by a frame called the gallows, which consists of two strong posts, about six feet high, with a cross piece, reaching from one to the other, athwart ships, and serving to support the ends of those booms, masts, and yards, which he is reserve to supply the place of others carried away, &c. The piece called *no man's land* is used to contain any blocks, ropes, &c. which may be necessary on the forecastle. It probably derives the name from its situation, as being neither on the starboard nor larboard side of the ship, nor on the waiste or gangwaies; but being situated in the middle, partakes equally of all those places. Falconer.

NOMANCY, compounded of *nomen*, *name*, and *mantia*, *divination*, a name given to the art of divining the fates of persons by means of the letters that form their names. *Nomancy*, or, as it should rather be called, *onomancy*, or *onomatomancy*, seems to be nothing else but the cabbalistic geomatria.

NOMARCHA, in *Antiquity*, the governor or commander of a nome, or nomos.

Egypt was anciently divided into several regions, or quarters, called *nomes*, from the Greek νέμω, taken in the sense of a division; and the officer who had the administration of each *nome*, or *nomos*, from the king, was called *nomarcha*, from ἀρχὴ and ἄρχω, *command*.

NOMBRIL *point*, in *Heraldry*, is the next below the *fesse* point; or the very centre of the escutcheon.

Supposing the escutcheon divided into two equal parts below the fesse, the first of these divisions is the *nombril*, and the lower the base.

NOME, or NAME, in *Algebra*, denotes any quantity with a sign prefixed, or which is to it, whereby it is connected with some other quantity; upon which the whole becomes a binomial, trinomial, or the like.

Thus $a+b$ is a BINOMIAL, whose *nomes*, or names, are a and b: and $a-b+c$ TRINOMIAL, whose *nomes* are a, b, and c, &c.

NOME, Νωμὴ, in *Medical Writers*, is used for an eating, or corroding ulcer, and is much the same with what NONNUS it occurs in Galen. Some later writers, as Forestus, call it *ulcus phagedænicum*, and *exedens ulcus*.

NOME, among the ancient Egyptians, a division or province, into which the whole kingdom was divided. The origin of the *nomes*, according to Diodorus Siculus, was this: the inhabitants being refractory, and much inclined to insurrections, in order to prevent these, the kings divided the whole country into different provinces or *nomes*, and established the worship of some particular animal in each of them, prohibiting, at the same time, such animal to be eaten within the bounds where it was worshipped. Hence, as every province was introduced with its own particular form, and object of worship, it entertained the highest contempt for that of its neighbours, and took a pleasure in profane those animals which among them had divine honours paid it. This religious opposition had the desired effect; for, all ancient writers are agreed, thereby cut off, there were no more insurrections against the government. Mem. Acad. Inscrip. vol. xiii. p. 32.

Plutarch also used for a kind of song, or hymn, in honour of the gods, said to have been invented by Terpander.

NOMEN. See PRÆNOMEN, NAME, and ADNOMEN.

NOMENCLATOR, or NOMENCLATOR, among the Romans, was usually a slave, who attended persons that stood candidates for offices, and prompted or suggested to them the names of all the citizens they met, that they might court them, and call them by their names; which among that people was the highest piece of civility.

NOMENCLATOR *of the Roman Court*, was an officer, whose business it was to call the persons whom the pope invited to dinner.

He also listened to those who were admitted to audience, in the same manner as those now retained by the cardinals, called *auditors*.

NOMENCLATORES, among the *Botanical Authors*, are those who have employed their labours about settling and adjusting the right names, synonyms, and etymologies of names, in regard to the whole vegetable world.

NOMENCLATURE, NOMENCLATURA, a catalogue of several of the more usual words in any language, with their significations, compiled in order to facilitate the use and retaining of such words to those who are to learn the tongue.

We have Latin, Greek, French, &c. *nomenclatures*.

NOMINA *villarum*, an account of the names of all the villages, and the portions thereof, in each county, drawn up by several sheriffs, at the instance of king Edward II. and returned by them into the exchequer, where it is still preserved.

NOMINAL *computers*. See CHARACTER.

NOMINALS, or NOMINALISTS, a sect of school-philosophers, the disciples and followers of Occam, or Ockam, an English Cordelier, in the fourteenth century.

The *Nominalists* were great dealers in words, whence they were vulgarly denominated *sophisters*.

They had the denomination *Nominalists*, because, in opposition to the REALISTS, they maintained, that words, not things, were the object of dialectics.

This sect had its first rise towards the end of the eleventh century, and pretended to follow Porphyry and Aristotle; but it was not till Ockam's time that they bore the name. The chief of this sect in the eleventh century, was a person called John, who, on account of his logical subtilty, was called the Sophist, and his principal disciples were Robert of Paris, Roscelin of Compiegne, and Arnoul of Laon. At the beginning, the *Nominals* had the upper hand: but the Realists, though greatly divided among themselves, were supported by men of great abilities; such as Albertus Magnus, T. Aquinas, and Duns Scotus. The *Nominal* sect became hereby into disrepute; till William Ockam, in the fourteenth century again revived it, and filled France and Germany with the flame of disputation. Having joined the party of the Franciscan monks, who strenuously opposed John XXII. that pope himself, and his successors after him, left no means untried to extirpate the philosophy of the *Nominalists*, which was deemed highly prejudicial to the interests of the church: and hence it was, that, in the year 1339, the university of Paris, by a public edict, solemnly condemned and prohibited the philosophy of Ockam, which was that of the *Nominalists*. The consequence was, that the *Nominalists* flourished more than ever. In the fifteenth century, the controversy was continued with more vigour and animosity than ever; and the disputants were not content with using merely the force of eloquence, but had frequently recourse to more hostile and dangerous weapons; and battles were the consequence of a philosophical question, which neither side understood. In most places, however, the Realists maintained a manifest superiority over the *Nominalists*. While the famous Gerson, and the most eminent of his disciples were living, the *Nominalists* were in high esteem and credit in the university of Paris. But upon the death of these patrons, the face of things was much changed to their disadvantage. In the year 1473, Lewis XI. by the instigation of his confessor, the bishop of Avranches, issued out a severe edict against the doctrines of the *nominalists*, and ordered all their writings to be seized and secured, that they might not be read by the people: but the same monarch mitigated this edict the year following, and permitted some of the books of that sect to be delivered from their confinement. In the year 1481, he not only granted a full liberty to the *Nominalists* and their writings, but also restored that philosophical sect to its former authority and lustre in the university. Mosheim, vol. iii. p. 222. 8vo. Eng. ed.

The *Nominalists* were the founders of the university of Leipsic: there are many yet abroad, who pique themselves on being *Nominals*.

The *Nominals*, with the Stoics, admit the formal conceptions or ideas of things, as the subject and foundation of universality; but to this they add names, which represent and signify, after the same univocal manner, and without any distinction, a great variety of single things alike in genus and species.

Whence it is that they are called *Nominals*; as pretending, that to become learned, it is not enough to have just ideas of things, but it is likewise required to know the proper names of the genera and species of things, and to be able to express them clearly and precisely, without confusion or ambiguity.

NOMINATION, the act of naming and appointing a person for some function, employ, or benefice.

The word is chiefly used for the right of presenting to a benefice, &c.

In common law, however, there is a difference between *nomination*, and PRESENTATION; the former being properly a power which a man has, by virtue of a manor, or otherwise, to appoint or name a clerk to a patron of a benefice, to be by him presented to the ordinary.

NOMINATIVE, in *Grammar*, the first case of nouns which are declinable.

The simple position, or laying down of a noun, or name, is called the *nominative case*: yet is it not so properly a case, as the matter or ground whence the other cases are to be formed, by the several changes and inflexions given to this first termination. See CASE.

Its chief use is to be placed in discourse before all verbs, as the subject of the proposition, or affirmation, as, *Dominus regit me*, the *Lord governs me*; *Deus exaudit me*, *God hears me*.

NOMINATOR, he who names or presents a person to an office, or benefice.

Hence *nominee*, the person named or presented.

Extard observes, that there are some customs where the *nominator* is responsible for the solvibility of the nominee.

NOMINE *pœnæ*, in *Law*, is a penalty incurred for not paying rent, &c. at the day appointed by the lease or agreement, for the payment thereof.

NOMINIS *identitate*. See IDENTITATE.

NOMOCANON, compounded of νομος, *law*; and κανων, *canon*, or *rule*, a collection of canons, and of imperial laws relative or conformable thereto. See CANON.

The first *nomocanon* was made by Johannes Scholasticus, in 554. Photius, patriarch of Constantinople, in 883, compiled another *nomocanon*, or collation of the civil laws with the canons: this is the most celebrated. Balsamon wrote a commentary on it, in 1180.

NOMOCANON also denotes a collection of the ancient canons of the apostles, councils, and fathers; without any regard to imperial constitutions.

Such is the *nomocanon* published by M. Cotelier.

NOMOCANON is sometimes also used for a PENITENTIAL book of the Greeks.

NOMOPHYLACES, Νομοφυλακες, among the Athenians, magistrates who were to see the laws executed, being not unlike to our sheriffs. They had the execution of criminals committed to their care, as also the charge of such as were confined prisoners. They had also power to seize thieves, kidnappers, and highwaymen, upon suspicion; and, if they confessed the fact, to put them to death: if not, they were obliged to prosecute them in a judicial way.

NOMOPHYLACES were likewise officers belonging to the Olympic games, whose business it was to instruct those who were to contend, in all the laws of the games. See HELLENODICÆ.

NOMOTHETÆ, Νομοθεται, among the Athenians, were a thousand in number, and chosen by lot out of such as had been judges in the court *Heliæa*. Their office was not (as their name seems to imply) to enact new laws by their own authority, for that could not be done without the approbation of the senate, and the people's confirmation; but to inspect the old, and, if they found any of them useless, or prejudicial, as the state of affairs then stood, or contradictory to others, they caused them to be abrogated by an act of the people. Beside this, they were to take care that no man should plough or dig deep ditches within the Pelasgian wall; to apprehend the offenders, and send them to the archon.

NO *more*, in *Sea-Language*, is the command given by the pilot or quarter-master, to the helmsman, to steer the ship *no nearer* to the direction of the wind than the sails will operate to advance the ship in her course.

NON-ABILITY, in *Law*, an exception taken against the plaintiff in a cause, on some just ground why he cannot commence a suit in law: as pronunire, outlawry, being professed in religion, excommunicate, or a stranger born. This last holds only in actions real, and mixed; and not in personal, except he be both a stranger, and an enemy. The civilians say, that such a man hath not *personam standi in judicio*. See DISABILITY.

NON *admittas*. See NE-*Admittas*.

NON-APPEARANCE, a default in not appearing in a court of judicature. See APPEARANCE.

NON *assumpsit*, in *Law*, a plea in personal actions, whereby a man denies any promise made, &c. or that he made any such promise within six years, which is an effectual bar to the complaint.

NON-CLAIM, in *Law*, the omission or neglect of him who challenges not his right within the time limited by law: as, within a year and a day, where continual claim ought to be made.

By such neglect he is either barred of his rights as upon *non-claim* within five years after a right accrued to him; or of his entry by descent, for want of a *claim* within five years after the disseisin.

NON *compos mentis*, a phrase denoting a person not to be of sound memory, or understanding.

Of this, in common law, there are said to be four kinds. First, an IDIOT born; secondly, he that by accident loseth his memory, and understanding; thirdly, a LUNATIC, that has *lucida intervalla*, sometimes understanding, and sometimes not; fourthly, he that by his own act, for a time, depriveth himself of his right sense, as a drunkard. But this last kind shall give no privilege to him, or his heirs.

A descent takes away the entry of an idiot, though the want of understanding were perpetual.

NON-CONFORMISTS is a general denomination comprehending all those who do not *conform* to the established worship of the church. These are of two sorts, viz. 1. Such as absent themselves from it through total irreligion, and attend the service of no other persuasion; who by 1 Eliz. cap. 2. 23 Eliz. cap. 1. and 3 Jac. I. c. 4. forfeit one shilling to the poor, every Lord's day they so absent themselves, and 20*l.* to the king if they continue such default for a month together: and if they keep any inmate thus irreligiously disposed, in their houses, they forfeit 10*l.* per month. And 2. Such as absent themselves from the worship of the established church, under the plea of conscience; and these are *Protestant* DISSENTERS, to whom the term is commonly applied, and PAPISTS. See also TOLERATION.

The word is said to have had its rise from a declaration of King Charles I. who appointed that all the churches of England and Scotland should have the same ceremonies and discipline; the acquiescence whereto, or dissenting from which, determined *conformity* and *non-conformity*. But this distinction primarily related to the rites of worship and ecclesiastical laws, enacted by Edw. VI. Those who complied with them were *Conformists*, and those who object *Nonconformists*. See PURITANS.

NON *damnificatus*, in *Law*, is a plea to an action of debt upon a bond, with condition to save the plaintiff harmless. Abr. 224. If the condition of a bond be to save harmless only, *non damnificatus* generally is a good plea; but if it be to discharge the plaintiff, &c. then the manner of the discharge is to be shewn.

NON *decimando*. See MODUS *decimandi*.

NON *distringendo*, a writ not to distrain, used in divers cases.

NON *est culpabilis*, NON *cul.* q. d. *he is not guilty*, in *Law*, the general plea in an action of trespass, whereby the defendant absolutely denies the fact charged on him by the plaintiff: whereas, in other special pleas, the defendant grants the fact to be done, but alledges some reasons in his defence, why he lawfully might do it.

As *non cul.* is the general answer in an action of trespass, i. e. a criminal action civilly prosecuted; so is it in all actions criminally followed, either at the suit of the king, or others, wherein the defendant denies the crime objected to him.

NON *est factum*, in *Law*, is an answer to a declaration, whereby a man denieth that to be his bond or deed, whereupon he is impleaded.

NON *est inventus*, in *Law*, is the sheriff's return to a writ, when the defendant is not to be found in his bailiwick. And there is a return that the plaintiff, *non invenit plegium*, on original writs. Shep. Epit. 1129.

NON *implacitando aliquem de libero tenemento sine brevi*, a writ to prohibit bailiffs, &c. from distraining any man touching his freedom, without the king's writ.

NON *intromittendo quando breve præcipe in capite sibidolu impetratur*, a writ directed to the justices of the bench, or in eyre, commanding them not to give one that had, under colour of inditing the king to land, &c. as holding of him *in capite*, deceitfully obtained, the writ called *præcipe in capite*, any benefit thereof, but to put him to that writ of right. Reg. Orig. 4. This writ having a dependence on the *court of wards*, since taken away, is now disused.

NON *juridici dies*. See DIES.

NON-JURORS, are persons that refuse to take the oaths to the government, who are liable to certain penalties; and for a third offence to abjure the realm, by 13 and 14 Car. II. cap. 1. Parsons, vicars, &c. are to take the oaths, and give their assent to the declaration. 14 Car. II. cap. 4. or they shall not preach, under the penalty of 40*l.* &c. stat. 17 Car. II. cap. 2. Ecclesiastical persons not taking the oaths on the Revolution, were rendered incapable to hold their livings: but the king was impowered to grant such of the *nonjuring* clergy as he thought fit, not above twelve, an allowance out of their ecclesiastical benefices for their subsistence, not exceeding a third part. 1 W. and M. sess. 1. cap. 8. persons refusing the oaths, shall incur, forfeit, and suffer, the penalties inflicted on Popish recusants, and the court of exchequer may issue out process against their lands, &c. 7 and 8 Will. III. cap. 27. See the stat. 1 Geo. I. cap. 53. and OATHS.

The *Non-jurors*, or high-church men, were particularly distinguished by the following principles: 1. They maintained the doctrine of PASSIVE *obedience*. 2. That the hereditary succession to the throne is of divine institution, and, therefore, can never be interrupted, suspended, or annulled, on any pretext. 3. That the church is subject to the jurisdiction, not of the civil magistrate, but of God alone, particularly in matters of a religious nature. 4. That, consequently, the bishops deposed by king William III. remained, notwithstanding their deposition, true bishops to the day of their death; and that those who were substituted in their places were the unjust possessors of other men's property. 5. That these unjust possessors of ecclesiastical dignities were rebels against the state, as well as schismatics in the church, and that all, therefore, who held communion with them were also chargeable with rebellion and schism. And, 6. that this schism, which rends the church in pieces, is a most heinous sin, whose punishment must fall heavy on all those who do not return sincerely to the true church, from which they have departed. See *High Church*.

NON *liquet*, *it does not appear*, a VERDICT given by a JURY, when a matter is to be deferred to another day of trial.

The same phrase was used among the Romans: after hearing a cause, such of the judges as thought it not sufficiently clear to pronounce upon, cast a ballot into the urn with the two letters *N. L.* for *non liquet*.

NON *merchandizandis victualia*, a writ to justices of assize to enquire whether the magistrates of such a town do sell victuals in gross, or by retail, during the time of their being in office, which is contrary to an ancient statute, and to punish them if they do. Reg. Orig. 184.

NON *molestando*, a writ which lies for him who is molested contrary to the king's protection granted him.

NON *obstante*, *notwithstanding*, in *Law*, a clause frequent in statutes, and letters patent; importing a licence from the king to do a thing, which at common law might be lawfully done; but being restrained by act of parliament cannot be done without such licence.

All grants of such pensions, and every *non obstante* therein contained, shall be void. Henry III. took up the clause, *non obstante* (first introduced by the pope), in his grants.

But the doctrine of *non obstantes*, which sets the prerogative above the laws, was effectually demolished by the bill of RIGHTS at the Revolution, and abdicated Westminster-hall when king James abdicated the kingdom. It is enacted by 1 W. and M. sess. 2. cap. 2. that no dispensation by *non obstante*, of or to any statute, or any part thereof, shall be allowed; but that the same shall be held void and of none effect, except a dispensation be allowed in such statute.

NON *obstantes*, in the *Romish Canon-law*, make the third part of the provisions of the court of Rome, beginning with *Non obstantibus*, and comprising absolutions from censures, rehabilitations, and necessary dispensations for the enjoyment of benefices. None inferior to the pope can use the clause *Non obstante*.

NON *omittas*, a writ which lies where the sheriff having delivered a writ or process to a bailiff of a franchise in which the party it is to be served on dwells, and the bailiff having refused or neglected to serve it, upon the sheriff's returning, that he delivered it to the bailiff, this second writ shall be directed to the sheriff, charging him to enter the franchise, and execute the king's command, either by himself or officer.

NON PLEVIN, *non plevina*, a default in not replevying of land in due time. See REPLEVIN.

In *Hengham Magna*, it is said, that the defendant should be sure to replevy his lands seized by the king, within fifteen days; and that if he neglects, then, at the instance of the plaintiff at the next court-day, he shall lose his seisin, *sicut per defaltam pro defaltam*. But, by stat. 9 Edw. III. it was enacted, that no person should lose his land thenceforward because of *non plevin*.

NON *ponendo in assisis, & juratis*, a writ granted on divers occasions to men for freeing them from serving on assizes and juries; as by reason of old age, charter of exemption, or the like.

NON *procedendo ad assisam rege inconsulto*, a writ to stop the trial of a cause appertaining to one who is in the king's service, &c. till the king's pleasure be farther known.

NON *residence*, in *Law*, is applied to such spiritual persons as are not resident on, but absent themselves, for one month together, or two at several times of the year, from their benefices or dignities. See BENEFICE.

Regularly, personal residence is required of ecclesiastical persons upon their cures; though there are some exceptions in favour of particular persons, as king's chaplains, bishops, &c. See RESIDENCE.

NON *residentia pro clericis regis*, is a writ directed to the ordinary, charging him not to molest a clerk employed in the king's service, on account of his *non-residence*.

NON *sanæ memoriæ*, or NON *sanæ memoriæ*, is an exception taken to an act declared to be done by another, importing that it was done at a time when the party that did it was mad, or not in his proper senses. See NON *compos*.

NON *sciffum*, in the *Ancient Musse*. See APTENON.

Non-such clay, a particular sort of earth, which, mixed with another clay brought from Worcestershire, makes a composition very useful for making the melting-pots used in the green glass making.

NON-SUIT, in *Law*, the dropping or letting fall a suit or action. *Non-suit* is a renunciation of a suit, by the plaintiff or defendant; most commonly upon the discovery of some error, or defect, when the matter is so far proceeded in, as that the jury is ready at the bar, to deliver their verdict. The civilians term it *litis renunciatio*.

When the plaintiff is voluntarily *non-suited*, or withdraws himself, the crier is ordered to *call the plaintiff*; and if neither he nor any body for him appears, he is *non-suited*, the jurors are discharged, the action is at an end, and the defendant shall recover his costs. A *non-suit* is more eligible for a plaintiff than a verdict against him and judgment

judgment, because in the former case he may commence the same suit again for the same cause of action; but in the latter he is for ever barred from attacking the defendant on the same ground of complaint. See JURY.

NON *cepit informatus, non, &c.* See INFORMATUS *non, &c.*

NON-TENURE, a plea in bar to a real action, whereby the party urges, that he holdeth not the land mentioned in the writ, or at least some part of it.

Writ distinguished *non-tenure into general and special.* The first, where one denies himself ever to have been tenant to the land in question. The second, where he only alledges, that he was not tenant on the day whereon the writ was purchased.

NON-TERM, the time of vacation between term and term. See VACATION.

It was anciently called *the time or days of the king's peace.* See PEACE *of God and the church.*

Among the Romans it was called FERIÆ, or *dies* NEFASTI.

NON-ENTITY, whatever has no real being, or is only conceived negatively, or claims only a negative denomination. See ESSE, ESSENCE, &c.

NON-ESSENTIAL *modes.* See MODES.

NON-NATURALS, in *Medicine*, *res non naturales*, are the causes and effects of diseases, whether near or remote.

Physicians have digested all the causes of diseases into six classes, which they call the six *non-naturals.* These are,

1. Air. 2. Meat and drink. 3. Motion and rest. 4. The passions of the mind. 5. Excretions and retentions. 6. Sleep and waking. See each under its proper article.

They are thus called, because, by their use or abuse, they become either good, *naturals*; or evil, *contra-naturals.*

But the division is of no great use; the causes of diseases being much more commodiously laid down otherwise.

NONÆ and *decimæ* were payments anciently made to the church by those who were tenants of church-farms.

The *nonæ* were a rent or duty claimed for things belonging to husbandry: the *decimæ* were claimed in right of the church.

NONAGE, in *Law*, an incapacity of doing certain things from a want of age.

The term of *nonage* is different, with regard to different things. In matters of inheritance, a man is in his *nonage* till twenty-one years; for marriage only to fourteen, &c. See AGE and MINOR.

NONAGE, NONAGIUM, also denotes the ninth part of a man's moveable goods, anciently paid in the nature of a MORTUARY; being claimed by the clergy upon the death of those of their parish.

At first this was a third part of the goods, and was called *tertiarium*; till by a bull of Clement VI. it was reduced to a ninth.

NONAGESIMAL, in *Astronomy*, the nineteenth degree of the ecliptic, reckoned from its eastern term, or point.

The altitude of the *nonagesimal* is equal to the angle of the east; and, if continued, passes through the poles of the ecliptic: whence the altitude of the *nonagesimal*, at a given time, under a given elevation of the pole, is easily found.

If the altitude of the *nonagesimal* be subtracted from 90°, the remainder is the distance of the *nonagesimal* from the vertex.

NONAGON, a figure having nine angles and sides.

NONE, or NONES, *Nonæ*, one of the seven canonical hours, in the Romish church. See HOUR.

Nine, or the ninth hour, is the last of the lesser hours, that is said before vespers; and answers to three o'clock in the afternoon.

The single office, and that for the dead, ends at *nones*; which, Father Rosweyd observes, was anciently the hour for the breaking up of the synaxis, or usual meetings at church of the primitive Christians.

The hour of *none* was also the usual time for taking the repast on fast-days; though some would keep the fast till night.

NONE *leperty*, in *Botany*. See SAXIFRAGE.

NONE *fuch*, in *Botany*. See CAMPION.

NONES, NONÆ, in the *Roman Calendar*, the fifth day of the months January, February, April, June, August, September, November, and December; and the seventh of March, May, July, and October: these four last months having six days before the *Nones*, and the others only four.

The word apparently has its rise hence, that the day of the *nones* was nine days before the ides, and might be called *nono-like.*

March, May, July, and October, had six days in their *nones*; because these alone, in the ancient constitution of the year by Numa, had thirty-one days a-piece; the rest having only twenty-nine, and February thirty. But when Cæsar reformed the year, and made other months contain thirty-one days, he did not likewise allot them six days of *nones.*

NONIUS, is a name erroneously given to the method of graduation now generally used in the division of the scales of various instruments, and which should be called VERNIER, from its real inventor. The method of *Nonius*, so called from its having been invented by Pedro Nunez, or *Nonius*, and described in his treatise de Crepuscules, printed at Lisbon in 1542, consists in describing within the same quadrant, forty-five concentric circles, dividing the outermost into ninety equal parts, the next within into eighty-nine, the next into eighty-eight, &c. till the innermost was divided into forty-six only. By this means, in most observations, the plumb-line or index must cross one or other of the circles very near a point of division: whereon by computation, the degrees and minutes of the arch might be easily computed. This method is also described by Nonius, in his treatise De Arte atque Ratione Navigandi, lib. 2. cap. 6. where he would persuade himself, that it was not unknown to Ptolemy. But as the degrees are thus divided very unequally, and it is very difficult to attain exactness in the division, especially when the numbers, into which the arches are to be divided, are incomposite, of which there are no less than nine, the method of diagonals, first published by Thomas Digges, esq. in a treatise intitled *Alae seu Scalæ Mathematicæ*, printed at London, in 1573, and said to be invented by one Richard Chancellor, a very skilful artist, was substituted in its room. However *Nonius*'s method was improved at different times; but the admirable division now so much in use, is the most considerable improvement of it.

NONUPLA, in the *Italian Music*, denotes a quick time, peculiar to jigs. This species of time is otherwise called *the measure of nine times*, which requires two falls of the hand, and one rise. There are three sorts of *nonupla*. 1. *Nonupla di semi-minime*, or *dupla sesqui quarta*, thus marked $\frac{9}{8}$, where nine crotchets are to be to the bar, of which four make a semi-breve in common time, i.e. in the down stroke, $\frac{4}{4}$, and but three up; it is usually beat *adagio*. 2. *Nonupla di crome*, or *sesqui ottava*, marked thus $\frac{9}{16}$, wherein nine quavers make a bar, instead of eight in common time, i. e. six down, and three up: it is beat *presto*. 3. *Nonupla di semi-crome*, or *super sesti partiente nona*, thus distinguished $\frac{9}{32}$, in which nine semi-quavers are contained in a bar, whereof sixteen are required in common time, six down, and three up: it is ordinarily beat *prestissimo*. See ADAGIO, PRESTO, and PRESTISSIMO.

Beside these, there are two other species of *nonupla*, for which see TRIPLE.

NONUS *humeri platysmini*, in *Anatomy*, a muscle, called also ROTUNDUS *minor*.

NOOK *of land*, *nocata terra*, in an old deed of Sir Walter de Pedwardyn, twelve acres and a half of land were called a *nook of land*; but the quantity is generally uncertain.

NOOZE, a name given by sportsmen to a sort of horse-hair springe made to take woodcocks, and very successful, when the proper precautions are taken. The *nooze* is made of several long and strong hairs twisted together, with a running *nooze* at one end, and a large knot at the other, which is to be pulled through the slit of a cleft stick, to prevent the *nooze* from being pulled away when the bird is caught in it.

The sportsman, when he knows his business, does not stay to watch these snares, but sets them in the morning, and returns again to them at four in the afternoon, when he seldom fails of meeting with a sufficient number taken. The sticks are to be about the bigness of a man's little finger, and are to be made sharp at one end, that they may fix the better in the ground: to each of these is to be fixed one *nooze*. The sportsman is to take out with him several dozens of these bundled up together, and going into the coppice woods where there lie many leaves upon the ground, he is to search among these for the marks of woodcocks frequenting the place; if there come any there, it will soon be found out by the leaves, which are spread about from side to side by their bills, in searching under them for worms. Their dung also, which is of a dark grey colour, being found about the place, is a proof of their frequenting it.

When the place is thus pitched upon, the sportsman is to take a large circle at some distance from it, on each side, in the way where the woodcocks are supposed to come to the place; he is here to plant a small hedge-row of furze, or other bushes, of a considerable extent, and pretty thick, leaving gaps in it here and there. The

woodcocks, in making up to their place of feeding, when they come to this hedge, will run along by the side of it, till they come to one of the gaps, and then go through, for they hate to take wing, and will run, at any time, a long way under a hedge, rather than fly over it. On this depends the success of the sport.

The *nooses* are to be fixed one in each of these gaps through which it is known the woodcocks will pass; the stick to which it is fastened is to be stuck firmly in the ground, and the *noose* to be spread wide open on the ground, leaving only some dry leaves to support it. The whole gap being occupied by this *noose*, the woodcock, when he comes, cannot easily escape being taken by the legs in it, and when once caught he will lie till the sportsman comes. While a sportsman is walking about a wood in this view, it is very common for him to find springes, or *nooses*, of horse-hair, fixed at six inches high, in several places. This may be looked on as a proof that these are partridges in the wood, and these are the means used by the country people to take them. The woodcocks, though in the day they lie in woods, *set*, in the night, they go out, and frequent rivers and brooks, and, in the frosty nights, such springs as do not freeze are particularly resorted to by them.

The sportsman, when he has set his *nooses* in the woods for the day time, should retire to the watery places near them, and search for the marks of these birds coming to them by their dung, and other tokens. As soon as a place is found which they frequent, there must be a small hedge-row built there also in the same manner as in the woods; and in the gaps, which are to be made at the distance of about six feet one from another, there are to be placed either the same sort of *nooses* as those in the woods, or the springes made with hazel boughs, and the horse-hair tied to a pack-thread. In either case, there is no doubt of success, for the birds which have once frequented a place, will come to it every night, as long as they remain any where near it; but particularly, if there be any spring near a wood, the water not freezing when other waters are iced over, will be sure to bring the woodcocks together to it, and *nooses* planted properly about this place, will seldom fail of success. If they have been left a night or two without success, the sportsman is not to despair; for though there should happen to be no woodcocks there when they are first set, these birds change place so often, that it need not be doubted but so proper a rendezvous will be soon resorted to by them.

NOPE, in *Ornithology*, an English name used by some for the BULL-*finch*.

NORA, a word used by some of the chemical writers for *lixa*, by others *for nitre*, and by others for all salts in general, as the word *sal*.

NORMAL *line*, in *Geometry*, is used for a perpendicular line. See PERPENDICULAR, and NORMAL.

NORMAN, in *Sea-Language*, a name given to a short wooden bar, thrust into one of the holes of the windlass, in a merchant ship, whereon to fasten the cable. It is only used where there is very little strain on the cable, as in a commodious harbour, when the ship is well sheltered from the wind and tide.

NORMANNORUM *terra*. See TERRA.

NORROY, *North Roy*, q. d. Northern king; the title of the third of the three kings at arms, or provincial heralds. See KING *at Arms*, and HERALD.

His jurisdiction lies on the north side of Trent, whence his name; as Clarenceux, on the south.

NORTH, in *Geography*, one of the four cardinal points of the horizon, being that intersection of the horizon and meridian which is nearest our pole.

NORTH *latitude of the moon*. See LATITUDE.

NORTH *compass*. See COMPASS.

NORTH *sea*. See DIAL.

NORTH-*east*, a rhumb, or point, in the middle between the east and north.

NORTH-*north-east*, *north-east-by-east*, are subdivisions of the compass between the *north* and *east*. See WIND.

NORTH-*east passage*. The advocates for the *north-east* passage, have a late writer, have divided that navigation into three parts; and by endeavouring to shew that these three parts have been passed at different times, they conclude from thence, that the whole taken collectively, is practicable. These three parts are, 1. From Archangel to the river Lena. 2. From the Lena round Tschukotskoi Noss, (or the north-eastern promontory of Asia) to Kamchatka: and 3. From Kamchatka to Japan. With respect to the first part, no one ever affirmed, that it has been performed in one voyage: from an account of the several voyages that have been made in these seas, it appears, that there is a cape between the rivers Chatanga and Pasida, that has never yet been doubled. As to the second division of the *north-east passage*, it has been affirmed, that a passage has been effected by several vessels, which have, at different times, sailed round the northern extremity of Asia. But from the Russian accounts it is inferred, that it has been performed but once, viz. by one Dethneff, who, in 1648, is said to have doubled this formidable cape. Of the third, or remaining part of this passage, no doubt can be entertained. The connection between the seas of Kamtschatka and Japan has been established by many voyages. Coxe's Account of the Russian Discoveries, &c. 4to. 1780.

NORTH *pole*. See POLE.

NORTH *sea*. See SEA.

NORTH *star*, the last in the tail of the Little Bear; called also the POLE-*star*.

NORTH *wall*. See WALL.

NORTH-*west*, is a point or rhumb, in the middle between the *north* and west. See WEST, &c.

NORTH-*west passage*. A *north-west passage* by Hudson's-bay, into the Pacific Ocean has been more than once attempted of late years, but, hitherto, without success. Some greatly doubt of the practicability of such an enterprize, and think the observations made by the Russians give us small hopes. But, as they have not yet published the particulars of their discoveries, little can be said about them. Some general things may be seen in the Phil. Transf. N° 482. sect. 14. It appears from thence, that the Russians have passed between the land of Nova Zembla, and the coast of Asia, and, as the Dutch did formerly discover the northern coasts of Nova Zembla, we may now be well assured, that that country is really an *island*.

NORTH-*wind*. See WIND.

NORTHERN *aspect*, or EXPOSURE. See EXPOSURE.

NORTHERN *lights*, or *Aurora Borealis*. See AURORA *Borealis*.

NORTHERN *ocean*. See OCEAN.

NORTHERN *signs* are those fix on the *north* side of the equator. See SIGN.

NORTHERN *hemisphere*. See HEMISPHERE.

NORTHING, in *Navigation*, the difference of latitude, which a ship makes in sailing towards the *north pole*.

NORWAY *rat*. See *Sable* MOUSE and RAT.

NOSE, the *external* organ of smelling; or that part in man which stands prominent, in the middle of the face.

The *nose* is usually divided by anatomists into *external* and *internal*; a division of very little service.

It is further subdivided into several parts, which make up its external figure.

The first is the *dorsum*, or ridge, running along the whole length of it; one part whereof, about the middle, more prominent than the rest, is called the *apex*; and the extreme, which in many is turned round, *orbiculus*. The sides are called the *alæ*, or *pinnæ*.

The organments of the *nose* are common to the rest of the face. Under these appear the muscles of the *nose*, which are three pair, viz. the *elevatores alæ nasi*, serving to pull the *alæ* upwards, and turn them outwards; the *depressores alæ nasi*, which draw them from each other, and widen the external apertures of the nostrils; and the *constrictores alæ nasi*, which draw them downwards nearer each other; and at the same time the upper lip also downwards. See each muscle described under its proper head, ELEVATOR, DILATATOR, &c.

The frame of the *nose* is chiefly supported by two bones, which end in cartilages of a triangular figure, and are divided in the middle by the third, called *septum*, into two partitions, called the *nares*, or NOSTRILS.

This septum likewise ends in a cartilage, by means of which cartilages, the lower part of the *nose* is rendered moveable, which the upper, being perfectly osseous, is not. The cartilages of the *alæ* are tied to the others by ligaments; which loose connexion renders them moveable.

The bones of the *nose* are either *proper* or *common*. The first of the *proper*, are the two external ones that constitute the dorsum, and are joined to the *ossa frontis*, the fourth bone of the upper jaw, and to each other, partly by sutures, and partly by harmony.

In the concave of the arch of these two bones, at their union internally, is placed the bony part of the septum. Its upper part joins the *os ethmoides*; but in adults is continued to that the ethmoides, and its process, called *crista galli*, appear of a piece with the septum. The *septum* is thinner in the middle, and divides the right nostril from the left; though its position is seldom perpendicular. It is capped with another thin bone, from its figure called *vomer anterius*, and is joined to the fourth bone of the upper jaw, and to the *ossa palati*.

The other proper bones are the *turbinata*, or *spongiosa*, two of which are usually found in each nostril, sometimes three, placed one over the other.

The middlemost, when there are three, is so placed as to

shelter the perforation of the antrum maxillæ superioris into the noſtril, and prevent the ſolden noſhing in of air from the noſtril into the antrum. They are all very porous, and turned, not unlike the ſhell concha Veneris. In quadrupeds, theſe bones are very numerous.

The common bones of the noſe are ſuch as make fences for the foramina narium, and help to compoſe the parts adjacent. The largeſt of theſe is the fourth bone of the upper jaw, which has the greateſt ſhare in forming the foramina.

This fourth bone, with the ſeptum and oſſa turbinata, chiefly frames the internal parts of the foramina. In the upper part, a portion of the os frontis, the inſide of the os unguis, the os tribroſum, with part of the ſphenoides; and backwards, towards the fauces, the oſſa palati help to compoſe the foramina.

Beſides the cavities circumſcribed by the bones now mentioned, the foramina have ſeveral collateral cavities that open into them: the largeſt is that called *antrum genæ*; by Dr Highmore, *antrum maxillæ ſuperioris*, framed in the fourth bone of the upper jaw, near two inches long, and an inch broad; the bony parts of which, with the ſphenoides, make the foramen lacerum externum. Its lower ſurface makes a thin covering for all the roots of the molares and canini, which frequently, upon drawing a tooth, to which it ſticks, is taken along with it; whereby this cavity is opened into the alveolus, and conſequently into the mouth.

All theſe cavities of the *noſe* and cheek, as alſo the oſſa turbinata, ſeptum, &c. are inveſted with a membrane furniſhed with large arteries from the carotides; and veins, which empty themſelves into the jugulars; and nerves, from the fifth pair, as well as the olfactory nerves.

In this membrane are a great number of ſmall glands, placed very near each other, from whence flows all that pituita, commonly diſcharged at the noſtrils.

By means of this mucus or pituita is the membrane kept ſoft, and defended from the injuries of extraneous bodies, eſpecially thoſe of the air, which muſt paſs this way in inſpiration, when the mouth is ſhut.

By this means alſo the olfactory nerves, here diffuſed, are rendered capable of the perception of odoriferous effluvia, which the drineſs of the part would be apt to deſtroy. See SMELLING.

Beſides this uſe of the *noſe*, which is the principal, nature has made it, as it were, a diverticulum to the eyes; there being a conſiderable paſſage into each noſtril that empties itſelf under the middle os turbinatum, ariſing from two apertures, called *puncta lacrymalia*, at the great canthus.

By this way, the ſuperfluous moiſture of the eyes is carried off, which would otherwiſe incommode the cheeks; as in effect it does, when theſe parts are affected with any diſorder; as in the ægilops, and fiſtula lacrymalis.

The diſeaſes to which the *noſe* is ſubject, are a coryza, ozæna, polypus, ſarcoma, and noli me tangere, beſide ſneezing, and a loſs of ſmelling. See each in its place.

In Tartary, the greateſt beauties are thoſe who have the leaſt *noſes*. Raybrock mentions the wife of the great Genghis Khan, the mother of Tamerlane, as a celebrated beauty, becauſe ſhe had only two holes for a *noſe*. In moſt other countries, China excepted, great *noſes* are in honour.

The Crim Tartars break the *noſes* of their children while young, as thinking it a great piece of folly to have their *noſes* ſtand before their eyes.

NOSE, *bleeding at the*. See HEMORRHAGE.

NOSE, *cutting off, or ſlitting the*, in *Law*. See MAIHEM.

NOSE, *fracture of the*. In the *noſe* both bone and cartilage are ſubject to fractures, which happen ſometimes on either ſide, and ſometimes in the middle from blows or falls; if either of the bones on the front of the *noſe* are fractured, it produces a flatneſs in the *noſe*, and the air meets with obſtructions in its paſſage through the noſtrils; and if the bone on either ſide is fractured, the part becomes hollow. When the cartilage is diſturbed, the *noſe* inclines too much on one ſide. Theſe fractures ſometimes happen without a wound, but more uſually they are attended with a wound of the common integuments. If the injury of the *noſe* is very great, the fracture can never be ſo perfectly cured, but that ſome deformity will remain. The vicinity of this part to the brain alſo, which is frequently injured at the ſame time, renders caſes of this kind often dangerous. A caries alſo, or an ozæna, or polypus, are no uncommon attendants on this diſorder. In order to reſtore the bones of the *noſe* to their proper ſituation, the patient is to be placed in a ſtrong oppoſite to the light, and his head held back by an aſſiſtant. The ſurgeon is to raiſe the depreſſed parts with a ſpatula, a probe, or a quill, applying externally the thumb of one hand, and the fore-finger of the other. If the bones of the *noſe* are fractured on both ſides, they are to be raiſed on each in this manner, and the cavity of the noſtrils is to be filled up with long doſſils, to prevent the bones from collapſing; covering the part alſo for this end with ſome plaiſter, and applying firſt the dreſſings common in recent wounds. If the bone is fractured into ſeveral ſplinters, they are to be reduced into their proper places by the fingers; but if a ſplinter is ſo entirely ſeparated from the bone, that it will not eaſily unite with it again, it is to be taken out with the forceps. The bones will unite, when properly replaced, in about fourteen days, if no caries, or abſceſs, intervene. If the bone ſhould require a ſtronger ſupport than what has been hitherto mentioned, one may be formed out of ſtrong paper, either ſingle or double, and adapted to each ſide of the *noſe*, and ſupported by doſſils, and the whole muſt be kept in its place by a four-headed bandage not tied too tight. Heiſter.

NOSE, *ſaddle*. It ſometimes happens, though not often, that the bones of the *noſe* are ſeparated from each other, or diſtorted out of their natural places, without a fracture. When this caſe happens, the patient is to be ſpeedily placed in a high chair, and an aſſiſtant muſt ſtand behind, and hold his head firm in a proper poſture: the ſurgeon is then to introduce with one hand a thick probe, a gooſe quill, or a ſmall ſtick ſhaped for that purpoſe up the noſtril internally, by which means the depreſſed parts of the *noſe* may be thruſt out into their places: in the mean time he is to apply his other hand externally, to guide and direct the parts which are thus moved from within. This being done, and the bones properly replaced, there is ſcarce any thing elſe to be done, but to let a piece of ſticking plaiſter lie upon the *noſe* for ſome time. Heiſter.

NOSE, *wounds of the*. Wounds of the *noſe* are generally cured by the dry future; but where the wound divides the cartilage, and penetrates ſo deep that the ſips of it cannot be kept in contact by the application of ſticking plaiſters, the true future muſt be made through the ſkin, on each ſide of the wound; and Bleyny affirms, that when a part of the *noſe* has been actually cut off, and ſeparated from the reſt, it has been afterwards united, by means of futures. When the naſal bones have been fractured, it is uſual to place ſmall tubes of lead or ſilver under them for ſome time, leſt the paſſage of the *noſe* ſhould be ſtopped up by the ſhooting of new fleſh. Externally ſome vulnerary balſam, or glutinous powder, is to be uſed, and covered with ſticking plaiſters, which muſt be kept on by the four-headed bandage. Heiſter.

NOSE-*band*, in the *Manage*, called in French *muſerelle*, is that part of the head-ſtall of a bridle that comes over a horſe's noſe.

NOSE-*bleed*, in *Botany*. See YARROW.

NOSOCOMIUM, Νοσοκομεῖον, an hoſpital, or infirmary, for the reception of the diſeaſed.

NOSOLOGY, Νοσολογία, compounded of νόσος, *malady, diſeaſe*, and λόγος, *diſcourſe, reaſon*, a diſcourſe or treatiſe of diſeaſes; otherwiſe called PATHOLOGY.

The importance of a comprehenſive and accurate *noſology* has been long and generally allowed: Baglivi, Boerhaave, Gorter, Gaubius, and Sydenham, have expreſſed their deſire of a work of this kind, the great object of which is to fix pathognomonics to every diſeaſe; or in which all diſeaſes are diſpoſed into certain claſſes, orders, and genera, founded on diſtinctions taken from the ſymptoms only, without regard to remote or proximate cauſes.

Felix Platerus, in his Praxis Medica, publiſhed in 1602, gave an imperfect ſketch of a *noſology* of this kind; but no writer ventured to purſue his idea for more than a century after his time. At length, M. Sauvages of Montpelier, publiſhed in 1731, in duodecimo, the outlines of ſuch a work, under the title of Nouvelles Claſſes des Maladies, in which he profeſſes to define diſeaſes from their conſtant and evident ſymptoms only. In 1763 this work was augmented, by the additions of the ſpecies under each genus, into two volumes, in octavo; and afterwards enlarged into two quarto volumes, and publiſhed after his death in 1768. The celebrated Linnæus adopted his plan, and framed a ſyſtem of inſtitutes, under the title of Genera Morborum: his ſcheme was firſt publiſhed in a theſis in 1759, and in a ſmall quarto, in 1763. In the claſſification of diſeaſes, he has nearly retained the arrangement of M. Sauvages, but he has altered the terms, changed the order of the claſſes, and added a new claſs, with which he begins his method. The number of claſſes is eleven, and they are as follow: 1. Exanthematici, or fevers attended with eruptions on the ſkin, comprehending three genera, viz. contagioſi, with ſix ſpecies; ſporadici, with three ſpecies; and ſaltuarii, affecting a part of the body only, to which he has reduced only one ſpecies. 2. Critici, or critical fevers, including three genera, viz. the continentes, with four ſpecies; the intermittentes,

mittentes, with five species; and the exacerbantes, or remitting, with five species. 3. Phlogistici, or inflammations, containing three genera, viz. the membranacei, with seven species; the parenchymatici, or viscerali, with seven species; and the musculosi, or muscular, with one species. 4. Dolores, or painful diseases, comprehending two genera, viz. intrinseci, or of the internal parts, with twenty species; and extrinseci, or of the limbs, with five species. 5. Mentales, or diseases in which the functions of the mind are disturbed, comprehending three genera, viz. ideales, in which the judgment is principally affected, with seven species; imaginarii, affecting the imagination, with six species; and pathetici, in which the appetites and passions are principally affected, with twelve species. 6. Quietales, or diseases in which the voluntary and involuntary motions, and the senses, suffer a diminution, including three genera, viz. defectivi, or defects of the vital powers, with six species; soporosi, or diminished sense and motion, with ten species; and privativi, or diminutions of the senses, with fifteen species. 7. Motorii, or spasmodic diseases, containing two genera, viz. spastici, spastic, or tonic diseases, with ten species; and agitatorii, or convulsive, with fifteen species. 8. Suppressorii, or diseases arising from, or attended with oppression of the organs and impeded excretions, comprehending two genera, viz. suffocatorii, with eighteen species; and constrictorii, with eight species. 9. Evacuatorii, or diseases attended with increased excretion and discharges, comprehending five genera, viz. capitis, of the head, with six species; thoracis, of the breast, with four species; abdominis, of the belly, with fourteen species; genitalium, of the genital passages, with eleven species; and corporis externi, of the external parts, with two species. 10. Deformes, or diseases occasioning external deformity of the body, comprehending three genera, viz. emaciantes, emaciating, with five species; tumidosi, enlarging the body, with eight species; and decolores, such as deform, or change the colour of the skin, with five species. 11. Vitia, or cutaneous, external, or palpable diseases, including eight genera, viz. humoralia, those attended with vitiated or extravasated fluids, with nine species; dialytica, solutions of continuity, as fractures, wounds, &c. with fourteen species; exulcerationes, ulcers, with thirteen species; scabies, cutaneous, with nineteen species; tumores, tumors, with ten species; procidentiæ, tumors arising from dislocation of fleshy or membranous parts, with eight species; deformationes, distortions of particular parts, and other deformities, with eighteen species; and maculæ, blemishes on the skin, with nine species.

The symptomatic plan of arranging diseases has since been followed by some other professors of physic. Dr. Vogel of Gottingen, in 1764, published his Definitiones Generum Morborum; Dr. Cullen of Edinburgh has also published a Synopsis Nosologiæ Methodicæ, and made it the basis of his First Lines of the Practice of Physic; in which, by omitting many genera, and reducing others to the rank of species only, he has very considerably abridged the whole. In 1776, Dr. Sagar, at Iglaw, in Moravia, published a Systema Morborum Symptomaticum, octavo, which is an useful abridgment of the work of M. Sauvages, with some alterations and additions.

NOSTOCH, the name of a vegetable substance which seems to differ from most of the other bodies of that kind, in several particulars.

It is a substance of an irregular figure, of a greenish brown colour, and somewhat transparent. It trembles at the touch, in the manner of a jelly, but it does not melt when held in the hand. It has therefore somewhat of the character of a vegetable leaf, but it has neither veins nor fibres.

It is found in all sorts of soils, but most frequently in sandy ones, sometimes on the gravel of garden walks, and most usually makes its appearance after rain. It is found only in the summer months, and retains its humidity and perfect figure so long as it is a moist season; but immediately dries up, and withers away, on the sun or winds affecting it.

Many people have supposed this not to be a plant; it appears all on a sudden, and, as it were, by a sort of miracle, either from the earth or clouds, and some have called it *flower of earth*, others *flower of heaven*; and the obscurity of its origin has occasioned its being held in great esteem among the chemists, who suppose that it contains an universal spirit capable of converting other metals into gold. Memoires Acad. Par. 1722.

If the *nostoch* has truly no roots, as appears to be very evidently the case, it follows, that it imbibes its nourishment in the manner of the sea-plants, which imbibe the water by which they are nourished at all their pores.

It should seem that there are two species of this *nostoch*, the one only a plain flat leaf; the other curled, wrinkled, and variously undulated; and it is on this last, that the fruits which produce the young plants are principally found. It may be, however, that the one of these may be the male, and the other the female of the same species, as in many larger plants; or possibly the being in the state of fructification alone may make the difference.

NOSTRILS, *nares*, the two apertures or cavities of the nose, through which the air passes, and which serve to convey odours, and to carry off the pituita separated in the sinus of the base of the cranium.

The *nostrils* are separated by a cartilage called *septum narium*, and lined with a very sensible membrane. See SMELLING.

Cicero observes, that the situation of the *nostrils* so near the mouth is very convenient, as the judging of the smells of meat and drinks is a great part of their office: he adds, that their erect position argues the Creator's wisdom; in regard all odours rise from below upwards.

The *nostrils* are sometimes subject to be preternaturally closed; though this is a case that but rarely happens. It is sometimes owing to a careless treatment in the small-pox, in the bad kind of which the *nostrils* have been known to close, and adhere so strongly to the upper lip, which is found turned back at the same time, as to leave no possibility of shutting the mouth. In this unhappy case, the only relief is by the knife, separating the lip from the nose, and then opening a passage through each of the *nostrils*. These are to be kept open, either with tents, or leaden pipes, and the lip pressed downward into its natural position by a compress and bandage, and this continued till the wounds are cicatrized. Heister.

NOSTRILS, *slitting the*, &c. in *Law*. See MAIHM.

NOSTRILS *of birds* are the nice instruments with which they are furnished for distinguishing their food: these are placed either in the middle of the upper mandible, or near the base, or at the base, or behind the base. Some birds have no *nostrils*. They are generally naked, but sometimes covered with bristles reflected over them, or hid in the feathers.

NOSTRILS *of fish*. See NARES *piscium*.

NOSUS, a name by which some of the barbarous writers of the middle ages have called *alabaster*: others also have called it *nisus*.

NOT *guilty*, the general issue or plea of the defendant, in any criminal action. See NON *est culpabilis*.

NOTABILIA *bona*. See BONA.

NOTARICON, the third part or species of the Jewish CABBALA.

Rabbi Nathan, in his Great Aruch, says, that *notaricon* is when a single letter is taken for the sign of a thing, i. e. for a whole name. He adds, that the word comes from the Latin *notarius*, a person who writes in notes, or short-hand; and R. Elias Levita gives the same account in his Thesbites; except that, in lieu of one letter for a word, he mentions two or three.

But, after all, neither the one nor the other seems alone sufficient; for, as a single letter frequently makes a word, so, in the *notaricon*, a whole word sometimes stands for a single letter.

There are, therefore, two principal kinds of *notaricon*; the first is, when, by apheresis, or apocope, the first or last letters of several words are joined to make a single word, or phrase; which, therefore, is of two kinds, the one initial, the other final; and each is done several ways. The first of these kinds, which the Rabbins call *Rischee Thebaths*, appears very ancient; and is supposed, by some well versed in the Hebrew, to have taken its origin from the Psalms, and other places of Scripture, proceeding alphabetically, i. e. the first verse beginning with א, the first letter of the alphabet; the second with ב, the second letter, &c. See ANCHRONY.

The second kind is also very common, and is called *Sophe Thebath*; i. e. the end of words. For instance; by telling the last letters of the words לי מה שמו מה, *Mihi quodnam nomen est? Quodnam?* they find the name of God, Jehovah. This becomes still more puerile, when they take the letters backwards.

The third kind is more modern, and is more gross and perplexed: here a letter gives a whole word, instead of a word's only giving a letter; so that a word shall furnish a whole phrase.

Thus, for example, in the first word of Genesis, בראשית, *barasith*, is found, He created the heaven and the earth, the sea, the abyss, &c.

NOTARY, *notarius*, primarily denotes one who takes notes, or short draughts, of contracts, or other instruments.

From the 44th Novel of Justinian it appears, that contracts were first written in notes, or abbreviatures, by the *notarii*, or clerks of the tabelliones, and were not yet obligatory. Afterwards they were engrossed, or written at length, by the TABELLIO himself, and then signed and sealed.

NOTARY

NOTARY is more particularly used to denote an officer who draws and keeps notes and minutes of contracts, obligations, and other instruments, executed before him; and delivers out authentic copies, &c. thereof.

Rapinean distinguishes between *notarii* and *tabelliones*; *notarii*, he says, in several cities, are only to receive and pass the minutes of contracts, and to deliver them to the parties in brief; being obliged to carry them to the tabelliones to be kept, and to have ingrossed copies delivered out to the parties.

He adds, that the *notaries* were anciently clerks of the tabelliones; and that separating, by degrees, from their masters, they at length erected offices of their own; and, at last, took place of the tabelliones, who were suppressed.

They had their name *notarii* from *notæ*, because anciently they wrote in notes, or short hand.

Notaries are now little used among us, except in mercantile affairs; though in France they still subsist in their legal capacity. The *notaries* of the chatelet are called the king's counsellors, and note-keepers.

NOTARY *public*, among us, is a person who draws, and publicly attests deeds, or writings, between merchants, to make them authentic in another country.

Notaries have the drawing, passing, keeping, issuing, &c. of all deeds, contracts, charter-parties, &c. in the mercantile world. In their books are registered protests, remonstrances, &c. See NOTE and BILL.

NOTARIES, *ecclesiastical*, were officers in the first ages of the church, whose business was, to collect and preserve the acts of the martyrs.

They are supposed to have been first instituted by St. Clement. Their number was seven, and they were disposed in the seven quarters or regions of Rome.

Pope Fabian, judging the short-hand of the *notaries* too obscure for common use, added seven subalterns to them, to transcribe at length what the *notaries* drew in short.

At length these *notaries* were laid aside, and two other kinds were established in their stead; viz. *apostolical notaries*, and *episcopal notaries*; whose business lies in spiritual and beneficiary instruments.

NOTATION, in *Arithmetic*, the art of characterizing numbers, or of representing them by proper figures.

The choice of arithmetical characters is arbitrary; hence, in various nations, they are various: but, perhaps, there are none so commodious as those commonly used in Europe, usually said to have been invented by the Arabs, and thence called ARABIC *characters*; though Dr. Wallis observes, that Alfraganus, an Arab, refers the invention to the Indians.

The Greeks, Hebrews, and other eastern nations, as also the Romans, expressed numbers by the letters of their common alphabet. See CHARACTER.

NOTATION, in *Algebra*, is the representing of quantities by letters of the alphabet; or calling them by those names. See QUANTITY, CHARACTER, &c.

NOTE, *nota*, is used for a character, or abbreviature, serving to denote or express something in a little compass.

The ancient notaries wrote all in *notes*, or short-hand; whence they were sometimes denominated *scriptores, quia notis cursim verba expediebant*.

NOTES, in *Music*, are characters which mark the tones, i. e. the elevations and fallings of the voice, or SOUND; and the swiftness or slowness of its motions.

In the general, under *notes* are comprehended all the signs, or characters, used in music, for the marking harmony of sounds.

But, in propriety, the word only implies the marks which denote the degrees of gravity, or acuteness, to be given each sound.

The Greeks used the common letters of their alphabet for musical *notes*; and, because more *notes* were needed than they had letters, the defect was supplied by the different situation of the letters; viz. by placing them upright, inverted, &c. and by cutting off, or by doubling, some strokes.

Thus the same letter Γ expressed different *notes* in all the following forms: Γ, ⊥, ⊐, ⊒, Γ, ⅂. For every several mode they had no less than eighteen signs.

Now Alypius gives us signs for fifteen different modes, which, with the differences of the genera, and the distinction between voice and instrument, Mr. Malcolm observes, makes, in all, 1620 *notes*. Not that they had so many distinct characters; but the same character has different significations on different occasions. Thus Φ, in the diatonic genus, is hehanos hypaton of the Lydian mode; and a hypate meson in the Phrygian.

The Latins, in the time of Boethius, had cased themselves of so needless a burden, and only used the first fifteen letters of their alphabet for *notes*: these, pope Gregory, considering that the octave was the same, in effect, with the first, and that the order was the same in the upper and lower octave of the gamut, afterwards reduced to seven; which were to be repeated in a different character.

At length, in the eleventh century, a Benedictine, one Guido Aretine, in lieu of the letters, substituted the six syllables, *ut, re, mi, fa, sol, la*; placing them on different lines, and marking them with points. Lastly, it was thought proper to add *note*, likewise, in the spaces. See GAMUT.

Of the seven musical *notes*, *ut, re, mi, fa, sol, la, si*, the first six are ascribed to Aretine, who is said to have invented them at Pomposa, in the duchy of Ferrara: the seventh, *viz. si*, was added, according to some, by Vander Putten; according to others, by De Muris. It serves very good purposes, in avoiding the difficulty of the divisions remaining in Guido's scale.

Indeed Vossius will not allow Guido to have the honour of inventing any of them; but shews, that the Egyptians had used them long before him: in which he is confirmed by the testimony of Hasdrubalites. However, common fame ascribes to him not only the *notes*, but also the lines, letters, or clefs, flats, and sharps.

The *notes ut, re, mi, &c.* he is said to have taken from a hymn in the vespers of St. J. Baptist: *Ut queant laxis resonare fibris, &c.*

Hitherto the *notes* only served to express the degree of tune: they were all of equal value, as to time, till about the year 1330, when John De Meurs, or De Muris, a doctor of Paris, gave different figures to the several *notes*, to express the quantity of time each was to be dwelt upon. See TIME.

There are three things to be considered in these *notes*: 1. The *quantity*, i. e. the size and figure of the head. 2. The *quality*, i. e. the colour of the head; whether it be white or black, or full or open. 3. The *properties*, as the Italians express themselves; viz. whether the *note* is accompanied with a virgula, or comma, or not. It must likewise be considered, whether the notes be separate and distinct, or bound together.

The several musical *notes* are, the *large*, which contains 8 measures, though Meibomius makes it 12 (see its figure under CHARACTER); the *long*, containing 4 measures; the *breve*, containing 2; the *semibreve*, containing 1; the *minim*, $\frac{1}{2}$; the *crotchet*, $\frac{1}{4}$; the *quaver*, $\frac{1}{8}$; the *semiquaver*, $\frac{1}{16}$; and the *demisemiquaver*, $\frac{1}{32}$.

Usually we only distinguish six principal *notes*, represented by as many different characters; viz. the *semibreve*, equal to two minims; the *minim*, equal to two crotchets; the *crotchet*, equal to two quavers; the *quaver*, equal to two semiquavers; and the *semiquaver*, equal to two *demisemiquavers*. See each under its proper article, SEMIBREVE, MINIM, CROTCHET, &c.

The mathematicians compute, that one may make 720 changes, or varieties, with six *notes*, without ever repeating the same twice; and that, of the *notes* of each octave, one may make 40,320 different tunes or songs.

NOTE is also used for a mark made in a book, or writing, where there occurs something remarkable, and worthy of particular notice.

NOTE is also used for an observation, or explication of some passage in an author, added in the margin, at the bottom of the page, or elsewhere, by an editor.

In this sense, *note* stands contradistinguished to text.

The *notes* make the principal difference in the editions of classic, &c. authors. We have Virgil, Horace, Terence, &c. with ROBERT'S *notes*, the Dauphin's *notes*, DACIER'S *notes*, BENTLEY'S *notes*, HARE'S *notes*, with *notes* VARIORUM, &c.

NOTE is also a minute, or short writing, containing some article of business.

In which sense we say, a *promissory note*, a *note under hand*, a *bank note*, &c.

Bond notes are made payable to bearer on demand; in which respect they differ from *bonds*, which are payable to order at seven days sight.

By 3 & 4 Ann. cap. 9. all *notes* signed by any person, and whereby such person shall promise to pay to any other person, or order, any sum of money, the money mentioned in such *note* shall be due, and payable to the person to whom made, and the *note* shall be assignable over as inland bills of exchange; whereupon the person to whom such *note* is payable, or assigned, may maintain an action for the same against the person who signed it, or any who indorsed the *note*, as in the case of inland bills, and recover damages and costs of suit, &c. If the party on whom any inland bill of exchange shall be drawn, refuses to accept it by under writing under his hand, the person to whom payable is to cause such bill to be protested, as foreign bills; but no acceptance shall charge any person, unless the bill be underwritten or indorsed; and if it be not so underwritten or indorsed, no drawer

shall be obliged to pay costs, damages, or interest thereon, unless protest be made for non-acceptance, and within fourteen days after the same be sent, or notice thereof given to the party from whom the bill is received, or left in writing at his usual place of residence. The bill being accepted, and not paid within three days after due, protest must be made, in writing, under a copy of the bill, by some notary public; or, if no such notary be resident in the place, then by any other substantial inhabitant, in the presence of two credible witnesses, and notice given as aforesaid, to charge the drawer, &c. Though no protest shall be necessary, except the value shall be expressed to be received in such bill and the bill be drawn for 20 *l.* at least. There is a proviso in the act, that nothing therein shall discharge any remedy any person may have against the drawer, acceptor, or indorser of any bill.

What has been said of bills of exchange is applicable also to promissory *notes*, that are indorsed over and negotiated from one hand to another; only, that, in this case, as there is no drawer, there can be no protest for non-acceptance: or rather, the law considers a promissory *note* in the light of a bill drawn by a man upon himself, and accepted at the time of drawing: and, in case of non-payment by the drawer, the several indorsers of a promissory *note* have the same remedy, as upon bills of exchange, against the prior indorsers.

Stealing of *notes*, bills of exchange, &c. is felony, in the same degree as if the offender had robbed the owner of so much money, &c. and the forging *notes* for money, bills of exchange, indorsements, &c. is FELONY, by stat. 2 Geo. II. cap. 25.

To NOTE *a bill*, is when a public notary goes as a witness, or takes notice, that a merchant will not accept or pay it. See PROTEST.

NOTE *of a fine* is a brief of a FINE made by the CHIROGRAPHER, before it be ingrossed. Or it is an abstract of the writ of covenant and the concord; naming the parties, the parcels of land, and the agreement. This must be enrolled of record in the proper office, by 5 Hen. IV. cap. 14.

NOTÆ *materne*, *mother's spots*. See NÆVUS.

NOTE, *natural*. See NATURAL.

NOTHÆ *costæ*, in *Anatomy*, denote the five lowest ribs, on each side; they are called *bastard*, or *spurious* RIBS, in regard they do not join with the breast bone, as the other ribs do; nor are they, as the others are, bony, but cartilaginous.

NOTHING, *nihil*, *nihilum*, or *non ens*.

The schoolmen distinguish between *nothing* taken *strictly*, which is what is impossible, or implies a contradiction; and *nothing* taken more *generally*, which is both applied to what is possible and impossible.

Again, they distinguish *nothing* into *negative*, which is the absence of reality in any subject; and *privative*, which is the absence of reality in a subject capable thereof, or wherein it ought to be found.

NOTHUS, νόθος, a Latin term, properly signifying a *bastard*, or a person of spurious birth.

Hence it is applied figuratively, by physicians, &c. to such diseases, as, though in respect of a similitude of symptoms, &c. they have the same denomination as some others; yet are of a different origin, seat, or the like from the same.

NOTHUS is sometimes also used for the back part of the chest, or thorax.

NOTIOMETER. See HYGROMETER.

NOTION, *notio*, in *Logic*, an idea or representation of any thing in the mind.

This term and the word idea are often taken in the same sense; but an ingenious author observes, that we cannot strictly be said to have an idea of an active being, or of an action, although we may be said to have a *notion* of them. I have some knowledge, or *notion*, of my mind, and its acts about *ideas*, inasmuch as I know, or understand what is meant by those words. What I know, that I have some *notion* of.

However, the terms idea and *notion* may be used convertibly. But yet it conduces to clearness and propriety, that we distinguish things very different by different names. It is also to be remarked, that all relations including an act of the mind, we cannot so properly be said to have an idea, but rather a *notion* of the relations or habitudes between things; but, if in the modern way, the word idea is extended to spirits, relations, and acts, this is, after all, an affair of verbal concern.—Berkeley, Princip. of Hum. Knowl. sect. 142. p. 160, 161. See IDEA.

M. Leibnitz, is very accurate in the distinction of *notions*, in the Acta Erud. Leipsi. anno 1684.

NOTION, *achar*, he defines to be such an one as suffices us to recollect the object; v. g. that a given figure is reckoned in the number of triangles.

NOTION, *an obscure*, is that which doth not suffice to recollect the object; such, v. g. is that of a plant, which upon seeing, you are in a doubt whether or no it be the same you had seen elsewhere, and which is called by this or that name.

NOTION, *distinct*. See DISTINCT.

NOTION, *a confused*, is that wherein you are not able to assign the very marks or characters whereby you recollect the object, though it be resolvable into them. Such, v. g. is the *notion* of red colour.

NOTION, *an adequate*. See ADEQUATE.

NOTION, *an inadequate*, that wherein you have only a confused *notion* of characters that enter a distinct one.

Some confused *notions* are admitted into mathematics; viz. such whose resolution is of no great consequence to any demonstrations.

Thus, Euclid does not resolve the *notion* of equality, though it enter the *notion* of an equilateral triangle, a rhombus, &c. inasmuch as the propositions, for whose demonstration it should be used, are easily granted, without such a detail: as, v. g. that things equal to the same third are equal to one another, &c. but no *notions* are admitted into the number of mathematical definitions, except distinct ones, and those too as adequate as possible, or as occasion requires.

The schoolmen distinguish *notions* into *formal*, and *objective*; and each of these they subdivide into *first* and *second*.

NOTION, *a first formal*, is the knowledge we have of any thing according to what it is, or has in itself: as the knowledge of fire, *quatenus* fire; of a light body, *quatenus* light, &c.

NOTION, *a first objective*, is the thing itself known, according to what it is, or has in itself; as the fire known as fire, &c.

NOTION, *second formal*, is the knowledge of a thing according to what it receives from the understanding: as, of fire, that it is the subject, and not the predicate.

NOTION, *second objective*, is what agrees to the thing by means of the operation of the intellect, or what it receives from the intellect.

NOTIONS, *common*, called also *prenotions*, προλήψεις, and *notiæ tritiæ*, are certain principles supposed by some writers to be innate, and which therefore are self-evident, i. e. appear, or are known by their own light, without the intervention of any medium or proof; being impressed, as it were, by the finger of God, to serve as the foundations of all our conclusions in the sciences, which are to be demonstrated thereby.

These *common notions*, considered as the foundations of sciences, are called AXIOMS.

They are called *common*, not as if so actually and necessarily perceived by every person, that nobody could be ignorant of, or deny them; but because they are judged to be true and certain, by all persons of sound reason.

For the same reason as we say, such a food is wholsome; not that it is so to all men, but to all that are of a sound body and constitution. Aristot. Topic. c. 4.

There are two kinds of *common notions*, viz. *theoretical*, which lay the ground-work for speculation; such are, every thing either is, or is not; nothing can be made by itself; the whole is greater than a part; equal things being added to equal, the sums are equal: and *practical*, which lay the foundation for honesty, and good morals; such are, God is to be beloved and worshipped; our parents to be honoured; to give every body their due; to do as we would be done by.

Some philosophers, however, and those even of best note, deny the reality of any innate, or *common notions*; urging, that the mind does not need any actual *notions* to prepare it to think, but that an innate faculty of thinking may suffice; as appears in an infant, from its perception of pain, taste, colour, &c. They add, that the common organs of sense, if they have but objects presented to them, and the faculty we have of reflecting on, and variously combining or ordering, the ideas received thereby, are sufficient to furnish us with all the stock of knowledge we have. See IDEA and *Common* SENSE.

NOTIONAL *quantity*. See QUANTITY.

NOTITIA, *notice*, something that has come under a person's knowledge or observation.

Hence *notification*, the action of giving notice, &c.

NOTITIA is also the title of certain books, composed for giving a particular knowledge of the places, roads, &c. of a province, kingdom, diocese, or the like.

Such is the *Notitia Imperii*, &c. M. Valois has given a *Notitia Galliarum*, being a collection of the several names

which the cities and provinces of that kingdom bore at different times.

The *Notitiæ Dignitatum Imperii*, both eastern and western, are of the utmost use both in the Roman, and in ecclesiastical history; yet they are of little service, at least to young people, without good notes; such are those of Pancirollus, &c. and unless the text, which is strangely corrupted and mutilated, be supplied.

NOTONECTA, in *Natural History*, the name of a species of water-insect, approaching to the nature of the cimex. It always swims upon its back, and is very swift in its motions. Its belly, which it shews while in the water, is of a yellowish white; its legs are long: when taken out of the water it hops. It is indeed a very beautiful, and very nimble little creature; and is common in the ponds of water in Hyde-park, and in several other places about London. It has four wings, six legs, but no antennæ, and when it swims, which is almost always on the back, its body resembles a boat in figure. This creature mostly lives in the water, where it preys on small insects, sucking their juices with its probofcis, in the manner of the water scorpion, and many other aquatic insects.

NOTOPEDA, in *Zoology*. See ELATER.

NOTORIOUS, something known, manifest, and public. Hence,

NOTORIA, *ars*. See ART.

NOTRE *Dame, our Lady*, a term frequently used for the holy Virgin. Hence, feasts of *Notre Dame*; the office of *Notre Dame*; congregations, nunneries, and orders of *Notre Dame*.

NOVACULA *piscis*, the *razor-fish*, in *Ichthyology*, the name of a sea-fish caught in the Mediterranean, and some other seas, and much esteemed at the tables of the great.

It is a small fish, seldom exceeding three or four inches in length, and, in its flat shape, somewhat resembles the saber. It keeps about the shores, particularly such as are stony, and seems never to go into deep water; and is caught on the shores of Majorca, Minorca, the island of Malta, and elsewhere, and lives on small fish.—Salvian. de Aquat.

NOVACULARUM *lapis*, in *Natural History*, the name given by De Laet to a stone which he describes from Ximenes, who has it under the American name *itzli*.

It is the stone out of which the natives of America made their weapons of war, and tools for other uses of life, before they knew the use of iron.

There are three species of this stone, the one blue, the other white, and the other black: they are all capable of a very high polish, and, when set in gold or silver, are very highly esteemed by the natives: they reflect the images of things, in the manner of all other highly polished bodies, and the two first are considerably transparent.

There are several quarries of these stones in the neighbourhood of Mexico, whence the Indians used to get them; they naturally split, in the getting out, into angular and edged figures, and these they afterwards fashioned to the purposes they wanted them for, and polished with the powder of a harder stone.

They still make knives of them, in a very expeditious and very remarkable manner. They hold the mass of stone between their feet, and, with an instrument prepared on purpose, they cut off pieces of four or five inches long, and about an inch broad, rising to a prominence on each side in the middle, and growing very thin toward the edges: it is wonderful to see with what expedition they finish this odd workmanship. The knives, when made, are sharper than any other instrument in the world; but they are very tender, easily broken, and more easily battered, and notched at the edges. They make also longer weapons of the same shape out of this stone, which they fix into wooden handles, with a sort of gum; and these serve them as swords. They are very terrible weapons for one blow, but they seldom hold together so as to bear a second. They make also the heads of their arrows with them; and, when these were first found by our travellers, they were not supposed to be of human workmanship, but to have fallen from heaven in thunder, and were called, by many authors, CERAUNIA. Ximenes, Hist. Ind. Occid. lib. x. cap. 13.

NOVALE, in our ancient customs, denotes land newly ploughed, and converted into tillage; and which had not been tilled within the memory of man before.

Quod novale *semel fuit, semper erit* novale *quoad decimarum retentionem vel solutionem. What was once* novale, *will ever remain so, as to the paying or non-paying of tythes. Excepta decima* novalium *cujusdam terræ, quam de novo excoluerunt.* Pat. 6 Edw. III.

NOVALE is sometimes also used for fallow land, i. e. land which has been ploughed for two years, and rests, or lies fallow, one more; or that lies fallow every other year.

NOVATIANS, *Novatiani*, a sect of ancient heretics, that arose towards the close of the third century, so called from Novatus, an African bishop; or from Novatianus, a priest of Rome.

They were called also *Cathari*, from καθαρὸς, *pure*, q. d. Puritans.

Novatian first separated from the communion of pope Cornelius, on pretence of his being too easy in admitting to repentance those who had fallen off in times of persecution.

Novatus coming to Rome, joined himself to the faction of Novatian; and both maintained, that there was no other admission into the church but by the repentance in baptism; grounding their opinion on that of St. Paul: "It is impossible for those once enlightened, and who "have tasted the heavenly gift, if they fall away, to re-"new themselves by repentance."

Not that they denied but a person fallen into any sin, how grievous soever, might obtain pardon by repentance; for they themselves recommend repentance in the strongest terms: but their doctrine was, that the church had it not in its power to receive sinners into its communion; as having no way of remitting sins but by baptism; which once received could not be repeated.

In process of time the *Novatians* softened and moderated the rigour of their master's doctrine, and only refused absolution to very great sinners.

The two leaders were proscribed, and declared heretics, not for excluding penitents from communion, but for denying that the church had a power of remitting sins.

NOVATION, INNOVATION, in the *Civil Law*, denotes a change or alteration of an obligation, whereby it becomes extinguished or annihilated.

Thus, when an obligation is discharged without receiving any money, but a simple promise is accepted in its stead, this occasions a *novation*.

There are two kinds of *novation*; the one *voluntary*, the other *necessary* and constrained.

NOVATION, *necessary*, is that made in consequence of a sentence or decree of justice.

NOVATION, *voluntary*, is made three ways; viz. by changing the cause of the obligation, without the intervention of any other person; by changing the nature of the obligation; and by delegation, as when the debtor makes over a debt to the creditor for his satisfaction.

In all these cases there is a will to innovate. Accordingly, Justinian says, *Voluntate, non lege, novandum.*

NOVEL, *novella*, in *Jurisprudence*, is a term used for the constitutions of several emperors; viz. Justin, Tiberius II. Leo, and particularly Justinian.

Most of Justinian's *Novels* were originally Greek, and afterwards were translated into Latin. Their number is 168, comprised in nine collections or chapters. See CIVIL *law*.

They had their name *novel*, either from their making a great alteration in the face of the ancient law; or, as Cujas rather thinks, because made on new cases not yet considered; and, after the revisal of the code, compiled by order of the emperor.

Wherever Accursius speaks of *novels*, he means those published, in Greek, by Justinian: the Latin version of them, made in the time of Bulgarus, he calls *Authentics*, by reason of its exactness and fidelity.

NOVEL, in *Matters of Literature*, a fictitious history of a series of surprising and entertaining events in common life, wherein the rules of probability are, or ought to be strictly observed; in which it differs from a romance, where the hero and heroine are some prince and princess, and the events, which lead to the catastrophe, are, in general, highly absurd and unnatural. The best *novels* are those, which, by means of a well-told story, convey a number of noble and elevated sentiments, and instruct the reader in the knowledge of mankind.

NOVEL *assignment*, in an action of trespass, is an assignment of time, place, or the like, in a declaration, otherwise or more particularly than it was in the writ.

NOVEL *disseisin*. See ASSISE *of novel disseisin*.

NOVEMBER, the eleventh MONTH in the Julian year, but the ninth in the year of Romulus; whence its name.

NOVEMSILES, or NOVENSILES, in *Mythology*, a species of Gods worshipped among the ancient Romans.

The *dii novensiles* were the gods of the Sabines, adopted by Romulus; and had a temple built to them, in consequence of a vow, by king Tatius.

Some antiquaries take the name to have been given to those heroes who were first placed among the number of the gods; as Hercules, Vesta, Sanctity, Fortune, &c.

NOVEMVIRI, an order of magistrates at Athens, nine in number.

The *novemviri* were the chief magistrates of the city: their

their office only held for one year. Their chief was called *archon*, whose name was recorded in the Athenian fasti; as, at Rome, that of the consuls.

The second bore the title of *basileus*; the third, of *polemarchus*, i. e. chief of the troops; and the remaining six, of *thesmothetæ*.

NOVENDIALE, or NOVEMDIALE, in *Antiquity*, a solemn SACRIFICE among the Romans, held on occasion of any prodigies appearing to menace them with ill fortune.

It had its name from the term of its celebration; viz. *novem dies*, *nine days*.

NOUER *l'aiguillette*, in the *Manege*. See YERKING.

NOVICE, a perſon not yet ſkilled or experienced in an art or profeſſion.

In the ancient Roman militia, *novicii*, or *novitii*, were the young raw ſoldiers, diſtinguiſhed by this appellation from the veterans.

In the ancient orders of knighthood there were *novices*, or clerks in arms, who went through a kind of apprenticeſhip before they were admitted knights.

NOVICE is more particularly uſed, in monaſteries, for a religious, yet in his, or her year of probation, and who has not made the vows.

In ſome convents the ſuperior has the direction of the *novices*. In nunneries the *novices* wear a white veil, the reſt a black one.

A *novice* is not eſteemed dead in law, but is capable of inheriting till the time of actual profeſſion; nor can his benefices be taken away during the year of probation, without his conſent.

The council of Trent prohibits a *novice* from aſſigning over his benefices, till two months before the expiration of his year of probation; and he may even reſume them, if the profeſſion be null.

A *novice* is not allowed to make any donation to his ſuperior, by reaſon of the dependance he is under.—*Novices* may either quit the convent during their noviciate, or may be turned off by the convent.

NOVICIATE, a year of probation, appointed for the trial of religious, whether or no they have a vocation, and the neceſſary qualities for living up to the rule; the obſervation whereof they are to bind themſelves to by vow.

The *noviciate* laſts a year at leaſt; in ſome houſes more. It is eſteemed the bed of the civil death of a novice, who expires to the world by profeſſion.

NOVICIATE is alſo uſed for the houſes or places where *novices* are inſtructed.

In this ſenſe the *noviciate* is frequently a cloiſter ſeparate from the grand dormitory.

NOUN, *nomen*, in *Grammar*, a name or word which expreſſes the ſubject ſpoken of; or expreſſes a ſubject whereof ſomething is, or may be affirmed; as man, food, whiteneſs, Henry, &c.

A *noun*, therefore, in language, anſwers to an idea in logic.

The generality of ſubjects ſpoken of have particular names; yet there are others, which, without being attached to the ſame particular ſubject, are yet real *nouns*.

Thus, beſides the particular name which each perſon bears, and whereby others denote him, he gives himſelf another when he ſpeaks of himſelf; as *I*, or *myſelf*.

It is only the more particular names that in grammar have retained the quality of *nouns*; the more general ones are called *pronouns*.

Nouns, again, are to be viewed in another light, viz. as divided into *nouns ſubſtantives*, and *nouns adjective*.

They are called *ſubſtantives* when the objects they deſign are conſidered ſimply in themſelves, and without any regard to their qualities.

They are called ADJECTIVES, when their objects are conſidered as clothed with any qualities.

But, in effect, the object is alone deſigned by the *nouns* ſubſtantives; which, in this view, are alone the proper *nouns*.

Adjectives, in reality, are only the modificatives of *nouns*; though in one view they may be conſidered as *nouns*; viz. as they do not ſo much repreſent a quality or circumſtance of the object, as the object itſelf, clothed with that quality or circumſtance. Nor muſt it be omitted, that a *noun* adjective frequently becomes a ſubſtantive: for as its nature is to expreſs the quality of an object, if that quality happen to be the object itſelf ſpoken of, then, according to our firſt definition, it becomes a ſubſtantive.

Thus, if I ſay, *a good intention*, the word *good* is here an adjective, repreſenting the intention as clothed with the quality of goodneſs; but if I ſay, *the good is to be choſen*, it is evident that *good* is here the ſubject ſpoken of and of conſequence is a *noun* ſubſtantive. Nor are there caſes wanting, wherein *nouns* ſubſtantives become adjectives.

It is true, that in the common uſe of grammar, many *nouns*, that are really adjectives, are not reckoned as ſuch: none being eſteemed adjectives but thoſe which without any, or at leaſt any conſiderable change in their inflexion and termination, are joined indifferently to *nouns* ſubſtantives of different genders.

Nouns are again divided into *proper* and *appellative*.

Nouns proper are thoſe which expreſs a particular thing or perſon, ſo as to diſtinguiſh it from all other things of the ſame kind; as, Socrates.

Nouns appellative are thoſe common to ſeveral individuals of the ſame kind; as man, angel, &c.

NOUNS, *heterogeneous*, are ſuch as are of one gender in the ſingular number, and of another in the plural. See HETEROCLITE.

NOURISHING *clyſters*. See CLYSTER.

NOURISHMENT. See NUTRITION.

NOVUS *auris muſculus*, in *Anatomy*, a name given, by Fabricius, to the muſcle called, by Albinus, *laxator tympani*, and, by others, *externus auris*, and *exterior*.

NOWED, NOWE, i. e. *knotted*, in *Heraldry*, is applied to the tails of ſuch creatures as are very long, and ſometime repreſented in coat-armour, as if tied up in a knot.

NUAYHAS, the *agus-tree*, a name given by the Indians to a ſort of bamboe cane, the leaves of which falling into the water, are ſaid to impregnate it with ſuch virtue, that the bathing in it afterwards will cure the ague. They uſe alſo a decoction of the leaves to diſſolve coagulated blood, giving it internally, and, at the ſame time, rubbing the bruiſed part externally with it.

There ſeems ſomething of fiction in the account of many particulars of this tree, in the Hortus Malabaricus, but it ſeems certain that the length of the ſtalks, or trunk, muſt be very great; for, in the gallery of Leyden, there is preſerved a cane of it of twenty-eight feet long, and another but little ſhorter in the Aſhmolæan Muſeum at Oxford, which is more than eight inches in diameter; yet both theſe appear to be only parts of the whole trunk, they being nearly as large at one end as at the other.

NUBECULA, *little cloud*, in *Medicine*, a term ſometimes uſed for a diſeaſe in the eye, where objects appear as through a cloud, or miſt.

The *nubecula* ſeems to ariſe from certain groſs particles detained in the pores of the cornea, or ſwimming in the aqueous humour, and thus intercepting the rays of light.

NUBECULA, or NUBES, is alſo uſed for what we otherwiſe call ALBUGO and PANNUS.

NUBECULA is alſo uſed for a matter in form of a cloud, ſuſpended in the middle of the urine. This they ſometimes alſo called ENAOREMA. See URINE.

NUBELOSA *linea*, a term uſed by the Latin writers on heraldry, to expreſs a ſort of clouded line in certain coats of arms. Our heralds call it NEBULE, and the French *nuance*. It is figured ſo as to repreſent clouds at the edge, and was given to the firſt of the families who bear it, as a token of their ſkill in aſtronomy and navigation.

NUBES, in *Natural Hiſtory*, a word uſed by the ancients to expreſs that whitiſh foulneſs which we frequently ſee in the bottom of the fineſt columns of cryſtal; we expreſs this by the ſame word, *cloud*.

The columnar emeralds are ſubject to the ſame ſort of foulneſs at their bottom; and this part was called the root of the emerald properly enough, as it was that end of the column where it grew to the ſtone; but the word root of emerald has been ſince applied to ſeveral very different ſubſtances of a green colour, and ſome degree of tranſparence.

NUBIGENUM *ærs*, a term uſed by ſome hiſtorians to ſignify copper generated in the clouds, and falling from thence with rains, or in ſtorms. They talk alſo of iron, and of ſtones produced the ſame way, and call them *ferrum nubigenum*, and *lapides nubigeni*.

Many of the German hiſtorians mention the falling of iron in duſt, and in large pieces; and Avicenna tells us ſuch things of Italy. Phil. Tranſ. N° 150. See *Præternatural* RAINS.

NUBILES *anni*. See ANNI.

NUCHA, the hinder part of the nape of the neck; called alſo CERVIX.

NUCIFEROUS, an appellation given by botaniſts to trees which bear nuts.

NUCIFRAGA, in *Ornithology*, a name given by many to the COCCOTHRAUSTES, or *groſs-beak*, from its breaking nuts, and the ſtones of fruits.

NUCKIANÆ *glandulæ*, in *Anatomy*, a number of ſmall glands, ſituate in that part of the ſkull wherein the orbits of the eyes are, between the abducent muſcle of the eye, and the upper part of the os jugale. See GLAND.

They

They were thus denominated from their discoverer, Ant. Nuck, professor of physic at Leyden.

The same author gave his name to a SALIVAL duct, *ductus Nuckianus*.

NUCLEUS, a Latin word, literally denoting the kernel of a nut, or stone-fruit; or, more strictly, the edible part contained within the skin of the kernel.

NUCLEUS is also used by botanists, in a larger sense, for any fruit or seed contained within a husk or shell.

NUCLEUS is also used by Hevelius, and some other astronomers, for the body of a comet, which others call its *head*, in contradistinction to its tail, or beard.

NUCLEUS is also applied by some to the central parts of the earth, and other planets, as supposing them to be loose from the exterior part, which they consider as a cortex or shell.

NUCLEUS, in *Architecture*, denotes the middle part of the flooring of the ancients, consisting of a strong cement, over which they laid the pavement, bound with mortar.

NUCULA *terrestris*, in *Botany*, a name given by some to the BULBOCASTANUM.

NUDE *compact*, *nudum pactum*, a bare contract, engagement, or promise of a thing without any consideration: *Ex quo*, say the lawyers, *non oritur actio*. See CONTRACT.

NUDE *matter* denotes a bare allegation of a thing done.—See MATTER.

NUDIPEDALIA, among the ancients, a festival in which all were obliged to walk bare-footed.

This was done on account of some public calamity, as the plague, famine, an intense drought, and the like.

It was likewise usual for the Roman matrons, when any supplication and vows were to be made to the goddess Vesta, to walk in procession to her temple bare-footed.

NUDITIES, in *Painting* and *Sculpture*, denote those parts of a human figure not covered with any drapery; or those parts where the carnations appear.

NUEL, or rather NEWEL of a stair-case. See NEWEL, and STAIR-*case*.

NUFAR, in *Botany*, the name of the *water*-LILY. This was the original name, and was first used by the Arabians; from them the Greeks borrowed it, and variously changed it.

The Arabians themselves added the prefix *nil* to it, to express one particular kind of *water-lily* of Ægypt.

NULLITY, the quality of a thing null; that is void, and of no effect, by reason of something contrary to law, custom, or form.

There are two kinds of *nullities* to invalidate a contract, or other instrument, viz. *de facto*, and *de jure*. The former where the thing commences null, *ipso facto*, as soon as the thing is proved: in the latter the act does not immediately become null, but a handle is given thereby to have it entirely annulled, or set aside.

NUMB-*fish*, a CRAMP-*fish*, in *Ichthyology*. See TORPEDO.

NUMBER, in *Arithmetic*, a collection or assemblage of several units, or several things of the same kind.

Stevinus chooses to define *number* as that whereby the quantity of any thing is expressed: agreeable to which, sir Isaac Newton conceives a *number* to consist, not in a multitude of units, as Euclid defines it, but in the abstract ratio of a quantity of any kind to another quantity of the same kind, which is accounted as unity. And in this view he divides *number* into three kinds, viz. INTEGERS, FRACTIONS, and SURDS.

Wolfius defines *number* to be something which refers to unity, as one right line refers to another. Thus, assuming a right line for unity, a *number* may likewise be expressed by a right line.

A less general definition of *number* that author thinks will not comprehend the several kinds of whole *numbers*, fractions, rationals, and surds.

The schoolmen, keeping to Euclid's definition, hold *number* to consist of *matter* and *form*: the matter is the things numbered, e. g. coins: the form, the idea whereby comparing the several pieces, we bring them into one sum, as ten: so that *number* depends altogether on the mind of the person that numbers; whence, changing the idea at pleasure, a hundred men shall only be called one, or it shall be two, or four, &c. Hence, say they, the form of a *number* is not any thing added to the things numbered; for the idea is a mere mode of the mind, not any thing superadded to the things. And hence, though there may be some efficacy in *number*, considered with respect to the matter, as when we say, a triple rope is not easily broken; yet there is none in respect to form; for what alteration should my idea make? And hence the folly of the philosophy of *numbers*.

The same philosophers call *number a discrete quantity*: *quantity*, as it admits of more and less; and *discrete*, since the several units it consists of are not united, but remain distinct.

NUMBERS, *for the manner of characterizing*, see NOTATION.

For that of expressing or reading those already characterized, see NUMERATION.

NUMBER, *for the measure of a*, see MEASURE.

Mathematicians, considering *number* under a great many circumstances, different relations, and accidents, make many kinds of *numbers*.

NUMBERS, *absolute*, *abstract*, *abundant*, *amiable*, *applicate*, *binary*. See the respective adjectives.

NUMBERS, *broken*, or *fractions*, are those consisting of several parts of unity; or those which refer to unity, as a part of the whole. See FRACTION.

NUMBERS, *cardinal*, *circular*, *composite*, *concrete*. See the adjectives.

NUMBER, *cubic*, the product of a square *number*, multiplied by its root; e. g. 8, the product of the square *number* 4, multiplied by its root 2. See CUBIC.

All *cubic numbers*, whose root is less than 6, v. g. 8, 27, 64, 125, being divided by 6, the remainder is their root itself. Thus, 8, being divided by 6, 2, the remainder of the division, is the cube root of 8. For the *cubic numbers* beyond 125; 216, the cube of 6, divided by 6, leaves no remainder; 343, the cube of 7, leaves a remainder of 1, which added to 6 gives the cube root of 343. And 512, the cube of 8, divided by 6, leaves 2, which added to 6, makes the cube root of 512. So that the remainder of the divisions of the cubes above 216, divided by 6, being added to 6, always give the root of the *cubic number* divided, till that remainder be 5, and of consequence 11 the cube root of the *number* divided: but the *cubic number* above this, being divided by 6, there remains nothing, the cube root being 12. Thus, if you continue to divide the higher cubes by 6, you must not add the remainder of the division to 6, but to 12, the first multiple of 6, and thus coming to the cube of 18; the remainder of the division must not be added to 6, nor to 12, but to 18; and so *in infinitum*.

Mons. de la Hire, from considering this property of the *number* 6, with regard to *cubic numbers*, found, that all other *numbers*, raised to any power whatsoever, had each their divisor, which had the same effect with regard to them, that 6 has with regard to cubes. And the general rule he has discovered is this: if the exponent of the power of a *number* be even, i. e. if that power be raised to the 2d, 4th, 6th, &c. power, it must be divided by 2; and the remainder, if there be any, added to 2, or to a multiple of 2, gives the root of the *number* corresponding to its power, i. e. the 2d or 6th root, &c. But, if the exponent of the power of the *number* be uneven, i. e. if it be raised to the 3d, 5th, 7th, &c. power, the duple of that exponent will be the divisor, which shall have the property here required.

NUMBERS, *defective*. See DEFICIENT.

NUMBER, *determinate*, is that referred to some given unit; as a ternary or three; which is what we properly call a *number*.

NUMBER, *even*, that which may be divided into two equal parts, without remainder or fraction; as 4, 6, 8, 10, &c. The sum, as also the difference, and the factum or product of any number of *even numbers*, is always an *even number*.

An *even number*, multiplied by an *even number*, produces an *evenly even number*.

An *even number* is said to be *evenly even*, when it may be measured or divided, without any remainder, by another *even number*.

Thus, twice 4 being 8, 8 is an *evenly even number*.

A *number* is said to be *unevenly even*, when it may be equally divided by an *uneven number*; as 20, which may be divided by 5.

NUMBERS, *figurate* or *figural*. Those of the first order are 1, 1, 1, 1, &c. those of the second order, the successive sums of those of the first order, viz. 1, 2, 3, 4, 5, &c. and form an arithmetical progression; those of the third order are the successive sums of those of the second, viz. 1, 3, 6, 10, 15, &c. and are the triangular numbers; those of the fourth order are successive sums of the third, viz. 1, 4, 10, 20, 35, and are the pyramidal numbers, and so on.

The *figurate numbers* of any order may be found without computing those of the preceding orders, by taking the successive products of as many of the *numbers* 1, 2, 3, 4, 5, &c. in their natural order, as there are units in the *number*, which denominates the order of *figurates* required, and dividing those products always by the first product: thus the triangular *numbers* are found by dividing the products 1×2, 2×3, 3×4, 4×5, 5×6, &c. each by the first product 1×2. The pyramids also are found by dividing the products $1\times2\times3$, $2\times3\times4$, $3\times4\times5$, $4\times5\times6$, &c. each by $1\times2\times3$. In general, the *figurate numbers* of any order denoted by M, are

found by ſubſtituting ſucceſſively 1, 2, 3, 4, 5, &c. in the place of x in the general expreſſion $\frac{x.x+1.x+2.x+3.\&c.}{1.2.3.4.\&c.}$ where the factors in the numerator and denominator are ſuppoſed to be multiplied by each other, and to be continued, till the number in each be equal to that which expreſſes the order of the figurates required, diminiſhed by unity. And when a *figurate number* of any order is divided by the correſponding figurate of any higher order, the numerator of the quotient is invariable, and n is in its denominator of as many dimenſions as there are units in the difference of the *numbers* that denote thoſe orders. See Maclaurin's Fluxions, art. 351, in the notes.

NUMBERS, *homogeneal*, are thoſe referred to the ſame unit. See HOMOGENEAL.

NUMBERS, *heterogeneal*, thoſe referred to different units. For every *number* ſuppoſes ſome determinate unit, which is determined by the notion to which we have regard in numbering; e. g. it is a diſtinguiſhing property of a ſphere, that the ſeveral points of its ſurface are equidiſtant from its centre. If then this be laid down as a note of unity, all bodies, to which it agrees, will have the nature of unity; and are the ſame units, *quotenus*, contained under this notion. But, if ſpheres be diſtinguiſhed, e. g. with regard to the matter they are compoſed of, then thoſe which before were the ſame units commence different. Thus, ſix golden ſpheres, and three golden ſpheres, are *homogeneal numbers* among themſelves: and three braſs ſpheres, and four ſilver ones, are *heterogeneous numbers*.

NUMBERS, *imperfect*, thoſe whoſe aliquot parts added together make either more or leſs than the whole, whereof they are parts.

Imperfect numbers are diſtinguiſhed into *abundant* and *defective*.

NUMBER, *indeterminate*, is that referred to unity in the general; which is what we call QUANTITY.

NUMBER, *irrational*, or *ſurd*, a *number* incommenſurable with unity. See SURD.

NUMBERS, *linear*, *mixt*. See the adjectives.

NUMBERS, *muſical*. See MUSICAL.

NUMBER, *ordinal*. See ORDINAL.

NUMBER, *perfect*, that whoſe aliquot parts added together make the whole *number*; as 6, 28, &c. The aliquot parts of 6 being 3, 2, and $1=6$; and thoſe of 28 being 14, 7, 4, 2, 1, which together make 28.

NUMBER, *plain*, that ariſing from the multiplication of two *numbers*; e. g. 6, which is the product of 3 multiplied by 2. The *numbers*, which thus multiplied produce a *plain number*, as here, 2 and 3 are called the *ſides* of the plane.

NUMBERS, *polygonous*. See *Figurate* NUMBER, and POLYGONAL.

NUMBER, *primitive* or *prime*. See PRIME.

NUMBERS, *pyramidal*. See PYRAMIDAL.

NUMBER, *rational*. See RATIONAL.

NUMBERS, *ſimilar*. See SIMILAR.

NUMBER, *ſquare*. See SQUARE.

Every *ſquare number*, added to its root, makes an even *number*.

NUMBER, *uneven*, that which exceeds an *even number*, at leaſt, by unity; or which cannot be divided into two equal parts; ſuch are 3, 5, 9, 11, &c.

The ſum, or the difference of two *uneven numbers*, makes an *even number*; but the factum of two makes an *uneven* one.

If an *even number* be added to an *uneven* one, or if the one be ſubtracted from the other; in the former caſe, the ſum, in the latter, the difference, is an *uneven number*: but the factum of an *even* and *uneven number* is even.

The ſum of any *even number* of *uneven numbers* is an *even number*; and the ſum of any *uneven number* of *uneven numbers* is an *uneven number*.

NUMBERS, *whole*, called alſo *natural numbers*, and *integers*, or ſimply *numbers*, are all the various aſſemblages of unity, or the ideas we have of ſeveral multitudes; or, according to Wolfius, all thoſe which, in the manner of expreſſing, refer to unity, as a whole does to a part.

NUMBER, *golden*, in *Chronology*. M. Caſſini defines the *golden number* by the number of years elapſed ſince that which had the new moon on its firſt day; as that of the year 1500, whoſe *golden number* was 0; which he takes for his epocha.

NUMBERS, *golden*, is alſo uſed, with ſomewhat leſs propriety, for a period of 19 years, invented by Meton the Athenian; at the end whereof, the ſame lunations return in the ſame days, though not preciſely in the ſame hour and minute of the day; but within an hour and a half of the ſame time.

In which ſenſe, *golden number* amounts to the ſame with what we otherwiſe call *lunar* CYCLE, or *Metonic year*.

Hence this period, called by the Greeks *ennaedecaeteris*, is not perfectly juſt; there being a proemptoſis, or leap, at the end of each 312 years; i. e. in that time, the lunations fall out a day ſooner than the *golden number* expreſſes them.

This, among other things, was what engaged pope Gregory XIII. to reform the calendar, to throw out the *golden number*, and ſubſtitute the cycle of epacts inſtead of it: for the uſe of the *golden number*, which, in the Julian calendar, ſerves to find the new moons, only ſerves, in the Gregorian, to find the cycle of epacts.

This *number* is ſaid to have had its name, *golden*, from the extent of its uſe; or, otherwiſe, becauſe the Athenians received it with ſo much applauſe, that they had it written in the public market in letters of gold.

NUMBER, *golden, of any year of Chriſt, to find the*. Since the lunar cycle commences with the year before our Saviour's birth; to the year of our Lord add 1: then dividing the ſum by 19; the remainder, after the diviſion, is the *golden number* required: if there be nothing remaining, the *golden number* is 19. Suppoſe, e. g. the *golden number* of the year 1781, were required: $1781+1=1782$. And 1782, divided by 19, gives a quotient of 93, and leaves a remainder of 15, which is the *golden number* of that year. See EPACT.

The following table ſhews the *golden number* (which is the ſame both in the old and new ſtyle), from the Chriſtian æra to A. D. 4000.

Years leſs than a Hundred.

Hundreds of Years.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37
	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56
	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75
	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94
	95	96	97	98	99														
0 1900 3800	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
100 2000 3900	6	7	8	9	10	11	12	13	14	15	16	17	18	19	1	2	3	4	5
200 2100 4000	11	12	13	14	15	16	17	18	19	1	2	3	4	5	6	7	8	9	10
300 2200 &c.	16	17	18	19	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
400 2300 —	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	1
500 2400 —	7	8	9	10	11	12	13	14	15	16	17	18	19	1	2	3	4	5	6
600 2500 —	12	13	14	15	16	17	18	19	1	2	3	4	5	6	7	8	9	10	11
700 2600 —	17	18	19	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
800 2700 —	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	1	2
900 2800 —	8	9	10	11	12	13	14	15	16	17	18	19	1	2	3	4	5	6	7
1000 2900 —	13	14	15	16	17	18	19	1	2	3	4	5	6	7	8	9	10	11	12
1100 3000 —	18	19	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1200 3100 —	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	1	2	3
1300 3200 —	9	10	11	12	13	14	15	16	17	18	19	1	2	3	4	5	6	7	8
1400 3300 —	14	15	16	17	18	19	1	2	3	4	5	6	7	8	9	10	11	12	13
1500 3400 —	19	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1600 3500 —	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	1	2	3	4
1700 3600 —	10	11	12	13	14	15	16	17	18	19	1	2	3	4	5	6	7	8	9
1800 3700 —	15	16	17	18	19	1	2	3	4	5	6	7	8	9	10	11	12	13	14

NUMBER *of direction*, in *Chronology*. The earliest EASTER possible is the twenty-second of March, and the latest the twenty-fifth of April. Within these limits are thirty-five days, and the *number* belonging to each of them is called the *number of direction*, because thereby the time of Easter is found for any given year.

To find this *number*, according to the new style, first find the DOMINICAL *letter*, then find the golden *number*, by the rule or table under the preceding article, entering the table with the complete hundreds of the same year at the left hand, and the year below an hundred at the top, and where the columns meet is the golden *number* for the same year. Lastly, enter the annexed table, with the Dominical letter on the left hand, and the golden *number* at the top; and where the columns meet is the *number of direction* for that year.—Thus, the Dominical letter, new style, for the year 1781, is G, and the golden *number* is 15, by which, in the following table, the *number of direction* is found to be 25, which, reckoning from the 21st of March, ends on the 15th of April, which is Easter Sunday in that year.

Table shewing the *number of direction*, for finding Easter Sunday, by the golden *number* and Dominical letter.

G. N.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
A	29	19	5	26	2	33	19	12	26	19	5	26	12	5	26	12	33	19	12
B	27	13	6	27	3	34	20	13	27	20	6	27	13	6	20	13	34	20	6
C	8	14	7	28	14	35	21	7	28	21	7	28	14	7	21	14	28	21	7
D	29	15	8	29	22	8	29	15	8	29	15	1	22	15	29	22	8		
E	3	16	2	23	16	30	23	9	30	16	9	23	16	2	23	9	30	23	9
G	24	17	3	24	10	31	24	17	10	24	17	3	24	10	31	24	17	10	
H	25	18	4	25	11	32	18	11	32	18	4	25	18	4	25	11	32	18	11

This Table is adapted to the New Style.

Ferguson's Astron. p. 275.

NUMBER, in *Grammar*, is a modification of nouns, verbs, &c. to accommodate them to the varieties of their objects, considered with regard to *number*.

Nouns, or names, agreeing to several things, may be considered either as applied to one of those things singularly, or to a *number* of them; and those either considered as several, or as united. To distinguish these cases, two *numbers* have been invented, the *singular* and *plural*.

When a noun indicates an object considered as single, or alone, or a *number* of them considered as united together, it is said to be of the *singular number*: as, a tree, a troop, a temple.

When it indicates several objects, and those as distinct, it is of the *plural number*: as trees, or temples. Thus, when I speak of myself, as making part of several others, instead of I, I say, we, &c.

The Greeks have a third *number*, which they call the *dual number*, as signifying two. The Hebrews have something like it; but then it only takes place when the words signify a thing double, either by nature, as the hands, the eyes, &c. or by art, as scissars, tongs, &c. As to common and appellative names, they seem all naturally to require a plural *number*; yet there are several, which have none, as the name of gold, steel, &c.

The difference of *numbers* in nouns is expressed by a difference of termination or ending.

In English, the singular is usually converted into plural, by adding s; as tree, trees; hand, hands; &c. Where the pronunciation requires it, as when the singular ends in s or x, sh, or ch, it is usually done by the addition of es, instead of s.

The plurals of adjectives, though varied from the singulars in most other languages, yet in English are generally the same.

NUMBERING *rods*. See NEPER's *bones*.

NUMBERS, in *Poetry*, *Oratory*, *Music*, &c. are certain measures, proportions, or cadences, which render a verse, period, or song agreeable to the ear.

Poetical and *prosaic numbers* are somewhat different.

NUMBERS, *poetical*, consist in a certain harmony in the order, quantities, &c. of the feet and syllables; which make the piece musical to the ear, and fit for singing; for which all the verses of the ancients were intended. See RHYTHM.

It is of these *numbers* Virgil speaks in his fourth eclogue:

——*Numeros memini, si verba tenerem.*

And again, in the sixth eclogue:

Tum vero in numerum faunosque ferasque videres
Ludere——

The *numbers* are what constitute the air and character of a verse; and denominate it smooth, or soft, or low, or rough, or sonorous. The following lines of Milton furnish an instance of soft, easy *numbers*:

Then feed on thoughts, which voluntary move
Harmonious numbers; as the wakeful bird
Sings darkling, and, in shadiest covert hid,
Tunes her nocturnal note——

How different from the *numbers* of these!

Arms meet with arms, foucheons with foucheons clash,
And sparks of fire, struck out from armour, flash.

NUMBERS, *rhetorical*, or *prosaic*, are a sort of simple unaffected harmony, less glaring than that of verse; yet such as is perceived, and affects the mind with pleasure. The *numbers* are that, by which the STYLE is said to be easy, free, round, flowing, &c.

A fine instance of *numbers* we have in that passage of Tully for Marcellus: *Nulla est tanta vis, tantusque copia, quæ non ferro ac viribus debilitari frangique possit.* All the beauty of which would be entirely lost to any tolerable ear, if the *numbers* were a little inverted, thus: *Nulla est vis tanta, & copia tanta, quæ non possit debilitari frangique viribus & ferro.*

Numbers are things absolutely necessary in all writing, and even in all speech. Hence Aristotle, Tully, Quintilian, &c. lay down abundance of rules as to the best manner of intermixing dactyls, spondees, anapests, iambuses, choriac, and dichoriac molossuses, &c. in order to have the *numbers* perfect.

The substance of what they have said, is reducible to what follows: 1. the style becomes numerous, by the alternate disposition and temperature of long and short syllables; so as that the multitude of short ones neither render it too hasty, nor that of longer ones too slow and languid. Thus Tully to Cæsar: *Domuisti gentes immanitate barbaras, multitudine innumerabiles, locis infinitas, omni copiarum genere abundantes*, &c.

Sometimes, indeed, long or short syllables are designedly thrown together, without any such mixture, to paint the celerity or slowness of a thing by that of the *numbers*; as,

Quadrupedante putrem sonitu quatit ungula campum.
Æneid. l. 8.

Luctantes ventos, tempestatesque sonoras.
Id. l. 1.

2. The style becomes numerous by the intermixing words of one, two, or more syllables: e. g. *Vitis; & vetus non ad deponendam, sed ad confirmandam audaciam.* Whereas the too frequent repetition of monosyllables renders the style pitiful and grating: e. g. *Hoc in re nos hic non sitis.*

3. It contributes greatly to the numerousness of a period, to have it closed by magnificent and well-sounding words; as, *Qui locus quietis ac tranquillitatis plenissimus fore videbatur, in eo maximæ molestiarum, & turbulentissimæ tempestates exstiterunt.*

4. The *numbers* depend not only on the nobleness of the words in the close, but in those of the whole tenor of the period; as in that fine oration of Cicero for Fonteius, a brother of one of the Vestal maids: *Nolite pati, judices, aras deorum immortalium, Vestæque matris, quotidianis virginum lamentationibus de vestro judicio commoveri.*

5. To have the period flow easily and equably, the harsh concurrence of letters and words is to be very studiously avoided, particularly the frequent meeting of rough consonants; as *ars studiorum, rex Xerxes*: the beginning the first syllable of a word with the last of the preceding; as, *Res mihi invisæ sunt*: the frequent repetition of the same letter or syllable; as in that verse of Ennius:

Africa terribili tremit horrida terra tumultu:

and the frequent use of like-ending words; as *amatrices, ajutrices, præstigiatrices, fuerunt*. See JUNCTURE.

Lastly, the utmost care is to be taken, lest, in aiming at *oratorial numbers*, you should fall into *poetical* ones; and instead of prose write verse; which even Cicero himself is sometimes guilty of: witness *Cum loquitur, tanti fletus gemitusque fiebant.*

With regard to English composition, the following cautions should be observed: a number of monosyllables should not be crouded together, nor several words of the same termination, especially if the accent falls on the same syllable in each of them; nor should a sentence end with a monosyllable: to which may be added, that very long words are not suited to the beginning or conclusion of a period. Ward's Orat. vol. i. p. 380, &c.

NUMELLA, among the Romans, an engine of wood used

used in punishing offenders, whose necks and feet were made fast in it.

NUMELLA was likewise used to denote a rope or cord made of raw ox-hides to bind beasts with.

NUMENIA, *Νουμηνια*, or *νεομηνια*, in *Antiquity*, a festival observed at the beginning of every lunar month, in honour of all the gods, but especially Apollo, who was called *Νουμηνιος*, because the sun is the author of all lights; for whatever distinction of times and seasons may be taken from other planets, yet they are all owing to him, as the original and fountain of all those borrowed rays, which the rest have only by participation from him.

For the ceremonies of this solemnity, see Potter, Arch. tom. i. p. 416.

NUMENIASTÆ, *Νουμηνιαστα*, among the *Ancients*, a designation given to those who kept a festival on every new moon. See NUMENIA.

NUMENIUS is a name used by many authors for the CURLEW, a bird more usually known by the name of ARQUATA.

NUMENIUS *indicus*, the *Indian curlew*. See GUARA.

NUMERAL *figures*. The antiquity of these in England has been supposed as high as the eleventh century, from an ancient date found at Colchester, at first thought to express 1090; the figure in the place of hundreds being taken for a cypher, by not attending to the inside strokes, which were pretty near defaced; but upon a more accurate view that mistake was discovered, and the date found to be 1490. See Phil. Trans. N° 439 and 475. See ARABIC *Figures*, and FIGURES.

NUMERAL *letters*, those letters of the alphabet, which are generally used for figures; as, I, V, X, L, C, D, M.

NUMERAL *characters*. See CHARACTER.

NUMERALS, in *Grammar*, are those words which express *numbers*; as six, eight, ten, &c. See ORDINALS.

NUMERATION, in *Arithmetic*, the art of estimating or pronouncing any *number*, or series of *numbers*.

The characters, whereby *numbers* are ordinarily expressed, are the nine following ones; 1, 2, 3, 4, 5, 6, 7, 8, 9.

It being the law of the common *numeration*, that when you are arrived at ten, you begin again, and repeat as before; only expressing the number of tens.

Weigelius, indeed, shews how to number, without going beyond a quaternary; i. e. by beginning to repeat at each fourth. And Leibnitz, in what he calls his *binary arithmetic*, begins to repeat at every second; only using two characters, 1 and 0. But these are rather matters of curiosity than use.

That the nine numerical notes may express not only units, but also tens or decads, hundreds or centuries, thousands, &c. they have a local value given them; so as that, when either alone, or when placed in the right hand place, they denote units; in the second place, tens; in the third, hundreds; and in the fourth, thousands.

Now to express any written number, or assign the proper value to each character: divide the proposed number by commas into classes, allowing three characters in each class, beginning at the right hand. Over the right-hand figure of the third class, add a small mark, or transverse line; over the right-hand figure of the fifth class, add two marks, or transverse lines; over that of the seventh, three, &c. The number to the left-hand of the first comma, expresses by thousands; that which has over it the first transverse line, expresses by millions; that with two, by billions; that with three, by trillions, &c. Lastly, the left-hand character of each class, expresses by hundreds; the middle one by tens; and the right-hand one by units. Thus will the *numeration* be effected.

E. gr. The following numbers 2^{m}, 125,473', 613,578', 432,597, is thus expressed or read: two trillions, one hundred twenty-five thousand four-hundred seventy-three billions, six-hundred thirteen-thousand five-hundred seventy-eight millions, four-hundred thirty-two thousand five hundred and ninety-seven.

NUMERATOR, in speaking of fractions, signifies the number, which shews how many of those parts, which the integer is supposed to be divided into, are expressed by the fraction.

The *numerator* is that part of a fraction which is placed over the little bar, by which it is separated from the under number called the *denominator*, and which shews into how many parts the integer is divided.

Thus, v. gr. $\frac{7}{10}$ expresses seven tenths; where 7 is the *numerator*, and 10 the denominator. See FRACTION.

NUMERICAL, NUMEROUS, or *numeral*, something that relates to number.

NUMERICAL *algebra* is that, which makes use of numbers, instead of letters of the alphabet.

NUMERICAL *difference* is the difference, whereby one individual is distinguished from another.

Hence a thing is said to be *numerically* the same, *idem numero*, or *numerice*, when it is the same in the strictest sense of the word. See UNITY and IDENTITY.

NUMERO, in *Commerce*, &c. a term prefixed to any number of things; marked or abbreviated thus, N°. See BOOK.

De NUMERO, i. e. by tale, is used in ancient authors for the payment, e. gr. of a pound in a certain number of pieces, viz. twenty shillings.

In contradistinction to *libra pensa*, or a pound weighed out.

NUMEROUS *arithmetic*. See ARITHMETIC.

NUMEROUS *exegesis*. See EXEGESIS.

NUMIDA, in *Ornithology*. See GUINEA *Hen*.

NUMISMATOGRAPHIA, a Greek term used for the description and knowledge of ancient medals and coins, whether of gold, silver, or brass.

Fulvius Ursinus, Ant. Augustinus, bishop of Saragosa, Frizzo, a noble Venetian, and Sambucus, a Polish gentleman, have all succeeded in the *numismatographia*. Nor must the more modern authors on the same subject be omitted; viz. the two Mezzabarbas, Patin, Spanheim, Hardouin, Morel, Vaillant, Joubert, Baudelot, Beger; and, among ourselves, Evelyn.

NUMMULARIA, in *Botany*. See MONEY-*wort*.

NUMMULARIUS, among the Romans, was used to signify a *banker*, or person who deals in money.

It likewise denoted an assayer, or one who estimated the goodness and value of money, as to its weight and fineness of metal.

NUMMUS, or NUMUS, among the Romans, a particular piece of money, otherwise called *sestertius* or *sesterce*.

This was sometimes called *nummus sestertius*. *Decem millia nummûm, & decem millia sestertium*, were Roman sums, which amounted to the same.

NUN, NONNA, a word anciently used for a female religious, and still retained in that sense in our language, and in other languages, particularly the French, but by way of ridicule and burlesque.

The word comes from *nonna*, *nonnana*, or *nunnanis*, all Latin terms, first used for penitents, then for religious. Borel derives it from *nonno*, or *nonna*, which, in Italian, signifies *grandfather* or *grandmother*; and adds, that it was applied by way of honour to the woman, as that of FATHER to the man, religious.

Nun or *nonnes*, used to signify a monk, are of Hebrew extraction, from *nin*, or *nun*, *a son*.

Hence also *nunnery*, a monastery of female religious.

NUN, in *Zoology*, the common English name for the PARUS *cærulus*, or blue TITMOUSE, distinguished from the common titmouse by its smallness, and by its having a blue head surrounded by a white line.

NUN is also the name of a peculiar species of pigeon, called by Moore the *columba cristata*. It is but a small pigeon, but something larger than the jacobine, and has a very particular plumage, from which it takes its name, its head being as it were covered with a veil.

The body of this species is all white, the head, tail, and six of the flight-feathers black, red, or yellow; the eyes are pearl-coloured, and the hood white: this is a large tuft of feathers on the hinder part of the head, and the more numerous they are, the more the bird is esteemed. This is a very beautiful species of pigeon, and is very much esteemed. Some of its feathers, however, will vary sometimes from their true colour; these birds are called foul feathered: but it is a mere accidental variety, the young of such being often as perfect and beautiful as of any others.

NUNCIATION, *nunciatio*, among the Romans, was particularly used to signify the report which the augur made concerning what he had seen.

This he did to the chief magistrate present, and the magistrate communicated the same to the people, and so dismissed the assembly, which was called *renunciation*.

NUNCIO, or NUNTIO, an ambassador from the pope to some catholic prince or state; or a person who attends, on the pope's behalf, at a congress, or an assembly of several ambassadors.

The word *nuncio* has the same import with ambassador; but is restrained, in its use, to the ambassadors of popes alone; as that of internuncio is to their envoys extraordinary.

The *nuncio* has a jurisdiction, and may delegate judges, in all the states where he resides, except in France, where he has no authority, but that of a simple ambassador.

NUNCUPATIVE, in the *Schools*, a term used to express something that is only nominal, or has no existence, but in name.

Felix of Urgel maintained, that Jesus Christ, as man, was only God *nuncupatively*, i. e. nominally. Alcuin, in his answer to Felix, maintains, that it is to fall into Nestorianism to distinguish two Sons of God in Jesus Christ, the

the one natural, the other adoptive; and two Gods, the one real, the other *nuncupative*.

NUNCUPATIVE *will* denotes a laſt WILL or TESTAMENT only made verbally, or *viva voce*, and not put in writing.

NUNDINAL, NUNDINALIS, a name which the Romans gave to the eight firſt letters of the alphabet, uſed in their calendar.

This ſeries of eight letters, A, B, C, D, E, F, G, H, is placed and repeated ſucceſſively from the firſt to the laſt day of the year: one of theſe always expreſſed the market-days, or the aſſemblies called *nundinæ*, *quaſi novendinæ*, becauſe they returned every nine days.

The country people, after working eight days ſucceſſively, came to town the ninth, to ſell their ſeveral commodities, and to inform themſelves of what related to religion and government.

Thus, the *nundinal* day being under the letter A on the 1ſt, 9th, 17th, and 25th, days of January, &c. the letter D will be the *nundinal* letter of the year following. Theſe *nundinals* bear a very great reſemblance to the DOMINICAL *letters*, which return every eight days, as the *nundinals* did every nine.

NUNTIO. See NUNCIO.

NUPER *obiit*, in *Law*, a writ which lies for a coheireſs being deforced by her coparcener of lands or tenements, whereof their common father or anceſtor died ſeiſed in fee-ſimple.

If the anceſtor died ſeiſed in fee-tail, the coheireſs deforced ſhall have a formedon.

NUPTIAL, ſomething that relates to MARRIAGE.

NURSERY, in *Gardening*, denotes a ſeminary, or ſeed-plot, for raiſing young trees or plants.

Some authors make a difference between *nurſery* and *ſeminary*, holding the former not to be a place wherein plants are ſown; but a place for the reception and rearing of young plants, which are removed, or tranſplanted hither from the ſeminary, &c.

With regard to a *nurſery*, it may be obſerved in general, that the mould of it ſhould be rich, deep, and ſtiffiſh, though the trees be afterwards removed into a poorer ſoil. Having fixed upon the place, let it be well fenced, ſo as to keep out not only cattle, but rabbits and hares; then trench the land all over, turning the turf down to the bottom of the trench, and covering it with the other mould, taking care not to dig deeper than the natural ſoil. When the whole is thus trenched, or double dug, which muſt be in September, the ſurface ſhould be ſmoothed, and laid out in quarters for the reception of the different trees from the SEMINARY.

Mr. Lawrence recommends the having ſeveral *nurſeries* for the ſeveral kinds of trees: one for tall ſtandards; viz. apples, aſhes, elms, limes, oaks, pears, ſycamores, &c. another for dwarfs; viz. ſuch as are intended for apricots, cherries, peaches, plums, &c. and a third for evergreens.

In France, their *nurſeries*, which are but few when compared with thoſe in England, are chiefly confined to the propagation of fruit trees, from whence they have the appellation of *pepinier*. For there is ſcarce any of thoſe gardens, where a perſon can be ſupplied either with evergreens, flowering-ſhrubs, or foreſt trees. And in Holland, their *nurſeries* are principally for flowers; ſome few of them indeed propagate tender exotic plants. But thoſe *nurſeries* in the neighbourhood of London, do, ſeveral of them, include all theſe; from hence moſt of the curious perſons abroad are ſupplied with furniture for their gardens; therefore every planter ſhould begin by making a *nurſery* upon the ground which is intended for planting, where a ſufficient number of the trees may be left ſtanding, after the others have been drawn out, to plant in other places; which for all large growing trees, but particularly ſuch as are cultivated for timber, will be found by much the moſt advantageous method; for all thoſe trees which come up from the ſeed, or which are tranſplanted very young into the places where they are deſigned to remain, will make a much greater progreſs, and become larger trees, than any of thoſe which are tranſplanted at a greater age; and hereby the expence and trouble of ſtaking, watering, &c. will be ſaved, and the trees will ſucceed much better. Theſe ſhould be thinned gradually as the trees advance; for, by taking away too many at firſt, the cold will check the growth of the remaining trees. But then thoſe trees, which are taken out from theſe *nurſeries* after a certain age, ſhould not be depended on for planting; and it will be prudence rather to confign them for fuel, than to attempt to remove them large, whereby in endeavouring to get them up with good roots, the roots of the ſtanding trees will be often much injured.

What has been here propoſed, muſt be underſtood for all large plantations in parks, woods, &c. but thoſe *nurſeries* which are only intended for the raiſing evet-greens, flowering-ſhrubs, or plants which are deſigned to embelliſh gardens, may be confined to one ſpot; becauſe a ſmall compaſs of ground will be ſufficient for this purpoſe. Two or three acres of land employed this way, will be ſufficient for the moſt extenſive deſigns, and one acre will be full enough for thoſe of moderate extent.

Such a *nurſery* as this ſhould be conveniently ſituated for water; for where that is wanting, there muſt be an expence attending the carriage of water in dry weather. It ſhould alſo be as near the houſe as it can with conveniency be admitted, in order to render it eaſy to viſit at all times of the year, becauſe it is abſolutely neceſſary that it ſhould be under the inſpection of the maſter, for unleſs he delights in it, there will be little hopes of ſucceſs.

The many advantages, which attend the having ſuch a *nurſery*, are ſo obvious to every perſon who has turned his thoughts the leaſt to the ſubject, that it is needleſs to mention them here: the carefully keeping the ground always clean from weeds, is a point of great importance; for if theſe are permitted to grow, they will rob the young trees of their nouriſhment. Another principal buſineſs is to dig the ground between the young plants at leaſt once every year, to looſen it for the roots to ſtrike out; but if the ground is ſtiff, it will be better to be repeated twice a year, viz. in October and March, which will greatly promote the growth of the plants, and prepare their roots for tranſplanting.

In a *nurſery* for fruit trees, the following rules are to be obſerved. 1. That the ſoil ſhould not be better than that in which the trees are to be planted out for good. 2. That it ought to be freſh, and not ſuch as has been already worn out by trees, or other large growing plants. 3. It ought neither to be too wet, nor too dry, but rather of a middling nature; though, of the two extremes, dry is to be preferred; becauſe, though trees in ſuch a ſoil do not make ſo great a progreſs, yet they are generally ſounder, and more diſpoſed to fruitfulneſs. 4. It muſt be incloſed in ſuch a manner that neither cattle nor vermin may come in; and ſo as particularly to exclude hares and rabbits, which, when the ground is covered with ſnow, are great deſtroyers of young trees. 5. The ground being incloſed ſhould be carefully trenched about two feet deep; this ſhould be done in Auguſt, that it may be ready for receiving young ſtocks at the ſeaſon for planting, which is commonly about the beginning of October: in trenching the ground, you muſt be careful to cleanſe it from the roots of all noxious weeds. 6. The ſeaſon being come for planting, level down the trenches as equal as poſſible; and then lay out the ground into quarters, which may be laid out in beds for a ſeminary, in which you may ſow the ſeeds or ſtones of fruit. 7. And having provided yourſelf with ſtocks, the next year proceed to tranſplant them, in the following manner: draw a line acroſs the ground intended to be planted, and open a number of trenches exactly ſtraight; then take the ſtocks out of the ſeed-beds; in doing which, you ſhould raiſe the ground with a ſpade, in order to preſerve the roots as entire as poſſible; prune off the very ſmall fibres, and if there are any that have a tendency to root directly downwards, ſuch roots ſhould be ſhortened. Then plant them in the trenches, if they are deſigned for ſtandards, in rows three feet and a half, or four feet, from each other, and a foot and half diſtant in the rows; but if for dwarfs, three feet, row from row, and one foot in the row will be a ſufficient diſtance. Theſe plants ſhould by no means be headed, or pruned at top, which will weaken them, and cauſe them to produce lateral branches. If the winter ſhould prove very cold, lay ſome mulch on the ſurface of the ground near their roots, taking care not to let it lie too thick near the ſtems of the plants, and to remove it as ſoon as the froſt is over. In the ſummer ſeaſon deſtroy the weeds, and dig up the ground every ſpring between the rows. The ſecond year after planting, ſuch of the ſtocks as are deſigned for dwarfs will be fit to bud; but thoſe that are deſigned for ſtandards ſhould be ſuffered to grow five or ſix feet high before they are budded or grafted; for the manner of doing which, ſee the articles INOCULATION and ENGRAFTING.

As to timber trees, Mr. Miller adviſes thoſe gentlemen who would have plantations in parks, woods, &c. to make *nurſeries* upon the ground intended for planting, where a ſufficient number of the trees may be left ſtanding, after the others have been drawn out to plant in other places.

The ground intended for the flower *nurſery* ſhould be well ſituated to the ſun; and defended from ſtrong winds by plantations of trees or buildings. The ſoil alſo ſhould be light and dry, eſpecially for bulbous rooted flowers; for in this *nurſery* the off-ſets of all bulbous-rooted flowers ſhould be planted, and remain there till they become

blowing roots, when they ſhould be removed into the pleaſure-garden, and planted either in beds or borders, according to the goodneſs of the flowers. Theſe flowers may alſo be raiſed in the *nurſery* from ſeed. The ſeedling auriculas, polyanthuſes, ranunculuſes, anemonies, carnations, &c. ſhould be raiſed in this *nurſery*, where they ſhould be preſerved till they have flowered, when all thoſe ſhould be marked that are worthy of being tranſplanted into the flower-garden; this ſhould be done in their proper ſeaſons: for all theſe ſeedling flowers ought not indiſcriminately to be expoſed to public view in the pleaſure garden, becauſe it always happens, that there are great numbers of ordinary flowers produced among them, which will there make but an indifferent appearance. Miller.

The *nurſery* for ſtandards, ſhould be in a rich, light ſoil, ſown, with the proper ſeeds, in October or November: for apples and pears, crab, and wild pear kernels, are to be preferred for ſtocks: elms and limes are to be raiſed from planted ſuckers: and walnuts to be ſown with the green ſhell upon them, to preſerve them from mice. In this *nurſery*, if it be well managed and weeded for two years, the crabs and pears will be fit for grafting and inoculating the third year.

Firs and pines are to be raiſed from thoſe little ſeeds taken out of their large apples.

The *nurſery* for dwarfs does beſt by itſelf, that it may not be over-topped by taller trees. Stones of apricots and peaches are not proper to raiſe thoſe trees; but, in lieu thereof, ſow the ſtones of the pear-plum, muſſel or bonum magnum plum; which prove better, and more laſting, than the former. For ſtocks for all ſorts of cherries, black-cherry-ſtones do beſt.

Mr. Mortimer directs all ſtone-fruit to be ſown quickly after gathering; for that, if they be kept, they will be two years before they come up: alſo, that if they have not all the moiſture of the winter to rot the ſhells, the kernel will ſcarce come up at all.

To furniſh the *nurſery* of ever-greens, the ſeveral ſorts of ſeeds or berries, as yew, holly, juniper, &c. are to be put in ſo many diſtinct pots or boxes, with ſome fine mould over them, and thus buried for a year; after which they are to be taken out, and ſown.

If they were to be ſown when gathered, like other ſeeds, they would not come up the firſt year, nor grow ſo kindly.

NUSANCE, NOCUMENTUM, in *Law*, is uſed not only for a thing done to the hurt or annoyance of another, in his fee-lands or tenements; but alſo for the aſſize, or writ lying for the ſame.

The word is derived from the French, *nuire, to hurt*.

The word is mentioned anno 22 Hen. VIII. cap. 4. *Nuſances* are either public or private: a public *nuſance* is an offence againſt the public in general, either by doing what tends to the annoyance of all the king's ſubjects, or by neglecting to do what the common good requires: in which caſe annoyances and injuries to ſtreets, highways, bridges, and large rivers; as alſo diſorderly ale-houſes, bawdy-houſes, gaming-houſes, ſtages for rope-dancers, mountebanks, &c. cottages erected ſingly on the waſte, making and ſelling of ſquibs and fire-works, or throwing them about in any ſtreet, eaves-droppers, a common-field, and keeping of hogs in any city or market-town, are held to be common *nuſances*. A private nuſance is when only one perſon or family is annoyed, by the doing of any thing; as where a perſon ſtops up the LIGHT of another's HOUSE, or builds in ſuch a manner that the rain falls from his houſe upon his neighbour's; as likewiſe the turning or diverting water from running to a man's houſe, mill, meadow, &c. corrupting or poiſoning a water-courſe, by erecting a dye-houſe, or a lime-pit, for the uſe of trade, in the upper part of the ſtream; ſtopping up a way that leads from houſes to lands; ſuffering a houſe to decay, to the damage of the next houſe; erecting a brew-houſe in any place not convenient; or an houſe of office, &c. ſo near another perſon's houſe as to offend him by its ſmell; or exerciſing any offenſive trade, and ſetting up a fair or market to the prejudice of another.

Indictment lies for a public or common *nuſance* at the king's ſuit, wherein the party offending ſhall be fined and impriſoned; but no action can be brought in this caſe except one man ſuffers more by a common *nuſance* than another; as where a pit is dug in the highway, and he falls into it. Action on the caſe, or aſſiſe of *nuſance*, lies, for any private *nuſance*, at the ſuit of the party aggrieved, and on ſuch action judgment is given that the *nuſance* ſhall be removed, and the injured party recover damages: but if a perſon has only a term of years in a houſe or lands, as he has no freehold therein, he can only have an action on the caſe, by which means the *nuſance* will be removed without his recovering damages. The continuation of a *nuſance* is by the law conſidered as a new *nuſance*, and therefore, where a perſon ſuffers a *nuſance* to be ſet up, and then alienates or lets the land, &c. without removing it, an action of the caſe has againſt him who erected it; and alſo againſt the alience or leſſee, for continuing it. It has been adjudged that any perſon may remove a *nuſance*, in which caſe, even the cutting down a gate that croſſes the highway is legal; yet if a man deſtroys the *nuſance* himſelf, before he commences his action, he cannot have it afterwards, nor recover damages. Neither the lord of a manor, nor the king himſelf, can licence any perſon to make or erect a *nuſance*. Manwood makes three kinds of *nuſances* in the foreſt; the firſt, *common nuſances*; the ſecond, *ſpecial nuſances*; the third, *general nuſances*.

The writ of *nuſance*, *de nocumento*, is either ſimply *de nocumento*, or *de parvo nocumento*.

Writs of *nuſance* are now properly termed *treſpaſſes*, and actions upon the caſe.

NUSANCE, *abatement of*, denotes the removal of it, which the party aggrieved is allowed to do, ſo as he commits no riot in the doing of it.

NUSANCE, *aſſiſe of*, is a writ, wherein it is ſtated that the party injured complains of ſome particular fact done, *ad nocumentum liberi tenementi ſui*, and therefore commanding the ſheriff to ſummon an aſſiſe, that is, a jury, and view the premiſes, and have them at the next commiſſion of aſſiſes, that juſtice may be done therein; and if the aſſiſe is found for the plaintiff, he ſhall have judgment of two things. 1. To have the *nuſance* abated, and 2. To recover damages. This action, as well as that called *quod permittat proſternere*, are now out of uſe, and have given way to the action on the caſe; in which no judgment can be had to abate the *nuſance*, but only to recover damages.

NUSTAM, a word uſed by Paracelſus and his followers to expreſs the cream of milk, or the pellicle which in ſome caſes ſwims upon the ſurface of wine.

NUT, among *Botaniſts*, a PERICARPIUM of an extraordinary hardneſs; which contains a ſofter edible nucleus, or kernel.

Of theſe we have divers kinds; ſmall nuts, filberds, cheſtnuts, walnuts, &c. which ſee.

NUT, *Barbadoes*. See PINHONS.

NUT, *bladder*, the Engliſh name of a diſtinct genus of plants, called by botaniſts *ſtaphylæa*, and *ſtaphylodendron*. See BLADDER *nut*.

NUT, *caſhew*. See ANACARDIUM.

NUT, *cob*. See HAZLE.

NUT, *cacao*, the name of a genus of plants, called by botaniſts CACAO.

NUT, *earth*, in *Botany*, a name given to two diſtinct genuſes of plants, called by botaniſts *bulbocaſtanum* and *arachis*. See EARTH-*nut*.

NUT, *fanſel*. See ARECA.

NUT, *filbert*. See HAZLE.

NUT, *Malabar*, the name of a ſpecies of the JUSTICIA.

NUT, *pea*, the name by which ſome call the *lathyrus* of botanical writers. See *Chickling* VETCH.

NUT, *phyſic*, a name ſometimes given to the *ricinoides* of Tournefort. See TURNSOLE.

This is alſo a name ſometimes given to the CASSADA, and ſometimes to the CROTON. See PINES *nuciſe*, &c.

NUT, *pig*, a name by which the *bulbocaſtanum*, or earth-*nut*, is ſometimes called. See PIG-*nut*.

NUT, *piſtachia*. See PISTACHIA.

NUT, *Spaniſh*, a name by which ſome call the SISYRINCHIUM of botanical writers, or the IRIS with a double bulb of Linnæus.

NUT, *vomic*. See NUX *vomica*.

NUT-*wall*, the name of a well known genus of trees, called by Linnæus *juglans*, and by Tournefort ſimply *nux*. See WALNUT.

NUTS *of an anchor*, in a ſhip, are two little prominences, appearing like ſhort ſquare bars of iron, fixed across the upper part of the anchor-ſhank, to ſecure the ſtock of it in its place; for which purpoſe there is a correſponding notch, or channel, cut in the oppoſite parts of the ſtock, of the ſame dimenſions with the *nuts*.

NUT-*crackers*, the *corvus* CARYOCATACTES of Linnæus, called by its Engliſh name becauſe it feeds on nuts.

NUT-*hatch*, in *Ornithology*, the Engliſh name of a bird, known among authors by that of SITTA; and from its climbing trees in the manner of the wood-pecker, called by ſome, though improperly, *picus cinereus*, the grey wood-pecker.

NUT-*jobber*, in *Ornithology*, an Engliſh name for the SITTA, more commonly known among us by the name of the *nut-hatch*.

NUT-*oil*, is the oil of walnuts, preſſed out of the kernels by means of a ſcrew-preſs. This is uſed for the mixing with ſlake white or other pigments, where the clearneſs of the colour is of great conſequence, and would be injured by the brown hue of linſeed oil.

NUTATION, in *Aſtronomy*, a kind of trepidation, or tremulous motion of the axis of the earth; whereby its inclination to the plane of the ecliptic is not always the ſame; but varies backwards and forwards ſome ſeconds: and the period of theſe variations is nine years. This *nutation* was diſcovered by Dr. Bradley, who publiſhed an account of his diſcovery in the year 1737. He alſo diſcovered the cauſe of this phenomenon in the Newtonian ſyſtem of attraction.

The firſt principle of that ſyſtem is known to be, that all bodies mutually attract each other in the direct ratio of their maſſes, and in the inverſe ratio of the ſquares of their diſtances. From this mutual attraction, combined with motion in a right line, Newton deduces the figure of the orbits of the planets, and particularly that of the earth. If this orbit was a circle, and if the terreſtrial globe was a perfect ſphere, the attraction of the ſun would have no other effect than to keep it in its orbit, and would cauſe no irregularity in the poſition of its axis; but neither is the earth's orbit a circle, nor its body a ſphere; for the earth is ſenſibly protuberant towards the equator, and its orbit is an ellipſis, which has the ſun in its focus. When the poſition of the earth is ſuch, that the plane of its equator paſſes through the centre of the ſun, the attractive power of the ſun acts only to auto draw the earth towards it, ſtill parallel to itſelf, and without changing the poſition of its axis, and this happens at the equinoxes. In proportion as the earth recedes from thoſe points, the ſun alſo goes out of the plane of the equator, and approaches that of one or other of the tropics; the ſemidiameter of the earth, which is then expoſed to the *ſun*, being no longer equal, the equator is more powerfully attracted than the reſt of the globe, which cauſes ſome alteration in its poſition, and its inclination upon the plane of the ecliptic: and as that part of the orbit, which is comprized between the autumnal and vernal equinox, is leſs than that which is comprized between the vernal and autumnal, it follows, that the irregularity cauſed by the ſun, during his paſſage through the northern ſigns, is not entirely compenſated by that which he cauſes during his paſſage through the ſouthern ſigns; and that the paralleliſm of the terreſtrial axis, and its inclination with the ecliptic, will be a little changed. But though the irregularity is now accounted for, we are ſtill at a loſs for the cauſe of its happening in a period of nine years. This difficulty, however, will immediately diſappear.

The ſame effect which the ſun produces upon the earth, by its attraction, is alſo produced by the moon, which acts with greater force, in proportion as it is more diſtant from the equator: now, at the time when its nodes concur with the equinoxial points, its greateſt latitude is added to the greateſt obliquity of the ecliptic. At this time, therefore, the power which cauſes the irregularity in the poſition of the terreſtrial axis, acts with the greateſt force; and the revolution of the nodes of the moon, being performed in eighteen years, it is clear, that in eighteen years the nodes will twice concur with the equinoxial points; and, conſequently, that twice in that period, or once every nine years, the earth's axis will be more influenced than at any other time; ſo that it will have a kind of balancing backward and forward, the period of which will be nine years, as Mr. Bradley had obſerved; and this balancing he calls *the nutation of the terreſtrial axis*. See Phil. Tranſ. N° 406 and N° 485. in vol. xlv. p. 1. &c. and a fuller account of Dr. Bradley's obſervations under the article STARS.

That the moon has the like motion, is ſhewn by ſir Iſaac Newton, in the firſt book of his Principia; but he obſerves withal, that this motion muſt be very ſmall, and ſcarce ſenſible.

NUTMEG, *nux moſchata*, a delicate kind of aromatic fruit, or ſpice, brought from the Eaſt Indies; whereof there are diſtinguiſhed two kinds, the *male* and *female*.

The *female* is that chiefly uſed among us; its form is round, its ſmell agreeable, and its taſte hot and pungent.

The *male* is a wild nut, of a longiſh form, and without either taſte or ſmell; yet ſometimes put off, while yet in the fruit, for the female.

Nutmegs are incloſed in four different covers: the firſt, a thick fleſhy coat, ſomething like that of our walnuts, which ſpontaneouſly opens, when ripe. Under this lies a thin reddiſh reticular coat, of an agreeable ſmell, and aromatic taſte, called *mace*; by others, though improperly, *flower of nutmeg*. This wraps up the ſhell, and opens in proportion as the fruit grows. The ſhell, which makes the third cover, is hard, thin, and blackiſh. Under this is a greeniſh film, of no uſe: and in this is found the *nutmeg*, which is properly the kernel of the fruit. Every *nutmeg* has a little hole in it, which ſome ignorantly take for a defect.

The *nutmegs* are cured, according to Rumphius, by dipping them in a thickiſh mixture of lime and water, that they may be every where coated with the lime, which contributes to their preſervation.

The largeſt heavieſt *nutmegs* are to be choſen; ſuch as are of the ſhape of an olive, well marbled without ſide, reddiſh within, unctuous in ſubſtance, and of a fragrant ſmell. The *nutmeg* is greatly uſed in our foods, and is of excellent virtues as a medicine; it is a good ſtomachic, promotes digeſtion, and ſtrengthens the ſtomach. It alſo ſtops vomiting; is an excellent remedy in flatulences; and is happily joined with rhubarb and other medicines, in diarrhœas. It is obſerved to have a ſoporific virtue, and to exert it too ſtrongly, if taken in immoderate quantities. It has a conſiderable degree of aſtringency; and given after toaſting before the fire, till thoroughly dry and crumbly, it has been ſometimes known alone to cure diarrhœas.

As to MACE, it muſt be choſen in large blades, of a high colour, and like the *nutmeg* in taſte and ſmell.

Nutmegs, preſerved green, are excellent to ſtrengthen the ſtomach, and reſtore the natural heat. They are particularly eſteemed carminative. The powder called *duke's powder*, eſteemed a ſovereign remedy againſt rheums, is only *nutmeg* pulverized with ſugar, and a little cinnamon.

Nutmegs, by diſtillation, or expreſſion, yield an oil of great fragrancy, and uſe in medicine.

When diſtilled with water, they yield nearly one fifteenth their weight of a limpid eſſential oil, very grateful, poſſeſſing the flavour of the ſpice in perfection, and which is ſaid to have ſome degree of an antiſpaſmodic or hypnotic power: on the ſurface of the remaining decoction is found floating an unctuous concrete matter, like tallow, of a white colour, nearly inſipid, not eaſily corruptible, and hence recommended as a baſis for odoriferous balſams: the decoction, freed from this ſebaceous matter, and inſpiſſated, leaves a weakly bitter, ſubaſtringent extract. The eſſential oil, and an agreeable cordial water, lightly flavoured with the volatile parts of the *nutmeg*, by drawing off a gallon of proof ſpirit from two ounces of the ſpice, are kept in the ſhops. Both the oil and ſpirituous tincture and extracts, agree better with weak ſtomachs than the *nutmeg* in ſubſtance. Two kinds of ſebaceous matter, ſaid to be expreſſed from the *nutmeg*, are diſtinguiſhed in the ſhops by the name of *oil of* MACE. Lewis.

The whole commerce of *nutmegs* is in the hands of the Dutch Eaſt India company. The *nutmeg* tree, which is ſaid to reſemble the pear-tree, is propagated after a particular manner: Tavernier tells us, that the birds, devouring the *nutmeg* when ripe, give it back whole by ſtool; and that thus falling down to the ground, beſmeared with a viſcous matter, it takes root, and produces a tree.

NUTRITION, in the *Animal Oeconomy*, the acceſſion or apposition of new parts to the body, ſimilar to thoſe it already conſiſted of, either for its augmentation, or for the reparation of ſuch as are worn off.

By the continual motion of the fluids in the minute veſſels of the body, and the actions of the muſcles, &c. ſmall parcels are of neceſſity worn off from the ſolids, become mixed with the fluids, move with them, and are at length eliminated and exhaled through the pores.

And, at the ſame time, the fluids, diminiſhed, as they are, by a conſtant attrition, apply to the orifices of the perſpiring veſſels, and vaniſh out of the body.

Hence the animal body, by the very condition of its frame, becomes ſoon liable to deſtruction.

To preſerve life, therefore, it is neceſſary, that a reſtitution be made to the juices and ſolids of the body, equal and ſimilar to what is loſt in thoſe motions; which is what we call the *action of nutrition*.

Now, the loſt juices are eaſily ſupplied by meat, drink, air, &c. taken into the ſtomach, digeſted, converted into chyle, then into blood, and thence ſecreted by the proper ducts, and carried, by the action of the body, to the proper receptacles; after the manner laid down under DIGESTION, CHYLIFICATION, SANGUIFICATION, and SECRETION.

But the *nutrition* of the ſolid parts is much more obſcure. This, indeed, has proved the ſubject of infinite doubts and differences among authors; nor had we any rational or ſatisfactory account of the ſame, till that of the accurate Boerhaave, whoſe doctrine is as follows:

Every ſolid part of the body conſiſts of other leſſer ones, in all reſpects like the larger; veſſels, v. g. of veſſels, and thoſe of others ſtill ſmaller; bones of offcles, &c. Which ſtructure goes beyond all limits of ſenſe, how ever aſſiſted by art; as appears by the experiments and obſervations of Malpighi, Ruyſch, Leuwenhoeck, and Hook. Yet it is ſcarce poſſible this diviſion and ſubdiviſion ſhould be infinite, as thoſe of foods and juices are.

Again,

Again, it appears from microscopes, injections, small wounds, excoriations, &c. that the solid parts of the body are very small, compared with the fluids; and it is also demonstrable, from considering the rise and generation of the vessels, and the resolution of the greater vessels into their smaller constituent ones, that all the solid mass of the body is constructed of mere nerves, as its elements. And, in effect, all this mass, an incredible small particle only excepted, at first, arose out of what was a very small coliquament, much like the nervous juice itself; as is abundantly shewn by the great Malpighi, in his two treatises on incubated eggs. For neither does the white of the egg nourish, till by means of the incubation, it have passed innumerable degrees of fluidity, from its first thickness, to that exceeding subtilty wherein it terminates. But, even then, the liquor, thus given to the embryo, is exceedingly thick, in comparison with what it is to be, when converted into its vessels and viscera.

Now, the first tender solids, arising from this subtile humour, do again pass infinite intermediate degrees, before they arrive at their utmost state and consistence; as is shewn by Malpighi in eggs, and by Ruysch in embryoes and fœtuses. Hence, therefore, it follows, that the solids, in their first formation out of the liquids whence they arise, only differ from them in rest, cohesion, and figure. Therefore such a particle, now in its fluid state, will become a part of the solid to be formed out of it, as soon as there happens to be a power to effect its cohesion with the other solid parts, however that cohesion be effected.

This cohesion is easily produced in a fibre already formed, if there happen to be a proper cavity in the solid, left open by some lost particle, and, at the same time, a particle in the fluid, answerable thereto in bulk, figure, and nature; and, lastly, if there be a power wherewithal to intrude it into that place, or accommodate it thereto. Thus will arise a real *nutrition* of the solids in the minute vessels, by whose union the large ones are formed; that is, in the nerves, or in vessels similar thereto. Which being impracticable by any other liquid than that brought into these vessels, it appears very evident, that the nervous juice, at least a juice perfectly like it, is the immediate matter of *nutrition*: whence *nutrition* appears one of the last and most perfect actions of the body; since, to have this laudable, all the precedent actions must of necessity have been so.

The chyle, therefore, which some make the immediate matter of *nutrition*, is, indeed, fitted to fill the larger vessels; but it cannot nourish or restore them. This, when attenuated, changed, more intimately mixed in the lungs by means of respiration, and thus fitted for the passage of certain vessels, is indeed, rendered fitter, yet far from being quite fit to be the matter of *nutrition*. But, by the repeated action of the lungs, the viscera, vessels, &c. there is formed, out of this humour, a soft, tenacious, plastic, insipid serum, which, thickening by the fire, becomes perfectly like the white of an egg. This fluid, therefore, has in it all the conditions found in that, from whence, by sure experience, we know all the solid parts of an animal arise by mere incubation. It is, therefore, a step nearer; but is not yet quite disposed for nutriment: much less is the cruor, or red globular part of the blood so. Neither are yet fitted to enter the vessels; yet both the one and the other are, by different authors, made the nutritive juice.

But as the heat of the incubation, so the action of the viscera and vessels on the serum, introduces various changes therein, till at length a part of it be rendered subtile enough for the purpose required. This, when exhausted, is instantly repaired: and thus we have the true immediate matter of *nutrition*.

But this same humour, losing too many of its oily parts, by many repeated circulations, is rendered too sharp; and being likewise stripped of its most liquid parts, from the same cause, becomes too dense, and is thus rendered unfit for this secretion. Hence the necessity of new chyle, and new food, to keep up *nutrition*.

The matter of *nutrition* thus ascertained, the manner wherein, and the cause whereby it is effected, are as follow: a juice being driven directly through a full, conic, or cylindric, elastic or rigid canal; if its course be from a wider to a narrower part, or if it have any thing to oppose its motion, will endeavour to stretch the sides of its canal, according to the axis of its length. This must be the case every where in the body, except, perhaps, in the veins and receptacles. By this nisus, or endeavour, how weak soever, continually repeated, the vessels will be insensibly lengthened out; and, in lengthening, they will be made more and more slender. Hence the last extremities of the vessels, which in man are extremely small, are continually stretched, and rendered less and less coherent, i. e. still nearer and nearer to a dissolution: and thus at length will they cohere so weakly, as scarce to differ from fluids.

While such motion goes on, therefore, and the propulsion is continued, there will, of necessity, happen these two things: first, the outmost particles of the minutest tubes, being torn off, will again be converted into a kind of humour, what part of the body soever they stick in. Secondly, the smallest particles, which, by their union, composed the slenderest fibrillæ, will be so separated from each other, as to leave open interstices in those places, where, before, they cohered. Both these effects will be produced at all times, and in all parts of the body, so long as life continues, especially where nature is strong, and the actions of the body violent. But the same humour whereby these effects are produced containing abundance of particles similar to those thus separated and lost, conveys and applies them to those interstices, by that very impetus whereby it endeavours to distend the canals; and thus intercepted, at length, it forms, adapts, and fastens them, so as to adhere in the same manner as the former.

The matter, preparation, application, energy of motion, still remaining the same; what, from time to time, is lost, is thus presently restored: and the solids continue in the same state as before, i. e. they are perpetually *nourished*, and supplied, and preserved.

In this the Creator's wisdom is very conspicuous; in that the same power which inevitably destroys, does repair again at the same time, and by the same action: and that the greater the loss is, the more copious the supply: and, lastly, that those parts first spent in the action of the body, are the first restored.

Farther, it is evident, that the newer, the more tender, and the nearer to the moving cause, these vessels are, the more easily will they be lengthened, distended, destroyed, and repaired: our bodies, therefore, the nearer to their origin, the more do they grow. For, the action still continuing, the greater vessels become more extended by their fluid; and at the same time, the smaller, whereof the membranes, or coats, of the larger sort are composed, are compressed, dried, and at last, concreted, and grow up; whence arises a firmness, indeed, of the fibres, but a loss of the vesicles.

Thus what were formerly vessels, commence mere hard ligaments; and thus the fluids being once fixed, the several vessels coalesce: from the concurrence of these causes arise the strength, hardness, rigidity, and thickness, of the solid parts.

Hence the number of vessels is greatest in embryoes, and, as age comes on, it sensibly diminishes; and hence it is, that their weakness constantly declines, and their strength and firmness increase. In young people, therefore, the quantity of humours is redundant, and greatly exceeds the solids: in old men, the solids exceed the fluids. And hence we see the reason, manner, and appearance, of growth, state, declension, and, at length, of death, from pure old age.

A person who considers this account, and compares it with what is actually observable in the body, will find every circumstance to obtain: thus the whole cuticula is every where, and at all times, constantly desquamating, peeling off, and again renewing: and thus the hair, nails, teeth, continually rubbed, torn, and worn off, come again: parts taken off from the vessels and the bones soon grow again: and the sordes, or filth, rubbed off from the extremities of the vessels, when examined by a microscope, or diluted, and viewed in water, appear plainly to consist both of solid and fluid parts; and those carried off by washing, shaving, &c. are the same.

Hence, too, we see, that a general increase of the bulk of the body, with regard to habit, as in fat, fleshy, brawny persons, does not arise from any increase of the solids, but by their extension into larger cavities, crowded with stagnant humours. And hence fatness becomes hurtful, as it loads, weakens, and suffocates.

Whence arises a very considerable distinction between *nutrition* and *repletion*, to which a physician must have special regard; the one strengthening and condensing the vessels, the other weakening, loosening, and extending the same.

Hence, lastly, we see, why the fabric of the solids is not destroyed by the contained fluids; how our machine comes to subsist so long; why, when a nerve is corrupted, the *nutrition* of that part it belongs to ceases; and why the same obtains in an artery: why in an embryo there are no solids, in a fœtus very few, in old men a great deal; and why even the nerves, tendons, arteries, and receptacles, become first cartilaginous, and then bony. Dr. Priestley concludes, from some experiments undertaken with a view of discovering the principle of *nutrition*, in vegetable and animal substances, that this principle is PHLOGISTON, in such a state as to be capable of becoming,

becoming, by putrefaction, a true inflammable air, but not generally such as to burn with explosions; but rather with a blue and lambent flame, mixed with a certain proportion of fixed air. This principle in *nutrition* is immediately held in solution by the gastric juice, and in the chyle formed by it: and when it has entered into the circulation with the chyle, and answered the purpose in the animal œconomy for which it is designed, it is thrown out again by means of the BLOOD in the lungs, and communicated to the air, which is phlogisticated with it. Exp. and Obs. vol. v. sect. 6.

NUTRITION *of plants*. See VEGETATION, SAP, CIRCULATION, PLANTS, &c.

NUTRITION, in *Pharmacy*, a kind of preparation, consisting in the gradual mixture of liquors of different natures, by stirring them together till they have acquired a thick consistence, as in making butter of Saturn, or unguentum nutritum.

NUTRITIOUS *juice*. See NUTRITION.

NUTRITIVE *faculty*. See FACULTY.

NUTRITUM, in *Pharmacy*, is a denomination given to a desiccative, cooling unguent, prepared by the agitation and nutrition of litharge of gold with oil and vinegar, or the juice of solanum, in a mortar.

NUX, in *Botany*. See HAZLE-NUT, WALNUT, &c.

NUX *maris*, in *Natural History*, a name given by many writers to a peculiar species of sea shell. It is one of the *dolium*, or *concha globosa* kind, and a species of that genus called GONDOLA.

NUX *regia*, the *royal nut*, a name given by some authors to the *walnut*.

NUX *vomica*, the fruit, or, as some will have it, the stone of a vegetable fruit, growing in several parts of Egypt, and in the islands of Timor and Ceylon; of a strong narcotic quality, so as to be ranked in the number of poisons.

It is the produce of a large tree, called by Plukenet, *arcuribitifera Malabaricensis, nymphæ folio rotundo, fructu orbiculari rubro cujus grana sunt* nuces vomicæ *officinarum*.

It is round and flat, of a grey mouse-colour without, and of various colours within; sometimes yellow, sometimes white, sometimes brown; it is covered with a kind of woolly matter, but internally it is hard and tough like horn. The largest, whitest, newest, and cleanest are the best.

This kernel discovers to the taste a considerable bitterness, but makes little or no impression on the organs of smell.

This drug is said to be an assured poison for all animals except men. On the contrary, Hermannus, botanic professor at Leyden, who has written expressly on it, says, that the *vomic nuts* of Timor and Ceylon are, for the human species, excellent sudorifics, and are also to be ranked among diuretic medicines.

It has been recommended in tertian and quartan fevers, in virulent gonorrhœas, as well as an alexipharmac. Fallopius relates, that it was given with success in the plague; that in doses of from a scruple to half a dram, it procured a plentiful sweat; in which case the patient recovered. However, it is now considered and not without good reason, as a deleterious drug.

The principal symptoms it has been observed to produce, in human subjects and brutes, are, great anxieties, strong convulsions, or epileptic fits, paralytic tremors, great increase of the motion of the heart and of respiration, and reachings and subversions of the stomach. The LIGNUM *colubrinum* and IGNATIUS's *beans*, partake of the same qualities with the *nux vomica*. Lewis.

NUX *pistle*. See GALL.

NYCTAGES, or NYCTAZONTES, derived from *νὺξ, night*, a religious sect, distinguished by their inveighing against the practice of waking in the night, to sing the praises of God; in regard, said they, the night was made for rest.

NYCTALOPIA, or NYCTALOPS, a disease which prevents the seeing by day, not by night; or an indisposition wherein a person sees better by night than by day.

The word comes from the Greek *νὺξ, night*, and ἀλαὸς, *blind*; this animal being said to see less by day than night. In which sense the word is used by Hippocrates.

The *nyctalopia* is supposed to be owing to the spirits being too much dissipated in the day, but collected by night. See SIGHT.

Boerhaave says, the *nyctalopia* consists in this, that the uvea is immoveable, and at the same time very open.

NYCTALOPIA is also used by some for a disease of the eyes, which prevents their seeing when the sun is set, and the light begins a little to diminish.

In which sense it amounts to the same with *nocturna cæcitas*.

In the general, any disease which prevents the seeing at any particular time, when others see, is called *nyctalopia*. In the Philosophical Transactions we have an instance of a *nyctalopia*, or *nocturna cæcitas*, in a youth of twenty years of age, who had been affected with it as long as he could remember.

NYCTANTHES, in *Botany*. See *Arabian* JASMINE.

NYCTELIA *orgia*, formed from *νὺξ, night*, and τελὼ, *to perform*, feasts in honour of Bacchus; so called because held in the night-time.

A great part of the ceremony consisted in running through the streets, with the bottle and glass in hand, and drinking: but there was no impurity unpractised in them.

The Athenians celebrated the *Nyctelia* every three years, at the beginning of the spring.

NYCTHEMERON, *Νυχθήμερον*, the natural day. See DAY.

NYCTICORAX. See *Night* RAVEN.

NYCTOSTRATEGI, *Νυκτοστρατηγοὶ*, among the *Ancients*, officers appointed to prevent fires in the night time.

At Rome, they had the command of the watch, and, from their number and office, were called *nocturni triumviri*.

NYGMA, a word used by some of the medical writers to express a wound by puncture.

NYL-GHAU, in *Zoology*, an animal brought from the East Indies, and lately described for the first time by Dr. Hunter. The name denotes a blue cow, or rather a bull, *ghau* or *gow* being masculine. Most of these animals that have been brought to England, have been received from Surat or Bombay; and it is conjectured, that they are indigenous in the province of Guzarat. The *nyl-ghau* is larger than any ruminant of this country, except the ox; its flesh will probably be found delicious; and if it should prove docile enough to be easily trained to labour, its great swiftness, with considerable strength, might be applied to valuable purposes. In size it seems to be a mean between black cattle and deer; being as much smaller than the one as it is larger than the other; and in its form there is a very evident mixture of resemblance to both. Its body, horns, and tail, are not unlike those of a bull, and the head, neck, and legs, are very like those of a deer. Some have made this animal a species of the antelope, but Mr. Hunter who dissected it, apprehends, that it is a new species. The colour, in general, is ash or grey, from a mixture of black hairs and white: most of them are half white towards the root, and half black: the height of the back is about four feet, and the trunk from the root of the neck to the pendulous tail is about the same length; along the ridge of the neck and back, the hair forms a short and thin, upright mane; the legs are small in proportion to their length; the neck is long and slender as in the deer, and when the head is raised, it resembles the Italic S; at the throat there is a shield-like spot of beautiful white hair; and lower down, on the beginning of the convexity of the neck, there is a mane-like tuft of long black hair. There are six grinders in each side of each jaw, and four incisores in each half of the lower jaw; the horns are seven inches long, and of a triangular shape. The *nyl-ghau* eats oats, is fonder of grass and hay, and must send of wheat bread. When thirsty, it would drink two gallons of water. It is vicious and fierce in the rutting season, but at other times tame and gentle. The female differs so much from the male, that we should scarcely suppose them to be the same species. She is much smaller, both in height and thickness. In her shape and yellowish colour, she very much resembles deer, and has no horns; she has four nipples, and is supposed to go nine months with young; she has commonly one at a birth, and sometimes twins. The young male *nyl-ghau* is like the female in colour, and therefore like a fawn.

The first of these animals, that were ever brought to England, were sent from Bombay, to lord Clive, in 1767: they were male and female, which bred every year. For a more minute description of this animal, see Phil. Transf. vol. lxi. part 1. art. 21. *Tab.* IV. *Quadrupeds, fig.* 40.

NYMPHI, NYMPHA, in *Mythology*, a sort of heathen divinity, supposed to preside over waters, rivers, and fountains.

The word comes from *νυμφη, a bride*, or *woman newly married*; and was applied to these deities because represented under the figure of young maids. Though others derive *nymph* from *ὑγρὸς, water*, on account of their inhabiting near the waters. See LYMPHATE.

Some extend the name *nymph* further, and comprise under it the goddesses of the fountains, forests, and trees; called particularly, *Oreades, Dryads*, and *Hamadryads*; as well as those of the sea, called *Nereids*, and those of the air, called *Auræ*.

Meursius is of opinion, the Greeks borrowed their notion of these divinities from the Phœnicians; for *nymphe*, in their language, signifying *soul*, the Greeks imagined,

that the ſouls of the ancient inhabitants of Greece were become *Nymphs*. Particularly, that the ſouls of thoſe who had inhabited the woods were called *Dryads*: thoſe who had inhabited the mountains, *Oreades*; thoſe who had dwelt on the ſea-coaſts, *Nereids*; and, laſtly, thoſe, who had their place of abode near rivers, or fountains, *Naiads*.

NYMPH-*animal*, in *Natural Hiſtory*, one of the terms uſed by Swammerdam, in his claſſing the inſects according to their ſtates and productions. It expreſſes thoſe creatures which are produced in their perfect form from the egg, and are ſubject to no changes of any kind afterwards. See *Transformation of* INSECTS.

NYMPHA, among *Naturaliſts*, is ſometimes uſed for the little ſkin wherewith inſects are incloſed; both while they are in the egg, and after they have undergone the firſt apparent tranſformation. See INSECTS.

NYMPHA is more frequently uſed by naturaliſts for the inſects themſelves, while they have yet only the form of worms, or maggots.

The word properly ſignifies bride, or a new-married woman; it being now, when it has laid aſide its former ſkin, that it begins to ſhew all its parts diſtinctly. In this change it loſes its motion for a while, as when in the egg; ſo that theſe inſects are twice in their *nympha* ſtate, firſt in the maggot, which is their firſt *nympha*; and again in this change, which is their ſecond. See AURELIA.

The only difference between the two *nympha* ſtates conſiſts in this, that in the latter the members appear more diſtinctly. Swammerdam calls this latter *nympha aurea*, or *aurelia*, and *chryſalis*; and the former ſimply *nympha*.

The *nymphæ* are otherwiſe diſtinguiſhed into *vermiformes*, and *oviformes*.

NYMPHÆ, in *Anatomy*, are two ſoft, ſpongy, red bodies, deſcending from the tip of the clitoris to the ſides of the urinary paſſage, thus reaching to about the middle of the orifice of the vagina; where they grow leſs and leſs, till they diſappear. See *Tab. Anat. (Splanch.) fig. 9. lit.* nn. *fig. 12. lit.* ee.

Their breadth is uncertain, uſually in maids half a finger; ſometimes they are large, and are capable of being diſtended to a great degree; ſo as to hang a good way out of the body: whence, in ſome, it has been neceſſary to cut theſe, as well as the clitoris.

The uſe of the *nymphæ* is, by ſwelling in the act of coition, to embrace the penis, and by their ſenſibility to affect the woman, and mutually invite to procreation.

Their ſubſtance is very ſpongy, compoſed of membranes, and veſſels looſely cohering, and therefore eaſily diſtendible.

NYMPHÆA, in *Botany*. See *Water* LILY.

NYMPHAGOGI, Νυμφαγωγοι, among the *Ancients*, an appellation given to thoſe who led the BRIDE from her father's houſe to that of the bridegroom.

NYMPHARENA, in *Natural Hiſtory*, the name of a ſtone found in the beds of ſome rivers, and having the appearance of a ſea horſe's tooth. Doubtleſs it was a petrified tooth of that or ſome other ſuch animal, ſuch things being often found now, though in theſe early ages they were little known or regarded.

NYMPHARIUM, in *Botany*, a name given by the Greek writers of the later ages to the *water* LILY.

NYMPHARUM *oculi*, in *Natural Hiſtory*, a name given by ſome of the ancient writers to a ſtone we call *oculus beli*, and ſometimes to the operculum of a ſhell-fiſh, common on the ſea ſhores in many places, and called *umbilicus Veneris*. We are told of Caligula that he carried his ſoldiers armed to the ſea ſide, to pick up the *nympharum oculi*, and ſhells. It is certain, in this place, the word only means the *umbilicus veneris*; for the other *oculi nympharum* are found only on the ſhores, and in the beds of ſome particular rivers, not on the ſea ſhores among ſhells.

NYMPHEUM, Νυμφαιον, derived from νυμφη, *bride*, among the *Ancients*, a public hall, or building, magnificently adorned and diſpoſed for banqueting and entertainment; where thoſe, who wanted conveniences at home, held their marriage-feaſts, &c.

Some authors rather take the ancient *nympheum* to have been a grotto, adorned with ſtatues, jets, and other ornaments; and that it had its name by corruption, from *lymphæum*, of *lympha*, *water*. In which ſenſe it muſt have been a public bath.

NYMPHOIDES, in *Botany*, the name of a genus of plants, approaching to the nature of the water lily, or *nymphæa*, in external appearance, and thence uſually eſteemed a ſpecies of that genus, but improperly. There are three ſpecies. In the Linnæan ſyſtem this is a ſpecies of MENYANTHES.

NYMPHOMANIA, in *Medicine*, the ſame with FUROR *uterinus*.

NYMPHOTOMIA, in *Surgery*, the operation of cutting off part of the nymphæ, or of the clitoris, by ſome alſo called *nympha*, when they are ſo large and tumid, as to prevent the conſummation of marriage, or render it very difficult.

The Egyptians, Galen obſerves, frequently practiſed the *nymphotomia*; but in our parts of the world, it is rarely found neceſſary.

When it happens to be ſo, the caſuiſts give their judgment, that the woman is obliged to undergo it.

The *nymphotomia* is properly the CIRCUMCISION of women.

NYSSA, in *Botany*. See TUPELO-*tree*.

O.

O, The fourteenth letter of the alphabet; and the fourth vowel.

The grammarians call it a close vowel; because pronounced with the mouth shut.

Among the Latins, the *O* bore so great an affinity to the U, that they frequently confounded them; writing *consul*, and pronouncing *consul*. See Gruter's Inscript.

Thus, also, they wrote *æquum* for *aquum*, *aurelius* for *nurelius*, *compoſcues*, *duomvir*, &c.

The Greeks had two *O's*; viz. omicron, ο, and omega, ω; the first pronounced on the tip of the lips with a sharper sound; the second in the middle of the mouth, with a fuller sound, equal to *oo* in our language. The long and short pronunciation of our *O* are equivalent to the two Greek ones; the first, as in suppose; the second, as in obey.

O is usually denoted long by a servile *a* subjoined, as *moan*; or by *e* at the end of the syllable, as *bone*; when these vowels are not used, it is generally short.

O, among the *Ancients*, was a numerical letter signifying eleven; as in the verse,

O numerum geſtat, qui nunc undecimus extat.

When a dash was added at the top, as $\bar{O}$, it signified eleven thousand.

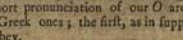
Among the Irish, the letter *O*, at the beginning of the name of a family, is a character of dignity, annexed to great houses Thus, in the history of Ireland, we frequently meet with the *O Neals*, *O Carrols*, &c. considerable houses in that island.

Camden observes, that it is the custom of the lords of Ireland to prefix an *O* to their names to distinguish them from the commonalty.

A majuscule O, in *Music*, is a note of time, called by us *semibreve*, by the Italians, *circolo*, making what they call *tempo perfetto*.

The ancients used *O* as a mark of triple time; from a notion that the ternary, or number 3, was the most perfect of numbers, and therefore properly expressed by a circle, the most perfect of figures.

It is not, strictly speaking, the letter *O*, but the figure of a circle O, or double CO, by which the modern ancients in music, used to express what they called *tempo perfetto*, or triple time. Hence the Italians call it *circolo*. This circle was sometimes pointed, and sometimes barred, thus,



But these equally signified a triple time. Brossard.

The seven antiphones, or alternate hymns of seven verses, &c. sung by the choir in the time of Advent, were formerly called *O*, from their beginning with such an exclamation.

In the statutes of St. Paul's church, in London, there is one chapter *de faciendo O*. Lib. Stat. MSS. f. 86.

O is an adverb of calling, or interjection of sorrow or wishing.

O. Ni. in the *Exchequer*. As soon as the sheriff enters into, and makes up his accounts for issues, amerciaments, and mean profits; the practice is to mark on his head, *O. ni.* which signifies, *Oneratur, nisi habeat ſufficientem exoneracionem*: and immediately he becomes the king's debtor, and a debet is set on his head.—Upon which the parties become debtors to the sheriff, and are discharged to the king.

OAK, *quercus*, in *Botany*, a genus of the *monoecia polyandria* class. Its characters are these: it hath male and female flowers on the same tree; the male flowers are disposed in a loose katkin, and have an empalement of one leaf, divided into four or five parts, no petal, but many stamina; the female flowers, which sit close to the buds, have a hemispherical thick empalement of one leaf, which is rough and entire, almost hiding the flower, which has no petal, but a small oval germen, supporting a single five-pointed style, crowned by single permanent stigmas; the germen afterwards becomes an oval nut, or acorn, with a thick cover, having one cell, whose base is fixed into the empalement, or cup.—Miller reckons twenty, and Linnæus fourteen species.

The first sort, mentioned by Miller, is the most common *oak* of this country, which is so well known as to need no description; the leaves of this have pretty long foot-stalks, and the acorns have none, but sit close to the branches.

The second sort, or the *oak* with long foot-stalks to the acorn, is not so common here as the first, but in the wilds of Kent and Suffex are many large trees of this kind.

The third sort, or the broad-leaved evergreen *oak*, grows upon the Apennines, and also in Swabia and Portugal.

The fourth sort, or broad-leaved female *oak*, grows common in some parts of France.

The fifth sort, or the *oak* with soft, hairy, downy leaves, grows in the south of France and Italy: where also the sixth sort, or dwarf *oak*, with galls growing together by pairs, by threes, or in larger clusters, is found. This is a low bush *oak*, which rises but six or seven feet high.

The seventh sort, or *oak* with prickly cups, and smaller acorns, grows in Burgundy.

The eighth sort, or cut-leaved Italian *oak*, grows naturally in Spain and Italy. The acorns of this sort are long and slender, the cups rough and a little prickly, sitting close to the branches. The acorns of this sort are sweet, and are frequently eaten by the poor in the south of France, who, in times of scarcity, grind them, and make bread with the flour. This is the *phagus* of the Greeks, and *ſculus* of Pliny.

The ninth sort, or *oak* with a prickly cup and a larger acorn, grows naturally in the Levant, from whence the acorns are annually brought to Europe, where they are used for dying: these are called velani, and the tree velanida, by the Greeks. It is one of the fairest species of *oak* in the world. The leaves are stiff, of a pale green on their upper side, and on their under side are a little downy; the acorns have very large scaly cups, which almost cover them; the scales are ligneous and acute-pointed, standing out a quarter of an inch; some of the cups are as long as middling apples.

The tenth, with broad spiny leaves; eleventh, or chesnut-leaved *oak*; and twelfth, or black *oak*, grow naturally in North America; as does also the thirteenth, or scarlet *oak* of Virginia, which is also called the red *oak*, from the leaves changing to that colour before they fall. The wood is not durable.

The fourteenth sort, or white *oak* of Virginia, is in most esteem there for building.

The fifteenth sort, or willow-leaved *oak*, grows also in North America.

The sixteenth sort, or narrow-leaved evergreen *oak*, is called the ilex or holm *oak*, of which there are several varieties, which will arise from acorns of the same tree.

The seventeenth sort, or holly-leaved evergreen *oak*, is supposed to be a different sort. The leaves are shorter and broader than the other, approaching in shape to those of the holly tree, and are set with prickles on their edges.

The eighteenth sort is the *oak* from which the kermes, or what is called scarlet grain, is collected; which is

an infect that harbours on this tree. It grows naturally in Provence and Languedoc, where it is known by the title D'Avaux. This is of ſmall growth. See KERMES.

The nineteenth ſort is called the live *oak*, in America: from the acorns of this kind the Indians draw a ſweet oil, little inferior to that of ſweet almonds.

The twentieth ſort is the cork tree, of which there are two or three varieties. See CORK. The exterior bark of this tree is taken off every eight or ten years; but there is an interior bark which nouriſhes the trees, ſo that the ſtripping off the outer is ſo far from injuring them, that it is neceſſary to continue the trees; for thoſe whoſe bark is not taken off, ſeldom laſt longer than fifty or ſixty years in health; whereas the trees, which are barked every eight or ten years, will live a hundred and fifty years or more. The bark of the young trees is porous and good for little, however it is neceſſary to take it off when the trees are twelve or fifteen years old, without which the bark will not be good, and after eight or ten years the bark will be fit to take off again; but this ſecond peeling is alſo of little uſe; but the third peeling the bark will be in perfection, and will continue ſo many years; for the beſt cork is taken from old trees. The time of year for ſtripping off this bark is July, when the ſecond ſap flows plentifully. This is periormed with an inſtrument like that uſed for diſbarking *oaks*.

All the ſorts of *oaks* are propagated by ſowing their acorns; and the ſooner they are put into the ground, after they are ripe, the better they will ſucceed; for they are very apt to ſprout where they are ſpread thin, and if they are laid in heaps, they ferment and rot in a little time; therefore the beſt ſeaſon for ſowing them is in October, by which time they will be fallen from the trees. Where *oak* trees are cultivated with a view to profit, the acorns ſhould be ſown where the trees are deſigned to grow, for thoſe which are tranſplanted will never arrive to the ſize of thoſe which ſtand where they are ſown, nor will they laſt ſo long ſound.

The firſt thing to be done is that of fencing the ground very well, to keep out cattle, hares, and rabbits; for if either of theſe can get into the ground, they will ſoon deſtroy all the young trees. Indeed they will, in a few years, grow to be out of danger from hares and rabbits, but it will be many years before they will be paſt injury from cattle. After the ground is well fenced, it ſhould be prepared by ploughing it three or four times, and after each ploughing by harrowing it well, to break the clods, and cleanſe the ground from couch, and the roots of all bad weeds. Indeed, if the ground is green ſward, it will be better to have one crop of beans, peas, or turneps, off the ground, before the acorns are ſown, provided theſe crops are well hoed, to ſtir the ſurface and deſtroy the weeds; for if this is obſerved, the crop will mend and improve the land for ſowing.

In making choice of the acorns, all thoſe ſhould be preferred, which are taken from the largeſt and moſt thriving trees; and thoſe of pollard trees ſhould be rejected, though the latter are generally the moſt productive of acorns; but thoſe of the large trees commonly produce the ſtrongeſt and moſt thriving plants. The ſeaſon for ſowing of the acorns being come, and the ground having been ploughed and harrowed ſmooth, the next work is to ſow the acorns, which muſt be done by drawing drills acroſs the ground, at about four feet aſunder, and two inches deep, into which the acorns ſhould be ſcattered at two inches diſtance. When the acorns are ſown, the drills ſhould be carefully filled in, ſo as to cover the acorns ſecurely; for if any of them are expoſed, they will entice the birds and mice, and if either of theſe once attack them, they will make great havock with them. The reaſon of directing the drills to be made at this diſtance is for the more convenient ſtirring of the ground between the rows, to keep the young plants clear from weeds; for if this is not carefully done, it cannot be expected that the young plants ſhould make much progreſs.

After the plants have grown two years, it will be proper to draw out ſome of them, where they grow too cloſe; but in doing this great care ſhould be had not to injure the roots of thoſe left, for as the plants, which are drawn out, are not only fit for plantations deſigned for pleaſure, ſo theſe ſhould not be ſo much regarded in their being removed, as to ſacrifice any of thoſe which are deſigned to remain: in the thinning of theſe plantations, the plants may at the firſt time be left about one foot aſunder, which will give them room enough to grow two or three years longer, by which time it may be eaſy to judge, which are likely to make the beſt trees: therefore theſe may be then fixed on at ſtandards to remain.

When the plants have been reduced to the diſtance of about eight feet, they will not require any more thinning: but in two or three years time, thoſe which are not to remain will be fit to cut down, to make ſtools for underwood; and thoſe which are to remain will have made ſuch progreſs, as to become a ſhelter to each other; for this is what ſhould be principally attended to whenever the trees are thinned; therefore, in all ſuch places as are much expoſed to the wind, the trees ſhould thinned with great caution, and by ſlow degrees; for if the air is let too much at once into the plantations, it will give a ſudden check to the trees, and greatly retard their growth; but in ſheltered ſituations there need not be ſo great caution uſed.

The diſtance to be allowed for theſe trees, which are deſigned to remain for timber, is from twenty-five to about thirty feet, which will not be too near, where the trees thrive well; in which caſe their heads will ſpread, ſo as to meet, in about thirty or thirty-five years: nor will this diſtance be too great, ſo as to impede the upright growth of the trees. This diſtance is intended, that the trees ſhould enjoy the whole benefit of the ſoil; therefore, after one crop of the underwood, or at the moſt two crops are cut, it would be proper to ſtub up the ſtools, that the ground may be entirely clear for the advantage of the growing timber.

The ſoil in which the *oak* makes the greateſt progreſs is a deep rich loam, in which the trees grow to the largeſt ſize; and the timber of thoſe trees which grow upon this land is generally more pliable than that which grows on a ſhallow or drier ground; but the wood of the latter is much more compact and hard. Indeed, there are few ſoils in England in which the *oak* will not grow, provided there is proper care taken in their cultivation. The other ſorts of *oak*, which are only planted for pleaſure, either in parks or gardens, may be raiſed from acorns ſown in beds, and the plants may be trained in a nurſery three or four years; then they ſhould be planted where they are to remain; for although they are not cultivated for their wood, yet the younger they are planted out, the better they will ſucceed, provided they are kept clean from weeds, and ſecured from animals. Miller's Gard. Dict.

Of the *oak*, the bark, the buds, the acorns, and their cups are uſed; as alſo, the GALLS, which are excreſcences cauſed by inſects, on the *oaks* of the eaſtern countries, of which there are divers ſorts; ſome perfectly round and ſmooth, ſome rougher with ſmall protuberances, but all generally having a round hole in them. All the parts of the *oak* are ſtyptic, binding, and uſeful in all kinds of fluxes and bleedings, either inward or outward. The bark is frequently uſed in gargariſms, for the relaxation of the uvula, and for ſore mouths and throats: it is alſo uſed in reſtringent clyſters, and injections, againſt the prolapſus uteri or ani. The acorns, beaten to powder, are frequently taken by the vulgar, for pains in the ſide. The only officinal preparation is the *Aqua Germinum Quercus*.

An extract made from the bark is ſaid by ſome to be equal to that of the Peruvian bark.

OAK *of Jeruſalem*. See GOOSE-*foot*.

OAK, *poiſon*. See POISON *wood*.

OAK, *ſea*. See FUCUS, and SEA *plants*.

OAK-*leaf galls*. Theſe are of ſeveral kinds; the remarkable ſpecies called the muſhroom gall is never found on any other vegetable ſubſtance but theſe leaves; and beſide this there are a great number of other kinds.

The double gall of theſe leaves is very ſingular, becauſe the generality of productions of this kind affect only one ſide of a leaf or branch, and grow all one way; whereas this kind of gall extends itſelf both ways, and is ſeen on each ſide of the leaf, in form of two protuberances, oppoſite the one to the other. Theſe are of differently irregular ſhapes, but their natural figure ſeems that of two cones, with broad baſes, and very obtuſe points, though ſometimes they are round, or very nearly ſo.—See *Tab. of Inſects*, N° 25.

Theſe make their firſt appearance on the leaf in April, and remain on it till June or longer. They are at firſt green, but afterwards yelloviſh, and are ſofter to the touch than many other of the productions of this kind: they are uſually about the ſize of a large pea, but ſometimes they grow to the bigneſs of a nut. When opened they are found to be of that kind, which are inhabited each by one inſect only, and each contain one cavity. The cavity in this is, however, larger than in any other gall of the ſize, or even in many others of three times the ſize; the ſides of it being very little thicker than the ſubſtance of the leaf.

It is not eaſy to aſcertain the origin of the ſeveral ſpecies of flies, which are, at times, ſeen in this manner to come out of the ſame ſpecies of galls. It ſeems the common courſe of nature, that only one ſpecies of inſect forms one kind of gall; yet it may be, that two or

three

three kinds may give origin to the ſame kind. There is, however, another occaſion of our ſeeing different ſpecies come out of different galls of the ſame kind; and this is the effect of the enemies of the proper inhabitants.

It might appear that the parent fly, when ſhe had formed a gall for the habitation of her worm offspring, had placed it in an impregnable fortreſs: but this is not the caſe; for it frequently happens, that a fly, as ſmall perhaps as that which gave origin to the gall, produces a worm which is of the carnivorous kind, as the other feeds on vegetable juices. This little fly, well knowing that where there is one of theſe protuberances on a leaf, there is a tender and defenceleſs inſect within, pierces the ſides of the gall, and depoſits her egg within it. This, when it hatches into a worm, feeds upon the proper inhabitant, and finally, after devouring it, paſſes into the chryſalis ſtate, and thence appears in the form of its parent fly, and is ſeen making its way out of the gall, in the place of the proper inhabitant.

On opening theſe leaf-galls, which are properly the habitation only of one animal, it is common to find two, the ſtronger preying upon the body of the other, and ſucking its juices as it does thoſe of the leaf; often it is found wholly employed in devouring its unoffending neighbour at once: this is probably the caſe when its time of eating is nearly over; and, in fine, when we find the gall inhabited by only one inſect, or containing only one chryſalis, as it ought in its natural ſtate to do, we are never certain that this is the proper inhabitant, as it may be one of theſe deſtroyers who has eaten up the other, and ſupplied its place.

OAK, *miſſetoe of the.* See MISTLETOE.

OAK *puceron*, a name given by naturaliſts to a very remarkable ſpecies of animal of the puceron kind. The generality of ſuch animals live on the ſurface of the branches and leaves of trees and plants; but theſe bury themſelves in the cleſts of the *oak*, and ſome other trees, and getting into the crevices, where the bark is a little ſeparated from the wood, they there live at eaſe, and feed to their fill, without being expoſed to their common enemies.

Theſe are the largeſt of all the ſpecies of pucerons; the winged ones are nearly of the ſize of the common houſe fly, and the naked, or ſuch as have no wings, though leſs than theſe are yet much larger than any other ſpecies of pucerons; the winged and naked kinds in theſe, as well as in the other ſpecies of pucerons, are all mothers, and great numbers of young ones may be preſſed out of the body of either kind, when gently ſqueezed. The winged ones are black, and the others of a deep brown or coffee colour; they have the moſt remarkable trunk of any animal in the world; it is more than twice the length of their bodies, and has not its origin at the extremity of the head, as in other inſects, but is fixed into the breaſt, near the origin of the firſt pair of legs. When the creature is walking, it carries this ſtrait along the belly, and trailing a conſiderable length behind it, but with the point turned up, that it may be out of the way of accidents, and be ready to ſuck. When the creature has a mind to ſuck a part of the tree that is juſt before it, it draws up, and ſhortens the trunk, till it brings it to a proper length and direction; but when it ſucks in the common way, it crawls upon the inner ſurface of the bark, and the turned up end of the trunk, which reſembles a tail, fixes itſelf againſt the wood that is behind it, or contiguous to its back, and ſucks there. The extremity of this trunk holds ſo faſt by the wood, that when it is pulled away, it frequently brings a ſmall piece of the wood away with it.

The ants are as fond of theſe as of the other ſpecies of pucerons, and that for the ſame reaſon, not feeding upon them, but on their dung, which is a liquid matter of a ſweet taſte, and is the natural juice of the tree, very little altered. Theſe creatures are the ſureſt guides where to find this ſpecies of puceron; for if we at any time ſee a number of theſe crawling up an *oak* to a certain part, and there creeping into the cleſts of the bark, we may be aſſured that in that place there are quantities of theſe *oak pucerons*. Reaumur's Hiſt. Inſ. vol. vi. p. 64, 76.

The ants are ſo extremely fond of the juices of the tree, when prepared for them by paſſing through the body of this animal, that when the puceron has a drop not yet evacuated, but hanging only in part out at the paſſage, an ant will often ſeize on it there.

OAK *ſnake* in *Zoology*. See DRYINUS.

OAKHAM, OCKHAM, or OAKUM, in the *Sea-Language*, denotes the matter of old ropes untwiſted, and pulled out again into looſe hemp, like hurds of flax, to be uſed in the CAULKING of ſhips.

White oakum is formed of untarred ropes.

OAR, in *Navigation*, a long piece of timber, flat at one end, and round or ſquare at the other, whereby a boat, barge, galley, &c. is rowed, or advanced along the water.

That part of the *oar* which is out of the veſſel, and which enters into the water, is called the blade, or waſh; and that which is within-board is termed the ſoom, whoſe extremity, being ſmall enough to be graſped by the rowers, is called the handle.

In a veſſel with *oars*, the water is to be conſidered as the point of ſupport, or fulcrum; the *oar* as a lever; the boat as the burden to be moved, and the rower's hand as the moving power. See LEVER, and MECHANIC *power*.

The burden is to be conſidered as applied to that point of the lever where the *oar* reſts on the boat; which point in large veſſels is called the *rowe-port*, but in lighters and boats it is always termed the *rowe-lock*. The greater, therefore, the diſtance of the hand from that point, and the leſs the diſtance of the water from that point, the greater effect will the *oars* have.

OARS, *to ſhip the*, is to fix them in the *rowe-locks* ready for rowing.

OAR, in *Natural Hiſtory*. See OAR.

OARISTUS, or OARISTYS, a term in the *Greek Poetry*, ſignifying a dialogue between a huſband and his wife; ſuch as that in the ſixth book of the Iliad, between Hector and Andromache.

Scaliger obſerves, that the *oariſtus* is not properly any particular little poem, or entire piece of poetry; but always a part of a great one. He adds, that the paſſage now cited in Homer, is the only proper *oariſtus* extant in the ancient poets.

OAST. See OOST.

OASY. See OAZY.

OAT, *avena*, in *Botany*, a genus of the *triandria digynia* claſs. Its characters are theſe: the flowers are collected in a looſe panicle, and have a bivalvular empalement ſwelling in the middle; the petal of the flower is bivalve, having a ſpiral beard, twiſting, jointed, and reflexed; there are two oval nectariums, ſitting upon the upper ſide of the germen, which have three ſlender ſtamina; the germen afterwards becomes an oblong ſwelling ſeed, having a longitudinal furrow, and chiefly ſhut up in the cover or chaff. Linnæus enumerates fifteen ſpecies.

There are three varieties of *oats* cultivated in England; viz. the white, the black, and the brown or red: there is alſo a naked *oat*, which is ſometimes cultivated in the diſtant parts of England, but is rarely ſeen near London.

The white *oat* is the moſt common about London; the black is more cultivated in the northern parts of England, and is eſteemed a very hearty food for horſes; but the firſt makes the whiteſt meal, and is chiefly cultivated where the inhabitants live much upon *oat* cakes.

This grain is a great improvement to many eſtates in the north of England, Scotland, and Wales; for no ſoil is too rich or too poor, too hot or too cold for it: and in wet harveſts, when other grain is ſpoiled, this will receive little or no damage, for the ſtraw and huſks are of ſo dry a nature, that, if they were houſed wet, they will not heat or become mouldy in the mow, as other grain uſually does. It is therefore of great advantage in the North, where the harveſt is generally late, and the autumn wet.

Oats are often ſown on land which has the former year produced wheat, barley, or rye. The common method is to plough in the ſtubble, about the beginning of February, ſow the *oats*, and harrow them in; but they muſt be harrowed in the ſame direction that the furrows lie, for if it be done croſſways, the ſtubble will be raiſed to the ſurface. But this is not a good method of huſbandry, for when there is time to plough the ſtubble in autumn, it will rot in winter; and then another ploughing and harrowing, juſt before the *oats* are ſown, will make the ground finer and better to receive the grain. The general allowance is four buſhels to an acre, but three buſhels, ſays Miller, are more than enough: the uſual produce is about twenty-five buſhels to an acre, though it ſometimes amounts to more than thirty.

Oats are alſo ſown upon land when it is firſt broken up, before the ground is brought to a tilth for other grain, and is frequently ſown upon the ſward with one ploughing: but it is much better to give the ſward time to rot before the *oats* are ſown, as the roots of the graſs will prevent thoſe of the corn from ſtriking downward.—Miller.

There is a duty on the importation of *oats*, when not above 16*s.* a quarter, of 5*s.* 4*d.* but if the price be at or above 16*s.* a quarter, the duty ſhall ceaſe, and 2*d.* a quarter only be paid. 22 Car. II. cap. 13. 13 Geo. III. cap.

cap. 43. No perſon is allowed to export *oats*, when the price is at or above 14 *s.* a quarter, under the penalty of forfeiting the *oats*, and 20 *s.* for every buſhel, together with the veſſel, &c. A bounty on exportation is allowed, when *oats* are under 14 *s.* a quarter, of 2 *s.* for every quarter. See CORN.

Some phyſicians have greatly recommended a diet drink made of *oats*, in various diſtempers. The method of preparing the drink is as follows: take of recent *oats* entire, and well waſhed, one pound and a half; of the freſh root of ſuccory, cut into ſlices, one handful; ſpring water, twelve pints; boil all together in a clean earthen veſſel to the conſumption of half, and then ſtrain the liquor through a linen cloth, and add to it ſix ounces of coarſe ſugar, and half an ounce of ſal prunellæ; let it boil again, and afterwards be taken off the fire, and ſet by, for a day and a night, in a cool place; then pour off the clear liquor, and keep it in a cellar in veſſels cloſe ſtopped.

Two ordinary cup-fulls of this liquor, given twice a day, three hours before, and as many after dinner, are ſaid to do wonders in the cure of all kinds of fevers, colic pains, pleuriſies, itches, cutaneous tumors, and hypochondriacal diſorders; as alſo in cleanſing the kidnies from ſand, and opening the obſtructed viſcera. The uſe of it is ordered to be continued thirteen days, and, if the patient be cacochymic, a gentle purge is to be given before it is taken. It is accounted a great preſervative againſt illneſs, if taken thrice a year, in ſpring, in autumn, and in the dog days; and the inventor of it, Joannes de St. Catherina, is ſaid to have kept himſelf alive by it to the age of an hundred and twenty years, without any diſeaſe.

Dr. Lower, having tried it, and found its good effects, by repeated experience, made it public, and the celebrated Hoffman has written an expreſs treatiſe about it, in which he recommends it both in intermittent and continued fevers, but adviſes purified nitre to be uſed inſtead of the ſal prunellæ, and obſerves that the two boilings, ordered by Dr. Lower, are not neceſſary, but that the ſugar and nitre may be added at firſt. It muſt be kept carefully in ſummer, otherwiſe it ſoon becomes ſour, and unfit for uſe.

Thoſe who deſire to have it coloured may boil in it an ounce of alkanet root, and two ounces of red ſanders, which will give it a fine red colour, without at all affecting its virtues.

It is, unqueſtionably, a very valuable medicine, affording ſingular relief wherever obſtructions of the veſſels are to be removed, or ſalts to be waſhed out of the habit; where the viſcid juices are to be diluted, or a due degree of moiſture, and humidity reſtored. It is alſo excellent for allaying thirſt in fevers, and for ſtopping hæmorrhages.

OAT, *wild*, in *Huſbandry*, a kind of *oat*, or *oat* graſs, which comes up of itſelf, without ſowing, and is much hated, and dreaded by the farmers. This, in many counties of England, is the greateſt of all hindrances of the good crops of barley, and often of other grain. It is a rough and hairy *oat*, and uſually black. In the wetter years, and after much froſt, this is found to be moſt troubleſome.

The beſt remedy the farmer has againſt this, is to ſow the land moſt apt to produce it with beans, and when they are come up to about three inches high, to turn in ſheep upon the ground, about twenty ſheep to an acre; theſe will eat up all the ſhoots of the wild *oat*, and not touch the beans ſo long as there are any of the *oat* ſhoots left. See GRASS, and FESTUCA.

OAT-*ſnail*. See SNAIL.

OATH, *juſjurandum*, is uſually defined a religious aſſertion, or aſſeveration; wherein a perſon invokes the Almighty, renounces all claim to his mercy, or even calls for the divine vengeance upon himſelf, if he ſpeak falſly.

Some civilians look on this definition as too lax, ſince it may agree to perjury; and would have this eſſential to an oath, that the thing affirmed be true. But this is arbitrary.

An *oath* is eſteemed a kind of civil medium, between the perſon that gives it, and him to whom it is given; whereby ſome controverſy or other matter, which could not otherwiſe be determined, is brought to an iſſue. Its form, and the ceremonies with which it is attended, are arbitrary, and various in different countries.

The *oaths* we make to God are called *vows*, and in ſome caſes *ſacraments*.

OATH, in a legal ſenſe, is a ſolemn action, whereby God is called to witneſs the truth of an affirmation given before one or more perſons impowered to receive the ſame.

Legal *oaths* end with, So help me God; anciently with, So help me God at his holy DOME, i. e. judgment.

This according to our law-books, is called a *corporal oath*; becauſe the party, when he ſwears, touches the Goſpels with his right hand.

But, in ſome old cuſtoms of Anjou and Maine, it appears that *corporal oath* was anciently a ſimple affirmation, or vow of faith and fidelity, made by a vaſſal who has no liege, by lifting up his hand; in contradiſtinction to that made by a liege vaſſal, which was made by laying his hand on the Goſpel.

An *oath* is called *canonica purgatio*, becauſe allowed of by the canons; to diſtinguiſh it from *vulgares purgationes*, viz. by battle, fire ordeal, &c. which the church always diſcouraged. In ſmall matters, which the plaintiff could not prove, or, if he could, if his proof were ſet aſide, the defendant might purge himſelf by his own *oath*: this was called, *jurare propria manu*.

But in matters of more weight, he was to bring other credible perſons, uſually of the ſame quality with the plaintiff, to ſwear that they believed the defendant had ſworn the truth.

Theſe were called *compurgators*, or *ſacramentales*; and their number was greater or leſs, according to the quality of the defendant, and the nature of the thing in queſtion. Hence, *jurare duodecima manu*.

OATH is alſo uſed for a ſolemn promiſe faithfully to execute or obſerve ſomething. See JURY and TRIAL.

In this ſenſe we ſay, *ſtate oaths*, the *oaths of* SUPREMACY, *oath of* ALLEGIANCE, *oath of* ABJURATION.

All that bear offices in the government, peers, and members of the houſe of commons, eccleſiaſtical perſons, members of colleges, ſchool-maſters, preachers, ſerjeants at law, counſellors, attornies, ſolicitors, advocates, proctors, &c. are enjoined to take the *oaths* of allegiance, ſupremacy, and abjuration: and perſons neglecting or refuſing are declared incapable to execute their offices and employments, diſabled to ſue in law or equity, to be guardians, executors, &c. or to receive any legacy, or deed of gift, to be in any office, &c. and to forfeit 500 *l.* We have frequently acts paſſed for indemnifying perſons, who have omitted to qualify themſelves for offices and promotions, within the time limited by law, and for allowing farther time for that purpoſe.

Kings and princes ſwear to the performance of the treaties they make: though, anciently, they did not ſwear of themſelves, but others ſwore in *their* name.

OATH, *coronation*, is, by 1 W. & M. ſtat. 1. cap. 6. to be adminiſtered to every king and queen, who ſhall ſucceed to the imperial crown of theſe realms, by one of the archbiſhops or biſhops of the realm, in the preſence of all the people: it is conceived in the following terms:

The archbiſhop or biſhop ſhall ſay, Will you ſolemnly promiſe and ſwear to govern the people of this kingdom of England, and the dominions thereto belonging, according to the ſtatutes in parliament agreed on, and the laws and cuſtoms of the ſame? *The king or queen ſhall ſay*, I ſolemnly promiſe ſo to do. *Archbiſhop or biſhop*. Will you, to your power, cauſe law and juſtice, in mercy, to be executed in all your judgments? *King or queen*. I will. *Archbiſhop or biſhop*. Will you, to the utmoſt of your power, maintain the laws of God, the true profeſſion of the Goſpel, and the proteſtant reformed religion, eſtabliſhed by the law? and will you preſerve unto the biſhops and clergy of this realm, and to the churches committed to their charge, all ſuch rights and privileges, as by law do or ſhall appertain to them, or any of them? *King or queen*. All this I promiſe to do.

After this the king or queen, laying his or her hand upon the holy Goſpels, ſhall ſay, The things which I have here before promiſed, I will perform and keep. So help me God. *And then ſhall kiſs the book*. Blackſt. Com. book i. p. 235.

OATH *ex officio*. See EX OFFICIO.

OATH, *teſt*. See TEST.

OATMEAL. The ſelling of corrupt *oatmeal* is puniſhable by ſtatute, which ſhall be forfeited for the ſecond offence, &c. See 51 Ed. I.

OAZY, or OASY *ground*, a name given by the ſeamen to ſoft, ſlimy, or muddy ground.

OBADIAH, or *the prophecy of* OBADIAH, a canonical book of the Old Teſtament, which is contained in a ſingle chapter, and is partly an invective againſt the cruelty of the Edomites, who mocked and derided the children of Iſrael, as they paſſed into captivity; and, with other enemies, their confederates, invaded and oppreſſed thoſe ſtrangers, and divided the ſpoil amongſt themſelves: and partly a prediction of the deliverance of Iſrael, and of the victory and triumph of the whole church over her enemies.

OBEDIENCE, *obedientia*, is ſometimes uſed in the *Canon Law*, for an office, or the adminiſtration of it.

In our *Ancient Coſtoms*, *obedientia* was uſed in the general for every thing that was injoined the monks, by the abbot.

OBEDIENTIA, in a more reſtrained ſenſe, was applied to the farm belonging to the abbey, to which the monks were ſent *vi ejuſdem obedientiæ*, either to look after the farm, or collect the rents. Hence, alſo, thoſe rents themſelves were called *obedientiæ*.

OBELIAS, among the ancients, a kind of ſmall cakes, which were toaſted on little ſpits, and ſerved at table as a deſert, to be eaten dipped in ſweet wine, called *paſſum*.

OBELISCUS *marmoreus*, in *Natural Hiſtory*, the name of a very remarkable ſpecies of ſhell fiſh, unknown to us in its recent ſtate, but met with very frequently foſſile in the Swediſh ſtone uſed for pavements, and ſome other kinds, and more accurately named by late authors *polythalamium*, and *orthoceratites*, and by Klein TUBULUS *marinus concameratus*.

OBELISK, *obeliſcus*, a quadrangular pyramid, very ſlender, and high; raiſed as an ornament, in ſome public place, or to ſhew ſome ſtone of enormous ſize; and frequently charged with inſcriptions, and hieroglyphics.

Borel derives the word from the Greek ὀβελὸς, *a ſpit, broach, ſpindle*, or even a kind of *long javelin*. Pliny ſays, the Egyptians cut their *obeliſks* in form of ſun-beams; and that in the Phœnician language, the word *obeliſk* ſignifies *ray*.

The Egyptian prieſts called their *obeliſks* the *ſun's fingers*; becauſe ſerving as ſtyles, or gnomons, to mark the hours on the ground. The Arabs call them *Pharaoh's needles*: whence the Italians call them *aguglia*; and the Engliſh *Cleopatra's needles*.

The difference between *obeliſks* and pyramids, according to ſome, conſiſts in this, that the latter have large baſes, and the former very ſmall ones, compared with their height.

Though Cardan makes the difference to conſiſt in this, that *obeliſks* are to be all of a piece, or conſiſt of a ſingle ſtone; and pyramids of ſeveral.

The proportions of the height and thickneſs are nearly the ſame in all *obeliſks*; that is, their height is nine, or nine and a half, ſometimes ten times their thickneſs; and their thickneſs, or diameter, a-top, is never leſs than half, nor greater than three-fourths, of that at bottom.

This kind of monument appears very ancient; and, we are told, was firſt made uſe of to tranſmit to poſterity the principal precepts of philoſophy, which were engraven in hieroglyphical characters hereon. In after-times they were uſed to immortalize the actions of heroes, and the memory of perſons beloved.

The firſt *obeliſk* we know of was that raiſed by Rameſes, king of Egypt, in the time of the Trojan war. It was 40 cubits high, and, according to Herodotus, employed 20,000 men in the building. Phius, another king of Egypt, raiſed one of 45 cubits; and Ptolemy Philadelphus another of 88 cubits, in memory of Arſinoe. See PORPHYRY.

Auguſtus erected an *obeliſk* at Rome, in the Campus Martius, which ſerved to mark the hours on an horizontal dial, drawn on the pavement.

F. Kircher reckons up fourteen *obeliſks*, celebrated above the reſt; *viz.* that of Alexandria, that of the Barberins, thoſe of Conſtantinople, of the Mons Eſquilinus, of the Campus Flaminius of Florence, of Heliopolis, of Ludoviſio, of S. Mahut, of the Medici, of the Vatican, of M. Cælius, and that of Pamphylia.

One of the uſes of *obeliſks* among the ancients was to find the meridian altitudes of the ſun, at different times of the year. Hence they ſerved inſtead of very large gnomons. One of the *obeliſks* now ſtanding at Rome, that of St. John's Lateran, is in height 108 Engliſh feet, without the pedeſtal; and the other *obeliſk*, brought to Rome by Auguſtus, buried under the Campus Martius, wants but little of the ſame height. Pliny gives us a deſcription of this gnomon, lib. XXXVI. ſect. 15. From him it appears, that there was laid down, from the foot of the *obeliſk* northward, a level pavement of ſtone, equal in breadth to the breadth of the *obeliſk* itſelf, and equal in length to its ſhadow at noon, upon the ſhorteſt day; that is to ſay, that its length was to the height of the *obeliſk*, almoſt as 22 to 10, and that under this pavement, there were properly let in parallel rulers of braſs, whoſe diſtances from the point, directly under the apex of the *obeliſk*, were reſpectively equal to the length of the ſhadow thereof at noon, on the ſeveral days of the year, as the ſame lengths decreaſed from the ſhorteſt day to the longeſt, and again increaſed from the longeſt day to the ſhorteſt. Vide Phil. Tranſ. N° 482. art. 5. vol. xliv. p. 365. where we alſo find ſome remarks by Mr. Folkes on Hardouin's Amendment of a Paſſage in Pliny's Natural Hiſtory, lib. ii. ſect. 74. Edit. Pariſ. 1723. fol. about the length of the ſhadows of gnomons in different latitudes. See GNOMON.

OBELISK, in *Grammar*, is a character in form of a dagger (†), ſerving to refer the reader to ſome note, or other matter, in the margin.

OBELUS, in *Antiquity*, denotes a little line or ſtroke, like a needle; whence its name ὀβελὸς, which ſignifies *needle*. The word is chiefly uſed in ſpeaking of Origen's Hexapla; wherein he diſtinguiſhes, with an aſteriſk or ſtar, the ſupplements he makes to the texts of the Septuagint, where it falls ſhort of the Hebrew meaning; and with an *obelus* or lineola (—), thoſe places where the Septuagint had any thing not in the Hebrew.

St. Jerom ſays, the *obelus* was only uſed in thoſe places where ſomething was to be retrenched from the Septuagint, as ſuperfluous, and the aſteriſk in thoſe that were defective. Theſe marks frequently occur in ancient manuſcripts. Uſually the *obelus* is accompanied with two dots, the one above, the other underneath, as (÷); and the aſteriſk, is a St. Andrew's croſs, cantoned with four points.

OBESITY, *obeſitas*, in *Medicine*, the ſtate of a perſon too much loaded with fat and fleſh, otherwiſe called CORPULENCY.

OBEY, in the *Manege*. A horſe is ſaid to *obey* the hand and heels, to *obey* the aids or helps, when he knows and anſwers them according to demand.

OBJECT, derived from *objicere*, *to ſet before*, which is compoſed of *ob* and *jacio*, *I lie againſt*, in *Philoſophy*, ſomething apprehended, or preſented to the mind, by ſenſation, or by imagination.

An *object* is ſomething that affects us by its preſence, that moves the eye, ear, or ſome other of the organs of ſenſe; or, at leaſt, is repreſented to us by the imagination.

The ſchool-philoſophers define *object* to be that about which a power, act, or habit, is employed. Thus, good is the *object* of the will; truth of the underſtanding; ſo colour is the *object* of ſight; ſound, of hearing, &c.

Objects are uſually divided into *next*, *proxima*, which are thoſe the power or habit is immediately employed on; in which ſenſe colour is the next *object* of ſight. And *remote*, which are thoſe only perceived by means of the former: in which ſenſe, the wall is the remote *object* of ſight, ſince we only ſee it by means of its colour, &c.

Ideas are the immediate *objects* of the mind in thinking: bodies, their relations, attributes, &c. are the mediate *objects*.

Hence it appears, that there is a ſort of ſubordination of *objects*. But note, that a *next object*, with regard to a *remote* one, is properly a SUBJECT, not an *object*.

They alſo diſtinguiſh *objects per ſe*, which are what properly move or affect our ſenſes: ſuch as are the ſenſible qualities. And *objects per accidens*, which are ſubſtances, and only affect us by being inveſted with ſenſible qualities.

Again, they diſtinguiſh between *common objects*, which are ſuch as affect *divers* ſenſes; as are motion, figure, &c. and *proper objects*, which only affect one SENSE.

There are ſeveral conditions requiſite to an *object of ſenſe*; as, that it be material; that it be within a certain diſtance of a competent extent; its ſenſible qualities ſufficiently intenſe, &c.

It is the *object* that reflects or emits the rays of light, which occaſion viſion. *Objects*, of themſelves, are inviſible; we only ſeem to perceive them, becauſe the different texture of their ſurface, diſpoſing them to reflect differently coloured rays, occaſions in us ſeveral ſenſations of colour, which we attribute to them.

The *objects* of the eye, or viſion, are painted on the retina; though not there erect, but inverted, according to the laws of optics. This is eaſily ſhewn, from Carte's experiment of laying bare the vitreous humour on the back part of the eye, and putting over it a bit of white paper, or the ſkin of an egg, and then placing the fore part of the eye to the hole of a darkened room. By this means is had a pretty landſcape of the *objects* abroad, painted invertedly on the back of the eye.—How, in this caſe, the *objects* which are painted inverted ſhould be ſeen erect, is matter of controverſy.

OBJECT-*glaſs* of a teleſcope or microſcope is the glaſs placed at the end of the tube which is next the *object*.

To prove the regularity and goodneſs of an *object-glaſs*, ſtrike two concentric circles on a paper, the one having its diameter the ſame with the breadth of the *object-glaſs*; the other half that diameter: divide the inner circumference into ſix equal parts; and, making ſix fine ſmall holes therein with a needle, cover one ſide of the glaſs with this paper; then, expoſing it to the ſun, receive the rays that paſs through theſe ſix holes on a plane, at a juſt diſtance from the glaſs; and, by withdrawing or approaching this plane, from or to the glaſs, we ſhall find whether the rays, that paſs through theſe ſix holes, unite exactly together at any

diſtance

distance from the glass; if they do, we may be assured of the regularity of the glass, that is, of its just form; and, at the same time, we obtain exactly the glass's focal length.

Indeed, there is scarce any better way of proving the excellency of an *object-glass*, than by placing it in a tube, and trying it with small eye-glasses, at several distant objects; for that *object-glass* which represents objects the brightest and most distinct, which bears the greatest aperture, and most convex and concave eye-glass, without colouring or hazines, is always the best.

A circular *object-glass* is said to be truly centered, when the centre of its circumference is situated in the axis of the glass; and to be ill centered when the centre of its circumference lies beside the axis.

To prove whether *object-glasses* be well centred, hold the glass at a due distance from the eye, and observe the two reflected images of a candle: where those images unite, or coalesce, there is the true centre. If this be in the middle, or central point of the glass, then it is known to be truly centred.

There are various methods of finding the true centre of an *object-glass*: the following was the method used by Mr. George Graham. Let a couple of short cylindrical tubes be turned in wood or brass, and let the convexity of the narrower be so exactly fitted to the concavity of the wider as just to turn round in it, with ease but without waddling; and let the planes of the bases of the tubes be exactly perpendicular to their sides. Place the base of the narrower tube upon a smooth brass plate or a wooden board of an equal thickness, and with any sharp-pointed tool, describe a true circle upon the board round the outward circumference of the base; and upon the centre of this circle, to be found when the tube is removed, describe a larger circle upon the board.

These two circles should be so proportioned, that the one may be somewhat greater and the other somewhat smaller than any of the glasses intended to be centred by them. Then having cleared out all the wood within the inner circle, put the end of the tube into this hole, and there fasten it with glew, so that the base of the tube may lie in the surface of the board: then having fixt the wider tube very firmly in a hole made in a window-shutter, and having darkened the room, lay the glass to be centered upon the board fixt to the narrower tube; and having placed the centre of it as near as you can guess over the centre of the hole, fix it to the board with two or three lumps of pitch, or soft cement, placed at its circumference. Then put the narrower tube into the wider as far as it can go, and fix up a smooth screen of white paper to receive the pictures of *objects* that lie before the window; and when they appear distinct upon the screen, let the inner tube be turned round about its axis; and if the centre of the glass happens to be in this axis, the picture will be perfectly at rest upon the screen; if not, every point of it will describe a circle. With a pencil mark the highest and the lowest places of any one circle, described by some remarkable point in that part of the picture which appears most distinct; and when this point of the picture is brought to the highest mark, stop the circular motion of the tube, and keeping it in that position depress the *object-glass* till the point aforesaid falls exactly in the middle between the two marks. Then turn the tube round again, and the point of the picture will either rest there or will describe a much smaller circle than before, which must be reduced to a quiescent point by repeating the same operation. Then the centre (of refraction) of the glass will lie in the axis of the tube, and by consequence will be equidistant from the circumference of the large circle described upon the board fixt to it. Now to describe a circle upon the glass *f g h*, *Tab.* V. *Optics*, *fig.* 82. about its centre of refraction, let a long slender brass plate *a c b*, be bent square at each end, as represented in the figure, leaving a piece in the middle equal in length to the diameter of the large circle *a d b e* that was described upon the board; and let the square ends of the plate be filed away so as to leave a little round pin in the middle of each. Then having laid it over the glass, along any diameter of the large circle *a d b e*, make two holes in the board to receive the pins *a*, *b*; and find the centre of this circle upon the long plate; and with this centre *c* describe as large a circle as you can, upon the glass underneath, with a diamond-pointed compass; and grind away all the margin as far as this circle *f i h*, in a deep tobl for grinding eye-glasses; and then the glass will be truly centred. If the pitch or cement be too soft to keep the glass from slipping, while the circle is describing, it may be fixt firmer with wax or harder cement. Smith's Optics, book iii. chap. 3.

Mr. Savery gives the following rule, which is very convenient for the use of the glass-grinder, and will enable him expeditiously to try whether a convex lens is well centred. Provide a round plate of brass (or hardened steel, if it can be prevented from rusting), conveniently thick, and well hardened by hammering, having many notches round it, one a little wider than the next, and numbered 1, 2, 3, &c. in their proper order, each of them being wider at the bottom than at the entrance. *Tab.* V. *Optics*, *fig.* 83. Fit one of these notches to the thickest side of the *object-glass*, so that the edge may reach to about half its depth; and if the opposite side pass to the bottom of the notch, grind the lens narrower on the thinnest side, till you find it at that part as thick as where you first tried it in the notch. After this manner reduce the glass to an equal thickness on its four quarters, and then grind off from other places what is needful to make it circular: let care be taken, when the lens is tried in the notch, that it be not warmer on one side than the other by grinding, but stay till it is quite cold; and observe likewise not to thrust it in harder on the one side than on the opposite side. Phil. Trans. vol. xlviii. p. 177, &c.

The chief advantage of having a glass well centred in this, that the rays coming through any given hole or aperture, whose centre coincides with the axis of the glass, will form a more distinct image than if that centre lay beside the axis; because the aberrations of the rays from the geometrical focus of the pencil, are as the distances of their points of incidence from the centre of refractions in the glass.

As *object-glasses* are commonly included in cells that screw upon the end of the tube of a telescope, one may examine whether they be well centred, by fixing the tube, and observing while the cell is unscrewed, whether the cross-hairs keep fixed upon the same lines of an object seen through the telescope. See CENTERING.

OBJECT is also used for the matter of an art or science; or that about which it is employed.

In which sense the word coincides with *subject*.

The school-philosophers distinguish divers kinds of *objects* in the same science; viz.

OBJECT, *material*, which is the thing itself that is considered, or treated of. And thus it is the human body, which is the *object* of medicine.

OBJECT, *formal*, is the manner of considering it. And thus the same human body, considered with a view to the healing it, is the *formal object* of medicine.

OBJECTUM *quod complexum*, of an art, is the aggregate whole, or a collection of all the objective conclusions, or consequences, found in the science.

OBJECTUM *quod incomplexum* is a collection of all the subjects of the objective conclusions. Thus, therefore, air, as elastic, is the *complex object* of one branch of physics; and air itself, or the subject of the conclusion, the *incomplex object* of the same branch.

OBJECTUM *quo complexum* is a collection of all the objective antecedents of the science.

OBJECTUM *quo incomplexum* is a collection of all the mediums, or arguments, contained in those antecedents, and whereby those conclusions are proved.

In these cases the *object* is said to be *complex*, inasmuch as it includes both an affirmation and negation; and *incomplex*, as it includes neither: *quod*, as being that which *(quod)* is shewn in the science; and *quo*, as being that whereby *(quo)* the conclusions therein are proved.

Schoolmen also distinguish an *object per se*, and *per accidens*; *objectum adæquatum*, and *inadæquatum*; *attributionis*, and *attributum*, &c.

OBJECTION, in *Reasoning*, something urged to overthrow a position; or a difficulty raised against an allegation, or proposition, of a person with whom we are disputing.

The answering of *objections* comes under that branch of oratory, or that part of an oration, called CONFIRMATION, or CONFUTATION.

OBJECTION, *over-ruling an*. See OVER-RULING.

OBJECTIVE, OBJECTIVUS, is used in the schools in speaking of a thing which exists no otherwise than as an object known.

The esse, or existence, of such thing, is said to be *objective*. Others call it *ratio objectiva*.

OBJECTIVE is also used for the power, or faculty, by which any thing becomes intelligible. And for the act itself, whereby any thing is presented to the mind, and known.

Hence a thing is said *to exist objectively*, *objectivè*, when it exists no otherwise than in being known, or by being an object of the mind.

This some will have to be real ESSE; others deny it.

OBJECTIVE *evidence*. See EVIDENCE.

OBJECTIVE *line*. See LINE.

OBJECTIVE *notion*. See NOTION.

OBJECTIVE *plane*. See PLANE.

OBJECT *upper*. See NUPER.

OBIT, Obitus, in our *Ancient Customs*, was a funeral solemnity, or office for the dead; commonly performed when the corpse lay uninterred in the church.

Obit is also an anniversary office, or mass, held yearly, in the Romish church, on a certain day, in memory of some person deceased.

One of the most ancient *obits* in Europe is that of king Childebert, founded in the abbey of St. Germains Des-prez, and said on the eve of St. Thomas's day.

The tenure of *obit*, or chantry-lands, held of the subject by such service, is decreed to be extinct with us, by stat. 1 Edward VI.

OBITUARY, *obituarium*, a funeral register, wherein are written the names of the dead, and the days of their burial; for whom obits, or anniversaries, are to be performed.

These, in some places, are also called *mortuaries*; but more frequently *necrologies*, or *calendars*.

Obituary is more particularly used for a book containing the foundation or institution of the several obits in a church, or monastery.

This is more frequently called the martyrology.

OBLADA, in *Ichthyology*, a name given by some to the *melanurus* of authors, a fish of the *sparus* kind, distinguished by Artedi by the name of the *sparus variegated with longitudinal lines, and with a large black spot on each side near the tail*.

OBLATA, things given, or voluntarily offered, particularly to the king, by any of his subjects.

They are thus called, because the *oblata*, or offerings to our kings, were so strictly looked to in the reigns of king John, and Henry III. that they were entered in the pine-roll under the term *oblata*; and, if not paid, were put in charge to the sheriff.

Oblata, in the *Exchequer*, signifies old debts; brought, as it were, together, from preceding years, and put to the present sheriff's charge.

Oblata is also a word used by some authors to express a sort of purging tablet, made of fine flour and sugar, with some purging ingredients.

Oblatæ is also used to signify the consecrated wafers, or hosts, distributed to the communicants in the mass or sacrament of the altar; and sometimes the customary treats in religious houses have been called by the name of *oblatæ*.

OBLATI, anciently, were secular persons, who bestowed themselves and their estates, on some monastery, and were admitted as lay-brothers.

There were some of the *oblati*, properly called *donati*; who gave their persons, their families, and effects; and even entered into a kind of servitude themselves, and their descendants.

They were admitted by putting the bell-ropes of the church around their necks, and as a mark of servitude, a few pence on their heads.

The donati took religious habits, but different from those of the monks.

In the archives of the abbey of St. Paul de Verdun is a permission, given, in 1360, to a man of that abbey, to marry a wife; on condition, that, of the children arising from the marriage, one half should belong to the abbey, in quality of *oblati*; the other half to the bishop. This kind of *oblati* are said to have taken their first rise in the eleventh century.

In the earlier times, those only were called *oblati*, whom their parents engaged from their infancy, to the monastic life. Those who embraced it themselves, when at an age capable of choice, were called *conversi*, *converse*.

The *oblati* made no profession; yet kept the celibate, lived in obedience to the superiors, and did the drudgery of the monastery. Yet they differed from the servants of the house, who were allowed to marry.

The *oblati* and donati were, properly, servants by devotion, as the others were by condition.

Helyot says, the *oblati* differed from converts, inasmuch as the latter made the profession, and wore the habit, which the former did not.

Oblati were also, in France, a kind of lay-monks, anciently placed by the king in all the abbeys and priories in his nomination; to whom the religious were obliged to give a monk's allowance, on account of their ringing the bells, and sweeping the church, and the court.

These offices were usually filled with lame soldiers, and invalids, some of whom had pensions on benefices, without any duty. But these *oblati*, with their pensions, have since been all removed to the Hotel of the Invalids at Paris.

OBLATIONS, Offerings, properly denote things offered to God.

In the canon-law, *oblations* are defined to be any thing offered by godly Christians to God, and the Church, i. e. to the priests, whether they be moveables, or immoveables.

Oblations, were anciently of various kinds, viz. *oblationes altaris*, which the priest had for saying mass. *Oblationes defunctorum*, given by the last wills of the faithful to the church. *Oblationes mortuorum*, those given by the relations of the dead, at their burials. *Oblationes panitentium*, those given by penitents. And *oblationes pentecostales*, or Whitsun-offerings.

Till the fourth century the church had no fixed revenues, nor any other means of subsistence but alms, or voluntary *oblations*.

Under this term are now comprehended not only those small customary sums commonly paid by every person, when he receives the sacrament of the Lord's Supper, at Easter, which, in many places is 2*d*. from every communicant, and in London, 4*d*. a house; but also the customary payments for marriages, christenings, churchings, and burials. The four offering days are Christmas, Easter, Whitsuntide, and the feast of the dedication of the parish church. It hath been decreed, with regard to Easter offerings, that they are due of common right, and not by custom only. Offerings may be recovered before the justices of the peace, by the small tythe act of 7 and 8 Will. cap. 6.

OBLIGATION, an act whereby a person engages, or binds himself, or is bound by another, to do something; as to pay a sum of money, to be surety, or the like.

The acceptance of a bill of exchange, is a kind of *obligation* to pay it.

The exacting of interest on a sum due by a simple *obligation*, is accounted usury.

All *obligations* arise from contracts, or quasi-contracts; from crimes, or quasi-crimes; and, in the Roman law, were either civil, or prætorian; i. e. either approved by the civil law, or introduced by the prætor.

There are three kinds of *obligations*; *natural*, *civil*, and *mixt*.

Obligations, *natural*, are founded on the mere bond of natural equity, without any civil necessity, and without producing any action of constraint. Such are the *obligations* a minor is under.

Obligation, *civil*, is that supported by civil authority alone, and which induces a constraint, without any principle or foundation in natural equity. Such is the *obligation* on a man condemned unjustly.

Obligation, *mixt*, or an *obligation* both natural and civil, is that which, being founded in natural equity, is farther confirmed and enforced by civil authority.

There are also *personal obligations*, *hypothecary obligations*, *obligations* of goods, body, &c.

Obligation, in a more strict sense, denotes a bond containing a penalty, with a condition annexed, for payment of money at a certain time; or for performance of covenant, or the like.

A bond, or *obligation*, is said to differ from a bill, in that the latter is commonly without a penalty, and without condition. Yet a bill may be *obligatory*. Coke on Littleton.

Till the Conquest, writings were rendered *obligatory* by certain marks of gold crosses, &c. The Normans first introduced the custom of making bills and *obligations* with a print or seal in wax, set to every one's signature, attested by three witnesses.

OBLIGATO, in the *Italian Musick*, signifies *for, on purpose for*, or *necessary, as doi violini obligato*, on purpose for two violins; and so of other things, as *con fagotto obligato*, that must be played with a bassoon, &c.

Sometimes it signifies confined, or restrained, by certain rules, subjected to certain limits or laws, in order to perform some particular thing, to give some particular expression of a passion, action, &c. In this sense we say, *contrapunto obligato*, *fuga obligata*, &c. We also say, the bass is *obligato*, when it is only a ground of a certain number of bars, which are to be repeated over and over; such is the bass to chacones, &c. and every bass wherein one is obliged to keep a certain movement, and to perform only certain notes, &c.

OBLIGEE, in *Law*, is the party to whom an obligation, or bond is made.

OBLIGOR, in *Law*, the party who enters into, or executes, an obligation, or bond.

OBLIQUATION, in *Catoptrics*. *Cathetus of* Obliquation is a right line drawn perpendicular to a mirror, in the point of incidence, or reflexion of a ray. See Cathetus.

OBLIQUE, in *Geometry*, something aslant, indirect, or that deviates from the perpendicular.

Oblique *angle*. See Angle.

Oblique-*angled triangle* is that whose angles are *oblique*; i. e. either obtuse, or acute.

Oblique *circle*, in the stereographical projection of the sphere, any circle that is *oblique* to the plane of projection.

Oblique *line*, a line which, falling on another, makes an *oblique* angle.

A line falling *obliquely* on another makes the angle on one side obtuſe, and that on the other acute.

OBLIQUE *planes*, in *Dialling*, are ſuch as recline from the zenith, or incline towards the horizon.

The obliquity, or quantity, of this inclination, or reclination, is eaſily found by a quadrant; it being an arch of ſome azimuth, or vertical circle, intercepted between the vertex of the place and of that plane. This azimuth, or vertical circle, is always perpendicular to the plane.

OBLIQUE *percuſſion*, is that wherein the direction of the ſtriking body is not perpendicular to the body ſtruck, or is not in a line with its centre of gravity. See PERCUSSION.

The ratio an *oblique* ſtroke bears to a perpendicular one, is demonſtrated to be as the ſine of the angle of incidence to the radius.

OBLIQUE *powers*, or *forces*. See MOTION, DIRECTION, &c.

OBLIQUE *projection*, in *Mechanics*, is that where a body is impelled in a line of direction, which makes an *oblique* angle with the horizontal line. See PROJECTION.

OBLIQUE *ſphere*, in *Geography*, is that whoſe horizon cuts the equator *obliquely*; and one of whoſe poles is raiſed above the horizon, by an elevation equal to the latitude of the place.

It is this obliquity that occaſions the inequality of days and nights.

Thoſe who live under an *oblique* ſphere (as we, and all thoſe in the temperate zone, do) never have their days and nights equal, except in the equinoxes.

OBLIQUE *aſcenſion*, in *Aſtronomy*. See ASCENSION.

OBLIQUE *deſcenſion*. See DESCENSION.

To find the *oblique aſcenſion* and *deſcenſion* by the globe, ſee GLOBE.

OBLIQUE *ſailing*, in *Navigation*, is when the ſhip, being in ſome intermediate rhumb between the four cardinal points, makes an *oblique* angle with the meridian, and continually changes both its latitude and longitude.

Oblique ſailing is of three kinds; viz. *plain ſailing*, *Mercator's ſailing*, and *great circle ſailing*. See SAILING.

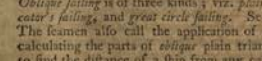
The ſeamen alſo call the application of the method of calculating the parts of *oblique* plain triangles, in order to find the diſtance of a ſhip from any cape, head-land, &c. by the name of *oblique ſailing*.

OBLIQUE *diſtillery*, in *Chemiſtry*. See DISTILLATION.

OBLIQUE *flanks*, in *Fortification*. See FLANK.

OBLIQUE *caſes*, in *Grammar*, are all the caſes of the declenſions of nouns, beſides the nominative. See CASE.

OBLIQUO, in the *Italian Muſic*, ſignifies two breves tied together, which make but one body, whence it is named in Italian *nota d' un corpo ſolo*; ſometimes there is a tail, on the right, or left ſide, either aſcending, or deſcending. See NOTE and LIGATURE. However it be, the two extremes mark the ſound, the middle ſerves only to tie them, thus:



OBLIQUUS, in *Anatomy*, (ſee MUSCLE), is applied ſubſtantively to ſeveral muſcles of the head and eye; particularly the

OBLIQUUS *capitis major*, or *par* OBLIQUUM *inferius*, the ſixth muſcle of the head; ſo called becauſe ſerving to turn the head aſide; though it has neither its origin nor inſertion in the head.

This riſes fleſhy from the external parts of the ſpine of the ſecond vertebra of the neck, and, ſwelling into a fleſhy belly, runs *obliquely* to the tranſverſe proceſs of the firſt vertebra. This ſome rank among the muſcles of the neck.

OBLIQUUS *capitis ſuperior*, or *minor*, or *par obliquum ſuperius*, the ſeventh muſcle of the head; which, ſpringing fleſhy from the tranſverſe proceſſes of the ſecond vertebra of the neck, and aſcending *obliquely*, is inſerted laterally into the occiput.

Others will have its origin to be in the occiput, where the common opinion places its inſertion; its inſertion they make in the tranſverſe proceſſes of the firſt vertebra, near that of the ſame ſide.

The two *oblique* muſcles, by pulling the tranſverſe proceſs, give the head a ſemicircular motion.

OBLIQUUS *oculi ſuperior*, or *major*, the fifth muſcle of the EYE.

It has its origin in the upper part of the orbit; whence, tending upwards towards the inward canthus of the eye, it paſſes through a cartilage on the bone of the forehead, called *trochlea*; whence, alſo, the muſcle itſelf is called *trochlearis*: thence it is reflected to its termination in the *ſclerotica*, on the back part of the ball of the eye.

When this muſcle acts, that part of the ball of the eye is drawn downwards towards the trochlea, whereby the pupil is directed downwards, towards the leſſer canthus; and, at the ſame time, the whole ball of the eye ſomewhat outwards.

OBLIQUUS *oculi inferior*, or *minor*, riſes from the external margin of the lower part of the orbit, near the inner canthus; whence, riſing towards the outer canthus, it terminates near the other. It draws the ball of the eye outwards, and turns its pupil upward, contrary to the former. See ROTATOR.

OBLIQUUS *deſcendens*, or *duellcti*, a very broad pair of muſcles of the abdomen, each covering one half thereof, and part of the thorax; ſo called from the *oblique* courſe of its fibres. It ariſes from the two laſt true ribs, and five ſpurious ones; and is indented with the ſerratus major anticus by five or ſix digitations, each whereof receives a nerve from the interſtices of the rib: it ſprings, likewiſe, from the margin of the ileum, and ends in a broad tendon in the linea alba. See *Tab. Anat. (Myol.) fig.* 7. *n.* 10. *fig.* 1. *n.* 45. and *fig.* 6. *n.* 31.

This is alſo called *obliquus externus*, *ſuperior*, or *major*; ſee farther Winſlow's Anatomy, p. 103.

Beſides the ordinary uſe aſcribed to it by all anatomiſts, which is, to compreſs the inteſtines and bladder; Cowper and Giſſon attribute to it another, which is, to turn the trunk of the body without moving the feet.

OBLIQUUS *aſcendens*, or *acclivis*, lies under the lower part of the former; running with a courſe juſt contrary, from the lower part upwards: its fleſhy fibres have their origin from the edge of the ileum, and end at the ſpurious ribs: it terminates with a large double tendon in the linea alba, the upper part whereof, creeping over the muſculus rectus, and the other creeping under it, and joining together at the linea alba, do, as it were, ſheathe the rectus. See *Tab. Anat. (Myol.) fig.* 2. *n.* 30. *fig.* 1. *n.* 44.

It is alſo called *obliquus internus*, ſee farther Winſlow's Anatomy, p. 165.

Its uſe is, to ſhut and compreſs the belly; as, alſo, the cavity of the thorax, in reſpiration; and it aſſiſts, with its antagoniſt, the *deſcendens*, in turning the body without moving the legs.

OBLIQUUS *auris*, lies in the external part of the canal of the aqueduct; whence, paſſing upwards and backwards, it enters the tympanum, by a very *oblique* ſinuoſity, immediately above the bony circle to which the tympanum is fixed; and is inſerted into the ſlender proceſs of the malleus.

OBLIQUITY, that which denotes a thing *oblique*.

The *obliquity of the ſphere* is the cauſe of the inequality of the ſeaſons, of nights and days.

OBLIQUITY *of the ecliptic*, is the angle which the ECLIPTIC makes with the equator.

OBLONG, in *Geometry*, a figure longer than it is broad.

Thus a rectangled parallelogram, whoſe ſides are unequal, is an *oblong*: ſo an ellipſis is alſo an *oblong*.

OBLONG *leaf*. See LEAF.

OBLONGATA *medulla*. See MEDULLA and CRURA.

OBNUNCIATION, *obnunciatio*, in *Roman Antiquity*. See NUNCIATION.

OBOE, or OBOI, in the *Italian Muſic*, is uſed to ſignify an *hautboy* or *hoboy*, or that a part is to be played on that inſtrument.

OBOLARIA, in *Botany*, a genus of the *didynamia angioſpermia* claſs: the characters of which are, that the calyx is bifid; the corolla campanulated, and divided into four ſegments; the capſule has one cell, two valves, and is polyſpermous; and the ſtamina ariſe from the diviſions of the corolla. There is only one ſpecies.

OBOLATA *terræ*, in our *Ancient Law Books*, is a certain quantity of land, which ſome authors fix at half an acre; though others make it but half a perch.

According to Thomaſius, the *obolus terræ* contains ten feet in length, and five in breadth.

OBOLUS, an ancient ſilver money of Athens, the ſixth part of a DRACHM; worth ſomewhat more than a penny farthing ſterling.

The word comes from the Greek, ὀβολὸς, of ὀβελὸς, *ſpit*, or *broach*; either becauſe it bore ſuch an impreſſion, or becauſe, according to Euſtathius, it was in form thereof: but thoſe now in the cabinets of the antiquaries are round.

They alſo ſtruck ſilver pieces of one, two, three, four, and five *oboli*, of half, and of one fourth of an *obolus*.

OBOLUS was alſo uſed, among our *Anceſtors*, for half a noble, or ſterling; where the noble was eſteemed as the penny, and its quarter part a farthing.

In effect, in the old hiſtories and accounts of coins, we are to underſtand by the word *denarius*, the whole coin, be it angel, rial, &c. by the *obolus*, its half; and by *quadrans*, its fourth part.

OBOLUS, in *Medicine*, is used for a weight of ten grains, or half a scruple.

Du-Cange says, the *obolus* weighs three carats, or four grains of wheat: others divide it into six areolæ, and the areola into seven minutes; others into three siliquæ, each siliqua into four grains, and each grain into a lentil and a half.

Among the Sicilians *obolus* also denoted a weight of a pound.

OBRANG, in *Botany*, the name given by the people of Guinea to a very singular and remarkable plant, the virtues of which they greatly praise. They boil it in water, and use the decoction by way of fomentation to take down swellings of the testicles. Its leaves have some faint resemblance to those of our liquorice, whence Petiver has called it *glycyrrhizæ folio singulari fructu Guineensis spinis armatis*.

OBREPTITIOUS, OBREPTITIUS, a quality of letters patent, or any other instrument which confers a favour, title, or concession; denoting it obtained of a superior by surprize, or by concealing from him the truth, which was necessary to have been expressed, in order to render it valid.

In which sense the word stands opposed to *surreptitious*, where some falsehood has been expressed, in order to procure it the more easily. *Obreption* annuls the grant, wherever found.

By the canon law, a person demanding a benefice, without expressing those he is already polished of, forfeits, &c. by *obreption*.

OBRINE, KNIGHTS *of* OBRINE, a military order instituted in the thirteenth century by Conrade, duke of Mazovia and Cujavia, whom some authors call also duke of Poland.

He first gave them the name of *knights of Jesus Christ*. Their first grand master was Bruno. Their chief end was to defend the country from the Prussians, who were yet idolaters, and committed great cruelties.

Duke Conrade putting them in possession of fort Obrine, they hence took a new name; and it was agreed between them, that whatever lands they conquered from the Prussians, should be equally divided with him.

But the Prussians blocking up the fort, so that none of the knights could get out, the order became useless, and was soon suppressed. Upon this, Conrade called in the Teutonic knights.

OBRIZUM, in *Antiquity*, a kind of gold. Pliny says, that they call the gold that has been several times purified in the fire, *obrizum*. *Auri experimento ignis ofi ut similis colore rubeat quo ignis; atque ipsum* obrizum *vocant*. *Obriz* in Arabic, or Persian, signifies fine gold without mixture, which the Greeks and Latins call *obrizum*.

OBSCURA *camera*. See CAMERA *Obscura*.

OBSCURA *clara*. See CLAIR-OBSCURE.

OBSCURE, something that is dark, or that only receives and returns a little light.

OBSCURE is also used, in a figurative sense, for a thing that is not clear, express, and intelligible; that one does not fully apprehend; or that may be construed into divers senses.

OBSCURE *notion*, or *idea*. See NOTION, and IDEA.

OBSCURE, *clair*. See CLAIR-OBSCURE.

OBSCURITY, that which denominates a thing obscure.

Obscurity is a fault that may either be in the perception, or the diction.

Obscurity in the perception arises chiefly hence, that we do not conceive things as they are, or as we find them; but as we judge them to be before we know them: so that our judgment precedes our knowledge, and is made the rule or standard of our conceptions. Whereas nature and reason direct, that things should be judged of according as they are known; and that they are to be known, not as they are in themselves, but only in such manner as God was pleased to have them known.

Obscurity in the diction may arise, first, from the ambiguity of the sense of words; secondly, from the figures or ornaments of rhetoric; thirdly, from the novelty or obsoleteness of the words.

OBSECRATION, *obsecratio*, in *Rhetoric*, a figure whereby the orator implores the assistance of God, or man. This figure Cicero makes admirable use of, for K. Deiotarus, to Cæsar. *Per dexteram te ejusm oro, quam regi Deiotaro hospes hospiti porrexisti: ejusm, inquam, dexteram non tam in bello & in præliis, quam in promissis & fide firmiorem.*

Thus Virgil:

Quod te per cali jucundum lumen, & auras,
Per genitorem oro, per spem surgentis Iuli,
Eripe me his, invicte, malis——

OBSEQUIES, funeral solemnities, or ceremonies performed at the burials of eminent persons.

The word is derived from the Latin *obsequium*, *obedience*; these *obsequies* being the last devoirs we can render to the deceased. See BURIAL and FUNERAL.

OBSERVANCE literally denotes the act of observing, or complying with, a rule, law, or ceremony.

Hence *observance* is sometimes also used for a RULE, statute, or ordinance to be observed.

OBSERVANCE, *observantia*, is particularly understood, in a monastic sense, of a community of religious, who are bound to the perpetual observation of the same rule. In which sense the word coincides with *congregation*, or *order*.

The CORDELIERS denominated themselves, *Religious of the Observance*; the *great*, and the *lesser observance*.

Those Fraciscans are called *Brethren of the Observance*, who religiously observe the primitive laws and institutions of their founder, in opposition to CONVENTUALS. See FRIARS *Observant*.

Among the Bernardines, there are monks of the *strict observance*, who eat nothing but fish.

OBSERVANTINES, religious Cordeliers of the observance. In Spain there are bare-footed *Observantines*.

OBSERVATION, in the *Sea Language*, the taking of the sun's, or any star's, meridian altitude, in order thereby to find the latitude.

For the method of making an *observation*, see LATITUDE.

The finding of a latitude from the meridian altitude observed, they call *working an observation*.

OBSERVATIONS, in *Astronomy*. See COELESTIAL *observations*.

OBSERVATORY, *observatorium*, a place destined for observing the heavenly bodies; or a building usually in form of a tower, raised on some eminence, and covered with a terrace, for making astronomical observations. The more celebrated *observatories* are, — 1. The Greenwich *observatory*, built in 1676, by order of king Charles II. at the solicitation of Sir Jonas Moor, and Sir Christopher Wren; and furnished with the most accurate instruments by the same; particularly a noble sextant of seven feet radius, with telescope-sights.

The person to whom the province of observing was first committed, was Mr. J. Flamsteed; a man, who, as Dr. Halley expresses it, seemed born for the employment. For the space of fourteen years, with unwearied pains, he watched the motions of the planets, chiefly those of the moon, as was given him in charge; that a new theory of that planet, exhibiting all her irregularities, being found, the longitude might thence be determined.

In the year 1690, having provided himself with a mural arch of seven feet diameter, well fixed in the plane of the meridian, he began to verify his catalogue of the fixed stars, which hitherto had depended altogether on the distances measured with the sextant, after a new and very different manner; viz. by taking the meridian altitudes, and the moments of culmination, or the right ascension and declination.

This instrument he was so pleased with, that he laid the use of the sextant almost wholly aside. Thus was the astronomer royal employed for thirty years; in the course of which time nothing had appeared in public, worthy so much expence and preparation: so that the observer seemed rather to have been employed for his own sake, and that of a few friends, than for the public; though it was notorious, the observations that had been made were very numerous, and the papers swelled to a great bulk.

This occasioned prince George of Denmark, in the year 1704, to appoint certain members of the Royal Society, viz. the honourable Fr. Robarts, Sir C. Wren, Sir Isaac Newton, Dr. Gregory, and Dr. Arbuthnot, to inspect Mr. Flamsteed's papers, and chuse out of them such as they should think fit for the press; purposing to print them at his own expence: but the patron of the work dying, before the impression was half finished, it lay still for some time; till at length it was resumed by order of queen Anne; and the care of the press committed to Dr. Arbuthnot; and that of correcting, and supplying the copy, to Dr. Halley.

Such was the rise and progress of the Historia Cœlestis; the principal part whereof is the catalogue of fixed stars, called also the Greenwich Catalogue.

Flamsteed was succeeded by Dr. Halley; and Dr. Halley by Dr. Bradley, in 1742, so deservedly celebrated for his discovery of the aberration of the stars (see LIGHT) and the NUTATION of the earth's axis: who was succeeded in 1762, by the rev. Mr. Maskelyne, the present astronomer royal.

The *Greenwich observatory* is found, by very accurate observations, to lie in 51°, 28′, 30″, north latitude. — 2. The *Paris observatory*, built by Louis XIV. in the Fauxbourg St. Jaques. It is a very singular, but withal a very magnificent building; the design of M. Perrault.

Perrault. It is eighty feet high, and a-top is a terrace. It is here M. de la Hire, M. Cassini, &c. have been employed. This *observatory* was begun in 1664, and finished in 1672. The difference in longitude between this and the *Greenwich observatory*, is 20° 20′ west.

In the *Paris observatory* is a cave, or cellar, of one hundred and seventy feet descent, for experiments that are to be made far from the sun, &c. particularly such as relate to congelations, refrigerations, indurations, conservations, &c.

In this cave there is a thermometer of Mr. de la Hire, which is always at the same height, and indicating the temperature of the place to be always the same.

3. Tycho Brahe's *observatory* was in the little island Ween, or the Scarlet Island, between the coasts of Schonen and Zealand, in the Baltic. It was erected and furnished with instruments at his own expence; and was called by him Uranibirgh. In this place he spent twenty years in observing the stars. The result is his Catalogue.

Mr. Gordon, in Phil. Transf. observes, that this was not the fittest place for some kind of observations, particularly the risings and settings; as it lay too low, and was landlocked on all the points of the compass but three; and the land horizon being exceeding rugged and uneven.

4. *Pekin observatory*. Father Le Compte describes a very magnificent *observatory*, erected and furnished by the late emperor of China, in his capital, at the intercession of some Jesuit missionaries, chiefly father Verbiest, whom he made his chief observer.

The instruments are exceedingly large; but the divisions are less accurate, and the contrivance, in some respects, less commodious, than those of the Europeans. The chief are an armillary zodiacal sphere, of six Paris feet diameter, an equinoctial sphere six feet diameter, an azimuthal horizon six feet diameter, a large quadrant six feet radius, a sextant eight feet radius, and a celestial globe six feet diameter.

OBSERVATORY *portable*. See EQUATOREAL.

OBSESSION, an action, or rather passion, of being beset by an evil spirit; which, without entering the body, torments, and, as it were, besieges the person without. In which sense, *obsession* differs from possession.

The marks of *obsession*, according to some, are a being hoisted into the air, and thrown violently down without being hurt; speaking languages never learnt; having an aversion to all acts and offices of religion, &c.

Some physicians look on all cases of *obsession* as natural, and curable by natural medicines, particularly by an unguent, called *unguentum curriculorum*; with purgatives, or vomitives.

Of this opinion is doctor Gabriel Clauderus, member of the Leopoldine academy, which he confirms with the testimony of Fromannus, in his treatise De Fascinationibus, and Gaulius de Corallibus adding, that it has been confessed by many witches and sorcerers, that the plant hyperion, and other simples, &c. incommode them terribly, and prevent their operations.

He confirms this sentiment hence, that the devil, in those he thus besets, makes use of the melancholic humour, or the atra bilis, and the grosser impurities of the blood, without always acting immediately of himself. For which he refers to the books of Melchior Sebizius, and Jerom Jordan De Divino in Homine; and gives the process of a cure of a manifest *obsession* of a child of 9 year old at Delitschebourg, three leagues from Lipsic. In truth, the devil hath no share in the matter. See DEMONIACAL *possession*.

OBSIDIANUS *lapis*, in the *Natural History of the Ancients*, the name of a stone which they have also described under the name of the *Chian marble*. It is a very smooth and hard marble, extremely difficult to cut, but capable of a fine polish, and was used among the ancient Greeks for the making of reflecting mirrors. See MARBLE.

The later writers have supposed the name *obsidianus* derived from somebody of the name of *Obsidius*, who was the inventor of this use of it; but it seems only a false spelling of the word *opsianus*, *ὀψιανὸς*, from seeing the images of things in it.

OBSIDIONALIS, an epithet which the Romans gave to a sort of crown wherewith they honoured such of their generals as had delivered a Roman army, or fortress, besieged by the enemy; and had raised the siege, or obliged them to decamp.

The word comes from the Latin *obsidio*, *siege*.

It was also called *graminea*, because made of grass or herbs found on the spot or soil.

It was the soldiery who bestowed this crown; which, doubtless, was the reason of its not being of a more precious matter.

OBSTIPA, among the Romans, a term used to signify places that had been thunder-struck, which were otherwise called *bidentalia*. See BIDENTAL.

OBSTRUCTION, in *Medicine*, a let or stoppage of the natural passages or cavities of the body; occasioned either by the excessive quantity, or the vicious quality, of the humours; as lentor, thickness, or the like.

Obstructions are supposed usually to arise from the gross parts of the blood, detained in the extremities of the capillary vessels, and thus blocking them up.

Some physicians doubt whether there be any such thing as *obstructions* in the viscera; or rather attribute the inconveniencies, usually ascribed to *obstructions*, to the acrimonies and crudities of the stomach. But their reasons are not convincing. It is true, *obstructions* may not perhaps be so frequent as is usually supposed; and many of the symptoms ascribed to them, are, doubtless, owing to disorders of the stomach; but then there is no denying, that there any *obstructions* at all in the viscera, &c. schirruses, and other kinds of tumors, are incontestable proofs hereof.

Obstructions frequently prove the causes of dropsies. See DROPSY.

OBSTRUENTS. See DEOBSTRUENT.

OBSTRUXIT, *Quare* OBSTRUXIT. See QUARE.

OBTUNDENTIA, a word used by some authors to express such medicines as are given to obtund, or edulcorate the acrimony of the humours.

OBTURATOR, in *Anatomy*, a name given to two muscles of the thigh; on account of their shutting, or covering up, the foramen, or aperture, between the os pubis and the hip-bone.

The *obturator internus* and *marsupialis* are the two parts, or divisions, that make the GEMINI.

OBTURATOR *externus*, a small flat muscle, which fills up the foramen ovale of the os innominatum exteriorly, and reaches from thence to the great trochanter of the os femoris behind the neck of that bone. It is fixed by fleshy fibres to the outer, or anterior side of the os pubis, all the way to the foramen ovale, to the edge of that hole next the small ramus of the ischium, under the acetabulum, where a tendon is formed which continues its course behind the neck of the os femoris toward the great trochanter, and is inserted between the gemelli and quadratus, in a small fossula, between the apex of the great trochanter, and the basis of the collum femoris. See *Tab. Anat. Myol. fig. 7. n. 25.* Winslow.

OBTURATOR *internus*, a flat muscle, almost triangular, situated in the bottom of the pelvis; it covers the foramen ovale, and almost all the inside of the os pubis and ischium. It is fixed to the internal labium of all the anterior half of the foramen ovale, a little to the neighbouring part of the *obturator ligament*, and also both above and below the foramen. It is likewise fixed to the upper half of the inside of the os ischium, from the upper oblique notch in the foramen ovale, to the superior part of the great posterior sinus of the os ischium.

From all this extent, the fleshy fibres contracting in breadth, run down below the spine of the ischium, where they go out of the pelvis through the posterior notch in the ischium.

The inside of the body of this muscle, or that turned to the cavity of the pelvis, is pretty uniform; but the outside, or that turned toward the foramen ovale, and which touches the bone, has four middle radiated tendons, which uniting at the posterior notch of the ischium, run over it from behind forward, as over a pulley, each tendon sliding in a particular cartilaginous channel. Afterwards the four tendons, having got out of the pelvis, are pretty strictly united in one large flat tendon, which, crossing over that of the pyriformis, unites with it, having first received on each side some additional fleshy fibres from the two gemelli. The great tendon slides freely, in a sort of membranous vagina, formed by these muscles, and is inserted in the middle of the superior part of the cavity of the great trochanter, adhering closely to the capsular ligament of the joint, and being united to the tendons of the gluteus minimus, and pyriformis. Winslow.

OBTURATOR *ligament*. This is one of the proper ligaments, of the ossa innominata, and fills up all the great foramen ovale, except the oblique notch at its upper part. It is fastened precisely to the edge of the circumference of that hole, from the anterior part of the oblique notch, all the way to the symphysis between the os pubis, and os ischium. From thence to the posterior part of the inferior notch, it is fixed to the internal labium of the edge of the circumference, forming a kind of small channel with the external labium; and afterwards it is fixed to the common edge of the foramen ovale, and coxyloide notch. By this disposition, an opening is left between this ligament, and the superior oblique notch, and immediately below this common opening, there are two small perforations in the ligament alone. Winslow.

OBTUSE literally imports blunt, dull, &c. in opposition to acute, sharp, brisk, &c.

OBTUSE *angle*, in *Geometry*. See ANGLE.

OBTUSE-ANGLED *triangle*, is a triangle, one of whose angles is obtuse.

OBTUSE-*angular section of a cone*, a name given to the HYPERBOLA by ancient geometricians, because they considered it only in such a cone, whose section by the axis is a triangle, *obtuse*-angled at the vertex. See CONIC *section*.

OBTUSE *appui*. See APPUI.

OBVENTIONS, *oblationes*, in *Ancient Law Books*, fignify the produce of a BENEFICE, or fpiritual living; including OBLATIONS, TITHES, rents, and other revenues.

OCCASIO, in *Ancient Law Writers*, denotes a tribute which the lord impofed on his vaffals, or tenants, on occafion of war, and other exigencies.

OCCASIONAL *cauſe*, &c. See CAUSE, &c.

OCCATION, a term in the ancient husbandry, by which they expreſſed what we do by harrowing, though they performed it with a different inſtrument, a kind of rake. With the teeth of this inſtrument, they levelled the ground, and broke the clods, and, with the hand, ſtrewed the corn over this level ground. Then they brought on the plough, and ploughed it in; ſo that the grain was ſown in furrows, as we expreſs it, and uſually came up, as we ſee it does at this time with us, in the ſame caſe, in the lower parts only. After it had got a few leaves, they went over the ground again with the ſame inſtrument a ſecond time, to clear away the weeds, and move the earth about the roots of the young plants. If they did this lengthways of the furrows, the earth being ſomewhat hardened, there fell but little of it among the corn; but if they did it croſſways of the furrows, a great deal fell down upon, and among, the young plants, and, in a manner, buried them; they were uſually obſerved to grow better for this croſs harrowing, except in cold places; and the huſbandmen thought the vigour of the plants was owing to the burying them with new earth; but this was really rather prejudicial to them, and the advantage they had ariſe from the more deep ſtirring of the ground. Tull's Huſbandry.

OCCHIO, in *Glaſs-Making*, the hole in the floor of the tower of the leer.

OCCIDENS, an affected name given by ſome of the chemical writers to *vinegar*.

OCCIDENT, *in Geography*, the weſtward quarter of the horizon, or that part of the horizon where the ecliptic, or the ſun therein, deſcends into the lower hemiſphere.

OCCIDENT, *equinoctial*, that point of the horizon where the ſun ſets, when entering Aries or Libra.

OCCIDENT, *eſtival*, that point of the horizon where the ſun ſets at his entrance into the ſign Cancer, when the days are longeſt.

OCCIDENT, *hybernal*, that point of the horizon where the ſun ſets, when entering the ſign of Capricorn; at which time, the days, with us, are ſhorteſt.

OCCIDENTAL, a term chiefly uſed in commerce, to diſtinguiſh commodities brought from the Weſt Indies, i.e. America, from thoſe brought from the Eaſt Indies, which are ſaid to be *oriental*.

In this ſenſe we ſay *occidental* BEZOAR.

OCCIDENTAL *pearl*. See PEARL.

OCCIDENTAL *horizon*. See HORIZON.

OCCIPITAL, in *Anatomy*, a term applied to the parts of the OCCIPUT, or of the hinder part of the head.

OCCIPITAL *bone*. See OCCIPITIS *os*.

OCCIPITALES, or OCCIPITAL *muſcles* (ſee MUSCLE), are a pair of muſcles of the head, whoſe origin is in the ſame place with that of the frontales, i.e. in the upper part of the head near the vertex, but which go a quite oppoſite courſe; viz. from before, hindwards; and are inſerted into the lower part of the hairy ſcalp, or ſkin of the occiput, which they ſerve to draw upwards. See *Tab. Anat. (Myol.) fig.* 6. *n.* 1.

Dr. Drake obſerves, that the *occipitalis* and frontalis are one continued digaſtric muſcle on each ſide; that part called the *occipitalis*, after a ſmall deſcent, becomes a thin tendon, and marches over the whole bregma, where it divides; the one part going to the os jugale; and the other, growing fleſhy, acquires the name frontalis.

OCCIPITIS *os*, or *os proræ*, in *Anatomy*, the fourth bone of the cranium; ſo called from its ſituation in the OCCIPUT. See *Tab. Anat. (Oſteol.) fig.* 2. *lit.* g. *fig.* 7 *n.* 2.

It forms the back part of the head; ſerves for the articulation of the head with the trunk; contains a part of the brain, and almoſt all the cerebellum; and gives paſſage to the medulla oblongata, and a great many of the nerves and veſſels; and inſertion to a great many of the muſcles.

It is the hardeſt and thickeſt of all the bones of the cranium. Its figure is triangular. In new-born children it is divided into four; but it grows up, and becomes one, in time.

It is joined to the bones of the ſinciput at the lambdoidal future; as likewiſe to the petroſa, and os ſphenoides, at the ſphenoidal future.

The parts of this bone are either ſolid or hollow, i. e. empty: the ſolid are two proceſſes, called *cornua*; the hollow parts are either foramina, or ſinuſes.

The foramina are either common, or proper. The common are two, one on each ſide, common with the oſſa petroſa, affording a paſſage to the nerves par vagum, and to the internal jugular veins.

The proper foramina are five. The firſt is very large; and through this it is that the ſpinal marrow paſſes: two others give paſſage to the nerves of the tongue, and the two laſt an entrance to the cervical arteries.

It has two large ſinuſes within-ſide, for the reception of the two hemiſpheres of the cerebellum.

On each ſide the foramina which give paſſage to the ſpinal marrow, is uſually a proceſs lined with a cartilage, articulated with the firſt vertebra of the neck.

In lieu of this, is ſometimes only a prominence of the bone; which, on the proceſs where it is found, receives the inſertions of the muſcles of the head, whereof there are ten; viz. the par ſplenium, par complexum, par rectum majus externum, par rectum minus externum, par obliquum ſuperius, obliquum inferius, par maſtoideum, rectum internum majus, rectum internum minus, and rectum laterale; each of which ſee in its proper place.

OCCIPUTO *frontalis*, in *Anatomy*, is, according to Douglas, a muſcle of the head; which he thus deſcribes: it riſes fleſhy from the tranſverſe line of the occiput, oppoſite to part of the ſuperior termination of the maſtoideus, and part of the beginning of the trapezius next it; and their tendinous from the reſt of that line backwards, ariſing after the ſame manner on the other ſide; from thence it grows ſtrait up, and ſoon becoming all tendinous, it covers the two parietal bones, and the *oſſa ſquamoſa* above the temporal muſcles, its outer eye being faſtened to the *os jugale*, on each ſide: this broad tendon near the coronal future grows fleſhy, and deſcends with ſtrait fibres as low as the *muſculi orbiculares*.

It is inſerted into the ſkin at the eye-brows, having ſent down, between them, a narrow fleſhy ſlip, or elongation, which is continued over the *oſſa naſi*, as far as its cartilaginous part, where its fibres run off on each ſide, and terminate in the ſkin above the *muſculus naſi proprius*.

When this digaſtric muſcle, which covers all the upper part of the ſkull, like a cap, acts, it pulls the ſkin of the head backward, at the ſame time it draws up and wrinkles that of the forehead, being antagonized by the corrugator.

OCCIPUT, the hinder part of the head or ſkull; or the part wherein is the os occipitis.

Sculletus obſerves, that cauterizing the *occiput* is very frequent in many places.

OCCULT, ſomething ſecret, hidden, or inviſible. The *occult* ſciences are, magic, necromancy, cabbala, &c.

Agrippa has ſeveral books of *occult philoſophy*, full of the vaineſt, wildeſt dreams imaginable: and Fludd nine volumes of the *cabbala*, or *occult ſciences*, wrapt up under figures, or Hebrew characters.

Weak philoſophers, when unable to diſcover the cauſe of an effect, and unwilling to own their ignorance, ſay, it ariſes from an *occult virtue*, an *occult cauſe*, an *occult quality*.

OCCULT, in *Geometry*, is uſed for a line that is fearce perceivable, drawn with the point of the compaſſes, or a black-lead pencil.

Occult, or dry lines, are uſed in ſeveral operations; as the raiſing of plans, deſigns of building, pieces of perſpective, &c. They are to be effaced, when the work is finiſhed.

OCCULT *cancers*. See CANCER.

OCCULTATION, in *Aſtronomy*, the time a ſtar or planet, is hid from our ſight, by the interpoſition of the body of the moon, or of ſome other planet. See ECLIPSE.

OCCULTATION, *circle of perpetual*. See CIRCLE.

OCCUPANT, in *Law*, he that firſt ſeizes and takes poſſeſſion of a thing.

If a tenant hold land, &c. for the term of another's life, and ſuch tenant die firſt, without making any eſtate of it; he that firſt enters to hold that term out, is ſaid to acquire a property; and is called an *occupant*, by reaſon his title comes by the firſt occupation.

So, if a tenant, for his own life, grant over his eſtate to another; if the grantee dies before him, there ſhall be an *occupant*.

OCCUPATION, or OCCUPANCY, in the *Civil Law*, denotes the poſſeſſion of ſuch things as at preſent properly belong to no private perſon, but are capable of being made ſo. As, by ſeizing or taking ſpoils in war; by catching things wild by nature, as birds, and beaſts

of game, &c. or by finding things before undiſcovered, or loſt by their proper owners.

OCCUPATION is alſo uſed, in *Common Law*, for the putting a man out of his freehold in time of war.

Occupation amounts to the ſame with DISSEISIN in time of peace; only that the former is deemed not ſo great an offence.

OCCUPATION is alſo uſed for holding tenure, or poſſeſſion. As, when we ſay, ſuch land is in the tenure or *occupation* of ſuch a man; that is, in his poſſeſſion.

OCCUPATIONS, in the ſtatute De Bigamis, denotes uſurpations upon the king, by uſing liberties or franchiſes a perſon is not intitled to.

As any unjuſt entry upon the king into lands and tenements, is called an INTRUSION; ſo an unlawful uſing of franchiſes is called an *occupation*.

OCCUPAVIT, in *Law*, a writ which lies for him who is ejected out of his land, or tenement, in time of war; as a novel diſſeiſin lies for one ejected in time of peace.

OCCUPIERS *of wallings*, a term in the ſalt works for the perſons who are the ſworn officers, that allot, in particular places, what quantity of ſalt is to be made, that the markets may not be over-ſtocked, and ſee that all is carried fairly and equally between the lord and tenant. Theſe perſons always appoint how many houſes ſhall work at a time; and, when there is ſalt to be made, theſe appoint a cryer to proclaim it to all the workers, that they may put to their fires at the ſame time; and a like proclaiming of the time when they ſhall leave off; and thoſe, who continue to work after this prohibition, are to have their ſalt ſpoiled or deſtroyed.

OCEAN, in *Geography*, the vaſt collection of ſalt and navigable water, which encompaſſes the whole globe of the earth.

The word comes from the Latin *oceanus*, of the Greek ὠκεανος, which Euſtathius derives from ὠκυς ναειν, *to flide ſwiftly*; others ſay, the Greeks borrowed it from the Phœnicians, who called the circumference of the *ocean*, עג; from the Hebrew חוג, *hhog*, *circuit*, *ambit*.

The *ocean* is that huge body of waters wherein the two grand continents known to us, the new and old, are incloſed like iſlands.

By computation it appears, that the *ocean* takes up conſiderably more of what we know of the terreſtrial globe than the dry land.

Dr. Keill computes the ſurface of the whole *ocean* to be 85490506 ſquare miles: ſo that, ſuppoſing the depth of the *ocean* at a medium to be ¼ of a mile, the quantity of water in the whole will be 21372626¼ cubic miles. See GLOBE, and *Magnitude of the* EARTH.

Yet Dr. Burnet computes, that all the waters in the *ocean* were not ſufficient to drown or overflow the dry land ſo high as the Scriptures ſay it was at the deluge: ſeven or eight *oceans*, according to him, would ſcarce have ſufficed.

The *ocean*, penetrating the land at ſeveral ſtreights, quits its name of *ocean*, and aſſumes that of *ſea*, or *gulph*; to which are uſually added ſome epithets, to diſtinguiſh it: as Mediterranean ſea, Perſian gulph, &c. In very narrow places it is called *ſtreights*, *fretes*.

The *ocean* takes different names, according to the divers countries it borders on: as the *Britiſh ocean*, *German ocean*, &c. According to Maty, the *ocean* may be commodiouſly divided into *ſuperior*, or *upper*; and *inferior*, or *lower*.

OCEAN, *upper*, which the ancients called the *exterior*, as environing all the known parts of the world, he ſubdivides, according to the four cardinal points, into the *northern*, *ſouthern*, *eaſtern*, and *weſtern*.

OCEAN, *northern*, called alſo the *glacial*, *frozen*, and *Scythian*, is that part of the *upper ocean* next the north pole; bounded on the ſouth with the arctic circle, and the northern coaſts of Europe, Aſia, and America; and on the north with the unknown lands about the pole.

It is called the *icy* or *frozen ocean*, becauſe thoſe who have attempted a paſſage through it to China, &c. have always been ſtopped with the ice; and *Scythian ocean*, becauſe waſhing the coaſts of Scythia.

OCEAN, *weſtern*, or *Atlantic*, is that part of the grand *ocean* which waſhes the weſtern coaſts of Europe and Africa, and the eaſtern of America, extending from the arctic circle to the equinoctial.

OCEAN, *ſouthern*, or *European*, is that part reaching from the equinoctial to the unknown antarctic lands.

OCEAN, *eaſtern*, or *Indian*, has its firſt name from its ſituation to the eaſt; as its latter from India, the chief country it waſhes. It reaches from the coaſt of Ajan to the Iſle aux Latrons, i. e. *of Thieves*.

It waſhes the ſhores of the eaſtern coaſts of Africa, and the ſouth of Aſia, and is bounded on the eaſt by the Indian iſlands, and the Southern continent.

OCEAN, *inferior*, or *American*, is that vaſt part of the grand *ocean*, which waſhes the coaſt of America; unknown, in great meaſure at leaſt, to the ancients. It is divided into three parts, *viz.*

The *north ſea*, which waſhes the eaſtern coaſts of America, from the arctic circle to the tropic of Capricorn.

The *Magellanic ſea*, extending from the tropic of Capricorn to the *Terra auſtralis incognita*.

The *ſouth ſea*, or *pacific*, which waſhes the weſtern coaſts of America to the eaſt, as far as the Iſle of Thieves; and from ſouth to north, from the tropic of Capricorn to the land of Jeſſo.

OCEAN, *for the ſaltneſs of the*, ſee SALTNESS.

OCEAN, *for the tides obſerved in the*, ſee TIDES.

Phil. Sachſius, in 1664, printed a diſſertation, intitled Oceanus Microcoſmicus, dedicated to Bartholine; wherein he ſhews, that there is a circular motion in the waters, like that of the blood in the human body: that they all come from the *ocean*, and return thither again. The thought is Solomon's, Eccleſ. xii. See VAPOUR, SPRING, &c.

OCELLATI *lapides*, in *Natural Hiſtory*, a name given by the ancients ſometimes to expreſs certain ſtones, found on the ſhores, and in the beds of rivers, and naturally marked with the figure of an eye; and ſometimes for ſmall round ſtones of the ſhape of the groove of the eye, made by art for children to play with, and of the nature of what we call marbles. Suetonius tells us, that Auguſtus Cæſar uſed to divert himſelf ſometimes with playing *nucibus et ocellatis*.

The word *lapidibus* is underſtood after the laſt word, and the meaning of the author plainly is, that he played, like a boy, with nuts and marbles. But we have abundant teſtimony among the ancient naturaliſts of the word having been uſed alſo as the name of the gem which we now call *oculus beli*, and all thoſe other ſtones of the agate, or other ſemi-pellucid kinds, which had the figure of an eye naturally impreſſed upon them, that is a round ſpot of a different colour, in the centre of a ſmall roundiſh ſtone. Theſe were ſcarce among the ancients, becauſe they had none but the true *oculi beli*, or ſuch ſtones as were of a particular ſpecies, and were found naturally of the ſhape and ſize of an eye; but we have them much more common, becauſe our jewellers, whenever they find a natural ſpot in an agate, furrounded with a white circle, cut it out from the reſt of the ſtone, and ſell it as a natural *oculus beli*.

OCELOT of *Buffon*. in *Zoology*, called by others the *Mexican cat*, and by Hernandez *tlacoxolotl*, is a ſpecies of cat, with its head, back, upper part of the rump, and tail, of a bright tawny; a black ſtripe extends along the top of the back, from head to tail; and from the forehead to the corners of the eyes, a ſtripe of black; the forehead ſpotted with black; the ſides whitiſh, marked lengthways with long ſtripes of black, ſprinkled with ſmall black ſpots; the neck and rump marked in the ſame manner; and the tail ſpotted with ſmall ſpots near its baſe, and black at the end. This animal inhabits Mexico, the neighbourhood of Carthagena, and Braſil; lives in the mountains; is very voracious, but fearful of mankind; preys on young calves, and different ſorts of game; lurks amidſt the leaves of trees; and ſometimes extends itſelf along the boughs, as if dead, till the monkies, approaching to examine it, become its prey. Pennant. See *Tab.* IV. *Quadrupeds*, N° 41.

OCHLOCRATIA, from ὀχλος, *multitude*, and κρατος, *power*, *command*, a form of government, wherein the populace has the whole power and adminiſtration in its own hand.

OCHNA, in *Botany*, the name of a genus of plants of the *polyandria monogynia* claſs, the characters of which are theſe: the cup is a perianthium, compoſed of five ſmall leaves, of an oval but pointed ſhape, ſtanding expanded, and falling with the flower; the flower is compoſed of five roundiſh petals, with very obtuſe ends, and with unguiculæ of the length of the leaves of the cup; the ſtamina are a number of fine ſlender filaments, converging at the ends; the germen of the piſtil is oval, and terminates in a pointed ſtyle, which is erect, and longer than the ſtamina; the fruit is a very large, and fleſhy receptacle, of a roundiſh, truncated form, in either ſide of which there is lodged a ſingle berry, of an oval figure; the ſeeds are ſingle, and of an oval figure alſo. There are two ſpecies.

OCHRA, or *gallinula* OCHRA, in *Ornithology*, the name of a ſpecies of moor-hen. It is all over of a duſky and obſcure yellowiſh green, and is browner on the breaſt, and belly than on the back, yet with the ſame yellowiſh green predominant; the head, neck, breaſt, and wings, have ſeveral white ſpots; and the face is in part white; the beak is part black, and part red; and the legs are of a yellowiſh colour.

OCHRA *vitrioli*, in *Natural Hiſtory*, a name given to that yellow earth, or *ochre*, which is one of the principles, or

conſtituent parts of all vitriol. This is ſeparated from it by ſolution in water, and falls to the bottom of the veſſel; and the yellow ſubſtance that tinges the ſides of fountains, and ſprings of chalybeat waters, in many places, is the ſame ſubſtance, and ſhews that they are only ſolutions of vitriol, which, as ſuch, muſt needs depoſit that earth, which, though retained imperceptibly in the vitriol, yet cannot be ſuſtained in water ſo well as while that ſalt was ſolid.

Baſil Valentine tells us, that repeated ſolutions of the ſame quantity of vitriol, will, at length, free it from all its earth; and that then it will be found a very different ſubſtance from what it was before, and fit for ſeveral wonderful experiments, which he deſcribes. This ſeparation of the earth of vitriol has been tried in vain, by twenty repeated ſolutions; but there is a much ſhorter way of effecting it, which is this: powder a good quantity of Dantzick or Hungarian vitriol; put it into a high and narrow cucurbit, and add to it a conſiderable quantity of water; keep a fire under it for four days, and the earth will, in a very great quantity, ſubſide from it, when cold, in much greater quantity from this one operation, than from ſeveral repeated ones of the common kind.

Another method, which ſeparates more than its earth from it, is this. Let the veſſel containing the powdered vitriol, without any addition of water, be placed in a balneum Mariæ, and kept hot in the ſame manner for four days; the vitriol will, in this caſe, melt as if water were put to it. While it continues in this fluid ſtate, the *ochre*, or earth, and not only that, but, with it, the metalline parts, and the groſs ſulphur, will in a great meaſure ſubſide, and become a hard cake, the vitriol continuing fluid about it. Let this be poured off, and, when cold, it will cryſtallize, leaving only a ſmall quantity of a liquamen behind. This operation may be repeated two or three times, and the vitriol then becomes a very different ſubſtance from what it was before, and is fitted for ſeveral operations, which it would not otherwiſe ſucceed in. Many have tried to effect this ſeparation by liquation, by means of a dry heat, placing the veſſel in ſand, in filings of iron, or over the flame of a lamp, burning ſpirit of wine, or oil; but it never will ſucceed this way, though the vitriol be ever ſo long kept in a ſtate of liquation. Phil. Tranſ. N° 103.

The *ochra vitrioli* may be obtained alſo in a great proportion, though in another form, if, after a long and intenſe calcination, the vitriol is freed from its ſalt by an ablution of warm water often repeated. The far greater part of the remaining colcothar, thus dulcified, is earth, with an admixture only of a ſmall quantity of ſome metalline parts.

Another way of obtaining it, is diſſolving vitriol in common water, and adding to the ſolution filings of zinc, or ſalts of tartar, or ſome other alkali. See VITRIOL.

A great proof of the earth called *ochra vitrioli* being contained in large quantity in that ſalt is, that it requires no earth beſide to be mixed with it in diſtillation: whereas common ſalt, nitre, and the other ſalts, require a great quantity of common earth to be added to them, to prevent their fuſion. Alum, and vitriol alone, require no ſuch additions, the firſt of theſe containing a very large quantity of an alkalious white earth, as the other does of an ochreous yellow one.

OCHRES, in *Natural Hiſtory*, the name of a large genus of earths, uſed principally by the painters. The moſt common kinds are either yellow, or red, though there are brown, blue, and green *ochres*, and a number of diſtinct ſpecies of all theſe colours. Of the yellow *ochres*, Dr. Hill, in his Hiſtory of Foſſils, deſcribes eleven ſpecies. Of the red, the ſame number. Of the brown, two. Of the blue, and green, one ſpecies each; and of the black, two.

The greater number of theſe are, or have been, at one time or other, in uſe in painting, in different parts of the world. Some, however, there are, eſpecially of the yellow and red kinds, which that author has himſelf diſcovered in different parts of our own, and other kingdoms, which are worthy the trials of the perſons concerned in that branch of trade, as they have already been proved, at his requeſt, in ſmall quantities, and found to anſwer very well.

Some authors refer *ochre* to the claſs of ſemi-metals rather than earths. It conſiſts, according to them, of earth and a metal, particularly iron, combined.

Mr. Boyle aſſures us he has ſeen a piece of *ochre* richer in metal than moſt iron-ores; and which was even rendered magnetical by heating, and then cooling it in a perpendicular poſition.

Ochre, in effect, is always impregnated with iron, and is what generally gives to the chalybeat ſprings their medicinal virtue; many of which we ſee, upon the water's ſtanding, will depoſit the *ochre* at the bottom of the veſſel. Some authors eſteem *ochre* proper to promote the melting of metals, when they are too harſh and brittle; but its chief uſe is in painting.

The beſt *ochre* is that of Berry in France. There are ſeveral kinds dug up in England; ſome of them uſed in painting, and others in poliſhing looking-glaſſes; and it is very probable that both our own country, and our plantations abroad, contain many treaſures of them, the value of which is yet unknown.

Dr. Liſter obſerves, that ochreous earths are ſeparated in greater or leſs quantities, from all the medicinal ſprings of England; and it is to theſe, and the nitrous and muriatic ſalts, that they all owe their virtues. The *ochre* they contain is uſually of the nature of that which our painters, to diſtinguiſh it from the yellower kind, call *brown ochre*. This is produced from the iron ores that are met with in the way of the current of theſe waters; and, among the reſt, the pyrites affords a great deal of them. All kinds of the pyrites, and all the lime-ſtones of England, when they are ſubject to be much moiſtened under ground, will, in time, ſhoot out their ſalts, and part with their earths.

The earth of the pyrites is *ochre*, and the ſalt of the lime-ſtone is the calcarious nitre, an alkaline ſalt of the nature of the natrum of Ægypt; and from theſe two ſubſtances, and a ſmall portion of common ſalt, which the waters take up in their paſſage through the earths that contain it, all the virtues of them are owing. The ſalt of the pyrites being green vitriol, it might be expected that this ſhould be found in the waters impregnated by that ſubſtance; but Dr. Liſter obſerves, that though there are many ſprings in England which are well known to receive their virtues from this foſſil, yet there is no ſuch thing as vitriol to be obtained from any of them; and this is not wonderful, ſince we know that the pyrites will not yield its vitriol when newly taken out of the earth, but muſt be expoſed a conſiderable time firſt to the air; ſo that the *ochre* only is the ſenſible thing that it receives from this ſubſtance, and, perhaps, with it ſome ſaline matter which is the baſis of vitriol, and would be vitriol in time, on a due expoſition to the air. *Ochres* ſeem to have been depoſited from ferruginous or vitriolic waters, nearly in the ſame manner as a reddiſh or yellowiſh powder is precipitated from ſolutions of iron in vitriolic acid, by expoſure to air. By reduction with charcoal or other inflammable matter, a conſiderable quantity of iron may be extracted from theſe earths. Wallerius obſerves, that this iron is of the red-ſhort kind, or brittle when hot. *By* calcination all *ochres* acquire a red colour.

OCHROPUS *gallinula*, in *Ornithology*, a name by which many authors have called a bird more uſually known by the name of TRINGA.

OCHROPUS, or *gallinula* OCHROPUS, the *yellow-legged water-hen*, a ſpecies of the *gallinula*, or *water-hen*. It is of the ſize of the common kind; its beak, as well as its legs, is yellow, or of a ſulphur colour; its back is of a reddiſh brown; the tips of its wings of a very fine red; it has white variegations on its head, and in the middle of its wings, and on its belly; the longeſt feathers of its wings are black; and there are alſo ſpots of black on the back in ſeveral places; the edges of its eye-brown are of a deep ſaffron colour; and it has, beſide all theſe colours, a great deal of grey in the wings; it has no hinder toe. It builds in thickets, in watery places, among ruſhes and high graſs.

OCHRUS, in *Botany*. See PEA.

OCIMUM, in *Botany*. See BASIL.

OCKHAM. See OAKHAM.

OCNUS, in *Ornithology*, a name by which Ariſtotle, and others of the ancients, have called the BITTERN, or *buttor-bump*.

OCOR, a name given by ſome chemiſts to ſal ammoniac.

OCREA, among the *Ancients*, a kind of military ſhoe, or ſhort boot, which was made of white tin, and ornamented with gold or ſilver, about the ancles. Its uſe was very ancient; the Greeks were ſo well provided with them in Homer's time, that he thence gives them the appellation of ἑυκνήμιδες Ἀχαιοὶ. Among the Romans, none were allowed to wear the *ocreæ*, but the two upper claſſes of the people, or ſuch whoſe eſtate exceeded 7500 drachmas.

OCTABIS, in *Law*. See OCTAVE.

OCTAETERIDES, formed from ὀκτατηρὶς, compoſed of ὀκτὼ, *eight*, and ἔτος, *year*, in *Chronology*, &c. the ſpace or duration of eight years.

OCTAETERIS, ὀκτατηρὶς, in *Antiquity*, a cycle, or term of eight years, at the end of which three entire inner months were added. This CYCLE was in uſe till Meton, the Athenian, reformed the CALENDAR, by finding out the golden number, or cycle of nineteen years.

OCTAETIS,

OCTAETIS, in *Natural History*, a name given by Linnæus, and many other authors, to a kind of ſtar-fiſh of the aſtrophyte claſs, the rays of which are eight in number, where they firſt part from the body, but ſoon divide into many more.

OCTAGON. See OCTOGON.

OCTAHEDRON, or OCTAEDRON, in *Geometry*, one of the five regular bodies; conſiſting of eight equal and equilateral triangles.

The *octahedron* may be conceived as conſiſting of two quadrilateral pyramids put together at their baſes.

Its ſolidity, therefore, is had, by multiplying the quadrangular baſe of either by one third of the perpendicular height of one of them, and then doubling the product.

The ſquare of the ſide of an *octahedron* is in a ſubduple ratio of the ſquare of the diameter of the circumſcribing ſphere.

OCTANDRIA, formed of *octo*, *eight*, and *ανηρ*, *male*, in *Botany*, a claſs of plants with hermaphrodite flowers, and eight ſtamina, or male parts in each. This claſs comprehends four orders, viz. *monogynia*, including thirty-one genera of plants with one ſtyle; *digynia*, containing four genera of plants with two ſtyles; *trigynia*, comprehending five genera with three ſtyles; and *tetragynia*, containing three genera with four ſtyles. See *Tab.* I. *and* IV. *of Botany*, *claſs* 8.

The plants of this claſs are the maple tree, heath, &c. See FRUCTIFICATION.

OCTANT, or OCTILE, in *Aſtronomy*, an ASPECT, or poſition of two planets, &c. wherein their places are diſtant by an eighth part of a circle, or 45 degrees, from one another.

OCTAPLA, formed from *octo*, *eight*, q. d. *ſomething with eight rows* or *columns*, a term in the ſacred learning, uſed for a kind of ancient Polyglot Bible, conſiſting of eight columns.

In the firſt column was the Hebrew text, in Hebrew characters; in the ſecond, the ſame text in Greek characters; in the third, the Greek verſion of Aquila; in the fourth, that of Symmachus; in the fifth, the Septuagint; in the ſixth, that of Theodotion; in the ſeventh, that called the *fifth*; the laſt was that called the *ſixth*.

Origen was the author of the *Octapla*, as well as of the TETRAPLA and HEXAPLA.

OCTATEUCH, in the *Sacred Literature*, is uſed for the eight firſt books of the Old Teſtament; viz. Geneſis, Exodus, Leviticus, Numbers, Deuteronomy, Joſhua, Judges, and Ruth. Procopius of Gaza has ten commentaries on the *Octateuch*.

OCTAVE, in *Muſic*, an harmonical interval conſiſting of eight tones, or degrees of ſound.

The moſt ſimple perception the ſoul can have of true ſounds is that of uniſon; becauſe the vibrations there begin and end together. The next to this is the *octave*; wherein the more acute ſound makes preciſely two vibrations, while the graver or deeper makes one; and wherein, by conſequence, the vibrations of the two meet at every vibration of the more grave.

Hence uniſon and *octave* paſs almoſt for the ſame concord. Hence alſo the proportion of the ſounds that form the *octave*, are in numbers, or in lines, as 2 to 1, ſo that two chords or ſtrings of the ſame matter, thickneſs, and tenſion, one whereof is double the length of the other, produce the *octave*.

The *octave* is called, by the ancients, DIAPASON, becauſe containing all the ſimple tones and concords; all of which derive their ſweetneſs from it, as they ariſe more or leſs directly out of it.

To be juſt, it muſt contain diatonically ſeven degrees, or intervals; and, conſequently, eight terms, or ſounds: whence its name, *octava*.

The *octave* containing in it all the other ſimple concords, and the degrees being the differences of theſe concords; it is evident, the diviſion of the *octave* comprehends the diviſion of all the reſt.

By joining, therefore, all the ſimple concords to a common fundamental, we have the following ſeries:

1 ; $\frac{1}{2}$: $\frac{2}{3}$: $\frac{1}{2}$: $\frac{2}{5}$: $\frac{1}{3}$: $\frac{1}{4}$: $\frac{1}{8}$.

Fund. 3d, 3d g, 4th, 5th, 6th, 6th g, 8ve.

Again, the ſyſtem of *octave* containing all the original concords, and the compound concords being the ſum of *octave*, and ſome leſſer concord; in order to have a ſeries to reach beyond an *octave*, we muſt continue them in the ſame order through a ſecond *octave*, as in the firſt; and ſo on through a third and fourth *octave*. Such a ſeries is called the *ſcale of muſic*.

Though the compoſition of *octaves* may be carried on infinitely, yet three or four *octaves* are the greateſt length we go in ordinary practice: the old ſcales went no farther than two, or at moſt three *octaves*, which is the full compaſs of an ordinary voice: and, notwithſtanding the perfection of the *octave*; yet, after the third, the agreement diminiſhes very faſt; nor do they ever go ſo far at one movement, as from one extreme to the other of a double or triple *octave*; ſeldom beyond a ſingle *octave*: nor is either voice or inſtrument well able to go beyond.

To form a fourth *octave*, if the acuter ſtring be half a foot, which is but a ſmall length to give a clear ſound, the longer muſt be eight feet. If, then, we go beyond the fourth *octave*, either the acute term will be too ſhort, or the grave one too long.

The *octave* is not only the greateſt interval of the ſeven original concords, but the firſt in degree of perfection. As it is the greateſt interval, all the reſt are contained in it. Indeed, the manner wherein the leſs concords are found in the *octave*, is ſomewhat extraordinary; viz. by taking both an harmonical and arithmetical mean between the extremes of the *octave*, and then both an arithmetical and harmonical mean between each extreme, and the moſt diſtant of the two means laſt found; i. e. between the laſt extreme and the firſt arithmetical, and between the greater extreme and the firſt harmonical mean, we have all the leſſer concords.

Mr. Malcolm obſerves, that any wind-inſtrument being over-blown, the ſound will riſe to an *octave*, and to other concord; which he aſcribes to the perfection of the *octave*, and its being next to uniſon.

From this ſimple and perfect form of the *octave*, ariſes this peculiar property, that it may be doubled, tripled, &c. and ſtill be concord; i. e. the ſum of two or more *octaves* are concord; though the more compound, gradually, the leſs agreeable. He adds, there is that agreement between its extremes, that whatever ſound is concord to one extreme of the *octave*, is to to the other.

Deſcartes, from an obſervation of the like kind, viz. that the ſound of a whiſtle, or organ-pipe, will riſe to an *octave*, if forcibly blown, concludes, that no ſound is heard, but its acute *octave* ſeems ſome way to echo or reſound in the ear.

OCTAVE, *diminiſhed*. See DIMINISHED *Octave*, and INTERVAL.

OCTAVE, or OCTABIS, in *Law*, denotes the eighth day after any feaſt, incluſively; which feaſt is alſo called *octas*.

OCTAVE, among the Romaniſts, is uſed for the ſpace or period of eight days allowed for the celebration of a feaſt, or ſervice, in commemoration of ſome ſaint, or on other ſolemn occaſions.

Eaſter, Whitſuntide, St. John Baptiſt, St. Laurence, Epiphany, the Dedication, &c. are celebrated with *octaves*. The office in the *octave* is ſemi-double.

OCTAVINA, in the *Italian Muſic*, a kind of ſmall ſpinet, eaſily moved, having only one row of keys, and thoſe not to the uſual number, perhaps not to above three octaves, the common ones going to four, or more. See SPINET.

OCTILE, or OCTANT, in *Aſtrology*, an ASPECT of two planets when diſtant from each other by an eighth of the zodiac, i. e. a ſign and half, or 45°.

OCTO, *ad* OCTO. See AD-OCTO.

OCTOBER, the eighth month of the year, in Romulus's calendar; though the tenth in that of Numa, Julius Cæſar, &c. conſiſting of thirty-one days.

October has ſtill retained its firſt name in ſpite of all the different names the ſenate and Roman emperors would have given it. The ſenate ordered it to be called *Fauſtinus*, in honour of *Fauſtina*, the wife of Antoninus the emperor: Commodus would have had it bear the name of *Invictus*; and Domitian made it be called *Domitianus*, after his own name.

OCTOGON, or OCTAGON, in *Geometry*, a figure of eight ſides, and eight angles.

When all the ſides and angles are equal, it is called a *regular octogon*, or an *octogon* that may be inſcribed in a circle.

OCTAGON, in *Fortification*, denotes a place that has eight baſtions. See BASTION.

OCTOPHORUM, among the *Ancients*, a carriage with eight wheels.

It alſo ſignified a chair, or litter, *lectica*, carried by eight chairmen, which kind of chair was moſtly uſed by the women.

OCTOSTYLE, in the *Ancient Architecture*, the face of a building, or ordonnance, containing eight columns.

The eight columns of the *octoſtyle* may either be diſpoſed in a right line, as in the Pſeudodiptere temple of Vitruvius, and in the Pantheon; or in a circle, as in the round Monoptere temple of Apollo Pythius at Delphi, &c.

OCTO *tales*. See TALES.

OCTUNX, a word uſed by ſome diſpenſatory writers to ſignify eight ounces.

OCULARES *dentes*, or *rendentes*, the eye-teeth. See TEETH.

OCULATA, in *Ichthyology*, a name given by many to the

fish more usually called MELANURUS. It has the name *ocellata* from the remarkable largeneſs and fine golden iris of its eyes.

OCULATUS *lapis*, the *eyed-ſtone*, a name given by Mercatus, in his Metalloſtheca Vaticana, and by many other writers, to what we call the *pudding-ſtone*, a ſtone formed of a great number of pebbles, of a ſmall ſize, immerſed, and formerly bedded, in a ſtinty cement, little leſs hard than the ſtones themſelves, and in ſome ſpecies not at all ſo. The reſemblance of theſe round pebbles, when the maſs was cut, to the eyes of animals, probably gave origin to this name. See *Tab. of Foſſils, Claſs* 5.

This *pudding-ſtone* is not the only inſtance of this effect of the rapidity of the waters of the deluge in running off from the face of the earth; for there are found in many places great numbers of ſtones which have been parts of ſtrata, or larger maſſes, and which have been broken off, and rolled into the form of pebbles at that time. And among what we commonly underſtand by the name pebbles, we find many which have prominent ridges running round them, which have been veins harder in their matter than the reſt of the ſtone; and therefore, while the reſt has been worn away, theſe have remained leſs worn, and conſequently ſtanding higher than the other parts.

OCULI, *eyes*, in *Botany*, the gemmæ or buds of a plant juſt putting forth, or the knots out of which thoſe buds ariſe.

OCULI, *abductor*, *depreſſor*, *elevator*, and *obliquus*. See the reſpective articles.

OCULI *ſpeculum*. See SPECULUM.

OCULIPETA, in *Zoology*, a ſpecies of ſerpents.

OCULIST is a name appropriated to a ſurgeon, who applies himſelf particularly to the ſtudy and cure of diſeaſes of the eye.

OCULUM *aperiens*, in *Anatomy*, a name given by ſeveral authors to a muſcle of the face, called by the generality of writers APERIENS *palpebram*, and *aperiens palpebram rectus*; by Albinus, LEVATOR *palpebræ ſuperioris*.

OCULUS, in *Anatomy*. See EYE.

OCULUS *beli*, in *Natural Hiſtory*, the name of one of the ſemipellucid gems of the genus of the *hydrophanæ*, and called by Dr. Hill *hydrophanes albido-cinereus, flavo-variegatus, nucleo centrali nigerrimo*, or the greyiſh white *hydrophanes*, variegated with yellow, and with a black central nucleus. See *Tab. of Foſſils, Claſs* 5.

It is a very elegant and beautiful gem; its baſis, or ground, is a whitiſh grey, variegated with yellow, and ſometimes with red, and a little black, but that more rarely, and is found in ſmall maſſes from half an inch to an inch in diameter; of a rounded figure, and thickeſt in the middle, tapering away gradually to the ſides; the outer part of the ſtone, or that toward the edges all round, is ever of a whitiſh grey, more or leſs variegated with yellow, &c. and its central nucleus is always of a deep and fine black, ſurrounded by a broad circle, of a pale yellow, and repreſenting very beautifully the pupil and iris of the eye; theſe are incloſed in the matter of the ſtone, and are often ſurrounded by other very fine concentric circles, of a pale flame colour; but more frequently there is only the black pupil, ſurrounded by the yellow iris, and that placed in the body of the ſtone which repreſents the white of the eye; the ſhape of the ſtone alſo favours its reſemblance of an eye, and the whole is very elegant. It is of the hardneſs of the agate, and takes a tolerable poliſh; when thrown into water, it has, in a great meaſure, the property of the *oculus mundi*, the whole ſtone becomes greatly more bright and lucid, and the grey part becomes of a plainly yelloviſh caſt.

There are many things improperly called *oculus beli* by our jewellers, but the genuine ſpecies is very rare. Nothing is more common than to find in the agates little circular veins of different colours round a central ſpot; theſe the lapidaries frequently cut out, with a proper quantity of the ſtone about them, and call them *oculus beli*. They are not peculiar to the agate, but are common alſo in the cornelian, and ſtand ſometimes ſingle, ſometimes two or three together, and, according to the colours of the circles, repreſent the eyes of various animals. Hill.

OCULI *cancrorum*. See CRAB'S *eyes*.

OCULUS *cati*. See ASTERIA.

OCULUS *Chriſti*, in *Botany*, a name given to a ſpecies of chary, from the ſuppoſed virtues of its ſeeds in clearing the ſight, which it does by its viſcous covering; for when any thing happens to fall into the eye, if one of theſe ſeeds is put into one corner, and the eye-lid kept cloſe over it, moving the ſeed gently along the eye, whatever happens to be there will ſtick to the ſeed, and ſo be brought out.

OCULUS *leporinus*, a diſtemperature of the eyes, called alſo ECTROPIUM.

OCULUS *marinus*, the *ſea-eye*, a name given by ſome authors to the UMBILICUS *marinus*, from its reſemblance to the ſhape of an eye.

OCULUS *mundi*, in *Natural Hiſtory*, the name of one of the ſemi-pellucid gems, of the genus of the *hydrophanæ*. It is of one plain and uniform colour, which is a whitiſh grey, and has no veins, or other variegations. It is found in ſmall maſſes, of the ſhape of our common flints and pebbles; it has but a very obſcure degree of tranſparence, and is not capable of a fine poliſh. This ſtone, however, though of little beauty, has this very ſingular property, that, when thrown into a baſon of water, in the ſpace of half a minute it begins to change its appearance, and very ſoon, inſtead of a pale grey, becomes of a very bright, and conſiderably pellucid, pale yellow, like that of amber, or the yellow cornelian; this it retains as long as it remains in the water, but as ſoon as taken out, and dried, it reſumes its grey colour, and becomes as opake as before. It is found, ſo far as is yet known, only in China; but the ſhores of ſome of our own rivers afford us ſtones coming up to its qualities in ſome degree, though not ſo beautifully tranſparent in water as the oriental. Hill's Hiſt. of Foſſ. p. 468.

OCULUS *Veneris*, a name given by ſome to the UMBILICUS *marinus*.

OCYMOPHYLLON, in *Botany*, a name given by Boxbaum to a new genus of plants, the characters of which are theſe: the flower is of the ſtamineous kind, having no petals; this ſtands upon the embryo fruit, which afterwards becomes an oblong quadrangular ſeed-veſſel, diviſed into four cells, and containing roundiſh and very ſmall ſeeds; its leaves are like thoſe of the common ocymum, or baſil, whence its name; and its place of growth is in damp marſhes. Boccone has deſcribed it under the improper name of *glaux*, calling it the great, green-flowered, *marſh glaux*. Act. Petropol. vol. iv. p. 421.

OCYMUM, in *Botany*. See BASIL.

ODA, in the *Turkiſh Seraglio*, ſignifies a *claſs*, *chamber*, or *order*.

The grand ſignior's pages are divided into five claſſes, or chambers, called *odas*. See PAGE.

The firſt, which is the loweſt in dignity, is called the *great oda*, from the number of perſons that compoſe it. Theſe are the juniors, who are taught to read, write, and ſpeak the languages; which are, the Turkiſh for this world; the Arabic for paradiſe; and the Perſian for hell, by reaſon of the hereſy of the people that ſpeak it.

The ſecond is called the *little oda*; where, from the age of fourteen or fifteen years, the youth are trained up to arms, and the ſtudy of ſuch polite learning as the Turks are acquainted with; viz. logic, arithmetic, geometry, and a little aſtrology.

In each of theſe chambers is a page of the privy-chamber, who ſuperintends them, as the prefects in the colleges of the Jeſuits.

The third chamber, called *kilar-oda*, comprehends two hundred pages; which, beſides their other exerciſes, are commanded by the kilerdgi-bachi, for the ſervice of the buttery and fruitery.

The fourth only conſiſts of twenty-four: theſe, under the khazineda-bachi, take care of the treaſure in the grand ſignior's apartment, where they never enter with any cloaths on that have pockets.

The fifth is called *khas-oda*, i. e. privy-chamber, and conſiſts of forty pages, which attend the emperor's bed-chamber. The firſt of this chamber is called *oda bachi*, the ſecond *ſilikiar*, &c.

Eight of theſe pages keep conſtant guard every night in the emperor's bed-chamber: they are poſted in ſeveral places, ſome nearer him, others farther off, according to their degrees in the chamber. They are to take care the lights, kept conſtantly in the chamber, do not glare in his eyes, and awake him; and if they find him diſturbed with any troubleſome dream, to take care he be awaked by one of the agas.

ODABACHI, or ODDABASSI, an officer in the Turkiſh ſoldiery, equivalent to a ſerjeant or corporal among us.

The common ſoldiers, and janizaries, called *eldachis*, after having ſerved a certain term of years, are always preferred, and made biquelairs; and of biquelairs, in time, become *odabachis*, i. e. corporals of companies, or chiefs of certain diviſions, whoſe number is not fixed; being ſometimes ten, and ſometimes twenty.

Their pay is ſix doubles per month, and they are diſtinguiſhed by a large felt, a foot broad, and above a foot long, hanging on the back, with two long oſtrich feathers.

ODD. See EVENLY, and FOOT.

ODE, *oda*, from the Greek ᾠδὴ, *cantus*, *ſong*, or *ſinging*, in the *Antient Poetry*, a ſong; or a compoſition proper to be ſung, and compoſed for that purpoſe; the ſinging being uſually accompanied with ſome muſical inſtrument, chiefly the lyre.

Ode,

Ode, in the *Modern Poetry*, is a lyric poem, conſiſting of long and ſhort verſes, diſtinguiſhed into ſtanzas, or ſtrophes, wherein the ſame meaſure is preſerved throughout.

The *odes* of the ancients, Voſſius obſerves, had a regular return of the ſame kind of verſe, and the ſame quantity of ſyllables, in the ſame place of every ſimilar verſe: "But there is nothing (ſays he) but confuſion of quan- "tities in the modern *odes*; ſo that, to follow the natural "quantity of our ſyllables, every ſtanza will be a dif- "ferent ſong."

He ſhould have obſerved, however, that all the ancient *odes* were not of ſuch kind. But he proceeds: "The "moderns have no regard to the natural quantity of the "ſyllables, and have introduced an unnatural and bar- "barous variety of long and ſhort notes, which they ap- "ply without any regard to the natural quantity of ſyl- "lables; ſo that it is no wonder our vocal muſic has no "effect." De Poem. Cantu.

Among the ancients, *ode* ſignified no more than a ſong; with us, they are different things. The ancient *odes* were generally in honour of their gods, as are many of thoſe of Pindar and Horace: ſometimes on other ſubjects, as thoſe of Anacreon, Sappho, &c. The Engliſh *odes* are generally compoſed in praiſe of heroes, and great exploits; as thoſe of Dryden, Prior, &c.

The diſtinguiſhing character of the *ode* is *ſweetneſs*: the poet is to ſooth the minds of his readers by the variety of verſe, and the delicacy of words; the beauty of numbers, and the deſcription of things moſt delightful in themſelves. Variety of numbers is eſſential to the *ode*.

At firſt, indeed, the verſe of the *ode* was but of one kind; but for the ſake of pleaſure, and the muſic to which they were ſung, they by degrees ſo varied the numbers and feet, that their kinds are now almoſt innumerable. One of the moſt conſiderable is the Pindaric, diſtinguiſhed by the boldneſs and rapidity of its flights.

The ancient *ode* had originally but one ſtanza, or ſtrophe; but was at laſt divided into three parts; *ſtrophe*, *antiſtrophe*, and *epode*. The prieſts going round the altar, ſinging the praiſe of the gods, called their firſt entrance *ſtrophe*, i. e. turning to the left; the ſecond, turning to the right, they called *antiſtrophe*, q. d. returning: laſtly, ſtanding ſtill before the altar, they ſung the remainder; which they called *epode*.

ODE, *Alcaic*. See ALCAIC.

ODEUM, *ᾠδεῖον*, among the *Ancients*, was a place deſtined for the rehearſal of the muſic to be ſung on the theatre.

ODEUM was ſometimes alſo extended to buildings that had no relation to the theatre. Pericles built an *odeum* at Athens, where muſical prizes were contended for: Pauſanias ſays, that Herod the Athenian built a magnificent *odeum* for the ſepulchre of his wife.

Eccleſiaſtical writers alſo uſe *odeum* for the choir of a church.

ODHAL *right*. Pontoppiddan, in his Hiſtory of Norway, p. 290, obſerves, that in the northern languages, *odh* ſignifies *proprietas*, and *all*, *totum*. Hence he derives the *odhal* right in thoſe countries, and hence perhaps is derived the *udal* right in Finland. Now the tranſpoſition of theſe northern ſyllables, *allodh*, will give us the true etymology of the *allodium*, or abſolute property of the feudiſts; as by a ſimilar combination of the latter ſyllable with *fee*, which ſignifies a conditional reward or ſtipend, *feodh*, or *feodum*, will denote ſtipendiary property. Blackſt. Com. book ii. p. 45. *n*.

ODIN, in *Mythology*, called alſo in the dialect of the Anglo-Saxons *Woden* or *Wodan*, a name given by the ancient Scythians to their ſupreme God, and aſſumed, about ſeventy years before the Chriſtian æra, by Sigge, a Scythian prince, who conquered the northern nations, made great changes in their government, manners, and religion, enjoyed great honours, and had even divine honours paid him. According to the account given of this conqueror by Snorro, the ancient hiſtorian of Norway, and his commentator Torfæus, *Odin* was a Scythian, who withdrew himſelf, with many others in his train, by flight, from the vengeance of the Romans, under the conduct of Pompey; and having officiated as prieſt in his own country, he aſſumed the direction of the religious worſhip, as well as the civil government, of the nations which he conquered. Having ſubdued Denmark, Sweden, and Norway, he retired to Sweden, where he died. There is nothing certain in this account; but it is probable, that the god, whoſe prophet or prieſt this Scythian pretended to be, was named *Odin*, and that the ignorance of ſucceeding ages confounded the deity with his prieſt, compoſing out of the attributes of the one, and the hiſtory of the other, the character of the northern conqueror. He deluded the people by his enchantments and ſkill in magic: having cut off the head of one Mimer, who in his life-time was in great reputation for wiſdom, he cauſed it to be embalmed, and perſuaded the Scandinavians that he had reſtored it to the uſe of ſpeech; and he cauſed it to pronounce whatever oracles he wanted. The Icelandic chronicles repreſent *Odin* as the moſt eloquent and perſuaſive of men; they aſcribe to him the introduction of the art of poetry among the Scandinavians, and likewiſe the invention of the Runic characters. He had alſo the addreſs to perſuade his followers, that he could run over the world in the twinkling of an eye; that he had the direction of the air and tempeſts; that he could transform himſelf into all ſorts of ſhapes, could raiſe the dead, could foretel things to come, deprive his enemies, by enchantment, of health and vigour, and diſcover all the treaſures concealed in the earth. They add, that, by his tender and melodious airs, he could make the plains and mountains open and expand with delight; and that the ghoſts, thus attracted, would leave their infernal caverns, and ſtand motionleſs about him. Nor was he leſs dreadful and furious in battle; changing himſelf into the ſhape of a bear, a wild bull, or a lion, and amidſt ranks of enemies committing the moſt horrible devaſtation, without receiving any wound himſelf. See EDDA, and Mallet's North. Antiq. vol. i. ch. iv. and v.

ODIO *& atia*, anciently called *breve de bono & malo*, is a writ directed to the ſheriff, to inquire whether a man, being committed to priſon on ſuſpicion of murder, be committed on juſt ſuſpicion, or only malice, and ill will.

ODONTALGIA, *ὀδοντάλγια*, formed from *ὀδοὺς*, *tooth*, and *ἄλγος*, *pain*, in *Medicine*, the TOOTH-*ach*; one of the moſt common, yet moſt ſevere, pains the body is ſubject to.

ODONTOIDES, *ὀδοντοειδὴς*, formed from *ὀδοὺς*, *tooth*, and *εἶδος*, *form*, in *Anatomy*, an apophyſis in the middle of the ſecond vertebra; ſo called from its reſemblance to a tooth.

Its ſurface is ſomewhat unequal, that the ligament which comes out of it, and binds it to the occiput, may take the better hold.

It is alſo encompaſſed with a ſolid ligament, contrived on purpoſe to prevent the ſpinal marrow from being compreſſed by this apophyſis.

ODOR, or ODOUR. See SMELL.

ODORAMENTUM, in *Pharmacy*, a medicine applied for the benefit of its ſmell, whether it be fetid, or agreeable.

Such are frequently uſed in hyſteric and hypochondriac diſorders; e. gr. aſſa fœtida, camphor, &c.

ODORIFEROUS *glands*. See GLANDS.

ODOROUS, or ODORIFEROUS *things*, are ſuch as exhale a briſk, agreeable ſmell, ſenſible at a diſtance.

Such are the jeſſamin, roſe, tuberoſe, &c.

ODYSSEY, *Odyſſea*, formed from *Ὀδύσσεια*, which ſignifies the ſame with *Ὀδυσσεὺς*, *Ulyſſes*, an EPIC poem of Homer, wherein he relates the adventures that befel Ulyſſes in his return to Ithaca from the ſiege of Troy.

The deſign of the Iliad, F. Boſſu obſerves, is to inſtruct the ſtates of Greece, conſidered as united in one body, or as parts of the whole; and that of the *Odyſſey*, to inſtruct thoſe ſame ſtates, conſidered in their private capacities.

A ſtate conſiſts of two parts: the head, which commands, is the firſt; and the members, that obey, the ſecond. Now, inſtructions are required both for the one and the other; but it is poſſible to have them both conveyed under the ſame perſon.

The fable, then, of the *Odyſſey* is as follows. A prince had been obliged to quit his country, and lead an army of his ſubjects upon a foreign expedition. After having glorioufly executed this, he was upon his return home; but in ſpite of all his endeavours, was detained for ſeveral years by tempeſts, which threw him on ſeveral countries very different from one another as to manners, cuſtoms, polity, &c.

In the dangers he had to ſtruggle with, his companions, neglecting his advice, all perith, through their own default. In the mean time, the great men of his country, abuſing his abſence, commit ſtrange diſorders in his palace, ſquander his treaſure, lay ſnares for his ſon, and will needs force his wife to chooſe a huſband among them; all this from an opinion, that he was entirely loſt. But at length he returns; and, having diſcovered himſelf to his ſon, and ſome others of his friends who had perſiſted in their allegiance, he becomes an eye-witneſs of the inſolence of his courtiers; puniſhes them as they deſerved; and reſtores that peace and tranquility to his iſland, which had been baniſhed during his abſence.

The truth or model whereon this fable is founded is, that a perſon's abſence from home, ſo as that he cannot have an eye to his affairs, occaſions great diſorders. Accordingly,

ingly, the hero's abſence is the principal and moſt eſſential part of the action, and takes up the greateſt part of the poem.

This poem, Boſſu adds, is more calculated for the people, than the Iliad is, where the ſubjects ſuffer rather from the ill conduct of their princes, than by their own faults. The great names of heroes, Ulyſſes, &c. do not here repreſent the pooreſt peaſants leſs than princes, Cæſars, Alexanders, &c. The meaneſt people are as liable to ruin their eſtates and families by negligence, &c. as the greateſt; and accordingly have as much need of Homer's lectures, and are as capable of profiting by them, as kings themſelves.

Gerard Croes, a Dutchman, in a book intitled *Ομηρος Εξαπατων*, printed at Dort in 1704, endeavours to prove, that the ſubjects of Homer's two poems are taken from the Scriptures; that the action of the *Odyſſey*, in particular, is nothing elſe but the adventures of the Iſraelites till the death of Moſes; and that the *Odyſſey* was compoſed before the Iliad, the ſubject whereof is the taking of Jericho. What fancies!

ŒCONOMICS, *œconomica*, that part of moral philoſophy, which teaches how to manage the affairs of a family, or houſhold.

ŒCONOMUS, *οικονομος*, a perſon appointed to direct and manage a vacant church revenue, or that of a hoſpital, or other community.

ŒCONOMUS was alſo anciently uſed for a protector, or advocate, who defended the rights and effects of churches, monaſteries, &c.

ŒCONOMUS was alſo an appellation given to a church-officer, who took care of the buildings and repairs of the church, and received and diſtributed alms according to the directions of the biſhop.

In this ſenſe it is that the ſixth counteil appoints, that every church have its *œconomus*.

ŒCONOMY, *οικονομια*, the prudent conduct, or diſcreet and frugal management of a man's eſtate, or that of another.

ŒCONOMY, *public*. See *Public* POLICE.

ŒCONOMY, *animal*, the firſt branch of the theory of medicine; or that which explains the parts of the human body, their ſtructure and uſe; the nature and cauſes of life and health, and the effects or phenomena ariſing from them.

This is otherwiſe called *phyſiology*; and its objects juſt enumerated are called the *naturals*, or *res ſecundum naturam*.

ŒCONOMY, *legal*, or *Jewiſh*, or *diſpenſation*, is the manner wherein God thought good to guide and govern his people under the miniſtry of Moſes. See JUDAISM.

This included not only the political and ceremonial laws, but alſo the moral law, inaſmuch as it pronounced a curſe on all thoſe who did not fulfil it perfectly.

ŒCONOMY, *evangelical*, or *Chriſtian*, or *diſpenſation*, is uſed in oppoſition to the *legal*; and comprehends all that relates to the covenant of grace, which God has made with men by Jeſus Chriſt.

ŒCONOMY *of the parts of plants*. See PLANT.

ŒCUMENICAL, formed of the Greek *οικουμενη*, of *οικεω*; the *habitable earth*, or the *whole earth*, ſignifies as much as *general*, or *univerſal*.

In this ſenſe we ſay, an *œcumenical* council, or ſynod; meaning one at which the whole Chriſtian church aſſiſted, or to which they were invited.

Du-Cange obſerves, that many of the patriarchs of Conſtantinople, aſſumed to themſelves the quality and denomination of *œcumenical* patriarchs; particularly John the Faſter in 590, and Cyril his ſucceſſor. Gregory the Great of Rome was exceedingly enraged at it; pretending it was a title of pride, and the character of anti-chriſt; as ſuppoſing the title of *œcumenical* to imply univerſal biſhop, or biſhop of all the world: whereas, in effect, it implied no more than the quality of chief of the eaſtern church; in like manner as the firſt doctor of the church of Conſtantinople was called *doctor œcumenicus*.

The title *œcumenical* biſhop was firſt offered to Leo I. but he refuſed it; nor did his ſucceſſors accept of it for a long time. The fifth council of Conſtantinople gave it to John, patriarch of that city; though ſome of the Romaniſts pretend, that the emperor Phocas gave it, by way of preference, to the biſhop of Rome. See POPE.

But thoſe of Conſtantinople have preſerved it; and ſo late as the council of Baſil, that patriarch uſed the title. But *œcumenical* here is only to be underſtood as of the extent of each patriarchate.

ŒDEMA, *οιδημα*, a tumor which appears whilſt, ſoft, and lax, without any notable change of colour, heat, pain, or pulſation; and which yields to the preſſure of the finger, ſo as for ſome time to retain the dent or impreſſion thereof.

The word comes from the Greek *οιδαω*, *I ſwell*; whence *οιδημα*, a *tumor*. Accordingly, Hippocrates uſes the word *œdema* for any tumor in general.

The general cauſe of *œdemas* is vulgarly ſuppoſed to be a *pituita*, as it is called, or a phlegmy humour in the body. But the true and immediate cauſe is the diſcharge of the lymph into the CELLULÆ *oſſiſonæ*. See DROPSY.

Contuſions, fractures, luxations, &c. when of long ſtanding, often give riſe to *œdemas*, eſpecially in dropſical and aged perſons; ſo alſo do irregular living, want of exerciſe, ruptures, diſorders of the lymphatics, deflexions of humours, weakneſs of joints, &c.

The chief ſeat of this tumor is in the legs: in a leucophlegmatia, the whole body is *œdematous*. It frequently comes upon other diſeaſes, eſpecially clinics; and is familiar to women with child. It is dangerous when it tends to an abſceſs; when it hardens, it becomes ſchirrous.

There are alſo *ſpurious œdemas*; in which caſe the pituitous humour is mixed with other humours; whence the tumor becomes eryſipelatous, ſchirrous, and ſometimes gipſous; and hence wens, &c.

ŒDEMATOUS, in *Medicine*, ſomething that is of the nature of an *œdema*; or ſeized, or affected, with an *œdema*. Thus we ſay, an *œdematous arm*, *œdematous leg*, &c.—Phyſicians divide tumors into *inflammatory*, *œdematous*, *ſchirrous*, *ſcrophalous*, *cancerous*, &c.

The perſons moſt ſubject to *œdematous* tumors, are people of a phlegmatic habit, and ſuch as have had ſuppreſſions of ſome natural evacuations. Men who have had the hæmorrhoidal diſcharges ſtopped upon them, and women labouring under ſuppreſſions of the menſes, are more than all others ſubject to them. Perſons ſomewhat advanced in age are, in general, more ſubject than young ones, and women with child, particularly during the more advanced ſtate of their pregnancy, are often afflicted with them. The long holding the legs in cold water will ſometimes alone occaſion them, and, among the poorer country people, the women who make a cuſtom of ſtanding in the water to waſh their cloaths are often affected with theſe ſwellings in one or both knees. People who have received large wounds, and have had them treated raſhly, with cold applications, are alſo ſometimes thrown into danger of theſe ſwellings. The repelling tumors of other kinds, and ſometimes the ſtriking in an eryſipelas, or other cutaneous eruption, will alſo occaſion them; and ſometimes people who have been treated with too hot a regimen in acute fevers are ſubject to ſwellings in their feet, which though they appear red, and are hot at times, yet, when ſtrictly examined, appear to be truly *œdematous*.

Prognoſtics in this caſe. *Œdematous* ſwellings are always very obſtinate, and tedious in their cure; but they are the more ſo when their cauſes are the more complicated, and more things than one conſpire to their origin. None of theſe ſwellings are ſo eaſily cured, as thoſe which ariſe from external injuries, or ſimple refrigeration; and thoſe which ariſe from cutaneous humours ſtruck in, are often found very eaſy of cure, provided that they are not of very long ſtanding; and, in general, ſuch as are very cold when out of bed, and always very hot when in it, are more difficult of cure than others. But this is to be obſerved, that there is great difference between a cure of theſe tumors, and the only ſtriking them in; the latter caſe being very often attended with much worſe complaints than the tumors themſelves, the too frequent conſequences of ſuch retropulſions being inflammations of the abdomen and præcordia, and abſolute dropſies.

Œdematous tumors ſeldom, of themſelves, prove dangerous, or mortal; but when they are of a long continuance, the effect of old age, or a dropſical habit; when they grow hard, ſchirrous, painful, or come to ſuppurate, the cure is generally tedious and uncertain. Thoſe which attend wounds, fractures, or the like, are leſs difficult to cure.

Method of cure. The firſt ſtep towards a cure muſt be the correcting the mucous and viſcid ſtate of the humours: this is beſt done by the neutral ſalts, as tartarum vitriolatum, and the like; and by gum ammoniacum, the roots of pimpernel, and woods of ſaſſafras, guaiacum, and the like, with the warm aromatics, as ginger, and the ſpices, and carminative ſeeds. The matter, when thus attenuated, is to be evacuated by purges of a ſtrength proportioned to the conſtitution of the patient; and, after this, the true tone of the parts is to be re-eſtabliſhed by chalybeats, and the part to be ſecured from a relapſe with a large bandage, and with warm and ſtrengthening fomentations. It rarely happens that theſe ſwellings ulcerate; but when they do, there is no application ſo proper as the liquor of myrrh. Junker's Conſp. Med. p. 410.

The method of treating *œdematous* tumors is very differ-

ent,

ent, according to the different causes to which they owe their rise. The external method of treating these tumors in the legs and feet is usually to have recourse to frequent frictions with warm cloths; these are to be repeated every night and morning, and the parts to be rubbed each time till they appear very red, and are hot; the limb is then carefully to be preserved from the injuries of the cold air, and it is a very proper method to wear stockings made of some warm furr, and to lie with hot bricks, wrapped up in cloths, near the legs and feet, to divide, and attenuate the blood; a proper bandage is, after these methods, to be applied, which is to ascend gradually from the feet up to the knees; this strengthens the limb, and prevents a stagnation, and collection of the blood in any part of it. Proper strengthening internal medicines must be given during all this time; and, after the trying what has been already directed, strengthening remedies are to be attempted externally also: to this end the limb may be placed over burning rectified spirit of wine, wrapping it up in cloths in such manner that it may receive the steam; this will incline the stagnating fluids to escape through the skin, or else render them fit to return into the circulation, and at the same time will do much toward restoring the proper tone of the limb. In many families it is a secret to apply the herb great celandine, bruised in manner of a pultice, either alone, or mixed with the perficaria acris, or water-pepper, and great benefit is sometimes obtained by these herbs, for they are very active medicines, and powerful resolvents. Others apply also, for the same purpose, the lepidium, or pepper-wort, and horse-raddish root, scraped, and moistened with white wine; but the most excellent remedy of this kind is the cataplasm made of pigeon's dung, mixt with common salt and vinegar, and applied warm, and often removed. A fomentation of no small use is made also of a ley made of oak ashes, mixed with smith's forge-water, adding a little spirit of wine, and a small quantity of alum. This may be applied with flupes, or the legs may be bathed in the liquor, as warm as it can well be borne, twice a day. Spirit of wine also, either alone, or mixed with lime-water and alum, or lime-water alone, are good fomentations; and another, from which great benefit has been received, is this: take spirit of wine, and common vinegar, of each a pint; crude alum, an ounce and half; vitriol, an ounce; mix all together, and use it as the foregoing. Great care must always be taken after the using these, or the like fomentations, that the limb be well covered with bandages and stockings; the patient must also, during the time, drink sparingly, and use moderate exercise frequently. The medicinal waters, especially the sulphureous, often do service in these cases, but they do not always succeed. Dr. Harris relates, that he has cured the most dangerous of these cases with a mixture of the aperient saffron of steel, and the bark. Others speak of having performed cures with the bark alone; but there are not wanting some who declare this to be a very dangerous method. Heister.

Under the class of *ædematous tumors*, are ranked condylomata, crithæ, rhagades, thymi, talpæ, or nævi, the ganglium and pfydracium. See CONDYLOMA, CRISTÆ, TUMOR, &c.

ŒDICNEMUS, in *Ornithology*, the name of a bird called also *thorddrinn* by Gesner and Aldrovand, and in English the *stone* CURLEW. It is a considerable large bird, weighing eighteen ounces; its beak is about two fingers breadth long, and is strait, pointed at the end, and partly black, partly yellow; it has a naked, yellowish, green membrane under its eyes; its legs are long and yellow; and it has only three toes, having no hinder one; its thighs are naked half the way up, as in other water birds; its breast and thighs are white; its throat, back, and neck, of a mixture of reddish brown and black, much like the colour of the curlew; whence the English have very improperly called it the *stone curlew*; the under part of its tail is reddish. It breeds very late, the young being often found callow at the latter end of October. It lives principally in watery places, and flies in the night, making at that time a very remarkable shrill noise.

ŒNANTHE, in *Botany*. See *Water* DROPWORT.

ŒNANTHE, or *drapiwort*, in *Botany*, is also a name originally given by the ancient Greeks to the flowers of the wild vine. It was afterwards made to express also the flowers of the common manured vine, and the young grapes while small, and just appearing from the flowers: these, with the tendrils, and small leaves of the vines, were sometimes used for the making garlands, and ornamenting other things; and after this, another plant of a very different nature became used on the same occasions, and called by the same name.

ŒNANTHE, in *Ornithology*, the name of a genus of birds of the smaller size, of which there are four species. 1. The common *œnanthe*, called the *fallow-finch*, or *wheat-ear*. 2. The *œnanthe*, called *anthus*, and *ferarius*; and in English, the *whinchat*. 3. The *œnanthe*, called *rubetra*, and in English *the stone-chatter*, or *moor-titling*. 4. The American *œnanthe guttarba rhoengela*. See WHEAT-EAR, WHINCHAT, &c.

ŒNARIA, a name given by the ancients to ashes prepared from the leaves, tendrils, and young stalks of the vine. They were accounted highly diuretic.

ŒNELÆUM, *οἰνέλαιον*, formed of *οἶνος*, *wine*, and *ἔλαιον*, *oil*, in *Pharmacy*, a mixture of wine and oil; usually of thick black wine, and oil of roses.

In fractures with wounds, where the bone is not bare, Scultetus orders that the compresses, to make them stick, be drenched with *œnelæum*, to sooth the pain, and prevent an inflammation; and the bandage to be every day moistened with the same, till the inflammation be out of all danger.

ŒNISTERIA, in *Antiquity*, sacrifices held by the youth of Athens, before the first time of cutting the hair, and shaving the beard.

The etymology of the word, which comes from *οἶνος*, *wine*, shews, that the matter here offered was wine.

These sacrifices were offered to Hercules, and the quantity of what was offered was regulated by law.

ŒNOGALA, a word used by Hippocrates, and other of the Greek authors, to express a mixture of milk and wine for immediate drinking. Others have used it to express wine alone heated, so as to be just as warm as new milk.

ŒNOMANTIA, *οἰνομαντεία*, in *Antiquity*, a species of divination by wine, which is done by making conjectures from the colour, motion, noise, and other accidents of the wine of libations.

ŒNOPTÆ, a kind of officers, or censors, at Athens, who attended at their feasts, regulated the number of cups each was to drink, and took care that none drank too much or too little.

Those who would not be kept within the bounds of temperance, were presented by the *œnopta* to the areopagus.

The *œnopta* were also called *eyes*, *oculi*.

ŒNOS, in *Ornithology*, the name used by authors for the *stock-dove*, or *wood-pigeon*, called also by some *vinago*, somewhat larger than the common pigeon, but of the same shape and general colour. Its neck is of a fine changeable hue, as differently opposed to the light; and its breast, shoulders, and wings, are of a fine purplish hue, or red wine colour, from whence it has its name *vinago*. Its legs are red, and feathered a little below the joint.

ŒNOSTAGMA, a name given by some of the chemical writers to *spirit of wine*.

ŒNOTHERA, in *Botany*. See *Tree* PRIMROSE.

ŒPATA, in *Botany*, a name by which some authors have called the tree which produces the fruit called *anacardium Orientale*, or the Malacca bean.

ŒSOPHAGÆUS, in *Anatomy*, one of the muscles of the pharynx, which it encompasses round like a ring.

It is single, and serves to squeeze the aliment down, by closing the pharynx after the manner of a sphincter; whence some call it the *sphincter gulæ*; others *deglutitor*, or *swallower*.

Dr. Drake will have it no more than a production of the pterygopharyngæus, whose fibres surround the pharynx from a tendinous line on the back part of it; though Verheyen makes it a distinct pair.

ŒSOPHAGUS, *οἰσοφαγος*, in *Anatomy*, the gula, or gullet; a membranous pipe or passage, whereby our food and drink is conveyed from the mouth to the stomach. See *Tab. Anat. (Splanch.) fig. 2. lit. a.*

The *œsophagus* descends from the fauces to the stomach, between the aspera arteria, and the vertebræ of the neck and back, in a strait line, excepting for a little deflexion about the fifth vertebra of the thorax, where it turns a little to the right to make way for the great artery, which runs along with it to the ninth; where turning again towards the left, it crosses the artery, and piercing the diaphragm, ends at the left orifice of the STOMACH.

It consists of several coats or membranes, usually reckoned three; though some make them four, others five or six, allowing the cruста villosa to be one; which last division Dr. Drake follows, as most accurate.

The first coat is membranous, and only designed for a covering for the rest; and seems only a continuation of the outward membrane of the stomach, derived from the peritonæum; though some derive it from the pleura, and others from the diaphragm.

The second coat is muscular, consisting of strong fleshy fibres like other muscles; so that it seems to make the gullet a hollow fistulous muscle. According to Steno and Willis, it consists of two orders of fibres, going from top to bottom in spiral lines, contrary to and decussating each

each other; which deſcription is very exact of the gullet of ruminants, but not ſo of that of men. In men it conſiſts of two fleſhy lamellæ, like two diſtinct muſcles; the outward compoſed of ſtrait longitudinal fibres; the inner of annular fibres, without any obſervable angles. The uſe of this coat is to promote deglutition; the longitudinal fibres, when in contraction, ſhortening the *œſophagus*, and making its capacity larger to admit of the matter to be ſwallowed; and the annular, on the contrary, contracting the capacity, and cloſing behind the deſcending aliment, preſs it downwards; ſo that the two orders of fibres ſeem to act as antagoniſt-muſcles to each other.

The next coat, called the *vaſcular*, conſiſts of a double membrane; the outer formed of irregular fibres and innumerable veſſels interwoven; the inner of ſtrait longitudinal fibres, mixed with little glands; whence ſome call it the *glandulous*. This membrane adheres cloſely to another within, called the *nervous coat*, which is exceedingly fine, and made up of exceſſively ſlender fibres, variouſly diſpoſed. It is continued to that which covers the fauces, mouth, and lips; whence it happens, that tickling the bottom of the fauces by vellicating this membrane, provokes a retching to vomit.

This membrane has a quick ſenſation; and in this part, as ſome *think*, is the ſeat of thirſt, or the organ whereby the appetite of drinking is excited. It is lined inwardly with a villous cruſt, which Dr. Drake takes to be the excretory ducts of the glands, and not unlike the cuticula of the cutis, to defend the ſubjacent membrane. In excoriations, this is ſometimes caſt out at the mouth.

The upper opening of the *œſophagus*, ſituate at the bottom of the fauces, is called the PHARYNX.

The inflammation of the *œſophagus* is ſometimes a ſymptom attending the quinzy. See ANGINA, and QUINZY.

ŒSTROMANIA, a name given by ſome authors to the uterine diſorders which ſometimes affect young women, and is commonly called FUROR *uterinus*.

ŒSTRUS, in *Zoology*, the name of a ſpecies of fly, called alſo ſometimes the *gad-fly*, *breeze-fly*, and *aſilum*. See GAD-*fly*.

The *œſtrus*, in the Linnæan ſyſtem, is a genus of two-winged flies, the mouth of which has neither teeth nor proboſcis. There are five ſpecies, which are very troubleſome to oxen, horſes, ſheep, and deer.

ŒSTRUM *Veneris*. See VENERIS.

ŒSYPE, or ŒSYPOS, a kind of fatty mucilage, of the conſiſtence of an unguent, of a greyiſh colour, and a ſickiſh diſagreeable ſmell, drawn from the greaſy wool growing on the throats and between the buttocks of ſheep.

The word is formed from the Greek ὀις, *ſheep*, and ὀυρω, *I putrefy*, or *corrupt*; the *œſype* being a filthy, and, as it were, corrupted matter, drawn from ſheep.

This wool they waſh, boil it in water, let the lotion, or decoction, ſtand for ſome time, and from the top ſkim off a fatty ſubſtance, which being ſtrained through a linen cloth, and ſet to cool, makes the *œſipe*, much uſed externally to reſolve, ſoften, and appeaſe pains.

ŒTHODES *ulcus*, a term uſed by the Greek writers for ſuch ulcers as had tumid and callous lips; and as ſuch ulcers are uſually very difficult to heal, the word became afterwards appropriated to all ſorts of ulcers difficult to cure.

OFFA *alba*, a name which Van Helmont gives to the white coagulum, ariſing from a mixture of rectified ſpirit of wine with ſpirit of urine, or ſpirit of ſal ammoniac.

Note, The ſpirit of urine muſt be diſtilled from well fermented wine, and the other muſt be well dephlegmated; elſe no *offa* will ariſe.

Some call it the *offa alba* of Paracelſus, others of Van Helmont; whence it is ſometimes called *offa Helmontiana*; but Van Helmont was not the inventor of it, but Raim. Lully, ſays Boerhaave.

The manner of making the *offa alba* is deſcribed by this laſt author, who obſerves it to be difficult, as it requires both liquors to be perfect, and ſome nice circumſtances to be obſerved.

Van Helmont endeavours to account for the formation of the ſtone in the bladder, from this experiment; but, as Boerhaave obſerves, the *offa alba* has nothing in common with the ſtone.

Boerhaave recommends this mixture as a good deobſtruent, taken in Canary, faſting.

OFFENCE, *delictum*, in *Law*, an act committed againſt the law, or omitted where the law requires it.

Offences are diſtinguiſhed into two kinds, viz. ſuch as are capital, and ſuch as are not. Capital *offences* are thoſe for which the offender is to loſe his life. Thoſe not capital, where the offender may forfeit his lands and goods; be fined, or ſuffer corporal puniſhment, or both, but not loſe his life. Hale, P. C. 2. 126, 134. Under capital *offences* are comprehended high treaſon, petit treaſon, and felony; and *offences* not capital include the remaining part of the pleas of the crown, and come under the title of miſdemeanours.

Some *offences* are puniſhable by the common law, but moſt of them by ſtatutes.

OFFERING. See OBLATION, and HEAVE-*offering*.

OFFERING, *burnt*. See HOLOCAUST.

OFFERTORY, *offertorium*, an anthem ſung, or played on the organ, at the time the people are making an offering.

Anciently, the *offertory* conſiſted of a pſalm ſung with its anthem; though it is ſomewhat dubious whether the pſalm was ſung entire; St. Gregory mentioning, that when it was time, the pope, looking at the choir who ſung it, gave the ſign when they ſhould end.

OFFERTORY was alſo a name anciently given to the linen whereon the offerings were laid. Dr. Harris ſays, it was properly a piece of ſilk, or fine linen, wherein the occaſional oblations or offerings of each church were wrapped up.

OFFICE, *officium*, in a moral ſenſe, denotes a duty; or that which virtue, and right reaſon, direct a man to do.

Virtue, according to Chauvin, is the purpoſe of doing well: the thing which immediately follows, or ariſes from this purpoſe, is obedience; which ſame is alſo denominated *officium*: ſo that an *office* is the object of an obedience to VIRTUE.

Cicero, in his diſcourſe of *offices*, cenſures Panætius, who had written before him on the ſame, for omitting to define the thing or ſubject on which he wrote; yet he does himſelf fall under the ſame cenſure. He inſiſts much on the diviſion of *offices*, but forgets the definition. In other of his pieces we find him defining *office* to be an action which reaſon requires to be done: *Quod autem ratione actum ſit, id officium appellamus*.

The Greeks, he obſerves, made two ſpecies of *office*: *perfect*, called by them κατορθωμα; and *common*, or *indifferent*, called καθηκον; which they define ſo, as that, what is abſolutely right, makes a *perfect office*; and what we can only give a probable reaſon for, a *common* or *intermediate office*.

OFFICE, in a civil ſenſe, denotes the mutual aid and aſſiſtance which men owe to one another.

Benevolence inſpires a man with an endeavour to do good *offices* to all mankind.

OFFICE is alſo a particular charge, or truſt, whereby a man is authorized to do ſomething.

Loyſeau defines *office* a dignity attended with a public function. The word is primarily uſed in ſpeaking of the *offices* of judicature and policy: as, the *office* of a ſecretary of ſtate, that of a juſtice of peace, of a ſheriff, &c.

Offices are either venal, or not venal. *Venal offices* are thoſe bought with money.

Venal offices are ſubdivided into two kinds; viz. *dominial* and *caſual*. *Dominial*, or *offices in fee*, are thoſe abſolutely torn off, and ſeparated from the king's prerogative, ſo as not to become vacant by death, but paſſing in the nature of a fee, or inheritance.

Of theſe we have but few inſtances among us, which go beyond a firſt reverſion. Among the French they are more frequent.

Caſual offices are thoſe given for life, by patent, commiſſion, &c. and which become vacant, by the officer's death, to the king's benefit; unleſs the officer have before reſigned, or diſpoſed of it.

The venality of *offices* of judicature is one of the grievances in the French policy. See VENAL.

OFFICE, *alienation, alternate, crown, jewel, poſt*. See the reſpective articles.

OFFICE, *victualling*. See VICTUALLING.

OFFICE is alſo uſed for a place, apartment, or board, appointed for the officers to attend in, for the diſcharge of their reſpective duties or employments.

Such are the *ſecretary's office*, *firſt fruits office*, the *ſix clerks office*, the *paper office*, *ſigner office*, the *prothonotary's office*, *pipe office*, *king's ſilver office*, *exciſe office*, *office of ordnance*, &c. See SECRETARY, FIRST-*fruits*, SIX CLERKS, PAPER, PIPE, SIGNET, EXCISE, ORDNANCE, &c.

Of ſuch *offices*, ſome are diſtinguiſhed by the name of *boards*, and other of *chambers*, as the board of green cloth, &c.

Where the inquiſition obtains, the tribunal thereof is called the *holy office*.

OFFICE, in the *Canon Law*, is uſed for a BENEFICE which has no juriſdiction annexed to it.

OFFICE is alſo uſed, in *Common Law*, for an inquiſition made to the king's uſe of any thing found by virtue of his

his *office* who enquires, or makes an inquisition, *ex officio*.

Hence, to traverse an *office*, is to traverse an inquisition taken of *office* before an escheator. To return an *office* is to return that which is found by virtue of the *office*.

There are two sorts of *offices* issuing out of the exchequer by commission; viz. an *office* to entitle the king in the thing enquired into; and an *office* of instruction.

OFFICE is also used for divine service celebrated in public. St. Jerom is the person, who, at the request of pope Damasus, is said to have first distributed the Psalms, Epistles and Gospels, in the order in which they are now found in the Romish *office*. The popes Gregory and Gelasius added the prayers, responses, and verses; and St. Ambrose the graduals, hallelujahs, &c.

OFFICE is more particularly used in the Romish church, for the manner of performing the service; which varies every day.

Thus they say the *office* of Sunday; the *office* of such a saint, &c. The *office* is either *single*, *half-double*, or *double*.

OFFICE, again, is applied to a particular prayer preferred in honour of a saint.

When any person is canonized, a particular *office* at the same time assigned him out of the common *office* of the confessors, the Virgin, or the like. See SAINT and CANONIZATION.

We say, the *office* of the Virgin; of the Holy Spirit; of the passion; the holy sacrament, &c. The *office* of the dead is rehearsed every day, excepting on feast-days, among the Carthusians. The *office* of the Holy Virgin is also added to the *office* of the day, in the order of Bernardines.

OFFICES, with regard to architecture, denote all the apartments that serve for the necessary occasions of a great house, or palace, or those where the servants are employed: as kitchens, pantries, brewhouses, confectionaries, fruiteries, granaries, &c. as also wash-houses, wood-houses, stables, &c.

The *offices* are commonly in the basecour; sometimes they are sunk underground, and well vaulted.

OFFICER, a person possessed of a post or office.

Great OFFICERS *of the crown*, or *state*, are the lord high-steward, the lord chancellor, the lord high-treasurer, the lord president of the council, the lord privy-seal, the lord-great chamberlain, the lord high constable, the earl marshal, and lord high-admiral. See CHANCELLOR, TREASURER, MARSHAL, &c.

OFFICERS *of justice* are those who are entrusted with the administration of equity and justice in the courts thereof.

OFFICERS, *royal*, are those who administer justice in the king's name; as the judges, &c. See JUDGE.

OFFICERS, *subaltern*, are those who administer justice in the name of subjects. Such are they who act under the earl marshal, admiral, &c.

OFFICERS *of policy* are those in whom the government and direction of the affairs of a community are invested. Such are mayors, sheriffs, &c.

OFFICERS *of war* are those who have command in the forces.

These are either *general*, *field*, or *subaltern officers*.

OFFICERS, *general*. See GENERAL *officers*.

OFFICERS, *field*, are such as have command over a whole regiment; such as the colonel, lieutenant-colonel, and major.

OFFICERS, *subaltern*. See SUBALTERN.

OFFICERS, *commission*, are such as are appointed by the king's commission.

Such are all from the general to the cornet and ensign, inclusive.

They are thus called in contradistinction to *non-commissioned officers*, as serjeant-majors, quarter-master-serjeants, serjeants, corporals, drum and fife-majors, who are nominated by their respective captains, and appointed by the commanding *officers* of regiments, and by them reduced, without a court martial.

OFFICERS, *staff*, are the quarter-master-general, and the adjutant-general, who are strictly said to exist only in time of war: also, the quarter-masters, adjutants, surgeons, and chaplains of regiments.

OFFICERS, *warrant*, are those who have no commissions, but only warrants from such boards or persons as are authorized by the king to grant them.

OFFICERS, *sea*, or *officers of the marine*, are those who have command in ships of war.

OFFICERS, *flag*. See FLAG.

OFFICERS *of the household*, are the lord steward, treasurer of the household, comptroller, cofferer, master, clerks of the green-cloth, &c. the lord chamberlain, vice-chamberlain, gentlemen of the privy and bed-chamber, gentlemen-ushers, grooms, pages, master of the wardrobe, of the ceremonies, &c. the master of the horse, avenor, equerries, surveyors, &c. See HOUSHOLD. See also each *officer* in his proper article.

OFFICERS, *staff*, are such as in the king's presence bear a white staff; and at other times, going abroad, have a white staff borne before them by a footman bare-headed. Such are the lord steward, lord chamberlain, lord treasurer, &c.

The white staff is taken for a commission; and at the death of the king, the *officers* break their staff over the hearse made for the king's body, and thereby discharge their inferior *officers*.

OFFICERS, *municipal*. See MUNICIPAL.

OFFICERS, *reformed*. See REFORMADO.

OFFICERS *of the mint*. See MINT.

OFFICERS, *signals for*. See SIGNAL.

OFFICIAL, *officialis*, in the *Canon Law*, the bishop's deputy, or lieutenant; or an ecclesiastical judge appointed by a bishop, chapter, abbot, &c. with charge of the spiritual jurisdiction thereof.

Of these there are two kinds: the one, as it were, vicar-general of the church, exercising jurisdiction throughout the whole diocese, called by the canonists *officialis principalis*, in our statute-law the bishop's CHANCELLOR.

There is no appeal from his court to the bishop; his being esteemed the *bishop's* COURT.

The other, called *officialis foranei*, as having his jurisdiction *foris*, & *extra civitatem*, is appointed by the bishop when the diocese is very large; having a certain extent of territory assigned him, wherein he resides.

This *official* has but a limited jurisdiction, though he have *universitatem causarum*, and exercise it in the bishop's name. Our statute-law calls him *commissary*.

The bishops, especially those of large sees, finding themselves oppressed with a multiplicity of business, at first, discharged a part of it upon their archdeacons and priests, to whom they gave commissions revocable at pleasure. These are called *vicarii*, or *officiales*.

As we do not meet with this term any where before the constitutions of the *jesuits decretalium*, it is pretty apparent the custom had not its rise till the end of the thirteenth century.

In process of time the function was divided into two; and the title *official* given to him with whom the bishop entrusted the exercise of litigious justice; and that of vicars general, or grand vicars, to those who had the voluntary jurisdiction.

The number of *officials* was soon excessively multiplied; and not only bishops, but chapters and archdeacons, would have their *officials*.

The *officials*, by degrees, had drawn to their cognizance and jurisdiction most of the civil causes; till they were taken out of their hands by appeals, &c.

OFFICIAL is also used, in our laws, for a deputy appointed by an archdeacon, for the executing of his jurisdiction.

OFFICIALTY, the court, or jurisdiction, whereof an *official* is head.

The practice of *officialties* is now reduced into a little compass; and actions of promises, and dissolutions of marriages, are the principal things transacted therein.

OFFICIARIIS *non faciendis, vel amovendis*, a writ directed to the magistrates of a corporation, requiring them not to make such a man an *officer*, or to put one out of the *office* he hath, until enquiry is made of his manners, &c.

OFFICINAL, formed of *officina*, a *shop*, in *Pharmacy*, a term applied to such medicines, whether simple or compound, as are required to be constantly kept in readiness in the apothecaries shops, to be mixed up in extemporaneous prescriptions.

The *officinal simples* are appointed, among us, by the college of physicians; and the manner of making the compositions is directed in their Dispensatory.

OFFICIO, *suspenso ab*. See SUSPENSION.

OFFICIO, *ex*. See EX *officio*, and INFORMATION.

OFFICIO, *quod clerici non eligantur in*. See QUOD.

OFFING, or OFFIN, in the *Sea Language*, that part of the sea that is at a good distance from shore; where there is deep water, and no need of a pilot to conduct the ship into port.

If a ship from shore be seen sailing out to seaward, they say she stands for the *offing*. And if a ship having the shore near her, have another a good way without her, or towards the sea, they say, that ship is in the *offing*.

OFF-SETS, in *Gardening*, &c. are those young shoots which spring and grow from roots that are round, tuberous, or bulbous. See ROOT, BULB, &c.

The word is also applied by some to the loose, outer, brown skins of tulips, onions, &c.

OFF-SETS, in *Surveying*, are perpendiculars let fall, and measured from the stationary lines, to the hedge, fence, or extremity of the inclosure.

OFF-SET-*staff*, in *Surveying*, a rod, or staff, of any convenient length; for instance, of ten links of the chain.

This ſtaff is divided into ten equal parts. Its uſe is for the ready meaſuring the diſtances from the ſtation line of things proper to be repreſented in a plan. See CHAIN.

OFF-TRACING. See CALQUING, COUNTER-*drawing*, DESIGNING, and PENTAGRAPH.

OFF-WARD, in the *Sea Language*, the ſame with contrary to the ſhore: thus they ſay, *the ſhip heels off-ward*, when, being aground, ſhe heels toward the water-ſide; *the ſhip lies with her ſtern to the off-ward, and the head to the ſhore-ward*, when her ſtern is towards the ſea, and head to the ſhore.

OGEE, or OG, in *Architecture*, a moulding, conſiſting of two members, the one concave, the other convex: the ſame with what is otherwiſe called *cymatium*. See *Tab. Archit. fig.* 7. and 25. N° 15.

Vituvius makes each member of the *ogee* a quadrant of a circle; Scamozzi, and ſome others, make them ſomewhat flatter, and ſtrike them from two equilateral triangles.

The figure of the *ogee* bears ſome reſemblance to that of an S.

OGIVES, or *og* arches, are arches or branches of a Gothic VAULT, which, in lieu of being circular, paſs diagonally from one angle to another, and form a croſs with the other arches which make the ſide of the ſquares, whereof the *ogives* are diagonals.

The middle, where the *ogives* cut or croſs each other, is called the *key*, which is ſometimes carved in form of a roſe, or a cul de lampe. The members or mouldings of the *ogives* are called nerves, branches, or reins; and the arches which ſeparate the *ogives*, double arches.

OGEE, in *Gunnery*, an ornamental moulding in the ſhape of an S, uſed in GUNS, MORTARS, and HOWITZES.

OGLIO. See OLIO.

OGRESSES, or AGRESSES, in *Heraldry*. See PELLETS.

OIL, *oleum*, formed from *oleu*, *olive-tree*, the fruit whereof abounds in ſuch juice; a fatty, unctuous, inflammable matter, drawn from ſeveral natural bodies.

Others define *oil* to be a compound body, little, if at all, ſoluble in water, which is capable of burning with a flame, accompanied with ſmoke and ſoot, and of leaving a reſiduum of coal after its diſtillation. The conſtituent parts of *oil* are phlogiſton, acid, water, and earth; for all theſe principles are diſcovered in the decompoſition of any oil: to which we may add, that *oils*, when decompoſed by heat, or by mineral acids, emit a very large quantity of elaſtic vapour, or a kind of fixable air. *Oil* appears to be one of the proximate principles of all vegetables and animals; and conſtitutes the eſſential diſtinction betwixt them and minerals, in which the ſmalleſt particle of *oil* cannot be diſcovered. As to the general properties of *oil*, it may be obſerved, that all *oils* are volatile; and thoſe which poſſeſs this property in the leaſt degree may be evaporated with much leſs than a red heat. They are alſo eaſily inflammable in open air, when expoſed to a heat capable of evaporating them, by contact of any inflamed matter; and they are entirely decompoſed by their inflammation. This inflammable property of *oil* had led the ancient chemiſts, down to the time of Beccher and Stahl, to give the name of *oil* to the inflammable principle of metals, of ſulphur, and of charcoal; whereas this principle is one of the conſtituent parts of *oil*; nor can it be tranſferred from *oil* to any other body, without previous decompoſition, and its ceaſing to be *oil*. In diſtilling *oil*, there firſt ariſes an acid phlegm, and afterwards the *oil* itſelf, which is accompanied with an acid. In the retort there remains a ſmall quantity of coal; which, as well as the ſoot of *oil*, are combuſtible with difficulty; but when the whole inflammable principle is burnt, nothing remains but aſhes, which, when well waſhed from the fixed alkali they may contain, are a pure earth. There is reaſon to believe, that *oil* in its greateſt purity and ſimplicity, or the *oily principle*, is eſſentially the ſame in all vegetable and animal matters; and that the differences, however conſiderable, in the ſeveral kinds of *oils*, proceed merely from the extraneous matters combined with them. It appears, likewiſe, that *oils*, by repeated diſtillations, are not only purified and rendered ſimpler, but eſſentially altered. They are alſo liable to alteration by the action of air, and by the concurrence of other circumſtances which favour fermentation. Acids have in general a power of acting upon *oils*; but the effects produced by their combination with them are very various, according to the nature of the acid, the degree of its concentration, and to the kind of *oil*; and the difference of their effects evidently proceeds from the difference of their affinities with the inflammable principle. Alkalis act upon all *oils*, and combine with them to a certain degree; but more or leſs readily, according to the nature of the *oil*. In general, the leſs thin and volatile any *oil* is, the more eaſily ſoluble it is by alkalis; and reciprocally *oils* may be united with metallic ſubſtances. They moſt ſenſibly attack copper and lead, diſſolving copper even without heat. The action of *oils* on metals is probably by means of their acid and phlogiſton, with which the air perhaps alſo concurs. But *oils* are moſt eaſily combined with the calxes of lead.

The *oils* in common uſe are of three different kinds. The firſt are mere *oily*, or fatty bodies, extracted either by expreſſion, or by decoction: of the firſt kind are thoſe of almonds, linſeed, nuts, olives, and the like; and of the other, that of bay-berries, and the like, which are procured by boiling the ſubſtance on which the *oil* collects itſelf on the top of the water.

The ſecond kind of *oils* are thoſe extracted from vegetables, by common diſtillation by the alembic, with the help of water; theſe contain the *oily* and volatile part of the plant, and carry, by way of pre-eminence, the name of *eſſential* or *ethereal oil*.

The third ſort of *oils* are the fetid ones, which are, in like manner, produced by diſtillation, but by means of a different diſtillation in a naked fire, and without the aſſiſtance of water.

The word *oil* is ſometimes applied to the juices which diſtil naturally from plants and trees; as balm, &c. but more ſtrictly to thoſe juices drawn by EXPRESSION, &c. from plants, fruits, grains, or ſeeds; as *oil of olive*, *nut-oil*, &c.

OIL, among the *Ancient Chemiſts*, is the ſecond of the elements, or hypoſtatical principles, otherwiſe called *ſulphur*. All natural bodies yield *oil*, either by diſtillation, putrefaction, or liquation, called *per deliquium*: and hence the chemiſts will have it a neceſſary ingredient in the compoſition of all bodies. They make it the principle of odours; and to the diverſities thereof aſcribe all the difference of bodies in reſpect of ſmells. See PHLOGISTON.

All plants, unleſs diſtilled with water, yield a fetid *oil* at the end of diſtillation; but aromatic ones, beſides this, yield another *oil*, which ariſes after the phlegm, and at the beginning of the diſtillation: this chemiſts call an *eſſential oil*, becauſe it retains the natural ſmell of the plant; whereas the ſecond *oil*, even that of aromatic plants, ſtinks intolerably.

M. Homberg, from an obſervation that plants which yield the moſt acid, yield likewiſe the moſt *oil*, took occaſion to think, that the acid might aſſiſt the *oil* to diſengage itſelf from the body, and to riſe in diſtillation; which he found to anſwer in the experiment. Mineral acids proved to have more force on the *oils* of plants, and put them in a condition of riſing in diſtillation, and in greater quantity, by the action of fire, than vegetable ones. Accordingly, whereas the perfumers find a great difficulty in raiſing eſſential *oil* of roſes; and ſcarce get an ounce out of a hundred pounds of the flower; M. Homberg, on his principle, got at leaſt one third more; viz. by laying the roſes fifteen days in water impregnated with ſpirit of vitriol, before diſtillation.

The chemiſts doctrine of principles, Mr. Boyle ſhews to be very deficient in the article of *oils*: for the characteriſtic of a ſulphur, or that which denominates a thing ſuch, is its inflammability: now there are at leaſt three ſubſtances manifeſtly different in conſiſtence, texture, or both, which, according to that notion, ought to be referred to ſulphurs: for ſometimes the inflammable ſubſtance obtained from a mixed body by means of fire, appears in form of an *oil* that will not mix with water; ſometimes in form of an inflammable ſpirit, which will readily unite with that liquor; and ſometimes alſo in form of a conſiſtent body almoſt like common ſulphur.

Dr. Slare, in Philoſ. Tranſ. gives us a ſcheme or analyſis of *oils*. He diſtinguiſhes *oils* into vegetable, animal, and mineral.

The vegetable he divides into *eſſential* and *not eſſential*. The *eſſential*, again, are either perfect ſtillations made by the analyſis of the chemiſt's fire, where the oleaginous particles are truly ſeparated from all other; as thoſe from the ſeeds of cumin, fennel, and dill: or light and etherial, uſually drawn from the tops of plants, and ſpecifically lighter than water, and ſome of them than ſpirit of wine; as thoſe from thyme, wormwood, hyſſop, lavender, roſemary, penny-royal, rue, ſage, favin, &c. or ponderous, which commonly ſink in water.

Thoſe *not eſſential* are imperfect, made by expreſſion; being decompounded of ſeveral parts of the plants; as of almonds, olives, walnuts, lime, rape, &c.

The *animal oils* are either thoſe of the ſolid parts, as hartſhorn, human ſkull, hoofs, &c. or thoſe of the fluids, as of human blood.

Laſtly, the *mineral oils* are thoſe of amber, petroleum, Barbadoes tar, to which ſome add bees-wax.

Of theſe *oils* there are twelve, that, by a mixture of compound ſpirit of nitre, make an ebullition, exploſion, and flame; eighteen, that make an ebullition and exploſion without flame: and four that produce neither.

Plato obſerves, that *oil* is deſtructive to all plants; and, he adds too, to the life of all animals, except that of man, to which it is agreeable, as alſo to the reſt of his body. He adds farther, that it is very uſeful to the external parts of the body, but ſometimes hurtful to the internal. Fernelius obſerves, that *oil* ſoftens, moiſtens, and lubricates the body, and takes off the ſenſe of wearineſs; for which reaſon the Greeks call it *ocipum*: it alſo renders the body prompt and agile. Dioſcorides ſays it cures leproſies, &c.

The uſe of *oil* in ſtopping the violent ebullition of various ſubſtances, may be very great in many occaſions of life. It is well known that if a mixture of ſugar, honey, or the like, be boiling on the fire, and in danger of riſing over the ſides of the veſſel, the pouring in a little *oil* immediately makes it ſubſide. In many caſes the marking a circle round the inſide of a veſſel, in which a liquor of this kind is to be boiled, with a piece of hard ſoap, ſhall, like a magic ring, confine the ebullition to that height, and not ſuffer it to ſtir any farther. This is wholly owing to the *oil*, or fat, contained in the ſoap: but there is, beſides theſe, another very important uſe of *oil*, on a like occaſion, which is the pouring a little of it on any metallic ſolution, while making; this reſtrains the aſcent of the noxious vapours; preſerves the operator from danger; and, at the ſame time, by keeping down the evaporating matter, gives redoubled ſtrength to the menſtruum.

Pliny has mentioned an extraordinary effect of *oil*, in ſtilling the ſurface of water when it is agitated with waves, and the uſe made of it, by the divers, for this purpoſe. *Omne*, ſays he, *oleo tranquillari*, &c. lib. ii. cap. 103. and Plutarch, in Quæſt. Natur. aſks, *Cur more oleo conſperſum perlucidum ſit et tranquillum?* Pliny's account ſeems to have been either diſcredited or diſregarded by our writers on experimental philoſophy, till it was confirmed by ſeveral curious experiments of Dr. Franklin, which were publiſhed in the year 1774.

The property of *oil* above mentioned has, however, been well known to modern divers and dredgers for oyſters, at Gibraltar, and elſewhere. The divers in the Mediterranean, in particular, deſcend, as in Pliny's time, with a little *oil* in their mouths, which they now and then let out; and which, on riſing to the ſurface of the ſea, immediately renders it ſmooth, ſo as to permit the light to paſs through the water, undiſturbed by various and irregular refractions.

The Bermudians, it is ſaid, are enabled to ſee and ſtrike fiſh, which would be concealed from their view, through the roughneſs of the ſea, by pouring a little *oil* upon it. And the Liſbon fiſhermen effect a ſafe paſſage over the bar of the Tagus, by emptying a bottle or two of *oil* into the ſea, when the ſurf is ſo great as to endanger its filling their boats. Our ſailors have alſo obſerved, that the water is always much ſmoother in the wake of a ſhip that hath been newly tallowed than it is in one that is foul.

Dr. Franklin was led, by an accidental obſervation made at ſea, in 1757, to attend particularly to Pliny's account; and the various informations which he afterwards received relating to it induced him to try ſome experiments on the ſubject. Standing on the windward ſide of a large pond, the ſurface of which was rendered very rough with the wind, he poured a tea-ſpoonful of *oil* on the water. This ſmall quantity produced an inſtant calm over a ſpace of ſeveral yards ſquare, which ſpread amazingly, and extended itſelf gradually, till it reached the lee ſide, making all that quarter of the pond perhaps half an acre, as ſmooth as a looking-glaſs. On repeating this experiment, which conſtantly ſucceeded, one circumſtance ſtruck him with particular ſurprize; this was the ſudden, wide, and forcible ſpreading of a drop of *oil* on the face of the water, which, he adds, "I do not know that any body has conſidered."

When a drop of *oil* is put on a looking-glaſs, or poliſhed marble, it ſpreads very little; but on water it inſtantly expands into a circle extending ſeveral feet in diameter, becoming ſo thin as to produce the priſmatic colours, for a conſiderable ſpace, and beyond them ſo much thinner as to be inviſible, except in its effects of ſmoothing the waves at a much greater diſtance. It ſeems, ſays Dr. Franklin, as if a mutual repulſion between its particles took place as ſoon as it touched the water, and a repulſion ſo ſtrong as to act on other bodies ſwimming on the ſurface, as ſtraws, leaves, &c. forcing them to recede every way from the drop, as from a center, leaving a large clear ſpace. The quantity of this force, and the diſtance to which it will operate, the author ſays, he has not yet aſcertained; but he thinks it a curious enquiry, and wiſhes to underſtand whence it ariſes. In endeavouring to account for the ſingular effects of *oil*, Dr. Franklin obſerves, that there ſeems to be no natural repulſion between water and air, ſuch as to keep them from coming into contact with each other.—Therefore air, in motion, which is wind, in paſſing over the ſmooth ſurface of water, may rub, as it were, on that ſurface, and raiſe it into wrinkles, which, if the wind continues, are the elements of future waves. The ſmalleſt wave does not immediately ſubſide, but in ſubſiding raiſes nearly as much of the water next to it. A ſmall power, continually operating, will produce a great action: ſo that the firſt-raiſed waves, being continually acted upon by the wind, are, though the wind does not increaſe in ſtrength, continually increaſed in magnitude, riſing higher and extending their baſes, ſo as to include a vaſt maſs of water in each wave, which, in its motion, acts with great violence. But if there be a mutual repulſion between the particles of *oil*, and no attraction between *oil* and water, *oil* dropt on water will not be held together by adheſion to the ſpot on which it falls; it will not be imbibed by the water; but be at liberty to expand itſelf and ſpread on a ſurface, that prevents, perhaps, by repelling the *oil*, all immediate contact; the expanſion will continue till the mutual repulſion between the particles of *oil* is weakened, and reduced to nothing by their diſtance.

Dr. Franklin imagines, that the wind, blowing over water, thus covered with a film of *oil*, cannot eaſily catch upon it, ſo as to raiſe the firſt wrinkles, but ſlides over it, and leaves it ſmooth as it finds it. It moves a little the *oil*, indeed, which being between it and the water, ſerves it to ſlide with, and prevents friction: hence the *oil*, dropt on the windward ſide of the pond, proceeds gradually to leeward, as may be ſeen by the ſmoothneſs it carries with it quite to the oppoſite ſide: for the wind, being thus prevented from raiſing the firſt wrinkles, which he calls the elements of waves, cannot produce waves, which are to be made by continually acting upon and enlarging thoſe elements, and thus the whole pond is calmed.

Upon the whole, there is great room to ſuppoſe (notwithſtanding the partial failure of an experiment made at Portſmouth, by Dr. Franklin, and others), that ſeafaring people may derive advantages from uſing *oil* on particular occaſions, in order to moderate the violence of the waves, or to leſſen the ſurf which ſometimes renders the landing on a lee-ſhore dangerous or impracticable.

To this purpoſe we are informed, that the captain of a Dutch Eaſt India ſhip, being overtaken by a ſtorm, found himſelf obliged, for greater ſafety in wearing the ſhip, to pour *oil* into the ſea, to prevent the waves breaking over her, which had an excellent effect, and ſucceeded in preſerving her. Phil. Tranſ. vol. lxiv. part 2. p. 445, &c. See LUMP-*fiſh*.

The kinds of *oils*, their properties, manners of expreſſion, &c. are numerous: for the generality of them, the reader is referred to the proper articles.

Such as could not be more conveniently inſerted, are as follow.

OIL *of amber*. See AMBER.

OIL *of bitter almonds*. See ALMONDS.

OIL *of ſweet almonds*, cold drawn, or without fire, is prepared various ways. Some peel the almonds before they pound them; others pound them without peeling. Some warm them in luke-warm water; others *in balneo Mariæ*; ſome only bruiſe them; others beat them into a paſte. In effect there are almoſt as many different ways of preparing this *oil*, as there are perſons who make it their buſineſs to prepare it.

In this diverſity, Pomet gives us a method eaſier, and leſs expenſive than any of the reſt; which, it ſhould ſeem, we cannot do better than follow.

Method of procuring OIL *of ſweet almonds by expreſſion without fire*. Take a pound and a half of ſweet almonds, new and dry; after pounding them in a mortar, paſs them through a coarſe ſieve, lay them in a hair-cloth, and put them under the preſs between two plates of copper, ſteel, or the like; preſs them gently; and when all the unctuous and fluid part is expreſſed, you will have a ſweet *oil* without any ſediment, which is ſcarce avoidable in any of the other manners.

Sweet almonds yield, on expreſſion, near half their own weight of *oil*; which, though it has no particular taſte or flavour, is ſomewhat more agreeable to the palate than *oil* olive, or moſt of the other common expreſſed *oils*; and hence is employed medicinally for internal uſes, in preference to thoſe *oils*, for obtunding acrid juices, and ſoftening and relaxing the ſolids; in tickling coughs, hoarſe-

hoarseneſs, coſtiveneſs, nephritic pains, &c. See ALMONDS.

OILS, *animal*, in general, are thoſe that are obtained from animal ſubſtances, either in the ſtate of butter and fat, uncombined with the other principles of animal matters; of which kind are fat, marrow, the expreſſed *oils* of yolks of eggs, ſpermaceti, &c. Or, in a ſtate of combination, afforded by diſtillation of the gelatinous ſubſtance, which forms almoſt entirely all the parts compoſing animal bodies, as fleſh, tendons, nerves, cartilages, bones, horns, hair, &c.

OIL, *animal, oleum animale*, in a more reſtricted ſenſe, the name of an eſſential *oil* diſtilled by a retort from blood, and recommended as a powerful remedy in epilepſies, the gout, and other obſtinate diſeaſes.

It was originally uſed in Germany in theſe intentions, and has become of late much uſed in England, but ſhould not be given too freely as an internal. As an external, it may probably be of good ſervice in removing fixed pains, hard tumors, &c. for it is extremely penetrating.

OIL, *animal, rectified*, called alſo *oil of dippel*, is the *oil* obtained from thoſe parts of animals which contain the pureſt gelatinous ſubſtance, and that are entirely free from fat, attenuated, and rendered more volatile by repeated diſtillations. By a ſufficient number of diſtillations, it may be rendered almoſt as white, thin, and volatile, as æther. This *oil* is particularly recommended for epileptic and convulſive affections. It is given from four to ten or twelve drops, in ſome proper vehicle.

OIL *of antimony*, a name given to the *butter of* ANTIMONY, and ſome other ſolutions of antimony by acids.

OIL *of arſenic*. See ARSENIC.

OIL *of aſpic*, or *ſpike*. See SPIKE.

OIL *of balm*. See BALSAM and BAUM.

OIL *of bays* is an eſſential *oil*, obtained from the berries of the BAY. Theſe berries give out to the preſs an almoſt inſipid fluid *oil*; and on being boiled in water, a thicker butyraceous one, of a yelloviſh green colour, impregnated with the flavour of the berry. The berries and leaves of the bay are accounted ſtomachic, carminative, and uterine: with this view, infuſions of the leaves are drank as tea, and the eſſential *oil* of the berries is given on ſugar, or diſſolved by means of mucilages, or in ſpirit of wine, from one to five or ſix drops. But the principal uſe of theſe ſimples in the preſent practice is external: they are made ingredients in carminative glyſters, warm cataplaſms, and uterine baths; and the butyraceous *oil* of the berries ſerves as a baſis for ſome nervine liniments, and mercurial and ſulphureous unguents. Lewis.

OIL *of beech*. See BEECH-*oil*.

OIL *of bean*, or *ben*. See BEN.

OIL *of bricks*. See BRICKS.

OIL, *Britiſh*, an empirical medicine of the ſame nature with the petrolea; the genuine ſort being extracted by diſtillation from a hard bitumen, or a kind of ſtone-coal, found in Shropſhire, and other parts of England. Lewis.

OIL *of camphor*. See CAMPHOR.

OIL *of caſtor*. See CASTOR.

OIL, *cauſtic*. See ARSENIC.

OIL *of chamomile*. See CHAMOMILE.

OILS, *chemical*, are diſtinguiſhed from the expreſſed *oils*; ſuch as thoſe of almonds, linſeed, olives, and the like, which are made by ſo ſimple a proceſs as mere ſqueezing. To procure this chemical principle pure and unmixed from the matter diſtilled from a vegetable body, the unctuous matter obtained from the proceſs may be waſhed from its adhering ſalts, and groſſer earth, in warm water; barely by ſhaking them in a glaſs together, then ſeparating the *oil* from the water by means of the common ſeparating glaſs; in which, if the *oil* be ſpecifically heavier than the water, it ſinks to the bottom, and may be ſuffered to run out firſt, by means of the pipe of that glaſs which has its inſertion at the bottom; if ſpecifically lighter than the water, it may be kept behind, as it floats on the top of the water, while all that is poured off, and has carried the groſs faculent parts with it.

OIL *of cinnamon*. See CINNAMON.

OIL *of cloves*. See CLOVE-*tree*.

OIL, *connecting*, in *Chemiſtry*, a term uſed by Boerhaave, and his followers, to expreſs a certain *oil*, found in all vegetable ſubſtances, but wholly differing from, and independent of, their eſſential *oil*. This is not poſſeſſed of any of their virtues or qualities, but ſeems the ſame in all plants, and is the means of their conſiſtence and ſolidity, giving tenacity to their earth, which, without it, falls to duſt, and the plant exiſts no more.

This *oil* is not ſeparable by boiling water, as the eſſential *oil* is, but only by fire: when a plant has been boiled and diſtilled, its eſſential *oil*, ſalt, &c. are all carried off, and what remains is only the earth connected by this *oil*. This being expoſed to the fire, the *oil* diſcovers itſelf in a thick, black, ſtinking ſmoak, and, finally, taking fire, it burns away, and leaves only the earth, which was the baſis of the plant; retaining its form, indeed, if the proceſs has been carefully made, but falling into a ſhapeleſs powder only on being roughly breathed upon.

This great author, therefore, eſtabliſhes it as a rule, that there are three ſorts of *oil* in plants. 1. An *oily* froth. 2. The *eſſential oil*, diſſolved in decoction. And, 3. This *connecting*, or *conſolidating oil*, ſeparable only by a naked fire.

OIL *of cumin*. See CUMIN.

OILS, *drying*, are formed of linſeed *oil*, prepared by means of boiling, ſometimes with and ſometimes without the addition of other ſubſtances. Thoſe commonly added to *oil*, in this preparation, are white vitriol, ſugar of lead, ſeed-lac, gum maſtic, gum ſandarac, gum anime, gum copal, umbre, colcothar, litharge, and red-lead. A drying *oil* for the nicer works may be prepared by boiling two ounces of gum ſandarac, white vitriol, and ſugar of lead, of each one ounce, in a pint of nut or poppy *oil*, till the ſolid ingredients be diſſolved, and the mixture becomes of the colour of linſeed *oil*. For coarſer work, take one gallon of linſeed *oil*, one pound of litharge of gold or ſilver, half a pound of white vitriol, and ſugar of lead, gum arabic, and umbre, of each a quarter of a pound; boil them as long as the diſcolouring of the *oil*, which is the gradual conſequence of boiling, will allow. That made for ſale is prepared by boiling one gallon of linſeed *oil*, and one pound and a half of red-lead, as long as the colour will bear it. When the calxes of lead are united in ſmall quantity with *oil*, they diminiſh its fluidity, and diſpoſe it to dry more readily. Theſe *oils* are much uſed in painting, on account of their drying quality. When a large quantity of calxes of lead is combined with *oil*, they form with it a ſolid, opake, and tenacious body, capable of ſoftening by heat. Theſe combinations are uſeful in pharmacy, for giving a convenient conſiſtence and tenacity to many plaſters.

OIL *of the earth*, *oleum terræ*, in the *Materia Medica*, the name of a thick mineral fluid of a duſky browniſh black, with a faint caſt of purple, and of the conſiſtence of a thin ſyrup, very little tranſparent, and of a ſtrong penetrating ſmell, like that of common *oil* of amber. It oozes out of the cracks of rocks, in ſeveral parts of the iſland of Sumatra, and ſome other parts of the Eaſt Indies, and is much eſteemed there in paralytic diſorders; but it is ſeldom imported into England; what our Eaſt India ſurgeons and captains uſually bring over under this name, being only a vegetable *oil* impregnated with the virtues of certain of their foſſils by boiling. See PETROL.

OILS, *empyreumatic*, or *fœtid*, comprehend all the *oils* of vegetable and animal matters obtained by diſtillation, with a heat ſuperior to that of boiling water; becauſe theſe *oils* have a diſagreeable, burnt, or empyreumatic ſmell. See EMPYREUMA.

OILS, *eſſential*, are thoſe which have evidently the ſmell of the vegetable from which they are obtained. All theſe *oils* are ſufficiently volatile to riſe with the heat of boiling water; and this degree of volatility is one of their ſpecific characters. The moſt uſual and beſt method of obtaining the eſſential *oil* of a vegetable by diſtillation is to take the plant in the prime of its age, when its ſmell is the ſtrongeſt, and to chuſe thoſe parts of the plant in which the ſmell chiefly reſides; to put them in the cucurbit of an alembic, without a water-bath; to add as much water as is ſufficient to prevent the plants from touching the bottom of the veſſel; to adjuſt a worm to the noſe of the alembic, and to give at once the degree of heat which is proper to make the water boil. In this way, the water riſes impregnated with the ſmell of the plant, and it carries along with it all its eſſential *oil*, part of which is mixed with the water, and renders it turbid, and the reſt of the *oil* floats upon the ſurface, or ſinks to the bottom, according to its ſpecific gravity. Let the diſtillation be continued till the water becomes clear, and more water muſt, from time to time, be put into the cucurbit, that the plant may be always kept moiſt. Theſe *oils* have an acrid and cauſtic taſte, on account of the copious and diſengaged acid with which they are penetrated; and this acid is the cauſe of their ſolubility in ſpirit of wine. All eſſential *oils* are ſubject to loſe, by evaporation, their moſt volatile and thin part, in which the ſpecific ſmell of the vegetable, from which they are obtained, reſides; and by this loſs they become thick, and acquire the conſiſtence and ſmell of turpentine, or even of reſins. In this ſtate they are not, properly ſpeaking, eſſential *oils*, becauſe they are no longer volatile with the heat of boiling water. Eſſential *oils*, altered by time, but retaining their ſmell, are rectified by a ſecond diſtil-

lation.

lation. But even this new diſtilled *oil* is ſubject to change and thicken.

This diſadvantage in keeping the eſſential *oils* diſtilled in the common way, has occaſioned Mr. Geoffroy to contrive another method of making them. This renders them more limpid and fluid than in the common way, and they are never ſubject to grow thick; but the medium not being water, ſo much of the *oil* cannot be procured from the ſubject, becauſe ſome is abſorbed and ſtained in the medium. The inſtance this gentleman gives of his new method is in the eſſence of citron, and it is this:

A common alembic is to be filled with the thin pared external rinds of the fruit; a ſufficient quantity of ſpirit of wine is to be poured on theſe, and the veſſel being well cloſed, the whole is to ſtand ſome time in digeſtion; during this time, the ſpirit charges itſelf with a vaſt quantity of the eſſential *oil* of the bark, and being carefully diſtilled in balneo Mariæ, it brings over with it a great deal incorporated in itſelf, but, beſide that, there is a large portion ſwimming on the ſurface of the ſpirit, and eaſily ſeparable from it in the common way: this is as clear, pellucid, and thin, as the ſpirit itſelf, and is, in all reſpects, ſuperior to the eſſence made by any other means. The ſpirit of wine may be ſaved for a ſecond operation of the ſame kind, and there will then be no loſs from it; for being already ſated with as much of the *oil* as it naturally abſorbs, it will take in no more by the ſame means, and therefore may ſerve for ever ſo many new diſtillations, without loſs. If all the *oil* be finally deſired to be ſeparated from the ſpirit, it may eaſily be obtained by mixing the ſpirit with a large quantity of water, as is done in making the *oil* of ſpike. The *oil* will then ſwim at top, and the ſpirit may be ſeparated again from the water by diſtillation.

Some of the eſſential *oils* are ſo abundantly charged with ſalts, that, in long keeping, they will actually depoſit plain concretions of the ſaline kind.

The *oils* of plants have not always the ſame taſtes with the plant they are diſtilled from, or, at leaſt, not in the ſame degree. Nothing is more bitter than wormwood, yet the *oil* of wormwood has no remarkable bitterneſs. Aniſe, which is of a ſweet taſte, yields, on the contrary, an *oil* infinitely more ſweet than the ſeed; and pepper, which is ſo remarkably hot and acrid, affords an *oil* no way remarkable for its pungency. Thyme, which is in itſelf very acrid and pungent, conveys that property, in a yet greater degree, to its *oil*; there is, indeed, no eſſential *oil* ſo acrid and fiery as that of this plant. The fetid *oils* drawn in dry diſtillation by the retort, in an open fire, no way differ from theſe but by the damage the fire has done them, and may always be converted into theſe by repeated diſtillations. Nay, the very fat *oils*, ſuch as that of almonds, may be attenuated ſo far as to become as fine, and as ſubtile, as the eſſential *oils*. This is to be done by means of quick-lime; and ſeveral repeated diſtillations of this *oil*, or any other of a like kind, with freſh lime to every diſtillation, will reduce it to be volatile, penetrating, and capable of being raiſed, and diſtilled, by means of water, which is the great teſt of the eſſential *oils*. The bituminous, and fetid *oils*, may alſo, in the ſame manner, be reduced, by repeated diſtillations, to the ſtate of the eſſential ones, and to be equally fluid and limpid, and equally penetrating. Memoirs Acad. Par. 1721.

The eſſential *oils* of vegetables may be divided into two claſſes, according to their different ſpecific gravities, ſome floating upon water, and others readily ſinking to the bottom thereof. Thus the eſſential *oils* of cloves, cinnamon, and ſaſſafras, readily ſink, but the *oils* of lavender, marjoram, mint, &c. ſwim upon the water. The lighteſt of all the eſſential *oils* is, perhaps, that of citron peels, which even floats on ſpirit of wine; and the heavieſt of them ſeems to be the *oil* of ſaſſafras.

For the obtaining the full quantity of the more ponderous *oils* from cinnamon, cloves, ſaſſafras, &c. it is proper, 1. To reduce the ſubjects to fine powder. 2. To digeſt this powder for ſome days in a warm place, with thrice its quantity of ſoft river water, made very ſaline with the addition of ſea ſalt, or ſharp with oil of vitriol. 3. To uſe the decoction left in the ſtill, inſtead of common water, for a freſh digeſtion. 4. To uſe alſo, for the ſame purpoſe, the water of the ſecond running, after it has been cleared of its *oil*. 5. Not to diſtil from too large a quantity of the ſubject at once. 6. To leave a conſiderable part of the ſtill empty. 7. To uſe a briſk fire, or a ſtrong boiling heat at firſt, but to ſlacken it a little afterwards. 8. To have a low ſtill-head, with a proper internal lodge, and current, leading to the noſe of the worm. And, 9. To cohobate the water, or pour it back upon the matter in the ſtill, after ſeparating its *oil*, and repeating this once or twice more.

The vegetable world affords vaſt variety of eſſential *oils*, moſt of them very odorous, and of great virtues; but different vegetables yield *oils* of different conſiſtence and in different quantities.

The eſſential *oils* of many of the plants uſually diſtilled have their peculiar reſervoirs in the plant. M. Geoffroy, perceiving this, determined to ſearch for them through the different parts of the plant, and enquire into the reaſon of ſeveral precautions which are always found neceſſary, in order to ſucceed in the diſtillation of them. See OIL-*bladders*, infra.

Eſſential *oils* are, in general, the moſt inflammable of all *oils*, and they unite more eaſily with acids than the ſweet *oils*, which are not volatile.

Theſe *oils* are employed in painting, in ſeaſoning liquors uſed at the table and at the toilette, in perfumes, and in medicine. As they act very powerfully, ſmall doſes, as from one drop to four or five, incorporated with ſugar, muſt be given internally. They are recommended as cephalic and antiſpaſmodic, in convulſive and hyſteric affections: they are alſo ſtimulant, ſudorific, and ſtrengthening. All drugs which are alexipharmic, cephalic, tonic, and ſtomachic, containing vegetable aromatics, derive their virtues from the eſſential *oils* of theſe vegetables. The ſame may be ſaid of all medicinal, aromatic, and ſpirituous waters. In ſome caſes, eſſential *oils* are employed externally, as ſtrengthening, and to allay painful ſpaſms of nervous and tendinous parts, to reſolve and diſſipate acrid humours, which occaſion pain, without any ſenſible inflammation; but they muſt not, on account of their cauſtic quality, be uſed alone, but formed into liniments or pomatums, by mixing them with a ſufficient quantity of fat, or fat *oil*. Diet. Chem. art. *Eſſential* OILS. When applied to the human body, they ſtimulate, corrode, and reſiſt putrefaction; and mixed with the blood, raiſe ſome degree of fever. Med. Eſſ. Edinb. vol. v. art. 24.

As many of the eſſential *oils* are dear, it is a very common practice to adulterate, or debaſe them, ſeveral ways, ſo as to render them cheaper both to the ſeller and the buyer. Theſe ſeveral ways ſeem reducible to three general kinds, each of which has its proper method of detection. Theſe three ways are, 1. To adulterate them with expreſſed *oils*. 2. With alcohol. And, 3. With cheaper eſſential *oils*.

If any eſſential *oil* be adulterated with an expreſſed *oil*, it is eaſy to diſcover the fraud, by adding a little ſpirit of wine to a few drops of the ſuſpected eſſential *oil*, and ſhaking them together; for the ſpirit will diſſolve all the *oil* that is eſſential, or procured by diſtillation, and leave all the expreſſed *oil* that was mixed with it untouched.

If an eſſential *oil* be adulterated with alcohol, or rectified ſpirit of wine, it may be done in any proportion, up to that of an equal quantity, without being eaſily diſcoverable either by the ſmell, or taſte. The way to diſcover this fraud is to drop a few drops of the *oil* into a glaſs of fair water; and if the *oil* be adulterated with ſpirit, the water will immediately turn milky, and by continuing to ſhake the glaſs, the whole quantity of ſpirit will be abſorbed by the water, and leave the *oil* pure at top. Shaw's Lectures, p. 145.

Finally, if an eſſential *oil* be adulterated by a cheaper eſſential *oil*, this is commonly done very artfully: the method is to put fir-wood, turpentine, or *oil* of turpentine, into the ſtill, along with the herbs to be diſtilled for their *oil*, ſuch as roſemary, lavender, origanum, &c. and, by this means, the *oil* of turpentine diſtilled from theſe ingredients comes over in great quantity, and is intimately blended with the *oil* of the genuine ingredient. The *oils* thus adulterated always diſcover themſelves in time, by their own flavour being overpowered by the turpentine ſmell; but the ready way to detect the fraud, is to drench a piece of rag, or paper, in the *oil*, and hold it before the fire; for thus the grateful flavour of the plant will fly off, and leave the naked turpentine ſcent behind.

OIL, *fern*. See FERN.

OIL, *granulated*, is that ſaid in little grains; this is the beſt, and moſt eſteemed, eſpecially of *oils* of olives.

OIL, *green, oleum viride*, a form of medicine preſcribed in the late London Pharmacopœia, and made in the following manner: take leaves of bay, rue, marjoram, ſea-wormwood, and chamomile, each three ounces; *oil* of olives, a quart. Boil the herbs in the *oil* till they are criſp, and then ſtrain off the *oil*; and when it has ſtood for the feces to ſubſide, put it up for uſe.

OIL *inflammable with acids*. See INFLAMMABILITY.

OIL *of juniper*. See JUNIPER.

OIL *of lavender*. See LAVENDER.

OIL *of lead*, is a ſolution of ſalt of LEAD in the eſſential *oil* of turpentine. This preparation is a powerful antiſeptic.

OIL *of lemon*, called the eſſence of *lemon*. See LEMON.

OIL *of linſeed*. See FLAX and LINSEED.

OIL *of mace*. See MACE.

OIL *of marjoram*. See MARJORAM.

OIL, *medullary*. See MEDULLARY.

OIL *of mercury*, a solution of corrosive sublimate in spirit of urine. See MERCURY.

OIL *of mint, mustard, myrrh, nut, nutmeg*. See the several substantives.

OIL *of olives*, is the most popular, and most universal of all others; being that chiefly used in medicine, in foods, sallads, and in the manufactures.

It is drawn from olives by presses or mills made for the purpose. The fruit is gathered when at its utmost maturity, in December and January, as it begins to redden: being put under the mill, as soon as gathered, it yields that *oil* so very sweet, and of so charming an odour, called *virgin-oil*. But, as the olives newly gathered yield but little *oil*, those who rather regard quantity than goodness, leave them on the ground for some time before they press them. See OLIVE.

Neither the smell nor taste of the second *oil* is very agreeable; though there is a third kind still worse, which is the common *oil* procured by throwing boiling water on the pressings, and re-pressing them more strongly.

The consumption of this *oil* is incredible; the south parts of France, Provence, Languedoc, &c. as also Candia, some parts of Italy, &c. yield vast quantities. Its use every body knows; it being reputed one of the most universally useful things in the whole world.

In order to prevent this *oil* from growing rancid, some sea-salt is added, which not being diffoluble in the pure *oil*, imbibes the watery and mucilaginous parts, and sinks with them to the bottom. It does not differ materially from the other flavourless expressed *oils*; but it is preferred to them for dietetic uses, and in plasters and unguents, though more rarely employed as an internal medicine.

OIL, *palm*, or OIL *of Senegal*, a thick unctuous liquor, of a yellow colour, and a violet smell; so called, because drawn, by ebullition, or by expression, from the fruit of a kind of palm-tree, growing in several places of Africa, especially in Senegal.

The Africans use this *oil* as we do butter; and burn it in their lamps when old. With us, it is only used in some external applications, for pains and weakness of the nerves, cramps, sprains, and other such complaints. The common people sometimes apply it to chilblains; and when used early, not without benefit. It is sometimes counterfeited with wax, *oil* of olives, iris, and turmeric; but the trick is found out either by air or fire. The air alters the colour of the genuine, and leaves the counterfeit unchanged; and, on the contrary, fire changes the counterfeit, but does not alter the genuine.

OIL *of Jamaica pepper*. See PIMENTO.

OIL *of petrol*. See NAPHTHA and PETROLEUM.

OIL *of black pitch*. See PITCH.

OIL *of poppy*. See POPPY.

OIL, *red*, in the *Porcelain Manufacture*, a name given to a peculiar colour used on the China ware, or to those pieces of the ware which are coloured with it. It is a very elegant ornament, and would be worthy our attempting to imitate in England, on our better sorts of wares. They do it in the following manner: they mix the red colour, called *tam-lan-bum*, or the copperas-red (see PORCELAIN) with OIL *of stone*, and with another *oil*, as they express it, of the same kind, made of a whitish sort of pebble, or agate, found on the shores of their rivers, and the place of which might probably be supplied with us by common crystal. The powder is to be thoroughly mixed with these liquors, and the vessel dipt carefully into the mixture, or some parts of it only covered with it in figures: after this, it is to be set by to dry, and, when thoroughly dried, it is to be baked in the common way. The general method is that of covering the vessel all over, both inside and out, with this red; and it comes out of the most bright and brilliant colour imaginable, but it will not ring when struck upon, as our common china ware does. We seldom see this in any degree of perfection, but it is very elegant when fine.

OIL, *rock*. See PETROLEUM.

OIL, *rosemary*. See ROSEMARY.

OIL *of sage*. See SAGE.

OIL *of sassafras*. Many of the vegetable *oils* obtained by distillation, will be found, under certain circumstances, to approach to camphor. The *oil* of thyme may be crystallized, according to a process of Mr. Newman's, who calls it, in that, *camphora thymi*. Phil. Transf. N° 479. That *oil* of saffafras is peculiarly liable to crystallization in certain circumstances, and that into the most beautiful forms. Mr. Maud gives an account of a quantity of this *oil*, which having stood exposed to the air in a very frosty night in an open vessel, was in the morning found changed three parts in four of it into very beautiful and large crystals: they were of an hexagonal form, very transparent, and of three or four inches in length, and half an inch in thickness. These crystals subsided in water, and were indissoluble in it; they were readily inflammable at the fire, and were reduced by heat to their pristine fluid state: hence it is evident that they still retain the natural qualities of an *oil*, though they appear under so very different a modification of their parts. What is most remarkable in this change, is, the metamorphosis of a fluid to a solid body, of so determinate and regular a figure, and that these crystals should be perfectly clear and colourless, though the liquor from which they froze was of a yellowish colour, not unlike that of Madeira wine.

This seems to afford a new instance of crystallization, which is generally accounted for by the particles of a fluid, or those of any other body suspended in a fluid, being brought nearer by cold, and, at length, coming within the sphere of each other's attraction, and uniting together into an immediate contact. This *oil* being a very heavy fluid, much heavier than water, is the more likely thus to unite, as its parts are nearer together. This may be a hint to the curious to discover wherein consists the difference of solidity and fluidity; and it likewise shews how much the colour of bodies depends upon the mechanical situation of their parts.

OIL, *stillatitious*. See STILLATITIOUS.

OIL *of stone*. In the manufacture of the Chinese porcelain, they use a liquid matter of a white colour, which they call by this name, on which their great mystery of finishing their work depends; yet this has been less enquired into by the imitators of that ware in Europe than many other articles of less consequence. The stone of which this *oil* is made, is of the same degree of hardness with that which the petunse is prepared of. They procure it from quarries, and chuse such as is of a good white colour, and has many dark green spots in it.

These spots are of the colour of the leaves of cypress. Sometimes a stone is chosen which has a brown ground, variegated with spots and blotches of a reddish colour. They first carefully wash this stone; then laying it in a clean place, they break it to pieces with iron instruments, and afterwards grind these to a perfectly fine and impalpable powder, by rubbing them in large mortars, with pestles of stone faced with iron, and turned either by the labourers, or by water. When the whole is thus reduced to a fine powder, they throw it into a vessel of water; and stirring it briskly about, they let the coarser part subside to the bottom, and there swims a fine thick matter like cream, for two or three inches depth, on the surface. This they carefully scum off, and putting it into another vessel, of clear water, they let it throw down any coarse matter it may yet contain; and, finally, taking off the thick surface again, they mix this with some fresh water in another vessel, and leave it to subside; then pouring off the clear water, they take out the remainder at the bottom of the vessel, which is perfectly fine, and resembles a thick cream. To every hundred pounds of this, they add one pound of a substance of the nature of which we are not yet perfectly informed. It is said to be a mineral resembling alum. They calcine this first, and then beat it to a fine powder; and this being added to the cream, or *oil*, as it is called, serves to keep it always in the same liquid state. This substance, when finished in this manner, has very little title to the name of an *oil*; it is rather a varnish, and is always used in mixture with another varnish, which is called at this time fern *oil*, and used to be called lime *oil*; it is prepared in the same manner with the other after burning. See FERN-*oil*.

OIL *of sulphur* is a name given to the concentrated acid of SULPHUR.

OIL *of tartar*. See TARTAR.

OIL, *train*. See *Whale* FISHERY, and TRAIN.

OIL *of Venus*, a name given by Lemery to the salt formed by the union of copper with the nitrous acid, when it is resolved into a liquor by the moisture of the air. This is a caustic and escharotic.

OIL, *virgin*, is understood of *oils* expressed from olives, nuts, &c. fresh gathered, without being heated, too much pressed, &c. See OIL *of olives*.

OIL *of vitriol*. See VITRIOL.

OIL *of wax*. See WAX.

Oil frequently takes new names from the drugs mixed with it; as *oil of roses*, which is that mixed with roses; *oil of jessamy*, that perfumed with jasmin.

OIL, *anointing with*. See UNCTION.

OIL-*bag*, a vessel in birds, replete with an unctuous substance, secreted by one, sometimes two glands, for the purpose, disposed among the feathers; which, being pressed by the bill or head, emits its *oily* matter, for dressing and pruning the feathers.

OIL *beetle*. See *Oil* BEETLE.

OIL-*bladders*, in *Plants*. It is a discovery, partly of Mr. Tournefort, and partly of Mr. Geoffroy, that the essential *oils* of all plants are contained in their perfect and pure state, in the plants themselves, while growing; they have

have, in different vegetables, different parts aſſigned for their reception; in ſome the flower; in others, the flower cup only, as in roſemary, and the like; in others the bark; in ſome, the parenchyma of the root; and in others, the wood.

Wherever they are lodged, they are always contained in theſe veſicles, or capſules, which require only to be broken, or burſt open, in order to ſet them looſe; this is effected by the boiling water in the common diſtillations, and the natural ſubtilty and lightneſs of the *oil* then makes it eaſily riſe in vapour, and its oleaginous quality rendering it incapable of mixing with the water, it ſwims at the top, and is eaſily ſeparated.

Theſe veſicles are moſt uſually placed in or about the flower; and it is in many plants a very eaſy matter to trace them to their ſeveral places of principal reſidence. Mr. Tournefort has obſerved that theſe *oil-bladders* in the fraxinella, taking their origin at the root, theuce aſcended to the fruit, or covering of the ſeeds. This plant has a very remarkable variety in its *oil* in the different parts. The flower is ſweet-ſcented; the veſicles placed along the ſtalk contain a very ſharp and acrid *oil*, ſomewhat reſembling the eſſence of lemons, when kept a long time. The leaves have ſcarce any ſenſible odour, but the root has a ſcent peculiar to itſelf, and different from that of all the reſt of the plant. Geoffroy, ap. Memoires Acad. Paris, 1721.

The eſſential *oil* of cinnamon has alſo a difference of the ſame kind, which is owing to the different fluid contained in the veſicles in different parts; the bark of the root yields an *oil*, which, after keeping ſome time, always yields a pure and genuine camphor; whereas the *oil* of the bark from other parts of the tree has nothing of this property.

It is alſo eaſy to obſerve, that the capſules of certain fruits have more odour than the fruits themſelves. The coat which covers the piſtachia nut contains much more eſſential *oil* than its kernel; and the bark which ſurrounds the amomum, and cardamoms, has much more ſmell than the kernel of the ſeed. The firſt bark of the nutmeg is well known to have a more fragrant ſmell than the nutmeg itſelf, being the mace; yet there is, within this, another covering of that fruit, which has no ſcent at all.

Moſt of the ſeeds of the umbelliferous plants, which uſually paſs for aromatics of the firſt and moſt eminent kind, have, in reality, no ſmell at all in themſelves; the *oil bladders* which yield their virtues being placed in their outer covering, the kernel within the ſeed uſually containing a fat *oil* of the olive or almond kind, and wholly different from the eſſential. The *oil* of aniſeed made by expreſſion is fluid, of a green colour, and of a fatty nature, but is highly ſcented with the *oil* which it has taken with it from the covering: on the contrary, the eſſential *oil* procured from the ſame ſeed by diſtillation, is thin, not fatty, of a much more clear and penetrating ſcent, of a pale colour, with no admixture of greeneſs, and readily concretes into a maſs like butter on external cold. In coriander ſeed, the kernel carefully ſeparated from its membranes has no ſmell, and contains only a fatty *oil*, like that of the olive, while the veſicles are all ranged in the rind, and therefore in that alone is the aromatic ſmell. Theſe veſicles in the ſkin of fruits are the occaſion of the ſweet flavour of many; as of the ſtrawberry, raſpberry, and the like; in theſe they are too ſmall to be diſtinguiſhable, while, in the thicker rinds of the orange and lemon kind, they are eaſily diſcerned, and, on the leaſt preſſure, burſt, and throw out their contents, which make what we call the *zeſt*, and which is ſeparated in this manner in greateſt quantity in hot countries; and where there are plenty of the fruit, is preſerved under the name of *bergamot*, and other eſſences of a like kind.

There is, however, no ſubject in the vegetable world in which theſe veſicles are more plainly perceived than in the berries of the juniper, a fruit very well known, and in conſtant uſe with us. Theſe berries are at firſt green, afterwards of a reddiſh brown, and finally black, and they are two years in coming to maturity. The berry is formed at the top, in the manner of a bud of the roſe, or piony, which is juſt ready to open; and it ſometimes does open into four or five parts, according to the number of ſeeds it contains. It contains, beſide theſe, an acrid, a ſweet, and an aromatic juice, which leaves a ſenſible bitterneſs behind it in the mouth.

In order to account for theſe ſo different taſtes in the ſame fruit, Mr. Geoffroy attributes its acrid quality to the ſkin, or huſk, and in ſome berries, indeed, to the unripeneſs of the whole, for want of a due heat of the weather; the ſweet taſte is from the juice of the fruits, which is properly a ſaccharine or mellicous liquor, and the aromatic flavour is wholly owing to the *oil* which is lodged in the veſicles expanded over the whole inner ſubſtance of the fruit. Theſe ſubſtances are indeed ſo determinately marked in the berry, that it is poſſible to ſeparate them; but theſe are not all the differences of taſte and matter in this little fruit, every kernel of which has in it five or ſix veſicles, lodged each in a peculiar, and appropriated cavity, in the external part of the ſeed. Theſe are eaſily ſeparated from the reſt of the fruit, and, when that is dry, are found to contain an abſolute reſin; they are of a duſky colour, and each drop of reſin in them is of an oval figure, and is very bitter to the taſte; hence therefore is the remarkable bitterneſs that affects the mouth, when the berry is thoroughly broken by the teeth.

The knowledge of this may be of great uſe to the apothecary in his medicinal preparations of juniper berries of ſeveral kinds. When he wants only the extract, which is the mellicous juice of the berries alone, they ought not to be ſtamped or bruiſed, to diſlodge their reſin, which has no buſineſs there, but ſhould be only boiled, and the decoction inſpiſſated. But when the eſſential *oil* is required, the whole berry muſt be bruiſed, and that in a thorough manner, that all its kernels may be broken. The cells, or veſicles of *oil*, now indurated into a reſin, burſt open, and the whole diſperſed in ſuch a manner that the water may affect it. Memoires Acad. Par. 1721.

In order to diſcover what are the parts of a plant in which the eſſential *oil* moſt abounds, it will be proper to examine what part yields the moſt ſmell; and this will be found different in different plants. In ſome the ſeat of odour occupies the whole body of the flower; in others only ſome particular part of the flower has it; and in ſome it is principally lodged in the covering; and in ſome it is diſperſed every way, through the body of the fruit. In ſome inſtances it is found lodged in other parts of the plant, and ſometimes it is equally ſtrong in every part of it.

This principle of the eſſential *oils* varies alſo not only in regard to the place where it reſides, but in the different ſcents it yields in different places; or in the ſame parts of the plant in different ſeaſons.

It is to be obſerved in the ſweet-ſcented woods, that the place where the reſin is collected in greateſt quantities, is in the knots from which young branches are to riſe; this is very eaſily obſervable in the firs and juniper. This is not, however, the caſe in all the reſinous woods; for ſome of theſe abound ſo in reſin, that their ſeveral woody beds, or layers, are all connected to one another by beds of reſin; as is the caſe in guaiacum, in the calambac wood, and that of aloes. And this is more peculiarly remarkable in the laſt; for in the fineſt wood of this kind, ſent from the Eaſt Indies, the woody parts are ſtript away, and only theſe reſinous beds are left remaining; and, conſequently, while the coarſer and cheaper ſorts burn like our woods to a charcoal, this precious kind melts upon the fire like a true reſin, and is the fineſt ſcented ſubſtance imaginable.

To all the reſinous woods, the young ſhoots of the tree are to be preferred for the extraction of the eſſential *oil*. This is well known to thoſe who traffic largely in this way; and even the liquid balſams, of which enough cannot be obtained by inciſion, may be thus procured: they boil the tops of the branches, and the young ſhoots, in water, and collect, from the ſurface of that liquor, the fluid balſam which the boiling has ſeparated from the ſhoots, and which cannot mix with it. See *Eſſential* OIL.

OIL *dregs*. See DREGS.

OIL, *gilding in*. See GILDING.

OIL-*mill*. See MILL.

OIL, *painting in*. See PAINTING.

OIL-*ſtone*, *cos olearia*, in *Natural Hiſtory*, is a ſtone of a whitiſh colour, with a faint mixture of a blueiſh grey; and it is ſometimes ornamented with black ſpots and dendritæ. It is of a moderately fine and compact texture, hard and heavy, and capable of a tolerable poliſh. It is not acted upon by acids, gives fire very freely with ſteel, and when burnt, acquires a pure white colour. This ſtone has not yet been found in England; but in the caſtern parts, and in Germany, there are large ſtrata of it. It is much uſed by our artificers for ſetting a fine edge on their tools, and is only uſed with *oil*, which by degrees changes its colour to a deep brown. They call it the Turkey-ſtone. D'Coſta's Hiſt. of Foſſils, p. 153.

OILY *grain*, *ſeſamum*, in *Botany*, a genus of the *didynamia angioſpermia* claſs. Its characters are theſe: the flower has an erect, permanent empalement, cut at the top into five very ſhort equal parts; the flower has one ringent petal, with a roundiſh tube, the length of the empalement; the chaps are ſwollen, bell-ſhaped; the brim is cut into five points, four of which are almoſt equal; the other is twice their length; it has four ſtamina riſing from the tube, which are ſhorter than the petal, the two inner being ſhorter than the other, terminated by erect ſummits, and an oval hairy germen, ſupporting a ſlender ſtyle, longer than the ſtamina, crowned by a

spear-shaped stigma, divided into two parts; the germen becomes an oblong almost four-cornered capsule, having four cells, filled with oval compressed seeds. Linnæus enumerates two, and Miller three species.

The *jasminum* with oblong entire leaves, called the Eastern fox-glove, is much used by the Egyptians and African Negroes, both as food and medicine. The Arabians call the expressed oil of the seeds *zeid tuib*, that is, good oil, by way of eminence, because it is of frequent use with meats; and in Egypt is sold dearer than oil of olives. Parkinson

OILY *waters*. See WATERS.

OINTMENT, in *Pharmacy* and *Surgery*, &c. See UNGUENT.

OISEAU, in *Conchyliology*, the name of a peculiar species of oyster, of so remarkable a figure, that it represents a bird, with its wings expanded, and has a small protuberance at the hinge, representing a head, and a long process at the opposite end, which very well represents a tail. It is of a dusky reddish colour on the outside, and of a fine pearly hue within. When the outside of this shell is taken off, and it is nicely coloured, by cutting it down to a proper depth in every part, it is of a fine reddish yellow, and is the aurora shell of collectors.

OISTER, in *Zoology*. See OYSTER.

OKE, an Egyptian weight, consisting of three rotolos, each of twelve ounces, at twelve drachms to the ounce, and sixteen carats to the drachm.

OKELAS, in Egypt, and some other of the eastern countries, are a sort of indifferent buildings round a court, and commonly appropriated to the merchants of some particular country, with their goods; as at Cairo, there is one for the merchants of Nubia, and the black slaves, and other goods they bring with them; and another for white slaves from Georgia.

OKER. See OCHRE.

OLAX, in *Botany*, a genus of the *triandria monogynia* class. Its characters are these: the empalement is entire, and the flower funnel-shaped, and divided into three parts; the nectarium is compoled of four leaves. There is only one species.

OLD *age*. See AGE, and LONGEVITY.

OLD *chronomy*. See ASTRONOMY.

OLD *style*. See STYLE.

OLD *subsidy*. See SUBSIDY.

OLD *tenements of tenures*. See DUTY.

OLD-*wife*, a name by which a species of BALISTES is called in several of our plantations.

OLD-*wife* is also a name given to the *wrasse*, a species of LABRUS.

OLD *works*, in *Mining*, are such that are either fallen in, or stand unwrought.

OLDENLANDIA, in *Botany*, a genus of the *tetrandria monogynia* class. Its characters are these: the empalement of the flower is permanent, sitting upon the germen; the flower has four oval petals, which spread open, and four stamina, terminated by small summits; it hath a roundish germen, situated under the flower, crowned by an indented stigma; the germen afterwards turns to a globular capsule, with two cells, filled with small seeds. We have but one species of this plant in the English gardens. Linnæus enumerates six species.

OLEA, in *Botany*. See OLIVE-*tree*.

OLEA is also the name of a stone described by Ludovicus Dulcis, and some other such authors, who attribute great virtues to it, and say it was variegated with several colours, as yellow, black, white, green, &c. It seems to have been some one of the common agates, to which their ignorance had prompted them to give a new name.

OLEA *Bahamica*, in *Botany*, a name by which some authors have called the *nzuphe* or *nzuphoi*, the wild *jujube* tree.

OLEAGINOUS, something that partakes of the nature of oil; or out of which oil may be expressed.

Thus olives, nuts, almonds, &c are *oleaginous* fruits, or fruits out of which oil is expressed.

Pines, firs, &c. are *oleaginous* woods, yielding resin, turpentine, &c. Of all woods, *oleaginous* ones burn the best. An *oleaginous* urine in malignant fevers is a sign of death.

OLEANDER, or ROSE BAY, *nerium*, in *Botany*, a genus of the *pentandria monogynia* class. Its characters are these: the empalement of the flower is permanent, and cut into five acute segments; the flower has one funnel-shaped petal, cut into five broad obtuse segments, which are oblique; it hath a nectarium, terminating the tube, which is torn into hairy segments; it hath five short awl-shaped stamina within the tube, it hath an oblong germen, which is bifid, with scarce any style, crowned by single stigmas; the germen afterwards turns to two long, taper, acute-pointed pods, filled with oblong seeds, lying over each other like the scales of a fish, and crowned with down. There are four species.

These plants are generally propagated by layers in this country, for although they will take root from cuttings, yet that being an uncertain method, the other is generally pursued; and as the plants are very apt to produce suckers or shoots from their roots, those are best adapted for laying; for the old branches will not put out roots: when these are laid down, they should be slit at a joint, in the same manner as it is practised in laying of carnations. There are few plants which are equal to them, either to the sight or smell, for their scent is very like that of the flowers of the white thorn; and the bunches of flowers will be very large if the plants are strong.

It is called nerium from *νηρος*, *moist*, *humid*, because it grows in humid places. The plant itself has a force which is insuperable; for its juice excites so great and violent an inflammation, as immediately to put a stop to deglutition; and if it be received into the stomach, that part is rendered incapable of retaining any thing; the pernicious drug exerting its force, and purging both upwards and downwards.

Nerium in qualities resembles the apocynum. But when handled and examined upon an empty stomach, in a close chamber they cause a numbness coming by degrees, with a pain in the head, which shews that something poisonous belongs to the smell, though there is no danger, if it be received in the open air, as may be found upon trial. Antidotes against its poison are vinegar and all acids.

OLEARIA, in *Natural History*, the name of a genus of round-mouthed sea-snail, or COCHLEA *lunaris*. It is of a very large size, capable of holding two quarts, and had its name *olearia* from its being anciently used in families, as the vessel in which they kept oil.

OLEASTER, in the *Materia Medica*, the name of the *sallow thorn*, or *sea buckthorn*, the *rhamnoides salicis folio* of botanical authors.

OLECRANUM, *ωλενοκρανον*, in *Anatomy*, an eminence behind the bend of the elbow; being the part whereon the arm bears when we rest on the elbow. See *Tab. Anat. fig. 3. n.* 11.

This eminence is nothing else but the posterior apophysis of the head of the ulna, which stays that bone, and prevents its slipping back; so as to form an acute angle when the arm is bent.

The *olecranum* is received into the hinder sinus of the lower end of the humerus; and with the fore protuberance of the ulna, which is received into the fore sinus of the humerus, it forms a perfect ginglymus, whereby the two bones move as on a hinge.

OLEOSUM *sal volatile*. See SAL.

OLERON, *laws of*. The inhabitants of the island of *Oleron*, near the coast of Poictou, have been able mariners for six or seven hundred years past: so that they framed and drew up the laws of the navy or marine, which are still called the laws of *Oleron*. See USES *and customs of the sea*. These laws, being accounted the most excellent sea-laws in the world, are recorded in the Black Book of the admiralty.

OLEUM, *viz.* See OIL.

OLEUM *Medicum*, in the writings of the ancients, a name given to a famous oil which had a quality of burning under water, in spite of all that could be done to quench it. It was called *Medicum*, because of its being produced among the Medes, and some have called it *oleum Medeæ*, because it was supposed to be that substance with which Medea anointed the crown of her rival. Ammianus Marcellinus tells us, that if an arrow was anointed with this oil, and shot out of a bow against any inflammable substance, the whole immediately took fire, and, if any one attempted to quench the flames by water, they only burnt the more fiercely for it. The *venenum Pharicum* of Nicander is supposed to be the same with this oil.

OLEUM *Medeæ*, a name given by the ancients to the mineral fluid, more generally known by that of NAPHTHA.

OLEUM *vitri antimonii*, in *Medicine*, a name given by Basil Valentine, and others, to a famous preparation of antimony, which they keep as a secret, or at least declare in such terms as are unintelligible, and boast of, as the universal medicine. The learned Kerkring has given the process for making this red oil of the glass of antimony, but that in so enigmatical a manner, that he seems himself not to expect any body to understand him; and only says, in his own justification, that he has given it in plainer terms than any body had done before him. The author relates many wonderful things of this diaphoretic oil, on his own experience; particularly, the curing a confirmed dropsy, by throwing off the water by sweat; so that the patient, in a manner, swam

ſwam in it, and the drops run through the bed, in all parts, to the floor. It were well if we could underſtand the proceſs.

OLFACTORY *nerves*, in *Anatomy*, the firſt pair of nerves ſpringing out of the medulla oblongata; ſo called as being the immediate inſtruments of ſmelling. See *Tab. Anat. (Oſteol.) fig.* 5. *lit. h h.*

The ancients called them *proceſſus papillares*; which Dr. Drake thinks a more ſuitable name, till their arrival at the os cribroſum, becauſe they rather appear productions of the medulla oblongata than diſtinct nerves, againſt which, their manifeſt cavities, and their communication with the ventricles, argue.

The *olfactory nerves* have their riſe juſt below the os frontis, and, as ſoon as they have made their way through the os cribroſum, are diſtributed among the membranes of the noſe.

OLIBANUM, in *Pharmacy*, a kind of gum or reſin, uſually called *male* FRANKINCENSE.

It has its name *olibanum*, *quaſi oleum Libani*: becauſe diſtilled, in form of an oil, from a tree growing on mount Lebanon.

OLIGACTIS, in *Natural Hiſtory*, a name given by Linkius, and others, to a genus of ſtar-fiſh, conſiſting of thoſe which have fewer than five rays.

OLIGAEDRA, in *Natural Hiſtory*, the name of a genus of CRYSTALS.

The word is derived from the Greek ολιγος, *a few*, and εδρα, *a plane* or *ſide*, and expreſſes a cryſtal, which is compoſed of only a few planes.

The bodies of this claſs are cryſtals of the imperfect kind, being compoſed of columns affixed irregularly to ſome ſolid body at one end, and, at the other, terminated by a pyramid; but the column and pyramid being both pentangular, the whole conſiſts only of ten planes, not, as the common kind, of twelve. See *Tab. of Foſſils, Claſs* 3.

OLIGARCHY, formed from ολιγος, *few*, and αρχη, *government*, a form of government, wherein the adminiſtration is in the hands of a few perſons.

The ſtates of Venice and Genoa may be ranked among *oligarchies*.

Oligarchy amounts to much the ſame thing with ariſtocracy; unleſs perhaps the former imports a kind of defect or corruption; as if the ſovereign power were monopolized by a few perſons, in prejudice of the rights of a great number.

OLIGOTROPHEROS, among the Greeks, a name given to the finer ſort of bread made of the fineſt flour.—They called it by this name becauſe of the little ſhare of nouriſhment it conveyed; and, by way of diſtinction from it, called the brown bread *polytropheros*, or *much nouriſhing*.

OLIO, or OGLIO, a favoury diſh, or food, compoſed of a great variety of ingredients; chiefly found at Spaniſh tables.

The forms of *olios* are various. To give a notion of the ſtrange aſſemblage, we ſhall here add one from an approved author.

Take rump of beef, neats tongues boiled and dried, and Bologna ſauſages; boil them together, and, after boiling two hours, add mutton, pork, veniſon, and bacon, cut in bits; as alſo turneps, carrots, onions, and cabbage, borage, endive, marigolds, ſorrel, and ſpinach; then ſpices, as ſaffron, cloves, mace, nutmeg, &c. This done, in another pot put a turkey or gooſe with capons, pheaſants, wigeons, and ducks, partridges, teals, and ſtock-doves, ſnipes, quails, and larks, and boil them in water and ſalt. In a third veſſel, prepare a ſauce of white wine, ſtrong broth, butter, bottoms of artichokes, and chefnuts, with cauliflowers, bread, marrow, yolks of eggs, mace and ſaffron: laſtly, diſh the *olio*, by firſt laying out the beef and veal, then the veniſon, mutton, tongues, and ſauſages, and the roots over all; then the largeſt fowls, then the ſmalleſt, and laſtly pour on the ſauce.

OLITORY, a kitchen-garden, or a garden of herbs, roots, &c. for food. See GARDEN, SALLET, &c.

OLIVARIA *corpora*, in *Anatomy*, are two protuberances in the under part of the brain, placed on each ſide the corpora pyramidalia, towards the lower end; having their name from their figure, which reſembles that of an olive.

OLIVE *tree*, *oleа*, in *Botany*, a genus of the *diandria monogynia* claſs. Its characters are theſe: it has a ſmall tubulous empalement of one leaf, cut into four ſegments at the top; the flower conſiſts of one petal, which is tubulous, cut at the brim into four ſegments; it has two ſhort ſtamina, terminated by erect ſummits, and a roundiſh germen, ſupporting a ſhort ſingle ſtyle, crowned by a thick biſid ſtigma; the germen afterwards turns to an oval ſmooth fruit, or berry, with one cell, incloſing an oblong oval nut. Miller reckons five, and Linnæus three ſpecies.

In Languedoc and Provence, where the *olive tree* is greatly cultivated, they propagate it by truncheons, ſplit from the roots of the trees; for as theſe trees are frequently hurt by hard froſts in winter, ſo when the tops are killed, they ſend up ſeveral ſtalks from the root; and when theſe are grown pretty ſtrong, they ſeparate them with an axe from the root; in the doing of which they are careful to preſerve a few roots to the truncheons; theſe are cut off in the ſpring after the danger of the froſt is over, and planted about two feet deep in the ground, covering the ſurface with litter or mulch, to prevent the ſun and wind from penetrating and drying the ground: when the plants have taken new root, they are careful to ſtir the ground, and deſtroy the weeds.

Theſe trees will grow in almoſt any ſoil, but when they are planted in rich moiſt ground, they grow larger and make a finer appearance than in poor land; but the fruit is of leſs eſteem, becauſe the oil made from it is not ſo good as that which is produced in leaner ſoil. The chalky ground is eſteemed the beſt for theſe trees, and the oil which is made from the trees growing in that ſort of land is much finer, and will keep longer than the other.

In the countries where the inhabitants are curious in the making of their oil, they are frequently obliged to get truncheons of the ordinary ſorts of *olives* to plant; but after they have taken good root, they graft them with that ſort of *olive* which they prefer to the others. In Languedoc, they chiefly propagate the cormeau, the ampoulan, and moureau, which are three varieties of the firſt ſpecies, or Provence *olive* with a ſmaller oblong fruit; but in Spain the ſecond ſort, or Spaniſh *olive* with the largeſt fruit, is generally cultivated, where they have more regard to the ſize of the fruit, and the quantity of oil they will produce, than to their quality. In England, the plants are only preſerved by way of curioſity, and are placed, in winter, in the green-houſe, for variety. Miller.

The oil is preſſed out from the *olives*, which are laid together awhile to wither, and then ground in a mill; and having hot water poured on them, they are preſſed out, the water ſubſiding, and the oil ſwimming on the top. What is drawn from the unripe *olives* is called omphacinum, and is accounted drying and reſtringent, and fitter for ſome external remedies: what is preſſed out of the ripe fruit is called OIL of *olives*, being what is generally eaten, and made uſe of in medicine; the different fineneſs being from the different care and management in the making it. The ſweeteſt, and what we eſteem moſt, comes from Provence.

The oil is moderately heating and mollifying, rendering the body lax and ſoluble; it is good for diſorders of the breaſt and lungs, tempering the ſharp choleric humours in the bowels, and ſo helps griping and the colic; and is uſeful againſt all corroſive mineral poiſons, as arſenic and ſublimate, &c. It opens the urinary paſſages, and is good for the ſtone and gravel. The pickled *olives* are grateful to the ſtomach, and are ſuppoſed to promote appetite and digeſtion: the ripe ones are more eaten in the eaſtern countries among the Greeks, being great part of their food, eſpecially in Lent.

There are three kinds of *olives* frequently ſold, different in ſize and goodneſs; viz. thoſe of Verona, thoſe of Spain, and thoſe of Provence.

The *olives*, while on the tree, are intolerably bitter, without any thing of that delicious taſte, which procures them admittance at the richeſt tables. To fit them for that, they muſt be prepared as follows:

OLIVES, *curing or pickling*. In the months of June and July, long before the *olives* are fit to yield their oil, they are gathered, and laid to ſteep ſome days in freſh water; when taken out, they are put in a ley made of water prepared with barilla, or kali, with aſhes of *olive*-ſtones calcined; or at leaſt with lime.

They are next laid in a liquor of water and ſalt, with which they are put into thoſe little barrels, wherein they are brought to us. To give them the flavour, they throw over them an eſſence uſually compoſed of cloves, cinnamon, coriander, and fennel.

This eſſence is a kind of ſecret among thoſe who deal hercin; and in effect it is in this that all the difficulty of the preparation lies.

OLIVE *gum*. See GUMMI *oliviæ*.

OLIVE, *ſpurge*. See SPURGE *laurel*.

OLIVE, *wild*, *elæagnus*, in *Botany*, a genus of the *tetrandria monogynia* claſs. Its characters are theſe: the flower has a bell-ſhaped empalement of one leaf, which is quadrifid, rough on the outſide, but coloured within; it has no petals, but four ſhort ſtamina, which

are inſerted in the diviſions of the empalement; at the bottom is ſituated a roundiſh germen, which becomes an obtuſe oval fruit, with a pauſture at the top incloſing an obtuſe nut. There are three ſpecies, natives of the Eaſt. Miller.

OLIVE, *Barbadoes wild, bontia*, in *Botany*, a genus of the *didynamia angioſpermia* claſs. The flower hath a ſmall erect empalement, which is quinquifid and permanent; it is of the ringent kind, gaping at the brim; the upper lip is erect, the lower lip trifid and turning backward; it has four ſtamina, two of them longer than the other; and in the centre is ſituated an oval germen, which becomes an oval berry with one cell, including a nut of the ſame form. We have but one ſpecies.

This plant is greatly cultivated in the gardens of Barbadoes, for making hedges; than which there is not a more proper plant to thrive in ſuch hot countries, it being an evergreen, and of quick growth. Theſe plants being ever green, and growing of a pyramidal form, make a pretty variety in the ſtove among other exotics.—Miller.

OLIVE-*colour* is a yellow mixed with black.

The term is chiefly uſed in ſpeaking of the tincture of the complexion: the Spaniards and Indians are rarely white, generally *olive*-complexioned.

OLOC, in *Natural Hiſtory*, a name given by the people of the Philippine iſlands to their *quail*. It is like our's in all reſpects, but much ſmaller.

OLOCENTROS, in *Natural Hiſtory*, a name given by the old Greeks to a ſmall animal of the ſpider kind, whoſe bite was accounted mortal. It is the ſame with the *ſalifuga*, ſo called from its ſtinging, or biting moſt violently, in places, or ſeaſons, where the ſun had the moſt power, as Africa, &c. The name *ſolifuga* was a corrupt way of writing that word, and this ſeems alſo a falſe way of writing the word HELIOCENTROS, which ſignifies the ſame as *ſalifuga*.

OLVAIDIA, in *Botany*, a name given by ſome authors to *chamomile*.

OLY, a word uſed by ſome chemical writers to expreſs the oily part of metals, ſeen, in ſome circumſtances, ſwimming upon the ſurface of their ſolutions.

OLYMPIAD, ὀλυμπιας, in *Chronology*, a ſpace or period of four years; whereby the Greeks reckoned their time. See EPOCHA.

The Peloponneſian war began on the firſt year of the 87th *Olympiad*. Alexander the Great died the firſt year of the 114th; and Jeſus Chriſt was born on the firſt year of the 195th *Olympiad*.

The *Olympiads* were alſo called *anni Iphiti*, from *Iphitus*, who inſtituted, or at leaſt renewed, the ſolemnity of the Olympic games.

We do not find any computation by *Olympiads* after the 364th, which ended with the year of Chriſt 440. Except that in a charter of our king Ethelbert, the years of his reign are ſaid to be reckoned by *Olympiads*.

OLYMPICS, or OLYMPIC *games*, were ſolemn games, which laſted five days, famous among the ancient Greeks; inſtituted, according to ſome, by Hercules, in honour of Jupiter, in the year of the world 2886, and re-eſtabliſhed by Iphitus, 372 years after this period; and held at the beginning of every fifth year, that is, every 50th month, on the banks of the Alpheus, near Olympia, a city of Elia; to exerciſe their youth in five kinds of combats.

Theſe games became ſo conſiderable, that the Greeks made them their epocha; diſtinguiſhing their years by the returns of the *Olympics*.

Thoſe who were conquerors in them, were ſo honoured by their countrymen, that, at their return, a piece of the wall of the city was pulled down to give paſſage to their chariots.

The prize contended for was a crown made of a peculiar ſort of wild olive appropriated to this uſe.

OLYMPIC *fire*. See FIRE.

OLYMPICI, *gli*, the title of the academiſts of Vicenza, in Italy. See ACADEMY.

OLYMPONICES, ὀλυμπονικαι, in *Antiquity*, an appellation given to thoſe who came off victorious in the Olympic games.

The *Olympionices* were infinitely honoured in their country, as being eſteemed to have done it immortal honour. The Athenians particularly were ſo laviſh in their preſents to the *Olympionices*, their countrymen, that Solon found it neceſſary to reſtrain their liberality by a ſpecial law, which imported, that the city ſhould give only 500 drachmas to the *Olympionices*; which amounted to about 58 ounces of ſilver of our weight.

OLYRA, a name given by many botanical writers to the *ſpelt-corn*, the *zea*, and *triticum amylæum*, or *ſtarch-corn* of other authors. This is a ſort of grain cultivated in many parts of Germany: it comes to ripeneſs toward the latter end of autumn, and is uſed for the common food of the poorer ſort of people; it is like the ſpelt wheat, but is ſomewhat leſs nutritive.

In the Linnean ſyſtem of botany, the *olyra* is a genus of the *monœcia triandria* claſs. This genus has male and female flowers; the calyx of the former is a ſingle-flowered, bearded glume; and the glume of the corolla has no beard; the glume of the calyx of the latter is ſingle-flowered, ſpreading, and ovated; the ſtyle is baſid; and the ſeed cartilaginous. There is only one ſpecies.

OMAGRA, a name given by ſome medical writers to the GOUT, when ſeated in the articulation of the humerus with the ſcapula.

OMBRE, a celebrated game at cards; played by two, by three, or by five perſons; but generally by three.

The game of *ombre* is borrowed from the Spaniards; and requires all the phlegm and gravity of that people in the playing.

The name ſignifies as much as *the game of man*; *ombre*, or *hombre*, in Spaniſh, ſignifying *man*; in alluſion to the thought and attention required herein.

In *ombre by three*, nine cards are dealt to each party; the whole *ombre* pack being only 40: by reaſon the eights, nines, and tens are thrown aſide: he that wins muſt take five tricks, or four when the other five are divided, ſo as one have two, and the other three.

After the cards are dealt, if none of the parties think their hand ſtrong enough to attempt for the ſtake or game, they all *paſs*; and, after ſomething put down to the former ſtake, deal over again. If any will attempt for it, he henceforth is called the *ombre*; and the other two become leagued together, like two partners at whiſt, to defend it againſt him.

Note, each has the refuſal of being *ombre*, according to his order of ſeniority.

There are two ways of undertaking for the game: in the firſt, which is the moſt uſual, after chooſing what he will have trumps, he *diſcards*, or lays aſide, what number of his cards he pleaſes, and in their lieu takes an equal number from the remainder of the pack; the like do the other two. The other way is, when he dare truſt to his own hand, and therefore declines to diſcard, or change any cards, but leaves that to the others, which is called playing *ſans prendre*: if he gains the point, in this latter caſe, he reaps ſomewhat extraordinary, more than in the firſt.

If he fail in either caſe, he is ſaid to be *beaſted*: and the failure is called a *remiſe*, or *repaſte*; and if one of the defenders of the ſtake win more tricks than he, ſuch perſon is ſaid to win *codille*, and takes up the ſtake the *ombre* played for: and in both caſes, the *ombre* is to forfeit the value of the ſtake played for, to the board.

If the *ombre* win all the nine tricks, it is called winning the *vole*, and he reaps double; and if he attempt it, and miſcarry, he ſuffers proportionably.

The overſights and irregularities committed in the courſe of the game, are called *beaſts*, and ſubject the perſons chargeable therewith to forfeitures.

As to the order and value of the cards at *ombre*, it is to be obſerved, that the ace of ſpades, called *ſpadille*, is always the firſt or higheſt trump, in whatever ſuit the trump be; the deuce of trumps, when trumps are either of the black colours, or of the ſeven, if of the red, is the ſecond trump, and called *manille*; the ace of clubs, called *baſto*, the third; and if either of the red ſuits be trump, the ace of that ſuit, called *punto*, the fourth. The reſt in the black ſuits are valued according to the following order; viz. king, queen, knave, ſeven, ſix, five, four, and three. In the red ſuits they follow thus; king, queen, knave, deuce, three, four, five, and ſix.

The three firſt, or principal trumps, are called *matadores*; which have this privilege, that they are not obliged to attend an inferior trump when it leads; but, for want of another ſmall trump, the perſon may renounce trumps, and play any other card. Add, that if the three *matadores* be in the hands of the *ombre*, in caſe he be beaſted, he is to forfeit for them; or, if he gain his point, he is to have a conſideration for them; but for nothing leſs than three. And it muſt be further noted, that the trumps immediately ſucceeding thoſe; viz. *punto*, king, *queen*, &c. if they be found in the ſame hand with the former, are alſo reputed as *matadores*, and to be allowed, or forfeited for, like the reſt; and this as low as the ſequence reaches without interruption.

There are ſome varieties in the manner of playing the game of *ombre*. Sometimes he who has *ſpadille* is obliged to play, let his game be ever ſo bad; which is called *forced ſpadille*: ſometimes when all have paſſed, a perſon undertakes the game on condition of diſcard-

ing,

ing, or making up his hand, before he names trump; which is called the *gascarille*.

In *ombre by five*, which some even prefer to that by *three*, as not requiring so much attention; only eight cards a-piece are dealt: and five tricks muſt be won, otherwiſe the *ombre* is *beaſted*.

Here the perſon, who undertakes the game, after naming the trump, calls a king to his aſſiſtance: upon which, the perſon in whoſe hand the king is, without diſcovering himſelf, is to aſſiſt him as a partner, and to ſhare his fate. If between both they can make five tricks, the *ombre* wins; and then the auxiliary king ſhares the ſpoil; and *vice verſa*.

If the *ombre* venture the game without calling in any king, this too is called playing *ſans prendre*; in which caſe the other four are all againſt him, and he muſt win five tricks alone, or be *beaſted*. The reſt is much the ſame as by *three*, *mutatis mutandis*.

OMBRE *de ſoleil*, in *Heraldry*, *ſhadow of the ſun*, is when the ſun is borne in armoury, ſo as that the eyes, noſe, and mouth, which at other times are repreſented, do not appear; and the colouring is thin, ſo that the field may be ſeen through it.

OMBRIA. See BRONTIA, and CERAUNIA.

OMBROMETOR, a machine to meaſure the quantity of rain that falls. We have the deſcription and figure of one in Phil. Tranſ. N° 453. p. 12. It conſiſts of a tin funnel, whoſe ſurface is an inch ſquare, a flat board, and a glaſs tube ſet into the middle of it in a groove. The riſe of the water in the tube, whoſe capacity, at different times, muſt be meaſured, and marked, ſhews the quantity of rain that has fallen.

OMELET, or AMELET, a kind of pancake, or fricaſſee of eggs, with other ingredients, very uſual in Spain and France.

Menage derives the word from the Italian *animella*, *little ſoul*; which, he ſays, that people uſe for the nice bits among the giblets of fowls, &c. uſed for fricaſſees, as livers, hearts, kidneys, gizzards, &c. From whence, by reſemblance, is formed the French *amelette*, *a fricaſſee of eggs*. Tripod derives the word from ἀμα, *together*, and μελω, *to diſſolve*, *moiſten*, *mix*. And M. de la Mothe le Vayer, from the French *œuf*, *egg*, and *meler*, *mingled*.

The forms of *omelets* are various. We meet with farced *omelets*, *omelets* with ſugar, *omelets* of green peas, *omelets à la Turq*, &c.

A noted author in this way preſcribes the following one: the eggs, being beaten, are to be ſeaſoned with ſalt and pepper, and then fried in butter made boiling hot; this done, gravy is to be poured on, and the whole ſtrewed with chives and parſley, ſhred ſmall. When one ſide is fried enough, it is to be turned on the other.

OMELYSIS, a word uſed by Hippocrates, and others of the ancients, to expreſs the meal of barley, crude or not parched. It is recommended, when reduced to the form of a pultice, by boiling in wine and oil, for curing all tumors of the tonſils. It is alſo recommended, mixed in water, to be drank in hæmorrhages of the uterus. Authors of later date have made the word *omelyſis* ſtand for all ſorts of meal or flour, and ſome for an equal mixture of the meal of barley, linſeed, and fenugreek ſeed, in equal quantities; in raddicine uſed for horſes. And Cœlius Aurelianus uſes it frequently for a cataplaſm made either of meal, or bread, and water.

OMEN, a ſign or indication of ſomething future, taken from the mouth of a perſon ſpeaking.

Feſtus derives the word *omen*, from *oremen*, *quod ſit ore*; as being a PRESAGE by the mouth.

OMEN *prærogativum*, among the Romans, was the vote of the firſt tribe or century in their comitia.

When a law, &c. was propoſed, or an election to be made, an urn was brought in to the prieſts there preſent, into which were caſt the names of the tribes, or centuries, or curiæ; as the comitia were either tributa, centuria, or curiata. And the lots being drawn, that tribe, century, &c. whoſe name came up firſt, was called *tribus*, *or centuria prærogativa*, becauſe their voices were aſked firſt. And ſo much did the Romans depend on this prerogative century, that the reſt generally followed them. Hence a perſon who had the voices of the prerogative was ſaid to have *omen prærogativum*.

OMENTA, a word uſed by ſome anatomical writers to expreſs the membranes of the brain.

OMENTUM, in *Anatomy*, a fat thin membrane, ſpread over the inteſtines, and following them in all their ſinuoſities. See *Tab. Anat. (Splanch.) fig.* 2. *lit. g g. fig.* 3. *lit. m m.*

The *omentum* is the ſame with what is otherwiſe called *epiploon*, *caul*, *rete*, *reticulum*, &c.

It reaches from the bottom of the ſtomach (to which it is connected) to the navel, at which it ordinarily terminates; though in ſome ſubjects it goes farther, to 12, upon a rupture of the peritonæum, to fall into the ſcrotum. Beſides the ſtomach, it is faſtened to the concave part of the liver, the backſide of the duodenum, part of the colon, the back, and the ſpleen; its other extremity to the ſmall guts.

Its form reſembles that of a pouch or ſatchel, which may be inflated with a blow-pipe to the capacity of a gallon.

Its ſubſtance is membranous, conſiſting of two leaves, or coats, between which, and on the ſurfaces of which, are innumerable veins, arteries, nerves, and vaſa adipoſa, or fat veſſels, variouſly interwoven, and by their interfections dividing the part into a multitude of little areolæ, reſembling the meſhes of a fine net; whence the name *rete*.

The fat, in its proper ducts, running along with the other veſſels, renders theſe areolæ very obſcure; while the intermediate ſpaces are filled with a tranſparent membrane, full of ſmall holes, ſo that the whole appears a beautiful kind of net.

Its arteries come from the cœliac and meſenterics, and its veins run to the porta, and are called epiploicæ; its nerves are from the intercoſtals.

The fat here, as in the membrana adipoſa, is either brought by the ducts into the adipoſe cells, or elſe delivered from the cells into the ducts; for the fineneſs of the veſſels, &c. renders their courſe exceeding difficult to trace: it is even doubted whether or no they be hollow. Malpighi, and many others, incline to the former opinion, and take the *omentum* to be nothing elſe but a large pouch, full of innumerable little ones, filled with fat; they add, that the ductus adipoſi are real veſſels, ariſing out of the *omentum*, and ſpreading themſelves, by means of the membrana adipoſa, throughout the whole body; diſtributing fat to every part, in the ſame manner as the arteries diſtribute blood. See FAT, and DUCTUS *adipoſi*.

The particular uſe of the *omentum* is to promote the periſtaltic motion of the guts, by lubricating them with its oily ſubſtance, which tranſudes through its pores; and by following them in their doublings and windings, to ſerve them as a bolſter to ſlide upon; and, by filling up their hollows, prevent their being too much diſtended with flatulences, yet giving way to them when replete with aliment. See Hiſt. Acad. Scienc. an. 1725. p. 12. ſeq.

The *omentum* is ſingle in all animals, excepting monkeys, in which it is triple or quadruple.

OMENTUM, *falling down of the*. On large wounds of the abdomen, the *omentum* will frequently protrude itſelf through the wound, either alone, or with ſome portion of the inteſtines. When this is the caſe the firſt buſineſs is to enquire whether the protruded part preſerves its heat, moiſture, and natural colour: if it is not found faulty in any of theſe circumſtances, it muſt be gently returned, but when the ſtraitneſs of the wound forbids this, the protruded part muſt be taken off cloſe to the wound, and the wound healed according to the common form. The *omentum* in this caſe will adhere to the internal part of the wound, without bringing on any diſorder, or inconvenience to the patient. But where the inteſtines fall out at the ſame time, the *omentum* is to be fomented by an aſſiſtant with warm milk and water, till the inteſtines are returned.

If any part of the protruded *omentum* be cold, dry, livid, putrid, or corrupted, the mortified part muſt be entirely cut off before the reſt is returned, leſt the neighbouring parts ſhould be brought into conſent, which would inevitably prove fatal to the patient. The corrupted part is to be taken off in this manner: paſs a waxed thread two or three times round the ſound part of the *omentum*, near the place where it is injured, and faſten it with a knot, to prevent any hæmorrhage from coſuing after the reduction of it; when you have made a ſecure ligature, take off the corrupted part with the knife, or ſciſſars, and return what is ſound, leaving, at leaſt, the length of a foot of the ligature hanging out of the wound of the abdomen, till it ſlips off from the ſound part of the *omentum*. The wound muſt be dreſſed in the common way, the depending part of it being kept open by a large tent: and, at every dreſſing, the ligature muſt be pulled a little gently forward, till it has, at length, entirely ſlipped off from the ſound part of the *omentum*. Heiſter.

OMER, in the *Jewiſh Antiquity*. See CORUS.

OMISSION, in *Rhetoric*. See PARALEPSIS.

OMITTAS, in *Law*. See NON *omittas*.

OMNES, in the *Italian Muſic*, a Latin term, which we ſometimes find uſed for TUTTI, *all*, or *altogether*.

OMNIUM is a term of finance, denoting all the particulars included in the contract between government and the

the public for a loan: ſuch as ſtock at 3 or 4 per cent, lottery tickets at a ſtipulated price, annuities for a certain term, &c.

OMNIUM *ſterum aquæ.* See AQUA.

OMOPHAGI, formed of ὠμος, *crudus*, and φαγω, *I eat*, among the ancient geographers, a name given to certain nations who feed on raw fleſh, as the Scythians, &c.

OMOPHORIUM, formed from ὠμος, *ſhoulder*, and φερω, *I bear*, a little cloak, anciently worn by the biſhops over their ſhoulders, thereby to repreſent the good ſhepherd, who brings home the ſtrayed ſheep on his ſhoulders.

For this reaſon the *omophorium* was put off at the opening of the Goſpels; becauſe then the true ſhepherd, Jeſus Chriſt, was ſuppoſed preſent in perſon.

Some confound the *omophorium* with the *pallium*, worn by the patriarchs: but there was this difference, that the pallium was a long cloak of purple, and was peculiarly reſerved for patriarchs; though ſince given to ſome biſhops, by way of diſtinction.

OMOPLATE, ωμοπλατη, from ὠμος, *ſhoulder*, and πλατυς, *broad*, in *Anatomy*, is uſed, in the general, for the ſhoulder, but more particularly for two bones, ſituate on the hind-part of the upper ribs, one on each ſide; called alſo *ſcapulæ*, and *ſhoulder-blades*. See SCAPULA and SHOULDER.

Theſe bones are broad, and eſpecially in the middle; thick in their apophyſes; of a triangular form, concave within, and convex without; and are joined to the clavicles and arms.

OMOPLATÆ *octavus*, in *Anatomy*, a name given by Spigelius and others to a muſcle, called by Winſlow *the upper portion of the rhomboidalis*; but by Albinus the *rhomboides minor*. What Winſlow calls the lower portion of the rhomboidalis, he calls the rhomboidæus major.

OMOPLATO-HYOIDÆUS, a muſcle called alſo CORACOHYOIDÆUS and *ſcapulohyoidæus*.

OMPANORATE, an appellation given to the prieſts of the iſland of Madagaſcar.

Theſe are the ſchoolmaſters of the country, and teach Arabic and writing. They have ſeveral books, but none of them contain more than ſome chapter of the Alcoran, and a few phyſical recipes.

They are divided into ſeveral orders, bearing ſome reſemblance to our eccleſiaſtical dignities; as *ombiaſſe*, ſecretary or phyſician; *tiben*, ſubdeacon; *moulahzi*, deacon; *faquihi*, prieſt; *catibon*, biſhop; *lumlamaha*, archbiſhop; *empiſſiquili*, prophets or diviners; *fahaba*, caliſ, or the chief of the religion.

The *ompanorates* deal much in taliſmans, and other charms, which they call *hitidzi*, and which they ſell to the grandees of the place. They alſo make little ſtatues, or images, called *auli*, which they conſult as oracles, and to which they aſcribe various powers: as the making rich, deſtroying enemies, &c. They have public ſchools, where they teach their ſuperſtitions and forcileges.

The *empiſſiquili* practice geomancy, and are mainly conſulted on diſeaſes, and the ſucceſs of affairs; reſolving all queſtions by figures drawn on a little table covered with ſand.

OMPHACION, ομφακιον, derived from ομφαξ, *unripe grape*, in *Pharmacy*, the juice of ſour or unripe grapes.

Some have alſo given the name to a kind of oil, pretended to be drawn from olives, while yet green and ſour. But Pomet charges it as an impoſture, adding, that olives yield no oil at all till perfectly ripe.

OMPHACITIS, a name given by naturaliſts to a ſmall ſort of gall of the oak.

OMPHACIUM. See OMPHACION.

OMPHACOMELI, a ſort of *oxymel* made of the juice of unripe grapes and honey.

OMPHALEA, in *Botany*, a genus of the *monœcia triandria* claſs. Its characters are, that it has male and female flowers; the calyx of the former conſiſts of four leaves, and it has no corolla; the receptacle is ovated, and the antheræ joined to it; the latter are the ſame with reſpect to the calyx and corolla as the former; the ſtigma is trifid; and the fruit is a fleſhy three-celled capſule, containing a ſingle ſeed. There are two ſpecies.

OMPHALOCELE, ομφαλοκηλη, formed of ομφαλος, *navel*, and κηλη, *tumor*, in *Medicine*, a kind of hernia, or tumor in the navel, ariſing, like other ruptures, from a relaxation and diſtenſion of the peritonæum, by which either the omentum, or the guts, fall down.

It is otherwiſe called EXOMPHALUS.

Its remoter cauſes are violent ſtrains, loud cries, abundance of ſerous humour, difficult delivery, &c.

OMPHALODES, in *Botany*. See HOUND'S *tongue*.

OMPHALOMANTIA, a word uſed by ſome authors to expreſs a ſort of divination pretended to by the midwives and old women, of telling how many more children a woman is to have, by examining the number of knots on the umbilical cord.

OMPHALO-MESENTERIC, in *Anatomy*. All ſcrufes are wrapped in at leaſt two coats, or membranes; moſt of them have a third, called *allantoides*, or urinary.—Some, as the dog, cat, hare, &c. have a fourth, which has two blood-veſſels; viz. a vein and an artery, called *omphalo-meſenterics*; becauſe paſſing along the ſtring to the navel, and terminating in the meſentery.

OMPHALOPTER, or OMPHALOPTIC, in *Optics*, a glaſs that is convex on both ſides, popularly called a *convex* LENS.

OMPHALOTOMY, ομφαλοτομια, the operation of cutting the navel-ſtring of new-born infants. See UMBILICAL.

OMPHALUS. See ENTEROMPHALUS, EXOMPHALUS, and HYDROMPHALUS.

OMPHALUS, in *Natural Hiſtory*, a term uſed by the ancients to expreſs what they at other times call *umbonulus* in ſtones; that is, a ſmall round and prominent ſpot, in the center of the ſtone.

The ZMILAMPIS, which was a kind of oculus beli found in the Euphrates, had uſually a blue prominent pupil, and this was called *omphalus*, and UMBILICULUS, indifferently, and ſo in other ſtones. The words have both the ſame origin, and are uſed to expreſs its being like the button, or prominent piece, in the middle of a ſhield, called by the Greeks *ompholos*, and by the Latins *umbo*.

OMPHAX, in the *Natural Hiſtory of the Ancients*, the name they gave to a gem of the pellucid kind, and of a diſagreeable greenith colour, with a mixture of yellow.—Pliny, and ſome other old writers, make this a kind of the aqua marine, calling it the *beryllus elegantior*; but the earlier writers very juſtly determined it not to be of the beryl kind, but properly a diſtinct ſpecies of gem; and therefore very properly called it by a peculiar generical name.

ONAGER, in *Natural Hiſtory*, the name given by authors to the *wild aſs*, a creature common in Syria, and ſome other places, and differing very little more from the common aſs, than as creatures in their native wildneſs do from thoſe of the ſame ſpecies kept in ſtables, and brought up to be domeſtic animals. The ſkin of this creature is very robuſt and durable, and makes the common ſhagreen leather uſed by our caſe-makers, &c. its ſurface being rough with ſmall tubercles. See ZEBRA.

ONAGRA, in *Botany*. See PRIMROSE.

ONANIA, and ONANISM, terms which ſome late empirics have framed to denote the crime of ſelf-pollution, mentioned in ſcripture to have been practiſed by Onan, and puniſhed in him with death. Some take it for the ſame with what in other places of ſcripture, particularly Levit. chap. xx. is called *giving of ſeed to Moloch*; for which the puniſhment allotted is ſtoning to death.

This is but ill warranted; the ableſt critics make them quite different things. Selden is poſitive the Jews, in imitation of their neighbours, actually ſacrificed their children to Moloch. Others fancy they only made them paſs between two fires, in order to obtain the idol's favour and protection.

ONCA, in *Zoology*, a ſpecies of the FELIS, in the Linnæan ſyſtem. See JAGUARA.

The *once* of Buffon is ſuppoſed to be the leſſer PANTHER of Oppian, and the panthera of Pliny. It has a large head, ſhort ears, long hair on the whole body; the colour is a whitiſh aſh, tinged with yellow; the head is marked with ſmall round ſpots, and behind each ear is a large black ſpot; the upper part of the neck is varied with large ſingle ſpots, and the ſides of the back with longitudinal marks, conſiſting of ſeveral ſpots; the ſpots on the legs are ſmall and thinly diſperſed; the tail is full of hair and irregularly marked with large ſpots. This ſpecies inhabits Barbary, Perſia, Hyrcania, and China, is uſed for the chace of antelopes and hares, and is as much under command as a ſetting dog, returns as the leaſt call, and jumps up behind his maſter, being carried on the crupper on horſeback.—*Tab.* IV. *Quadrupeds*, N° 42.

ONCOS, ογκος, in *Antiquity*, was uſed to ſignify an ornament of the head, peculiar to thoſe who offered ſacrifice.

ONDEE, in *Heraldry*. See WAVED.

ONDEGGIARE, in the *Italian Muſic*, ſignifies to return the hand beating time, not directly, but by degrees; as *ondeggiare la mano*, to keep it wavering in the air, or giving it two motions, before it is quite liſted up to end the bar, and thence to fall it to beat a firſt, ſecond, or third time, of that or another meaſure.

ONE-*berry*, in *Botany*. See *Herb* PARIS.

ONE-*blade*, in *Botany*. See SMILAX.

ONE-*wheel plough*. See PLOUGH.

ONEIROCRITICA, ὀνειροκριτικὴ, the art of interpreting dreams, or a method of foretelling future events, by means of dreams.

The word is formed from the Greek ὄνειρος, *dream*, and κρίσις, of κρίσεως, *judgment*. Some call it *oneirocratia*, and derive it from ὄνειρος, and κρατέω, *I poſſeſs, I command*.

It appears, from ſeveral paſſages of ſcripture, that there was, under the Jewiſh diſpenſation, ſuch a thing as foretelling future events by dreams; but then there was a particular gift, or revelation, required for that purpoſe.

It ſhould ſeem, hence, that dreams are really ſignificative, and do forebode ſomething to come; and all that is wanting among us is the *oneirocritica*, or the art of knowing what: yet it is the opinion of many, that dreams are mere chimeras; bearing, indeed, ſome relation to what has paſſed, but none to what is to come. As to the caſe of Joſeph, it was poſſible for God, who knew all things, to diſcover to him what was in the womb of fate; and, to introduce that, he might take the occaſion of a dream; not but that he might as well have foretold it from any other accident or circumſtance whatever: unleſs God, to give the matter more weight, ſhould purpoſely communicate ſuch a dream to Pharaoh, in order to fall in with the popular notion of dreams and divination, which then prevailed among the Egyptians. See DREAM.

ONEIROCRITICS, formed from ὄνειρος, *dream*, and κρίσις, *judgment*, a title given to interpreters of dreams, or thoſe who judge of events from the circumſtances of dreams.

There is no great regard to be had to thoſe Greek books called *oneirocritics*; nor do we, indeed, know why the patriarch of Conſtantinople, and others, ſhould amuſe themſelves with writing on ſo pitiful a ſubject.

Rigault has given us a collection of the Greek and Latin works of this kind; one attributed to Aſtrampſichus; another to Nicephorus, patriarch of Conſtantinople; to which are added, the treatiſes of Artimedorus and Achmet. But the books themſelves are little elſe but reveries: a kind of waking dreams, to explain and account for ſleeping ones.

The ſecret of *oneirocriticiſm*, according to them all, conſiſts in the relation ſuppoſed to be between the dream and the thing ſignified; but they are far from keeping to the relations of agreement and ſimilitude; and frequently they have recourſe to others, of diſſimilitude and contrariety.

ONEIROGMOS, a word uſed by the ancients to expreſs *venereal dreams*.

ONEIROPOLI, ὀνειροπόλοι, in *Antiquity*, perſons whoſe buſineſs it was to make predictions from dreams.

ONEIROSCOPI, ὀνειροσκόποι, in *Antiquity*. See ONEIROPOLI.

ONERANDO *pro rata portionis*, a writ which lies for a joint-tenant, or tenant in common, when diſtrained for more rent than the proportion of his land comes to.

ONGLEE, or ONGLE, is uſed by the French heralds to denote the talons or claws of beaſts or birds, when of colours different from the body.

ONIONS, *cepa*, in *Botany*. For the characters, ſee GARLICK. The botanic difference between them being the ſwelling pipy ſtalk of the *onion*, which is much larger in the middle than at either end.

The three ſorts of *onions* propagated for the ſake of their roots for winter uſe, are the Straſburg *onion*, the red Spaniſh *onion*, and the white Egyptian *onion*. Theſe are to be propagated by ſowing their ſeeds in the latter end of February, or beginning of March, in a dry, and ſomewhat ſandy ſoil, yet rich: in about a month's time the plants will appear, and, in a fortnight after that, they will be forward enough for hoeing, which muſt be done with a very ſmall hoe, cutting up all the weeds, and leaving the *onions* two inches aſunder; this ſhould be done in a dry ſeaſon, and the ground will then be clear of weeds for a month. At the end of this time, they muſt be hoed again, and cut to three inches apart; and, a month after this, to ſix inches ſquare, at which diſtance they will thrive well, and grow very large. Towards the middle of Auguſt, the *onions* will have arrived at their full growth, which is known by their blades hanging down, and ſhriveling: and they muſt at this time be pulled up, and ſpread on a dry place, and turned every day, to prevent their ſtriking freſh roots; in a fortnight's time they will be dry enough to houſe, and ſhould be wiped clean, and ſpread thin in an upper loft or garret.

The differences between the ſpecies are not eſſential, as they often degenerate into one another: and even the large Portugal *onion*, after a few years, with us, will loſe itſelf ſo far that no one would imagine it came of that race.

ONION, *Welch*, a ſort of *onions* propagated by gardeners, for the uſe of the table in ſpring: they never make any bulb, and are therefore only to be eaten green in ſallads. They are propagated by ſowing their ſeeds toward the end of July, in beds of a dry, but rich ſoil, about three feet and a half wide; and, in a fortnight after ſowing, they will appear above ground: they muſt be kept carefully cleared from weeds. About October their blades die away, which has occaſioned ſome to think the whole plantation loſt, and to dig up the ground for ſome other uſe; but, if they are ſuffered to ſtand, they will ſhoot up again very ſtrong in January, and from that time will grow very vigorouſly, and reſiſt all weathers, and will be fit to draw for young *onions* in March, and are extremely green and fine, and more valued at market at that ſeaſon than any other kind; but they are much ſtronger than any other *onions*, and have very much of the taſte of garlick.

There are alſo the following ſorts of *onions* cultivated in the kitchen-gardens; viz. the ſhallot, or ESCHALLOT; the ciboule, which according to Miller is the ſame with the Welch *onion*, and the CIVES.

Onions are much eaten, and it would be well if they were yet more ſo; they attenuate tough humours, cleanſe the ſtomach, excite appetite, and promote the natural excretions, particularly expectoration and urine, and in ſome degree the menſes. But they are apt to breed flatulencies, and, if eaten too largely, to affect the head and diſturb the ſleep afterwards, eſpecially with perſons of hot bilious diſpoſitions. They are powerfully antiſeptic, and on this account are recommended as a ſalubrious addition to the food in ſcorbutic caſes.

An *onion* boiled to a perfect ſoftneſs, is recommended by many as a cataplaſm for ripening peſtilential buboes. A freſh cut *onion* rubbed on the part till it become red, and itch, is ſaid to be a cure for baldneſs. A mixture of equal parts of juice of *onions* and ſpirit of wine is eſteemed a cure for deafneſs, a few drops being put at times into the ears. An *onion* cut in two, and macerated an hour in the ſame ſpirit, is a good application for the head-ach. A cataplaſm of roaſted *onions* and butter is an excellent application for the piles.

ONIONS, *ſea*. See SQUILL.

ONION-*ſhell*, in *Natural Hiſtory*, a name given by authors to a peculiar kind of *oyſter*, which is of a roundiſh figure, and very thin and tranſparent, and repreſents very exactly a piece of the peel of an *onion*. See OSTREA.

ONISCUS, in *Ichthyology*, a name given by Athenæus, and others of the Greek writers, to the ACCIPENSER, or STURGEON.

ONISCUS is alſo the officinal name of the WHITING.

ONISCUS, in *Zoology*, is alſo a name uſed by ſome to expreſs the common MILLEPEDES, called in Engliſh *woodlice*, and *ſows*.

It is a genus of the *aptera* inſects in the Linnæan ſyſtem, with fourteen feet, ſetaceous, bent antennæ, a mouth furniſhed with two palpi, the head intimately joined to the thorax, and an oval body; comprehending fifteen different ſpecies.

ONKOTOMY, formed from ὄγκος, *tumor*, and τομὴ, *Icut*, in *Surgery*, the operation of opening a tumor or abſceſs.

ONOBRYCHIS, in *Botany*. See SAINTFOIN.

ONOCENTAURUS, a fabulous animal, ſuppoſed to be a compound of a man and an aſs. Ælian ſpeaks of *onocentaurs*. It was half man and half aſs, as the centaur was half man and half horſe. Lib. vii. cap. 9.

ONOCLEA, *ſenſible polypody*, in *Botany*, a genus of ferns, which has the flowers in two rows, and looking two ways, and the part that ſerves for fructification furniſhed with five valves.

ONOMANCY, or rather ONOMAMANCY, the art of divining the good or evil fortune which ſhall befall a man, from the letters of his name.

The word is ſuppoſed to be formed from the Greek ὄνομα, *name*, and μαντεία, *divination*. Indeed, there is ſomething ſingular in the etymology; for, in ſtrictneſs, *onomancy* ſhould rather ſignify divination by aſſes; being formed from ὄνος, *aſinus*, and μαντεία; to ſignify divination by names, it ſhould be *onomatomancy*.

Onomantia was a very popular and reputable practice among the ancients. The Pythagoreans taught, that the minds, actions, and ſucceſſes of men, were according to their fate, genius, and name; and Plato himſelf ſeems ſomewhat inclinable to the ſame opinion.

One of the great rules of *onomancy*, among the Pythagoreans, was, that an even number of vowels in a name ſignified an imperfection in the left ſide of the man; and an odd number, in the right. Another rule, about as good as this, was, that thoſe perſons were the moſt happy, in whoſe names, the numeral letters, added together, made the greateſt ſum: for which reaſon, ſay they, it was, that Achilles vanquiſhed Hector; the nu-

meral letters in the former name amounting to a greater number than the latter.

And it was, doubtleſs, from a principle much of the ſame kind; that the young Romans toaſted their miſtreſſes at their meetings as often as there were letters in their names. Thus Martial,

Naevia ſex cyathis, ſeptem Juſtina bibuntur.

ONOMATOPŒIA, formed from ὄνομα, *name*, and ποιέω, *fingo, I feign*, in *Grammar* and *Rhetoric*, a figure of ſpeech, whereby names and words are formed, to the reſemblance of the ſound made by the thing ſignified.

Thus is the word *trique-trac* formed from the noiſe made by moving the men at this game: and from the ſame ſource ariſe the *hum* of bees, the *grunting* of hogs, the *cackling* of hens, the *ſtoring* of people aſleep, the *claſhing* of arms, &c.

The fureſt etymologies are thoſe deduced from the *onomatopœia*.

ONONIS, in *Botany*. See REST *Harrow*.

ONOPORDUM, *woolly thiſtle*, in *Botany*, a genus of the *ſyngeneſia polygamia æqualis* claſs; of which Linnæus enumerates four ſpecies.

ONONYCHITES, formed from ὄνος, *aſs*, and ὄνυξ, *hoof*, ſomething that has hoofs like the feet of an aſs.

ONONYCHITES was an appellation which the heathens in the firſt century gave the God of the Chriſtians, becauſe they owned and adored the ſame God with the Jews.—For it was a notion (however it had its riſe), as appears from Tacitus, Hiſt. lib. v. cap. 3. that the Iſraelites, much afflicted with thirſt, were led to a ſpring by an aſs going to drink; and that, in gratitude for the benefit, they worſhipped an aſs; and that the Chriſtians did ſo likewiſe. See Tertull. Apol.

ONOS, in *Ichthyography*, a name given by ſome authors to the ÆGLEFINUS, or common HADDOCK.

ONOS is uſed by Athæneus, and many other of the Greek writers, for the fiſh which we call the HAKE, the *aſellus minor* of authors; called by Bellonius, Geſner, and ſome others, the *merluccius*.

ONOSMA, in *Botany*, a genus of the *pentandria monogynia* claſs; the corolla of which is bell-ſhaped, and yielding four ſeeds. There are three ſpecies.

ONTOLOGY, or ONTOSOPHY, the doctrine or ſcience *de ente*, that is, of being, in the general, or abſtract. See ÆNS.

Ontology coincides with what in the ſchools is more uſually called *metaphyſics*.

ONYCOMANCY, or, as ſome write it, ONYMANCY, derived from ὄνυξ, *nail*, and μαντεία, *divination*, a kind of divination, by means of the nails of the fingers.

The ancient practice was to rub the nails of a youth with oil and ſoot, or wax, and to hold up the nails, thus ſmeared againſt the ſun. Upon them were ſuppoſed to appear figures or characters, which ſhewed the thing required.

Hence, alſo, modern chiromancers call that branch of their art which relates to the inſpection of the nails, *onycomancy*.

ONYX, in *Natural Hiſtory*, the name of a genus of the ſemipellucid gems; the characters of which are, that they have variouſly coloured zones, but none of red, theſe making them ſardonyxes; and that they are formed of cryſtal debaſed, but by a very ſmall admixture of earth, and compoſed either of a number of flat plates, or of a ſeries of coats made by incruſtation round a central nucleus; the different coloured ones being covered with a coat of the baſis or common matter of the ſtone, and ſeparated from one another by, and alternately variegated with, thin veins of that matter, in form of other zones.

As there have been many diſputes about what were properly the gems of the ancients, the *onyx* has not been leſs perplexed than the reſt. The characters here aſſigned them will diſtinguiſh them, however, from all other ſtones; and will not let the careful obſerver eaſily be deceived, when he ſees a ſtone in its rough and native ſtate; but they will not ſo well ſerve the leſs nice enquirer from being impoſed upon in purchaſing *onyxes* when cut and wrought. Our lapidaries ſeem to have had a deſign of baniſhing the diſtinctions of the agate and *onyx* out of the world; for as the zones are the moſt obvious character of the *onyx*, they have found an eaſy way to make pieces cut properly out of maſſes of agates reſemble them. Agates, though never plated or formed of regular zones, are frequently veined in ſtrait narrow lines; and a piece of one of theſe agates cut perpendicularly to the ſite of theſe veins, gives the very figure of the zones of an *onyx*.

The white Gambay agate is what they uſually chooſe for this purpoſe; ſuch pieces of this ſtone as have the black dendritæ in them, when properly cut out from the reſt of the maſs, are their Mocoa ſtones; but other parts of the ſame ſtone, which have not theſe delineations, but have ſtrait cloſe veins, are cut out in a proper direction, and ſold for *onyxes*. Theſe may always, however, be diſtinguiſhed by their wanting the proper degree, purity, and tranſparence; and by this, that the common pale auricular *onyxes*, which are the kind theſe moſt reſemble, have always a peculiar blueiſh caſt, which is not found in theſe counterfeits.

We have four ſpecies of the *onyx* now in uſe among our lapidaries. The firſt is a blueiſh white one, with broad white zones: this was the true *onyx* of the ancients, and is compoſed of a blueiſh white *onyx*, variegated with white and brown zones: it is ſometimes found compoſed of flat and even plates of theſe, laid cloſely on one another, and ſometimes is in form of a pebble, compoſed of a central nucleus of pure cryſtal, or nearly pure, ſurrounded with thoſe cruſts which form the zones. It is very common in the Eaſt Indies, and is found alſo in New Spain, and ſometimes in Germany and Italy, though of much ſmaller value, and leſs brightneſs, hardneſs, and tranſparence.

The ſecond is a very pure *onyx*, with ſnow-white veins, which is exceeding bright and tranſparent, and, though compoſed only of two colours, is inferior to very few of the *onyxes* in beauty. It is always found in the form of a roundiſh pebble, uſually about the ſize of an egg, and compoſed of ſeveral coats of a blueiſh white, and a fine and pure white, laid evenly round a central nucleus of pure but ſhattery cryſtal; the whole is very bright, and the blueiſh part very little leſs tranſparent than pure cryſtal; the nucleus is generally of an angular form, and the coats or zones, being all exactly of the ſame ſhape, make a very beautiful appearance. It is found only in the Eaſt Indies, and is very much eſteemed in Italy, but with us is not ſo much regarded as it deſerves.

The third ſpecies is the *jaſponix*, which ſee under its proper head.

The fourth is the brown *onyx*, with blueiſh white zones. This is a very clear and pure ſtone, but is ſo much leſs beautiful than the other kinds, that, though very common in the Eaſt Indies, it is very ſeldom ſeen or regarded among us. Hill's Hiſt. of Foſſ. p. 490.

ONYX, in *Conchyliology*, the name given by the curious to a ſpecies of VOLUTA, found in cabinets, but never met with in that ſtate on the ſea-ſhores. The true account of this is, that the ſhell in this elegant form owes its appearance to art, having been poliſhed, and having had its outer coat taken off. With this outer coat, which is of a duſky yellow, it is often kept in the ſame cabinet under another name, being then called, by the French, the cierge or wax ſhell.

ONYX, in *Zoology*, a name by which Pliny, and many other of the ancient writers, have called the SOLEN.

ONYX *indicus*, in the *Materia Medica of the Ancients*, a term uſed by the Greek writers to expreſs what is uſually called *unguis odoratus*, or the ſweet hoof. Some call it *onychus indicus*, as particularly Myrepſus, in his antidote of fifty ſpecies. The ſame author mentions the *blatta byzantia*, and tells us that it is not the ſame thing with the *onyx indicus*, but that the Italians called by this name the *os naſi*, or bone of the noſe, of the purple fiſh. What he means by this is probably the bony tongue of that animal, nature having given it ſuch a weapon to pierce the ſhells of thoſe fiſh on which it is to feed.—We frequently find the chamæ, and other ſhell-fiſh, with holes bored through the upper ſhell as exact as if it were done with an inſtrument: this has been done by the purple fiſh, to get at the fleſh of the animal within for food; and the bony tongue, with which this fiſh performs this, is called, by the Italians of thoſe times, *blatta byzantia*. Acharius tranſlates the blatta byzantia of all the earlier writers by the phraſe *os naſi purpuræ*; and the interpreters of the Arabian writers give the ſame name to what they call *unguis odoratus*, or *onyx indicus*, for the Arabian name exactly expreſſes this.

OOROO, a kind of cloth made by the people of Otaheite, and of other iſlands in that neighbourhood, from the bark of the BREAD-FRUIT tree; the proceſs of its manufacture has been explained under the word AOUTA, which is a name given in thoſe countries to another kind of cloth, made of the bark of the paper-mulberry tree, preciſely after the ſame manner.

OOSCOPIA, ὠοσκοπία, in *Antiquity*, a ſpecies of divination, wherein predictions were made from eggs.

OOST, or OAST, in *Huſbandry*, a name given by the people who manure hops, for the kiln in which they dry them after they are picked from the ſtalks. This is a ſquare room, built up of brick or ſtone, ten feet wide, more or leſs, and having a door on one ſide. In the midſt of this room is a fire-place, about thirteen inches wide,

wide, and as much high; and, in length, reaching from the mouth so nearly to the back part of the kiln, that a man has just room to go round it. This fire-place is called a *horse*, and the fire is let out into the room by several holes in the sides, in the same manner as in malt-kilns. Five feet above this is laid the floor, on which the hops are to be laid to dry; and this must have a wall round it of four feet high, to keep the hops from falling out. At one side of the upper bed must be made a window by which to push out the hops, as they are dried, into the room prepared for them. The beds must be made of laths an inch square, placed at a quarter of an inch distance from one another, and supported by beams underneath. The hops are to be poured on this bed with a basket, till the whole is covered half a yard thick with them; when this is done, lay them even with a rake, and let a fire be made in the fire-place below. Some recommend a wood fire, but experience shews that nothing does so well as charcoal; let the fire be kept at the mouth of the furnace, for the air will be carried all the way through; and thus let the hops lie, never stirring them till they are thoroughly dry; when they rattle under the rake, and the inner stalks are brittle, they are sufficiently dried, and are to be pushed out, and a fresh parcel laid in the *east* in their place.

Some people dry their hops in a common malt-kiln, spreading them on a hair-cloth about six inches thick, and now and then turning them till they are all thoroughly dried, then laying them in a heap till they are to be put in the bags. But both these ways are liable to some inconveniencies; the *east* generally over-dries the under ones, by the time that the upper ones are dry enough; and the hair-cloth, and the turning in the other way, breaks and shatters them, and spills many of the seeds. See TUN-*floor*.

OPACITY, in *Philosophy*, a quality of bodies which renders them opake; that is, impervious to the rays of *light*.

The term *opacity* is used in opposition to *transparency*.

Opacity, according to the Cartesians, consists in this; that the pores of the body are not all strait, or directly before each other; or rather not pervious every way.

But this doctrine is deficient: for though it must be allowed, that, to have a body transparent, its pores must be strait, or rather open every way; yet how it should happen, that not only glass and diamonds, but even water, whose parts are so very moveable, should have all their pores open and pervious every way; and, at the same time, the finest paper, or the thinnest gold plate, should exclude the light, for want of such pores, is inconceivable. So that another cause of *opacity* must be found. Now all bodies have vastly more pores or vacuities than are necessary for an infinite number of rays to find a free passage through them in right lines, without striking on any of the parts themselves: for since water is nineteen times lighter, i. e. so much rarer than gold; and yet gold itself is so very rare, that magnetic effluvia pass freely through it, without any opposition; and quicksilver is readily received within its pores, and even water itself by compression; it must have much more pores than solid parts: consequently, water must have, at least, forty times as much vacuity as solidity.

The cause, therefore, why some bodies are opake, does not consist in the want of rectilinear pores, pervious every way; but either in the unequal density of the parts, or in the magnitude of the pores; and their being either empty, or filled with a different matter; by means whereof, the rays of light, in their passage, are arrested by innumerable refractions and reflections, till falling at length, on some solid part, they become quite extinct, and are utterly absorbed.

Hence cork, paper, wood, &c. are opake; while glass, diamonds, &c. are pellucid. For in the confines or joining of parts alike in density, such as those of glass, water, diamonds, &c. among themselves, there arises no refraction or reflexion, by reason of the equal attraction every way; so that such of the rays of light, as enter the first surface, pass strait through the body, excepting such as are lost and absorbed, by striking on solid parts: but in the bordering of parts unequal in density, such as those of wood and paper, both with regard to themselves, and with regard to the air or empty space in their larger pores, the attraction being unequal, the reflexions and refractions will be very great: thus the rays will be unable to pass through such bodies, being continually driven about, till they become extinct.

That this interruption or discontinuity of parts is the chief cause of *opacity*, sir Isaac Newton argues, does appear hence; that all opake bodies immediately begin to be transparent, when their pores become filled with a substance of equal, or almost equal, density with their parts. Thus paper dipped in water or oil, the stone called *oculus mundi* steeped in water, linen-cloth dipped in oil or vinegar, and other substances soaked in such fluids as will intimately pervade their little pores, become more transparent than before.

On the contrary, the most transparent substances, by emptying their pores, or separating their parts, may be rendered very opake. Thus salts, or wet paper, or *oculus mundi*, by drying; horn, by scraping; glass, by pulverizing, or flawing; and water itself, by being beat into bubbles or froth; are rendered opake.

Indeed, to render bodies opake, and coloured, their interstices must not be less than of some determinate size: for the most opake bodies that are, if their parts be very minutely divided, as when metals are divided in acid menstruums, become perfectly transparent.

OPAH, or *king-fish*, in *Ichthyology*, a species of fish, common on the coast of Guinea; it is smooth-skinned, without scales or teeth; it has one erect fin on its back, which rises below its neck, and reaches almost to its tail; there is also on each side, behind the gills, a fin; and a pair of fins a little before the vent under its belly; from behind the vent runs one fin within a little of the tail; and the tail-fin is large and forked; the eyes of this fish are large, the irides scarlet, encompassed with a circle of a gold colour, verged with scarlet; its nostrils are placed above its eyes; the upper part of the body is of a dark blue, or violet colour; this, and the sides which are of a bright green, are speckled with oblong white spots; the cheeks of a pale red; the nose, gills, and belly of a silver colour; and all the fins of a bright scarlet; the mouth is small, the tongue thick, and resembling a human tongue, but thick set with prickles, which are pointed backwards, and which seem to serve instead of teeth for retaining its prey or food. The fish from which this description is taken, was three feet seven inches long, and three feet ten inches round in the thickest part, and weighed eighty-two pounds; the flesh of the fore-part was firm, and had the appearance of beef, and the hinder part like fine veal. Phil. Trans. vol. xlvi. p. 518.

See *Tab.* III *Fishes*, N° 30.

OPAL, *opalus*, in *Natural History*, a precious stone, of various colours; changeable according to the different position of the stone to the light.

It is generally classed among the siliceous earths, although some specimens are so soft as to be capable of being scratched with a knife.

The *opal* is a gem of a very peculiar kind, and has been esteemed by many, in all ages, of very great value; though, at present, it is of less price, in proportion to its size, than any other of the finer gems. The Romans esteemed it the fourth gem in value; and its singularity, as well as beauty, seem very well to entitle it to at least that rank; it is softer than any other of the gems, and is with difficulty polished to any degree of nicety: its most frequent size is between that of a pea, and a horse bean, but it is found as small as the head of a large pin, and up to the size of a walnut; its figure is very various and uncertain, but it is never found in a columnar or crystalliform state; its most usual figure is an irregularly oblong, flatted at the bottom, and convex at the top, and dented with various sinuosities on the sides. There have been found some of the regular shape of a kidney, and others almost perfectly round, and, not unfrequently, it is met with in thin flat pieces. It is often found loose among the earth of mountains, sometimes on the shores of rivers, and not unfrequently bedded in the coarser kinds of jasper, ten or twenty *opals*, of different sizes and colours, being frequently found in one stone.

It is naturally of a smooth surface, and fine gloss; and many of the finest *opals* that have been seen, have been worn with their native polish; its colour, as it appears in a fine specimen, is of so mixed a nature as not to be easily described, but is best expressed by comparing it with the finest sort of mother of pearl; it differs, however, greatly from that in its superior lustre and brightness, and in being so pellucid that one may see deep into the stone. As it is variously turned about, it shews the colours of all the other gems, yellow, red, blue, green, purple, and a milky grey: when the stone is broken, most of these colours disappear, which shews that they arise by reflexion from one or two principal ones. The last of these colours is the native dye of the stone, and it has many of the others in a superior beauty even to the gems to which they naturally belong, particularly the fire-colour of the carbuncle, which seems in the *opal* to lie deep in the body of the stone. It is the most difficult to counterfeit of all the gems; and this is done by a very fine, and well chosen piece of some pearly shell. It is sometimes found wanting one or more of the colours,

and

and ſometimes of a deep bluiſh black, with no other colour viſible on changing the light, but a deep red, which is very ſtrong and glowing, and makes it a very beautiful ſtone: ſometimes it has alſo a general yellowiſh caſt, and ſometimes a greyiſh one, which greatly impair the reflections of the other colours, and injure the ſtone.

It is found in Ægypt, and Arabia, and in ſome parts of the Eaſt Indies, and in Europe. The oriental ones are the fineſt, but thoſe of Bohemia are often very beautiful. Hill's Hiſt. of Foſſ. p. 600.

To imitate this gem in natural cryſtal, uſe the following method: take yellow orpiment, and white arſenic, of each two ounces, crude antimony, and ſal ammoniac, of each one ounce; powder all theſe, and mix them well together; put this powder into a large crucible, and lay upon it ſmall fragments of cryſtal, and, upon theſe, other larger pieces of cryſtal; fill up the crueible with theſe, and lute on to it another crucible inverted, with a hole at the bottom as big as a ſmall pea: when the lute is dry, ſet the veſſels in a quantity of charcoal in a large chimney, covering them up with coals to the middle of the upper crucible; ſo long as the materials fume out at the hole, keep up a ſtrong fire; when that is over, let the fire go out of itſelf; and then unlute the crucibles; the greateſt part of the cryſtal will be found tinged to the colours of various gems; not only the *opal*, which will be very fair and beautiful, but the topaz, and ruby colour will be ſeen in others.

A compoſition of ſemi-tranſparent white glaſs and paſte, reſembling the *opal*, may be formed by taking of the compoſition for hard GLASS, or PASTE, deſcribed under thoſe articles, ten pounds, and of horn, bone, or ivory, calcined to a perfect whiteneſs, half a pound: grind them well together, and fuſe them with a moderate heat.

OPALIA, in *Antiquity*, feaſts celebrated at Rome in honour of the goddeſs Ops.

Varro ſays, that they were held three days after the expiration of the Saturnalia: according to Macrobius they were held on the nineteenth of December, which was one of the days of the Saturnalia. He adds, that thoſe two feaſts were celebrated in the ſame month, becauſe Saturn and Ops were huſband and wife; and that it is to them we owe the invention of corn and fruits: for which reaſon, the feaſt was not held till the harveſt and fruit-time was entirely over.

The ſame author obſerves, that the vows offered to the goddeſs were made ſitting on the ground; to ſhew, that ſhe was earth, the mother of all things.

OPALIN. See MAGNESIA *Opalina*.

OPEN *flank*, in *Fortification*, is that part of the flank which is covered by the orillon.

OPEN *fire*. See FIRE, and REVERBERATORY.

OPEN *fountain*. See FOUNTAIN.

OPEN *ground*. See FOUND.

OPENING *a vein*. See PHLEBOTOMY.

OPENING *of trenches* is the firſt breaking of ground by the beſiegers, in order to carry on their approaches towards a place. See TRENCH.

OPENING *of gates*, in *Aſtrology*, is when one planet ſeparates from another, and preſently applies to a third, bearing rule in a ſign oppoſite to that ruled by the planet with which it was before joined.

OPENING *the mouth*. See MOUTH.

OPERA, a dramatic compoſition, ſet to muſic, and ſung on the ſtage, accompanied with muſical inſtruments; and enriched with magnificent dreſſes, machines, and other decorations.

Bruyere ſays, that it is eſſential to the *opera* to keep the mind, the eyes, and ears, in an inchantment. St. Evremond calls the *opera* a chimerical aſſemblage of poetry and muſic; where the poet and muſician mutually cramp each other.

The *opera* we derive from the Venetians, among whom it is held one of the principal glories of their carnival. Riccoboni dates the public exhibition of *operas* from the year 1637, when the *opera* of Andromache was performed at the theatre of St. Caſſan, at Venice. Meneſtrier aſcribes the invention of it to Johannes Sulpitius, a native of Veroli, in the Campania di Roma, towards the end of the 15th century. Creſcimbeni aſcribes it to Emilio Cavaliere, who, in 1590, exhibited, in the palace of the grand duke, at Florence, two dramas of the paſtoral kind, ſet to muſic. Others ſay, that it was invented by Ottavio Rinuccini, a native of Florence; and that his firſt compoſition of this kind was a paſtoral called Daphne, which was ſucceeded by his Eurydice: and that this latter was repreſented on the theatre at Florence, in 1600, upon occaſion of the marriage of Mary de Medicis, with Henry IV. of France. See Hawkins's Hiſt. of Muſic, vol. iii. p. 424, &c.

While the Engliſh and French comic and tragic threatres were forming, the Venetians invented the *opera*: the abbot Perrin, introductor of ambaſſadors to Gaſton, duke of Orleans, was the firſt who formed the deſign of introducing it into Paris; and he obtained the king's privilege for the ſame in 1669; and it was not long before it paſſed thence into England. The author of the Spectator obſerves, that the French muſic agrees with the accent and pronunciation much better than the Engliſh; and they are at the ſame time, better calculated for the gay humour of that people.

At Rome they had a kind of *ſpiritual operas*, frequent in Lent; conſiſting of dialogues, duos, trios, ritornellas, choruſes, &c. the ſubject whereof is taken out of Scripture, the life of ſome ſaint, or the like. The Italians call them *oratorios*. The words are frequently Latin, and ſometimes Italian.

OPERA-*glaſs*, in *Optics*, is ſo called from its uſe in playhouſes, and ſometimes a *dioptral perſpective*, from its conſtruction, which is as follows. ABCD (*Tab.* V. *Optics*, *fig.* 84.) repreſents a wooden tube about four inches long; in each ſide of which there is a hole EF and GH, exactly againſt the middle of IK a plane mirror, which reflects the rays falling upon it to the convex glaſs LM; through which they are refracted to the concave eye-glaſs NO, whence they emerge parallel to the eye at the hole *r s*, in the end of the tube. Let P *a* Q be an object to be viewed, from which proceed the rays P *c*, *a b*, and Q *d*: theſe rays, being reflected by the plane mirror IK, will ſhew the object in the direction *e p*, *b a*, *d q*, in the image *p q*, equal to the object PQ, and as far behind the mirror, as the object is before it: the mirror being placed ſo as to make an angle of 45 degrees, with the ſides of the tube. And as in viewing near objects it is not neceſſary to magnify them, the focal diſtances of both the glaſſes may be nearly equal; or if that of LM be three inches, and that of NO one inch, the diſtance between them will be but two inches, and the object will be magnified three times, which is ſufficient for the purpoſes to which this glaſs is applied.

If the object be very near, as XY, it is viewed through a hole *s r*, at the other end of the tube AB, without an eye-glaſs; the upper part of the mirror being poliſhed for that purpoſe, as well as the under. The tube unſcrews near the object-glaſs LM, for taking out and cleanſing the glaſſes and mirror. The peculiar artifice of this glaſs is to view a perſon at a ſmall diſtance, ſo that no one ſhall know who is obſerved; for the inſtrument points to a different object from that which is viewed, and as there is a hole on each ſide, it is impoſſible to know on which hand the object is ſituated, which you are viewing. The poſition of the object will be erect through the concave eye-glaſs. See POLEMOSCOPE.

OPERATION, in the *general*, the act of exerting, or exerciſing ſome power, or faculty, upon which an effect follows.

The moſt noble *operation* of man is that by the ſchoolmen called *vital*, or *immanent*; viz. the *operation* of the mind; which, with regard to the underſtanding, is threefold; apprehenſion or perception, diſcretion or judgment, and reaſoning or diſcourſe.

The directing of theſe makes the object of LOGIC.

With regard to the will, the immanent *operations* are willing and nilling; to which are referred loving and hating.

OPERATION, in *Medicine*, denotes a methodical action of the hand, on the human body; in order to re-eſtabliſh health.

Bleeding is a very common, but, at the ſame time, a dangerous *operation*.

Trepanning is one of the fineſt *operations* in ſurgery.

The Cæſarean *operation* is the cutting open a woman with child, and drawing out the child through the aperture.

The other chirurgical *operations* are ſutures, tapping, caſtrating, cutting for the fiſtula, amputation, extirpation, cupping, &c. See SUTURE, &c.

OPERATION, *high*. See HIGH and LITHOTOMY.

OPERATION, *lateral*. See LITHOTOMY.

OPERATION is more particularly uſed in medicine, for the means whereby any remedy produces its ſalutary effect; or that ſeries of actions, mediate and immediate, whereby its remote end is attained.

See the *operations* of each kind of medicines under the proper heads, SPECIFICS, PURGATIVES, EMETICS, DIURETICS, &c.

OPERATION, in *Chemiſtry*, denotes the proceſſes, or experiments, by means whereof the proper changes are produced in bodies, and the effect of the art procured.

The changes chemiſtry produces in bodies, are reducible to two kinds; viz. an union of parts, and a ſeparation thereof:

thereof: thus chemistry either separates spirits, salts, oils, &c. or compounds them together.

A chemical *operation*, then, consists in changing the situation of the parts; particularly, either in moving some parts, but not the whole, which is called *separating*; or, in adding new parts, which is called *uniting*.

All chemical *operations*, therefore, are reducible to two general kinds; viz. such whereby the parts of bodies, before joined or united, are separated, which the ancient chemists called *solution*; and such whereby the parts, before disjoined, are combined, or united, called *coagulation*.

Some, however, object digestion as a third species of *operation*, not reducible to either of them; but Boerhaave shews, that it is a composition of both.

Most chemists, however, look on this division as scarce accurate and minute enough, and subdivide the art into a number of particular or subordinate *operations*; as CALCINATION, VITRIFICATION, DISTILLATION, SUBLIMATION, COHOBATION, AMALGAMATION, FERMENTATION, PUTREFACTION, &c.

OPERATION, in *Theology*, is used for the actions, both of the Word and the man, in Jesus Christ. See PERSON. The orthodox teach, that there are two *operations* in Jesus Christ, the one divine, the other human; and not one *theandric operation*, as was the doctrine of the Monothelites and Monophysites.

OPERATOR, in *Medicine*, &c. a person who operates, or works with the hand, on the human body, to preserve or restore its health.

We say an *operator for the stone*, meaning a lithotomist, or a person who cuts.

OPERATOR *for the eyes* denotes a person who couches cataracts, &c.

OPERATOR *for the teeth* signifies a tooth-drawer, &c. See TEETH.

OPERCULUM, in the *History of Shell-fish*, denotes the cartilaginous cover, with which nature has furnished the mouths of the univalve water-shells; for as to the land ones, they have only a viscid liquor to supply the place of an *operculum*.

OPHIASIS. See ALOPECIA.

OPHICARDELON, in *Natural History*, the name of a gem mentioned by Pliny, which, he says, was a black stone covered at top and bottom with white: this seems, without all doubt, to have been the *camea* of our jewellers.

OPHIDION, in *Ichthyology*, the name of a fish of the eel kind, and resembling the common eel, and conger, in shape, but that it is shorter in proportion to its thickness, and more flatted, and of a paler colour; it seldom exceeds eight inches in length, and the back is grey, and the sides of a bright silver colour; it is clothed with small scales, which are long and narrow, and are not placed like tiles hanging over one another, as in other fishes, but only scattered here and there, and laid in no order; the mouth is large, and the jaws are furnished with very small teeth, and, beside these, with three small eminences set with the like teeth; the one on the roof of the palate, the others lower on each side; the eyes are large, and it has one pair of fins near the gills; it is a very delicate fish, and is caught in great plenty in the Mediterranean, and sold at Venice, and other places.

The name *ophidion* is given by Artedi to a genus of fishes, the characters of which are these: they are of the malacopterygious, or soft-finned kind; the body is oblong, and of a cylindric figure, and has three fins. The species of this genus are properly only two, distinguished by the cirri, or beards; the first is the *ophidion* with four cirri growing from the lower jaw: this is the *ophidion* of authors. The second is the *ophidion* without cirri: this is found in the Baltic.

OPHIOBORUS, in *Natural History*, a name given by the ancients to a species of carnivorous fly, which feeds on the bodies of beetles, or other flies, or on the flesh of dead serpents. Its wings are of the colour of polished brass, whence it was also called by the Greeks *chalcomuia*, the *brass-fly*.

OPHIOGLOSSUM, in *Botany*. See ADDER's *Tongue*.

OPHIOMANCY, Ὀφιομαντεία, compounded of ὄφις, *a serpent*, and μαντεία, *divination*, in *Antiquity*, the art of making predictions from serpents. Thus Calchas, on seeing a serpent devour eight sparrows with their dam, foretold the duration of the siege of Troy. And the seven quoils of a serpent that was seen on Anchises's tomb, were interpreted to mean the seven years that Æneas wandered from place to place before he arrived in Latium. Thus, Virgil, Æn. lib. v. ver. 85.

Septem enim gyros, septena volumina traxit.

OPHIOMORPHITES, in *Natural History*, the name given by some authors to the fossils called more usually CORNU *Ammonis*; which are composed of several wreaths, rolled in a spiral form over one another, and resemble a snake when rolled up. These are found of prodigious sizes, some not less than the fore-wheel of a chariot. They are evidently formed from some sea-shell, the shelly matter remaining on some of them, and all being composed of several cells, communicating with one another by means of a siphunculus, in the manner of those of the nautilus.

OPHIOPHAGI, in *Natural History*, a name given by some to the *eagle vulture*, and some other birds of prey which are sometimes seen to feed on serpents.

Pliny gives the name *ophiophagi* to a certain people of Æthiopia, whom he describes as very barbarous and savage, going always naked, and feeding on serpents, whence the appellation. Solinus, who generally copies Pliny, but imperfectly, has perverted his meaning strangely in this passage, having placed the *ophiophagi* in Arabia Felix, instead of Æthiopia.

OPHIORRHIZA, in *Botany*, a genus of the *pentandria monogynia* class: the corolla of which is funnel-shaped; the germen is bifid; the stamina are two, and the fruit has two lobes. There are two species.

OPHIEXYLON, in *Botany*, a genus of the *polygamia monoecia* class: the flowers are hermaphrodite and male; the calyx of the former as well as the corolla are divided into five segments, and the corolla is funnel-shaped; it has five stamina, and one pistil; the calyx of the latter is bifid; the corolla divided into five segments, funnel-shaped, and furnished with a cylindric nectarium; it has two stamina. There is only one species.

OPHITES, Ὀφίτης, in *Natural History*, a sort of variegated marble of a dusky green ground, sprinkled with spots of a lighter green; otherwise called *serpentine*.

It is thus called from the Greek ὄφις, *serpent*; because its spots resemble those of that animal.

The ancients knew three species of this kind, which they call the black, the white, and the grey *ophites*, and this last also frequently *tephria*; and allowing these spotted variegations to be the characters of an *ophites*, we have, beside these, two others known at this time.

The other two *ophitæ*, which seem not to have been known to the ancients, are, 1. A greyish brown one with green spots. It is frequent in Ægypt, and Arabia; and is said to have been dug in England. The second is a pale grey one, with green spots and veins. It is very hard, and capable of an elegant polish. It is frequent in Germany, and tables are made of the larger pieces, and vases of the smaller ones. It is said also to be found in England.

OPHITES, in *Ecclesiastical History*, is also the name of a sect of ancient heretics, who sprung out of the Gnostics, in the latter end of the second century; so called from their worshipping the serpent that seduced Eve.

This serpent, they taught, was instructed thoroughly in all knowledge; and they make it the father and author of all the sciences.

On which principle they founded a thousand chimeras; part of which may be seen in St. Epiphanius. See GNOSTIC.

They said this serpent was the Christ; that he was very different from Jesus born of the Virgin, into whom, said they, the Christ descended; and that it was this Jesus, not the Christ, that suffered. Accordingly, they made all those of their sect renounce Jesus to follow Christ.

In consequence of this opinion, they nourished a certain number of serpents, which they looked upon as sacred, and to which they offered a subordinate kind of honour and worship.

The Sethians, or Sethites, mentioned by Theodoret, were either the same with the *Ophites*, or very little different from them.

The leader of this ridiculous sect was one Euphrates; it had its origin among the Jews, and was of a more ancient date than the Christian religion. A part of its followers embraced the Gospel, while the other retained their primitive superstition; and from hence arose the division of the *Ophites* into Christian and antichristian.

OPHITICUS, in *Astronomy*, a constellation of the northern hemisphere; called also SERPENTARIUS.

OPHRYS, in *Botany*. See TWYBLADE.

OPHTHALMIA, Ὀφθαλμία, in *Surgery*, a disease of the eyes; properly, an inflammation of the tunica adnata, or conjunctiva; accompanied with a redness, swelling, heat, and pain.

The word is formed from the Greek ὀφθαλμὸς, *eye*. Celsus calls the *ophthalmia*, *lippitudo*, by reason of a gum sticking to the eye-lids in this disease, which the Latins called *lippa*.

The *ophthalmia* is either *moist*, or *dry*: in the first, there is a shedding of tears; in the second, none at all.

It sometimes happens in the *ophthalmia*, that the two eye-lids are so distorted, that the eye continues constantly

open, without being able to ſhut; which is called *χαυωσις*; ſometimes the eye-lids are ſo faſtened together, that the eye cannot be opened, which they called *φιμωσις*, q. d. cloſure of things that ſhould be open.

The immediate cauſe of the *ophthalmia* is the blood flowing in too great abundance in the little veſſels of the adnata, ſo as to ſtagnate therein, and by that means diſtend them. The remote cauſes are the ſame with thoſe of other inflammations.

This diſeaſe may be occaſioned by external injuries; by the ſtoppage of cuſtomary evacuations; by long expoſure to the night air; by watching, and reading or writing much by candle-light; by drinking ſpirituous liquors; by exceſs of venery; by the acrid fumes of metals; by a venereal taint; and by a ſcrophulous or gouty habit. The diſeaſe is ſometimes epidemic, eſpecially after wet ſeaſons; and Dr. Buchan obſerves, that he has frequently known it to prove infectious. It may be alſo occaſioned by a moiſt air, or living in low, damp houſes. In children, it often proceeds from imprudently drying up ſcabby heads, a running behind the ears, or other ſimilar diſcharges: and it often ſucceeds the ſmall-pox or meaſles, eſpecially in children of a ſcrophulous habit. A ſlight inflammation of the eyes, eſpecially from an external cauſe, is eaſily cured; but when the diſeaſe is violent, and continues long, it often leaves ſpecks upon the eyes, or dimneſs of ſight, and ſometimes ends in total blindneſs.

Snow, applied to the afflicted eye, is reputed a good remedy for the *ophthalmia*: the Ephemerides of the Leopoldine academy mention an *ophthalmia* cured by applying cow's dung, while hot, between two linen cloths, to the eye. A fox's tongue, and the fat and the gall of a viper, are empirical preſervatives againſt the *ophthalmia*. The cure of *ophthalmias*, according to the modern practice, depends chiefly on the due repetition of purgatives: if theſe fail, recourſe is had to veſicatories, iſſues, ſetons, &c. though Pitcairn preſers bleeding; it being his obſervation, that no diſeaſe requires copious bleeding ſo much as the *ophthalmia*.

This inflammation, ſays Mr. Warner, ſhould be removed as ſoon as poſſible, by taking blood in proper quantities from the temples by leeches, or the lancet, or from one of the external jugular veins; or from the arm or foot, and occaſionally repeating it. Cupping in the head, neck, or between the ſhoulders is adviſeable, when the patient will not ſubmit to the uſe of leeches or the lancet: and bliſters are likewiſe proper applications. Dr. Buchan recommends a ſeton in the direction of the ſpine, and in the middle between the ſhoulder-blades, which may be dreſſed twice a day with yellow baſilicon. The loſs of blood, Mr. Warner obſerves, when aſſiſted by mercurials given in proper doſes alone, or mixed with ſmall quantities of opium, will, with the farther aſſiſtance of cooling purges, adminiſtered at proper intervals, be found of the utmoſt conſequence. The quantity of mercury, and the ſtrength of the purges muſt be adapted to the age and ſtrength of the patient; and repeated every ſecond or third night, and on the ſucceeding morning, as may be found neceſſary. On the intermediate days, antiphlogiſtic medicines ſhould be preſcribed, together with a ſtrict regimen in diet; and opiates ſhould be uſed occaſionally: and this treatment ſhould be continued, till there is a remiſſion of pain, fever, and reſtleſſneſs: then, and generally not before, the bark, in infuſion, decoction, or ſubſtance, mixed with ſomething opening, if neceſſary, ſhould be given more or leſs frequently, according to the ſymptoms and appearances. During the inflamed ſtate of the eyes, the patient ſhould be kept in the dark, and nothing painful or ſtimulating ſhould be applied to them: but fomentations of the ſofteſt kind ſhould be uſed two or three times a day, or oftener, if neceſſary. Soft cooling ointments, and emollient relaxing cataplaſms, will be found uſeful in many circumſtances of this diſeaſe; taking heed at the ſame time, not to bandage down the eye-lids for a longer time than is neceſſary, leſt this confinement ſhould obſtruct a freedom of circulation in the minute veſſels of the eye and its coverings, and prevent the tears and ciliary ſecretions from being properly ſecreted and diſcharged. When the inflammation diſappears, and in ſome caſes before it has quite diſappeared, Mr. Warner recommends lotions that are cooling, and moderately aſtringent, ſuch as are compoſed of a ſolution of ſaccharum ſaturni, or of the pulvis e ceruſſa comp. or of the extractum ſaturni, to be uſed two or three times a day, till the eyes reſume their natural ſtrength and colour. Aſtringent ointments may be ſometimes rubbed upon the internal ſurface of the edges of the eye-lids; but eye-waters are, in moſt caſes, preferable to theſe ointments. If the inflammation of the eyes be joined with a venereal, ſcrophulous, or ſcorbutic habit of body, it will be neceſſary to recur to the uſe of mercurius dulcis ſublimatus, merc. calcin. pil. plum. the extract of hemlock, alkaline abſorbents, decoctions of the woods prepared in lime-water, or common water, and the Peruvian bark in ſubſtance. Warner on the Eye, p. 47, &c. Mr. Ware, in his remarks on the *ophthalmy*, &c. 1780, recommends the application of the Thebaic tincture of the London diſpenſatory; compoſed of opium and warm aromatics, digeſted in mountain wine. Two or three drops of this tincture are applied to the naked eye, by dropping them from a vial, once or twice a day, as the ſymptoms are more or leſs violent. A ſharp pain is excited, ſucceeded by a copious flow of tears, which continue a few minutes, and gradually abate; and after this the patient is eaſy: the inflammation is often abated by one ſingle application; and many bad caſes, ſays Mr. Ware, have been completely cured by it in leſs than a fortnight, after every other kind of remedy had been uſed for weeks, and ſometimes months, without ſucceſs. The powers of electricity have been ſucceſsfully applied to a very obſtinate inflammation of the eyes: when the eyes of the patient had been electrified three days with the inſtrument deſcribed under GUTTA *ſerena*, the inflammation began viſibly to abate, and in a fortnight's time quite ſubſided; but the pupil of the eye was ſo nearly cloſed, that ſcarce any of it could be ſeen. He continued to be electrified every day for five weeks, and the pupil gradually dilated, till he attained a degree of ſight ſufficient to diſtinguiſh objects at ſome diſtance. The pain left him, and he omitted the uſe of electricity, without experiencing any farther inconvenience.

Thoſe that are liable to frequent returns of this diſorder, ought conſtantly to have an iſſue in one or both arms. Bleeding or purging in the ſpring and autumn will be alſo very beneficial. Such perſons ought to live regularly, avoiding ſtrong liquor, the night air, and late ſtudies. Pitcairn, and ſome others, diſtinguiſh an *external* and *internal ophthalmia*; the firſt in the adnata, which is that hitherto ſpoken of; the ſecond in the retina. The ſymptoms or indications of the latter, are muſcæ volitantes, duſt ſeeming to fly in the air, &c.

This, when inveterate, degenerates into a GUTTA *ſerena*, or AMAUROSIS.

OPHTHALMICS, medicines proper for diſeaſes of the eyes.

Such are *ophthalmic* waters. See WATER. *Ophthalmic* powders, ointments, &c. There is an excellent *ophthalmic* prepared of ſaccharum ſaturni.

OPHTHALMIC *nerves*. The fifth pair of nerves of the brain, dividing into three branches; the firſt is called *ophthalmic*, becauſe *it goes to the eye*. This, again, ſubdivides into two branches, after ſending out ſeveral twigs, which encompaſs the optic nerves, and are diſtributed into the choroides. See NERVES.

OPHTHALMOGRAPHIA, formed from *οφθαλμος*, *eye*, and *γραφω*, *I deſcribe*, that branch of anatomy which conſiders the ſtructure and compoſition of the EYE, the uſe of its parts, and the principal effects of viſion.

Our countryman, Dr. William Briggs, has publiſhed an excellent *ophthalmographia*, and Plempius another.

OPHTHALMOSCOPIA, that branch of phyſiognomy which conſiders a perſon's eyes and looks; to deduce thence the knowledge of his temperament, humour, and manners.

OPIATE, OPIATUM, in *Medicine*, is ſometimes applied to any confection, or electary.

In which ſenſe it is defined an internal remedy, variouſly compoſed of powders, pulps, liquors, ſugar, or honey, reduced into a ſoft conſiſtence.

The *opiate* of Solomon is a compoſition of great fame, ſo called from one Solomon, a phyſician, its inventor; and firſt publiſhed by Laurence Joubert.

There is a particular kind of *opiates*, called *incorporating*, for the teeth and gums, made of alum, ſumach, lignum aloes, myrrh, maſtic, &c. reduced into powder.

OPIATE is alſo uſed for any medicine given with an intention to procure ſleep.

In which ſenſe the word is of the ſame import with *narcotic*, *hypnotic*, *ſoporific*, or *paciſic*.

OPIATE is more particularly uſed for a compoſition, wherein opium is an ingredient.

The operation of *opiates*, or the manner wherein they produce their effect in the body, Dr. Quincy thus lays down: all pain is a ſtimulus on the part affected, and is attended with contractions of the pained membrane, which occaſion a greater afflux than ordinary of the nervous juice that way: on the other hand, pleaſure, or a delightful ſenſation in any part, is accompanied with a ſmooth undulation, and eaſy reflux of the nervous juice towards the brain. This is, as it were, the entertainment of the mind; with which being taken up, it doth not determine the ſpirits to the organs of motion; that is, there is ſuch a relaxation of the muſcular fibres, and ſuch

ſuch a diſpoſition of the nervous fluid, as is neceſſary to ſleep.

Now, it is ſhewn, that an agreeable ſenſation produced in the ſtomach, together with a diſtention of its membranes, is the immediate cauſe of that ſleepineſs, to which we are inclinable after eating; the one engaging the mind, the other acting on the body. For pleaſure amuſes the ſoul, and the fulneſs of the veſſels in the brain checks and hinders, in ſome meaſure, the derivation of the nervous juice in the organs.

Now, to apply this; a moderate doſe of an *opiate* uſually tranſports people with pleaſing ſenſation, to that degree, that, as they often expreſs themſelves, they are in heaven; and though they do not always ſleep (which proceeds from the preſentation of pleaſing images to the mind ſo ſtrongly, that, like dreams, they over-engage the fancy, and ſo interrupt the ſtate of reſt), yet they enjoy ſo perfect an indolence and quiet, that no happineſs in the world can ſurpaſs the charms of ſo agreeable an ecſtaſy.

Thus we have from the medicines, but in a far more eminent degree, all thoſe effects which are obſerved to follow upon that grateful ſenſe in the ſtomach, which a moderate fullneſs produceth. For no bodies are ſo fit and able pleaſingly to affect our ſenſible membranes, as thoſe which conſiſt of volatile parts, whoſe activity is tempered and allayed by the ſmoothneſs of ſome which are lubricating and oily; for they lightly ſurely the juices of the ſtomach, and cauſe a pleaſant titillation of its nervous coat, whereby there is induced an agreeable plenitude, and the mind is entertained with ideas of ſatisfaction and delight.

And thus we eaſily ſee upon what mechaniſm the other virtues of *opiates* depend; for their eaſing pains, checking evacuations, &c. proceed not only from the mind's being taken up with a pleaſing ſenſe, whereby it is diverted from a diſagreeable one; but all pain being attended with a contraction of the part, the relaxation of the fibres, which they cauſe, eludes and deſtroys the force of the ſtimulus.

Opiates are found to abate immoderate ſecretions and evacuations, which they do by removing that irritation of the organs, whereby they are occaſioned. And herein lies the incraſſating quality of thoſe medicines, in that the twitching ſenſe upon the membranes of the lungs, bowels, &c. being leſſened, the ſharp humour is ſuffered to lodge there in a greater quantity, before it is ſo troubleſome as to be thrown off and expelled; it being all one as if there were no irritation of the part, if the uneaſy ſenſe thereof be not regarded by the mind. And theſe effects will all be heightened by the mixture of the *opiate* particles with the blood; which is hereupon rarefied, and diſtends its veſſels, eſpecially thoſe of the brain; and this does ſtill, to a greater degree, leſſen the influx of the nervous fluid to the parts, by preſſing upon the tubuli, or little canals, through which it is derived. Whence the reaſon of that difficulty of breathing, which *opiates* occaſion; this ſymptom being inſeparable from the rarefaction of the blood in the lungs.

OPILIO, in *Natural Hiſtory*, the name given to a peculiar genus of ſpiders. The diſtinguiſhing character of which is, that they have but two eyes; their legs are uſually very long, and their ſkin hard and firm; they do not ſpin webs like the common ſpiders, for the catching their prey; their head ſeems to grow to the middle of their ſhoulders; their forceps is terminated by two claws like thoſe of the leg of a crab: they differ from the common ſpider alſo in the nature of their excrements, thoſe of this kind being hard and ſolid, the others liquid.

Of theſe there are four principal kinds. See TANT.

OPIMATORES, among the Romans, military men, who had the direction and management of the proviſions, and were to take care that the army wanted nothing.

OPINION, OPINIO, denotes a probable belief; or a doubtful and uncertain judgment of the mind.

Opinion is better defined the aſſent of the mind to propoſitions not evidently true at firſt ſight; nor deduced, by neceſſary conſequence, from others that are ſo; but ſuch as carry the face of truth.

The ſchools define *opinion*, *aſſenſus intellectus cum formidine de oppoſito*; an aſſent of the underſtanding, with ſome fear or diſtruſt of the contrary being true.

According to logicians, demonſtration begets ſcience, or knowledge; and probable arguments beget *opinion*.

Wherever the mind's acquieſcence in a truth propoſed to it is accompanied with any doubt, this is what we call an *opinion*.

Plato makes *opinion* a medium between knowledge and ignorance; clearer and more expreſs than ignorance; yet more obſure and unſatisfying than knowledge.

OPISTHODOMUS, ὀπισθόδομος, among the Athenians, the public treaſury, ſo called from its being ſituated on the back-ſide of Minerva's temple. Here, beſides other public money, a thouſand talents were laid in ſtore, againſt any very urgent occaſion; but if any man expended them upon a trivial account, he was to be put to death. Alſo the names of all that were indebted to the common wealth, were entered in a regiſter in this place. The tutelar gods of this treaſury, were Jupiter Σωτὴρ, or the Saviour, and Plutus, the god of riches, whom they repreſented with wings, and placed next to the ſtatue of Jupiter the Saviour; which was unuſual in other places.

OPISTHOGRAPHUM, ὀπισθόγραφον, among the *Ancients*, a waſte book, or ſchedule, on which were writ extemporary things that wanted to be reviſed and corrected afterwards.

The word is compounded of ὀπισθεν, i. e. *afterwards*, or *on the backſide*, and γραφω, *I write*; becauſe it was writ over again on the backſide of every page, which was left blank for that purpoſe.

OPISTHOTONOS, Ὀπισθότονος, compounded of ὀπισθεν, *backward*, and τεινω, *to ſtretch* or *bend*, in *Medicine*, a kind of convulſion, or ſpaſmodic diſeaſe, wherein the body is bent backwards, ſo as to form a kind of a bow.

In which ſenſe the word ſtands oppoſed to EMPROSTHOTONOS, wherein the body is bent forwards.

The *opiſthotonos* ariſes from a tonic motion of the muſcles of the poſterior parts of the body, eſpecially thoſe on the back of the head.

Dr. Chalmers, of South Carolina, in his account of the diſeaſes of this claſs, obſerves, that the *opiſthotonos* is moſt common in ſummer, when people are alternately expoſed to the ſcorching heat of the ſun, and heavy ſhowers; and that it often ſeizes on thoſe who ſleep abroad, expoſing themſelves to the cool night-air. This obſervation is farther confirmed by Dr. Huck Saunders. The *opiſthotonos* often comes on gradually, and is miſtaken for three or four days, for the rheumatic complaint, commonly called a crick in the neck: the patient feels a ſtiffneſs in the back part of the neck and about the ſhoulders; which increaſes ſo as to render it troubleſome for him to turn his head, or bend it forward: by degrees he finds it difficult to open his jaws and to ſwallow; and is ſenſible of a painful traction under the cartilago enſiformis, which ſtrikes through to the back, and inſtantly increaſes the rigidity about the neck and ſhoulders, draws the head backward a little, and ſhuts the jaws cloſer. The ſpaſm under the ſternum, which is the pathognomic ſymptom of this diſeaſe, becomes more violent, and frequent in its return, as the diſeaſe advances, and is ſucceeded by a ſtronger retraction of the head, with great rigidity and pain all round the neck, and along the ſpine, to the lower extremities: the countenance is pale and contracted, the jaws are cloſed together, and cannot be opened ſo wide as to receive the end of the little finger. The maſtoid, coracohyoid, and ſternohyoid muſcles, as well as all the others concerned in deglutition, and the deltoid and pectoral, are moſt violently contracted, ſo that the ſhoulders are ſtrongly raiſed forward, and the arms are ſtretched or drawn acroſs the body. In a few ſeconds, the ſpaſm ceaſes, after which the ſhoulder and arms recline, and the inferior extremities relax, though the parts never altogether loſe their rigidity: the face is generally flushed in the intervals, and bears ſtrong appearances of diſtreſs and melancholy; the tongue is ſtiff and torpid; the belly always bound; and the patient generally wiſhes to avoid drinking, ſpeaking, or being moved, either of which is apt to occaſion a return of the ſpaſm. In the laſt ſtage of the diſeaſe, the ſpaſm returns oftener than once in a minute, is much more violent, and continues longer, ſo that the patient has ſcarcely any remiſſion. The anterior muſcles of the whole body now ſuffer equal contractions with the poſterior, but the laſt overcomes the force of the others; ſo that the ſpine is ſtrongly recurvated, and forms a hollow arch with the bed, and the patient reſts on the back part of the head and the heels. The belly is flat and drawn inward, and the muſcles are ſo rigidly contracted, that they do not ſeem in the leaſt to yield to the deſcent of the diaphragm in inſpiration; the lower extremities are violently diſtended; the tongue darted out and often torn by the ſnapping of the teeth, and the muſcular fleſh that lies between the arch of the lower jaw and the head of the trachea thruſt upwards within the throat: the countenance is contracted, and the patient in a foam of ſweat; the eyes watery and languid; and a pale or bloody froth bubbles out from between the lips. In this ſtate the perſons afflicted are commonly delirious; and a ſevere ſpaſm or general convulſion terminates their ſuffering by death.

In ſome caſes this diſeaſe is very rapid in its progreſs: and proves fatal within the third day, generally in twenty-four, thirty-ſix, or forty-eight hours. But few die after the ninth or eleventh day. The warm bath with gentle friction, and the free uſe of opiates, are the remedies for this diſeaſe: to which it will be proper to add

glyſters

glysters prepared with a decoction of chamomile flowers, mallows, &c. and a large proportion of oil. The rigid parts may be also fomented, and then embrocated with camphorated oil and tinctura thebaica, twice a day, as occasion requires, during the course of the disease. Musk is likewise a very efficacious and useful remedy in this disorder. See the references under *Locked* Jaw.

OPIUM, formed from *opos*, *juice*, in *Pharmacy*, &c. a narcotic, gummy-resinous juice, drawn from the head of the white poppy, and afterwards inspissated. It is of a dark reddish-brown colour in the mass, and when reduced into powder, yellow.

When the juice flows of itself, through incisions made in the poppy-heads, it is properly called *opium*. When drawn by expression, it ought rather to be called *meconium*. The difference between the qualities and virtues of the two juices is very considerable. The former is preferable on all accounts, but it is exceeding rare; the Turks, among whom it is produced, and who make great use of it, never allowing it to be exported. So that it is the latter that is ordinarily used among us, and sold for *opium*.

Kæmpfer relates, that the heads, when almost ripe, are wounded with a five-edged instrument, by which as many parallel incisions are made at once from top to bottom; that the juice which exudes is next day scraped off, and the other sides of the head wounded in like manner; and that the juice is afterwards worked with a little water, till it acquires the consistence, tenacity, and brightness of the finest pitch.

It is mostly brought from the Levant, and Cairo, in flat cakes or irregular masses, from four to about sixteen ounces in weight, covered with leaves; generally very impure; the Levantines, to shorten their labour, and to have the more juice, drawing it equally from the heads and the leaves of poppies, by expression, and then reducing it to the thickness of an extract by fire. Though a late traveller into their countries assures us, it is drawn by decoction, and afterwards inspissated. See Mem. Acad. R. Scien. an. 1732, p. 427.

Dr. Charles Alston, professor of botany and the materia medica, in the university of Edinburgh, has given us a dissertation on *opium* in the Medical Essays of that place, vol. v. art. 12. This gentleman is of opinion, that notwithstanding the authorities of Lemery, Savary, Monsieur de la Condamine, in the Mem. de l'Acad. des Sciences for 1732, all which would lead us to conclude we have nothing but the meconium, or the expressed juice or decoction of the plant, our *opium* is neither an extract, nor an inspissated expressed juice of poppies, but the milky juice drawn by incision from poppy heads. To shew this, the doctor, according to the directions of Dioscorides, on a dry day before noon, cut off the crown of white poppy heads, so as to avoid penetrating into the cavity of the fruit, and collected the milk with a silver spoon in a China cup. The juice being exposed to the open air, in a few days thickened to the consistence of *opium*, and was of a fiery, hot, bitter taste, and soporiferous smell, and more so than the common *opium*, of a dark yellowish brown colour on the outside, somewhat higher within, and appeared as if composed of drops: after ten years keeping, its colour and taste remained. This agreed with the account Bellonius, lib. iii. obs. 15. gives of the best *opium*. That which was gathered from the papaver vulgare, or wild poppy, was somewhat of a lighter colour; but Dr. Alston thinks this but accidental, as the milk soon turns black on the knife. He also slightly scarified some poppy heads, after the Persian manner. When the juice was thickened, he scraped off the *opium*, and obtained more of it than by the other method. To procure the tear in its utmost perfection, he cut off the star from several heads, and bending them down, let the milk drop into a cup. It grew solid as *opium*, and being formed into a lump, appeared uniformly white; nor was there any difference in the juice of different poppies.

Secondly, the doctor observes, that the extract and inspissated juice scarce any way resemble *opium*; nor is their taste and smell like it. The extract appears black when dried, and so does the juice, but when diluted, the first is brown, and the latter green. The extract is tough and adhesive, the juice rough and friable, and grows mouldy a day or two after expression. *Opium* may possibly be mixed with either of these; and the greenish brown *opium* may have some small portion of the juice in it. Its penetrating smell is certainly owing to the mixture of some aromatic substance.

Thirdly, *opium* contains more resin than either the inspissated juice, or extract. One third of *opium* appears to be resin, while the juice and extract scarce yield one tenth part.

Fourthly, if *opium* was not the tear of the poppy, there would be no occasion for sowing so many fields with poppies in Egypt, and other places. Nor would it be so powerful a medicine, for its anodyne virtues depend chiefly on the milky juice.

It is a popular error, that there is any such thing as *white opium*; for though the juice, as it runs from the heads of the poppies, be of a milk-colour, it always becomes of a very deep brown as it thickens. Wherever it is found yellowish or soft, it is a sign that the juice has not had fire enough.

Most of the *opium* sold at Constantinople is brought from Anatolia, from a place called, by the Turks, Aphium Carahissar, i. e. Black Castle of *Opium*. It is also produced in the territory of Thebes, in Egypt, whence the best *opium* was formerly called Thebaic *opium*; but no distinction is now made with regard to the places of its production.

It must be chosen dry, the smoothest and blackest possible; of a disagreeable smell, a bitterish, somewhat hot, biting taste, and neither rugged nor sticky, nor all in a mass.

Opium is acrid, bitter, and strongly odoriferous. On attentively tasting it, a nauseous bitterness is first perceived; then a pungent heat affects the tongue, next the palate, and last of all the lips. The heat continues some time, the bitterness longer, provoking a plentiful discharge of saliva. It also heats the nose, and produces an inclination to sneeze.

Opium is certainly diaphoretic, and has stimulating qualities, which strongly refute the notion of its being refrigerating; it is certainly a hot medicine, though in many cases it diminishes preternatural heat.

Opium consists of five parts of gum, four of resin, and three of earth, or other impurities, not dissolvable either in watry or spirituous menstruums. From these last it is purified, in the shops, by softening the *opium* with boiling water, in the proportion of a pint to a pound, into the consistence of a pulp, with care to prevent its burning; and whilst it remains quite hot, strongly pressing it from the faces through a linen cloth; the strained *opium* is then inspissated in a water-bath, or other gentle heat, to its original consistence. When thus softened with a small quantity of water, the gummy and resinous parts pass the strainer together; whereas, if dissolved by a larger quantity, they would separate from one another. Supposing that the resin of *opium* is as good, or as much wanted as the gum, or the mucilaginous part, brandy will be found the best menstruum.

The most active principles of *opium* are very fixed; for it keeps well, and, when forty years old, remains hard, solid, and retains its taste; and it seems that the practice of roasting *opium*, in order to correct it, by divesting it of its narcotic part is of no service, and many other processes have been proposed for correcting the ill qualities, which *opium* is supposed to possess, besides roasting it; such as fermentation, long continued digestions or boiling, and repeated dissolutions and distillations. These processes, says Dr. Lewis, do not promise any singular advantage: and he adds, that diminishing the dose of *opium* is a more certain method of lessening its effects. Alkaline salts, he says, diminish the soporific virtue of the *opium*; fixed alkalis render it diuretic, whilst volatile ones determine its action to the cutaneous pores; and acids almost entirely destroy its force.

Upon a chemical analysis *opium* yields phlegm, urinous spirit, oil, a volatile and a fixed salt, and some earth; but little of the virtues of *opium* can be investigated, or explained, from its analysis, since simples extremely different as to their effects on human bodies, afford the same principles on distillation, as Homberg has shewn by the analysis of the deadly night-shade, and cabbage. See Mem. de l'Acad. des Sciences. An. 1701.

The curious may find the analysis of *opium* in the above mentioned dissertation by Dr. Alston.

It has been disputed, whether the activity of *opium* resides in its gummy or resinous parts. From the experiments of Hoffman and Neumann, it seems to be neither in the gum, nor in the resin; but in a certain subtile part of the resinous matter, somewhat analogous to essential oils, but of a much less volatile kind: and they relate, that on boiling the *opium* in water, there arises to the surface a frothy, viscid, unctuous, strong-scented substance, to the quantity of two or three drams from sixteen ounces; that this substance, in the dose of a few grains, has killed dogs that could bear above a dram of crude *opium*; that in distillation with water, though it does not rise itself, it gives over, at least in part, the active principle of which it is the matrix; impregnating the distilled liquor with its scent and its soporific power; as essential oils exhale their odoriferous principle in the air, without being dissipated themselves. But what this subtile and active principle really is, in essential oils, odorous vegetables, or *opium*, is equally unknown. Neumann says, that he knows a preparation of *opium*, by which a whole chamber full of men may be presently stupefied,

ſtupefied, deprived of their ſenſes, and even of their lives, without ſwallowing a ſingle grain: and he thinks, that it operates much in the ſame manner as the vapours of burning charcoal, or as the exhalations of fermenting liquors.

The uſe of *opium*, taken in proper doſes, is to procure ſleep, and a temporary reſpite from pain, or the action of any ſtimulating power. One grain is generally a ſufficient, and, in ſome caſes, too large a doſe: though maniacal perſons, and thoſe who labour under violent ſpaſms, require frequently two, three, or more grains. But uſe makes the quantity of *opium* ſafe, and even beneficial, which would otherwiſe prove poiſonous. Daily experience confirms this; and they who habituate themſelves to *opium*, find it as neceſſary as ſpirituous liquors to tiplers, and can take fifty or ſixty grains: Charas ſays, that he has taken twelve grains himſelf, and adds, that he knows one who made no ſcruple of thirty-ſix. And in the Phil. Tranſ. we have an inſtance of one Mr. Lovelock, who, in a fever, in three days time, took one hundred and two grains.

A few grains will deſtroy a perſon unaccuſtomed to it; but ſome diſorders, as madneſs, enervate its force. Among the Eaſtern nations, a dram of *opium* is but a moderate doſe. The Turks are ſaid to take this quantity when they go to battle, or undertake any affair that requires vigour and ſtrength. Garcias mentions one who took ten drams every day, and though ſhe appeared ſtupid and ſleepy, yet ſhe diſputed very readily and learnedly on any ſubject. It is remarkable that, notwithſtanding this exceſſive uſe of *opium*, the Turks are generally long lived, if we credit Bellonius.

The action of *opium* is very analogous to that of wine or vinous ſpirits; the good and ill effects of both differ little. See Wedelius in his Opiologia, and Geoffroy's Materia Medica. Platerus affirms that wine is narcotic, and Sydenham that *opium* is the moſt excellent cordial in nature.

Dr. Smyth, while at Smyrna, took pains to obſerve, what the doſes of *opium* taken by the Turks, in general, were. He found that three drams in a day was a common quantity among the larger takers of it, but that they could take ſix drams a day without miſchief. A Turk eat this quantity before him, three drams in the morning, and three in the evening, with no other effect than its giving him great chearfulneſs. But the taking it thus habitually greatly impairs the conſtitution; the perſons who accuſtom themſelves to it, can by no means live without it, and are feeble and weak; their legs are uſually thin, and their gums eaten away, ſo that the teeth ſtand bare to the roots; they are alſo often of a yellow complexion, and look much older than they really are. The Turkiſh meſſengers, when ſent upon buſineſs of haſte, always carry *opium* with them, and take largely of it when tired; they ſay it immediately gives them ſtrength and ſpirits to proceed, taken with proper precaution. Phil. Tranſ. N° 223.

Dr. Ruſſell in his Hiſtory of Aleppo, p. 84. informs us, that the greateſt quantity he knew to be taken, was three drams in twenty-four hours; and the immediate effects which he obſerved it to have on ſuch as were addicted to it, were, that their ſpirits were exhilarated, and from a doſing, depreſſed ſtate into which they ſunk after paſſing the uſual time of taking their doſe, they became quite alert. The conſequences of a long uſe of it are, that they ſoon look old and befotted, like ſuch as in Europe have ruined their conſtitutions by hard drinking. And it may be conſidered as a point of fact, that they ſeldom live to a good old age: though they are rarely carried off by dropſies or ſuch other diſeaſes, which are the uſual conſequences of hard drinking amongſt us; but having firſt loſt their memory and moſt of their intellectual faculties, they decline, in all appearance, in the ſame way as thoſe who ſink under the weight of years.

We have an account, in the Memoirs of the Academy of Sciences at Paris, of the death of a young man at Cairo, from his being decoyed into taking a very large doſe of this medicine. Among a number of young people in that city, who frequently drank together, there was one who always boaſted of his ſuperior power to bear a large quantity of liquor; and his companions, determined to get the better of him for once, diſſolved, without his knowing of it, a dram of *opium* in the liquor he was to drink; the conſequence was, that, inſtead of falling aſleep, as they expected he would, he fell into violent deliriums, and afterwards into a profound and dead ſleep.

The next morning his comrades went to ſee him, and triumph in their victory, but found him dying, looking livid, without pulſe, and with his mouth cloſed. They ſent for aſſiſtance, but in vain. After the death of the perſon, the body, arms, and thighs, became covered with livid tumors as big as the head of a young child, and theſe emitted an intoleraible ſtench, almoſt as ſoon as the corpſe was cold. There is one very ſingular accident in regard to this caſe, which is, that this ſtench allured all the cats from the neighbouring houſes, who came with great eagerneſs, and were hardly prevented from devouring the body.

Dr. Lewis has given us the following view of the general effects of *opium*. It renders the ſolids, while the operation of the *opium* continues, leſs ſenſible of every kind of irritation, whether proceeding from an internal cauſe, or from acrimonious medicines, as cantharides, and the more active mercurials, of which it is the beſt corrector. It relaxes the nerves; abating or removing cramps or ſpaſms, even thoſe of the more violent kind; and increaſing paralytic diſorders and debilities of the nervous ſyſtem. It incraſſates thin ſerous humours in the fauces and adjacent parts; by which means, it proves frequently a ſpeedy cure for ſimple catarrhs and tickling coughs; but in phthiſical and peripneumonic caſes, dangerouſly obſtructs expectoration, unleſs this effect be provided againſt by ſuitable additions, as ammoniacum and ſquilla. It produces a fullneſs and diſtenſion of the whole habit; and thus exaſperates inflammations both internal and external, and all plethoric ſymptoms. It promotes perſpiration and ſweat; but reſtrains all other evacuations, unleſs when they proceed from a relaxation and inſenſibility of the parts, as the colliquative diarrhœa in the advanced ſtage of hectic fevers. It promotes labour-pains and delivery more effectually than the medicines of the ſtimulating kind uſually recommended for that purpoſe; partly perhaps by increaſing plenitude, and partly by relaxing the ſolids or taking off ſpaſmodic ſtrictures. And indeed all the preceding effects are perhaps conſequences of one general power, being nearly allied to thoſe which natural ſleep produces.

The operation of *opium* is generally accompanied with a ſlow but ſtrong and full pulſe, and a ſlight redneſs, heat, and itching of the ſkin: it is followed by a weak and languid pulſe, lowneſs of the ſpirits, ſome difficulty of breathing, or a ſenſe of tightneſs about the breaſt, a ſlight giddineſs of the head, dryneſs of the mouth and fauces, and ſome degree of naufea. Given on a full ſtomach, it commonly occaſions a naufea from the beginning, which continues till the opium is rejected along with the contents of the ſtomach. Where the evacuation of acrid humours, accumulated in the firſt paſſages, is ſuppreſſed by it, great ſickneſs and uneaſineſs are generally compleined of, till the ſalutary diſcharge either takes place again ſpontaneouſly, or is promoted by art.

An over doſe occaſions either immoderate reſt or ſtupidity, a redneſs of the face, ſwelling of the lips, relaxation of the joints, vertigo, deep ſleep, with turbulent dreams and ſtartings, convulſions, and cold ſweats. Geoffroy obſerves, that thoſe who recover, are generally relieved by a diarrhœa, or by a profuſe ſweat, which is accompanied with a violent itching. The proper remedies, beſides emetics, bliſters, and bleeding, are acids and neutral mixtures: Dr. Mead ſays he has given, with extraordinary ſucceſs, repeated doſes of a mixture of ſalt of wormwood and lemon juice.

A long continued uſe of opium is productive of great relaxation and debility, ſluggiſhneſs, heavineſs, loſs of appetite, dropſies, tremors, acrimony of the humours, frequent ſtimulus to urine, and propenſity to venery. On leaving it off, after habitual uſe, an extreme lowneſs of the ſpirits, languor, and anxiety, ſucceed; which are relieved by having again recourſe to *opium*, and in ſome meaſure by ſpirituous or vinous liquors. Lewis's Mat. Med.

The virtues of *opium*, internally taken, depend chiefly on its action on the ſtomach. There are many inſtances of terrible ſymptoms, and death itſelf cauſed by narcotics, before they went out of the ſtomach, and without inflaming it, or cauſing any viſible change in it, far leſs vitiating the maſs of blood; and alſo of the ſame ſymptoms being removed, and death prevented by vomiting. Dr. Aſhton is alſo of opinion, 1. That the anodyne and hypnotic virtues of *opium* do not depend on its action on the brain, or on the blood. 2. That it affects firſt and principally the nerves to which it is applied; next ſuch as more immediately communicate with them; then thoſe which ſerve for ſenſation and voluntary motion; and laſt of all, by conſent, the whole nervous ſyſtem. 3. That this impreſſion on the nerves differently affects the ſenſorium commune and the mind, according to its degree, and the nature and function of the nerves primarily acted upon. 4. That the primary or firſt obſervable effect of *opium* on the nerves, is the relaxation of the fibres. Now as this relaxation of the nerves, and conſequently of the moving fibres, demonſtrates *opium* to be more than a pal-

a palliative remedy in a great many diſeaſes; ſo it is not difficult by it to account for its bad as well as good effects. For by relaxing to a certain degree, it may prove anodyne, cordial, diaphoretic, hypnotic, &c. or cauſe ſtagnations, deliriums, lethargies, apoplexies, and death.

It does not appear that *opium* rarefies the blood, or that the operation of this medicine depends on ſuch a rarefaction. If it were, it ſeems likely that bleeding might be a remedy for the ſymptoms occaſioned by the abuſe of *opium*; but ſome authors affirm that veneſection is mortal even the day after a narcotic has been taken.

Opium given too ſoon, to ſtop the operation of emetics, has been known to produce dangerous effects. See Medic. Eſſ. Edinb. vol. iv. art. 6.

The reſinous part of *opium* being noxious in Mr. Godfrey's opinion, he propoſes to make liquid laudanum, by digeſting an ounce and a quarter of *opium*, in half a pint of diſtilled water, twenty-four hours, ſhaking the veſſel frequently; then filtres it, and adds three ounces of ſpirit of wine; after which, the other ingredients may be added at pleaſure.

Opium, externally applied, is diſcutient, anodyne, and ſoporiferous, and has almoſt the ſame effects as when taken inwardly; but, that it can make any part inſenſible of pain is not evident. Wedelius declares he never could obſerve any ſuch effects. One inconvenience following the immoderate application of *opium*, mandragora, and hyoſciamus for pains of the eyes, taken notice of by Galen, is the midriaſis, or a preternatural dilatation of the pupils. Mr. Ray gives a notable inſtance of this kind, ariſing from the application of a leaf of the deadly night-ſhade to a cancerous ulcer a little below the eye. The uvea, in a night's time, entirely loſt its muſcular force, and was ſo relaxed, that the pupil, in the cleareſt light, remained four times bigger than that of the other eye.

Opium rather coagulates than attenuates the blood. This favours what is affirmed by ſome authors, that the blood has been found congealed, or frozen, as they expreſs it, about the hearts of thoſe who have been killed by *opium*. The effects of opium on other animals, are not much different from its effects on men. Dr. Alſton put a few drops of a ſolution of *opium* into a frog's ſtomach, and the circulation of the blood of the animal being examined by a microſcope, no alteration was perceived in the blood, as to its conſiſtence, colour of the ſerum, magnitude, figure, or colour of the red globules, but its velocity was ſurpriſingly diminiſhed. In about half an hour, the blood regained its common celerity, and the frog its vigour. On giving the creature a ſecond doſe, the blood moved ſlower than it did the firſt time, and its velocity gradually decreaſing, ſtagnated firſt in the ſmaller, then in the larger veſſels, and in a quarter of an hour the frog expired. It is remarkable, that, notwithſtanding the diminution of the velocity of the blood, the pulſe was not leſs frequent, and that even when the circulation ſtopt in the foot, the pulſe remained viſible by an undulatory motion. On opening the frog, its ſtomach was found full of a clear mucus, tinged with the *opium*, and every thing alſo ſeemed perfectly natural. This experiment was repeated ſeveral times, with the ſame appearances.

A dog being killed by an injection of a ſolution of *opium* into his crural vein, on opening his thorax, the lungs were found ſound, but very ſmall, and white, without any blood in them. The heart was big, and all its great veſſels, diſtended with blood; but nothing preternatural was obſerved in the brain or abdomen.

Willis, Sylvius, and Muller, look on *opium* as a coagulating poiſon, which fixes the ſpirits in the nerves. Wepfer and Pitcairn, on the contrary, maintain it to be a hot diſſolving poiſon, which ſubtilizes the blood, exalts and reduces it into vapours, which bloat up the arteries; and the bloated arteries, compreſſing the veins and neſtles, ſtop up the paſſage of the ſpirits.

Tinctures of *opium* in water, wine, and proof ſpirit, have the ſame effects as the *opium* in ſubſtance; with this difference, that they exert themſelves ſooner in the body, and are leſs diſpoſed to leave a naufea on the ſtomach. See TINCTURE.

In a ſolid form, *opium* is ſometimes mixed with ſaponaceous or gummy ſubſtances, which promote its diſſolution in the ſtomach; and ſometimes with reſinous ones, which render its diſſolution and operation more gradual and ſlow: and to theſe is commonly added ſome aromatic ingredients, to prevent its occaſioning a naufea. Of the firſt kind are the *ſtoap* PILLS; and of the ſecond the PILLS *of ſtorax*.

OPIUM *Cyrenaicum*, in the *Materia Medica*, a name given by ſome of the writers of the middle ages to *aſſa fœtida*. This was the *ſilphium* of the Greek writers of thoſe times, and was called *Cyrenaicum* from the place whence it was principally brought. Avicenna tells us, that, in his time, it was brought principally from Kirvan, and that is Cyrene.

OPLITODROMI, ὁπλιτοδρόμοι, among the Greeks, a deſignation given to thoſe who ran in armour, at the Olympic, and other games.

The word comes from the Greek ὅπλον, *armour*, and δρόμος, *a race*.

OPOBALSAMUM, in *Pharmacy*, a whitiſh juice, gum, or reſin, diſtilled from the branches of a tree called *balſamum*, or the *balſam tree*.

It is whitiſh, pretty thick, tranſparent, and of a ſmell approaching turpentine, but much more agreeable.

It is the ſame with the celebrated *balſamum verum*, or balm of the Levant.

It obtains a place among the alexipharmics, and is a good ingredient in the theriaca Andromachi, and mithridate; very ill ſupplied with the expreſſed oil of mace for a ſucedaneum, which does not at all come up to the ſubtility and activity of its parts, but is of a much heavier texture.

This, as all other balſams, is ſuppurative, deterſive, and incarnating, applied outwardly to tumors, ulcers, or green wounds. See BALSAM *of Gilead*.

OPOCALPASON, ὀποκάλπασον, ὀποκάρπασον, the juice of a tree called *calpaſi*; this juice reſembles myrrh, but is poiſonous and deadly, inducing a ſtrangulation. Galen, de Antidot. lib. i. ſays, that in the courſe of his time, he had obſerved the fatal effects in many who had ignorantly taken myrrh mixed with *opocalpaſam*. For they who prepare antidotes, he ſays, purpoſely mix this as an ingredient, taking it for the beſt ſort of myrrh; becauſe they had obſerved it to be a very good medicine in Collyria, where it attenuates fanies without corroſiveneſs, and ſometimes removes an incipient cataract. And if you put, ſays he, this kind of myrrh into a plaſter, cerate, or any attenuating medicine, to be outwardly applied, you will increaſe its virtue, but the effects of it taken into the body are deadly. James.

OPODELDOC, in the *Materia Medica*, the name of a plaſter ſaid to be invented by Mindererus, though often mentioned by Paracelſus. There is a famous popular ointment, which goes by the name of *opodeldoc*, which is ſaid to be thus prepared.

Take of the root of marſhmallows, comfrey, gentian, long birthwort, angelica, of each one ounce and a half; of the herbs ſanicle, ladies mantle, mouſe ear, colts foot, ſnakeroot, periwinkle, bruiſed, of each half a handful; of the leaves of roſemary, ſage, and lavender, of each one handful; juniper berries, two ounces; cumin ſeeds, one ounce; camphor and caſtor powdered, of each one ounce and a half; and of ſpirit of wine, three pints and a half.

Put all into a glaſs cucurbit, well luted, and digeſt for ten hours in balneo Mariæ, that is in hot water, but not to boil, then ſtrain; and the ſpirit of wine being ſufficiently impregnated with the ingredients, then add one pound of Caſtile ſoap ſhaved thin; digeſt in the ſame manner as before, until the ſoap is diſſolved.

Lute the juncture carefully, with two or three doubles of paper, daubed over with the white of eggs, and tied about with thread; the luting being dried, then digeſt in balneo Mariæ for ten hours, the mattraſs being fixed in the middle of the kettle, with a layer of ſtraw under it to keep it at the diſtance of two inches from the bottom: for the firſt eight hours keep the water ſo hot about it, that you can ſcarce hold your finger therein; and the two other hours augment the heat, but not ſo much as to make the water boil.

After the ſpirit of wine is thoroughly impregnated with the tincture of the roots, herbs, leaves, and powders, cool it gently, and ſtraining it through a linen cloth, pour it again into the mattraſs, with one pound of Caſtile ſoap, ſhaved thin; then fit the veſſel of rencounter to the mattraſs: lute the junctures, and digeſt as before, till the ſoap is entirely mixed with the ſpirit, and the whole reduced to an ointment; then take out the mattraſs, and ſuffer it to cool.

If the doſes and other directions are duly obſerved, it will be of the conſiſtence of an unguent, neither too thick nor thin, and the method of trying if it is truly prepared, is, to rub ſome of it on your hand, which it will immediately penetrate, leaving only a greeniſh ſtain; though the natural colour of the ointment is brown. It is excellent in ſtrains, relaxations of the ſinews in horſes, as well as in the human kind; alſo in all pains, numbneſs, weakneſs in the joints, or other parts, being well rubbed in. James.

The Edinburgh Pharmacopœia directs the *opodeldoc* to be made in a much more ſimple manner, viz. by digeſting two ounces and a half of Spaniſh ſoap, in a pint of rectified ſpirit of wine, and afterwards adding half an

ounce of camphor, a dram of oil of rosemary, and a dram of oil of origanum.

OPOPANAX, Οποπανάξ, formed from ὀπὸς, *juice*, and πανὰξ, the name of the plant which yields it, in *Pharmacy*, a concrete gummy refinous juice, yellow without side, white within, fatty, and brittle, of a bitter, acrid, and somewhat nauseous taste, and a very ſtrong, diſagreeable ſmell.

The Latins call it *panax Herculeum*, from Hercules, who is ſuppoſed to have firſt diſcovered its ſpecific virtues. It is one of the three celebrated panaceas, or univerſal medicines, to which the ancients attributed ſuch wonderful virtues. The two others are the Aſclepium and Chironium; the firſt found by Æſculapius, the ſecond by Chiron.

The gum *opopanax* flows by inciſion from the roots of a plant which is brought from Turkey, and the Eaſt Indies; growing abundantly in Achaia, Bœotia, Phocis, and Macedonia: while it is liquid, it is white; but as it dries and hardens, it aſſumes a beautiful golden yellow.

There are three kinds of it imported; that in tears, ſuppoſed to be a ſpecies of *ollebanum*, or WOUND-*wort*; that in the maſs; and that counterfeited, or flatted. The firſt is the beſt, and the ſecond is the better, as it has the more tears; the third is a rank ſophiſtication, and good for little.

Of an ounce of this gum-reſin, two drams and two ſcruples are ſoluble by ſpirit of wine, and three drams two ſcruples are ſoluble by water. Both water and ſpirit, by diſtillation with *opopanax*, acquire its flavour; but no oil is thereby ſeparated. *Opopanax* is an uſeful attenuant and deobſtruent, and in conſiderable doſes looſens the belly. It is given from a ſcruple to a dram with the ſame intentions as ammoniacum or galbanum; and joined in ſmaller doſes, is an auxiliary to thoſe and the other deobſtruent gums. It is alſo uſed in the cure of wounds; whence it enters the compoſition of the unguentum divinum, with the galbanum, ammoniac, and bdellium.

OPOPTA, a name given by ſome anatomical writers to the bones which form the receptacle of the eyes.

OPORICE, a name given by the ancients to a medicine compoſed of the autumnal fruits, and extolled for its great virtues againſt weakneſſes of the ſtomach and dyſenteries.

It was compoſed of five quinces with their ſeeds, as many pomegranates, a pint of ſervices, a pint of Syrian ſumach, and half an ounce of ſaffron; all theſe were put together into a gallon of muſt, and boiled over a very gentle fire, to the conſiſtence of honey, with great care to avoid burning.

OPOS, a word uſed by the old medical writers, to expreſs the juices of plants, whether flowing ſpontaneouſly, or by means of inciſions. It is uſed by Hippocrates to expreſs the juice of ſilphium, which was called ſimply the juice, by way of eminence, as we call the quinquina bark ſimply the bark. Others have made it ſignify the juice of the fig-tree, and the caprificus, which they had in frequent uſe to curdle their milk.

OPOSSUM, or POSSUM, in *Zoology*, the name of a very remarkable American animal, the DIDELPHIS *marſupialis* of Linnæus, deſcribed by various authors, under the names of *mariacaca*, *carigui*, *copæa*, *corigueya*, *japotuma*, *tlanuarnia*, *ſarigui*, and *ſemivulpa*. See *Tab.* IV. *Quad.* *fig.* 43.

It is a creature of the ſize of a large cat; its head is ſhaped like that of the fox; it noſe ſharp, and its upper jaw longer than the under; its teeth are ſmall, but like thoſe of the fox, and it has two long ones like the hare, in the front of the mouth; its eyes are very beautiful, ſmall, black, round, and vivid; its ears long, ſmooth, and very ſoft, placed erect, like thoſe of the fox, and very thin and tranſparent, of a black colour edged with white; it has black whiſkers, like thoſe of a cat; and has other hairs of the ſame kind on the other parts of its face, and over its eyes; its tail is round, and a foot long, and is of great ſervice to it, as it uſes it to twiſt round the branches of trees, hanging itſelf to them by that means; the tail is hairy near the inſertion, but naked all the other part, covered with ſmall ſcales, and is partly black, partly of a browniſh white; its hinder feet are conſiderably longer than the fore ones, and each has five toes; they much reſemble hands, and the nails are white and crooked, the hinder one being, as in the monkey kind, the longeſt; its head, and legs, as Hernandez obſerves, ſomething reſemble thoſe of the badger; it has a broad, longitudinal, black ſtreak, on the face; it is of a blackiſh colour with a mixture of a brown and grey on the back and ſides, and has ſomewhat of a faint yellowiſh caſt on the belly.

What diſtinguiſhes this creature, however, from all the other animals of the world, is, that it has a bag or pouch into which it receives its young as ſoon as delivered; this is a ſort of open uterus, and is placed under the belly near the hinder legs; in this the young are ſheltered till they are able to ſhift for themſelves, and when they begin to be ſtrong enough they frequently run out and return in again. The creature is of a ſtinking ſmell, like our fox or martin. It feeds on ſugar canes, and ſome other vegetables; but not wholly on theſe, for it frequently preys on birds which it catches on the trees, and often plays the fox's trick of ſtealing poultry.

The male *opoſſum*, as well as the female, has this kind of pouch under its belly, and takes upon himſelf, at times, the care of carrying and preſerving the young in caſe of any impending danger. Phil. Tranſ. N° 230. p. 123.

The fleſh of the old animals is very good, like that of a ſucking pig; the hair is dyed by the Indian women, and wove into garters and girdles; and the ſkin is very feetid.

When the Endeavour was refitting in Endeavour river, in New Zealand, Mr. Banks found here a female animal of the *opoſſum* kind, and with it two young ones. They reſembled the remarkable one which Buffon has deſcribed in his Natural Hiſtory, by the name of PHALANGER, but were not the ſame. Mr. Banks thinks Buffon miſtaken in ſuppoſing this tribe to be peculiar to America; and that it is more probable, as Pallas has obſerved in his Zoology, that the PHALANGER itſelf is a native of the Eaſt Indies; for this animal which Mr. Banks ſpeaks of, reſembled it in the extraordinary conformation of the feet, in which it differs from animals of every other tribe.

OPPILATION, in *Medicine*, the act of obſtructing or ſtopping up the ducts, or paſſages of the body, by redundant or peccant humours.

The word is chiefly uſed for obſtructions of the lower belly.

Viſcid, heavy foods, difficult of digeſtion, are *oppilative*; they do not paſs off well, but ſtop in the mouth of the veſſels.

OPPILATIVE. See DEOPPILATIVE.

OPPONENT, a perſon who withſtands or oppoſes another.

The term is chiefly uſed in ſpeaking of ſcholaſtic or academic diſputes or exerciſes, where a perſon who oppoſes a theſis, or impugns it by his objections, is called *opponent*, *opponent*.

OPPOSER, *foreign*. See FOREIGN *Opposer*.

OPPOSITES, *oppoſita*, among *Logicians*, are ſuch things as differ among themſelves; but ſo as not to differ in like manner from ſome third.

By which circumſtance, *oppoſites* differ from *diſparates*.

The ſchoolmen reckon four kinds of *oppoſites*; viz. relatively, contrarily, privatively, and contradictorily *oppoſites*.

Either, ſay they, the oppoſition is between ens and non ens; if the former, it is either with a dependent ens, which makes a relative oppoſition, the loweſt of all; or an independent one, which is a contrary oppoſite: if a non ens, it is either with a non ens ſecundum quid, which is privative; or with a non ens ſimply, which is the higheſt oppoſition.

OPPOSITES, *oppoſita*, complexly taken, are propoſitions that claſh with each other. As, man is an animal; and man is not an animal.

OPPOSITE *angles*. See ANGLE.

If a line S T *(Tab.* II. *Geometry*, *fig.* 46.) meet two other lines, A P and B R, in different points A and B, but in the ſame direction; the angles u and y, as alſo z and y, hereby formed, are called *oppoſite* angles; particularly u, the *external oppoſite* angle, and z, the *internal oppoſite* angle of y.

OPPOSITE *cones* denote two ſimilar cones, vertically *oppoſite*, that is, having the ſame common vertex, as well as the ſame axis. See CONE.

OPPOSITE *ſections* are two hyperbolas made by cutting two *oppoſite* cones by the ſame plane. See HYPERBOLA.

OPPOSITION, in *Geometry*, the relation of two things, between which a line may be drawn perpendicular to both.

OPPOSITION, in *Logic*, the quality of diſagreement between propoſitions which have the ſame ſubject, and the ſame attribute.

Oppoſition is ſaid, by logicians, to be either *complex* or *incomplex*.

Incomplex, or *ſimple oppoſition*, is the diſagreement of two things, which will not ſuffer each other to be in the ſame ſubject.

Thus *heat* is oppoſed to *cold*; *ſight* to *blindneſs*, &c. Which *oppoſition* has already been obſerved to be of four kinds.

Complex oppoſition is defined, by Ariſtotle, to be the affirming and denying the ſame predicate of the ſame ſubject, not taken equivocally; but for the ſame, in the ſame manner, and at the ſame time, as, Socrates is learned; and Socrates is not learned.

The

The later ſchoolmen, deviating from their maſter, define *oppoſition* an affection of enunciations, whereby two abſolute propoſitions, the ſame extremes being ſuppoſed in the ſame order and number, and underſtood without any ambiguity, of the ſame thing, oppoſe each other, either in reſpect of quantity or of quality, or of both. According to the former definition, there are three ſpecies of *oppoſition*, *contrary*, *ſubcontrary*, and *contradictory*: according to the ſecond, a fourth ſpecies is admitted, viz. *ſubaltern*.

To know how and wherein propoſitions are oppoſite, they muſt be compared, in quantity and quality, all the ways they can be compared in. If they be oppoſite both in quality and quantity, i.e. if the one be affirmative, and the other negative; the one univerſal, the other particular; they are ſaid to be contradictory; v. gr. no pleaſure is allowed; ſome pleaſure is allowed.

If they be only oppoſite in quality, and not in quantity, they are called *contrariæ*, if univerſal: and *ſubcontrariæ*, if particular; v. gr. all uſe of wine is evil; no uſe of wine is evil. Some means of preſerving reputation are allowed; ſome means of preſerving reputation are not allowed.

If the propoſitions be only oppoſite in quantity, they are called *ſubalternæ*; v. gr. every man is liable to ſin; ſome man is liable to ſin. But this laſt is no proper *oppoſition*; inaſmuch as the univerſal propoſition always includes the particular one.

Single propoſitions, which can only be oppoſed in quality, are reducible to contrary ones.

The eſſential properties of propoſitions, conſidered with regard to their *oppoſition*; are, 1. That of two contradictory propoſitions, there is one always true, and another falſe. 2. Two contradictory propoſitions can never be both true; but may be both falſe. 3. Subcontrary propoſitions may be all true at the ſame time; as happens when the attribute is accidental to the ſubject; but when it is eſſential to it, the one is true, the other falſe. 4. Subalterns may be either true or falſe at the ſame time; or the one may be true, the other falſe. If the attribute be eſſential to the ſubject, the ſubaltern affirmatives are true, and the negatives falſe; but if the negatives deny the ſubject an attribute incompatible with the ſubject, they will be both true. When the attribute is accidental to the ſubject, the univerſal ſubaltern is ordinarily falſe, and the particular one true.

OPPOSITION, in *Rhetoric*, denotes a figure, whereby two things are joined together, which appeared incompatible; as when Horace ſays, a *wiſe folly*.

In Bouhours's notion, this figure, which ſeems to deny what it eſtabliſhes, and contradicts itſelf in appearance, is very elegant. See ANTITHESIS.

OPPOSITION, in *Aſtronomy*, is that aſpect or ſituation of two ſtars or planets, wherein they are diametrically oppoſite to each other, or 180°, that is, a ſemicircle, apart.

When the moon is diametrically oppoſite to the ſun, ſo that ſhe ſhews her whole illumined face; ſhe is ſaid, with regard to the ſun, to be in *oppoſition*; and ſhe is then ſaid to be *in her full*, and ſhines all night long. See MOON and PHASES.

Eclipſes of the moon never happen but when ſhe is in *oppoſition* with the ſun, and when they both meet in or near the nodes of the ecliptic.

Mars in his *oppoſition* to the ſun is nearer the earth than he is to the ſun.

OPSONOMUS, in *Antiquity*, a magiſtrate of Athens, whereof there were two or three; choſen out of the ſenate or council.

Their office was to inſpect the fiſh-market, and to take care that every thing were done in order, and according to the laws.

OPTATIVE, in *Grammar*, the third mood in the conjugations of verbs, ſerving to expreſs an ardent deſire or wiſh for any thing.

Inſtead of a particular mood, or a particular ſet of inflexions to expreſs this deſire, the Engliſh, Latins, &c. expreſs it by an adverb of wiſhing prefixed to it. The Latins by *utinam*; the French by *plût à Dieu*; and the Engliſh by *would to God*, &c.

In theſe languages, ſetting aſide the adverb, the *optative* is the ſame with the ſubjunctive; the inflexions of the verb, which make what we call the MOODS, being the ſame in both.

Indeed, in the Greek, the wiſh is expreſſed by a particular inflexion, thence called *optative*; and in the French, Spaniſh, and Italian, there is ſomething like it; their triple ſenſes ſerving the ſame purpoſe. But the *optative* MOOD may be fafely retrenched from the Latin and Engliſh.

OPTERIA, formed from ὀπτομαι, *I ſee*, among the *Ancients*, preſents made to a child the firſt time a perſon ſaw it.

OPTERIA was alſo uſed for the preſents which the bridegroom made his bride when ſhe was conducted to him; this being the firſt time he ſaw her. See Barthol. de Puerp. vet.

OPTIC or OPTICAL, ſomething that relates to VISION, or the ſenſe of ſeeing.

OPTIC *angle*. See ANGLE.

OPTIC *axis*. See AXIS.

OPTIC *chamber*. See CAMERA *Obſcura*.

OPTIC *glaſſes* are glaſſes ground either concave or convex; ſo as either to collect or diſperſe the rays of light; by means whereof viſion is improved, and the eye ſtrengthened, preſerved, &c.

For the manner of grinding and poliſhing *optic glaſſes*; ſee GRINDING, POLISHING, GLASS, &c. For their phenomena, ſee LENS, MIRROR, &c.

The principal among *optic glaſſes* are *teleſcopes*, *microſcopes*, *ſpectacles*, *reading glaſſes*, *magic lanterns*, &c. See the conſtruction and uſe of each under its proper article, TELESCOPE, MICROSCOPE, SPECTACLE, MAGIC *Lantern*, &c.

OPTICAL *inequality*, in *Aſtronomy*, is an apparent irregularity in the motions of far diſtant bodies; ſo called, becauſe not really in the moving bodies, but ariſing from the ſituation of the ſpectator's eye: ſo that if the eye were in the centre, it would always ſee the motions uniform.

The *optical inequality* may be thus illuſtrated: ſuppoſe a body revolving in the periphery of a circle ABDEFGQP (*Tab. V. Optics, fig.* 85.) and moving through equal arches AB, BD, DE, EF, in equal times; and ſuppoſe the eye in the plane of the ſame circle, but at a diſtance from it, viewing the motion of the body from O: when the body goes from A to B; its apparent motion is meaſured by the angle AOB, or the arch HL, which it will ſeem to deſcribe. But in an equal time, while it moves through the arch BD, its apparent motion will be determined by the angle BOD, or the arch LM, which is leſs than the former arch HL. And when arrived at D, it will be ſeen at the point M of the line NLM. But if ſpends the ſame time in deſcribing DE, as it does in AB or BD; and when arrived at E, it is ſtill ſeen at M; appearing ſtationary in all the ſpace from D to E. When it arrives at F, the eye will ſee it in L; and at G, it will appear at H; ſo that it will ſeem to have gone retrograde: and, laſtly, from Q to P, it will again appear ſtationary.

OPTIC *nerves*, the ſecond pair of nerves, ſpringing from the crura of the medulla oblongata, and paſſing thence to the eye. See *Tab. Anat. (Oſteol.) fig.* 5. *lit.* i. i.

Theſe nerves approach, by degrees, in their recels from their origin; and at length meet, in the baſis of the brain, near the infundibulum. Thence they again ſeparate, but without decuſſating; and proceed one to each EYE.

They are covered with two coats, which they take from the dura and pia mater; and which, by their expanſions, form the two membranes of the eye, called the *uvea* and *cornea*.

The *retina*, which is a third membrane, and the immediate organ of ſight, is only an expanſion of the fibrous, or inner, and medullary part of theſe nerves.

The conſtruction of the *optic* nerve ſeems to be different from that of the other nerves, which all appear to conſiſt of hard fibres; for this, before it enters the orbit of the eye, is only a coat or cover formed by the pia mater, and including a production of the medulla of the brain, which is eaſily ſeparated from it. At its entrance into the eye, it takes another coat from the dura mater; which two coats are bound together by exceedingly fine filaments; that from the pia mater is continued in the choroides, and that from the dura mater in the uvea.

From their entrance within the orbit, to the ball of the eye, the medulla, incloſed under the two coats, is ſeparated into a number of little cells anſwering to each other. See VISION.

OPTIC *pencil*. See PENCIL *of Rays*.

OPTIC *place* of a ſtar, &c. See PLACE.

OPTIC *pyramid*, in perſpective, is the pyramid ABCO (*Tab. Perſpective, fig.* 3.), whoſe baſe is the viſible object, ABC; and its vertex in the eye O; formed by rays drawn from the ſeveral points of the perimeter to the eye.

Hence alſo may appear what is meant by *optic* triangle.

OPTIC *rays* are particularly uſed for thoſe wherewith an *optic* pyramid, or *optic* triangle, is terminated. As OA, OC, OB, &c.

OPTICORUM *nervorum thalami*. See THALAMI.

OPTICS, *optica*, is properly the ſcience of direct VISION.

OPTICS is also used, in a larger sense, for the science of vision, or visible, in general.

In which sense, *optics* include CATOPTRICS, and DIOPTRICS; and even PERSPECTIVE.

OPTICS, in its more extensive acceptation, is a mixed mathematical science, which explains the manner wherein vision is performed in the eye; treats of sight in the general; gives the reasons of the several modifications or alterations, which the rays of light undergo in the eye: and shews why objects appear sometimes greater, sometimes smaller, sometimes more distinct, sometimes more confused, sometimes clearer, and sometimes more remote. In this extensive signification, it is considered by Sir Isaac Newton in his admirable work called Opticks.

Optics makes a considerable branch of natural philosophy; both as it explains the laws of nature, according to which vision is performed; and as it accounts for abundance of physical phenomena, otherwise inexplicable. For what can be determined about light, colours, transparency, opacity, meteors, the rainbow, parhelia, &c. but on the principles of *optics*? What about the nature of the stars? The structure of the mundane system? The motions of the planets? The eclipses of the luminaries? &c. *Optics*, therefore, makes a considerable part of astronomy.

Euclid has written on the ancient *optics* and catoptrics: dioptrics were unknown to the ancients. F. Honorat. Fabri has an abridgment of *optics*, catoptrics, and dioptrics; father Eschinard has given a century of problems in *optics*; Vitello and Alhazen have performed well on the elements of *optics*. Father Kircher has a large volume on the secrets of *optics*, of light and shadow, and their surprising effects, which pass on the people for magic. We have also *l'Optique* & Catoptrique of F. Mersenne, Paris, 1651. Dioptrique Oculaire of father Cherubin, Paris, 1671, fol. Christ. Sheineri *Optica*, Lond. 1652. Jacobi Gregorii *Optices*. Barrovii Lectiones *Opticæ*, Lond. 1663. Joh. Bapt. Porta De Refractione *Optices*, Lond. 1663. Principæ Generale de *l'Optique*, by Mr. Leibnitz, in the Leipsic Acts, 1682. L'Occhiale all' Occhio, or Dioptrica Practica, Carol. Ant. Mancini, Bologna, 1660, 4to. Physico-mathesis de Lumine, Coloribus, & Iride, per F. Mar. Grimaldi, Bononiæ, 1665, 4to. Cogitationes Physico-mechanicæ de Natura Visionis, per Joh. Ott. Scaphusam, Heidel. 1670, 4to.; and, which ought to be named first, the great Sir Isaac Newton's *Optics*, Latin and English, 4to and 8vo. We have also an excellent and comprehensive work on *Optics*, by Dr. Smith, 4to. and an elaborate History of the Present State of Discoveries relating to Vision, Light, and Colours, by Dr. Priestley, 4to. 1772.

From *optics* likewise arises *perspective*; all the rules whereof have their foundation in *optics*. Indeed Tacquet makes perspective a part of *optics*; though John, archbishop of Canterbury, in his Perspectiva Communis, calls *optics*, catoptrics, and dioptrics, by the name *perspective*.

OPTIMATES, in *Antiquity*, one of the divisions of the Roman people, opposed to *populares*.

According to Tully's description, the *optimates* were the best citizens, or those who desired their actions might be approved by the better sort; and the populares those, who, out of a thirst of vain-glory, did not so much consider what was right, as what would please the populace, and get an interest in them.

Others rather make the *optimates* to be the vigorous asserters of the dignity of the chief magistrate, and the stickers for the grandeur of the state; who cared not if the inferior members suffered, if it were for the advancement of the commanding powers; and the populares, those who courted the favour of the populace, and encouraged them to demand larger privileges, to bring matters nearer to a level.

OPTIO, among the Romans, an assistant or lieutenant belonging to every centurion.

They were called *optiones* from *opto*, *I choose*; because it was in the option of the centurion to choose whom he pleased for this employment; though at first it was otherwise, the *optio* being chosen by the tribune or chief commander of the legion.

The *optiones* were not peculiar to the camp, but were used also in many other offices of life.

OPTION, the power or faculty of willing, or choosing; or the choice a person makes of any thing.

When a new suffragan bishop is consecrated, the archbishop of the province, by a customary prerogative, claims the collation of the first vacant benefice, or dignity, in that see, according as he shall choose; which choice is called the archbishop's *option*.

But in case the bishop dies, or is translated, before the present incumbent of the promotion chosen by the archbishop shall die or be removed, it is generally supposed that the *option* is void; inasmuch as the grantee, singly and by himself, could not convey any right or title beyond the term of his continuance in that see. And if the archbishop dies before the avoidance shall happen, the right of filling up the vacancy shall go to his executors or administrators.

OPULUS, in *Botany*. See WAYFARING-*tree*.

OPUNTIA, in *Botany*. See *Prickly* PEAR.

OR, in *Heraldry*, *yellow*, or the colour of gold.

Without this colour, or argent, silver, there can be no good armory.

In the coats of nobles, it is called *topaz*; and in those of sovereign princes, *sol*. It is represented in engraving by small points, or dots, all over the field, or bearing; as in *Plate* II. *Heraldry*, *fig.* 73.

It is accounted the symbol of wisdom, temperance, faith, force, constancy, &c.

*Toison d'*OR. See TOISON.

ORA, in *Antiquity*, was a term equivalent to an ounce; but it has been much debated among our antiquaries, whether the *ora*, the mention of which so often occurs, was a coin, or only money of account. Dr. Hickes observes, that the mode of reckoning money by marks and *oras* was never known in England till after the Danish settlements; and by examining the old nummulary estimates among the principal Gothic states upon the Baltic, it appears, that the *ora* and *örtoden* were synonimous terms, and that the *ora* was the eighth part of the mark. From several of the Danish laws, it likewise appears, that the Danish *ora*, derived by corruption from *aureus*, was the same as the Frank solidus of twelve pence. As a weight, the *ora* was regarded as the uncia or unit, by which the Danish mark was divided; and in Domesday-book the *ora* is used for the ounce, or the twelfth part of the nummulary Saxon pound, and the fiftieth of the commercial: as a coin, it was an aureus, or the Frank solidus of twelve pence. And from the accidental coincidence of the Frank aureus with the eighth part of their mark, the Danes probably took occasion to give it the new name of *ora*. There was another *ora*, mentioned in the rolls of the 27th of Henry III. the value of which was sixteen pence; and this was probably derived from the half mancus of the Saxons. Such, in all appearance, was the original of these two *oras*; as there were no *aurei* of that period, to which these two denominations of money of sixteen and twelve pence can possibly be ascribed. It is observed farther, that the name *ora* distinguishes the gold coins in several parts of Europe to this day. The Portuguese *moidore* is nothing else but *moeda d'ora*, from the Latin *moneta de aureo*; the French *Louis d'ores* come from the same use of the word, and owe their appellation to the *ora*. Clarke on Coins, p. 307, &c.

ORACH, *atriplex*, in *Botany*, a genus of the *polygamia monoecia* class. Its characters are these: it has female and hermaphrodite flowers on the same plant; the hermaphrodite flowers have a permanent empalement of five leaves, with membranaceous borders; they have no petals, but five awl-shaped stamina; in the centre is placed the orbicular germen, which afterward becomes an orbicular compressed seed, shut up in the five-cornered empalement; the female flowers have a two-leaved empalement, without petals or stamina; in the centre is a compressed germen, which becomes an orbicular compressed seed, included in the heart-shaped valves of the empalement. Miller particularizes three species; acknowledging that there are several more. Linnæus enumerates twelve species.

The pale green *orach* is sometimes cultivated in gardens as a culinary herb, being used as spinach, and, by some, much preferred to that herb; but there are few in England that are fond of it. It is to be sown in spring as spinach, and must be eaten while it is young; for when it is run up to seed, it is very strong. If suffered to scatter its seeds in a garden, it will make itself a lasting inhabitant, without farther trouble: the seeds often remain many years in the ground, and every time it is turned up, send up new plants. Miller.

The herb itself bruised, and applied to the parts in which thorns or other small splinters have plunged, extracts them, and cures the wound occasioned by them. When applied to the navel, it dissolves and expels worms; it is also used in mollifying clysters, and in such dressings as are intended to mitigate and allay pain; its distilled water, mixed with aloes, stops hæmorrhages, and cures scald heads; the seeds are purgative, but often act like an emetic. The country people in Lombardy make pies of the herb, in conjunction with butter and cheese, which they look upon as excellent food. In Virginia the inhabitants prepare a salt from the ashes of this herb, which they use in dressing their victuals.

There is a species of this plant called *atriplex fœtida*, *stinking orach*. It grows upon dunghills, and other waste places, and has a strong, fetid, filthy smell. This is a

herb particularly appropriated to the female sex, being aperitive, deobstruent, and useful in uterine disorders; good to promote the menstrual evacuations, to expel the after-birth, to help child-bed purgations, to appease strangulation of the womb, and to take off hysteric fits. It is usually given in a decoction; and there is a syrup kept in the shops, made with the juice of this plant, and sugar.

ORACH, *berry-bearing*. See BLITE.

ORACH, *creeping shrubby*. See ATRAPHAXIS.

ORACH, *wild*. See GOOSE-*foot*.

ORACLE, an answer, usually couched in very dark and ambiguous terms, supposed to be given by dæmons of old, either by the mouths of their idols, or by those of their priests, to the people, who consulted them on things to come.

The Pythian was always in a rage when the gave *oracles*. Ablancourt observes, that the study or research of the meaning of *oracles* was but a fruitless thing; and that they were never understood till after their accomplishment. Historians relate, that Crœsus was tricked by the ambiguity and equivocation of the *oracle*:

Κροισος Αλυν διαβας μεγαλην αρχην καταλυσει.

Thus rendered in Latin:

Crœsus Halym superans magnam pervertet opum vim.

ORACLE is also used for the DÆMON who gave the answer, and the place where it was given.

The principal *oracles* of antiquity are that of Abæ, mentioned by Herodotus; that of Amphiaraus; that of the Branchidæ at Didymus; that of the camps at Lacedæmon; that of Dodona; that of Jupiter Ammon; that of Nabarca, in the country of the Anariaci, near the Caspian Sea; that of Trophonius, mentioned by Herodotus; that of Chrysopolis; that of Claros in Ionia; that of Mallos; that of Patares; that of Pella in Macedonia; that of Phaselides in Cilicia; that of Sinope in Paphlagonia; that of Orpheus's head, mentioned by Philostratus, in his Life of Apollonius, &c.

But of all *oracles*, the *oracle* of Apollo Pythius at Delphi was the most celebrated: this was consulted in the *dernier ressort*, by most of the princes of those ages. See PYTHIA.

Mr. Bayle observes, that at first it gave its answers in verse; and that it fell at length to prose, upon the people's beginning to laugh at the poorness of its versification.

It is a pretty general opinion among the more learned, that *oracles* were all mere cheats and impostures; either calculated to serve the avaricious ends of the heathen priests, or the political views of the princes.

M. Bayle says positively, they were mere human artifices, in which the devil had no hand. He was strongly supported by Van Dale, and M. Fontenelle, who have written expressly on the subject.

There are two points in dispute on the subject of *oracles*; viz. whether they were human, or diabolical machines; and whether or no they ceased upon the publication or preaching of the Gospel?

Plutarch has a treatise on the ceasing of some *oracles*; and Van Dale, a Dutch physician, has a volume to prove they did not cease at the coming of Christ; but that many of them ceased long before; and that others held till the fall of Paganism, under the empire of Theodosius the Great; when Paganism being dissipated, these institutions could no longer subsist.

Van Dale was answered by a German, one Mœhius, professor of theology at Leipsic, in 1685. M. Fontenelle espoused Van Dale's system, and improved upon it in his History of *Oracles*; and shewed the weakness of the argument used by many writers in behalf of Christianity, drawn from the ceasing of *oracles*.

It was Eusebius who first endeavoured to persuade the Christians, that the coming of Jesus Christ had struck the *oracles* dumb; though it appears from the laws of Theodosius, Gratian, and Valentinian, that the *oracles* were still consulted as low as the year 358. Cicero says, the *oracles* became dumb, in proportion as people, growing less credulous, began to suspect them for cheats.

Plutarch alledges two reasons for the ceasing of *oracles*: the one was Apollo's chagrin; who, it seems, took it in dudgeon to be interrogated about so many trifles. The other was, that in proportion as the genii, or dæmons, who had the management of the *oracles*, died, and became extinct, the *oracles* must necessarily cease. He adds a third and more natural cause for the ceasing of *oracles*; viz. the forlorn state of Greece, ruined and desolated by wars. For, hence, the smallness of the gains let the priests sink into a poverty and contempt too bare to cover the fraud.

Most of the fathers of the church took it to be the devil that gave *oracles*; and looked on it as a pleasure he took to give dubious and equivocal answers, in order to have a handle to laugh at them. Vossius allows, that it was the devil who spoke in *oracles*; but thinks that the obscurity of his answers was owing to his ignorance as to the precise circumstances of events. That artful and studied obscurity, wherein the answers were couched, says he, shewed the embarrass the devil was under; as those double meanings they usually bore, provided for their accomplishment. Where the thing foretold did not happen accordingly, the *oracle*, forsooth, was misunderstood.

Eusebius has preserved some fragments of a philosopher, called Oenomaus; who, out of resentment for his having been so often fooled by the *oracles*, wrote an ample confutation of all their impertinencies: "When we come "to consult thee, says he to Apollo, if thou smell what "is in futurity, why dost thou use expressions that will "not be understood? Dost thou not know, that they "will not be understood? If thou dost, thou takest plea- "sure in abusing us; if thou dost not, be informed of "us, and learn to speak more clearly. I tell thee, that "if thou intendedst an equivoque, the Greek word "whereby thou affirmedst, that Crœsus should overthrow "a great empire, was ill chosen; and that it could sig- "nify nothing but Crœsus's conquering Cyrus. If things "must necessarily come to pass, why dost thou amuse "us with thy ambiguities? What dost thou, wretch as "thou art, at Delphi; employed in muttering idle pro- "phecies?"

But Oenomaus is still more out of humour with the *oracle*, for the answer which Apollo gave the Athenians, when Xerxes was about to attack Greece with all the strength of Asia. The Pythian declared, that Minerva, the protectress of Athens, had endeavoured in vain to appease the wrath of Jupiter; yet that Jupiter, in complaisance to his daughter, was willing the Athenians should save themselves within wooden walls; and that Salamis should behold the lots of a great many children, dear to their mother, either when Ceres was spread abroad, or gathered together.

Here Oenomaus loses all patience with the god of Delphi. "This contest, says he, between father and daughter, is "very becoming the deities! It is excellent, that there "should be contrary inclinations and interests in heaven. "Poor wizard, thou art ignorant whose the children are, "that Salamis shall for perish; whether Greeks or Per- "sians. It is certain, they must be either one, or the "other; but thou needest not have told so openly, that "thou knewest not which. Thou concealest the time "of the battle under those fine poetical expressions, *ei- "ther when Ceres is spread abroad, or gathered together*; "and wouldst thou cajole us with such pompous lan- "guage? Who knows not, that if there be a sea-fight, "it must either be in seed-time or harvest? It is certain "it cannot be in winter. Let things go how they will, "thou wilt secure thyself by this Jupiter, whom Mi- "nerva is endeavouring to appease. If the Greeks lose "the battle, Jupiter proved inexorable to the last; if "they gain it, why then Minerva at length prevailed."

ORACLES *of the Sibyls*. See SIBYL.

ORAL, something delivered by the mouth, or voice.

In this sense, we say, *oral law*, *oral tradition*, &c.

ORANDO *pro rege & regno*, an ancient writ. Before the Reformation, while there was no standing collect for a sitting parliament, when the houses of parliament were met, they petitioned the king that he would require the bishops and clergy to pray for the peace and good government of the realm, and for a continuance of the good understanding between his majesty and the estates of the kingdom; and accordingly the writ *de orando pro rege & regno*, was issued, which was common in the time of king Edward III.

ORANG-*outang*, in *Zoology*, the *homo troglodytes*, or *nocturnus*, of Linnæus, called also the *man of the wood*, is a species of ape without a tail; with a flat face, and a deformed resemblance of the human; ears exactly like those of a man; short neck; hair on the head longer than on the body; body and limbs covered with reddish and shaggy hair; face and paws swarthy; and buttocks covered with hair. The want of nails, and of the second phalanx in the large toes, form a remarkable characteristic of this animal; though nature seems, in this respect, to be inconstant in different species. This animal inhabits the interior parts of Africa, the isles of Sumatra, Borneo, and Java. It is solitary, and lives in the most desert places, feeding on fruits and nuts; grows to the height of six feet; and has such strength as to overpower the strongest man. See *Tab.* IV *Quadrupeds*, N° 44. They will attack and kill the negroes who wan-

der in the woods; drive away the elephants, beating them with their fists or with clubs; and throw stones at people who offend them; they sleep in trees, and shelter themselves from the inclemency of the weather; their appearance is grave, and their disposition melancholy; they are very swift, walk erect, and can only be taken alive, and tamed when they are young; in which case they are very docile. M. Buffon relates, that he had seen this animal offer his hand to those who came to see him, and walk with them, as if he had been one of the company; that he has seen him sit at table, unfold his napkin, wipe his lips, make use of his knife and fork, pour out his drink into a glass, take his cup and saucer, put in sugar, pour out the tea, and stir it, in order to let it cool; and that he has done this not only at the command of his master, but often without bidding. He did no kind of mischief, and offered himself to be caressed by strangers. The food which he preferred to every other was dried ripe fruits. A traveller relates, that he has seen a female of this species at Java, who every morning regularly made its own bed; at night lay down with the head on the bolster, and covered itself with the quilt. When its head ached, it wrapped a handkerchief round it. Hoppius, in his Anthropomorpha, 1760, takes great pains to prove, that the *orang-outang* is incapable, from the extreme dilatation of the pupil, of seeing in the day-time. Dr. Camper, late professor of astronomy, &c. in the university of Groningen, having dissected the whole organ of voice in the *orang*, in apes, and several monkies, concludes, that *orangs* and apes are not made to modulate the voice like men; for the air passing by the *rima glottidis* is immediately lost in the ventricles or ventricle of the neck, as in apes and monkies, and must, consequently, return from thence without any force and melody within the throat and mouth of these creatures; and this seems to be the most evident proof of the incapacity of *orangs*, apes, and monkies, to utter any modulated voice, as indeed they have never been observed to do. Phil. Transf. vol. lxix. part i. art. 14. where the reader may find an account of the dissection of the organs of speech of the *orang-outang*, illustrated by figures.

This animal, some have supposed, is the prototype of all the Fauns, Satyrs, Pans, and Sileni, described by the ancient poets, and whose forms are come down to us in the works of the painters and sculptors of antiquity; varied and embellished according to the fancy of the authors. They seem to have been more numerous formerly than at present, if we credit the account of the large troop, to whom Alexander, when in India, prepared to give battle; and the attack made by Hanno on another large body, in an island on the coast of Africa, where he took three of the females, whose skins were depositedin the temple of Juno, and found there by the Romans at the taking of Carthage. Vide Strab. lib. xv. & Hannonis Periplum, p. 77. ed. Hagæ, 1674.

Mr. Pennant apprehends, that the satyrs of the ancients were a species of monkey, and not the same with this animal; because Ælian and Ptolemy affirm, that they had tails. See SIMIA and CHIMPANZEE.

ORANGE-*tree, aurantium*, in *Botany*. This genus is joined by Linnæus to the CITRON. Its characters are these: the empalement of the flower is small, of one leaf, and indented into five parts; the flower has five oblong spreading petals, and many stamina, which are frequently joined in small separate bodies at the bottom; in the centre is situated the germen, which becomes a globular fleshy fruit, compressed at both ends, having a thick, fleshy pulp, and divided into several cells, each containing two oval callous seeds. There are five species, including several varieties. Those in the English gardens are the yellow and white-striped leaved *orange*; the curled leaved *orange*; the horned *orange*; the double flowering *orange*; and the hermaphrodite *orange*.

The manner of raising them from seeds is this: when you purpose to raise stocks for budding, they should be raised from citron seeds, taken out of the rotten fruit in spring; for the stocks of this kind are preferable to any other, both for their quickness of growth, and their readily taking buds either of *oranges*, lemons, or citrons.

A good hot-bed must be prepared, either of horse-dung or tanner's bark. The last, where it can be had, is much the best; the seeds must be sown in pots of rich earth, and these, when the bed is of a due temper, must be plunged into it. The pots must be watered frequently, and the glasses of the hot-bed shaded with mats in the heat of the day, and at times raised to give air.

The seeds will come up in three weeks, and a month after this the plants will be fit to transplant into single pots. The bed must be now renewed, and some pots of about five inches over at the top, must be filled half full with fresh earth, mixed with very rotten cow-dung. Place one plant in the middle of each of these pots, and then fill up with the same earth; then place these pots in the new hot-bed, and water the plants every day. By July, the plants will be two feet high, and must then be hardened by degrees to the air, by raising more and more the glasses of the hot-bed. In September they must be taken into the greenhouse; in the winter season they must have frequent small waterings, and in spring their heads must be washed, to cleanse them from filth. In spring, they must have again a gentle hot-bed, but in June they must be hardened again; and in August they will be fit to bud. At this time you are to make choice of cuttings from very thriving and fruitful trees; chusing such buds as are round. When the stocks are budded, they must be removed into the green-house, to shelter them from wet, turning their buds from the sun, but letting them have as free air as possible, and refreshing them often with water. They must remain in the greenhouse all winter, and in the spring must have another bark hot-bed; then cutting off the stocks about three inches above the buds, observe to give them as much water as they require.

The buds with this management will be by July two or three feet high, and they must then be hardened by degrees, that they may bear the greenhouse in the winter; and as this will be a sufficient height for the stems, it is proper at this time to stop the leading branch to force out lateral shoots. This first winter they will be tender, and must be taken great care of, and after this they require no more care than other full grown trees.

This is a regular and certain way of supplying a greenhouse with *orange-trees*; but there is a much more expeditious one, which is the purchasing such trees as are brought over every year from Italy. These are as large when we receive them, as those of our own produce will be in eighteen or twenty years growth; and though they have but small heads then, will be brought to have very good ones in three years, and to produce very fine fruit.

In the choice of these trees, those which have two buds in stock are preferable to those which have only one; and the straitness of the stem, freshness of the branches, and plumpness of the bark, are greatly to be regarded. When you have purchased a proper number of these trees, each of them is to be set in a tub of water, with its head and half its trunk above the surface; they are to stand in this two or three days, then they are to be taken out, their roots picked, and brushed clean, and the tops of the branches cut off, and they are to be planted singly, in pots just large enough to contain their roots, in a mixture of fresh earth and rotten cow-dung. These are to be set in a moderate hot tanners bark bed, and some potsherds must be always put at the bottom of the pots, to keep their holes from being stopped, and give a free passage to the water. They are to be moderately watered at proper times, and by the month of June they will shoot out pretty long shoots, which must be stopped, in order to produce the lateral branches. They must now be hardened by degrees, and in the middle of July must be brought into the open air, in some warm situation, defended from winds, and from the too great heat of the sun. In September they must be removed into the greenhouse, and watered gently during the winter. In the succeeding summer, the branches must be stopped from growing to their lengths, to furnish a good head; and they must be frequently watered. And after this, they will require no farther management, but to be new potted every year; which should be done in April, and the earth prepared for it a year beforehand, of cow-dung and fresh earth. The roots should be soaked a quarter of an hour in water, and afterwards scrubbed very clean, before they are put into the new pot.

If the old *orange-trees* have bad heads, the way to mend them is to cut them mostly off, and proceed with them in the same manner as with the trees brought from Italy. All *orange-trees* require frequent waterings, but these should not be large; there must always be a passage for the water to run off at the bottom of the pot or tub; they must have as much fresh air in winter, as the season will allow, and they should not be placed too near each other in the greenhouse. In summer they should be placed where they may have the morning and evening sun, without too much wind; and they should not be housed till October. The shaddock and citron are much tenderer than the *orange*, and should therefore be housed sooner.

In the Philosophical Transactions, N° 114, there is a very remarkable account of a tree standing in a grove near Florence, having an *orange* stock, which had been so grafted upon, that it became in its branches, leaves, flower, and fruit, three-formed; some emulating the *orange*, some the lemon, or citron, and some partaking of both forms in one; and what was very remarkable, was, that these mixed fruits never produced any perfect seeds;

feeds; ſometimes there were no ſeeds at all in them, and ſometimes only a few empty ones.

The ſeeds of the *orange* kind ſeem different in their nature from thoſe of all other plants. In the generality of others, the ſeed is only a ſort of nidus, and bed of a nouriſhing matter, for the young plant contained in ſome one part of it, and called the plantula ſeminalis; and however minute the ſeed itſelf may be, this plantula is but a very ſmall part of it; but the ſeeds of the *orange*, though contained in the inſide of a pulpy fruit, and in all reſpects ſeeming of the nature of the common ſeeds, yet, when examined nicely, are found to contain not a ſimple plantula ſeminalis, but each of theſe ſeeds, or kernels, contains within it another complete ſeed. Both in the *orange*, and lemon kinds, on opening what we call the ſeeds, when the ſkin, or membrane, is ſtripped off, there are frequently found two ſeeds incloſed in that membrane, that is, under the ſkin, and without ſide of the kernel, there is a ſmall ſeed, the like of which does not appear in the ſeed of any other fruit.

It is true, indeed, that in hazel nuts, as alſo in almonds, and in peach and apricot kernels, we often find a double ſeed, or kernel, but then each of them is ſeparately incloſed in its own membrane, and has no communication with the other, but is only placed in ſimple contact with it; and each has its diſtinct ſtalk, or ſtring, by which it ſeverally receives its nouriſhment; and in theſe, the containing of two kernels ſeems only an accident, a kind of ſuperfœtation, as in the twin births of animals, which naturally bear only one.

When one of the *orange* or lemon ſeeds is ſtripped of its outer membrane, there appears a little ſtring, which lying under it, cauſes a protuberance in the firſt ſkin; and from this ſtring not only the ſeed, but the plant within it, receives its nouriſhment; and the firſt and hard ſkin, which is eaſily ſeparated, ſeems only given to it for the defence of the inward parts; whereas nuts, almonds, peach-ſtones, and the like, have a much harder and firmer coat given them for the ſame purpoſe. The ſtring which appears through the firſt membrane extends its ſmall veſſels alſo through the ſecond membrane near the ſeat of the plantule; but theſe are ſo extremely fine, that we loſe them before they enter it, no microſcope being able to ſhew them farther than where they grow extremely ſmall and fine, near the entrance into this part. It is an amazing thought, but it is alſo an evident truth, that the ſmall ſtring, which runs in this manner under the coat of this ſeed, contains in it as many diſtinct veſſels as are to be found in a full grown *orange-tree*; for if all theſe veſſels were not in the young plant, while involved in its matrix, whence ſhould they come afterwards? When this ſtring is cut tranſverſely, and examined before a good microſcope, ſomething of this appears; for there are ſeen in it the ſections of ſeveral veſſels, and the ſmall quantity of pulpy matter between them is incloſed in a ſeemingly thick and tough membrane, together with them, in order to keep the whole together: if the ſeed, or kernel, be itſelf cut acroſs, it appears to be only a congeries of a great number of globules of a ſoft matter, preſſed together. Within this ſeed thus cut, and under all its membranes, are ſeen the two regular and perfect ſeeds, lodged together, and not ſeparated by any membrane, as the accidental double kernels of nuts, &c. always are; ſometimes, indeed, there is only one ſuch obſerved, and ſometimes there are three. Theſe are not always of the ſame ſize, but one is often larger than the others. Each of theſe is, however, a true, perfect, and diſtinct ſeed, and is divided naturally into two lobes, and theſe ſeem only to have been united at firſt, juſt where the young plant lies, ſo that this whole kernel ſeems to have been deſtined by nature for no other end, but to foſter and cheriſh the young plant, till it become able to ſhoot up and live above ground. In the heart of this inner ſeed is found the plantula ſeminalis, which is not larger than a ſmall grain of ſand to the naked eye. The wonderful conformation of this ſtructure cannot but ſtrike any one who is uſed to examine ſeeds, with great amazement. It is plain that the ſeed contained within the other ſeed, can only receive its nouriſhment from the veſſels contained in the ſtring above deſcribed. But it is amazing, that theſe ſhould not be, as uſual, immediately diſtributed from that general cord, or congeries of them, to the ſeed itſelf, but to another that is in the centre ſeed, and can only come to the inner ſeed, after having paſſed through this, and been in it divaricated into other veſſels too fine for the eye to trace.

Signior Franciſco Lana, in his prodromus to ſome philoſophical diſcoveries, tells us, that there is a way of producing *oranges*, without ſowing or planting the trees, only by infuſing the flowers in oil of almonds; for that this oil will, every year afterwards, at the proper ſeaſon, produce both flowers, and ripe *oranges*.

The *oranges* in common uſe with us are the Seville and China *oranges*. The flowers of the Seville *orange* are highly odoriferous, and very juſtly eſteemed one of the fineſt perfumes. In diſtillation with water, they impregnate it with their agreeable colour, and yield a ſmall quantity of fragrant eſſential oil: the diſtilled water, called *aqua napha*, and oil, called *ol. ſeu eſſentia Neroli*, are generally brought to us from Italy and France. The leaves have alſo a pleaſant ſmell, and bitteriſh taſte. In diſtillation with water, a ſmall portion of oil, of an agreeable flavour, ſeparates from the veſicles, which appear againſt the light like tranſparent ſpecks on their ſurface. The yellow rind, ſeparated from the white fungous matter under it, is a grateful, warm, aromatic bitter; often uſed as a ſtomachic and corroborant. It is warmer than the peel of lemons, of a more durable flavour, and abounds more with a light fragrant eſſential oil, which is lodged in diſtinct cells on the ſurface of the peel, and exudes upon wounding it. Eight ounces of the freſh rind give a ſtrong impregnation to four or five pints of water; which, with the addition of ſugar, forms an agreeable ſyrup, prepared in the ſhops. A ſpirituous water is obtained by diſtilling a gallon of proof ſpirit from ſix ounces of the dry rind; and a ſimple is prepared by drawing over a gallon of water from four ounces of the dry peel; and this is found to be an uſeful diluent in fevers and other diſeaſes.

The juice of *oranges* is a grateful acid, of great uſe in inflammatory and putrid diſorders, both acute and chronical. This juice contains an eſſential acid ſalt, mixed with much mucilage. The ſalt may be obtained in cryſtals, by diluting the juice, clarifying it with whites of eggs, and evaporation. In this way a ſaline extract may be made, capable of being preſerved, and poſſeſſed of the ſame medicinal qualities as the juice, which is ſaid to be very powerful in the ſcurvy.

The rind of the China, or ſweet *orange*, has a weak ſmell, and very little bitterneſs, and is ſcarcely ever employed for any medicinal uſe. The juice is an uſeful refrigerant in inflammatory diſpoſitions, and an excellent antiſeptic in ſcorbutic and other putrid diſorders. Lewis.

Oranges are ordinarily brought from Nice, Cionta, the iſles of Hieres, Genoa, Provence, Portugal, the American iſlands, and even China, and the coaſts of India.

Thoſe called *China oranges* were firſt brought into Europe from China, by the Portugueſe; and it is ſaid the very tree, whence all the European *orange-trees* of this ſort were produced, is ſtill preſerved at Liſbon, in the houſe of the count S. Laurent.

Thoſe moſt eſteemed, and that are made preſents of as rarities in the Indies, are no bigger than a billiard-ball; when ſweetened with a little ſugar, they are eſteemed excellent for diſorders of the breaſt. The juice is cooling and antiſcorbutic.

Oranges are ordinarily preſerved in halves and quarters. They are firſt peeled, then ſcooped, and dried in a ſtove. *Orangeat* is the *orange-peel* cut in pieces, and candied. Italy furniſhes a great deal of flower of *oranges*, either dry or liquid.

ORANGE, *ſea*, in *Natural Hiſtory*, a name given by count Marſigli to a very remarkable ſpecies of marine ſubſtance, which he calls a plant. It is tough and firm in its ſtructure, and in many things reſembles the common fucus; but inſtead of growing into the branched form the generality of thoſe ſubſtances have, it is round and hollow, and in all reſpects reſembles the ſhape of an *orange*. It has, by way of root, certain very fine filaments, which faſten themſelves to the rocks or to ſhells, ſtones, or any thing elſe that comes in the way. From theſe there grows no peduncle, but the body of the *orange*, as it is called, is faſtened by them to the rock, or other ſolid ſubſtance. The *orange* itſelf is uſually of about three or four inches in diameter; and while in the ſea, is full of water, and retains this when taken up. In this ſtate it frequently weighs a pound and a half, but when the water is let out, and it is dried, it becomes a mere membrane, weighing ſcarce any thing. It is beſt preſerved, by ſtuffing it full of cotton, as ſoon as the water is let out of it, and hanging it up to dry in this form. Its ſurface is irregular and rough, and its colour a duſky green on the outſide, and a clearer, but ſomewhat bluiſh green within; and its thickneſs is about an eighth part of an inch. When viewed by the microſcope, it is ſeen to be all over covered with ſmall glandules, or, indeed, compoſed of them; for they ſtand ſo thick, one by another, as to leave no ſpace between, and ſeem to make up the whole ſubſtance; ſo that it appears very like the rough ſhagreen ſkin uſed to cover toys. Theſe are all ſo many hollow ducts, through which the ſea-water finds a paſſage into the globe formed by this ſkin, and by this means it is kept always full and diſtended; on cutting it with a pair of ſciſſars, the water immediately runs out, and the ſkins collapſe; but there is ſomething farther remarkable,

markable, which is, that the whole substance, near the wounded place, is in motion, and seems as if alive, and sensible of the wound. The glandules are found full of water, and resembling small transparent bottles; and what goes to the structure of the plant beside these, is an assemblage of a vast number of filaments, all which are also hollow, and filled with a clear and transparent fluid.

There is another substance of this kind, described by count Marsigli, Triumfetti, and others, and called the *ramose*, or branched *orange*. This is very much of the nature of the former; but, instead of consisting of one round globule, it is formed of several oblong ones, all joined so together, that they represent the branches of some of the fucuses, but that they are shorter; and these are all hollow and full of water, in the same manner as the single globes of the common kind. This has, by way of root, certain fine and slender filaments, which fasten it to the stones or shells near which it is produced; and it is of a dusky greenish colour on the surface, and of a fine bluish green within. The surface, viewed by the microscope, appears rough, as in the other, and the glandules are of the same kind, and are always found full of clear water. Marsigli, Hist. de la Mer, p. 81. See CORALLINES.

ORANGE-*colour*, is a hue or dye that partakes equally of red and yellow; or is a medium between the two.

In heraldry, the term *orange* or *orenge* is given in blazon to all roundles that are tenne or tawny.

ORANGE-*dew*, a sort of dew which falls in the spring-time from the leaves of *orange* and lemon trees, and is extremely fine and subtile. Mr. De La Hire observing this, placed some flat pieces of glass under the leaves to receive it, and having thus procured some large drops of it, was desirous of finding out what it was. He soon found that it was not a merely aqueous fluid, because it did not evaporate in the air; and that it was not a resin, because it readily and perfectly mixed with water: it was natural here to suppose it a liquid gum; but neither did this, on examination, prove to be the case; for being laid on paper, it did not dry as the other liquid gums do. Its answering to none of these characters, and its being of the consistence of honey, and of a sweet sugar-like taste, gave a suspicion of its being a kind of manna; and whatever in the other trials had proved it not a resin, a gum, &c. all equally tends to prove that it is this substance.

ORANGE-*flower-water*. See WATER.

ORANGE-*lake*. See LAKE.

ORANGE, *mock*. See PHILADELPHUS.

ORANGEADE, a drink made of orange-juice, water, and sugar.

Lemery says it may be given to people in the height of a fever.

ORANGERY, a gallery in a garden, or parterre, exposed to the south, but well closed with a glass window, to preserve oranges in, during the winter season.

The *orangery* of Versailles is the most magnificent that ever was built: it has wings, and is decorated with a Tuscan order.

ORANGERY is also used for the parterre, where the oranges are exposed in kindly weather.

ORARIUM, in *Ecclesiastical Writers*, the same with BRANDEUM.

ORATION, a speech or harangue, framed according to the rules of oratory, and spoken in public.

All the kinds of *orations* may be reduced to three heads; viz. *demonstrative*, *deliberative*, and *judicial*.

To the demonstrative kind belong all such discourses as relate to the praise or dispraise of persons or things, as *panegyrics*, *genethliacs*, *epithalamia*, *epicedia*, *eucharistiæ*, *epinicia*, and *congratulations*.

To the deliberative kind belong whatever may become a subject of debate, consultation, or advice, by means of *persuasion*, *dissuasion*, *exhortation*, and *commendation*.

To the judicial kind belong all subjects which pertain to the security of property, the protection of innocence, the maintenance of justice, and punishment of crimes, by *accusation*, *confirmation*, *confutation*, &c. See each under its proper article, CONFIRMATION, &c.

Aristotle is said to be the author of this division, which seems to be very just; since, perhaps, there is no subject of oratory, whether sacred or civil, that may not be referred to one or other of these heads.

ORATION, *funeral*. See FUNERAL.

ORATOR. See ORATORY.

ORATORIO, in the *Italian Music*, a sort of spiritual drama of dialogues, containing recitatives, duettos, trios, ritornellos, choruses, &c.

The subjects of these pieces are usually taken from the Scriptures, or from the life of some saint, &c.

The music for the *oratorio* should be in the finest taste, and most chosen strains. These *oratorios* are greatly used at Rome in time of Lent; and of late in England.

Menestrier attributes the origin of *oratorios* to the crusades, and says, that the pilgrims returning from Jerusalem and the Holy Land, &c. composed songs, reciting the life and death of the Son of God, and the mysteries of the Christian faith, and celebrating the atchievements and constancy of saints and martyrs. Others, with greater probability, observe, that the *oratorio* was an avowed imitation of the OPERA, with this difference only, that the foundation of it was always some religious, or, at least, moral subject. Crescimbeni ascribes its origin to San Filippo Neri, born at Florence in 1515, who, in his chapel, after sermons, and other devotions, in order to allure young people to pious offices, had hymns, psalms, and such like prayers, sung by one or more voices. Among these spiritual songs were dialogues; and these entertainments becoming more frequent, and improving every year, were the occasion that in the seventeenth century *oratorios* were first invented, so called from the place of their origin. Hawkins's Hist. of Music, vol. iii. p. 441, &c.

ORATORY is the art of speaking well, upon any subject, in order to persuade: and to speak well, as Cicero explains it, is to speak justly, methodically, floridly, and copiously. In which sense the same with RHETORIC; the difference between the two only consisting in this, that one is taken from the Greek language, and the other from the Latin. However, the case is not precisely the same with the words *rhetorician* and *orator*. For although the Grecians used the former to express both those, who taught the art, and such as practised it; yet the Romans afterwards, when they adopted that word into their language, confined it to the teachers of the art, and called the rest *orators*.

Lord Bacon defines *rhetoric*, or *oratory*, to be the art of applying and addressing the dictates of reason to the fancy, and of so recommending them as to affect the will and desires. The end of rhetoric, he observes, is to fill the imagination with ideas and images, which may assist nature, without oppressing it.

Vossius defines rhetoric, the faculty of discovering what every subject affords of use for persuasion. Hence, as every author must invent arguments to make his subjects prevail; dispose those arguments, thus found out, in their proper places; give them the embellishments of language proper to the subject; and, if this discourse be for public delivery, utter them with that decency and force which may strike the hearer; *rhetoric*, or *oratory*, becomes divided into four parts, viz. INVENTION, DISPOSITION, ELOCUTION, and PRONUNCIATION.

As to the history of *oratory*, the first invention of it is ascribed by the Egyptians, and fables of the poets, to Mercury. Quintilian observes, with respect to the origin of this art, that we derive the faculty of speech from nature; but the art from observation: and that men, perceiving that some things in discourse are said to advantage, and others not, accordingly marked those things, in order to avoid the one, and imitate the other: and that they also added some things from their own reason and judgment, which being confirmed by use, they began to teach others what they knew themselves. But it is not known when this method of observation first took place. It is reasonable to believe, that the Greeks had the principles of this art so early as the time of Pittheus, whose nephew Theseus lived not long before the taking of Troy. And at this time Cicero thought it was in much esteem among them. After this period, there is a great chasm in the history of *oratory*: for Quintilian says, that afterwards Empedocles, who flourished about five hundred years after Troy was taken, is the first upon record who attempted any thing concerning it. About this time there arose several masters of this art, the chief of whom Quintilian has enumerated; as Corax and Tisias, of Sicily; Gorgias, of Leontium, in the same island, the scholar of Empedocles; Thrasymachus, of Calcedon; Prodicus, of Cea; Protagoras, of Abdera; Hippias, of Elis; Alcidamus of Elea; Antiphon, who first wrote orations; Polycrates and Theodore, of Byzantium. Nor should we omit Plato, whose elegant dialogue, entitled Gorgias, is still extant. To these succeeded Isocrates, the most renowned of the scholars of Gorgias, extolled by Cicero as the greatest master and teacher of *oratory*; Aristotle, whose system of *oratory* is esteemed the best and most complete of any in the Greek language; Demosthenes, who was an auditor of Isocrates, Plato, and Iseus, and who has been esteemed by the best judges the prince of Grecian orators; Æschines, who taught rhetoric at Rhodes; Theodectes and Theophrastus, disciples of Aristotle; Demetrius Phalereus, scholar of Theophrastus; Hermagoras;

goras; Apollonius Molon; Areus Cæcilius; Dionyſius, of Halicarnaſſus; Apollonius, of Pergamus; and Theodore, of Gaza. After the time of Quintilian we may mention Hermogenes, and Longinus, the author of the excellent treatiſe Of the Sublime.

This art was introduced late, and with difficulty among the Romans. In the year of their city 592, when, by the induſtry of ſome Grecians, the liberal arts began to flouriſh in Italy, a decree paſſed the ſenate, by which all philoſophers and rhetoricians were ordered to depart out of Rome: but in a few years after, on the arrival of certain ambaſſadors from Athens to Rome, the Romans were ſo charmed with the eloquence of their harangues, that they could no longer be reſtrained from purſuing the ſtudy of *oratory*. According to Seneca, Lucius Plotius, a Gaul, was the firſt who taught the art of *oratory*, at Rome, in Latin; and the firſt Roman, who engaged in it was Blandus, of the equeſtrian order; and he was ſoon ſucceeded by others.

The writers on this art, enumerated by Quintilian, were M. Cato, the cenſor, and after him Anthony, the orator; but he who carried eloquence to its higheſt pitch was Cicero, who has likewiſe, by his rules, given the beſt plan, both to practiſe and teach the art. He alſo mentions Cornificius, Stertinius, Gallio the father, Celſus, Lenas, Virginius, Pliny, and Rutilius.

Quintilian himſelf deſerves the higheſt commendation for diligence and accuracy as a writer: of whom St. Jerom ſays, that he was the firſt who taught publicly at Rome, and received a ſalary from the treaſury. This he places in the eighth year of Domitian; whereas Suetonius informs us, that Veſpaſian was the firſt, who granted out of the treaſury a yearly ſalary of near 800 *l.* ſterling, to the Latin and Greek rhetoricians. Since the revival of learning, there has been a great number of writers, who have treated on the ſubject of *oratory*, and contributed to the perfection of it, both in theory and practice.

We ſhall cloſe this article with obſerving, in the words of a very good judge, that the method of forming the beſt ſyſtem of *oratory* is to collect it from the fineſt precepts of Ariſtotle, Cicero, Quintilian, Longinus, and other celebrated authors; with proper examples taken from the choiceſt parts of the pureſt antiquity. On this plan, the learned Dr. Ward has formed his ſyſtem, to which we refer the reader, and on the ſubject of this article to his firſt lecture, vol. i. Concerning the diſtribution of the ſubject of *oratory*, ſee ORATION.

ORATORY is alſo uſed, among the Romaniſts, for a cloſet, or little private apartment, in a large houſe, near a bed-chamber, furniſhed with a little altar, and a book-ſtand, for private devotion.

The ancient *oratories* were little chapels, adjoining to monaſteries, wherein the monks ſaid prayers, before they had any churches. Several councils and ſynods have condemned the uſe of private *oratories*.

In the ſixth and ſeventh centuries, *oratories* were little churches, frequently built in burial-grounds, without either baptiſtery, cardinal prieſt, or any public office; the biſhop ſending a prieſt to officiate occaſionally.

ORATORY is alſo uſed for a ſociety or congregation of devout perſons, who form a kind of monaſtery, and live in community; but without being obliged to make any vows. Hence,

ORATORY, *prieſts of the*, a community of ſecular prieſts, who live together in a monaſtic manner, but without vows. They were firſt eſtabliſhed at Rome, about the year 1590, by S. Philip Neri, a Florentine, under the title of *Oratory of Sancta Maria in the Vallecella*.

The name of this religious ſociety was derived from an apartment, accommodated in the form of an *oratory*, or cabinet for devotion, which St. Philip Neri built at Florence for himſelf, and in which for many years he held ſpiritual conferences with his more intimate companions.

On the model of this the cardinal Berulle eſtabliſhed a congregation of the *Oratory* of Jeſus, in 1613, in France, which has ſince increaſed: ſo that there are now ſixty houſes of *Prieſts of the Oratory* in that kingdom.

The fathers or *Prieſts of the Oratory* are not, properly ſpeaking, religious or monks, being bound by no vows, and their inſtitute being purely eccleſiaſtical or ſacerdotal.

There is ſome difference, however, between the Italian and French inſtitutions. S. Philip Neri, to prevent the confuſion which the great number of houſes uſually occaſioned in congregations, would have his to be a ſingle houſe: and though others were at liberty to form the like congregations, yet they were to have no dependence on one another.

For this reaſon, the houſes of the *Oratory*, in Italy and Flanders, are all independent; whereas thoſe in France have a relation to each other, and all depend on the ſame chief, who has the quality of ſuperior-general; and, with three aſſiſtants, governs the whole congregation.

ORB, *orbis*, in *Aſtronomy*, a ſpherical body or ſpace, contained under two ſuperficies; the one concave, the other convex.

The ancient aſtronomers conceived the heavens as conſiſting of ſeveral vaſt azure tranſparent *orbs* or ſpheres, incloſed in one another; or vaſt circles, which in their areas included the bodies of the planets; the radii whereof were comprized between the centre of the earth, and the higheſt point to which the planets riſe, ſuppoſing the earth to be in the centre.

There are *orbs concentric*, i. e. having the ſame centre; and *orbs eccentric*.

The *magnus* ORBIS, or *great* ORB, is that wherein the ſun is ſuppoſed to revolve; or rather it is that wherein the earth makes its annual circuit.

ORB, in *Aſtrology*. An *orb* of light is a certain ſphere, or extent of light, which the aſtrologers allow a planet beyond its centre.

They ſay, that, provided the aſpects do but fall within this *orb*, they have almoſt the ſame effect as if they pointed directly againſt the centre of the planet. See ASPECT.

The *orb* of Saturn's light they make to be 10 degrees; that of Jupiter 12 degrees; that of Mars 7 degrees 30 minutes; that of the Sun 17 degrees; that of Venus 8 degrees; that of Mercury 7 degrees; that of the Moon 12 degrees 30 minutes.

ORBICULAR *leaf*, in *Botany*. See LEAF.

ORBICULARE *os*, or ORBICULAR *bone*, in *Anatomy*, the fourth of the little bones of the inward ear; tied by a ſlender ligament to the ſtapes; and named from its figure, which is round.

It was firſt diſcovered by Fran. Sylvius. Its uſe is, in the extenſion and relaxation of the tympanum. See EAR and Os.

ORBICULARIS, or *conſtrictor labiorum*, in *Anatomy*, is one of the muſcles of the lips. See CONSTRICTOR.

ORBICULARIS, or *deprimens palpebrarum*, is a muſcle ſpringing from each corner of the eye, and anſwered by another of like figure and ſtructure in the lower eyelid; which are therefore often conſidered as one *orbicular* muſcle. See *Tab. Anat. (Myol.) fig.* 1. *n.* 2.

Its fibres environ the eye-lids, and are inſerted into them, not unlike the ſphincters of other parts: it is faſtened to that part of the margin of the orbit, towards the noſe, made by the fourth bone of the upper jaw.

ORBICULARIS, in *Botany*, a name given by ſome authors to the *artanita*, or CYCLAMEN, called in Engliſh *ſow-bread*.

ORBICULARIS *inteſtini*, in *Anatomy*, a name given by Veſalius, and ſome others, to the muſcle now known by the name of the SPHINCTER *ani*.

ORBIS, in *Ichthyology*, the name of a genus of fiſh, of which there are a great many ſpecies: that, however, which is uſually meant by the word *orbis* above, is the ſpecies called *orbis primus* by Rondeletius, and *orbis Ægyptiacus* by Salvian, becauſe frequently caught in the oſtia of the Nile. Excepting the tail, this fiſh is of a round figure. It has no ſcales, but is covered with a firm and hard ſkin all over, full of ſmall prickles, which render it very rough; its mouth is ſmall, and has four broad teeth; it has only one hole on each ſide for its gills, and a fin under each; it has another fin near the tail on its under part, and another anſwering to it in its upper; the tail is one broad and flat fin; it is not eatable, for the whole fiſh is head, or rather belly. See *Tab.* III. *of Fiſh*, N° 31 and 32.

There is an opinion, that when this fiſh is dried and hung up by the tail, it will always turn its mouth to that quarter from whence the wind blows.

The other ſpecies of this genus are, the *orbis lagocephalus*, *orbis ſcutatus*, *orbis muricatus*, *orbis ranæ ritus*, *orbis ſpinoſus Cluſii*, *orbis muricatus alter Cluſii*, and the *orbis oblongus teſtudinis capite*.

ORBIT, *orbita*, in *Aſtronomy*, the path of a planet or comet; or the line deſcribed by its centre in its proper motion in the heavens.

The ſun's, or rather the earth's, *orbit* is the curve which it paſſes along in its annual revolution; called the ECLIPTIC.

The *orbit* of the earth, and that of all the primary planets is an ellipſis, in one of whoſe foci the ſun is placed; in which ellipſis they move according to this law, that a radius drawn from the centre of the ſun to the centre of the planet, always deſcribes areas proportional to the times.

The ancient aſtronomers made the planets deſcribe circular

cular *orbits*, with an uniform velocity: Copernicus himſelf could not believe they ſhould do otherwiſe. *Fieri nequit*, ſays he, *ut cœleſte corpus ſimplicæ uno orbe inæqualiter moveatur*. So that, to account for their inequalities, they were obliged to have recourſe to eccentrics and epicycles; from the embarraſs whereof Copernicus himſelf could not entirely diſentangle himſelf.

But after him came aſtronomers, who, with a little more phyſics, have made no difficulty of changing theſe circular *orbits* into elliptic ones; and of making them move with different velocities in different parts thereof.

Of theſe elliptic *orbits*, there have been two kinds aſſigned: the firſt that of Kepler, which is the common ellipſis; to which Seth Ward, though he himſelf keeps to it, thinks one might venture to ſubſtitute circular *orbits*, by uſing two points, taken at equal diſtances from the centre, on one of the diameters, as they do in the foci of the ellipſis. The ſecond is that of M. Caſſini, whoſe character is this; that the products of the right lines, drawn from each point of its circumference, are every where equal; whereas, in the common ellipſis, it is the ſum of thoſe right lines that is always the ſame. M. Varignon ſhews how inconſiſtent Copernicus's ſentiment is with the mechaniſm of the heavens: ſince the forces which planets have, to retain them in their *orbits*, muſt almoſt always conſpire to make them move with really different velocities; and that, among an infinity of caſes, there is but one wherein they can move uniformly.

The ſemidiameter of the earth's *orbit* Dr. Gregory makes 94,696,969 miles Engliſh, and the ſemidiameter of Saturn's *orbit* about ten times as great.

The *orbits* of the planets are not all in the ſame plane as the ecliptic, or the earth's *orbit* round the ſun; but are variouſly inclined to it, and to one another: but ſtill the plane of the ecliptic interſects the plane of the *orbit* of every planet in a right line, which paſſes through the ſun.

The quantities of the inclinations of the planes of the *orbits* of the primary planets to that of the ecliptic, are as follow: that of Saturn is an angle of 2 degrees; that of Jupiter, an angle of 1 deg. 20 min. that of Mars is almoſt 2 deg. that of Venus is a little more than 3 deg. 20 min. and that of Mercury a little more than 7 deg. See PLANET.

The *orbits of comets* Caſſini takes to be rectilinear; but they are now known to be very eccentric ellipſes. See COMET.

ORBITS, in *Anatomy*, the two large cavities or ſockets, wherein the eyes are placed. See *Tab. Anat. (Oſteol.) fig.* 1. *lit. b.*

Their figure is pyramidal: they are formed of the proceſſes of the os frontis and the upper jaw-bone, joined together; and are perforated at bottom, to give paſſage to the optic nerves.

ORBITER, in *Anatomy*, a name ſometimes given to two holes or cavities, either from their reſemblance of, or nearneſs to the orbits of the eyes.

The *orbiter externus* is a hole in the cheek-bone below the orbit.

The *orbiter internus* is a hole in the coronal bone of the ſkull, within the orbit.

ORCHARD, a ſeminary, or plantation of fruit-trees.

In planting of an *orchard* great attention ſhould be paid to the nature of the ſoil, and ſuch ſorts of fruits only ſhould be choſen as are beſt adapted to the ground deſigned for planting, otherwiſe there can be little hopes of their ſucceeding: and it is for want of rightly obſerving this method, that we ſee in many countries *orchards* planted, which never arrive to any tolerable degree of perfection; the trees ſtarving, and their bodies either covered with moſs, or the bark cracked and divided, both which are evident ſigns of the weakneſs of the trees; whereas if, inſtead of apples, the *orchard* had been planted with pears, cherries, or any other ſort of fruit better adapted to the ſoil, the trees might have grown very well, and produced great quantities of fruit.

As to the poſition of the *orchard*, if there is liberty to chooſe, a riſing ground, open to the ſouth eaſt, is to be preferred; but by no means upon the ſide of a hill, where the declivity is very great, for in ſuch places the great rains commonly waſh down the better part of the ground, whereby the trees would be deprived of proper nouriſhment; but where the riſe is gentle, it is of great advantage to the trees, by admitting the ſun and air between them, better than where they are upon an entire level. The ſituation will be ſtill more advantageous if it be defended from the weſt, north, and eaſt winds, for theſe are the winds that are moſt injurious to fruit-trees.

A method has been lately practiſed, by ſome particular gentlemen, with very good ſucceſs, that is to plant the trees fourſcore feet aſunder, but not in regular rows. The ground between the trees they plough and ſow with wheat and other crops, in the ſame manner as if it were clear from trees; and they obſerve their crops to be full as good as thoſe expoſed, except juſt under the trees, when they are grown large, and afford a great ſhade; and by thus ploughing and tilling the ground, the trees are rendered more vigorous and healthy, ſcarcely ever having any moſs, or other marks of poverty, abide much longer, and produce better fruit. In making choice of trees for an *orchard*, you ſhould always obſerve to procure them from a ſoil nearly akin to that where they are to be planted, or rather poorer; for if you have them from a very rich ſoil, and that wherein you plant them is but indifferent, they will not thrive well, eſpecially for four or five years after planting: ſo that it is a very wrong practice to make the nurſery, where young trees are raiſed, very rich, when the trees are deſigned for a middling or poor ſoil. The trees ſhould alſo be young and thriving; for whatever ſome perſons may adviſe to the contrary, yet it has always been obſerved, that though large trees may grow and produce fruit, after being removed, they never make ſo good trees, nor ſo long-lived, as thoſe which are planted while young. Theſe trees, after they are planted out, will require no other pruning, but only to cut out dead branches, or ſuch as croſs each other, which render their heads confuſed and unſightly: the pruning them too often, or ſhortening their branches, is very injurious, eſpecially to cherries and ſtone-fruit, which will gum prodigiouſly, and decay in ſuch places where they are cut; and the apples and pears, which are not of ſo nice a nature, will produce a greater quantity of lateral branches, which will fill the heads of the trees with weak ſhoots, whenever their branches are thus ſhortened; and many times the fruit is hereby cut off, which on many ſorts of fruit-trees is firſt produced at the extremity of their ſhoots.

It hath been obſerved in Herefordſhire, the great county for *orchards*, that when *orchards* are ſo planted or ſituated, that the air is pent up amongſt the trees, the vapours will ariſe from the damp of the ground, and the perſpiration of the trees collect the heat of the ſun and reflect it in ſtreams, ſo as to cauſe what they call a fire blaſt, which is the moſt hurtful to their fruits; and this is moſt frequent where the *orchards* are open to the ſouth ſun. As *orchards* ſhould never be planted unleſs where large quantities of fruit are deſired, ſo it will be the ſame thing to allow twice or three times the quantity of ground, ſince there may be a crop of grain of any ſort upon the ſame ſpot of land, ſo that there is no loſs of ground; and for a family only, it is hardly worth while to plant an *orchard*, ſince a kitchen garden, well planted with eſpaliers, will afford more fruit than can be eaten while good, eſpecially if the kitchen garden be proportioned to the largeneſs of the family; and if cyder be required, there may be a large avenue of apple trees extended croſs a neighbouring field, which will render it pleaſant, and produce a great quantity of fruit; or there may be ſome ſingle rows of trees planted to ſurround fields, &c. which will fully anſwer the ſame purpoſe, and be leſs liable to the fire blaſt before mentioned. Miller.

Orchards are ſtocked by tranſplantation, ſeldom by ſemination.

The ſeaſon for tranſplanting apple-trees into *orchards*, is in the months of October and November, provided the ſoil be dry; but if it be moiſt the beginning of March will be a better ſeaſon: if the leaves be not all off at the time they are removed, they muſt be pulled off, and they are likewiſe to be pruned. Trees may be tranſplanted into *orchards* after three years grafting, and ought not to be ſet at a leſs diſtance than forty feet; but thoſe trees that are planted at twice this diſtance will ſucceed better. In the following ſpring, if the ſeaſon prove dry, green ſward, with the graſs downward, ſhould be laid about the roots, and this will preſerve them moiſt, and ſave much expence in watering. In ploughing between the trees, care ſhould be taken not to go too deep among the roots, ſo as to wound them: with this caution, ſtirring the ſurface of the ground will be of great ſervice.

The ſide-branches of all tall *orchard* fruit-trees are to be cut off, till the tree be arrived at the height deſired: if the tree be to ſpread low, ſome are to be left on each ſide; ſo as to form a kind of balance. For the firſt three years, at leaſt, they muſt not grow thick, and buſhy-headed: this muſt be prevented, by cutting off ſome of the inſide ſhoots, and ſuch as grow acroſs each other, or pendent. See PRUNING.

The ſoil, if not rich enough, is to be amended in two or

or three years, by opening it around the tree, and on the outside of the ground firſt dug when the tree was ſet; and in a month's time filling it up again with a proper compoſt, or manure.

Perſons robbing *orchards* are to make ſuch recompence of damage, as a juſtice ſhall award, and forfeit not exceeding 10*s.* or be ſent to the houſe of correction, &c. Stat. 43 Eliz. cap. 7. See LARCENY.

ORCHESOGRAPHY, the art of noting all the ſteps and motions uſed in dancing. See DANCE.

ORCHESTRA, in the *Drama*, the lower part of the ancient theatre; made in form of a ſemicircle, and ſurrounded by the ſeats.

It was ſo called, becauſe, in the Grecian theatres, it was a place where they held their balls; from ὀρχέομαι, *I dance*.

The *orcheſtra*, among the Greeks, made a part of the ſcena; but, on the Roman theatres, none of the actors went down to the *orcheſtra*, which was taken up with ſeats for the ſenators, magiſtrates, veſtals, and other perſons of diſtinction; anſwering, nearly, to the pit in our theatre. With us the *orcheſtra* is the name of the place where the muſicians ſit.

ORCHILL. See ARCHIL.

ORCHIS, *ſatyrion*, or FOOL'*s-ſtones*, in *Botany*, a genus of the *gynandria diandria* claſs. Its characters are theſe: it has a ſingle ſtalk, with a vague ſheath, and no empalement; the flower hath five petals, three without and two within; the nectarium is of one leaf, fixed to the ſide of the receptacle, between the diviſion of the petals; the upper lip is ſhort and erect, the under large, broad, and ſpreading; the tube is pendulous, horn-ſhaped, and prominent behind; it hath two ſhort ſlender ſtamina, ſitting upon the pointil, with oval erect ſummits, fixed to the upper lip of the nectarium; it hath an oblong contorted germen, under the flower, with a ſhort ſtyle, faſtened to the upper lip of the nectarium; the germen afterwards turns to an oblong capſule, with one cell, having three keel-ſhaped valves, opening on the three ſides, but jointed at top and bottom, filled with ſmall ſeeds like duſt. Miller enumerates ten, and Linnæus thirty-three ſpecies.

All thoſe ſorts of *orchis*, deſcribed by Miller, grow wild in ſeveral parts of England, but, on account of the extreme oddneſs and beauty of their flowers, deſerve a place in every good garden; and the reaſon of their not being cultivated in gardens, proceeds from the difficulty of tranſplanting them: though this may be eaſily overcome, where a perſon has an opportunity of marking their roots, in their time of flowering, and letting them remain until their leaves are decayed, when they may be tranſplanted with ſafety; for it is the ſame with moſt ſorts of bulbous or fleſhy-rooted plants, which, if tranſplanted before their leaves decay, ſeldom live, notwithſtanding you preſerve a large ball of earth about them; for the extreme parts of their fibres extend to a great depth in the ground, from whence they receive their nouriſhment, which if broken or damaged by taking up their roots, ſeldom thrive after; for though they may ſometimes remain alive a year or two, yet they grow weaker until they quite decay; which is alſo the caſe with tulips, fritillaries, and other bulbous roots. But if their ſoil and ſituation be adapted to their various ſorts, they will thrive and continue ſeveral years, and during their ſeaſon of flowering will afford as great varieties as any flowers which are at preſent cultivated. Miller.

For the medicinal virtues of the *orchis* root, ſee SALEP.

ORCHIS-*root*, in the *Materia Medica*, is otherwiſe named *ſalep*, vulgarly called *ſalop*. See SALEP.

ORCHIS, in *Ichthyology*, a name given by Geſner, and ſome others, to the fiſh commonly called ORBIS, and, by Artedi, the ſpherical OSTRACION, with four teeth, and ſmall ſpines all over it.

ORCHOTOMY, derived from ὄρχις, *teſticle*, and τομὴ, *ſection*, of τέμνω, *I cut*, a word uſed by ſome chirurgical writers for the operation of caſtration.

ORCYNUS, in *Ichthyology*, a name by which ſome authors have called the fiſh commonly known by the name of the TUNNY or *thynnus*.

ORDEAL, *ordalium*, a form of trial, that is, of diſcovering innocence or guilt; practiſed, in England, in the time of Edward the Confeſſor; and ſince, as low as king John and king Henry III.

The word, in the original Saxon, ſignifies *a great judgment*, formed of *or*, *great*, and *deal*, or *dele*, *judgment*.

It was called *purgatio vulgaris*, or *judicium Dei*, in oppoſition to *beſtium* or *combat*, the other form of purgation: and alſo to the canonical purgation, which was by the oath of the party.

The *ordeal* was of various kinds; viz. that of fire, that of red-hot iron, that of cold water, that of judicial pottage, that of hallowed cheeſe, that of boiling water, that of a green croſs, and that of dice laid on relics, covered with a woollen cloth. There were particular maſſes for each ſpecies of *ordeal*.

The more popular kinds of *ordeal* were thoſe of red-hot iron, and water: the firſt for freemen and people of faſhion; the ſecond for peaſants.

Fire-*ordeal* was performed either by taking up in the hand, unhurt, a piece of red-hot iron, of one, two, or three pounds weight; or elſe by walking barefoot and blindfold, over nine red-hot plough-ſhares, laid lengthwiſe, at unequal diſtances; and if the party eſcaped without injury, he was adjudged innocent; but if it happened otherwiſe, as without colluſion it generally did, he was then condemned as guilty.

It is a popular ſtory, in our hiſtories, that Emma, mother of Edward the Confeſſor, being accuſed of too much familiarity with Alwyn biſhop of Wincheſter, demanded the *ordeal* of red-hot iron; and paſſed bare-footed and hood-winked over nine red-hot plough-ſhares, without touching any of them.

Water-*ordeal* was performed either by plunging the bare arm up to the elbow in boiling water, and eſcaping unhurt; or by caſting the perſon ſuſpected into a river or pond of cold water, and if he floated therein, without any action of ſwimming, it was deemed an evidence of his guilt, but if he ſunk he was acquitted.

It is eaſy to trace out the traditional relics of this water-*ordeal*, in the ignorant barbarity ſtill practiſed in many countries, to diſcover witches, by caſting them into a pool of water, and drowning them to prove their innocence. This purgation by *ordeal*, ſeems to have been very ancient, and very univerſal, in the times of ſuperſtitious barbarity. It was known to the ancient Greeks, vide Antigone of Sophocles, v. 270. And Grotius Com. on Numb. v. 17. gives many inſtances of water-*ordeal*, in Bithynia, Sardinia, and other places.

It was very anciently known in Perſia, and perhaps originated from their ſuperſtitious veneration for fire. Records of trial by *ordeal* remain above 500 years before the Chriſtian æra. It is ſtill in practice, where ſatisfactory evidence cannot be obtained, among the GENTOOS, in Hindoſtan, and of very high antiquity. It is mentioned ſeveral times in the code of Gentoo laws, as a common mode of proof. The modes of this *ordeal* are various in India, according to the choice of the party, or nature of the offence; but the infallibility of the reſult is to this day as implicitly believed, as it could have been in the darkeſt ages of antiquity. See chap. iii. of the Code of Gentoo Laws, by Halhed.

The moſt reſpectable authors, ancient and modern, attribute the invention of water-*ordeal*, in the Chriſtian church, to pope Eugenius II. though Le Brun, a prieſt of the Oratory, maintains, that it was more ancient.—However this be, the cuſtom was condemned and abrogated, by the authority of Lewis the Meek, about the year 829. It was afterwards revived, and practiſed in the 10th, 11th, and 12th centuries.

The firſt account we have of Chriſtians appealing to the fire-*ordeal*, as a proof of their innocence, is that of Simplicius, biſhop of Autun, who lived in the fourth century. This prelate, as the ſtory is related, before his promotion to the epiſcopal order, had married a wife, who loved him tenderly, and who, unwilling to quit him after his advancement, continued to ſleep in the ſame chamber with him. The ſanctity of Simplicius ſuffered, at leaſt in the voice of fame, by the conſtancy of his wife's affection; and it was rumoured about, that the holy man, though a biſhop, perſiſted, in oppoſition to the eccleſiaſtical canons, to taſte the ſweets of matrimony: upon which, his wife, in the preſence of a great concourſe of people, took up a conſiderable quantity of burning coals, which ſhe held in her cloaths, and applied to her breaſts, without the leaſt hurt to her perſon or her garments, as the legend ſays, and her example being followed by her huſband, with the like ſucceſs, the ſilly multitude admired the miracle, and proclaimed the innocence of the loving pair. A ſimilar trick was played, by St. Brice, in the fifth century.—Moſh. Eccl. Hiſt. vol. ii. p. 169. n. f. Eng. ed. 1768.

The practice of *ordeal* obtained very generally, in more modern times; and even in England, ſo late as king John's time, we find grants to the biſhops and clergy to uſe the *judicium ferri, aquæ, et ignis*. And both in England and Sweden, the clergy preſided at this trial, and it was only performed in the churches or in other conſecrated ground. However the canon law declared, very early, againſt trial by *ordeal*, as being the fabric of the devil. Upon this authority, though the canons themſelves were of no validity in England, it was thought proper (as had been done in Denmark, above a century before) to diſuſe and, aboliſh this trial entirely

entirely in our courts of juſtice, by an act of parliament, in 3 Hen. III. according to Sir Edward Coke, or rather by an order of the king in council. Blackſt. Com. vol. iv. p. 378. &c.

ORDEFF, or OREDES, a word frequently uſed, in charters of privileges, for a liberty whereby a man claims the ore found in his own ground.

It properly ſignifies ore lying under-ground; as a *delf* or *diff of coal* is coal lying in veins under-ground.

ORDER, in *Architecture*, a ſyſtem of the ſeveral members, ornaments, and proportions of a column and pilaſter. Or, a regular arrangement of the projecting parts of a building, whereof the column is the chief, ſo as to form one beautiful whole. See *Tab. Archit. fig.* 24, 25, 26, 27, 28.

Perrault defines *order* to be, that which preſcribes the proportions of entire columns, and determines the figures of certain parts ſuitable to the different characters, which their different uſes and ends require.

M. Le Clerc defines an *order* to be a column charged with an entablature, and ſupported on a pedeſtal.

The definitions Vitruvius, Barbaro, Scamozzi, &c. give of *order*, are ſo obſcure, that it were vain to repeat them: without dwelling, therefore, on the definition of a word, which cuſtom has eſtabliſhed, it is ſufficient to obſerve, that there are five *orders* of columns; three whereof are Greek, viz. the *Doric*, *Ionic*, and *Corinthian*; and two Italic, viz. the *Tuſcan* and *Compoſite*.

The three Greek *orders* repreſent the three different manners of building, viz. the *ſolid*, *delicate*, and *middling*: the two Italic ones are imperfect productions thereof.

The little regard the Romans had for theſe laſt, appears hence, that we do not meet with one inſtance, in the antique, where they are intermixed: that abuſe the moderns have introduced by the mixture of Greek and Latin *orders*, Davilier obſerves, ariſes from their want of reflection on the uſe made thereof by the ancients.

The origin of *orders* is almoſt as ancient as human ſociety.

The rigour of the ſeaſons firſt led men to make little cabins, to retire into; at firſt half under-ground, and the half above covered with ſtubble: at length, growing more expert, they planted trunks of trees on-end, laying others acroſs to ſuſtain the covering.

Hence they took the hint of a more regular architecture: for the trunks of trees, upright, repreſent columns; the girts or bands, which ſerved to keep the trunks from burſting, expreſſed baſes and capitals; and the ſummers, laid acroſs, gave a hint of entablatures; as the coverings, ending in points, did of pediments.—This is Vitruvius's hypotheſis; which we find very well illuſtrated by M. Blondel.

Others take it, that columns took their riſe from pyramids, which the ancients erected over their tombs; and that the urns, wherein they incloſed the aſhes of the dead, repreſented the capitals, whoſe abacus was a brick, laid thereon to cover the urns: but Vitruvius's account appears the more natural.

At length the Greeks regulated the height of their columns on the foot of the proportions of the human body.

For the meaſures of the ſeveral orders, ſee COLUMN.

Theſe *orders* took their names from the people among whom they were invented: Scamozzi uſes ſignificative terms to expreſs their character, when he calls the *Tuſcan*, the *Gigantic*; the *Doric*, the *Herculean*; the *Ionic*, the *Matronal*; the *Compoſite*, the *Heroic*; and the *Corinthian*, the *Virginal*. See TUSCAN, DORIC, &c.

To give a general idea of the *orders*, it muſt be obſerved, that the whole of each *order* is compoſed of two parts, at the leaſt, viz. the column and entablature; and of four parts, at the moſt, when there is a pedeſtal under the column, and an acroter or little pedeſtal a-top of the entablature: that the column has three parts; viz. the *baſe*, the *ſhaft*, and the *capital*: the entablature has three likewiſe; viz. the *architrave*, the *freeze*, and *cornice*: which parts are all different in their ſeveral *orders*. See ENTABLATURE, CAPITAL, &c.

B, *Tab. Archit. fig.* 40. is an example of the manner of placing one *order* over another, where there are ſeveral ranges of columns, as at St. Paul's Cathedral, the Banqueting-Houſe at Whitehall, and many other public edifices. They are determined by the *order*, over which they ſtand, and the greateſt diameter of the upper tier of columns is in general made equal to the diameter of the lower tier at the top of the columns; and the axis of the upper column is placed immediately over the centre of the lower column; which diſpoſition determines the INTERCOLUMNIATION.

ORDER, *ruſtic*. See RUSTIC.

ORDER, *Attic*. See ATTIC.

ORDER, *Perſian*. See PERSIAN.

In ſome caſes the CARYATIDES, or *Perſian order*, is introduced as an Attic, over columns; as in the front of the Royal Academy, in the Strand.

ORDER, *carpatic*. See CARYATIDES.

ORDER, *Gothic*. See GOTHIC.

ORDER, *French*, is a new-contrived *order*, wherein the capital conſiſts of attributes agreeing to that people; as cocks heads, fleurs de lis, &c.

Its proportions are *Corinthian*. Such is that of M. Le Brun, in the grand gallery at Verſailles; and that of M. Le Clerc.

M. Le Clerc gives a ſecond *Tuſcan order*, and a *Spaniſh order*, beſides his *French order*. The *Tuſcan* he ranks between the firſt *Tuſcan* and *Doric*. Its height he makes 23 ſemidiameters 22 minutes; the column to have 15, the pedeſtal 5, and the entablature 3, and 22 minutes: and he propoſes its frieze to be adorned with turtles, which are the arms of Tuſcany.

The *Spaniſh order* he places between the *Corinthian* and *Compoſite*. The whole *order* he makes 30 ſemidiameters, 28 minutes; whereof the column has 9 and 25 min. the pedeſtal 16 and 18 min. and the entablature 4 and 15 min. The horns of the abacus he ſuſtains with little volutes; the middle, in lieu of a roſe, has a lion's ſnout; that animal being the ſymbol of Spain, and expreſſing the ſtrength, gravity, and prudence of that nation.

There has been alſo an *order*, where lions and unicorns have been made to iſſue from the volutes, in compliment to the arms of the king of England, and called the *Britannic order*: but all theſe diſtinctions are alterations without improvement, and encumber rather than ornament the original figure of the antique capital.

ORDERS, *Greek*. See GREEK.

ORDER, in *Rhetoric*, is the placing of each word and member of a ſentence in ſuch a manner, as will moſt contribute to the force, beauty, or evidence of the whole; according to the genius and cuſtom of different languages. With regard to *order*, we may obſerve in general, that, in Engliſh, the nearer we keep to the natural or grammatical *order* it is generally the beſt; but in Latin, we are to follow the uſe of the beſt writers; a point regard being always had to the judgment of the ear, and the perſpicuity of the ſenſe, in both languages. See DISPOSITION.

ORDER is alſo uſed for a claſs or diviſion of the members of the body of a ſtate; with regard to aſſemblies, precedence, &c.

In this ſenſe, *order* is a kind of dignity, which, under the ſame name, is common to ſeveral perſons; and which, of itſelf, does not give them any particular public authority, but only rank, and a capacity of arriving at honours and employments.

To abridge this definition, *order* may be ſaid to be a dignity attended with an aptitude for public employ. By which it is diſtinguiſhed from an *office*, which is the exerciſe of a public truſt.

In this ſenſe, nobility is an *order*, &c. The clericate is alſo an *order*, &c.

ORDER is alſo the title of certain ancient books, containing the divine office, with the *order* and manner of its performance.

Roman order is that wherein are laid down the ceremonies which obtain in the Romiſh church. See RITUAL.

ORDER, in *Aſtronomy*, &c. A planet is ſaid to go according to the *order* of the ſigns, when it is direct; proceeding from Aries to Taurus, thence to Gemini, &c.—It goes contrary to the *order* or ſucceſſion of the ſigns, when it is retrograde, i. e. when it goes back from Piſces to Aquarius, &c.

ORDER, in *Botany*, is a name given to a ſubdiviſion of plants, in the Linnæan ſyſtem; which in the firſt 13 claſſes takes its denomination from the number of piſtils or female parts of the plant; and theſe are uſually reckoned from the baſe of the ſtyle, if there be any; but if the ſtyle be wanting, the number is taken from the ſtigmata. Of the three *orders* of the 14th claſs the firſt two are founded on a diſtinction in the fruit, and the third expreſſes ſuch plants as have many petals. The two *orders* of the 15th claſs are founded on a diſtinction in the pericarpium. The *orders* of the three next claſſes are founded on the number of ſtamina in each brotherhood, or diſtinct ſet of ſtamina. The four firſt *orders* of the 19th claſs are founded on four caſes of the POLYGAMY *of flowers*; the 5th *order* comprehends thoſe plants which have partial cups growing out of the common calyx, which ſurround and divide the floſculi, or florets; and the 6th *order* has a ſimple flower, and not a flower compounded of many florets, as in the other *orders*. The *orders* of the 20th claſs are founded on the number of ſtamina. The *orders* of the

two preceding claſſes are diſpoſed under the titles of thoſe claſſes, to which their reſpective flowers would have belonged, if the ſtamina and piſtillum had been under the ſame covers. In the 23d claſs, the titles of the two firſt *orders* are the ſame with thoſe of the 21ſt and 22d claſſes, and are to be underſtood in the ſame manner. The 3d *order* has been eſtabliſhed in favour of a ſingle genus, viz. the *ficus*; in which the polygamy is on three diſtinct plants, one producing male flowers, another female, and the third hermaphrodite or androgynous. The diſtinguiſhing characters of the four *orders* of the 24th claſs are not ſo accurately aſcertained as thoſe of the others. See FRUCTIFICATION.

A diſtinct and intelligible view of the different *orders* may be obtained by conſulting *Tab.* III, IV, V, VI, and VII, *of Botany*, explained by the following references, for which the editor is indebted to Mr. Miller's late excellent Illuſtration of the Sexual Syſtem of Linnæus.

Claſs I. *Order* 1. *Cocnus.* (See *Tab.* III.) The whole flower is repreſented in the firſt figure; the perianthium is triphyllous, as 1; the corolla monopetalous, but divided into ſix ſegments, 2, 2; the nectarium is ſhaped like a petal, and divided into two ſegments, the upper aſcending archwiſe, the inferior rolled back, 3; the filament is wanting, but the anthera adheres to the margin of the ſuperior ſegment of the nectarium, 4; the parts of the piſtil are a roundiſh germen, 5; a ſword-ſhaped ſtyle, 6, adhering to the nectarium; and a linear ſtigma, 7, growing to the margin of the ſtyle.

Ord. 2. *Blitum.* The perianthium is tripartite, 1; no corolla; the filament briſtly, 2; the antheræ twins, 3; the germen ovate, 4; the ſtyles two, 5, 5; and the ſtigmas ſimple, 6, 6.

Claſs II. *Ord.* 1. *Monandia.* The perianthium of one leaf, 1; the corolla monopetalous, but divided into two lips, 2; the two filaments are ſetaceous, 3; the antheræ compreſſed, 4; the germen quadriſid, 5; the ſtyle filiform, 6; and the ſtigma biſid, 7.

Ord. 2. *Anthoxanthum.* The calyx is a bivalvular glume, with one flower, 1; the corolla is an unilocular bivalvular glume, each valve having a dorſal ariſta, 2; the nectarium is diphyllous, thin, cylindrical, embracing the germen, ſtamen, and ſtyle 3, 3; the filaments like two hairs, 4, 4; the antheræ double forked, 5, 5; the germen oblong, 6; and the ſtyles thread-ſhaped, 7, 7.

Ord. 3. *Piper.* The perianthium monophyllous, 1; no corolla, or ſtamens; the antheræ are two, placed at the root of the germen, 2; the germen is large, 3; there are no ſtyles, but three briſtly ſtigmas, 4; a filiform ſpadix, covered with flowers, 5.

Claſs III. *Ord.* 1. *Crocus.* The calyx a ſpatha, 1; the corolla is monopetalous; its tube, 2, is long, and its limb divided into ſix parts, 3; the filaments are three, and awl-ſhaped, 4; the antheræ are arrow-ſhaped, 5; the germen is roundiſh, 6; the ſtyle filiform, 7; the ſtigmas are three, 8, 8.

Ord. 2. *Avena.* The calyx is a glume generally with many flowers; the glume is bivalvular, the valves without beards, 1; the wild oat having a beard, 2; the corolla bivalvular, having a beard ſpirally wreathed, and growing out at its back; the filaments are three, and like hairs, 3; the antheræ oblong and biſurcate, 4; the germen obtuſe, 5; the ſtyles are two, reflex, thread-like, and feathered at the top, 6; but the ſtigmas undivided.

Ord. 3. *Mollugo.* The calyx a perianthium of five leaves, 1; no corolla; the filaments three, lying cloſe to the piſtil, 2; the antheræ ſimple, 3; the germen ovate and triſulcate, 4; the ſtyles are three and ſhort, 5.

Claſs IV. *Ord.* 1. *Diſpacus.* The common perianthium of the calyx is multiflorous, 1; the proper perianthium ſcarce diſtinguiſhable to the naked eye, 2; the univerſal corolla equal, 3; the proper corolla monopetalous, 4; the filaments are four, 5; the antheræ incumbent, 6; the germen, 7; and the ſtyle filiform, 8.

Ord. 2. *Hamamelis.* The involucrum is triphyllous, 1; the calyx a double perianthium, the exterior diphyllous, and the interior tetraphyllous, 2; the corolla has four long linear petals, 3; the nectarium four folioles, truncated, and grown to the corolla, 4; the filaments are four and linear, 5; the antheræ obovate like two together, with a ſmall elevated top, 6; the germen ovate and hairy, 7; the ſtyles two, 8; and the ſtigmas truncated, with an elevated top, 9.

Ord. 3. *Potamogeton.* The corolla hath four petals, 1; the filaments are four, but very ſhort, 2; the antheræ are twins, 3; the germina are four, 4; no ſtyle; the ſtigmas obtuſe, 5.

Claſs V. *Ord.* 1. *Nerium.* The perianthium monophyllous, and quinquepartite, 1; the corolla of one leaf, and funnel-ſhaped, but divided at the upper part into five, 2; the filaments are five, and ſhort, 3; the antheræ arrow-ſhaped, inclining together, and terminating in a long thread, 4; the germen roundiſh and biſid, 5; the ſtyle cylindric, 6; and the ſtigma truncate, 7.

Ord. 2. *Asclepias.* The univerſal umbel conſiſts of many partial umbels, 1; a partial umbel, 2; and univerſal involucrum none; a partial one none; the proper perianthium obſolete; the univerſal corolla uniform; the baſeſcales all fertile, and conſiſting of five petals, 3; the filaments five, and capillary, 4; the antheræ roundiſh, 5; the germen, 6; the ſtyles two, 7; and the ſtigmata obtuſe, 8.

Ord. 3. *Turnera.* The perianthium monophyllous, its tube cylindrical, the limb quinquepartite, 1; the petals five, 2; the filaments five, 3; the antheræ, 4; the conic germen, 5; the ſtyles three 6; a ſtyle magnified 7; the ſtigmas are bundles of hairs 8.

Ord. 4. *Parnaſſia.* The petals five, 1; the filaments five, 2; the antheræ, 3; the nectaria five, 4; the germen ovate, 5; no ſtyle; the ſtigmas four, 6.

Ord. 5. *Ceraſtium.* The perianthium pentraphyllous, 1; the petals five, united at their baſe, 2; the filaments five, 3; the antheræ oblong, 4; the germina five, 5; the nectaria five, 6; the Ryles five, 7; and the ſtigma obtuſe, 8.

Ord. 6. *Myoſurus.* The perianthium pentaphyllous, 1; no corolla; the nectaria five, 2; the filaments five, 3; the antheræ oblong, 4; the germina numerous, 5; each germen is conic and ſmooth, 6; no ſtyles; ſtigmas ſimple, 7.

Claſs VI. *Ord.* 1. *Amaryllis.* The corolla hexapetalous, bell-ſhaped, with a hook on every other petal, 1; the filamenta ſix, 2; the antheræ, 3; the germen, 4; the ſtyle, 5; the ſtigmas 6.

Ord. 2. *Ovyza.* The glume of the calyx, 1; the corolla is bivalve, 2; the nectaria are two, 3; the filaments ſix, and capillary, 4; the antheræ biſid, 5; the germen ſhaped like a top, 6; the ſtyles two, 7; and the ſtigmas elevated, 8.

Ord. 3. *Rumex.* The perianthium triphyllous; the petals three, 1; the filaments ſix, 2; the antheræ, 3; the germen, 4; the ſtyles three, 5; the ſtigmas 6.

Ord. 4. *Peſtacia.* The perianthium monophyllous, but quadripartite, 1; no corolla; the filaments ſix, 2; the antheræ oblong, 3; the germen compreſſed, 4; the ſtyles four, 5; and the ſtigmas, 6.

Ord. 5. *Alisma.* The petals three, 1; the filaments ſix, 2; the antheræ roundiſh, 3; the germina more than five, 4; a ſingle germen, 5; the ſtyle 6; and ſtigma, 7.

Claſs VII. *Ord.* 1. (See *Tab.* IV.) *Æſculus.* The perianthium monophyllous, tubulous, quinquefid, 1; corolla, five petals inſerted in the calyx, 2 *a*; filaments ſeven, inſerted in the receptacle, ſubulate, bending downward, pilous, 2 *b*, 3 *a*; antheræ ovate, riſing upright, 2 *c*, 3 *b*; germen ovate and villous, 4 *a*, 5 *a*, ending in a ſubulate ſtyle, 5 *b*; ſtigma acuminate, 5 *c*.

Ord. 3. *Saururus.* The amentum (or catkin) oblong, covered with flowers, 1; the proper perianthium monophyllous, ovate, lateral, coloured, and hairy, 2, 3; corolla none; filaments ſeven, filiform 3 *a*; antheræ oblong, erect, 3 *b*; germina four, ovate, 4 *a*; ſtyles thickiſh, ſubulate, 4 *b*; ſtigmas ſimple, acute, 4 *c*.

Claſs VIII. *Ord.* 1. *Oxanthera.* The perianthium monophyllous, the tube cylindraceous, the limb quadripartite, 1; corolla, four petals, obcordate, 2 *a*; inſerted in the diviſures of the calyx, 3; filaments eight, ſubulate, incurved, inſerted in the mouth of the calyx, ſhorter than the corolla, 2 *b*, 4 *a*; antheræ oblong, incumbent, 2 *c*, 4 *b*; germen cylindraceous, ſtanding under the corolla, 5 *a*; ſtyle filiform, of the length of the ſtamina, 5 *b*; ſtigmas quadrifid, thick, obtuſe, reflexed, 5 *c*.

Ord. 2. *Gobinia.* The perianthium ſmall, quadrifid, and concave, 1; corolla none; filaments eight, like hairs, 2 *a*; anthera divided into two lobes, 2 *b*, 3 *a*; germen nearly round, 2 *c*, 4 *a*; ſtyles two, ſimple, reflexed, 4 *b*; ſtigmas, ſimple, obtuſe, 4 *c*.

Ord. 3. *Polygonum.* The perianthium turbinate, on the outſide coloured, quinquepartite, 1 *a*, 2 *a*; corolla none, except the coloured calyx; filaments often eight, ſubulate, ſhort, 2 *b*, 3 *a*; antheras ſubrotundæ, incumbent, 2 *c*, 3 *b*; the germen triquetrous, 2 *d*, 4 *a*; ſtyles often three, filiform, very ſhort, 4 *b*; ſtigmas ſimple, 4 *c*.

Ord. 4. *Adansa.* The flowers terminating in a head, 1; perianthium below the flowers, biſid, ſpreading flat, 2; corolla monopetalous, quadrifid, ſpreading flat, 3 *a*; filaments eight, 3 *b*, 4 *a*; antheras ſubrotundæ, 3 *c*, 4 *b*; germen within the receptacle of the corolla, 3 *d*, 5 *a*; ſtyles four, ſimple, erect, 5 *b*; ſtigmas ſimple, 5 *c*.

Claſs IX. *Ord.* 1. *Caſſyta.* The perianthium triphyllous; the foliotes acute, concave, a little ſpreading, 1 *a*, 2 *a*; petals three, their margins from the middle to their

points

points convolute, 2 *b*; the nectarium is formed of three glands, coloured, truncate, the length of the germen, and ſtanding round it, 3 *a*, 4 *a*; filaments nine, 2 *c*, 4 *b*; antheras with three lobes, 4 *c*; germen ſtanding under the flower, 2 *d*, 4 *d*, 5 *a*; ſtyle 5 *b*; ſtigma trilobate, 5 *c*.

Ord. 2. *Rheum.* Calyx none; corolla monopetalous, the limb cut into ſix ſegments, 1 *a*; filaments nine, inſerted into the corolla, 1 *b*; antheras twins, 1 *c*; germen three-cornered, 2 *a*; ſtyles ſcarce any, 2 *b*; ſtigmas three, reflex, plumoſe, 2 *c*.

Ord. 3. *Butomus.* The involucrum ſimple, triphyllous, 1; petals ſix, 2 *a*; filaments nine, of which ſix are exterior, 3 *a*; antheras as if compoſed of two plates, 3 *b*; germens ſix, 4 *a*, terminating in ſtyles, 4 *b*; ſtigmas ſimple, growing to the inſide of the ſtyles. 4 *c*.

Claſs X. *Ord.* 1. *Kalmia.* The perianthium quinquepartite, 1; corolla monopetalous, partly hypocrateriform, and partly infundibuliform, cut into five ſegments 2 *a*; ten nectariferous horn-ſhaped cavities, which before the flower is perfectly blown contain the ſtamens and antheras like a ſheath, 2 *b*, 3 *a*; filaments ten, inſerted into the baſe of the corolla, 3 *b*; antheras ſimple, 3 *c*; germen roundiſh, 4 *a*; ſtyle filiform, 4 *b*; ſtigma obtuſe, 4 *c*.

Ord. 2. *Saxifraga.* The perianthium monophyllous, quinquepartite, 1; petals five, 2 *a*; filaments ten, 3 *a*; antheras ſubrotund, 3 *b*; germen roundiſh, tapering upwards, 3 *c*, 4 *a*, ſo as to form two ſhort ſtyles, 4 *b*; ſtigmas obtuſe, 4 *c*.

Ord. 3. *Stellaria.* The perianthium pentaphyllous, 1; petals five, bipartite, oblong, 2 *a*; filaments ten, every other ſhorter, 3 *a*; antheras heart-ſhaped, 3 *b*; germen ſubrotund, 3 *c*, 4 *a*; ſtyles three, 4 *b*; ſtigmas obtuſe, 4 *c*.

Ord. 4. *Oxalis.* The perianthium quinquepartite, 1; corolla monopetalous, quinquepartite, the ungues joined together at their baſes, 2 *a*; filaments ten, capillary, the exterior ſhorter than the interior, 3 *a*; antheras ſubrotund, furrowed, 3 *b*; germen quinquangular, 4 *a*; ſtyles five, filiform, 4 *b*; ſtigmas obtuſe, 4 *c*.

Ord. 5. *Pentaſtes.* Calyx none (except the corolla is taken for a coloured calyx); petals five, 1 *a*, 2 *a*; filaments ten (eight or twenty), 2 *b*; antheras ſubrotund, 2 *c*; germen orbicular, divided on the outſide by little bands or wreaths, 2 *d*, 3 *a*, terminating with ten (or eight) ſtyles, 3 *b*; ſtigmas ſimple, 3 *c*.

Claſs XI. *Ord.* 1. *Aſarum.* The perianthium monophyllous, bell-ſhaped, ſemitrifid, coriaceous, coloured, villous, 1; corolla none; filaments twelve, ſubulate, inſerted on the top of the germen, 2 *a*, 3 *a*; antheras oblong, joined to the middle of the filaments, 2 *b*, 3 *b*; germen below the calyx, and hid within its ſubſtance, 3 *c*, 4 *a*; ſtyle, a cylindraceous cone, hexagonal, 3 *d*, 4 *b*; ſtigma ſtar-ſhaped, 3 *e*, 4 *c*.

Ord. 2. *Ariſtolochia.* The perianthium monophyllous, quinquefid, ſitting on the top of the germen, 1 *a*; ſurrounded by another calyx, 1 *b*; petals five, and inſerted in the calyx, 2 *a*; filaments capillary, inſerted into the calyx, 2 *b*; antheras twins, 2 *c*; germen ſitting under the calyx, 2 *a*; ſtyles two, ſimple, 3 *b*; ſtigmas, 3 *c*.

Ord. 3. *Euphorbia.* Perianthium monophyllous, venticoſe, having at the mouth four teeth, ſometimes five, 1 *a*, 2 *a*; petals four, ſome few five, turbinated, gibbous, twelled, truncated, 1 *b*, 2 *b*, with the calycine denticles alternate, 2 *c*; the ungues faſtened to the margin of the calyx, 2 *a*; filaments many, twelve or more, filiform, articulated, inſerted on the receptacle, 3 *a*; antheras didymous, ſubrotund, 3 *b*; germen ſubrotund, triquetrous, with a footſtalk, 4 *a*; ſtyles three, biſid, 3 *b*; ſtigmas obtuſe, 4 *c*.

Ord. 5. *Semperviuum.* The perianthium divided into from ſix to twelve ſegments, with hairs round their margin, 1; petals, from ſix to twelve, a little larger than the calyx, 2 *a*; filaments from ſix to twelve, 2 *b*; antheræ, ſubrotund; before they diſcharge their pollen, ſubovate, 3 *a*, with four ſurrows, after the pollen is diſcharged, 3 *b*; germens, from ſix to twelve, placed in a circle, erect, 4 *a*, terminating in as many ſtyles, 4 *b*; ſtigmas, acute, villous, 4 *c*.

Claſs XII. *Ord.* 1. *Ponica.* The perianthium monophyllous, bell-ſhaped, quinquefid, 1; petals five, inſerted into the calyx, 2 *a*; filaments numerous, capillary, inſerted into the calyx, 3 *a*; antheras a little oblong, 3 *b*; germen placed below the calyx, 3 *c*, 4 *a*; ſtyle ſimple, 4 *b*; ſtigma headed, 4 *c*.

Ord. 2. *Crataegus.* The perianthium monophyllous, having five teeth, 1; petals five, inſerted in the calyx, 2 *a*; filaments twenty, inſerted in the calyx, 3 *a*; antheras ſubrotund, 3 *b*; germen below the flower, 4 *a*; ſtyles two, 4 *b*; ſtigmas, 4 *c*. N. B. Fig. 4. is a longitudinal ſection.

Ord. 3. *Sorbus.* The perianthium monophyllous, having five teeth, 1; petals five, ſeſſile, inſerted into the calyx, 2 *a*; filaments twenty, inſerted into the calyx, 2 *b*; antheras roundiſh, 2 *c*; germen ſtanding under the receptacle, 3 *a*; ſtyles three, 3 *b*; ſtigmas capitate, 3 *c*. N. B. Fig. 3. is a longitudinal ſection.

Ord. 4. *Pyrus.* The perianthium monophyllous, ſemiquinquefid, 1; petals five, inſerted into the calyx, 2 *a*, 3 *a*; filaments twenty, inſerted into the calyx. 3 *b*; antheras ſimple, 3 *c*; germen placed below the calyx, 3 *d*; ſtyles five, 3 *e*; ſtigmas ſimple, 3 *f*. N. B. Fig. 3 is a longitudinal ſection.

Ord. 5. *Rubus.* The perianthium monophyllous, quinquepartite, 1; petals five, inſerted in the calyx, 2 *a*; filaments many, inſerted in the calyx, 2 *b*; antheras ſubrotund, compreſſed, 2 *c*. 3; germens numerous, 4 *a*; ſtyles filiform, coming out of the ſides of the germens, 4 *b*; ſtigmas ſimple, 4 *c*.

Claſs XIII. *Ord* 1. (See *Tab.* V.) *Sarracenia.* The calyx is a double perianthium, the inferior with three ſmall leaves, 1 *a*, the ſuperior with five leaves, large and coloured, 1 *b*, 2 *a*; petals five, inflex, aſſurgent, betwixt the angles of the ſtigma, covering the ſtamens, embracing the top of the ſtigma, 2 *b*; filaments many, 3 *a*; antheras ſimple, 3 *b*; germen roundiſh, furrowed, 3 *c*; ſtyle cylindrical, growing thicker at the top. 3 *d*; ſtigma ſhield-ſhaped, the ſtyle inſerted in its middle, membranaceous, quinquangular, overſhading the ſtyle, germen, and ſtamens, like an umbrella, 2 *c*, 3 *e*.

Ord. 2. *Paeonia.* The perianthium pentaphyllous, the folioles ſubrotund, reflex, unequal in ſize and ſituation, 1; petals five, 2 *a*; filaments numerous, ſhort, about three hundred ſtanding in three circles round the germens, 3 *a*; antheras oblong, quadrangular, large, and quadrilocular, 3 *b*; germens two, ovate and downy, 3 *c*; ſtigmas recurvate, 3 *d*.

Ord. 3. *Aconitum.* Calyx none; petals five, unequal, the uppermoſt helmet-ſhaped and tumulate, the two lateral ones are broad, ſubrotund, oppoſite, connivent, the two undermoſt are oblong, bending downwards, 1 *a b c*; nectaria two, covered by the helmet-ſhaped petal, 1 *d*; filaments many, ſhort, 1 *e*, 2 *a*; antheras heart-ſhaped, 2 *b*; germens three (ſometimes five), 3 *a*, terminating in a ſtyle, 3 *b*; ſtigmas ſimple, acuminate, 3 *c*.

Ord. 5. *Aquilegia.* Calyx none; petals five, 1 *a*, 2 *a*; the nectaria five, equal, with the petals placed alternate, 1 *b*; each is horn-ſhaped, on the upper part gradually broad, aſcending obliquely on the outer ſide with an opening or mouth fixed on the inner ſide to the receptacle, 2; the baſe advancing to a long tube, growing narrower, the apex obtuſe, incurved; filaments from thirty to forty, the outer ſhort, 1 *c*, 3 *a*; antheras oblong, 3 *b*; germens five, 6 *a*, terminating in ſubulated ſtyles, longer than the ſtamens, 5 *c*, 6 *b*; ſtigmas ſimple, 5 *d*, 6 *c*; the germens are each covered with two paleæ, 5 *e*.

Ord. 6. *Stratiotes.* The ſpatha diphyllous, uniflorous, 1, 2 *a*, on both ſides carinated, the carinæ jagged with ſhort ſpines; perianthium monophyllous, tripartite, 2 *b*, 3; petals three, obcordate, 2 *c*; filaments twenty, ſhort, inſerted in the receptacle, 4 *a*; antheras ſimple, ſagittated, and lanceolated, 4 *b*; germen inferous, 5 *a*; ſtyles ſix, bipartite, 5 *b*, longer than the ſtamens; ſtigmas ſimple, 5 *c*.

Ord. 7. *Ranunculus.* The perianthium pentaphyllous, 1; petals five, 2; the nectarium at the ungues of each petal hath a hollow or cavity, 3 *a*; the eſſential character conſiſts in the nectarium, the other parts being commonly inconſtant and different, which when unknown, cauſes a great deal of confuſion; the nectarium is in ſome ſpecies only an open pore, in others ſurrounded with a cylindraceous margin, and ſome few cloſed by an emarginated ſcale; filaments many, four in the magnified one, 4 *a*; antheras oblong, twins, 4, in the magnified one, *b*; germens numerous, collected in a ſmall head, 5 *a*; ſtyles none, ſtigmas reflexed, very ſmall; a germen magnified, 5 *b*; its ſtigma 5 *c*.

Claſs XIV. *Ord.* 1. *Melittis.* The perianthium monophyllous, bell-ſhaped, villous, the mouth bilabiate, the upper lip higher, the inferior lip ſhorter and trifid, 1; corolla monopetalous, gaping, the tube long and narrow, the upper lip erect, the inferior, patent, trifid, 2; filaments four, the inner ones ſhorter than the outer, 3 *a*; antheras in pairs, croſs ways, biſid, 3 *b*; germen quadrifid, villous, 4 *a*; ſtyle filiform, 4 *b*; ſtigma biſid, 4 *c*.

Ord. 2. *Mellanthus.* The perianthium large, quinquepartite; the ſuperior lacinias erect, oblong, 1 *a*, the under lacinia very ſhort, 1 *b*, ſhaped like a bag, downwards gibbous; the two middle lacinias lanceolate, 1 *c*; petals five, the upper one erect, 2 *a*; the other four on the upperſide patent, reflexed at the apex, 2 *b*; the

nectarium is in the undermoſt lacinia of the calyx; 3 filaments four, 2 c; antheras cordate, oblong, on the fore part quadrilocular, 2 d; germen tetragonous, ending in four knobs, 3 a; ſtyle, 3 b; ſtigma, quadrifid, 3 c.

Claſs XV. *Ord.* 1. *Lunaria.* The perianthium tetraphyllous, the folioles ſpread at their apex, two of them are gibbous at the baſe like a ſack, 1; corolla tetrapetalous, each petal terminating with an unguis, the length of the calyx, 2 a; filaments ſix, four longer and two ſhorter, 3 a; antheras, 3 b; germen on a pedicle, 3 c; ſtyle of a conic form, 3 d; ſtigma, 3 e.

Ord. 2. *Cheiranthus.* The perianthium tetraphyllous, the two exterior folioles are gibbous at their baſe, 1; corolla tetrapetalous, 2 a; filaments ſix, four longer and two ſhorter, 3 a; antheras biſid at the baſe, 3 b; germen, in ſhape of a priſm, tetragonous, 3 c; ſtyle ſhort, 3 d; ſtigma bipartite, 3 e.

Claſs XVI. *Ord.* 1. *Hermannia.* The perianthium monophyllous, quinquefid, 1; corolla pentapetalous, 2 a, twiſting from the right to the left, 3 (N. B. Fig. 3 is magnified); the ungues of the petals on both ſides are provided with a nectariferous membrane, rolled up lengthway, and in form of a tube, 4; filaments five, joined together in one body at the baſe, 5 a; antheras, 5 b; germen ſubrotund, pentagonous, quinquangular, 6 a; ſtyles five, ſtanding near each other, 6 b; ſtigmas, ſimple, 6 c.

Ord. 2. *Geranium.* The perianthium monophyllous, quinquepartite, 1; petals five, 2 a; filaments ten, five longer, five ſhorter, alternately, 3 a; antheras turn on the apex of the filament like the needle of a compaſs, 3 b; germen quinquangular, having a beak like that of a crane, 4 a; ſtyle, 4 b; ſtigmas five reflexed, 4 c.—N. B. The African geraniums have commonly the calyx at the baſe, tubulous and monophyllous, the petals unequal, the filaments at their baſe ſlightly grown together, generally no more than ſeven antheras, their ſeeds uncovered with long feathery beards. The European geraniums, &c. have a calyx conſiſting of ſix leaves.

Ord. 4. *Pentapetes.* The involucrum uniflorous, triphyllous, 1 a, 2 a; the perianthium monophyllous, quinquepartite, 1 b, 2 b; corolla monopetalous, the tube ſhort, the limb quinquepartite, 3 a; filaments fifteen, connected at the baſe into a tube, 3 b, 4 a; five filaments long, without antheras or farina, between two or three filaments with their antheræ, ſtands one of the longer ones, without their antheræ, 4 b; antheræ, 5 a, 4 c; germen ſubrotund, with five furrows, 5 a; ſtyle, cylindraceous, 5 b; ſtigma, 5 c.

Ord. 5. *Alcea.* The perianthium double; the exterior monophyllous, divided into ſix ſegments, 1 a, the interior monophyllous, ſemiquinquefid, 1 b; petals five, joined together at their baſe, 2 a; filaments numerous, forming at the baſe a pentagonous cylinder, inſerted into the corolla, 2 b, 3 a; antheras reniform, 3 b; germen orbicular, 1 c; ſtyle cylindraceous, 1 d; ſtigmas numerous (twenty), 1 e.

Claſs XVII. *Ord.* 1. *Fumaria.* The perianthium diphyllous, 1, 2 a; corolla oblong, tubulated, gaping, 2 b; filaments two, each incloſed in its lip, 3 a; antheras three, terminating each filament, 3 b; germen oblong, 3 c, 4 a; ſtyle the length of the filaments in this ſpecies, 3 d, 4 b; ſtigma, 3 e, 4 c.

Ord. 3. *Polygala.* The perianthium tripartite, 1; one of the foliages ſtands above the corolla, and two below it, 2 a; corolla butterfly-ſhaped, the number of petals undetermined, 3; the wings, 3 a; the vexillum (or ſtandard), 3 b; filaments diadelphous, eight in one body, 4 a; antheras eight, 4 b; germen oblong, 5 a; ſtyle, 5 b; ſtigma terminates with a navel, 5 c.

Ord. 4. *Lathyrus.* The perianthium monophyllous, ſemiquinquefid, campanulate, 1; corolla butterfly-ſhaped, 2; the carina (or keel), 2 a, opens in the middle internally; filaments diadelphous, one ſtamen ſtanding by itſelf, the others in one body divided into nine, 3 a; antheras, 3 b; germen oblong 4 a; ſtyle, 4 b; ſtigma willous, 4 c.

Claſs XVIII. *Ord.* 1. *Theobroma.* The perianthium quinquepartite, the foliages plain with three nerves, 1; petals five, with five nerves, inſerted by the unguis into the ſquamas of the exterior nectarium under and within its apex, 2 a; filaments five, ſhort, between the ſquamas of the interior nectarium, as the antheras, which are from three to ſeven, in each family, grow on the outſide of the nectarium; the antheras are didymous, divaricated, uniform, and yellow, 3 a; germen ſtanding above the flowers, cylindraceous, quinquangular, 4 a; ſtyles five, approximate, 4 b; ſtigmas, 4 c.

Ord. 2. *Citrus.* The perianthium monophyllous, quinquedentate, 1; petals five, 2 a; filaments often twenty, ſtanding in a circle or cylinder, joined together in many or few ſmall bodies, 3 a; antheras, 3 b; germen, 4 a; ſtyle, 4 b; ſtigma globoſe, hath within nine loculaments, 4 c; the ſtigma magnified, 4 d.

Ord. 3. *Hypericum.* The perianthium quinquepartite, 1; petals five, having round the margin, in this ſpecies, glandules, 2 a, 3 a; filaments numerous, grown together at the baſe in five or ſix phalanxes, 3 b; antheras ſmall, on both ſides canaliculated; on the apex a black gland, 4 a; germen ovate, in this ſpecies, 5 a; ſtyles three, ſpreading, 5 b; ſtigmas, 5 c.

Claſs XIX. *Ord.* 1. (See *Tab.* VI.) *Leontodon.* The common calyx, 1; the interior ſcales linear, 1 a; the exterior ſcales fewer, often reflexed, 2 a; the compound corolla, 2; the corollulas, of which it is compoſed, being hermaphrodite, 3; the proper corolla monopetalous, quinquedentate, 3; filaments five, 4 a; antheræ cylindraceous, tubuloſe, 4 b; germen, 5 a; ſtyle, 5 b; ſtigmas two, revolute, 5 c.

Ord. 2. *Xeranthemum.* The common calyx, 1; the compound corolla unequal, in which the hermaphrodite corollulas are very numerous, tubular, placed in the diſk; the female corollulas leſs numerous, tubular, placed in the circumference, 2 a, 3 a; the firſt, being the proper corollas of the hermaphrodite floſcules, are funnel-ſhaped, much ſhorter than the calyx, the limb quinquefid, 4, 5; the ſecond, being the proper corollas of the female floſcules, are tubular, 6 a; ſtamens of the hermaphrodite flowers have five ſhort filaments, 5 a; antheræ cylindraceous, tubular, 5 b; germen of the hermaphrodites ſhort, coronate, crowned in this ſpecies with a crown of five ſtraccous points, 4 a; the ſtyle filiform, 5 c; ſtigma biſid, 5 d; germen of the females as in the hermaphrodites, 6, 7; ſtyle, 7 a; ſtigma, elevate, 7 b.

Ord. 3. *Hellianthus.* The calyx, 1; the compound corolla radiate, its corollulas are either thoſe of hermaphrodite floſcules, numerous, and placed in the diſk, 2 a, or thoſe of the female floſcules, leſs numerous, much longer, and placed in the radius, 2 b; the proper corolla of the hermaphrodite floſculeslare cylindraceous, 3; the proper corolla of the female floſcules in the form of a tongue, 4; filaments of the hermaphrodites, five, 5 a; antheræ cylindraceous, 3 a, 5 b; germen of the hermaphrodite floſcules oblong, 5 c; ſtyle filiform, 5 d; ſtigma bipartite, reflex, 5 e; germen of the female floſcules ſmall, 4 a; ſtyle none; ſtigma none.

Ord. 4. *Calendula.* The common calyx ſimple, 1; the corolla a compound radiated flower, 2; the hermaphrodite corollulas many in the diſk, 3 a; the female corollulas many, 3 b; the proper hermaphrodites tubulous, 4; the limb quinquefid, 4 a; the female tongue-ſhaped, 5, with three teeth, 5 a; filaments of the hermaphrodite five, 6 a; antheras cylindraceous, tubulous, 6 b; germen of the hermaphrodite oblong, 6 c; ſtyle filiform, 6 d; ſtigma biſid, 6 e; germen of the female oblong, trigonous, 5 b; ſtyle filiform, 5 c; ſtigmas two, 5 d.

Ord. 5. *Echinops.* The calyx a common one, containing many flowers, 1 a; the partial perianthium uniflorous, 2 a; corolla monopetalous, funnel-ſhaped, the border divided into five, reflex, ſpreading, 2 b; filaments five, like hairs, ſhort, 3 a; antheras cylindraceous, with five teeth 3 b; germens oblong, 4 a; ſtyle filiform, 4 b; ſtigma double, 4 c.

Ord. 6. *Lobelia.* The perianthium monophyllous, quinquedentate, growing round the germen, 1 a; corolla monopetalous, the tube cylindraceous, 1 b; the limb quinquepartite, 1 c; filaments five, 2 a; antheras growing together in the form of an oblong cylinder, 2 b; germen, 3 a; ſtyle cylindraceous, 3 b; ſtigma, 3 c.

Claſs XX. *Ord.* 1. *Orchis.* The calyx, the ſpatha, 1 a; the ſpadix, 1 b; perianthium none; petals five, the two interior form a helmet, 2 a; filaments two, 2 b; antheras, 2 c; germen oblong, 2 d; ſtyle, 2 e; ſtigma, 2 f.

Ord. 2. *Stylidium.* Calyx an univerſal ſpatha, diphyllous, 1; petals ſix, 2 a; filaments three, ſtriking from the outward coat of the ſtyle, 3 a; antheræ biſid at their lower end, fixed to the ſtyle at the bottom of the ſtigma, 3 b; germen, 3 c; ſtyle, 3 d; ſtigma trifid, 3 e.

Ord. 4. *Paſſiflora.* The involucrum three-leaved, placed ſo as to leave ſome ſpace betwixt it and the flower, 2 a; calyx a perianthium monophyllous, quinquepartite, the keel ending in a hooked briſtle, 2, 2 a; petals five, 2 c, 3 b; nectarium a triple crown, ſurrounding the piſtillum, divided into rays, 4 a, 5 a; filaments five, fixed to the column, growing together at the baſe, 5 a; antheræ, 5 b; germen, 5 c; ſtyles three, 5 d; ſtigmas, 5 e.

Ord. 5. *Ariſtolochia.* Calyx none; corolla monopetalous, tubulous, the limb dilated, 1; filaments none; an-

theras fix, quadrilocular, at their base joined to the ſtigmas, 2 *a*; germen oblong, ſtanding below the flower, angular, 2 *b*; ſtyle ſcarce any; ſtigma ſubglobоſe, ſexpartite, concave, 3 *c*.

Ord. 7. *Arum.* The calyx, the ſpatha, monophyllous, 1; the ſpadix club-ſhaped, 2 *a*; below ſurrounded with germens, 2 *b*; corolla none; filaments none, otherwiſe than like nectarias, which are thickiſh at their baſe, 2 *c*; terminating in a filiform cirrhis or tendrils, 2 *d*; in a double order, coming out in the middle of the ſpadix; antheras many, ſeſſile, tetragonous, between the double order of the cirrhis or tendrils, 2 *e*, joined to the ſpadix; germens many, covering the baſe of the ſpadix, 2 *f*; ſtyles none; ſtigmas being a beard of little hairs, 2 *g*.

Claſs XXI. *Ord.* 1. *Zannichellia.* Male flowers; the calyx monophyllous, tridentated at the mouth, 1; corolla none; filament one, 1 *a*; anthera ſagittated, 1 *b*.

Female flower cloſe to the male; the calyx a monophyllous perianthium, ſcarce viſible, 2; corolla none; germens four, 3 *a*; ſtyles four, 3 *b*; ſtigmas four 3 *c*.

Ord. 3. *Triſpacum.* The male flowers; the calyx a glume or chaff, bearing on each ſide two flowers, having two valves, 1; corolla the chaff, bivalve, 1, 2; filaments three, 3 *a*; antheras, 3 *b*.

The female flowers; the calyx, the chaff, divided into two or four, 4; at the baſe winding into a gaping hollow, 5 *a*; the corolla, the chaff, having three valves, 6; germen oblong, 7 *a*; ſtyles two, 7 *b*; ſtigmas hairy, 7 *c*.

Ord. 4. *Urtica.* The male flowers; the perianthium tetraphyllous; the folioles have a prickle at the apex, 1; petals none; filaments four, 1 *a*; antheras bilocular, 1 *b*.

Female flowers, 7; the perianthium two valves, 3, 4 *a*; corolla none; germen, 4 *a*; ſtyles none; ſtigma, 4 *b*.

Ord. 5. *Parthenium.* The common perianthium ſimple, pentaphyllous, 1; corolla compound and convex; the hermaphrodite corollules are many in the diſk, 2 *a*; the females ſtanding round the hermaphrodites, five in the radius, 2 *b*; the property of the hermaprodite florets monopetalous, 3; tubulous, the mouth quinquefid, 3, 4; the female florets monopetalous, 5, 6, tubulous, the filaments of the hermaphrodites five, capillary, 7 *a*; antheras, 7 *b*; germen of the hermaphrodites within its proper receptacle, hardly to be obſerved, 4 *a*, 7 *c*; ſtyle capillary, 3 *a*; ſtigma none; germen of the females below the flower, 6 *a*; in form of a top, heart-ſhaped, compreſſed, large; ſtyle filiform, 6 *b*; ſtigma two, filiform, 6 *c*.

Ord. 8. *Juglans.* The male flowers diſpoſed in an oblong amentum, 1; the calyx, the common amentum, all over looſely imbricated, in form of a cylinder, conſiſting of uniflorous ſcales, 2; each fixed in the centre on the outſide of the corolla, bending outwards, 3; corolla ſexpartite, with footſtalks, 2 *a*; inſerted both in the inner centre of the corolla and the rachis, 1 *a*; filaments many (eighteen), very ſhort, 4 *a*; antheras, 4 *b*.

The female flowers have no amentum, two or three are ſitting on the ſame plant, and are ſeſſile, 5; calyx is the perianthium, it is quadrifid, 6 *a*; corolla quadripartite, acute, erect, 6 *b*; germen oval, 7 *a*; ſtyles two, very ſhort, 7 *b*; ſtigma large, on the top lacerated, 7 *c*.

Ord. 9. *Pinus.* The male flowers growing in a ſpike, 1; calyx, the ſcales of the gem, open during the flowering time; thoſe near the baſe and apex ſteril. 1 *b*, *c*; corolla none, unleſs the little ſcales which adhere to the antheras may be ſo called, 2 *a*; filaments many, growing round a column, in little oval ſpikes, 1 *d*, 3 *a*; antheras oval, after the diſcharge of the pollen they become flexulous and lacerated, 3 *b*; endowed with dorſal ſcales, 3; theſe ſcales are oblong, tapering at both ends.

The female flowers on the ſame plant, 4; the calyx, the common catkin, ovate, conſiſting of ſcales, of which each contains two flowers, 5; corolla none; germen elevated, ſmall, 5 *a*; ſtyle, 5 *b*; ſtigma hairy, 5 *c*.

Ord. 10. *Momordica.* The male flowers; the perianthium monophyllous, concave, quinquefid, 1; corolla quinquepartite, 2; filaments three, 3 *a*; antheras in two of the filaments are biſid, having ears on both ſides, 3 *b*; the third having only on one ſide an ear.

Female flowers on the ſame plant with the male, 4; perianthium monophyllous, ſtanding above the germen, quinquepartite, 5 *a*; corolla as in the male, 4 *a*; filaments three, very ſhort, without antheras, 5 *b*; germen ſtanding below the flowers, of a conic form, large, 5 *c*; ſtyle one, 5 *d*; ſtigmas three, 5 *e*, 6 *a*.

Ord. 11. *Andrachne.* The male flowers, 1; perianthium pentaphyllous, 2; petals five, 1 *a*; nectaria one within each petal, 1 *b*; filaments five inſerted at the baſe of the ſtyle, 3 *a*; antheras, 3 *b*.

The female flowers on the ſame plant with the males, 4; perianthium pentaphyllous, 4 a; petals none; nectaria the ſame as in the male flowers; germen globoſe, 5 *a*; ſtyles three, bipartite, 5 *b*; ſtigmas globoſe, 5 *c*.

Claſs XXII. *Ord.* 2. (See *Tab.* VII.) *Salix.* The male, 1; the calyx, the common amentum, oblong, with an involucrum formed of the gem, 1 *a*; conſiſting of ſquamas, having one flower, 2; petals none; nectarium a cylindraceous gland in the centre of the flowers, 2 *a*; filaments two, 2 *b*; antheras didymous, quadrilocular, 2 *c*.

The female, 3; the amentum and ſquamas the ſame as in the male; corolla none; germen ovate, 4 *a*; attenuated into a taper ſtyle, not very diſtinct, 4 *b*; ſtigmas two, biſid, revolute, 4 *c*.

Ord. 3. *Empetrum.* The male, 1; perianthium tripartite, 2; petals three, 1 *a*; filaments three, 1 *b*; antheras bipartite, 1 *c*.

The female, 3; perianthium and petals as in the male; germen depreſſed, 4 *a*; ſtyle ſcarce any; ſtigmas nine, 4 *b*.

Ord. 4. *Viſcum.* The male, 1; perianthium quadripartite, 2; corolla none; filaments none; antheras four, oblong, acuminate, one joined to each of the calycine folioles, 1 *b*, 3 *a*.

The female very often oppoſite to the male flowers, 4; perianthium tetraphyllous, fixed on the germen, 5 *a*; corolla none; germen oblong, trigonous, 6 *a*; ſtyles none; ſtigma obtuſe, 6 *b*.

Ord. 5. *Humulus.* The male, 1; perianthium pentaphyllous, 1 *a*; corolla none; filaments five, 1 *b*; antheras with four furrows, 1 *c*.

The females, 2; univerſal involucrum quadripartite, 2 *a*; the partial involucra tetraphyllous, 3 *a*; the folioles ſubrotund and ovate, having eight flowers, 3 *b*; each flower hath its perianthium monophyllous, 4; corolla none; germen, 5 *a*; ſtyles two, 5 *b*; ſtigmas, 5 *c*.

Ord. 6. *Tamus.* The male, 1; perianthium ſexpartite, 1 *a*; corolla none; filaments ſix, 1 *b*; antheras 1 *c*.

The female, 2; perianthium monophyllous, ſexpartite, ſitting on the apex of the germen, 2 *a*; petals none; nectarium an oblong point, adhering to the baſe of every ſingle ſegment of the perianthium, 2 *b*; germen ovately oblong, ſtanding under the calyx, 2 *c*; ſtyle cylindraceous, 2 *d*; ſtigmas three, 2 *e*.

Ord. 7. *Populus.* The male, 1; the common amentum oblong, conſiſting of uniflorous ſquamas, 1 *a*, 2; petals none; filaments eight, 1 *b*; anthera tetragonous, large, 1 *c*.

The female, 3; amentum and ſquamas as in the male, 4; germen ovate, narrow at both ends, 3 *a*; ſtyle ſcarcely to be obſerved, 3 *b*; ſtigma quadrifid, 3 *c*.

Ord. 8. *Mercurialis.* The male, 1; perianthium tripartite, 1 *a*; corolla none; filaments nine or twelve, 1 *b*; antheras globoſe, didymous, 1 *c*.

The female, 2; perianthium as in the male; corolla none; nectaria two ſharp points, one on each ſide of the germen, 2 *a*; germen roundiſh, 2 *b*; ſtyles two, reflexed, 2 *c*; ſtigmas acute, reflexed, 2 *d*.

Ord. 9. *Kiggelaria.* Male, 1; perianthium monophyllous, quinquepartite, 1 *a*; petals five, longer than the calyx, 1 *b*; nectaria five, obtuſe, with three lobes, 1 *c*; filaments ten, 2 *a*; antheras 2 *b*.

The female, 3; calyx the ſame as in the male; corolla the ſame as in the male; germen ſubrotund, 3 *a*; ſtyles five, 3 *b*; ſtigmas obtuſe, 3 *c*.

Ord. 10. *Meniſpermum.* Male, 1; perianthium hexaphyllous, 1 *a*; petals eight, 2 *a*; filaments ſixteen, cylindric, 3 *a*; anthera, 3 *b*.

Female, 4; calyx and corolla the ſame as in the male; filaments eight, ſimilar to thoſe of the male, 4 *a*; antheras pellucid. ſterile, 4 *b*; germens two or three, ſtanding on a pedicle, 5 *a*; ſtyles, 5 *b*; ſtigmas, 5 *c*.

Ord. 11. *Cliffortia.* Male, 1; perianthium triphyllous, 1 *a*; corolla none; filaments about thirty, 1 *b*; anthera didymous, 1 *c*.

Female, 2; perianthium triphyllous, 2 *a*; corolla none; germen, 3 *a*; ſtyles two, feathery, 3 *b*; ſtigmas, 3 *c*.

Ord. 12. *Juniperus.* Male, 1; the amentum in form of a cone, having a common rachis, 2 *a*; to which there are three oppoſite flowers, 2 *b*; the tenth flower terminating the amentum, each flower ſerving for a baſe fixed to the pedicle of the column; corolla none; filaments (in the terminating flowers) three, at the baſe joined in one body, in the lateral flowers ſcarcely to be obſerved, 3 *a*; antheras three, ſeparate in the terminating flowers, 3 *b*; in the lateral ones fixed to the ſcales of the calyx, 4.

The female, 5; perianthium tripartite, joined with the germen, 5 *a*; petals three, 5 *b*; germen below the flower, 6 *a*; ſtyles three, 6 *b*; ſtigmas, 6 *c*.

Ord. 13. *Ruſcus.* Male, 1; perianthium hexaphyllous, 1 *a*; petals none; nectarium, 1 *b*; filaments none; antheras three, inſerted on the apex of the nectarium, at their baſe coherent, 1 *c*.

Female, 2; perianthium as in the male; petals as in the male; nectarium as in the male; germen bid within the nectarium, 3 *a*; ſtyle cylindraceous, 3 *b*; ſtigma, 3 *c*.

Ord. 14. *Clutia.* Male 1; perianthium pentaphyllous, 1 *a*; petals five, ſhorter than the calyx, 1 *b*; the exterior nectaria tripartite, placed within the petals, 2 *a*; the interior nectaria, 2 *b*; filaments five, fixed in the middle of the ſtyle, ſpreading horizontally, 1 *c*; antheras ſubrotund, 1 *d*; germen none; ſtyle cylindraceous, club-ſhaped, 1 *e*.

Female, 3; perianthium as in the male; petals as in the male; nectaria exterior none; the interior five, in pairs, ſituated as in the male, 3 *a*; germen ſtanding above the flower, 3 *b*; ſtyles three, bifid, 3 *c*; ſtigmas, 3 *d*.

Claſs XXIII. *Ord.* 1. *Veratrum.* Hermaphrodite flowers, 1; calyx none, except the corolla be taken for it, 1 *a*; which conſiſts of ſix petals; filaments ſix, 1 *b*; anthera quadrangular, 1 *c*; germens three, 2 *a*; ſtyles three, 2 *b*; ſtigmas, 2 *c*.

The male flowers on the ſame plant, below the females, 2; calyx, corolla, and ſtamens the ſame as in the hermaphrodite.

Ord. 2. *Fraxinus.* Hermaphrodite flower, 1; calyx none; ſometimes it hath a monophyllous perianthium, quadripartite, 1 *a*; corolla none; ſometimes it hath four petals, 1 *b*; filaments two, 1 *c*; antheras having four furrows, 1 *d*; germen ovate, 1 *e*; ſtyle cylindraceous, 1 *f*; ſtigma, 1 *g*.

The female, 2; all as in the hermaphrodite. The common female aſh has very often ſome hermaphrodite flowers interſperſed; and the hermaphrodite female flowers have neither calyx nor corolla. The flowering aſh having both a corolla and a calyx, is always a true hermaphrodite, and without male flowers intermixt.]

Ord. 3. *Ficus.* Calyx a common one, obovate, large, fleſhy, concave, ſhut up with many ſcales, 1; the ſcales magnified, 2 *a*; whoſe interior ſurface is all over covered with florets, of which the uppermoſt approaching the calycine margin are hermaphrodites, and are few, 2 *b*; thoſe underneath are females, which are numerous, 2 *c*; the hermaphrodite flowers, each whereof ſitting on a peduncle, 3; the proper perianthium, tripartite, 3 *a*, 4 *a*; corolla tetrapetalous, fixed at the baſe of the ſtamens, 4 *b*; filaments four, 4 *c*; antheras two in the middle of each filament, 4 *d*; germen oval, 3 *b*; ſtyle, 3 *c*; ſtigma, 3 *d*.

The female flowers, each whereof ſitting on a peduncle, 5; the proper perianthium quinquepartite, 5 *a*; corolla none; germen oval, 5 *b*; ſtyle coming out on one ſide of the apex of the germen, 5 *c*; ſtigmas two, 5 *d*.—N. B. The fructification ſhould be examined a little before the maturity of the fruit. The fruit of a fig is not a pericarpium, but a receptacle, the interior ſides of which ſupport the flowers with the fructification.

Claſs XXIV. *Ord.* 1. *Polypodium.* The ſtipes on the forepart channeled, 1 *a*, 2 *a*; on the hind part rounded, covered with cheſſy ſcales; the front is oblong, acute, bipinnate, branches alternate, 1 *b*, ſpreading, lanceolate, pinnate; the pinnæ for the moſt part alternate, ſeſſile, grown together at the baſe; the fructification in rows, 3 *a*; one row on each ſide of the mid-rib; the clypei (or ſhields) membranaceous, 4, orbiculate, peltate, 5; pedunculated, is at the time of flowering, flat, covering the fructifications, 4; after the flowering reflexed, 6, lacerated, deciduous; the capſular globules roundiſh, 6 *a*, numerous, faſciculated, on ſmall foot-ſtalks, 7; the upper ſide of the clypeus (or ſhield) magnified, 4; the under ſide 5; the clypeus after the flowering reflexed, with mature globules, 6; the whole cluſter of globules diſengaged from the pinna and the clypeus, 8; the ſame diſengaged from the pinna, and ſtill adhering to the clypeus, 9; a few globules with their foot-ſtalks, 7; a ſingle globule in the ſtate of flowering, rough on the upper part, half-way down, with ſmall tubercles, and four ſhallow wrinkles, 10; the ſame nearly ripe, 11; the ſame ripe, the roughneſs and wrinkles being then vaniſhed, 12; the ſame burſt in two, throwing out the ſeeds, 13; the ſame empty, 14; the ſeeds, 15; the conceptacle of the ſeeds, 16. N. B. The ſtrons is a ſpecies of trunk, whoſe branches and leaves are blended together, and generally united with the fructification, which is only applicable to ferns and palms; and the ſtipes is the baſe of this trunk in palms, ferns, and muſhrooms.

Ord. 2. *Bryum.* Calyx, the calyptra, 1, 2, 3, 4 *a*; anthera, ſubrotund or oblong, 5 *a*; the mouth with a little cuſhated ring, covered with a conic operculum, 6 *a*; receptacle, no apophyſis; perichetium none, but a tubercle for the baſe of the pedunele; root, fibrous, 2 *a*; trunk erect, ſomewhat branched, 2 *b*; leaves, 2 *c*; capſule, at firſt erect, 2, green, afterwards pendulous, 7, and reddiſh; the operculum magnified, 8 *a*; *fig.* 7, the moſs in its early ſtate with its calyptra, *a*; *fig.* 3 *a*, the calyptra taken off; *fig.* 4, as the moſs increaſes, the calyptra *a* withers: *fig.* 6, as the calyptra increaſes it becomes pendulous; *fig.* 8, the operculum *a* taken off to diſcharge the ſeeds *b*; *fig.* 10, a longitudinal ſection, to ſhew how the petals or fetæ are placed within, and how the anthera is fixed to the operculum *a*; *fig.* 11. 5, when the operculum *(a)* is taken off, the outer row of petals or fetæ ſpring back, but the inner remain erect; each row contains fifteen petals, but in leſs than ſix or ten ſeconds, fold themſelves up as in *fig.* 8 and 12; *fig.* 9. a longitudinal ſection of the ſame; *fig.* 11. the operculum on the inner ſide with the anthera *a*; *fig.* 12. the anthera taken out of the operculum *a*; fig. 13. a horizontal ſection of the operculum with the anthera, much magnified *a*; *fig.* 14. the ſituation of the petals or fetæ greatly magnified, *p*; fig. 15. two leaves, the outſide *c*, the inſide *i*.

Ord. 3. *Fucus.* Root fibrous, 1 *a*; leaves linear, cartilaginous, ſmooth, without joints, very branched, the branches alternate, the little branches many on each ſide alternately, 1, 2; in *fig.* 2. the branches are magnified, the fruit, the veſicles lateral, ſcattered without order, ſeſſile globous, black, the ſize of poppy ſeeds; *fig.* 3. is a veſicle magnified.

Ord. 4. *Agaricus.* The fungus horizontal with thin plates underneath, 2; the ſtem erect, cylindraceous, ſtriated, white, ſolid, bulbous at the baſe, 1 *c*, 2 *c*; the volva or calyx growing in the middle, 1 *a*, 2 *a*; the cap convex, white, ſomewhat lacerated and ſquamated, 1 *b*; the lamellæ or thin plates, 2, 3, 4, a little convex, entire, a ſingle lamella, 4 *a*, at firſt reddiſh 5 *a*, afterwards a brown black, 2, 3, 4; a ſection, *fig.* 3. a maſs of old horſe dung, collected by the gardeners, wherein are lodged white threds or filaments, 6 *a*, which contain the ſeeds or cauſes of muſhrooms; a ſingle thred or filament 7; the manner in which the fungi firſt appear *b*; a fungus on it's under ſide, before it expands itſelf, to ſhew how the pileus and the volva are connected, 8; a vertical ſection of the ſame, 5.

ORDER, in *War*, denotes an arrangement of the parts of an ARMY, either by land or ſea; whether for marching, ſailing, or engaging.

ORDER *of battle*. See BATTLE and LINE.

An ORDER *of march* is diſpoſed in two or three columns, according to the ground. The *orders* and EVOLUTIONS make the ſubject of the ſcience of tactics.

ORDER is more particularly uſed for the equal diſtance of one rank or file, from another.

The uſual *order* in files is three feet; in ranks ſix feet. The open or marching *order* is twice as much.

ORDERLY *ſerjeant*, and ORDERLY *man*, in *Military Language*, are thoſe who are appointed to attend on general officers, or ſuch other officers as are entitled to ſuch, who walk behind them with their arms.

ORDERLY *book*, is a book provided for every company, in which the ſerjeants write down both general and regimental *orders*, that the officers may read them.

ORDERS, in *Law*, are of ſeveral ſorts, and by divers courts; as of the Chancery, King's Bench, &c. *Orders* of the Court of Chancery, either of courſe or otherwiſe, are obtained on the petition or motion of one of the parties in a cauſe, or of ſome other intereſted in, or affected by it; and they are ſometimes made upon hearing, and ſometimes by conſent of parties. Pract. Solic. 26.

ORDERS, in a *Military Senſe*, denote all that is lawfully commanded by ſuperior officers. Thus, *orders* are given out every day, whether in camp, garriſon, or on a march, by the commanding officer; which *orders* are afterwards given to every officer in writing by their reſpective ſerjeants.

ORDERS, by way of eminency, or *holy* ORDERS, denote a character peculiar to eccleſiaſtics, whereby they are ſet apart for the miniſtry.

This the Romaniſts make their ſixth ſacrament.

In the reformed churches there are but three *orders*; viz. biſhops, prieſts, and deacons. In the Romiſh church there are ſeven, excluſive of the epiſcopate: all which the council of Trent enjoins to be received, and believed, on pain of anathema.

They are diſtinguiſhed into *petty*, or *ſecular orders*; and *major*, or *ſacred orders*.

ORDERS, *the petty*, or *minor*, are four; viz. thoſe of door-keeper, exorciſt, reader, and acolyth.

Thoſe in petty *orders* may marry without any diſpenſation: in effect, the petty *orders* are looked on as little other than formalities, and as degrees neceſſary to arrive at the higher *orders*. Yet the council of Trent is very ſerious about them: enjoins that none be admitted into them, without underſtanding Latin; and recommends it to the biſhops,

to

to observe the intervals of conferring them, that the perſons may have a ſufficient time to exerciſe the function of each *order*: but it leaves the biſhops a power of diſpenſing with thoſe rules; ſo that the four *orders* are uſually conferred the ſame day, and only make the firſt part of the ceremony of ordination.

The Greeks diſavow theſe petty *orders*, and paſs immediately to the ſubdiaconate; and the reformed to the diaconate.

Their firſt riſe Fleury dates in the time of the emperor Juſtinian. There is no call nor benefice required for the four petty *orders*; and a baſtard may even enjoy them without any diſpenſation; nor does bigamy diſqualify.

ORDERS, *ſacred*, or *major*, we have already obſerved, are three: viz. thoſe of deacon, prieſt, and biſhop.

The council of Trent retrieving the ancient diſcipline, forbids any perſon being admitted to the major *orders*, unleſs he be in peaceable poſſeſſion of a benefice ſufficient for a decent ſubſiſtence; allowing no ordinations on patrimonies or penſions; except where the biſhop judges it for the ſervice of the church.

A perſon is ſaid to be promoted to *orders per ſaltum*, when he has not before paſſed the inferior *orders*. The council of Conſtantinople forbids any biſhop being ordained without paſſing all the degrees; yet church hiſtory furniſhes us with inſtances of biſhops conſecrated, without having paſſed the *order* of prieſthood; and Panormus ſtill thinks ſuch an ordination valid.

ORDERS, *military*, are companies of knights, inſtituted by kings and princes; either for defence of the faith, or to confer marks of honour, and make diſtinctions among their ſubjects.

There have been five *orders*, purely military, in England; viz. thoſe of the knights of the GARTER, knights BANNERETS, knights of the BATH, knights BACHELORS, and knights BARONETS.

The French have had five military *orders*; viz. that of the *Genette*, inſtituted by Charles Martel; but which ſoon fell. The *order of the Virgin Mary*, ſince called the *order of the Star*, inſtituted by king John, in 1352. The *order of St. Michael*, inſtituted in 1469, by Lewis IX. The *order of the* HOLY *Ghoſt*, or the *blue ribband*; the members of which are firſt to be knights of St. Michael. And the *order of* St. LOUIS, inſtituted by Lewis XIV. in 1693. The princes of the blood, marſhals of France, admirals, and generals, become knights of St. Louis by their offices.

ORDER *of Alcantara, of Amaranth, of Aryonaut, of the Band of Calatrava, of Chriſt, of the Croſs, of the Elephant, of the Ermine, of the Golden Fleece, of St. James, of the Knot, of St. Lazarus, of the Roſary, of the Star, of the Sword, and of the Thiſtle*, &c. See the reſpective articles. See the references under KNIGHTS.

ORDER *of Merit*, was inſtituted by Frederic III. king of Pruſſia, as a reward to thoſe officers whoſe behaviour deſerved ſome mark of diſtinction. The enſign of this *order* is a golden ſtar of eight rays, enamelled with blue, which is worn appendant to a black ribband, edged with ſilver: and the motto is *Pour la merite*.

ORDER *of St. Alexander Newſky*, or the red ribband, was inſtituted by Peter I. emperor of Ruſſia: but the czarina Catherine I. conferred it in the year 1725.

ORDERS, *religious military*, are thoſe inſtituted in defence of the faith, and privileged to ſay maſs; and who are prohibited marriage, &c.

Of this kind are the knights of Malta, or of St. John of Jeruſalem. Such alſo were the knights Templars, the knights of Calatrava, knights of St. Lazarus, Teutonic knights, &c. See MALTA, TEMPLAR, &c.

Father Putignani accounts thoſe *military orders* where marriage is not allowed, real *religious orders*. F. Papebroch ſays, it is in vain to ſearch for *military orders* before the twelfth century.

ORDERS, *religious*, are congregations, or ſocieties, of monaſteries, living under the ſame ſuperior, in the ſame manner, and wearing the ſame habit.

Religious orders may be reduced to five kinds; viz. *monks, canons, knights, mendicants*, and *regular clerks*. See MONK, CANON, &c.

Father Mabillon ſhews, that till the ninth century, almoſt all the monaſteries in Europe followed the rule of St. Benedict; and that the diſtinction of *orders* did not commence till upon the re-union of ſeveral monaſteries into one congregation: that St. Odo, abbot of Cluny, firſt began this re-union, bringing ſeveral houſes under the dependence of Cluny: that, a little afterwards, in the eleventh century, the Camaldulians aroſe; then, by degrees, the congregation of Vallombroſa; the Ciſtertians, Carthuſians, Auguſtines; and at laſt, in the thirteenth century, the Mendicants. He adds, that Lupus Servatus, abbot of Ferrieres, in the ninth century, is the firſt that ſeems to diſtinguiſh the *order* of St. Benedict from the reſt, and to ſpeak of it as a particular *order*.

White order denotes the order of regular canons of St. *Auguſtine*. See AUGUSTINS.

Black order denoted the order of BENEDICTINS.

Theſe names were firſt given theſe two *orders* from the colour of their habit; but are diſuſed ſince the inſtitution of ſeveral other *orders*, who wear the ſame colours.

Grey order was the ancient name of the CISTERCIANS; but ſince the change of the habit, the name ſuits them no more.

ORDER *of Charity*. See CHARITY.

ORDER *of St. Saviour*. See SAVIOUR.

ORDER, *third*. See THIRD.

ORDER, in the *Geometry of Curves*. See GENDER, LINE, and CURVE.

ORDERS, *book of*. See BOOK.

ORDER, *interlocutory*. See INTERLOCUTORY.

ORDINAL, ORDINALE, a book containing the order or manner of performing divine ſervice. See RITUAL.

ORDINAL, in *Grammar*, an epithet given to ſuch numbers as mark the order of things, or in what rank they are placed.

Thus, firſt, ſecond, tenth, hundredth, &c. are *ordinal* numbers. See CARDINAL.

ORDINANCE, or ORDONNANCE, a law, ſtatute, or command, of a ſovereign or ſuperior.

Ordinance of parliament, is ordinarily uſed in the ſame ſenſe as *ſtatute*, or act of parliament.

In the parliament-rolls, acts are often called *ordinances of parliament*. Though in ſome caſes we find a difference made between the two; *ordinances* being only temporary things, by way of prohibition; and capable of being altered by the commons alone: whereas an act is a perpetual law, and cannot be altered but by king, lords, and commons.

Sir Edward Coke aſſerts, that an *ordinance* of parliament differs from an *act*, as the latter can only be made by the king, and the threefold conſent of the eſtates; whereas the former may be made by one or two of them.

Ordinance of the foreſt, is a ſtatute made in the thirty-fourth year of Henry I. relating to FOREST-matters.

In the French juriſprudence, *ordonnances* are ſuch laws as are eſtabliſhed by the king's authority alone. All *ordonnances* begin with, *à tous preſens & à venir ſalut*.

ORDINANCE, or ORDNANCE, is alſo a general term for all ſorts of great guns, or cannon, mortars, &c. uſed in war. See CANNON, and GUN.

The ſtrength and ſerviceableneſs of a piece of *ordinance*, depends much on the thickneſs of the metal, eſpecially about its chamber and breech, which is called its *fortification*.

Of this there are three degrees, both for cannons and culverins. Such are the ordinarily fortified, alſo called *legitimate pieces*. Thoſe whoſe fortification is leſſened, are called *baſtard pieces*. Thoſe doubly fortified, are called *extraordinary pieces*.

The fortification of a gun is reckoned from the thickneſs of the metal at the touch hole, at the trunnions, and at the muzzle, in proportion to the diameter of the bore.

The doubly fortified pieces are a full diameter of the bore in thickneſs at the touch-hole, $\frac{1}{2}\frac{5}{6}$ of it at the trunnions, and $\frac{1}{3}\frac{7}{6}$ at the muzzle: the leſſened cannons have but $\frac{1}{2}$, or $\frac{1}{2}\frac{3}{6}$, of the diameter of their bore, in the thickneſs at the touch-hole, $\frac{1}{3}\frac{5}{6}$ at the trunnions, and $\frac{1}{3}\frac{7}{6}$ at the muzzle.

All the double-fortified culverins, and all the leſſer pieces of that kind, have a diameter and $\frac{1}{2}$ at the touch-hole, $\frac{1}{3}\frac{5}{6}$ at the trunnions, and $\frac{1}{3}\frac{7}{6}$ at the muzzle. And the ordinary fortified culverins are every way as the doubly fortified cannon; and the leſſened culverins as the ordinary cannon, in all reſpects. The ordinary-fortified cannon have $\frac{1}{2}$ at the touch-hole, $\frac{1}{3}$ at the trunnions, and $\frac{1}{4}$ at the muzzle.

ORDINANCE, in *Painting*. See ORDONNANCE.

ORDINANCE, or ORDNANCE *office*, is the ſtanding grand magazine of arms, habiliments, inſtruments, and utenſils of war, as well by ſea as land; not only of thoſe lodged in the Tower, but in all the garriſons, caſtles, forts, &c. in Great Britain: from whence, as occaſion requires, his majeſties armies are ſupplied.

The officers of the *ordinance* are, the *maſter-general*, with a ſalary of 1500*l.* a year, from whom are derived all orders and diſpatches relating to the ſame, as the ſervice ſhall beſt require, and who has the ſole command of the royal regiment of artillery. This poſt has often been annexed to the office of general and commander in chief. The ſame military reſpect is paid to the maſter-general of the *ordinance*, as to generals of horſe and foot; that is, on all occaſions to have the march beat to him, and to be ſaluted by all officers, the colours excepted.

Under him is a *lieutenant-general of the ordinance*, with a ſalary of 1100*l.* a year, who receives orders from the maſter-general, and the reſt of the prime officers at the

board; sees them duly executed; orders the firing of guns on days of rejoicing; and sees the train of artillery fitted out when ordered to the field.

Next to him is the *surveyor-general*, with a salary of 700*l.* a year, who has the inspection of the *ordinance*, stores, and provisions of war, in the custody of the store-keepers; he allows all bills of debts, keeps a check on labourers, &c.

Under these is a *clerk of the ordinance*, with a salary of 600*l.* a year, who records all orders and instructions given for the government of the office; with all patents, grants, names of officers, &c. draws all estimates for provisions, and supplies all letters, instructions, commissions, deputations, contracts, &c. and serves as a check between the two accomptants of the office, the one for money, the other for stores.

This office has also a store-keeper, with a salary of 400*l.* a-year, who takes into his custody all *ordinance*, ammunition, stores, &c. thereto belonging; and indents, and gives in legal security for the safe keeping thereof; and renders an exact account from time to time.

Here is also a *clerk of the deliveries*, with a salary of 400*l.* a-year, whose duty is to draw up all provisions, either at the Tower, or any other of his majesty's magazines, to see them duly executed, &c.

And lastly, a *treasurer* and *paymaster*, with a salary of 500*l.* a year, through whose hands passes the money of the whole office, as well for payment of salaries, as debentures.

Under these superior officers belonging to the civil branch of the *ordinance*, there are secretaries and clerks, &c.

The military branch of the *ordinance* is under the direction of a chief engineer, &c. See ENGINEER.

ORDINANCE, or ORDNANCE *bills*, commonly called *ordnance debentures*, are bills issued by the board of *ordnance* on the treasurer of that office, for the payment of stores, &c. These are not payable at any certain time, and do not bear any interest, so that the discount upon them is often very high: but they are seldom much above two years in arrear.

ORDINANCE, *spiking up the*. See SPIKING.

ORDINARII, in *Antiquity*, were a sort of gladiators; being those appointed to exhibit combats on certain stated days, &c.

ORDINARY, something that happens, or passes frequently, or usually.

We say, the *ordinary* course of things: whatever is done without miracles, is done by *ordinary* agents.

ORDINARY *culverin*. See CULVERIN.

ORDINARY *minion*, &c. See MINION, &c.

ORDINARY, *ambassador*, or *envoy in*. See EMBASSADOR, and ENVOY.

ORDINARY is also applied to several officers and servants belonging to the king's household, who attend on common occasions. Thus we say, physician in *ordinary*, &c.

ORDINARY, in *Naval Language*, denotes the establishment of the persons employed by government to take charge of the ships of war, which are *laid-up* in the several harbours adjacent to the royal dock-yards. These are principally composed of the warrant-officers of the said ships, as the gunner, boatswain, carpenter, deputy-purser, and cook, and three servants. There is besides a crew of labourers inrolled in the list of the *ordinary*, who pass from ship to ship occasionally to pump, moor, remove, or clean them, whenever it is necessary.

The term *ordinary* is also applied sometimes to the ships themselves: it is likewise used to distinguish the inferior sailors from the most expert and diligent. The latter are rated *able* on the navy books, and have 1*l.* 4*s.* per month; whereas those who are rated *ordinary*, have only 19*s.* per month. Falconer.

ORDINARY, *ordinarius*, in the *Civil Law*, is any judge vested with authority to take cognizance of causes, in his own right, as he is a magistrate; and not by deputation.

ORDINARY *court of chancery*. See PETTY *bag*.

ORDINARY, in *Common* and *Canon Law*, denotes him who has *ordinary* or immediate jurisdiction in ecclesiastical causes in such a place.

In which sense archdeacons are *ordinaries*. Though the appellation be most frequently given to the bishop of the diocese, who has the *ordinary* ecclesiastical jurisdiction, and the collation to benefices therein.

There are several chapels, chapters, abbeys, &c. exempted from the jurisdiction of the *ordinary*.

The archbishop is *ordinary* of the whole province, to visit, and receive appeals from, the inferior judicatures.

The Romish canonists call the pope *ordinary of ordinaries*, since by the Lateran council he has usurped the right of collating, by prevention, to all benefices; in exclusion of the *ordinary* collators.

ORDINARY *of assizes and sessions* was a deputy of the bishop of the diocese, anciently appointed to give malefactors their NECK-verses, and judge whether they read or not; also to perform divine service for them, and assist in preparing them for death. So

ORDINARY *of Newgate*, is one who is attendant in *ordinary* upon the condemned malefactors in that prison, to prepare them for death; and he records the behaviour of such persons.

ORDINARY, or *honourable* ORDINARY, in *Heraldry*, a denomination given to certain charges properly belonging to that art.

The *honourable ordinaries* are ten in number; *viz.* the *chief*, *pale*, *bend*, *fesse*, *bar*, *cross*, *saltier*, *chevron*, *bordure*, and *orle*. See CHIEF, PALE, &c.

The heralds give several reasons for their being called *honourable*; viz. 1. Their great antiquity, as having been used ever since armoury was set on foot. And, 2. Because they denote the ornaments most necessary for noble and generous men: thus the chief represents the helmet, wreath, or crown, covering the head: the pale represents his lance or spear: the bend and bar, his belt; the fesse his scarf; the cross and saltier, his sword; the chevron, his boots and spurs; and the bordure and orle, his coat of mail.

As to the allotting or distributing of these *ordinaries*, some authors write, that when a gentleman, having behaved himself gallantly in fight, was presented to the prince, or general, and a suitable coat-armour ordered him; if he were wounded in the head, they gave him a chief; if in the legs he had a chevron; and if his sword and armour were discoloured with the blood of the enemies, a cross or bordure.

Some heralds have attempted to increase the number of *honourable ordinaries* to twenty; adding to those above mentioned, the plain *quarter*, the *giron*, the *escutcheon*, *coupe* dexter and sinister, *enmanch* dexter and sinister, *couusse* dexter and sinister, and the *point*. But these are not yet authorized.

Some writers distinguish *ordinaries* into *honourable* and *subordinate*. *Honourable ordinaries*, which are the principal charges in heraldry, they define as made of lines only; which according to their disposition and form, receive different names. Of these they reckon nine, viz. the *chief*, *pale*, *bend*, *bend sinister*, *fess*, *bar*, *chevron*, *cross* and *saltier*. The *subordinate ordinaries* are ancient heraldic figures, frequently used in coats of arms, and distinguished by peculiar terms: these are the *gyron*, *canton*, *fret*, *pile*, *orle*, *inescutcheon*, *trefoare*, *flanches*, *flasques*, *voiders*, *lozenge*, *fusil*, and *mascle*. Porny's Elem. of Heraldry, p. 50, and 114.

ORDINATE. See CO-ORDINATE.

ORDINATES, in *Geometry* and *Conics*, are lines drawn from any point of the circumference of an ellipsis, or other conic section, perpendicularly across the axis, to the other side.

The Latins call them *ordinatim applicatæ*. Such are the lines M M, M M, &c. (*Tab. Conics, fig.* 26.)

Half of each of these, as the lines E M, E M, &c. are properly only *semi-ordinates*, though popularly called *ordinates*.

The *ordinates* of a curve may more generally be defined to be right lines parallel to one another, terminated by the curve, and bisected by a right line called the DIAMETER. In curves of the second order; if any two parallel right lines be drawn so as to meet the curve in three points; a right line which cuts these parallels so, as that the sum of two parts terminating at the curve on one side the secant, is equal to the third part terminated at the curve on the other side; will cut all other right lines parallel to these, and that meet the curve in three points, after the same manner; i. e. so as that the sum of the two parts on one side will always be equal to the third part on the other side.—And these three parts, equal on either side, Sir Isaac Newton calls *ordinatim applicatæ*, or *ordinates of curves of the second order*. See CURVE.

To find the greatest and least *ordinates* to curves. See MAXIMUM.

ORDINATE *in a parabola*, *hyperbola*, and *ellipsis*. See the respective articles.

ORDINATE *ratio* is that wherein the antecedent of the first ratio is to its consequent, as the antecedent of the second is to its consequent.

ORDINATION, the act of conferring holy orders; or of initiating a candidate into the diaconate, or priesthood.

As to the qualification of the persons to be ordained. See DEACON and PRIEST.

The form of *ordination* in the Church of England is annexed to the book of Common Prayer, and the authority of it established by 5 and 6 Edw. VI. cap. 1. 8 Eliz. cap. 1. by art. thirty-six of the thirty-nine ARTICLES, and by the eighth canon.

The *ordination* of bishops is more properly called CONSECRATION.

Ordination has always been esteemed the principal prerogative of bishops; and they ſtill retain the function as a kind of mark of ſpiritual ſovereignty in their dioceſes. In the ancient diſcipline there was no ſuch thing as a vague, and abſolute *ordination*; but every one was to have a church, whereof he was to be *ordained* clerk, or prieſt. In the twelfth century they grew more remiſs, and *ordained* without any title, or benefice.

The council of Trent reſtored the ancient diſcipline, and appointed, that none ſhould be *ordained* but thoſe who were provided of a benefice ſufficient to ſubſiſt them. The ſhadow of which practice ſtill obtains among us.

The reformed hold the call of the people the only thing eſſential to the validity of the miniſtry; and teach, that *ordination* is only a ceremony which renders the call more regular, and authentic.

Accordingly the proteſtant churches of Scotland, France, Holland, Switzerland, Germany, Poland, Hungary, Denmark, &c. have no epiſcopal *ordination*. For Luther, Calvin, Bucer, Melancthon, &c. and all the firſt reformers and founders of theſe churches, who ordained miniſters among them, were themſelves preſbyters, and no other. And though in ſome of theſe churches, there are miniſters called ſuperintendants, or biſhops, yet theſe are only *primi inter pares*, the firſt among equals, not pretending to any ſuperiority of orders. Having themſelves no other orders than what either preſbyters gave them, or was given them as preſbyters, they can convey no other to thoſe they ordain. On this ground the proteſtant diſſenters plead, that their *ordinations*, though not epiſcopal, is the ſame with that of all the illuſtrious proteſtant churches abroad; and object, that a prieſt ordained by a popiſh biſhop, ſhould be received into the church of England, as a valid miniſter, rightfully ordained; whilſt the orders of another, ordained by the moſt learned, religious preſbytery, which any foreign country can boaſt, are pronounced not valid, and he is required to ſubmit to be ordained afreſh.

In oppoſition to epiſcopal *ordination*, they urge, that Timothy was ordained by the laying on of the hands of the preſbytery, 1 Tim. iv. 14. that Paul and Barnabas were ordained by certain prophets and teachers in the church of Antioch, and not by any biſhop preſiding in that city, Acts xiii. 1, 2, 3. and that it is a well known fact, that preſbyters, in the church of Alexandria, ordained even their own biſhops for more than two hundred years in the earlieſt ages of Chriſtianity. They farther argue, that biſhops and preſbyters are in Scripture the ſame; and not denominations of diſtinct orders or offices in the church; referring to Philip. i. 1. Tit. i. 5, 7. Acts xx. 27, 28. and 1 Pet. v. 1, 2. To the ſame purpoſe they maintain, that the ſuperiority of biſhops to Preſbyters is not pretended to be of divine but of human inſtitution, not grounded on ſcripture, but only upon the cuſtom or ordinances of this realm, by the firſt reformers and founders of the church of England, nor by many of its moſt learned and eminent doctors ſince. See Stillingfleet's Irenic. chap. 8. p. 385. in which the learned author affirms and ſhews this to be the ſentiment of Cranmer, and other chief reformers, both in Edw. VI. and Queen Elizabeth's reign, of archbiſhop Whitgift, biſhop Bridges, Doc. Hooker, Sutcliffe, Hales, Chillingworth, &c. Moreover, the book intitled the Inſtitution of a Chriſtian Man, ſubſcribed by the clergy in convocation, and confirmed by parliament, owns biſhops and preſbyters by ſcripture to be the ſame. Beſides, the proteſtant diſſenters alledge, that if epiſcopal ordination be really neceſſary to conſtitute a valid miniſter, it does not ſeem to be eſtabliſhed by the conſtitution of the church of England: becauſe the power of *ordination* which the biſhops exerciſe in this kingdom, is derived entirely and only from the civil magiſtrate; and he authoritatively preſcribes how, and to whom *ordination* is to be given: that if an *ordination* ſhould be conducted in other manner and form than that preſcribed by him, ſuch *ordination* would be illegal, and of no authority in the church. Accordingly the biſhop at the *ordination* of the candidate aſks, are you called according to the will of our Lord Jeſus Chriſt, and the due order of this realm? The conſtitution and law of England ſeems to know nothing of uninterrupted lineal deſcent, but conſiders the king, veſted (by act of parliament or the ſuffrage of the people) with a plenitude of all power eccleſiaſtical in theſe realms, as empowering and authoriſing biſhops to ordain: and this power of *ordination* was once delegated to Cromwel, a layman, as vicegerent to the king. They farther think it ſtrange, that the validity of orders and miniſtrations ſhould be derived, as ſome have contended, from a ſucceſſion of popiſh biſhops; biſhops of a church, which, by the definition of the nineteenth article of the church, can be no part of the true viſible church of Chriſt, and biſhops, likewiſe, who conſider the proteſtant clergy, although ordained by proteſtant biſhops, as mere common unconſecrated laymen. They object alſo to that ſubſcription, which is the term of *ordination* in the church of England. See Towgood's Diſſent from the Church of England fully juſtified, &c. edit. 5. 1779. p. 196, &c.

The council of Rome in 744, orders, that no *ordinations* ſhall be held except on the *firſt*, fourth, ſeventh, and tenth months. With us, by can. 31. *ordination-days* are the four Sundays immediately following the Imberweeks; being the ſecond Sunday in Lent, Trinity-Sunday, and the Sundays following the firſt Wedneſday after September the 14th, and December the 13th.

Pope Alexander II. condemns *ordination per ſaltum*, as they call it; i. e. the leaping to a ſuperior order without paſſing through the inferior.

Ordination is one of the Sacraments of the church of Rome.

ORDNANCE. See ORDINANCE.

ORDONNANCE, or ORDINANCE, in *Painting*, denotes the diſpoſition of the parts of a picture, either with regard to the whole piece, or to the ſeveral parts; as the groups, maſſes, contraſts, *aſpects*, &c.

In the *ordonnance* there are three things regarded; viz. the place, or ſcene, where; the diſtribution, how; and the contraſt.

In the firſt, regard is to be had to the *diſpoſition* of things to ſerve as a ground-work; and to the *place*, or poſition of bodies: under the former whereof come, 1. The *landſcape*; whether an uninhabited place, where there is full liberty of repreſenting all the extravagancies of nature; or inhabited, where the marks of cultivation, &c. muſt be exhibited.

2. The *building*, whether ruſtic; wherein the painter's fancy is at liberty: or regular; wherein a nice attention is required to the orders.

3. The mixture of both; wherein it is a maxim to compoſe in great pieces, and make the ground-plot big enough; to neglect ſome little places, in order to beſtow more on the whole maſs, and to ſhew the more conſiderable parts with the more advantage; and to mark ſome agitation in all the things that move.

As to the place of bodies, they are either ſolid; which, again, are either ſo by nature, and which muſt be proportioned to their places; or artificial, where regard is to be had to the rules of geometry, perſpective, architecture, &c. Or they move: which they do, either by a voluntary motion, wherein care muſt be had to proportion them to their ſituation, and to ſtrengthen them by regarding the equilibrium; or by ſome extraordinary power, as machines, &c. where the cauſes of their motions muſt appear. Or they are things at a diſtance. In all which an even plane muſt ſtill be propoſed to find their preciſe ſituation, and ſettle their place by ſudden breaks and diſtances agreeable to perſpective.

In placing the figures, regard muſt be had, 1. To the *group*, which connects the ſubject, and ſtays the ſight. In this are to be conſidered the knot or nodus, which binds the group; and the nearneſs of figures, which we may call the chain, as it holds them together; that the group be ſuſtained by ſomething looſe and diſtinct from it; and by the ſame joined and continued to the other groups: and that the lights and ſhadows be ſo diſpoſed, as that we may at once ſee the effect of all the parts of the compoſition.

2. To the *action*, wherein forced attitudes are to be avoided, and ſimple nature ſhewn in her moſt advantageous poſtures. In weak and lean figures, the nudities are not to be ſhewn; but occaſions of covering them are to be ſought. In all human figures, ſpecial care to be taken, the head be well placed between the ſhoulders; the trunk on the haunches; and the whole on the feet.

3. To the *draperies*; which is to be adjuſted, ſo as it may appear real garments, and not ſtuffs looſely thrown on. The folds to be ſo diſpoſed as to leave the great parts, wherein the nudity may appear, free; ranging the little folds about the joints, and avoiding them on the relievo of the members. And, laſtly, to diſpoſe the draperies, by raiſing the ſtuff, and letting it fall eaſily and lightly, that the air, ſuſtaining the folds, may let them fall ſoft. Laſtly, in the *contraſt*, are to be conſidered the actions, which vary infinitely: the aſpects, which, in actions of the ſame kind, may, by their difference, make a contraſt: the ſituation, according as they meet above or under the ſight, far or near. And, laſtly, cuſtom; which extends, indeed, to all parts of painting, but is particularly to be regarded in the *ordonnance*; to be managed differently, however, and ſtiffneſs and formality avoided.

ORDONNANCE, in *Architecture*, is nearly the ſame as in painting; viz. the compoſition of a building, and the diſpoſition of its parts, both with regard to the whole, and to one another.

Vitruvius defines *ordonnance* to be that which regulates

the size or magnitude of all the parts of a building with reſpect to their uſe.

This definition is cenſured by M. Perrault, who takes the *ordonnance* to conſiſt in the diviſion of the plan or ſpot of ground whereon the building is to be raiſed; i. e. in the apportioning or laying it out, agreeable to the intended dimenſions of the whole fabric; which Mr. Evelyn expreſſes in fewer words, by "determining the "meaſure or what is aſſigned to compoſe the ſeveral "apartments."

On this foundation, *ordonnance* is the judicious contrivance of the plan or model; as when the court, hall, lodgings, &c. are neither too large, nor too little: but the court, v. gr. affords convenient light to the apartments about it, and is large enough for uſual acceſs. The hall of fit capacity to receive company; the bed-chambers accordingly, &c. When theſe diviſions are either too great or too ſmall, with reſpect to the place, as a large court to a little houſe, or a little chamber in a magnificent palace; the fault is in the *ordonnance*.

This the ancients called *taxis*; and diſtinguiſhed it from *diathesis*, diſpoſition; which is, where all the parts and members of a building are aſſigned their juſt places and ſituation with regard to their quality, office, rank, &c. without any regard to the dimenſions, or quantity: as, that the veſtible or porch be before the hall, the hall before the parlour, and that before the withdrawing-room, &c. The bed-chambers, again, to look to the ſun-riſing; and libraries, galleries of paintings, and cabinets of curioſities, &c. to the north.

ORE, in *Natural Hiſtory*, the mineral glebe, earth, or ſtone, dug out of the mines, to be purified and to have the metalline parts procured, and ſeparated from the ſame. The *ore* is frequently called the *mineral*; and by ſome the *marcaſite*; though, on other occaſions, a difference is made in the ſignification of theſe two words; the denomination *ore* being only given where the mineral is rich enough of metal to be wrought. When it is not, it is denominated *marcaſite*.

Ores, ſays the editor of the Chemical Dictionary, conſiſt 1. Of metallic ſubſtances in a calcined or rather calciform ſtate; or, 2. Of theſe ſubſtances combined with other matters, with which they are ſaid to be mineraliſed.

Calcined metallic ſubſtances, or calciform *ores*, are metallic ſubſtances deprived of phlogiſton, and in the ſtate of a *calx*, or metallic earth. See CALX. Such are all ferruginous ochres, which are calxes of iron.

Mineraliſed *ores* are, 1. Simple, containing only one metallic ſubſtance: or, 2. Compound, containing two or more metallic ſubſtances.

Of the ſimple, and alſo of the compound *ores*, four kinds may be diſtinguiſhed.

1. *Ores* conſiſting of metallic ſubſtances mineraliſed by ſulphur. Such is the lead-*ore* called galena, compoſed of lead and ſulphur.

2. *Ores* conſiſting of metallic ſubſtances mineraliſed by arſenic. Such is the white pyrites, containing iron and arſenic.

3. *Ores* conſiſting of metallic ſubſtances mineraliſed by ſulphur and by arſenic. Such is the red ſilver-*ore*, containing ſilver, arſenic, and ſulphur.

4. *Ores* conſiſting of metallic ſubſtances mineraliſed by ſaline matters. Such are the native vitriols. Such alſo is probably the corneous ſilver-*ore*, which, according to Mr. Cronſtedt's opinion, is a luna cornea, or ſilver combined with marine acid. To this claſs alſo may be referred the ſilver mineraliſed by an alkaline ſubſtance, which Mr. Von Juſti pretends to have diſcovered.

Henckel, and after him Cramer, and the author of the Dictionary of Chemiſtry, pretend that in mineraliſed *ores*, beſides the above mentioned metallic and mineraliſing ſubſtances, are alſo contained a metallic and an unmetallic earth. But Wallerius affirms, that the exiſtence of ſuch earths cannot be ſhewn, and that ſulphur is incapable of diſſolving unmetallic earths, and even the calxes of all metallic ſubſtances, excepting thoſe of lead, biſmuth, and nickel.

Having thus defined and diſtinguiſhed the ſeveral general claſſes of *ores*, we proceed to ſhew how they are lodged, and where they are found.

Metals and metalliferous *ores* are found in various places.

1. They are found under water; in beds of rivers, lakes, and ſeas, and chiefly at the flexures of theſe: ſuch are the auriferous and ferruginous ſands, grains of native gold, ochres, and fragments of *ores* waſhed from mines.

2. They are found diſſolved in water: ſuch are the vitriolic waters containing iron, copper, or zinc.

3. They are found upon the ſurface of the earth. Such are many ochres; metalliferous ſtones, ſands, and clays; and lumps of *ores*. Mr. Gmelin ſays, that in the northern parts of Aſia, *ores* are almoſt always found upon or near the ſurface of the ground.

4. They are found under the ſurface of the earth. When the quantity of theſe collected in one place is conſiderable, it is called a mine.

Subterranean metals and *ores* are differently diſpoſed in different places.

1. Some are inſixed in ſtones and earths, forming nodules or ſpots diverſely coloured.

2. Some are equably and uniformly diffuſed through the ſubſtance of earths and ſtones, to which they give colour, denſity, and other properties. Such are the greateſt part of thoſe earths, ſtones, ſands, clays, cryſtals, flints, gems, and fluors, which are coloured.

3. Some form ſtrata in mountains. Such are the ſlates containing pyrites, copper-*ore*, lead-*ore*, ſilver-*ore*, or blend. Theſe lie in the ſame direction as the ſtrata of ſtones betwixt which they are placed; but they differ from the ordinary ſtrata in this circumſtance, that the thickneſs of different parts of the ſame metalliferous ſtratum is often very various; whereas the thickneſs of the ſtony ſtrata is known to be generally very uniform.

4. Fragments of *ores* are frequently found accumulated in certain ſubterraneum cavities, in fiſſures of mountains, or interpoſed betwixt the ſtrata of the earth. Theſe are looſe, unconnected, frequently involved in clay, and not accreted to the contiguous rocks or ſtrata immediately, nor by intervention of ſpar or of quarz, as the *ores* found in veins are. Tin and iron mines are frequently of the kind here deſcribed.

5. Large entire maſſes of *ores* are ſometimes found in the ſtony ſtrata of mountains. Theſe are improperly called cumulated veins, becauſe their length, relatively to their breadth and depth, is not conſiderable.

6. Some inſtances are mentioned of entire mountains conſiſting of *ore*. Such is the mountain Taberg in Smoland; and ſuch are the mountains of Kerunavara and Luoſavara in Lapland, the former of which is one thouſand four hundred perches long, and one hundred perches broad. Theſe mountains conſiſt of iron-*ore*.

7. Laſtly, and chiefly, metals and *ores* are found in oblong tracts, forming maſſes called veins, which lie in the ſtony ſtrata compoſing mountains. See MINERALOGY. Some *ores* are ſo kindly as to melt readily of themſelves, without any aſſiſtance from the common fluxes; theſe are of great value to the owners. Others are more intractable, and require the aſſiſtance of various fluxes, and others ſo very obſtinate as not to be worked in the larger way, where there can be no very conſiderable expence allowed for fluxes. On this account many mines remain at this time unwrought, as being untractable in the large way without great charges; hence the improving the buſineſs of fluxes ſerves to render them at once both cheap and effectual, and muſt be of great ſervice to metallurgy. See FLUXES.

The *ores* of the richer metals, as gold and ſilver, uſually contain a very conſiderable portion of ſulphur; and Alonſo Barba tells us, that the moſt expert mineraliſts in Peru always eſteem abundance of ſulphur a ſign of a rich *ore* in the neighbourhood. Among the richeſt *ores* of the mountain of Potoſi, there are ſuch quantities of native brimſtone, that the cavities in the mines are often filled with a blue flame, on only bringing a lighted candle into them ſo as to touch their ſides. It has been wondered at, that, where there is abundance of ſulphur in theſe mines, there ſhould be no vitriol found, that being only a metal diſſolved by means of ſulphur; but this objection ceaſes, when we conſider the denſe and compact nature of theſe two metals, which renders them not ſoluble by means of ſulphur, as the others are. Wherever there is ſtore of ſulphur, or of pyrites, or other ſtones which contain ſulphur in the mines of copper and iron, great ſtore of vitriols are always found there alſo, being formed by the corroſion of the *ores* of thoſe metals by ſulphur, which renders them ſoluble in water, from which they again concrete in form of ſalts. Chemiſtry is able to imitate the operations of nature on this occaſion ſeveral ways; for copper or iron, being formed in thin plates, and either rubbed over with the acid ſpirit of ſulphur, or calcined with powder of common ſulphur, become ſoluble in water, and afford cryſtals of true vitriol wholly analogous to the natural ones, and either blue or green, as iron, or copper are the metals employed; but theſe proceſſes not being able to produce cryſtals of ſalt, or vitriol, from either ſilver or gold, it is not wonderful that nature is not able to form them by the ſame means.

The general formation of ſulphur from the ores of metals yet lying in the bowels of the earth, is, probably, after this manner. An acid, ſaline, ſulphureous ſteam, or vapour, ſuch as common ſulphur is eaſily reduced to, by heat not greater than that within the bowels of the earth, inſinuating itſelf either through the pores of ſtones, or through their cracks, which are always frequent about the veins of metals, penetrates into the bed of *ore*; ſup-

pose of copper. The vapour is continually supplied with fresh quantities from below; and as it blends itself with the metal, corrodes it as the fume of brimstone will the same copper in plates. The metal, thus corroded, being soluble in water, as we find by experience, it is necessary that the *ore* must, under the same management, be so too; and, in this case, the water, which is continually pervading all the strata of the earth, washes off the dissolved metal: and wherever it happens to be stayed in small quantities afterward, whether within the vein of the metal, or at a distance from it, it crystallizes the salt it contains, and common blue vitriol is produced, if the metal in the vein be iron. The same process is observed, and the event is the same in all respects, when copper is the metal corroded, except that the vitriol, instead of blue, is green: this plainly accounts for the observation of the workers in copper-mines, that vitriol and brimstone are usually found together, the one being a natural consequence of the other. Sulphur is, indeed, often found where there is no vitriol; but vitriol is very seldom found without sulphur, it being not a distinct principle, but a genuine production of sulphur. Phil. Trans. N° 104.

ORES, *dressing or washing of*, is the preparing them as they come rough from the mine, for the working by fire. This is done several ways in different countries, and in respect to the different *ores* of the metals; in Devonshire we have a very easy method, which is so expeditious, and so good for all the purposes, that it is worthy of imitation in other places. After the *ore* is dug, it is tossed up by hand from shamble to shamble by the shovel-men in the mine, and drawn up in buckets by a winch at the top of the shaft. As soon as the whole quantity for one dressing is brought up, the large stones are broken, and the whole is then carried to the mills, where one horse turns a wheel that moves the machines for powdering a great quantity of it; these are called the stamping or knocking mills. The *ore* is unloaded at the head of the pass or entrance into these mills; this pass is made of two or three bottom boards and two side boards, in form of a hollow trough, and stands in a slanting direction. The *ore* by its own weight is carried down this trough, and lodges itself in the coffer. The coffer is a long square box made of the firmest timber, and of three feet long, and a foot and half broad; the *ore* is not suffered to fall into this all at once, but is stopped over the mouth of the trough by a cross board, where a cock turns in a quantity of water at the same time, which washes down just as much of the *ore* with it into the trough, as there ought to be. In this coffer there are three lifters placed between two strong board-leaves, having two braces or thwart pieces on each side to keep them steady, as a frame with stamp-heads. These heads are of iron, and weigh about thirty or forty pounds a-piece, and serve to the breaking the lumps of ore in the coffer.

The lifters are about eight foot long, and half a foot square. They are always made of heart of oak, and have as many in-timbers or guiders between them; they are lifted up in order, by a double number of tappets, which are fastened to as many arms passing diametrically through the great beam, which is either turned by the wheel and horse, or, where there is conveniency of water, by an overshot water-wheel on two houlsters. The tappets exactly but easily meet with the tongues, which are so placed in the lifters, as that they easily slide from each other, and suffer the lifters to fall with great force on the *ore* in the trough. The frequent pounding of these soon reduces the large masses into a sort of sand, which is washed out of the trough by the continual current of the water from the cock through a brass-grate, which is placed at one end of the coffer between two iron bars. This operation is called by the miners *bricking*, or brick-working the *ore*. See BUDDLE.

The powdered *ore* is conveyed out of the trough into the *launder*, which is a trench cut in the floor of eight feet long, and ten feet over; this is stopped at the lower end with turf, so that the water is all suffered to pass away, and the powder of the *ore* is stopped. Thus the launder by degrees fills up with the dressed *ore*, and this is removed out with shovels as occasion requires. The launder is divided into three parts, the forehead, the middle, and the tail; that *ore* which lies in the forehead, that is, within a foot and half of the grate, is always the richest and best, and is laid up in a heap by itself; the middle and tail afford a poorer ore, and these are sometimes laid up in separate heaps; sometimes thrown in one heap together.

ORES, *essaying or assaying of*. See ASSAYING, and the following references. Consul on this subject, Cramer's Art of Assaying, and the extracts subjoined to the article of *ores* in the Chemical Dictionary.

ORES *of antimony, arsenic, bismuth, cobalt, copper, gold, iron, lead, mercury, platina, silver, tin, zinc*. See the several articles.

ORES, *smelting of*. See SMELTING.

ORE, in *Navigation*. See OAR.

ORELLARD, in the *Admiralty*. See WIDE-*board*.

OREJUELAS, in *Botany*, a name used by some authors for the *flos auricula*, a flower growing in New Spain, and used there in making chocolate.

ORELLANA, in *Botany*. See SANICLE.

OREON, a name given by the ancients to a kind of HORSE *tail*, which they found growing on the mountains in wet and damp places. It is to this species that many authors have attributed the principal virtues of the genus; and this seems to have been the same with our great water *horsetail*. Neophytus says, that it rose up with a single stalk, resembling a young reed, and that this was composed of several joints, which, in the manner of cups, were inserted one into another; and that from these joints the leaves grew, and that they resembled those of the pine-tree. The branches are what this author calls leaves, and they do pretty well resemble the leaves of the pine-tree. They are long and slender and of a bright green. Our great *horsetail* loves the heads of springs in hilly countries, and is always most plentiful in such places.

OREOSELINUM, in *Botany*. See SPIGNEL.

OREXIS, *appetite*. The *appetite*, when excessive, or otherwise vitiated, is distinguished by medical writers into several kinds, and described under several names, according to its difference in degree, and other particulars.

The first kind is the ADEPHAGIA: this is the name given to that species in which the food is not only eaten in too large a quantity, but is swallowed in a particularly ravenous manner.

The second is the *orexis canina*: in this case the patient is continually eagerly longing for food; and if it is not ready so soon as he desires, he is subject to fainting-fits; after the recovery from which he does not feel the same craving *appetite*. See BULIMY.

The third is the PICA, or *pitta*: this is the case when the patient has an eager *appetite* to things not fit for food; such as chalk, cinders, tobacco-pipes, and the like.

The fourth is the MALACIA: this is distinctively made the name of that species of *excessive appetite*, in which the patient has a great desire for some particular things, but those of the nature of common food, and usually of the nicer, and more delicate kind.

Signs attending it. An over-large eating is usually attended with cardialgias, anxieties, and straitness of the breast; after this, with nausea, eructations, and not unfrequently with a vomiting, or a diarrhœa; often a dizziness of the head follows, and sometimes very violent pains in it, with a lassitude and pains in the limbs, and pains and rumblings in the abdomen; finally, sometimes fevers, sometimes suffocations, and sometimes convulsions, are the consequence.

Persons subject to it. The *excess of appetite*, in its different kind, affects different sets of people. The *adephagia* is usually the case with boys who are just come to distinguish good taste, and feed as their parents do; and sometimes with women who have more sensation than judgment. People in general of sanguine and sanguineo-phlegmatic habits, eat more food than others; and choleric persons often eat, and usually swallow their food, quicker than others. Persons of melancholic habits, are usually of all others, the least eaters. Finally, people, in general, eat heartily, and even excessively, when they come, from a coarse and homely diet, to a more elegant and agreeable one; and this *excessive appetite* becomes a symptomatic complaint with people who are troubled with worms, and with hypochondriac complaints, with quartans, and often with epilepsies.

The *malacia* seems particularly to affect women during the time of their being with child. The *pica* is common to women with child; to young women before the first eruption of the menses; with those who are emaciated by a too violent flux of that discharge; and, finally, sometimes, though more rarely, to persons in epilepsies, and in quartans.

Causes of it. *Excessive appetite* is generally occasioned by a too great love to agreeable tastes, which generally degenerates into a custom of devouring things of agreeable flavours greedily; and, finally, into an habitual and almost necessary desire of them. In infants who are over-much fed by their nurses, the fault is not in the will, but even this also, in fine, becomes habitual, and not to be overcome easily

Prognostics in it. *Excessive appetite* does great mischief among men, and is a very common complaint, inasmuch that there are ten thousand who err in eating more than nature requires, for one who eats less. It is common for persons recovered from illnesses to have an *excessive appetite*;

appetite; but, if this be indulged to the extent, it usually brings on either a return of the same disease, or at least, one equally bad. People, after long hunger, have also the same sort of *excessive appetite* as after diseases, but there have been frequent instances, that those who indulged it freely have died upon the spot. In general, the consequences of *excessive appetite* indulged, are diseases of many kinds, particularly obstructions of the viscera, cachexies, and atrophies. When the *pica* attends a quartan, it very often happens, that all medicines are vain in the attempt of a cure, till that unnatural *appetite* has been perfectly sated. When young girls fall into a *pica* from a want of the menses at a due time, they are always relieved from it by the appearance of that evacuation; but in persons who fall into it from inordinate profluvia of that discharge, it is usually very difficult of cure, and the same difficulty always attends it when hereditary.

When people have sat to an immoderate degree by reason of any of these kinds of *excessive appetite*, the best method of relieving them, is by giving them large draughts of warm water, till they vomit; or, if the stomach will not be brought to discharge its contents by this means, a few grains of emetic tartar are to be given, or a small dose of ipecacuanha. After this the bowels are to be gently relaxed; but this is by no means to be done by any violent medicines, the stimulus of which would bring on violent and dangerous pains. After the mischief of a monstrous repletion is, by this means, got over, the best preservative for the future is abstinence, and gentle exercise. There have, however, been instances of people being cured of this disease, by palling the *appetite* by large draughts of oil, regularly taken, three times a day. The good women have a way of curing the *pica* in girls, by making the chalk, and other such things which they are to eat, bitter, or of some other disagreeable taste; when a girl has been once tricked in this manner, she will often have as violent a distaste to these unnatural eatables, as she before had an inclination for them; and, in like manner, grown persons who have violent *appetites* to certain particular foods, have been cured by conveying into them an infusion of tobacco, or some other such thing as will provoke vomiting, so disguised as not to be tasted, while eaten. When the stomach and bowels, over-loaded by these meals, are, of themselves, discharging their abundant contents, by vomit, or stool, it is a very rash and dangerous practice to give any thing to stop those emotions till the whole is thoroughly carried off. Junker's *Conf.* Med. p. 605. seq.

ORFFYREUS's *wheel*, in *Mechanics*, is a machine so called from its inventor, which he imagined to be a *perpetual* MOTION. This machine, according to the account given of it by M. s'Gravesande, in his Oeuvres Philosophiques published by Allamand, Amst. 1774, consisted of a large circular wheel, or rather drum, twelve feet in diameter, and fourteen inches in depth, and very light; as it was formed of an assemblage of deals, the intervals between which were covered with waxed cloth, in order to conceal the interior parts of it. The two extremities of an iron axis, on which it turned, rested on two supports. On giving the wheel a slight impulse in either direction, its motion was gradually accelerated; so that after two or three revolutions it acquired so great a velocity as to make twenty-five or twenty-six turns in a minute. This rapid motion it actually preserved during the space of two months, in a chamber of the landgrave of Hesse, the door of which was kept locked, and sealed with the landgrave's own seal. At the end of that time it was stopped, to prevent the wear of the materials. The professor, who had been an eye-witness to these circumstances, examined all the external parts of it, and was convinced that there could not be any communication between it and any neighbouring room. Orffyreus, however, was so incensed, that he broke the machine in pieces, and wrote on the wall, that it was the impertinent curiosity of professor s'Gravesande which made him take this step. The prince of Hesse, who had seen the interior parts of this wheel, being asked by s'Gravesande, whether, after it had been in motion some time, there was any change observable in it, and whether it contained any pieces that indicated fraud or deception, answered both questions in the negative, and declared that the machine was of a very simple construction.

ORFUS, in *Ichthyology*, the name of a fresh water fish, common in Germany, and called there the *orfe*, the *orvus*, and the *nerfling*; seeming by the descriptions of Gesner, and other authors, to be the same with our *rudd*, or *rubellio fluviatilis*. *See Tab.* III. *of Fish*, N° 33.

ORGAL, or ARGOL, the lees of wine dried, and used by dyers to prepare the cloth for the more readily taking their several colours. See TARTAR.

ORGAN, Οργανον, is used in the general for any thing framed and destined for some certain action, use, or operation.

ORGAN, or ORGANICAL *part*, in *Physiology*, is such a part of the body as is capable of the performance of some perfect act, or operation.

In which sense, all the parts, even the most simple, may be denominated *organical*.

The *organs* are divided into *primary* and *secondary*. The *primary* are those composed of similar parts, and appointed for some one single function. Such as consist of several of these, though appropriated to one single act, are termed *secondary organs*.

Thus the veins, arteries, nerves, and muscles are *primary organs*; and the hands, fingers, &c. are *secondary organs*.

ORGAN *of sense* is that part of an animal body, by means whereof it perceives external objects.

These some divide into *external*, which is the brain; and *external*, viz. the eye, ear, nose, &c.

ORGAN, in *Fortification*. See ORGUES.

ORGAN, in *Music*, denotes the largest and most harmonious of all wind-instruments; on which account it is called the *organ*, *organum* the instrument by way of excellence; chiefly used for playing a thorough bass, with all its accompaniments.

The invention of the *organ* is very ancient, though it is agreed it was little used till the eighth century. It seems to have been borrowed from the Greeks. Vitruvius describes one in his tenth book. The emperor Julian has an epigram in its praise. St. Jerom mentions one with twelve pair of bellows, which might be heard a thousand paces, or a mile; and another at Jerusalem, which might be heard to the mount of Olives.

It has been a subject of debate, when the use of *organs* was introduced into the church. Bellarmine says, that they began to be used in the service of the church, in the time of pope Vitalian, about the year 660, as Platina relates out of the Pontifical; or at Alexandria church, after the year 826, in the time of Leon the Pious. A learned writer has shown that neither of these dates can be just; alledging, that Thomas Aquinas expressly says, that, in his time, i.e. about the year 1250, the church did not use musical instruments, lest she should seem to judaize. Pierce's Vind. of the Dissenters, ed. 1718, p. 295.

Bingham, in his Antiq. of the Christian Church, vol. I. p. 314. folio ed. adds, that Marinus Samutus, who lived about the year 1290, first brought the use of them into churches. However, it appears from the testimony of Gervas, the monk of Canterbury, who flourished about the year 1200, that *organs* were introduced more than one hundred years before this time: in his description of Lanfranc's church, as it was before the fire in 1174, he has these words "*Cruce australis supra fornicem organa fuerunt fabricata.*" Decem Scriptores, p. 1293, line 25.

The structure of the modern *organ* may be conceived as follows:

The *organ* is an assemblage of several rows of pipes. Its size is usually expressed by the length of its largest pipe: thus we say an *organ* of thirty-two feet, of sixteen feet, of eight feet, and of two feet.

Church *organs* consist of two parts; viz. the main body of the *organ*, called the *great organ*; and the *positive*, or *little organ*, which is a small beaufet, usually placed before the great *organ*.

The *organ* has at least one set of keys, when it has only one body; and two or three, when it has a positive. The large *organs* have four, sometimes five sets. Besides, the pedals or largest pipes have their key, the stops or touches whereof are played by the feet: said to be the invention of Bernhard, a German, about the year 1500. These command certain pipes, which, to increase the harmony, are tuned below the diapason. The keys of an *organ* are usually divided into four octaves; viz. the second sub-octave, first sub-octave, middle octave, and first octave. Each octave is divided into twelve stops or frets; whereof the seven black make the natural sounds, and the five white the artificial sounds; i. e. the flats and sharps. So that the keys usually contain forty-eight stops or touches. Some organists add to this number one or more stops in the third sub-octave, as well as in the second. Note, in harpsichords and spinets, the natural stops or keys are usually marked white, the artificial ones black. The pedals extend to two or three octaves at the pleasure of the organist: so that the number of stops is indeterminate.

Each key or stop pressed down opens a valve or plug, which corresponds lengthwise, to as many holes as there are rows of pipes on the sound-board. The holes of each row are opened and shut by a register or ruler pierced with forty-eight holes. By drawing the register, the holes of one row are opened, because the holes of the register correspond to those of the sound-board. So that, by opening a valve, the wind brought into the sound-board by a large pair of bellows finds a passage into the pipe, which corresponds to the open hole of the sound-board.

board. But by pushing the regiſter, the forty-eight holes of the regiſter not anſwering to any of thoſe of the ſound-board, that row of pipes anſwering to the puſhed regiſter is ſhut. Whence it follows, that by drawing ſeveral regiſters, ſeveral rows of pipes are opened; and the ſame thing happens, if the ſame regiſter correſpond to ſeveral rows. When all the ſtops are drawn, and the regiſters open, the wind pervades the whole inſtrument, and we hear that full and complete harmony, which is what the ancient writers mean to expreſs by the term diapaſon.

Hence the rows of pipes become either ſimple or compound: *ſimple*, when only one row anſwers to one regiſter; *compound*, where ſeveral. The organiſts ſay, a row is *compound*, when ſeveral pipes play upon preſſing one ſtop.

And thoſe orders of pipes, whether ſimple or compound, which in the conſtruction of the inſtrument are connected together and rendered ſubſervient to one touch of the key, are called ſtops. The ſimple ſtops, or thoſe in which only one pipe anſwers to the touch of the key, are the diapaſon, principal, tierce, twelfth, fifteenth, flute, block-flute, trumpet, clarion, nazard, vox humana, krumhorn, and ſome others. The compound ſtops are the cornet, the ſeſquialtera, mixture, furniture, &c. and are ſo called, becauſe in them ſeveral pipes are made to ſpeak at the touch of a ſingle key; as in the ſeſquialtera three, in the cornet five, in the mixture and in the furniture three, four, or more; and the full *organ* or chorus is compounded of all. Of the ſtops of an *organ*, the moſt uſual are the diapaſons, the open and ſtopped, the tierce, ſeſquialtera, flute, cornet, tenth, twelfth, fifteenth, principal, furniture, mixture, trumpet, clarion, hautboy, ſarigot, vox humana, krumhorn, and nazard. The foreign *organs*, eſpecially thoſe of Germany, have many more: particularly that in the abbey church of Weingarten, a town in the Upper Palatine, which has ſixty-ſix, and contains no fewer than ſix thouſand ſix hundred and ſixty-ſix pipes. The *organ* at Haerlem is ſaid to have ſixty ſtops, many of them but little known to the Engliſh workman and diſtinguiſhed by names that expreſs the ſound which they produce. Hawkins's Hiſt. Muſic, vol. iv. p. 149.

The pipes of the *organ* are of two kinds; the one with mouths like our flutes; the other with reeds. The firſt, called *pipes of imitation*, conſiſt,

1. Of a foot AABB (*Tab.* II. *Miſcell. fig.* 25.) which is a hollow cone, and which receives the wind that is to ſound the pipe. 2. To this foot is faſtened the body of the pipe BBDD. Between the foot and the body of the pipe is a diaphragm, or partition, EEF, which has a little, long, narrow aperture to let out the wind. Over this aperture is the mouth BFCC; whoſe upper lip, CC, being level, cuts the wind as it comes out at the aperture.

The pipes are of pewter, of lead mixed with a twelfth part, or as ſome ſay with half of tin, and of wood. Thoſe of tin are always open at their extremities: their diameter is very ſmall, and their ſound very clear and ſhrill. Thoſe of lead mixed are larger; the ſhorteſt open, the longeſt are quite ſtopped; the mean ones partly ſtopped, and having, beſides, a little ear on each ſide the mouth, to be drawn cloſer, or ſet farther aſunder, in order to raiſe or lower the ſound. The wooden pipes are made ſquare, and their extremity ſtopped with a valve or tampion of leather. The ſound of the wooden and leaden pipes is very ſoft; the large ones ſtopped, are uſually of wood; the ſmall ones of lead. The longeſt pipes give the graveſt ſound; and the ſhorteſt the moſt acute: their lengths and widths are made in the reciprocal ratios of their ſounds; and the diviſions regulated by their rule, which they call *diapaſon*. But the pipes that are ſhut are of the ſame length as the open ones, which yield the ſame ſound. Uſually, the longeſt pipe is ſixteen feet: though in extraordinary *organs* it is thirty-two. The pedal tubes are always open, though made of wood, and of lead.

A *reed-pipe* conſiſts of a foot AABB (*Tab.* II. *Miſcell. fig.* 26.) which carries the wind into the ſhalot, or reed CD, which is a hollow demi-cylinder, fitted at its extremity D into a kind of mould II, by a wooden tampion FG. The ſhalot is covered with a plate of copper EEFF, fitted at its extremity FF into the mould by the ſame wooden tampion: its other extremity EE is at liberty; ſo that the air entering the ſhalot, makes it tremble or ſhake againſt the reed; and the longer that part of the tongue which is at liberty, FL, is made, the deeper is the ſound. The mould II, which ſerves to fix the ſhalot or reed, the tongue, tampion, &c. ſerves alſo to ſtop the foot of the pipe, and to oblige the wind to go out wholly at the reed.

Laſtly, in the mould is ſoldered the part HHKK, called the *tube*, whoſe inward opening is a continuation of that of the reed. The form of this tube is different in the different ranks of pipes.

The degree of acuteneſs and gravity in the ſound of a reed-pipe, depends on the length of the tongue, and that of the pipe CK, taken from the extremity C of the ſhalot, to the extremity K of the tube.

The quality of the ſound depends on the width of the reed, the tongue, and the tube; as alſo on the thickneſs of the tongue, the figure of the tube, and the quantity of wind.

To diverſify the ſounds of the pipes, they add a valve to the port-vent, which lets the wind go in fits or ſhakes.

Of the pipes in an *organ*, thoſe called the diapaſons are to be conſidered as the baſis or foundation: above theſe ſucceed in regular order other ſimple ſtops, tuned in harmonical intervals to the diapaſons, as the tierce or third, the ſeſquialtera in the ratio of three to two, or the fifth; ſome in the octave, others in the tenth, which is the replicate of the third, the twelfth the replicate of the fifth, the biſdiapaſon, and ſo on to the twenty-ſecond. Among the modern improvements of the *organ*, the moſt remarkable are the ſwell and the tremblant: the former, invented by an Engliſh artiſt, conſiſts in a number of pipes placed in a remote part of the inſtrument, and incloſed in a kind of box, which, being gradually opened by the preſſure of the foot, increaſes the ſound as the wind does the ſound of a peal of bells, or ſuppreſſes it in like manner by the contrary action. The tremblant is a contrivance by means of a valve in the port-vent or paſſage from the wind-cheſt, to check the wind and admit it only by ſtarts; ſo that the notes ſeem to ſtammer, and the whole inſtrument to ſob, in a manner very offenſive to the ear. There is a tremblant in the *organ* at the German chapel in the Savoy. Hawkins, ubi ſupra, p. 150.

ORGAN, *hydraulic*, denotes a muſical machine that plays by means of water inſtead of wind.

Of theſe there are ſeveral in Italy in the grottoes of vineyards.

Cteſebes of Alexandria, who lived in the reign of Ptolemy Euergetes, is ſaid to have firſt invented *organs* that played by compreſſing the air with water, as is ſtill practiſed. Archimedes and Vitruvius have left us deſcriptions of the *hydraulic organ*. Feliblen, de la Vie des Archit. See Hawkins's Hiſt. of Muſic, vol i. p. 190, &c.

In the cabinet of queen Chriſtina is a beautiful and large medallion of Valentinian, on the reverſe whereof is ſeen one of theſe *hydraulic organs*; with two men, one on the right, the other on the left, ſeeming to pump the water which plays it, and to liſten to its ſound. It has only eight pipes, placed on a round pedeſtal. The inſcription is PLACRA SPETRI, if it be not wrong copied, which we ſuſpect.

ORGANICAL, in the *Ancient Muſic*, was that part performed with inſtruments.

The *organical* comprehended three kinds of inſtruments; viz. *wind inſtruments*, as the trumpet, flute, &c. *ſtringed inſtruments*, as the lute, lyre, &c. and *pulſatile inſtruments*, or thoſe played on by beating, as drums, &c. See each in its place, TRUMPET, &c.

ORGANICAL *part* is that part of an animal or plant deſtined for the performance of ſome particular function. See ORGAN.

ORGANICAL *parts*, in Buffon's ſyſtem of generation. See GENERATION.

ORGANICAL *diſeaſe*, a diſeaſe in an *organical* part of the body, whereby its function is impeded, ſuſpended, or deſtroyed.

ORGANICAL *deſcription* of curves is the method of deſcribing them on a plane, by means of inſtruments. See CURVE.

ORGANO, in the *Italian Muſic*, is uſed to ſignify the thorough baſs. It is uſually ſcored with figures over the notes, for the harpſichord, baſs-viol, and lute.

ORGASM, *orgaſmus*, denoting violence, or turgeſcency; formed from ὀργαω, *turgeo*, *I ſwell*, an ecſtaſy, or impetuous deſire of coition, occaſioned by a turgeſcency of the ſeminal veſſels, which are no longer able to reſtrain their contents.

The ancients alſo extend *orgaſm* to the other humours, and even excrements, which being accumulated, and coming to ferment, demand excretion.

Quincy uſes *orgaſm* for an impetuous, or too quick, motion of the blood, or ſpirits; whereby the muſcles are diſtended with an uncommon force.

ORGIA, ὀργια, in *Antiquity*, feaſts and ſacrifices performed in honour of Bacchus, inſtituted by Orpheus, and chiefly celebrated on the mountains by wild, diſtracted women, called *Bacchæ*.

Euſebius derives the word ἀπο της ὀργης, *fury*, *madneſs*.

Others from ὄρος, *mountain*; becauſe Orpheus removed from Thrace to mount Citheron: others from ὀργαί, a place conſecrated to ſome divinity: others from κωλύω, *to remove, repulſe*; in regard the profane were to be driven away.

The *orgia* were alſo called *Orphica*, from their inſtitutor, and BACCHANALIA, DIONYSIA, and LIBERALIA.

They were held every third year. The chief ſolemnities were in the night-time; and were attended with all manner of impurities.

They were carried to ſuch an exceſs, that in the year of Rome 564, the ſenate was obliged to aboliſh them through the whole empire.

Servius ſays, that at firſt *orgia* was a common name for all kinds of ſacrifices among the Greeks, of the ſame import with the word *ceremoniæ* among the Romans.

ORGUES, in *Fortification*, thick long pieces of wood, pointed and ſhod with iron, and hung each by a ſeparate rope over the gateway of a city, ready on any ſurprize or attempt of the enemy to be let down to ſtop up the gate.

The ends of the ſeveral ropes are wound round a windlaſs, by means of which they may be all let down together.

Orgues are preferable to herſes, or portcullices, becauſe theſe may be either broke by a petard, or they may be ſtopped in their falling down; but a petard is uſeleſs againſt an *orgue*; for if it break one or two of the pieces, they immediately fall down again, and fill up the vacancy; or if they ſtop one or two of the pieces from falling, it is no hindrance to the reſt; for being all ſeparate, they have no dependence upon one another.

ORGUES is alſo uſed for a machine compoſed of ſeveral harquebuſs or muſquet-barrels, bound together; by means whereof ſeveral exploſions are made at the ſame time; uſed to defend breaches, and other places attacked.

ORGYA, ὄργυια, an ancient Grecian meaſure, containing ſix feet.

Some repreſent the *orgya* as the Grecian pace.

Heſychius deſcribes it as the ſpace comprehended between the two hands, when the arms are extended; anſwering to the Roman *ulna*, and our fathom.

ORICHALCUM, or AURICHALCUM, *braſs*. See BRASS.

It is evident, from all accounts, that the *orichalcum* of the ancients was a fictitious ſubſtance, not a natural metal. They made it on the ſame baſis that we make braſs at preſent; but they had ſeveral ways of doing it, and diſtinguiſhed it into ſeveral kinds. They had a white ſort in frequent uſe and great eſteem; and even the yellow they diſtinguiſhed into two principal ſorts, under different names. The *orichalcum* and *æs flavum*, braſs and yellow copper, are with us ſynonymous terms; but with them they were uſed to expreſs different combinations of the ingredients.

ORICHALCUM, or AURICHALCUM *album*, *white braſs*. This was a metal well known among the ancients, and celebrated by Ariſtotle and by Strabo, and others, under the name of χρυσὸς λευκὸς. It was made by mixing an earth with copper, while in fuſion; but what that earth was, we are not informed.

None of our methods ſeem to be the ſame with their's, ſince the metal is debaſed by all our's, and becomes brittle; whereas, in their management, according to their own accounts, it ſeems not to have loſt any thing of its ductility, though it acquired a peculiar brightneſs.

ORIENT, ORIENS, in *Geography* or *Aſtronomy*, the eaſt, or eaſt point of the horizon.

It is thus called from the Latin, *oriri*, *to ariſe*; becauſe it is in this point the ſun riſes.

ORIENT, *equinoctial*, is uſed for that point of the horizon wherein the ſun riſes when he is in the equator, or when he enters the ſigns Aries and Libra. See SPRING, and AUTUMN.

ORIENT, *æſtival*, is the point wherein the ſun riſes in the middle of ſummer, when the days are longeſt.

ORIENT, *hybernal*, is the point where the ſun riſes in the middle of winter, when the days are ſhorteſt.

ORIENTAL, ſomething ſituated towards the eaſt with regard to us: in oppoſition to *occidental*.

In this ſenſe we ſay, *oriental pearls*, q. d. ſuch as are found in the Eaſt-Indies, (ſee PEARL.) *Oriental languages*, meaning the Hebrew, Syriac, Chaldee, and Cophtic. See LANGUAGE.

ORIENTAL *bezoar*. See BEZOAR.

ORIENTAL *Bibles*. See BIBLE.

ORIENTAL *emerald*. See EMERALD.

In aſtronomy, a planet is ſaid to be *oriental*, when it appears in the eaſt before the ſun. See RISING.

ORIENTAL *philoſophy*, is ſometimes uſed for the philoſophy of the Eaſt, or that of the Perſians, Chaldeans, and Arabians (ſee MAGI); but by eccleſiaſtical writers it is generally uſed for that which was ſtyled gnoſis or ſcience, and which was adopted by the GNOSTICS.

The firſt principles of the *oriental philoſophy* ſeem perfectly conſiſtent with the dictates of reaſon; for its firſt founder muſt undoubtedly have argued in the following manner: "There are many evils in this world, and men frame "impelled by a natural inſtinct to the practice of thoſe "things which reaſon condemns; but that eternal mind, "from which all ſpirits derive their exiſtence, muſt be "inacceſſible to all kinds of evil, and alſo of a moſt "perfect and beneficent nature; therefore the origin of "thoſe evils, with which the univerſe abounds, muſt be "ſought ſomewhere elſe than in the deity. It cannot "reſide in him who is all perfection; and therefore it "muſt be without him. Now, there is nothing without or beyond the deity, but matter; therefore matter "is the centre and ſource of all evil, of all vice." Having taken for granted theſe principles, they proceeded farther, and affirmed, that matter was eternal, and derived its preſent form, not from the will of the ſupreme God, but from the creating power of ſome inferior intelligence, to whom the world and its inhabitants owed their exiſtence. As a proof of this aſſertion, they alledged that it was incredible, that the ſupreme deity, perfectly good, and infinitely removed from all evil, ſhould either create or modify matter, which is eſſentially indignant and corrupt, or beſtow upon it, in any degree, the riches of his wiſdom and liberality.

The *oriental* philoſophers were divided in their opinion, when they proceeded to argue from theſe principles. Some imagined two eternal principles, from whence all things proceeded; the one preſiding over light, and the other over matter, and, by their perpetual conflict, explained the mixture of good and evil, that appears in the univerſe. Others maintained, that the being, which preſided over matter, was not an eternal principle, but a ſubordinate intelligence, one of thoſe whom the ſupreme God produced from himſelf. They ſuppoſed that this being was moved, by a ſudden impulſe, to reduce to order the rude maſs of matter, which lay excluded from the manſions of the deity, and alſo to create the human race. A third ſort fell upon a ſyſtem different from the two preceding, and formed to themſelves the notion of a triumvirate of beings, in which the ſupreme deity was diſtinguiſhed both from the material, evil principle, and from the creator of this ſublunary world. Theſe, then, were the three leading ſects of the *oriental philoſophy*, which were ſubdivided into various factions, by the diſputes that aroſe, when they came to explain more fully their reſpective opinions, and to purſue them into all their monſtrous conſequences.

The diviſions among the various ſects of theſe philoſophers, did not prevent their holding, in common, certain opinions concerning the deity, the univerſe, the human race, and ſeveral other ſubjects. They were unanimous in acknowledging the exiſtence of an eternal nature, in whom dwelt the fulneſs of wiſdom, goodneſs, and all other perfections, and of whom no mortal was able to form a complete idea. This great being was conſidered by them, as a moſt pure and radiant light, diffuſed through the immenſity of ſpace, which they called pleroma, a Greek word which ſignifies *fulneſs*; and they taught concerning him and his operations, the following things: "The eternal nature, infinitely perfect and "infinitely happy, having dwelt from everlaſting in a profound ſolitude, and in a bleſſed tranquillity, produced, "at length, from itſelf, two minds of a different ſex, "which reſembled their ſupreme parent in the moſt "perfect manner. From the prolific union of theſe two "beings others aroſe, which were alſo followed by ſucceeding generations; ſo that, in proceſs of time, a "celeſtial family was formed in the pleroma. This divine progeny, being immutable in its nature, and above "the power of mortality, was called, by the philoſophers, æon," a term which ſignifies, in the Greek language, an eternal nature. How many in number theſe æons were, was a point much controverted among the *oriental* ſages.

"Beyond the manſions of light, where dwells the deity "with his celeſtial offspring, there lies a rude and unwieldy maſs of matter, agitated by innate, turbulent, "and irregular motions. One of the celeſtial natures "deſcending from the pleroma, either by a fortuitous "impulſe, or in conſequence of a divine commiſſion, "reduced to order this unſeemly maſs, adorned it with "a rich variety of gifts, created men, and inferior animals of different kinds to ſtore it with inhabitants, "and corrected its malignity by mixing with it a certain portion of light, and alſo of a matter celeſtial and "divine. This creator of the world is diſtinguiſhed from "the ſupreme deity by the name of demiurge. His

"character

" character is a compound of ſhining qualities, and in-
" ſupportable arrogance; and his exceſſive luſt of em-
" pire efaces his talents and his virtues. He claims
" dominion over the new world he has formed, as his
" ſovereign right; and, excluding totally the ſupreme
" deity from all concernment in it, he demands from
" mankind for himſelf and his aſſociates, divine ho-
" nours."

" Man is a compound of a terreſtrial and corrupt body,
" and a ſoul which is of celeſtial origin, and, in ſome
" meaſure, an emanation from the divinity. This nobler
" part is miſerably weighed down and encumbered by the
" body, which is the ſeat of all irregular luſts and im-
" pure deſires. It is this body that ſeduces the ſoul from
" the purſuit of truth, and not only turns it from the
" contemplation and worſhip of the ſupreme being, ſo
" as to confine its homage and veneration to the creator
" of this world, but alſo attaches it to terreſtrial objects,
" and to the immoderate purſuit of ſenſual pleaſures, by
" which its nature is totally polluted. The ſovereign
" mind employs various means to deliver his offspring
" from this deplorable ſervitude, eſpecially the miniſtry
" of divine meſſengers, whom he ſends to enlighten, to
" admoniſh, and to reform the human race. In the
" mean time, the imperious demiurge exerts his power
" in oppoſition to the merciful purpoſe of the ſupreme
" being, reſiſts the influence of thoſe ſolemn invitations,
" by which he exhorts mankind to return to him, and la-
" bours to efface the knowledge of God in the minds of
" intelligent beings. In this conflict, ſuch ſouls, as,
" throwing off the yoke of the creators and rulers of this
" world, riſe to their ſupreme parent, and ſubdue the
" turbulent and ſinful motions, which corrupt matter
" excites within them, ſhall, at the diſſolution of their
" mortal bodies, aſcend directly to the pleroma. Thoſe,
" on the contrary, who remain in the bondage of ſervile
" ſuperſtition, and corrupt matter, ſhall, at the end of
" this life, paſs into new bodies, until they awake from
" their ſinful lethargy. In the end, however, the ſu-
" preme God ſhall come forth victorious, triumph over
" all oppoſition, and, having delivered from their ſer-
" vitude the greateſt part of thoſe ſouls that are impri-
" ſoned in mortal bodies, ſhall diſſolve the frame of this
" viſible world, and involve it in a general ruin. After
" this ſolemn period, primitive tranquillity ſhall be re-
" ſtored in the univerſe, and God ſhall reign with happy
" ſpirits, in undiſturbed felicity, through the everlaſting
" ages." Moſheim's Eccl. Hiſt. vol. i. p. 69, &c. 8vo.

ORIFICE, *Orificium*, the mouth or aperture of a tube, pipe, or other cavity.

ORIFICE, in *Anatomy*, is particularly applied to the mouths of the ſeveral ducts, veſſels, and other cavities; as of the bladder, uterus, ſtomach, &c.

The upper *orifice* of the ſtomach is the part where hunger is felt; the lower *orifice* is called the *pylorus*.

There are ſome operations in chemiſtry, where the *orifices* of the veſſels muſt be ſealed hermetically.

ORIFICE is alſo uſed by extenſion for the aperture of a WOUND, or ULCER.

ORIGANUM, in *Botany*. See MARJORAM.

ORIGENIANS, *Origeniani*, a ſect of ancient heretics, who even ſurpaſſed the abominations of the Gnoſtics. St. Epiphanius ſpeaks of them as ſubſiſting in his time but in very ſmall number. He ſeems to fix their riſe about the time of the great *Origen*; but does not ſay they took their name from him. On the contrary, he diſtinguiſhes them from the *Origeniſts*, whom he derives from *Origen Adamantius*; adding, indeed, that they firſt took their name from one *Origen*; by which he intimates, that it was not the great *Origen*. And St. Auguſtine ſays expreſly it was another. As to their doctrine, all that modeſty will allow to be ſaid, is, that they rejected marriage; that they uſed ſeveral apocryphal books, as the acts of St. Andrew, &c. and that, to excuſe their open crimes, they accuſed the catholics of doing the ſame in private.

ORIGENISTS, in *Church Hiſtory*, followers of the opinions of Origen, a preſbyter of Alexandria, who, in the third century, maintained, that Chriſt is only the Son of God by adoption; that the human ſoul had a pre-exiſtent ſtate, and had ſinned in heaven before the body was created; that the torments of the damned ſhall not be eternal, but that all intelligent beings ſhall be reſtored to order and happineſs, and that the devils themſelves ſhall be relieved at laſt.

Origen, as Moſheim repreſents him, was a man of vaſt and uncommon abilities, and the greateſt luminary of the Chriſtian world that the age in which he lived exhibited to view. Had the juſtneſs of his judgment been equal to the immenſity of his genius, the fervor of his piety, his indefatigable patience, his extenſive erudition, and his other eminent and ſuperior talents, all encomiums muſt have fallen ſhort of his merits. Yet ſuch as he was, his virtues and his labours deſerve the admiration of all ages, and his name will be tranſmitted with honour through the annals of time, as long as learning and genius ſhall be eſteemed among men. However, Origen, notwithſtanding his diſtinguiſhed abilities, was miſled by his imagination, and by that taſte for *oriental philoſophy* which prevailed in his time. Enchanted by the charms of this philoſophy, derived from the Platonic ſchool, he ſet it up as the teſt of all religion, and imagined that the reaſons of each doctrine were to be found in that favourite philoſophy, and their nature and extent to be determined by it; nor can it be denied, that many of the corruptions of Chriſtianity proceeded from this ſource. Hence ſprung both the ſcholaſtic and myſtic theology, and to the ſentiments that were now adopted we may aſcribe the riſe of monks and hermits. Origen was alſo miſled by his imagination: for, having entertained that it was very difficult, if not impoſſible, to defend every thing in the ſacred writings from the cavils of heretics and infidels, ſo long as they were explained literally, according to the real import of the terms, he maintained that the ſcriptures were to be interpreted in the ſame allegorical manner that the Platoniſts explained the hiſtory of the Gods. In conſequence of this pernicious rule of interpretation, he alledged that the words of Scripture were, in many places, abſolutely void of ſenſe; and then though in others there were, indeed, certain notions conveyed under the outer terms according to their literal force and import, yet it was not in theſe that the true meaning of the ſacred writers was to be ſought, but in a myſterious and hidden ſenſe, ariſing from the nature of the things themſelves. This hidden ſenſe he endeavours to inveſtigate throughout his commentaries, neglecting and deſpiſing, for the moſt part, the outward letter. He divided this hidden ſenſe into moral, which diſplays thoſe doctrines that relate to the ſtate of the ſoul and the conduct of life; and myſtical or ſpiritual, which repreſents the nature, the laws and hiſtory of the ſpiritual or myſtical world. This myſtical world he again ſubdivided into two diſtinct regions, one called the ſuperior, i. e. heaven; and the other the inferior, by which he meant the church. And thus he was led to another diviſion of the myſtical ſenſe into an earthly or allegorical ſenſe, adapted to the inferior world; and a celeſtial or anagogetical one, adapted to the ſuperior region. Origen found a violent enemy in Demetrius, biſhop of Alexandria; who obliged him, in the year 231, to retire from his charge to Ceſarea: and farther to ſatisfy his vengeance, he aſſembled two councils, in the firſt of which he condemned him unheard, and deprived him of his offices; and in the ſecond had him degraded from the facerdotal dignity. However, the character and doctrine of Origen were held by many, and eſpecially by the monks in the higheſt veneration, and cheriſhed in this and the following centuries with a kind of extravagant enthuſiaſm. Hence many commotions were raiſed in the church, which were terminated by the fifth general council, aſſembled at Conſtantinople by Juſtinian, A. D. 553, in which Origen and his followers were again condemned. The tenets of Origen which gave the greateſt offence were the following, viz. 1. That, in the Trinity, the Father is greater than the Son, and the Son than the Holy Ghoſt. 2. The pre-exiſtence of ſouls, which Origen conſidered as ſent into mortal bodies for the puniſhment of ſins committed in a former ſtate of being. 3. That the ſoul of Chriſt was united to the word before the incarnation. 4. That the ſun, moon, and ſtars, &c. were animated and endowed with rational ſouls. 5. That after the reſurrection, all bodies will be of a round figure. 6. That the torments of the damned will have an end; and that, as Chriſt had been crucified in this world to ſave mankind, he is to be crucified in the next to ſave the devils.

St. Epiphanius inſiſts very largely on the errors of this father; but, as he declares himſelf too warmly againſt him, there may be ſomewhat of exaggeration in what he ſays. Nor do St. Jerom, or Theophilus of Alexandria, ſeem to have kept their zeal within the proper bounds, in ſpeaking of Origen. For which reaſon, no doubt, it was, that St. Chryſoſtom himſelf was accuſed of being an *Origeniſt*, becauſe not ſo vehemently bent againſt him; and condemned to baniſhment by the council of Chalcedon in the year 403. *Origeniſm* ſpread itſelf chiefly among the monks of Egypt.

The myſtic theology of Origen ſeems to be adopted by our modern QUAKERS. On the ſubject of this article conſult Moſheim's Eccl. Hiſt. vol. i.

ORIGINAL, a firſt draught, deſign, or autograph, of any thing; ſerving as a model, or exemplar, to be imitated or copied.

Scarce any of the ancient titles, tenures, &c. are now

found in the *originals*. They are only vidimuſes, or copies collated with the *originals*.

ORIGINAL. In the Court of King's Bench the uſual *original* writ in actions, is for action of treſpaſs upon the caſe; and this court doth not iſſue *originals* in actions of debt, covenant, or account, &c. Whereas the court of Common Pleas proceeds by *original* in all kinds of actions; but to arreſt and ſue a party to outlawry, it is made uſe of by both courts. And for *originals* in treſpaſs on the caſe, there is a fine payable to the crown, where the damages are laid above forty pounds, in proportion to the damage. Practiſ. Solic. 254, 255.

The *original* is the foundation of the capias and all ſubſequent proceſs; the return whereof is generally the teſte of the capias, though the capias may be taken out before the *original*, by leaving the precipe with the filazer, who will make out a capias upon it, and afterwards carry it to the curſitor to make an *original*; and the filazer when it is returned, is to file it with the cuſtos brevium.

ORIGINAL *ſin*. See SIN.

ORIGINAL *conveyances*. See CONVEYANCE.

ORIGINAL *writs*. See WRIT.

ORIGINALIA, in the *Exchequer*, are records, or tranſcripts, ſent to the remembrancer's office out of chancery.

They differ from *recorda*, which contain the judgments and pleadings in ſuits tried before the barons.

ORIGINARY, *originarii*, among the Romans, an appellation given to ſlaves born in their maſter's houſes, who were otherwiſe called *vernæ*.

ORILLON, in *Fortification*, a ſmall rounding of earth, lined with a wall; raiſed on the ſhoulder of thoſe baſtions that have caſemates, to cover the cannon in the retired flank, and prevent their being diſmounted by the enemy. *Orillons* and retired flanks are conſtructed by deſcribing the front MPQRST (*Fab. Fort. fig.* 15. N° 2.) in the manner directed under art. FORTIFICATION *according to M. Vauban's firſt method*, and dividing the flank into three equal parts, of which let S *r* be one; then from the oppoſite flanked angle M draw a line M *r*, in which take *m r* = 5 toiſes; take alſo R *n* in the line of defence M R produced equal to 5 toiſes, and join *n m*; upon which, as a baſe, deſcribe the equilateral triangle *n p m*, and from the angle *p*, oppoſite to the baſe, as a centre, deſcribe the circular flank *n m*: and if S *r* be biſected by the perpendicular 1, 2, and another be erected on the face S T at S, the point of interſection, 2, of theſe two perpendiculars will be the centre of the arc which forms the *orillon*.

There are other ſorts of *orillons*, properly called EPAULEMENTS, almoſt of a ſquare figure.

ORIOLUS, in *Ornithology*, a name by which ſeveral authors have called the GALBULA, a very beautiful yellow bird of the thruſh kind, remarkable for its manner of hanging its neſt. See *Tab.* III. *of Birds, fig.* 38.

ORION, in *Aſtronomy*, one of the conſtellations of the ſouthern hemiſphere.

The word is formed from the Greek ὁρίω, *to make weather*; the ancients ſuppoſing, that it raiſed tempeſts at its riſing and ſetting.

The ſtars in the conſtellation *Orion*, in Ptolemy's catalogue, are thirty-eight; in Tycho's and Hevelius's, ſixty-two; in the Britannic catalogue, ſeventy-eight. The names, ſituations, magnitudes, longitudes, and latitudes whereof are as follow:

Names and ſituations of the ſtars.	Signs. Bayer's Cha.	Longitud.	Latitude. South.	Magnitude.
		° ′ ″	° ′ ″	
Preced. and ſixth in the lion's ſkin.	♊	7 32 39	15 25 34	4
5th in the lion's ſkin.	ν	8 00 55	13 31 20	4
7th in the lion's ſkin.		7 46 00	16 48 55	4
1ſt and north, in the lion's ſkin.	ε	9 09 15	8 16 07	4-5
		7 56 9	19 57 15	6
5.				
3d in the lion's ſkin.	ξ	9 22 11	13 03 15	6
4th in the lion's ſkin.	ω	9 14 55	12 24 02	6
8th in the lion's ſkin.		8 09 40	20 00 41	4
2d in the lion's ſkin.	ο	10 00 34	9 06 32	4-5
Laſt and ſouth in the lion's ſkin.		9 11 42	20 53 51	4-5
10.				
Prec. of 2 infor. tow. the horn of ♉	γ	12 11 56	7 25 55	5
North. in the preced. arm.		12 21 32	13 22 20	6
South and ſubſeq. in the arm.		12 24 47	13 22 51	6
		12 20 45	14 22 37	5
Sub. of the inf. tow. the horn of ♉	ι	13 27 34	7 21 32	5
15.				
	δ	12 51 58	13 5 34	6
		13 13 48	20 07 24	4-5
That againſt the preced. ſide.		14 44 26	11 43 44	0-5
That again the preced. arm.				
Bright one in preced. foot called Rigeth	β	12 30 50	31 10 11	1
More north, over the heel.	ρ	13 30 26	29 52 51	4
20.				
Laſt of the north.		13 30 50	31 10 11	1
		13 33 48	30 07 24	4-5
		14 44 26	11 43 44	0-5
		12 30 50	31 10 11	1
		13 30 26	29 52 51	4

Names and ſituations of the ſtars.	Signs. Bayer's Cha.	Longitud.	Latitude. South.	Magnitude.
		° ′ ″	° ′ ″	
		14 46 42	20 30 1	6
North. in the proc. ſide under the girdle.		15 13 36	23 31 20	4
Preced. and north. in the ſide.	π	15 48 41	19 [illegible]	6
In the preced. ſhoulder.	γ	16 37 33	20 [illegible]	[illegible]
Preced. and ſouth. in the back.	ψ	16 12 26	21 [illegible]	[illegible]
25.				
		16 10 46	21 40 [illegible]	0
S. in the preced. ſide, under the girdle		15 55 49	24 05 [illegible]	6
In the hilt of the ſword.	κ	15 49 49	25 34 [illegible]	5
Under the left hoof.	τ	15 15 42	30 52 [illegible]	5
Preced. of 4 in the back, (as it were in a right line)	ψ	16 50 50	20 08 18	5
30.				
		17 23 22	24 21 29	6
That fol. the ſhould. to the ſouth	λ	18 02 50	17 20 25	5
2d of four in the back.	ν	18 01 10	20 00 09	6
Preced. in the girdle.	β	18 01 38	23 36 07	2
		19 19 28	9 2 31	6
35.				
Under the point of the ſword.	υ	17 34 05	30 35 12	4
Preced. in the head.	φ	19 15 51	13 52 19	5
In the back the 3d.		18 51 06	19 34 10	6
In the head the north. of three.	λ	19 22 18	13 25 02	4
South. and ſubſeq. of the head.	φ	19 46 26	14 02 58	5
40.				
Prec. of the cornig. in the middle of the ſword.	ψ	18 37 58	28 42 45	6
Preced. of the north. of the contig. in the mid. of the ſword.	ζ	18 42 13	28 10 17	5
Subſeq. in the mid. of the ſword.	θ	18 39 55	28 44 23	4
South. in the ſword.	ι	18 39 17	29 14 37	3-4
Laſt of the north. in the ſword.	ζ	18 46 42	28 11 45	5
45.				
Middle of three in the girdle.	ι	19 07 44	24 33 25	2
Laſt of 4 in the line of the back.	ν	20 09 56	19 16 03	5
That under the 3d of the girdle	ε	19 45 41	25 58 47	4
Subſ. under the point of the ſw.	d	19 35 25	30 34 50	5
Third and laſt in the girdle.		20 21 45	25 20 17	2
50.				
Preceds. in the hind-ſide.	b	20 58 49	21 56 12	5
		22 32 35	16 59 55	6
In the hind-knee.	a	22 03 41	33 07 00	3
Preced. of two in the club.	χ	24 22 23	3 11 44	5
		23 9 32	30 58 58	6
55.				
Latter of two in the hind-ſide.		23 38 1	21 37 51	6
	χ	24 29 13	3 44 01	5
Glittering ſtar in the hind-ſhould.	a	24 25 00	16 04 26	1
		25 14 10	21 38 50	6
That follow. the ſide out of form.	a	25 20 41	22 56 04	6
60.				
In the lower part of the hind-arm	χ	26 16 05	13 50 01	4
Subſ. in the club.	χ	26 36 02	3 20 40	6
		26 21 38	18 02 56	6
		27 11 40	3 48 31	6
Second. of 2 in the club,	χ	27 18 23	3 21 33	5-6
65.				
		26 59 00	19 19 18	6
Prec. of the S. in ♊ of hind-haud	ι	27 31 17	8 42 16	4-5
		28 30 25	5 39 59	6
Prec. of the north. in the ſquare.	ſ	28 35 14	7 19 31	6
Laſt of the ſouth. in the ſame.	ε	28 34 01	9 14 49	4-5
70.				
	ſ	29 12 10	4 16 02	6
Laſt of the north.	k	29 24 9	7 17 31	6
	k	29 34 49	10 53 13	6
North in the hind ulna.	l	29 45 12	11 10 30	6
South in the hind ulna.		0 00 00	3 28 35	6
75.				
		1 57 50	18 05 18	6
		3 6 57	23 4 8	6
		3 9 5	23 34 28	6

ORION's *river*, in *Aſtronomy*, a conſtellation called alſo ERIDANUS.

ORIS *columna*. See COLUMNA.

ORIS *diſtortor*. See DISTORTOR.

ORIS *ſpeculum*. See SPECULUM.

ORITES, in *Natural Hiſtory*, the name of a ſtone deſcribed by the ancients, and celebrated by the writers of the middle ages for its wonderful virtues. Pliny ſays, that it was round, and remained unhurt in the fire, and that ſome called it *ſideritis*. To this the later writers have added, that there are three kinds of it: the firſt round and black; this rubbed over with oil of roſes was famous for the bites of venomous beaſts. The ſecond was green, variegated with veins and ſpots of white; this was to be annexed to the bodies of perſons, to preſerve them from many ſorts of injuries. And the third was compoſed of parallel plates, and ſaid to have the virtue of cauſing abortion, if only carried in the pocket.

ORITORIUS *lapis*, a name given by Ludovicus Dulcis, and ſome other authors, to the *echroeſorreous ellitæ*, or

eagle ſtones; particularly to a ſpecies of them common in Germany, and uſed in the ſhops there, and in ſome other places, under the name of *eagle ſtones*. Theſe are of a brownish colour and ſmooth ſurface, and are eaſily broken, being only compoſed of a thin cruſt of ferruginous earth, incloſing ſeveral ſmall lumps of a greenish marle, which rattle in it when ſhaken.

ORIZEUS *color*, a term uſed by authors to expreſs the yellow colour in the eyes and urine of perſons afflicted with the JUNDICE.

ORKNEY *beans*, in *Natural Hiſtory*, a name given by authors to a ſort of fruit found on the ſhores of the *Orkney* iſlands, near Scotland. Theſe are of ſeveral diſtinct ſpecies, and are none of them the produce of thoſe iſlands, nor of any places thereabout, but are probably of American origin, many of them being plainly natives of Jamaica.

They are found principally on thoſe coaſts which are moſt expoſed to the waves of the great ocean, and are on theſe ſo plentiful, that they might be gathered in large quantities, if of any value; but the only uſe they are put to, is the making ſnuff-boxes out of them. Sir Robert Sibbald, and Mr. Wallace, in their accounts of Scotland, have both named them under the title of *Molucca* BEANS.

ORLE, ORLET, or ORLO, in *Architecture*, a fillet under the ovolo, or quarter-round of a capital. See *Tab. Archit. fig.* 25.

The word is French, formed from the Latin *oriolum*, or *orlum*, of *ora*, a *border* or *liſt*.

When it is at the top or bottom of the ſhaft, it is called the *cincture*.

Palladio alſo uſes *orlo* for the plinth of the baſes of columns and pedeſtals.

ORLE, in *Heraldry*, is an ordinary in form of a fillet, drawn round the ſhield, near the edge or extremity thereof, leaving the field vacant in the middle.

Its breadth is but half that of the bordure, which contains a fifth part of the ſhield; the *orle* only a tenth: add, that the *orle* is its own breadth diſtant from the edge of the ſhield; whereas the bordure comes to the edge itſelf.

There is ſometimes one *orle*, ſometimes there are two, and ſometimes three. When there are three, or more, they take up the whole ſhield. It is ſometimes borne flory, or counter-flory, or like the treſſure.

The form of the *orle* is the ſame with that of the ſhield; whence it reſembles an eſcutcheon: as repreſented in *Tab.* II. *Heraldry, fig.* 74.

If a round of martlets, cinquefoils, &c. be placed about any ordinary, in manner of an *orle*, they are ſaid to be *en orle*, or *orle-wiſe*.

ORLEANA, in the *Materia Medica*, the name of the ARNOTTO, or ROUCOU.

ORLOPE, or ORLOP, in the *Sea-Language*, a platform of planks laid over the beams in the hold of a ſhip of war, whereon the cables are uſually coiled, and the ſeveral officers ſtore-rooms contained. It is alſo uſed for the uppermoſt ſpace or deck in a great ſhip, from the main-maſt to the mizen.

In three-decked ſhips, the ſecond and loweſt decks are ſometimes alſo called *orlopes*. See *Tab. Ship. fig.* 2. *lit.* I, E, F.

ORNAMENTS, in *Architecture*, expreſs all the ſculpture, or carved work, wherewith a piece of architecture is enriched.

ORNAMENTS *in relievo* are thoſe carved on the contours of mouldings; as leaves, ſhells, ſcrolls, flowers, &c. See RELIEVO.

ORNAMENTS *in creux* are thoſe cut within the mouldings; as eggs, flutes, &c. See CREUX.

Vitruvius and Vignola alſo uſe the word *ornament* to ſignify the entablature.

ORNAMENTS, *diſtribution of*. See DISTRIBUTION.

ORNICUS *lapis*, a name given by ſome authors to the *ſapphire* of the ancients, which is a peculiar ſpecies of our *lapis lazuli*, in which the gold-coloured matter is not diſpoſed in veins, but in ſeparate ſpots of the form of a ſtar. It was firſt called *orniſcus*, and *ornus*, by corruption from *aureus*, *golden*; and thence came, at length, the word *ornicus*.

ORNITHIA, a name given by the ancients to certain winds, which uſually blew in ſpring, at the time when the birds of paſſage came over to them. Pliny ſays, that theſe winds blew from the weſt, and that, by ſome, the Etefian winds were called by this name. Others ſuppoſe that they blew from the north, or north-weſt.

ORNITHOGALUM, in *Botany*. See STAR *of Bethlehem*.

ORNITHOLOGY, formed from ὄρνις, *bird*, and λόγος, *diſcourſe*, that branch of natural hiſtory which conſiders and deſcribes BIRDS, their natures and kinds, their form, external and internal; and teaches their œconomy and uſes.

Linnæus arranges the whole claſs of birds under ſix orders, according to the different figures of their beaks, viz. 1. The *accipitres*, or birds with uncinated or hooked beaks. This order comprehends four genera, and ſeventy-eight ſpecies.

2. The *picæ*, or birds that have convex and compreſſed beaks, containing twenty-two genera, and two hundred and forty-three ſpecies.

3. The *anſeres*, comprehending ſuch birds as have depreſſed and dentated, or ſerrated beaks, comprehending twelve genera, and a hundred and ſix ſpecies.

4. The *grallæ*, or thoſe furniſhed with ſubcylindric and obtuſe beaks, including eighteen genera, and a hundred and twenty-ſeven ſpecies.

5. The *gallinæ*, or birds which have the beak of a convex form, but crooked, and the upper chap imbricated, comprehending ſeven genera, and thirty-nine ſpecies.

6. The *paſſeres*, or birds with conic and ſharp-pointed beaks, including fifteen genera, and three hundred and thirty-ſeven ſpecies.

In the deſcription of birds, beſides the beak, BILL, or ROSTRUM, noſtrils, and tongue, the feet, wings, and tail, are chiefly attended to. In moſt birds the toes are four in number; three ſtanding forwards, and one backwards; in ſome, two toes ſtand forward, and two backward; ſome feet, again, are palmated, or have the toes connected together by a membrane.

With regard to the wings, the long quill-feathers are called by authors *remiges*, as ſerving to fly with; and the other feathers, placed over the reſt of the body, *tectrices*.

The long feathers of the tail are called *rectrices*, as ſerving to ſteer the bird's courſe through the air.

As to the other terms made uſe of in the deſcription of birds, they are theſe: *cera* expreſſes the membrane or naked tunic, which ſurrounds and extends itſelf over more or leſs of the baſe of the beak; *mentigrum* is the rump; *capiſtrum* is the front, or fore-part of the head; *vertex*, the ſummit or crown; *nucha*, or nape, the hind-part, with the next joint of the neck; *lora*, or ſtraps, the ſpace between the bill and the eyes; *genæ*, or cheeks, the ſpace beneath the eyes; the *orbitæ*, or eye-lids, which in ſome birds are naked, in others covered with ſhort ſoft feathers; the *ſupercilia*, which in the groſs kind denote a ſcarlet naked ſkin above the eyes; and the term is alſo applied to any line of a different colour that paſſes from the bill over the eyes; but birds have no eye-brows, nor external ears, the ſound being admitted through an orifice, which is open in all but owls, whoſe ears are furniſhed with valves: and as to other terms, they will be found explained under their ſeveral heads. See FEATHERS, NECK, WINGS, &c.

We have an excellent *Ornithology* of Fr. Willughby, Eſq. and another of Mr. Ray, a poſthumous work, which is chiefly an abridgment of the former, with the addition of his *ichthyology*; and ſeveral kinds wanting in the other. Willughby, herein ſpeaks with aſſurance of a ſwan that lived three hundred years; and a gooſe that they were obliged to kill at eighty, on account of its miſchievouſneſs.

Mr. Pennant's Genera of Birds, is an uſeful introduction to the ſcience of *ornithology*. In this work, publiſhed in 1781, the author, diſtinguiſhed by his extenſive and accurate acquaintance with this and other parts of zoology, arranges birds into two general diviſions: the firſt, or that of land-birds, comprehends ſix orders; viz. the rapacious, or *accipitres* of Linnæus; the *pici*, or *picæ*, of the ſame author; the *gallinaceous*, or *gallinæ*; the *columbine* and the *paſſerine*, which two orders include the *paſſeres* of Linnæus; and the *ſtruthious*, or *gallinæ*, and *grallæ*, of Linnæus. The ſecond diviſion, or that of water-fowl, includes three orders; viz. the cloven-footed, or waders, to which ſome of the *grallæ* of Linnæus are reduced; the pinnated feet, and the web-footed, comprehending ſeveral genera of the *grallæ* and *anſeres* of the ſame writer.

The ſyſtem of Mr. Ray, compoſed in 1667, and publiſhed in 1678, founded on an arrangement firſt ſuggeſted by Belon of Mons, in France, in a work publiſhed in 1555, is preferred by Mr. Pennant to every other.

ORNITHOMANCY, a kind of divination, or method of arriving at the knowledge of futurity, by means of birds.

ORNITHOMANCY, amongſt the Greeks, was the ſame with AUGURY among the Romans.

ORNITHOPODIUM, or ORNITHOPUS, in *Botany*. See BIRD's *foot*.

ORNITHOSCOPI, οἰωνοσκοποι, in *Antiquity*, diviners, or ſoothſayers, who made predictions, and drew omens, from birds. They were likewiſe called *ornithomantes*, and *oneiroſcopi*, &c.

ORNUS *fraxinus* is that ſpecies of the ASH-*tree* in the Linnæan ſyſtem, which, according to Dr. Cirillo of Naples, produces the MANNA. It is the aſh-tree, whoſe ſmaller

leaves are ſawed, with flowers having petals. In order to obtain the manna, thoſe whoſe buſineſs it is, in July and Auguſt make an oblong inciſion, and take off from the bark of the tree about three inches in length, and two in breadth; they leave the wound open, and by degrees the manna runs out, and is almoſt ſuddenly thickened to its proper conſiſtence, and is found adhering to the bark of the tree. This is collected in baſkets, and called *manna groſſa*. When they want fine manna, they apply to the inciſion of the bark thin ſtraw or ſmall bits of ſhrubs, ſo that the manna in coming out runs upon theſe bodies, and is collected in a ſort of regular tubes, which give it the name of *manna in cannell*. Phil. Tranſ. vol. lx. art. 22.

OROBANCHE, in *Botany*. See *Broom* RAPE.

OROBO, a name given by the chemiſts to any ſort of metallic glaſs.

OROBOIDES, a name given by Hippocrates, and other authors, to a ſurfuraceous ſediment in the urine of perſons who have the jaundice: it is uſually of a reddiſh brown colour; and is not peculiar to that diſeaſe, but is found in ſome others.

OROBUS, in *Botany*. See *Bitter* VETCH.

OROCONITES, in the *Materia Medica*, a name given by Hippocrates, and others, to a bulbous root that is recommended as a rich food. It has the name from the Greek ορος, *a mountain*, and κονις, *of a conic figure*. This ſhews that it was a root of ſuch a ſhape, found growing in mountainous places; but the learned have been puzzled in their attempts to find out what it was.

ORONTIUM, in *Botany*, a name given by ſome authors to the *antirrhinum*, called in Engliſh *calf's ſnout*, or *ſnap-dragon*.

ORONTIUM, or *floating arum*, in the Linnæan *Syſtem*, is a genus of the *hexandria monogynia* claſs. Its characters are, that the ſpadix is cylindric, and covered with little flowers; the corolla has ſix naked petals; there is no ſtyle, and the noſes contain ſingle ſeeds. There is only one ſpecies.

OROSMADES, a deity among the Perſians, which is deemed the principle, or author of good, in the ſyſtem of Zoroaſter, revived by the Manicheeſ. *Oſmades* produced the good ſpirits and the ſtars, and incloſed them in an egg, which was broken by Arimanius; whence proceeded confuſion, and a mixture of good and evil. But after many conflicts the good deity totally vanquiſhes the evil one.

OROSPIZA, in *Ornithology*, a name by which the ancient naturaliſts called the BRAMBLING, or *mountain-finch*.

The word is Greek, and expreſſes *mountain-chaffinch*. See MONTIFRINGILLA.

ORPELLO, a preparation of braſs uſed in the glaſs trade, and prepared in this manner: cut plates of braſs into ſmall pieces, and place them in a luted crucible in a ſtrong fire, but not ſo violent as to melt it. Let it ſtand in this manner for four days, in which time it will be well calcined; when cold, powder, and ſift it, and finally grind it on a porphyry. This will be a black powder; ſpread this on tiles, which place on burning coals in the leer, near the hole, for four days; take off the aſhes that may fall into it, and finally powder and ſift it fine for uſe. It is known to be nicely prepared, when, on mixing with the melted metal in the glaſs furnace, it makes it ſwell and boil.

The colour it gives is a very elegant ſky-colour, and a ſea-green, or a mixt colour, between them, according to the quantity and degree of calcination. Neri's Art of Glaſs, p. 33.

ORPHAN, a child, or minor, deſtitute of father; or that has neither father nor mother.

Hence the Taborites, or followers of Ziſca, finding themſelves, at his death, without chief or conductor, took the appellation of *orphans*.

Among the Athenians, the *orphans* whoſe fathers had loſt their lives in the ſervice of their country, were under the guardianſhip of the POLEMARCHUS, who was to provide them with a competent maintenance out of the public treaſury.

In the city of London there is a court of record eſtabliſhed for the care and government of *orphans*. The lord-mayor and aldermen of London have the cuſtody of *orphans* under age, and unmarried, of freemen that die; and the keeping of all their lands and goods; and if they commit the cuſtody of an *orphan* to any man, he ſhall have a writ of *raviſhment of ward*, if the *orphan* be taken away; or the mayor and aldermen may impriſon the offender, until he produces the infant. If any one, without the conſent of the court of aldermen, marries ſuch an *orphan* under the age of twenty-one years, though out of the city, they may fine and impriſon him until paid.

Executors and adminiſtrators of freemen dying, are to exhibit true inventories of their eſtates before the lord-mayor and aldermen in the court of *orphans*, and give ſecurity to the chamberlain of London, and his ſucceſſors, by recognizance, for the *orphan's* part; which if they refuſe to do, they may be committed to priſon until they obey.

The lord mayor and commonalty of London being anſwerable for the *orphans* money paid into the chamber of the city, and by ſome accidents become indebted to the *orphans* and their creditors, in a greater ſum than they could pay; it was enacted by 5 & 6 W. & M. cap. 10. that the lands, markets, fairs, &c. belonging to the city of London, ſhall be chargeable for raiſing 8000*l.* to be appropriated for a perpetual fund for *orphans*; and towards raiſing ſuch a fund, the mayor and commonalty may aſſeſs 2000*l.* yearly upon the perſonal eſtates of the inhabitants of the city, and levy the ſame by diſtreſs. A duty is alſo granted of 4*l.* per ton on wines imported, and on coals; and every apprentice ſhall pay 2*s.* 6*d.* when he is bound, and 5*s.* when he is admitted a freeman, for raiſing the fund, which is to be applied for payment of the debts due to *orphans*, by intereſt, after the rate of 4 *per cent.*

By the cuſtom of London, the ſhare of the children, or *orphanage* part, is not fully veſted in them till the age of twenty-one, before which they cannot diſpoſe of it by teſtament; and if they die under that age, whether ſole or married, their ſhares ſhall ſurvive to the other children; but after the age of twenty-one, it is free from any *orphanage* cuſtom, and, in caſe of inteſtacy, ſhall fall under the ſtatute of diſtributions.

ORPHANUS, in *Natural Hiſtory*, a name given by ſome authors to a poor ſpecies of *opal*, called by ſome *pſeudo-opalus*: it has no other colours beſide a milky white, and purpliſh red. This ſtone is frequent in Germany, and Hungary.

ORPHEOTELISTÆ, *Orpheotelistæ*, in *Antiquity*, perſons initiated in the Orphic myſteries. They aſſured all that were admitted into their ſociety of certain felicity after death; which when Philip, one of that order, boaſted of, Leotychides, the Spartan, replied, "Why do not "you die then, you fool, and put an end to your miſ"fortunes, together with your life?" At their initiation, little elſe was required of them beſides an oath of ſecreſy.

ORPHEUS, in the *Ancient Mythology*, was the ſon of Oagrus, king of Thrace, and of the Muſe Calliope. He excelled in poetry, and eſpecially in muſic, to ſuch a degree, that he is repreſented as taming the moſt ferocious animals, changing the courſe of the winds by his melody, and as cauſing the trees of the foreſt to dance in concert with his lyre. In the character of *Orpheus*, according to the account that is recorded concerning him, were comprehended not only the felicacies of muſic and poetry, but thoſe alſo of moral philoſophy, legiſlature, and theology. Diodorus Siculus, lib. iv. cap. 25 ſays of him, that he was a man who diligently applied himſelf to literature, and having learned the mythical part of theology, travelled into Egypt, where he attained to farther knowledge, and became the greateſt of all the Greeks in the myſterious rites of religion, theological ſkill, and poetry. To which Pauſanias, lib ix. p. 586, adds, that he gained great authority, as being believed to have found out expiations for wicked actions, remedies for diſeaſes, and appeaſements of the divine diſpleaſure. The general tradition of the Greeks derived the Thracian religious rites and myſteries from *Orpheus*; and Suidas expreſly declares, it is commonly ſaid, that *Orpheus* the Thracian was the firſt inventor of the religious myſteries of the Greeks, and that religion was called *Orpheus, Threſkeia*, as being a Thracian invention. Some, however, have doubted, from what Cicero ſays, *Orphæum poetam docet Ariſtoteles nonquam fuiſſe; Ariſtotle teacheth, that there never was ſuch a man as* Orpheus *the poet*, whether there ever exiſted ſuch a perſon. But Dr. Cudworth has ſhewn, from the general teſtimony of ancient writers, that there was ſuch a perſon, who is commonly ſuppoſed to have lived before the Trojan war, (that is, in the time of the Iſraelitiſh judges) or at leaſt to have been ſenior both to Heſiod and Homer, and alſo to have died a violent death; moſt writers affirming that he was torn in pieces by women, becauſe their huſbands deſerted them, in order to follow him. The ſame learned writer has alſo inquired into the ſuſpected authenticity of the poems aſcribed to *Orpheus*; and he inclines to the opinion, that they were either written by him, or that they were very ancient, and contained his doctrine and opinions. He farther argues, that though *Orpheus* was a polytheiſt, and aſſerted a multiplicity of gods, he, nevertheleſs, acknowledged one ſupreme, unmade deity, as the original of all things; and that the Pythagoreans and Platoniſts not only had *Orpheus* in great eſteem, being commonly called by them the *Theologer*, but were alſo thought in great meaſure to have owed their theo-

logy and philosophy to him, deriving it from his principles and traditions. Cudworth's Intellectual System, book i. cap. 4. § 17. p. 204, &c. ed. 2. by Birch.

ORPHEUS, in *Ichthyology*, the name of a fish caught in the Archipelago. It is of a broad and flat figure, and of a fine purple colour; its eyes are large and prominent, and its teeth ſerrated; it has only one fin on the back, and the anterior rays of that are prickly, the others ſoft to the touch; its anus is ſmall, and is ſaid to have no paſſage for the ſemen.

This was the fiſh called *orphous* by the ancients, but the modern Greeks call another fiſh by that name. It is a ſpecies of the ſparus, of a flat figure, but very thick, has a ſmall mouth, and is covered with ſmall, but very rough ſcales, which adhere very firmly to the fleſh; the tail is not forked; it has fleſhy lips, and very ſmall teeth; its back and ſides are blackiſh, its belly white; it has a large black ſpot at the root of the tail; its head is reddiſh, and its fins are very elegantly diverſified with various colours; it has only one back-fin, and that has the anterior ray prickly, the hinder rays not at all ſo. It grows ſometimes to twenty pounds weight, and is much eſteemed among the modern Greeks.

ORPIMENT, *auri pigmentum*, a bituminous mineral, uſually found in copper mines, and ſuppoſed to contain particles of gold, which may be extracted by chemiſtry, but which were never found to countervail the expence.

Orpiment is found in lumps of ſeveral ſizes and figures; its colour is always yellow, intermixed with ſhades of other colours; as green, red, orange, &c.

Sometimes it is found almoſt quite red; which is the proper ſandaracha of the ancients.

But that uſually called *red orpiment*, or *red arſenic*, is only the yellow *orpiment* heated to a great degree, in a crucible, with oil of hemp-ſeeds, olives, or nuts.

Painters, ſarſlers, &c. make a great conſumption of this mineral; but as it is found a violent corroſive, and is even reputed a poiſon, it muſt be uſed with a great deal of caution.

Orpiment muſt be choſen of a yellow golden hue, eaſy to ſcale, and the ſcales very thin, ſmall, and ſhining like gold.

Some authors injudiciouſly diſtinguiſh *orpiment* into three kinds: white, which is the ſame with arſenic, and not properly any ſpecies of *orpiment*; *yellow*, which is the proper *orpiment*; and *red*, which is ſandarach, or REALGAR.

The Indians uſe *orpiment*, corrected with juice of lemons, with good ſucceſs, againſt fevers.

Orpiments are inflammable foſſile ſubſtances, compoſed of numbers of thin flakes, like the talcs, which eaſily ſplit, and are ſeparated from one another, and are flexile and not elaſtic, ſoluble in oil, fuſible in a moderate fire, and yielding in burning an offenſive ſmell like that of garlic.

Theſe, like the talcs, are, in ſome of the ſpecies, compoſed of large plates, or flakes, each making the whole ſurface of the maſs, and, in others, of ſmall flakes lodged in extraneous matter, or cohering alone into a maſs in form of ſpangles.

Of this genus of foſſils, there are only three known ſpecies. 1. A broad-flaked, gold coloured kind, well known among the ancients, as is plain from the deſcription of it left us by Dioſcorides, and much eſteemed at preſent by our painters. This is found in ſeveral places, as in the iſlands of the Archipelago, in the mines of Goſſelaer, in Saxony, in ſome parts of Turkey, and the Eaſt Indies, and in its utmoſt purity about Smyrna; this makes the fineſt of all yellows in painting. 2. The ſmall-flaked, yellow kind, which is the common *orpiment* of the ſhops, and is a fine colour, though greatly inferior to the former. This is found in many parts of the Turkiſh dominions, and in Germany. And, 3. Red *orpiment*. This has been a name given by the more judicious to ſandarach, and, by the vulgar, to red arſenic, but is to be reſtrained only to this foſſile, which is of a fine bright red, and of the regular texture of the *orpiments*, and anſwering all their characters. This is a very beautiful ſubſtance of a fine bright red, very gloſſy, and a little tranſparent, and is found in the Turkiſh dominions, in the iſlands of the Archipelago, and even in our own country, Dr Hill having received ſome of it from Cornwall, under the name of red mundic.

The Engliſh druggiſts are guilty of an unpardonable piece of ignorance, in that, in general, they know no difference between yellow *orpiment*, and the yellow factitious arſenic, which they regularly ſell under its name: the *orpiment* is known to be a ſafe internal medicine, and the thing they ſell under its name is a very terrible poiſon. The colour-men, however, who ſell both, are well acquainted with the difference. Hill's Hiſt. of Foſſils, p. 204.

ORPINE, in *Botany*, a ſpecies of HOUSELEEK.

The common *orpine* grows naturally in woods and ſhady places in many parts of England. Of this there are two varieties, the one with white, and the other with purple flowers; it has a perennial root, compoſed of many glandulous knobs, from which come out round ſucculent ſtalks, two feet high, garniſhed with fleſhy lead-ſhaped leaves, a little ſawed. The ſtalk is terminated by a corymbus of flowers, which are ſtar-pointed.

The ſtalks of the common *orpine* are frequently cut in ſummer, and fixed in lathes framed together, as ſcreens for fire-places in rooms. Theſe ſtalks will ſhoot all over the frames; and if the frames are taken out once a week, and watered, they will continue in verdure for two months.

The leaves of *orpine* are accounted vulnerary and aſtringent; being chiefly uſed for eroſions of the inteſtines in a dyſentery.

ORPINE, *baſtard*, *pedrachme*, in *Botany*, a genus of the *monoecia gynandria* claſs. Its characters are theſe: there are male and female flowers on the ſame plant; the male flower hath a five-leaved empalement, hath five ſlender petals, and five ſlender ſtamina; the female flowers come out from the wings of the ſtalk near the male; theſe have a five-leaved empalement, but no petals; there are three ſlender ſtyles, which are inſerted in the rudiment, and a globular capſule, having three cells, in each of which are lodged two triangular obtuſe ſeeds. We have but one ſpecies.

This is a low plant, whoſe branches trail on the ground; the leaves are ſmall, of an oval ſhape, ſmooth, and of a ſea-green colour. It is found wild in ſome parts of Italy, and in the Archipelago; and being a plant of no great beauty, it is ſeldom cultivated but in botanical gardens.

ORPINE, *leſſer*. See CRASSULA.

ORRACH, in *Botany*. See ORACH.

ORRERY, an aſtronomical inſtrument, or rather machine, for repreſenting the motions and various appearances of the ſun and planets; and hence, with greater propriety, called PLANETARIUM.

The reaſon of its being called an *Orrery*, was this: Mr. Rowley, a mathematical inſtrument-maker, having got one from Mr. George Graham, the original inventor, to be ſent abroad with ſome of his own inſtruments, he copied it, and made the firſt for the earl of *Orrery*. Sir Richard Steel, who knew nothing of Mr. Graham's machine, thinking to do juſtice to the firſt encourager, as well as to the inventor, of ſuch a curious inſtrument, called it an *Orrery*, and gave Mr. Rowley the praiſe due to Mr. Graham. Deſaguliers, Experiment. Phil. vol. i. p. 430.

Since that time *Orreries* have been much in vogue, and executed in the moſt ornamental manner.

ORRHAGOGA, formed of ὀρὸς, *ſerum*, and ἀγω, *I draw away*, a name given by the ancients to ſuch medicines as operated violently, as purges, and evacuated ſerous and watery humours.

ORROPHIGION, a word uſed by anatomical authors, ſometimes to expreſs the extremity of the ſpine, but more frequently the line or ſeam which runs from the penis along the middle of the ſcrotum to the anus.

ORRHOPISSA, a name given by the ancients to the thinner or more fluid parts of tar.

ORRICE, a name given by the vulgar to the IRIS-*root*.

ORRUS, in *Botany*, a name by which many of the ancients called the cultivated pine-tree, from its being remarkably full of juice.

The firſt perſon who has given us the name is Theophraſtus; but he is followed in it not only by the other Greeks, but alſo by the Latine, who have called the ſame tree for the ſame reaſon *ſapinus*, a contraction or abbreviation of the word *ſapo-pinus*, the juicy pine. Pliny tells us, that this laſt was the name of the manured pitch-tree; but in this he errs; for Vitruvius, and others, tell us, that the pine nuts, *nuces pinae*, which were eaten and uſed in medicine, were the fruit of the *ſapopinus*, or *ſapinus*; and it is evident, that theſe muſt be the produce of a pine-tree, not of a pitch-tree, or any thing of the fir kind.

ORTEGIA, in *Botany*, a genus of the *triandria monogynia* claſs. Its characters are, that the flower hath a five-leaved empalement, and no petal; the fruit is a capſule with a ſingle cell, containing many ſeeds. There is only one ſpecies.

ORTHA, in *Fortification*. See BERME.

ORTHIA, in *Mythology*, the ſurname of DIANA, who had a temple at Lacedæmon.

ORTHOCERATITES, in *Natural Hiſtory*, a name by which ſome late authors have called a ſpecies of ſea-ſhell, found frequently foſſile, but not known at preſent in its recent ſtate; called by others *polythalamium*, and *tubulus marinus concameratus*. It is uſually ſtrait, but ſometimes its end is twiſted like the *cornu ammonis*. See TUBULI *concamerati*.

ORTHODORON, ὀρθόδορον, an ancient Greek long meaſure;

fore; being the space from the carpus, or wriſt, to the tips of the fingers, rated at eleven inches.

ORTHODOXI, in *Botany*, ſuch ſyſtematic writers as have formed their methods on the true natural foundation, and divided the plants under their conſideration into claſſes and genera, according to the characters of their parts of fructification. Theſe are either the *univerſales*, or *particulares*; by the firſt are meant, thoſe who have thus ranged the whole vegetable world; and by the latter, thoſe who have undertaken only ſome claſs of plants, as the umbelliferous, &c. See BOTANY.

ORTHODOXY, formed from ὀρθὸς, *right*, and δόξα, *opinion, judgment*, a ſoundneſs of doctrine or belief, with regard to all the points and articles of faith.

According to the proper etymology of the word, *orthodoxy* denotes what every honeſt man believes his own opinions to be, in contradiſtinction to the opinions of others, which he rejects. In England it is vulgarly reſtricted to ſignify the opinions contained in the Thirty-nine Articles; and in Scotland it is in like manner uſed to denote the doctrines contained in their confeſſion of faith. It is, in general, applied to the opinions that are maintained by thoſe called CALVINISTS.

Orthodoxy is uſed in oppoſition to *hetero doxy*, or HERESY.

ORTHODOXY, or, *Feaſt of* ORTHODOXY, denotes a ſolemn feaſt in the Greek church, inſtituted by the empreſs Theodora; ſtill held on the firſt Sunday in Lent, in memory of the reſtoration of images in churches, which had been taken down by the ICONOCLASTS.

ORTHODROMICS, that part of navigation which teaches the art of ſailing in the arch of ſome great circle.

The word is Greek, ὀρθοδρομικὰ, derived from ὀρθὸς, *rectus, ſtraight*, and δρόμος, *curſus, run*, or *diſtance*; q. d. the ſtraight or ſhorteſt diſtance; and this can only be in the arch of a great circle.

ORTHOGONIAL, *orthogonius*, in *Geometry*, denotes as much as rectangular, or right-angled.

When the term is referred to a plain figure, it ſuppoſes one leg or ſide to ſtand perpendicular to the other: when ſpoken of ſolids, it ſuppoſes their axis to be perpendicular to the plane of the horizon.

ORTHOGRAPHIC *projection of the ſphere*. See PROJECTION.

ORTHOGRAPHY, formed from ὀρθὸς, *right*, and γράφω, *writing*, in *Grammar*, the art of ſpelling; that is, writing words juſtly, and with all the proper and neceſſary letters. Or, it is the art of combining letters into ſyllables, and ſyllables into words.

Orthography makes one of the greateſt diviſions or branches of grammar.

That diverſity found in moſt of the modern languages, eſpecially the Engliſh and French, between the pronunciation and *orthography*, makes one of the principal difficulties in acquiring them; yet does it ariſe from the ſame ſource as the languages themſelves.

The Gauls, e. gr. forming a new language from the ancient Latin, took the liberty to model the words to their fancy: at firſt, indeed, it is probable they wrote as they pronounced; but, by degrees, finding, that words, pronounced with all their letters, ſounded harſh, they began to pronounce more ſmoothly.

Thus, in ſpeaking, they thought fit to ſoften that harſhneſs reſulting from the concurrence and cluſhing of conſonants; but as the *orthography*, or writing, did not offend the ear, it ſtill continued on its former footing.

Attempts have been ſince made to reduce the writing to the pronunciation, or to make us write as we ſpeak; which has occaſioned great diſputes. Pelletier of Mans, was the firſt who pleaded for the change of the *orthography*; and after him Maigret, Peter Ramus, De Bois, Menage, and others; but in vain.

They have, however, occaſioned a ſchiſm among writers, which has done more harm than the evil they intended to reform, the French writers being now divided into two parties; one of which adheres to the *old*, the other to the *new orthography*. The latter, F. Boſſier obſerves, is the moſt conſiderable body; yet are theſe divided among themſelves, ſome being for carrying the reformation much farther than others.

The chief matters urged in behalf of the ancient *orthography* are, that, by changing it, we ſhould loſe ſight of the origin and etymology of words borrowed from the Greek and Latin, &c. That it does not matter what characters are uſed to expreſs ſounds in writing, provided one knows the relation between thoſe characters and the ſounds they repreſent; that, by a neceſſary conſequence of ſuch change, the language would, in time, be all altered, and we ſhould loſe the uſe of our old authors; as our's, in their turn, would likewiſe become unintelligible.

What is alledged for the new *orthography* is, its being more commodious, natural, eaſy, ſhort, &c.

Some authors take a middle courſe between the two extremes, retrenching the letters where they are abſolutely uſeleſs, as the *s* in a multitude of words; and yet ſtudiouſly retaining all the letters whereon the etymology has any dependence.

In the Engliſh, the *orthography* is more vague and unaſcertained than in any other language we know of. Every author, and almoſt every printer, has his particular ſyſtem; nay, it is ſcarce ſo well with us as that; we not only differ from one another, but there is ſcarce any one that conſiſts with himſelf. The ſame word ſhall frequently appear with two or three different faces in the ſame page, not to ſay, line. See ENGLISH.

The ancients, who have written treatiſes of *orthography*, are Verius Longus, Marius Victorinus, Flavius Caper, Caſſiodorus, and Beda. Among the moderns, Scaliger, Lipſius, Dauiquius, Scoppa, Valla, and Manutius the Younger, have treated on the ſame ſubject.

ORTHOGRAPHY, in *Geometry*, is the art of drawing, or delineating the fore-right plan or ſide of any object, and of expreſſing the heights or elevations of each part.

It is called *orthography*, from the Greek ὀρθὸς, *right*, and γράφω, *deſcription*, from its determining things by perpendicular right lines falling on the geometrical plan; or rather, becauſe all the horizontal lines are here ſtrait and parallel, and not oblique, as in repreſentations of perſpective.

ORTHOGRAPHY, in *Architecture*, is the elevation of a building, ſhewing all the parts thereof in their true proportion. The *orthography* is either *external* or *internal*.

ORTHOGRAPHY, *external*, is a delineation of the outer face or front of a building; exhibiting the principal wall, with its apertures, roof, ornaments, and every thing viſible to an eye placed before the building.

ORTHOGRAPHY, *internal*, called alſo *ſection*, is a delineation, or draught of a building, ſuch as it would appear, were the external wall removed.

ORTHOGRAPHY *of a building, to draw the*. Draw a right line for a baſis or ground-line (*Tab.* III. *Perſpective, fig.* 47.) AB, and at one end erect a perpendicular AD. Upon AB ſet off the widths and diſtances of the gates, windows, &c. On the right line AD ſet off the heights of the ſeveral parts viſible in the face of the building, v. gr. of the floors, windows, the roof, chimneys, &c. and apply a ruler to each point of diviſion.

The common interſections of the right lines drawn from three points, parallel to the lines AB and AD, determine the external *orthography* of the building; and after the ſame manner is the internal *orthography* laid down. See PERSPECTIVE.

ORTHOGRAPHY, in *Fortification*, is the profile, or repreſentation of a work; or a draught ſo conducted, as that the length, breadth, height, and thickneſs, of the ſeveral parts are expreſſed; ſuch as they would appear, if it were perpendicularly cut from top to bottom.

ORTHOPNŒA, ὀρθόπνοια, compounded of ὀρθὸς, *right, erect*, and πνέω, *I reſpire, or breathe*, in *Medicine*, a great difficulty of reſpiration, wherein the patient is obliged to ſit, or ſtand upright, to be able to breathe.

An *orthopnœa* is a ſpecies or degree of an ASTHMA.

It may be cauſed by pus, thick, or mucilaginous juices, or polypus in the bronchia; mercurial and other fumes hindering the playing of the lungs; ſtoppage of evacuations; cachexies; ill digeſtions; or whatever affords viſcid chyle, or occaſions the blood to run ſlower through the lungs, either by ſtrengthening the canals, or thickening the blood, or hindering the motion of the animal ſpirits, ſo that they cannot elevate the breaſt; or that cauſes the blood to be more rarefied, or more in quantity, ſo that there is not ſufficient room to receive it into the veſſels of the lungs.

ORTHRAGORISCUS, in *Ichthyology*, the name uſed by Rondeletius, and ſome other authors, for the ſith more commonly known by the name of the *mola*, and called in Engliſh the SUN-*fiſh*.

ORTIVE, *ortivus*, in *Aſtronomy*. *Ortive*, or *eaſtern amplitude*, is an arch of the horizon intercepted between the point where a ſtar riſes, and the eaſt point of the horizon, or point where the horizon and equator interſect. See AMPLITUDE.

ORTYGOMETRIA, in *Ornithology*. See DAKER-*hen*.

ORVALA, in *Botany*, the name given by Linnæus to a genus of plants, called *pappa* by Micheli. The characters are theſe; the perianthium is compoſed of one leaf; it is tubulated and dilated at the mouth, and is crooked and divided into five ſegments, the lower two being ſhorter than the reſt; the flower is compoſed of one petal, and is not of the labiated kind; the tube is of the length of the cup; the limb is erect, long, and divided into four ſegments; the upper of which is oblong, convex, and falcated, and lunated at the point; the lower is oblong, and is alſo lunated at the point; and the ſide ones are oblong and pointed, and divided each into three ſegments; the ſtamina are four filaments of the length of the flower;

they are placed under the upper segments of the flower; the anthers are two in number; the germen of the pistil is divided into four; the style is simple, and of the same length with the stamina; the stigma is bifid, and acute; the seeds are four, and of an oval kidney-like shape. In the last edition of the Linnæan system, this is a species of LAMIUM.

ORVALA, in *Botany*, is also a name used by some authors for the *leonurus*, or *ehery*.

ORVETA, *penitents of*. See PENITENTS.

ORVIETAN, a celebrated antidote, or counter-poison; so called, because invented, and originally sold, by an operator from Orvieta in Italy; who made experiments thereof in his own person, on the public stage, by taking several doses of poisons.

In Charas's Pharmacopœia is a method of making *Orvietan*; where it appears, that Venice treacle is one of the principal ingredients of it.

ORYCTOGRAPHY, formed of ὀρυκτὸς, *fossil*, and γράφω, *I describe*, is that part of natural history wherein fossils are described.

ORYCTOLOGY, of ὀρυκτὸς, *fossil*, and λόγος, *discourse*, is that part of physics which treats of fossils. Under this head comes the doctrine of salts, sulphurs, stones, gems, and metals.

ORYGMA, ὄρυγμα, among the Athenians, a name given to the pit, more usually called BARATHRUM; whence the public executioner received the appellation of ὁ ἀπὸ τοῦ ὀρύγματος.

ORYX, in *Zoology*, an animal, mentioned by Aristotle and Pliny, with only one horn. Pliny makes it a species of wild goat; but Columella thinks it was a kind of deer. It is said, that this creature was of great use in Africa, to relieve the scorched inhabitants from thirst, there being always found in its body vesicles full of a very wholesome and pleasant liquor.

ORYZA, in *Botany*. See RICE.

ORYZEUM, a name given by many of the chemical writers to gold.

OS, in *Anatomy*. See BONE.

Os *argentum*, in *Natural History*, the name of a species of shell-fish, of the round-mouthed snail, or LUNARIS *cochlea* kind. It has a very elegant silver colour in the round opening, or mouth of the shell.

Os *aureum*, the *golden mouth*, in *Natural History*, a name given to a species of cochlea of the lunar kind, or of that genus which have a round mouth. This, in the *os aureum*, is of a fine yellow. See LUNARIS *cochlea*.

Os *calcis*, in *Anatomy*. This is the largest bone of the foot, of which it makes the posterior part, and as some measure the basis. It is oblong and very irregular, and may be divided into a body and two apophyses, one great and anterior, the other smaller, lateral, and internal. The body of the *os calcis* has six sides; one posterior, one anterior, one superior, one inferior, and two lateral. The posterior side is broad, unequally convex, and, as it were, divided into two portions, one superior, small, and polished; the other inferior, much larger, unequal, and rough, which, in children, is an apophysis, and may be termed the *tuberosity* of the *os calcis*. The lower part of it is bent downward, and terminates in two tubercles or obtuse points, which belong rather to the inferior than the posterior sides of the bone. The upper side may be divided into two parts, one posterior and unequal, having a small depression; the other anterior, convex, and cartilaginous, proportioned to the great inferior cavity of the astragalus. This side is turned obliquely forward, and by this obliquity becomes part of the forehead, the remaining part of which is left in the anterior apophysis. The lower side is narrow, and behind it lie the two tubercles already mentioned, of which the internal is the biggest; they both serve for the insertion of the apeneurosis in the sole of the foot, but chiefly the biggest. The two lateral sides are continued over the anterior apophyses; the external is gently convex and unequal, covered only with the common integuments and ligaments; the internal is hollow and depressed. The greater anterior apophysis lies in the same direction with the body, being a continuation thereof. It has five sides or remarkable parts, and were it not for the body would have a sixth. The upper side has an irregular and unequal depression, which, together with that in the apophysis of the astragalus, forms a considerable fossula; and its anterior extremity has a small cartilaginous surface, answering to one of those in the apophysis of the astragalus. The anterior side of the apophysis is broad, oblique, cartilaginous, partly convex, and partly concave, and is articulated with a like surface of the os cuboides: this is the foreside of the whole *os calcis*, when considered without any division. The outside of the apophysis is very rough, being a continuation of the outside of the body, with a tuberosity or eminence of the place where the two sides meet. This, however, is not found in all subjects. On the lower part of this tubercle is a cartilaginous surface for the passage of the tendon of the *peronæus longus*: sometimes we see only some small vestiges of this eminence, and often none. We sometimes also meet with a cartilaginous surface, small, lower down, and more forward near the anterior extremity of the apophysis, for the passage of the same tendon. The lower side is a tuberosity continued from the edge of the body, and designed for the insertion of muscles. The lateral apophysis is almost common to the body, and to the great anterior apophysis, and increases the cavity on the inside of the *os calcis*. On its upper part it has a very smooth cartilaginous surface, articulated with one of the inferior surfaces of the astragalus. This apophysis is very low down, and its inferior part is smooth for the passage of tendons. Winslow's Anatomy, p. 95, seq.

For the cartilages of the *os calcis*, see PONY.

Os *calcis luxatum*. It sometimes happens, that the *os calcis* above, and no other bone of the foot, is displaced or luxated by some external force; and this happens sometimes toward the external, sometimes toward the internal side of the foot. When this accident happens, it is easily discovered by the violent pain it occasions; and by the inequality of the part, that is, there is a cavity plainly observable in one part, and a tumor in the other, on the place. The reduction of this dislocation is very easy. The patient is to be placed on a bed, and while two assistants extend the limb in the opposite directions, the surgeon replaces the dislocated bone with his fingers, and the pressure of the palm of his hand, and then there is no more than a proper bandage and rest required to the cure. Heister's Surg. p. 174.

Os *cordis*. See WRIST.

Os *magnum cordis*. See MAGNUM.

Os *clavicular*. See CLAVICULA.

Os *coccygis*. See COCCYGIS *os*.

Os *cuneiforme*. See SPHENOIDES, and CUNEIFORMIA *ossa*.

Os *ethmoides*. See ETHMOIDES.

Os *femoris*. See FEMUR.

Os *frontis*. *See Tab. Anat. (Osteology) fig.* 1. *lit. a.* This is situated in the anterior part of the skull, and forms that part of the face which is called the forehead, from whence it has its name. Its figure is symmetrical, resembling a large shell almost round. Though this has always been looked upon as one bone, it is to be observed that it is sometimes found divided into two equal parts by a continuation of the sagittal suture; and this division is equally common to both sexes. Considered as one bone it may be divided into an upper part, which belongs to the crown of the head; a lower part, which belongs to the basis of the skull; an anterior part, which is the forehead; and two lateral parts, at which the temples begin. Its two sides are the one external, which is in its greatest part convex, and forms the forehead; the other internal, which is concave in proportion. On the outside are observed the following eminences: two superciliary arches, which form the upper edge of each orbit, or the supercilia; three risings, not always equally apparent, one between the two arches, and the other two above them, which may be called the knobs of the forehead; five apophyses, one at the extremity of each arch, one between the orbits, which sustains the ossa nasi, and which in some subjects makes a part of the bony septum of the nose: this last may be called the nasal apophysis, the other four the angular apophyses. The external cavities are these: two orbitary portions, or vaults, forming the upper portions of the orbits; a remarkable depression in each of these vaults above the external angle, which contains the lachrymal gland; a small depression above the internal angle, to which is fixed the cartilaginous pulley of the great oblique muscle of the eye; two portions of the temporal fossæ; two little cristæ, which form the anterior extremity of the great semicircular plane of the temples, on each side, at the edge of the superciliary arches, near the external angle; two supercilary foramina, which are sometimes double, and sometimes only notches; and, lastly, two holes, or portions of holes, called the internal orbitary holes.

On the inside of this bone we see a sharp perpendicular eminence, called the frontal or coronal spine, directly opposite to the middle rising on the outside already mentioned; above this spine, a portion of the groove for the longitudinal sinus, which, when the spine is wanting, runs down lower; below the spine a considerable opening, called the ethmoidal opening, because it contains the os ethmoides; the sides of this are always more or less cellular. Between this opening and the coronal spine, a blind opening, which in some subjects is wholly in the *os frontis*, in others common to that bone and to the os ethmoides, and which seems to open into the frontal sinuses near the nose. There are also the anterior fossæ of the basis of the skull, which receive the anterior lobes of the brain, and which, by jutting out forward, form the risings on

the outside, before taken notice of; toward the lower part they are uneven, answering the inequalities of the lobes, and they are also a little raised, to make room for the orbits; and, finally, sulci, or furrows for the arteries of the dura mater, and sometimes other indeterminate depressions. Though this bone is in general composed of two tables, and a diploe, yet the orbitary vaults are very thin, and without any diploe. About the middle of the lower part of the bone, where the middle rising is commonly situated, the two tables are parted, to form two cavities called the frontal, or superciliary sinuses; and the separated portions are here each of them composed in some measure of two tables, or at least have two surfaces, which make in all four surfaces or tables.

The frontal sinuses are extended on the edge of the superciliary on each side, more or less, all the way to the superciliary perforations; below they are open, and communicate with the cells of the os ethmoides. They are commonly parted by a bony septum, which is often more or less uneven; sometimes also it is perforated, and sometimes part of it, sometimes the whole is wanting.

In different subjects these sinuses are observed to vary extremely both in extent and form; in some they are very small, and often very irregular, in their disposition cellulous; sometimes also they are entirely wanting, and in such subjects the cavity of the nose is larger than ordinary; one of them does not open into the nose, but only communicates with the other.

The *os frontis* is articulated by future with seven other bones, the ossa parietalia, os ethmoides, os sphenoides, ossa lachrymalia, ossa nasi, maxillaria, and the ossa malarum. It contains the anterior lobes of the brain, and a portion of the longitudinal sinus, and forms the forehead, the upper parts of the orbits, and a portion of the temples. Winslow's Anatomy, p. 21.

Os *humeri*. See HUMERUS.

Os *hyoides*. See HYOIDES.

Mr. Du Vernoy observes, that the right side of the *os hyoides* is shorter than the left.

Os *ilium*. See ILIUM.

Os *innominatum*. See INNOMINATUM.

Ossa *innominata, cartilages of the*. These are not so numerous as might be imagined, on examining the bones in a dried skeleton, where we are apt to think we see the dried remains of cartilages on the crista of the os ilium, on the tuberosity of the os ischium, and on the grooves and notches which give passage to the tendons of muscles; but none of these incrustations are true cartilages, but for the most part tendinous, aponeurotic, or ligamentary, which substances being dried, look more like cartilages than the true cartilages themselves in the same state. The true cartilages of these bones in adults are properly five in number, three of which are common, and two proper. The first and principal common cartilage, is that which makes the symphysis of the ossa pubis. This forms a kind of arch, which is more considerable in men than in women; the two others join the ossa ilium to the os sacrum, but are thinner than that of the ossa pubis. The proper cartilages are those which line the cotyloide cavities, in the edge of each of which there is a notch or opening between the anterior or inferior parts, and in the cavity itself there is a broad and shallow depression, reaching from the notch beyond the middle part of the cavity; all the rest of the acetabulum is covered with a very white, shining, smooth cartilage, which terminates precisely at the edge of the cavity. Winslow's Anatomy, p. 122. See FEMUR.

Ossa *innominata, ligaments of the*. These are of two kinds, common and proper: the common ligaments are those which go between these and the neighbouring bones, of which there are a considerable number: one superior, inserted by one end in the internal labium of the posterior part of the os ilium; one inferior and anterior, fixed by one end in the inner side of the crista of the os ilium, and by the other in the superior and anterior part of the first false transverse apophysis of the os sacrum. Several inferior and posterior, fixed by one end along the internal labium of the tuberosity of the crista of the os ilium, and by the other in the first three false transverse apophyses; and to these must be added the ligaments by which the os sesamoides is joined to the *os innominatum*. The principal proper ligaments are four: the two sacrosciatic, the obturator, and the inguinal, which see under their proper heads; but, beside these, there is another small, flat, and very strong ligament, which runs transversely between the two angles of the cotyloide notch, and may be termed the proper, or transverse ligament thereof. The elastic border of the cotyloide cavity may likewise be reckoned among the ligaments: it is a sort of additional piece, strongly united to the edge of the cavity, but easily yielding any way, on pressure. The two ligaments by which the os femoris is connected to the *os innominatum*, are also inserted in this bone; one of these ligaments surrounds the whole articulation, and the other is contained in it: the first is called the orbicular ligament, the other, though very improperly, the round ligament: the orbicular is very strong, and unequally thick, and surrounds the whole convex circumference of the superciliary of the cotyloide cavity. The ligament which lies in the joint is not round, but is a flat cord, broad at one end, and narrow at the other, and of the degree of a triangular shape, Winslow's Anatomy, p. 129.

Os *innominatum, fractured*. A fracture of this bone seldom happens; but when it does, it is rendered very severe by the injury and symptoms in the [illegible] parts, and is the more particularly dangerous, [illegible] the patient discharges a brown bloody matter. [illegible] this bone, the patient must lie down on the [illegible] the bone must be replaced with the hands, [illegible] compresses, dipt in spirit of wine, and kept on by [illegible] spica bandages. Afterwards bleeding, with cooling and relaxing medicines, must be used, and a thin diet observed. Heister's Surg. p. 126.

Os *ischii*. See ISCHIUM.

Os *lunare*. See LUNARE *os*.

Ossa *malarum*. See MALARUM *ossa*.

Ossa *maxillaria*. See MAXILLARY *bones*.

Ossa *metacarpi*. See METACARPUS.

Os *occipitis*. See OCCIPITIS *os*.

Os *orbiculare*. This, in the carpus, is the fourth bone of the first row. It has its name from the roundness of its figure, and is, for the same reason, by some called *os pisiforme*, and *os lenticulare*; it is, however, not perfectly, or regularly round; it has but one cartilaginous side, which is irregularly orbicular, the border or circumference of which represents a kind of narrow cellar. The rest of the bone is rough, convex, and irregularly round, making one of the four eminences on the concave side of the carpus. This bone, and the os cuneiforme, may be supposed to make a third row, distinct from the other two. Winslow's Anatomy, p. 83.

Ossa, *nasi*. See NOSE.

Ossa, *palati*. See PALATE.

Ossa, *parietalia*. See PARIETALIA *ossa*.

Os *pectoris*. See STERNUM.

Os *pubis*. See PUBIS.

Os *sacrum*, in *Anatomy*, the lower extremity of the *spina dorsi*; being that part on which we sit. See *Tab. Anat. (Osteol.) fig.* 3. *n.* 15. *fig.* 7. *n.* 20.

It is doubted whence this name should arise. Some think it is so called, because the ancients offered this part in sacrifice to the gods; others, because it is very large; and others, again, because it includes the natural parts. As this bone is the basis by which the whole spine is supported, it has by some been called *os basilare*; its figure comes near to that of a long triangle, with the basis upward, and apex downward. It is hollow within, and thus contributes in forming the cavity at the bottom of the hypogastrium, called the pelvis; its fore-part is smooth, by which means the parts contained in it are secured from being wounded; and its hinder part is rough, that the muscles may the better adhere to it. Anatomists, in its description, divide it into the upper part, or basis, the lower, as it is situated, or apex; two sides, the anterior or concave, and the posterior, or convex; and two lateral parts, or edges. The pieces of which it is composed in infants, called false vertebræ, are five in number, and are united together by cartilages, which in time almost disappear, leaving only little ridges or lines, more or less prominent in their places. The first of these is much larger than any of the true vertebræ, but their size diminishes by very great degrees as they descend; so that the lowest, which makes the point of the *os sacrum*, has scarcely the appearance of a vertebra. At the basis, or upper part, of the *os sacrum*, are two articular apophyses, answering to the inferior ones of the last vertebra of the loins. Below each of these apophyses laterally is a large notch, and between them we see distinctly enough the body of this first false vertebra, which is like that of the lumbar vertebræ, being very much inclined backward; so that the body of this first false vertebra, as well as that of the last true one, is longer before than behind; and from this obliquity it is that the *os sacrum*, and last lumbar vertebra, form, at their connection, a very considerable angle. The lateral parts are broad at top, forming on each hand a large, irregular, cartilaginous surface, in the figure of a great S, and sometimes of a bird's head. By these two sides the *os sacrum* is connected to the ossa innominata, by a cartilaginous symphysis. Between each of these lateral sides, and the nearest posterior holes, there is a large rough depression, and under that another not so large. These depressions are often pierced by sacral holes, which lose themselves in the substance of the bone. Winslow's Anatomy, p. 60.

It is in the *os sacrum* that the cavity which contains the spinal marrow terminates.

Os *sacrum*, *fractured*. When this bone is found to be fractured, the fragments are to be reduced into their proper places with the fingers; and if any part of it be depressed inwards, a finger dipped in oil or butter, and with the nail close cut off, must be introduced up the anus, in order to thrust the depressed fragment into its proper place, to which it is to be directed externally by the other hand. This being performed, a sticking plaister is to be applied, and compresses dipped in spirit of wine over it, to be kept on by the T bandage, or the plasters may be let alone, and only the compress and bandage applied. The patient must keep his bed a fortnight, lying on his sides; or if he will needs sit up, it must be on a chair without a bottom, that the bones may not be displaced by touching the seat. Heister.

Os *scaphoides*. See SCAPHOIDES.

Os *scapulæ*. See SCAPULA.

Os *sepiæ*. See CUTTLE-*fish bone*.

Os *sphenoides*. See SPHENOIDES.

Ossa *temporum*. See TEMPLES, and *Ossa* PETROSA.

Os *tincæ*. The sides of the *os tincæ* have been known to open together in women with child, and have been divided by incision, in order to extract the child. See Med. Ess. Edinb. vol. iii. art. 19.

Os *tropæum*, *tropezoides*, and *uniforme*. See the several articles.

OSBECKIA, in *Botany*, a genus of the *octandria monogynia* class. Its characters are, that the empalement of the flower is divided into four segments; that the flower has four petals; and that the fruit is a four-celled capsule, surrounded with the truncated tube of the empalement. There is only one species.

OSCHEALIS *hernia*, a term used by some writers for a HERNIA of the scrotum.

OSCHEOCELE, *oschiocele*, formed from the Greek *oscheon*, *scrotum*, and κηλη, *tumor*, in *Medicine*, a kind of HERNIA, wherein the intestines or omentum descend into the scrotum.

OSCHOPHORIA, in *Antiquity*, feasts instituted by Theseus, in acknowledgment for his having destroyed the Minotaur, and by that means freed his country, Athens, from the tribute of seven young men, who were to be sent every year into Crete, to be devoured by that monster. The word is formed from the Greek *oschos*, *branch of a vine loaden with grapes*, and φερω, *I bear*. Plutarch says, they were so named, because instituted by Theseus at his return to Athens, which happened to be at the time of vintage. Some say, the *Oschophoria* were instituted in honour of Minerva and Bacchus, who had assisted Theseus in his enterprize. Others, that they were in honour of Bacchus and Ariadne.

To celebrate the *Oschophoria*, the young people, who had fathers and mothers alive, ran to the temple of Bacchus, and that of Minerva, with grapes in their hands. He, who arrived there first, was the conqueror, and was to perform the sacrifice, by pouring out of a phial a mixture of wine, honey, cheese, flour, and oil.

OSCILLA, in *Antiquity*, small images of wax or clay, made in the shape of men or women; which were consecrated to Saturn, in order to render him propitious.

OSCILLATION, in *Mechanics*, *vibration*; or the reciprocal ascent and descent of a pendulum.

OSCILLATION, *axis of*, is a right line, parallel to the apparent horizontal one, and passing through the centre; about which the PENDULUM *oscillates*.

M. Huygens's whole doctrine of *oscillation* is founded on this hypothesis, that the common CENTRE *of gravity* of several bodies, connected together, must return precisely to the same height whence it fell; whether those weights return conjointly, or whether, after their fall, they return separately; each with the velocity it had then acquired.

This supposition was opposed by several, and very much suspected by others. And some, who inclined to believe it true, yet thought it too daring to be admitted into a science, which demonstrates every thing.

At length M. James Bernoulli demonstrated it by strict geometry, by referring the weights to a lever; and published it in the Mem. Acad. of Scien. of Paris, for the year 1703. After his death, a more easy and natural demonstration of the centre *of oscillation* was advanced by his brother, and published in the Mem. of the same Academy, for the year 1714: the substance whereof may be conceived as follows:

A simple pendulum of a determinate length and weight, raised to a determinate height, whence it is to fall till it recover its vertical line, employs in that fall, or demi-vibration, a determinate space of time, which can never possibly be either greater or less. Which time is necessarily such, because the agitative force, i.e. the force which produces the motion of the pendulum, is determined in every thing that concurs to the formation thereof: so that it can only cause one certain effect.

The agitative force of the pendulum arises from three things: 1. The power or moment of gravity. 2. The mass or body tied to the end of the inflexible rod. 3. The distance of that body from the point of suspension, or, which is the same, the length of the rod, or the pendulum.

Now, 1. The power of gravity, be the cause what it will, is that power, which makes a body fall, and that, v. gr. at the rate of $15\frac{1}{12}$ feet in the first second of time. It is visible, then, that this force is the effect of a quantity, which determines those $15\frac{1}{12}$ feet; and that a heavy body would pass more or less space in the same first second, if the force of gravity were greater or less.

2. As that force is inherent in each point, or infinitely small part of a body, the greater this body is, or the larger its mass, the greater quantity of motion or force it has.

3. The distance of the moving body from the point of suspension, or the length of the rod, is always the radius of a circle, whereof the moving body describes an arch; and of consequence, the greater the radius is, *ceteris paribus*, the larger arch the body describes. And, at the same time, the greater height it falls from, the greater velocity it acquires.

Now, the agitative force of the pendulum is only that of the body fastened to the end of the rod. So that it is the product of the force of the weight of the mass of that body, and of its distance from the point of suspension. The force of gravity, therefore, being always the same, and a body or weight, fastened to the end of the rod, always the same, it is impossible, that two simple pendulums, of a different length, should be isochronal, or should make their vibrations in the same time; for, by virtue of those different lengths, the velocities will be unequal, and of consequence, the times of their vibrations will be so.

But if it be supposed, that there are, in nature, different powers of gravity, it will then be possible, that two simple pendulums, of different lengths, should be isochronal; the one animated by the natural weight, the other by the imaginary one.

If the imaginary gravity or weight be greater than the natural one, the pendulum, imagined isochronal to the natural one, will necessarily describe a larger space or arch in the same time; and of consequence the weight will be fastened at a greater distance from the point of suspension. Though, to have an isochronism, the two agitative forces of the two pendulums must be equal; yet, of the three things which compose those forces, there are always two greater in the imaginary than the real pendulum; the third, therefore, i. e. the mass or ball, must be diminished in the necessary proportion.

As the space or arch described by the imaginary pendulum is greater than that by the natural pendulum, in the same ratio as the imaginary gravity is greater than the natural one, and a radius of that arch greater in the same ratio, are two things inseparable; the two gravities will be always to one another, as those two radii, or the two lengths of the two pendulums; which always gives the expression of the imaginary gravity, and, by a necessary consequence, that of a diminished mass or ball of the imaginary pendulum. If the power of gravity be imagined less than that of the natural one, it is easy to observe how it is to be taken; but that were needless in our design.

If now there be a compound pendulum, charged with two weights or balls fastened to the same rod, M. Bernoulli conceives each of those weights removed to a greater distance from the point of suspension than it was before; but both to the same; and diminished, in mass, in a due proportion: so as that both together only make one simple pendulum, animated with one weight, the expression whereof is had, and isochronal to the natural compound pendulum.

Thus, we shall have one simple natural pendulum isochronal to the compound natural one, by having a simple natural pendulum isochronal to the simple imaginary pendulum before found; which is very easy: since, as the imaginary gravity is to the natural, so is the length of the simple imaginary pendulum to the length of the simple natural pendulum; and it is there the centre of *oscillation* is required.

We should here take notice that Mr. Taylor, a celebrated mathematician of our own country, discovered about the same time with Mr. John Bernoulli, a similar solution of this problem, and published it in his Methodus Incrementorum. See PENDULUM.

OSCILLATION, *centre of*, in a suspended body, is a certain point therein, each vibration whereof is performed in the same manner, as if that point or part alone were suspended at that distance from the point of suspension.

Or, it is a point, wherein, if the whole length of a compound pendulum be collected, the several *oscillations* will

be performed in the same time as before. See CENTER *of Oscillation*.

OSCINES, among the Romans, an appellation given to such birds, from whose chattering or notes, omens and predictions were drawn. See ALITES.

OSCITATION, the act popularly called YAWNING.

OSCULA, in *Anatomy*, a term used for the orifices, or openings of the lesser vessels.

OSCULATION, in *Geometry*, is used for the contact between any given curve and its osculatory circle; that is, the circle of the same curvature with the given curve. See CURVATURE.

OSCULATORY *circle*, in *Geometry*, is used chiefly by foreign mathematicians, for the circle of curvature; that is, the circle having the same curvature with any curve at any given point. See CURVATURE.

OSCULATORY *parabola*. See PARABOLA.

OSCULATORY *point*, the point of contact between a curve and its *osculatory* circle. See CURVATURE.

OSCULUM, in the new analysis. A circle described on the point C, as a centre (*Tab. Analysis, fig.* 12.) with the radius of the evolute MC, is said to *osculate*, kiss, the curve described by evolution in M; which point M is called by the inventor, Huygens, the *osculum of the curve*. The line MC is also called the *radius of the osculum*.

The evolute BCF is the place of the centres of all the circles that *osculate* the curve A M, described by evolution.

The doctrine of the *osculu of curves* is owing to M. Leibnitz, who first shewed the use of Huygens's evolute in measuring the curvature of curves. See EVOLUTE.

OSCULUM *pacis*. Anciently it was a custom in the church, that, in the celebration of mass, after the priest had consecrated the wafer, and spoken the words, *Pax Domini vobiscum*, the people kissed each other; which was called *osculum pacis*.

When this custom was abrogated, another arose; and, while the priests spoke the words, a deacon, or subdeacon, offered the people an image to kiss; which they called *pacem*.

OSIANDRIANS, a sect among the Lutherans, so called from Andrew Osiander, a celebrated German divine.

Their distinguishing doctrine was, that a man is justified formally, not by the faith and apprehension of the justice of Jesus Christ, or the imputation of our Saviour's justice, according to the opinion of Luther and Calvin; but by the essential justice of God.

OSIANDRIANS, *semi*, were such among the *Osiandrians*, as held the opinion of Luther and Calvin with regard to this life; and that of Osiander, with regard to the other; asserting, that man is justified here by imputation; and hereafter by the essential justice of God.

OSIER, in *Botany*. See WILLOW.

OSIRIS, in *Mythology*, one of the great gods of the Ægyptians, to whom they paid their chief worship. *Osiris* was supposed to represent the sun, *and* Isis the moon.

Some writers in theology have supposed, that all the other deities of the Egyptians were only attributes of *Osiris* and Isis.

OSLOM, or, in the *Wire Works*, a particular sort of bars of iron wrought on purpose for the manufacture of iron-wire. These are small and square, and the first thing done with these, toward the making them into wire, is, the drawing, or drawing them at a furnace to small rods, of the thickness of one's little finger; these they bow round, and deliver them to the wire-drawers. See WIRE.

OSMERUS, in *Ichthyography*, the name of a genus of fish, of the malacopterygious, or soft-finned kind: the characters of which are these: the branchiostege membrane contains seven or eight bones on each side; the back and belly fins are placed at the same distance from the top of the snout; by which it is distinguished from the coregonus and salmon; the teeth are large, and are placed on the tongue, in the palate, and in the jaws. The species of *osmerus*, enumerated by Artedi, are two.

OSMITES, in *Botany*, a genus of the *syngenesia polygamia frustranea* class: its characters are, that it has a chaffy receptacle; that the down is scarce discernible; that the corolla consists of several rays united together; and that the calyx is imbricated, and so dry on the margin as to sound when touched. There are three species.

OSMOND *royal*, or *flowering fern*, in *Botany*. This is one of the kinds of FERN, which is distinguished from the other sorts by its producing flowers on the top of the leaves, whereas the others, for the most part, produce them on the back of their leaves.

There is but one kind of this plant which grows wild in England, but there are several sorts of them which grow in America; but as they are seldom kept in gardens, it is needless to enumerate their species.

The common sort grows on bogs in several parts of England, therefore whoever hath an inclination to transplant it into gardens, should place it in a moist, shady situation, otherwise it will not thrive. Miller.

Linnæus makes a distinct genus of the *osmunda*, in the class of *cryptogamia* ferns: whose characters are, that it has a branched spike, and that the parts of fructification are globular. He enumerates seventeen species.

OSMONDS, in our *Old Writers*, a kind of iron anciently brought into England. It is mentioned in stat. 32 Hen. VIII. cap. 14.

OSNABURGHS, a kind of coarse linen imp[illegible] from Germany; of which there are two kinds; [illegible] and the other brown. The manufacture [illegible] well understood in our own country; [illegible] practised in Germany of manufacturing [illegible] and of giving it its peculiar colour, is [illegible] have supposed, that it depends on the [illegible] ching the flax, and others on that of bleaching the yarn after it is spun.

OSOSOC, a word used by some authors as a name for OPIUM.

OSPREY, in *Ornithology*. See BUZZARD and HALIÆTUS.

OSPRION, a word used by some authors for a bean, which is its proper and determinate signification; but by some authors it is extended to all sorts of pulse.

OSSA, in *Anatomy*. See BONE and OS.

OSSÆI, or OSSENI, a name sometimes given to the Jewish sect of religion called ESSENIANS.

OSSELET, in the *Manage*, is a very hard excrescence, resembling a little bone, on the inside of the knee (and never on the outside), appearing to be of the same substance with the rest of the knee, and only distinguishable from the knee by its descending a little lower.

OSSERVANZA, in the *Italian Music*, is used for singing or playing with care; that is, executing a piece of music justly and exactly as it is marked, without adding or diminishing.

OSSICLE, OSSICULUM, *little bone*; a diminutive of *os*, *bone*.

In which sense the term is frequently found among anatomists.

Botanists also assume *osselum* for the stone of a cherry, plum, apricot, or any other stone fruit.

OSSICULA *auditorii*, in *Anatomy*, are four little bones contained in the cavity of the tympanum, or barrel of the EAR, and assisting to the hearing; they are denominated from things they have been supposed to bear a resemblance to, the malleus, incus, stapes, and os lenticulare, called by others the os *orbiculare*; each of which see under their proper heads.

OSSICULA *muscularum*, in *Ichthyology*, a name given by authors to those oblong and slender bones which are situated in the flesh of some kinds of fish between the muscles: these, in the anterior part, and especially near the head, are of a forked shape; but in the hinder part of the body, they are usually simple and slender. These sorts of bones are found in the following kinds of fish: 1. In all the cyprini. 2. In the esoces. 3. In the clupeæ. 4. In the cobi. 5. In the coregones. 6. In the osmerus. 7. In the salmon kind. 8. In mackrel. And 9. in the ammodytes or sand-eel. In the five last, these bones touch the spine at one end, but in the others they no where come near it.

The use of these loose bones seems to be, to strengthen and support the muscles, that by this means they may be able the more forcibly to move the body, and turn it about: they are peculiar to fish, no land animal having them.

OSSIFICATION, in the *Animal Oeconomy*, the formation of the bones; but more especially the conversion of parts naturally soft to the hardness and consistency of bones. Bones, Dr. Drake argues, are formed out of the most comminute or broken parts of the blood; since we see, that the blood of old men, which by a long course of circulation, becomes, in a manner, unfit for the common office of nutrition, will, however, *ossify*, and convert into bones, many of the tendons and ligaments, and even the coats of the vessels themselves, whose substance, being next to the bone, the most compact, admits only of the smallest particles of the blood; which therefore soonest become *osseous*, as they are frequently found.

Dr. Nesbit's opinion of *ossification* is, that in the blood, or a fluid secreted from it, there is an ossifying juice consisting of particles which are not apparent: that wherever nature designs an *ossification* between membranes, or with a cartilage, the occasions a more than usual influx of this fluid; which so much distends the vessels which were before invisible, as to make them capable of receiving the red globules of blood, which is always to be seen near to the place where *ossification* is begun. In this blood, gritty bony particles are to be felt by the point of a knife; which have been formed by the attraction and cohesion of the particles of the ossifying juice obstructed, along with the other grosser fluids, in the beginning of the vessels prepared to receive resilient juices. The blood being capable of forming fine membranes, the membranous

parts of a bone, which act as a gluten to keep these particles and fibres together, if there be any such, that do not arise from the coats of its vessels, are produced by a cohesion round the cretaceous particles of a part of the fluid, in which they were generated and contained. Thus the membranes of cartilages serve as a bed between, or within which the bony particles are deposited, or shoot; but without any intermixture of the particles of the bone and cartilage, or continuation of the fibres of the one substance to those of the other, as is evident in cartilages containing bones kept long enough in water, and then dry; for the bone will, as soon as the large vessels that enter its substance are divided, flip as easily, if not easier, from it, than an acorn does out of its cup: and there is a smoothness and polish of the parts of both cartilage and bone, which shew there is no conjunction of the fibres of the two substances. While the bones are increasing within cartilages, the cartilages are extended and spread out; by which, with the pressure which they suffer, and the great influx of various fluids, and the nutritious matter being hindered to flow freely into them, they decrease continually; and at last may truly be said to be entirely destroyed. See Bones.

Dr. Baddeus endeavours to prove, that the preternatural *ossifications*, which are commonly said to be formed in different parts of the body, do not deserve that name; for that these hard substances have scarce any other properties of bone, except whiteness and hardness.

OSSIFRAGUM, in *Botany*, a name given by Bartholine, and some other writers, to a peculiar kind of grass, growing in some parts of Norway. It comes up early in the spring, before any other grass, and the cattle are tempted to eat it; but it emaciates them, and makes them sickly; their back bones become protuberant if they feed any time on it, and their legs so weak that they can hardly go. The remedy among the country people is a very odd one. They collect the bones of different animals, and break them into small pieces. The cattle greedily devour this sort of food when offered them in this disease, and there follows a sort of drivelling at the mouth for a considerable time, after which they become well. It is possible there may be much error in this story. The kingdom of Norway is full of mines, and the effluvia of these may be the occasion of the cattle's illness, and the ceasing of these effluvia their cure; for it is not probable that either of these effects should be owing to the grass or the bones.

OSSIPAGINA, in *Botany*, a name given by Arnobius and some other of the old Greek writers to the consolida major, or greater comfry. It had this name from its supposed quality of agglutinating broken bones on being taken internally.

The Greek writers have sometimes called this plant *pectle*.

OSTENSIO, a tax anciently paid by merchants, &c. for leave to shew, or expose their goods to shew and sale in markets.

OSTENSIVE *demonstrations*, such as plainly and directly demonstrate the truth of any proposition.

In which they stand distinguished from *apagogical* ones, or reductions *ad absurdum*, or *ad impossibile*, which prove the truth proposed, by demonstrating the absurdity or impossibility of the contrary.

Ostensive demonstrations are of two sorts: some barely, but directly, prove the thing to be; which they call *οτι*. Others demonstrate the thing from its cause, nature, or essential properties; and these are called in the schools *διοτι*. See Demonstration.

OSTEOCOLLA, οστεοκολλα, in *Natural History*, a white, or ash-coloured sparry substance, shaped like a bone, and by some supposed, without sufficient reason, to have the quality of uniting broken bones; on which account it is ordered in some plasters.

It is found in long, thick, and irregularly-cylindric pieces, which are usually hollow, but are sometimes filled up with a marly earth, and sometimes contain within them the remains of a stick, round which the *osteocolla* had been formed; but though it is plain from thence, that many pieces of *osteocolla* have been formed by incrustations round sticks, yet the greater number are not so; but are irregularly tubular, and seem formed of a flat cake, rolled up in a cylindric shape. The crusts of which these are composed do not form regular concentric circles round the internal cavity, as must have been the case had they been formed by incrustation, but shewing plainly that they were once so many thin strata, composing a flat surface, which has afterwards been rolled up as one might do a paper three or four times doubled, into two, three, or more spiral lines; in which case, each single edge of the paper would be every where a regular part of a continued spiral line drawn from a given point; but they would by no means be so many detached concentric circles.

The *osteocolla* is found of various sizes, from that of a crow-quill to the thickness of a man's arm. It is composed of sand and earth, which may be separated by washing the powdered *osteocolla* with water, and is found, both in digging and in several brooks, in many parts of Germany, and elsewhere.

Osteocolla is called *hammosteus* in many parts of Germany. It has this name in these places from the observation of its always growing in sand, never in clay, or any solid soil, nor even in gravel. Where a piece of it any where appears on the surface, they dig down for it and find the branches run ten or twelve feet deep. They usually run straight down, but sometimes they are found spreading into many parts near the surface, as if it were a subterraneous tree, whose main stem began at twelve feet depth, and thence grew up in a branched manner, till met by the open air. The main trunk is usually of the thickness of a man's leg, and the branches that grow out from it are thickest near the trunk, and thinner as they separate from it. The thinnest are about the size of a man's finger. The people employed to collect this *osteocolla*, when they cannot find any mark of it on the surface, search after the specks of white or little lumps of whitish soft matter, which they find lying in different parts on the top of the sand. These always lead them either to a bed of perfect *osteocolla*, or to some in the formation. If they miss of the substance which they seek after, they still find a substance like rotten wood; which, when traced in its course, is found to proceed from a main trunk, at the depth of that of the *osteocolla*, and to spread itself into branches in the same manner. The diggers call this substance the flower of *osteocolla* or *hammosteus*.

The *osteocolla* found in the earth is at first soft and ductile, but in half an hour's time, if exposed to the air, it becomes as hard as we find it in the shops. The method to take up a perfect piece for a specimen is to open the ground, clear away the sand, and leave it so for an hour or thereabouts: in this time it will harden, and may be taken out whole. It is certain, that the *osteocolla* is produced at this time; for, if a pit be cleared of it, there will more grow there in a year or two, but with this difference, that it will be softer and will not harden so easily in the air as the other.—What the rotten substance resembling the decayed branches of trees is, it is not easy to say, unless it really be such: but the opinion of the common people, that it is the root of something, is absurd; because its thickest part always lies at the greatest depth, and the branches all run upwards. The *osteocolla* is a marly spar, which concretes round this matter; but what it is that determines it to concrete no where on the same ground but about these branches, it is not easy to say. The rottenness of this substance, which forms the basis of the *osteocolla*, renders it very liable to moulder and fall away; and hence it is that we usually see the *osteocolla* hollow. Sometimes it is found solid, but in this case there will be found to have been a vegetable matter serving as its basis, and instead of one branch, it will be found in this case to have concreted about a number of fibres, the remains of which will be found in it on a close examination. Philos. Trans. N° 33.

Osteocolla-*flower*. See Flower.

Osteocolla-*roots*. See Root.

OSTEOCOLLON, in *Botany*, a name given by some authors to the great comfry.

This name was given by some of the old writers to the symphytum, or comfry, from an opinion that its agglutinating quality reached to the bone, and that it was of great service taken internally, in cases of fractures.

OSTEOCOPOS, or Ostocopos, formed from οστεον, *bone*, and κοπτω, *to break, cut, or cleave*, is used by some for an acute pain, wherein the patient is affected as if his bones were breaking.

It arises from a sharp humour vellicating the periosteum, or membrane, wherewith the bones are invested. It is particularly incident to scorbutic and pocky persons.

OSTEOGONY. See Ossification.

OSTEOLOGY, οστεολογια, formed from οστεον, *bone*, and λογος, *discourse*, that part of anatomy which teaches the nature and fabric of the bones of the human body; their form, disposition, articulation, use, &c. See *Tab. Anat. P. 1. Osteol.*

There are properly two kinds of *osteology*, one of which is to be learned from bones dried and prepared by boiling, and the other from the bones of a dead subject, as they are naturally connected with each other. Both these methods are very necessary for the practice of physic, and for the exact knowledge of the human body. By examining dry bones, however, we can only learn their exterior forms, their situation, and the connection

which they may have with one another; but when we conſider them as joined together in a dead body, we are in a condition to obſerve many other things in regard to them very uſeful in phyſic: becauſe their connections with one another by cartilages and ligaments, and by the diverſity of articulations, are ſometimes very different in the dry from what you ſee them in the freſh bones; there are, for inſtance, in dry bones, certain cavities which appear to be cotyloide, becauſe they are diveſted of their cartilages; but in freſh bones, they are found to be glenoide, their cavities being filled with cartilages. And, on the other hand, ſome cavities appear to be glenoide in the ſkeleton, which are cotyloide in the body, their cavities being augmented by cartilaginous ſuperficies.

The exterior form and qualities of bones are much better demonſtrated alſo from freſh ſubjects, than from prepared bones; becauſe they loſe a great many things in boiling, ſuch as the cartilaginous bodies, the periоſteum, the mucilaginous ſubſtance found between them, and the marrow contained in their cavities; all which may be ſhewn in a freſh body but cannot be ſeen in a ſkeleton. Biolan. Enchiridion Anatomicum.

Dr. Clopton Havers has given us an *oſteology* in good repute. See BONES.

OSTEOSPERMUM, in *Botany*. See *Hard-ſeeded* CHRYSANTHEMUM.

OSTIA, in *Anatomy*, a term uſed indifferently with *oſculi*, *oriſices*, &c. for the mouths or apertures of the veſſels of the body; as the *oſtia vaginæ*, &c.

OSTINATO, or *Contrapunto* OSTINATO, in the *Italian Muſic*, is much the ſame with PERTIDIA.

OSTRACION, in the Linnæan ſyſtem of *Zoology*, the name of a large genus of fiſh of the claſs of the *amphibia nantes*.

The characters which diſtinguiſh the fiſh of this genus are, that they have no belly-fins, and their ſkin is always hard and often prickly.

The characters of the *oſtracion*, according to Artedi, are theſe: there is no branchioſtege membrane; the figure of the body is particular, being globoſe, or ſpherical, or roundiſh, oval, or oblong and ſquare, or finally conic; the ſkin is very hard, and uſually beſet with rigid and hard ſpines, either on the whole body or on ſome part of it, but in ſome ſpecies it is wholly ſmooth; there are no belly-fins; the number of the others is five; there are two pectoral or lateral fins, two others are on the back, the other at the anus and the tail; the mouth is ſmall; the teeth are large; and the eyes are covered with the common ſkin of the head; there are on each ſide two foramina for the noſtrils, near the eyes; the lips may be drawn back, but in their natural ſtate they cover the greater part of the teeth.

The ſpecies of this genus enumerated by Linnæus are nine.

OSTRACISM, ὀστρακισμὸς, a kind of popular judgment, or condemnation, among the Athenians; being a ſentence of baniſhment againſt perſons, whoſe too great power rendered them ſuſpected to the people; or whoſe merit and credit gave umbrage, leſt they ſhould attempt ſomething againſt the public liberty, and their power degenerate into tyranny.

It had the denomination *oſtraciſm*, becauſe the people gave their votes, by writing the name of the perſon to be baniſhed in a ſhell, by the Greeks called ὄστρακον, and caſting the ſhells into an urn.

This kind of baniſhment had nothing infamous in it, as not being for a crime; but, on the contrary, was held very honourable, as it was a mark of popularity.

It laſted for ten years; but the baniſhed perſon had the full enjoyment of his eſtate all the time.

Oſtraciſm was null, unleſs there were 6000 citizens in the aſſembly of the people, whereby it was decreed.

OSTRACITES, in *Natural Hiſtory*, a name given by authors to the foſſile *oyſters*, common in many parts of England. Theſe are of various ſhapes and kinds; and the name is by ſome authors made to ſignify the ſhell itſelf, when preſerved in its native ſtate and condition; as is the caſe with thoſe found about Woolwich and Blackheath; and by others, the ſtones call or formed in thoſe ſhells, or in cavities from whence they have been waſhed away and diſſolved: in both theſe caſes the ſtone carries the exact reſemblance of the ſhell, even in its niceſt lineaments; in the firſt caſe, carrying every mark of the inſide, in the other of the outer ſurface.

We have this ſtone in great plenty in many parts of England; and it is very famous, in ſome places, for its virtues in caſes of the gravel, and the like complaints. See *Tab. of Foſſils, Claſs* 9.

It is to be obſerved that all the foſſile ſhells, and particularly the *lapides Judaici*, or Jew's ſtones, which have been the ſpines of ſea echini, have been eſteemed diuretics, and good in the ſtone and gravel. Among the ancients, Dioſcorides, Pliny, and all the reſt recommend them highly.

Dr. Home, in the Philoſ. Tranſ. ſays, it rather diſſolves the little ſtones, than forces them out, as not being remarkably diuretic.

He adds, that he preſcribes it in powder, with a third part of flores chamæmeli.

The doſe is from half a drachm to a whole one, in white wine.

OSTRACITIS is alſo the name of a kind of CADMIA, found at the bottom of furnaces where copper is purified.

It is very heavy, and in ſtructure reſembles an oyſter-ſhell; whence its name.

It is eſteemed aſtringent and deterſive; and is an ingredient in ſeveral unguents.

OSTRACODERMATA, a term uſed by Ariſtotle to expreſs that claſs of ſhells which we call *teſtaceous*, in oppoſition to the cruſtaceous animals or malacoſtraca. — The definition Ariſtotle gives of this claſs of animals is, that they are ſoft within, but hard without; that their ſhells may be bruiſed or broken, but their parts cannot be torn from one another, as they can in the cruſtaceous kind, ſuch as the lobſter; whoſe ſhell covering the legs, body, tail, &c. being ſo many diſtinct pieces of ſhell, and only joined by membranes, may be torn aſunder by pulling till thoſe membranes give way. Philoſ. Tranſ. N° 219. p. 199.

OSTREA, in *Zoology*. See OYSTER.

OSTRICH, *ſtruthio*, in *Ornithology*, according to Linnæus, makes a diſtinct genus of birds of the order of *grallæ*, the characters of which are, that its beak is of a conical ſhape, its noſtrils ovated, its wings unfit for flight, and its feet formed for running. He enumerates three ſpecies. See *Tab.* III. *of Birds*, N° 39.

The camel *oſtrich* is the talleſt of all the bird kind, meaſuring ſeven or eight feet when it ſtands erect; its head is ſimple, or not ornamented with the appendages which are common to moſt birds of this order; its legs are very long and naked; and the ſtructure of the foot, having only two toes, is particular. It often lays fifty eggs in the ſand, which it ſits upon only in the night. The other ſpecies are the CASSOWARY and RHANDUGUACU.

OSTRUCIUM, a name given by the Latin writers of late ages to the plant called ſmyrnium and oluſatrum. Mæer calls this plant caulis ſylveſtris, and has given to it the virtues attributed by the ancients to the ſtruthium, ſuppoſing theſe to be the two names of the ſame plant; but this is evinced to be an error by the writings of all the ancient Greeks. Theophraſtus in particular ſays, that the ſtruthion is a prickly or thorny plant. This alone is ſufficient to prove it can have no relation to the *oſtrucium* of the later authors, or Alexanders, which is a ſmooth umbelliferous plant.

This inaccuracy of the writers who collect their accounts from the ancients is ſometimes of bad conſequence; ſince thoſe who are unable to have recourſe to the original authors, are miſled ſo far as to ſuppoſe the virtues of one plant may be found in another.

OSWEGO *tea*, in *Botany*. See MONARDA.

OSYRIS, in *Botany*. See POEY'S *coſſia*.

OSYRIS is alſo uſed by ſome authors for the linaria, or *toad-flax*.

OTACOUSTIC, formed from ὠτος, *ear*, and ἀκουω, *I hear*, a term applied to inſtruments which aid or improve the ſenſe of hearing. See ACOUSTIC.

OTALGIA, ὠταλγία, formed from ὠτος, *ear*, and ἄλγος, *pain*, in *Medicine*, denotes a pain in the ear, eſpecially that in the fartheſt parts of the auditory paſſage.

The *otalgia* uſually ariſes from an inflammation; though ſometimes from a ſharp ſerous humour, which vellicates the membrane wherewith the canal of the ear is lined. It is ſometimes alſo occaſioned by a wound or ulcer in that part, or by ſome pungent matter gathered within the ear.

The ſmoke of tobacco, conveyed into the ear through a pipe, Etmuller recommends as good to aſſuage this pain; as alſo milleped̃es in a proper vehicle.

The *otalgia* is ſaid alſo ſometimes to ariſe from a worm in the ear; which is to be drawn out alive, or killed within. Warm milk, they ſay, tempts the worm to come forth; wormwood juice deſtroys it within.

OTAPULLI, in *Botany*, a name given by ſome authors to the tree which produces the *gambeg*, or *gutta gamba* of the ſhops.

OTARDES. See BUSTARD.

OTENCHYTES, a name given by ſome authors to a ſyringe made for injecting into the ears.

OTHOMAN. See OTTOMAN.

OTHONE, *ὄθονη & ὀθόνιον*, among the ancients, a kind of linen garment worn by women.

OTHONI, a word used by chemical writers for what they otherwise call the *mercury of the philosophers*, or *philosophic ops*.

OTHONNA, the name given by some authors to a stone found in Egypt, and described to be always in small pieces, and of the colour of polished brass: probably it is some species of the *pyrites*.

OTHONNA, in *Botany*. See RAGWORT.

OTIOSI, in the *Hebrew Customs*. The learned are exceedingly divided about the *decem otiosi*, *ten idle persons*, spoken of in the Jewish synagogues.

Some say, they were the three presidents and the seven readers; others, that they were ten persons hired to attend constantly at the synagogue, because without the number ten it could be no regular synagogue or legal assembly; so that the *decem otiosi* were ten idle folks kept in pay, to form by their presence a legal synagogue or quorum.

Vitringa, in his Archi-Synagoga, refutes this opinion; and will have the *otiosi* to have been ten directors or officers in the synagogue.

He shews, that each synagogue had its directors; that the number was greater or less, according to the dignity of the synagogue; that the smallest had at least two; that from the earliest times each synagogue had its chief, called *archi-synagogus*, who had two colleagues, to be present at the ceremonies, and other acts of religion, and to take care every thing were done with decency; but that the archi-synagogus reserved to himself the power of teaching: that besides these three, the archi-synagogus named several readers, who read in the synagogue every Sunday; and that these made the *decem otiosi* of the synagogue; so called, because, being disengaged from all other employment, their whole attendance was on divine service.

OTIS. See BUSTARD.

OTITES *digitus*, the *ear-finger*, a name given by authors to the finger next the little one.

OTOMO, in *Ornithology*, the name of a bird of the lagopus kind, called also *colomastre*, and by the Germans *steinhun*, that is *stonehen*. It is of the bigness of a tame pigeon; its belly and wings are white, with only a very few brownish feathers; its head, neck, and breast are variegated with brown feathers, and the upper part of the neck with black and white; its beak is very short and black, and it has fine red granulated membranes over its eyes; its tail is principally black, but is variegated with brown and white; and its legs and feet are feathered to the ends of the toes.

Mr. Ray is of opinion, that this is the same species of bird, with the common white *lagopus*, it being no way different but in colour, and those birds being said to change colour in the summer months. It is caught in the mountains of Germany, and is a very delicate bird for the table.

OTTER, *lutra*, in *Zoology*, an animal called by the Greeks, from its loving the water, *ὑυδρις*, *enhydris*. See *Tab.* IV. *of Quadrupeds*, N° 45.

In the Linnæan system of zoology, the *lutra* is a species of the MUSTELA.

The *otter* is smaller than the beaver, and has a longer and more slender body. Its tail is also longer than that of the beaver, and is all over covered with hair; and its legs are very short in proportion to the size of its body; but very strong, broad, and muscular; and the joints are articulated so loosely, that the animal is capable of turning them quite back, and bringing them on a line with the body, so as to perform the office of fins. The feet have all five toes each, which are naturally expanded, and are connected by a membrane like the toes of a web-footed fowl; and are all so equally distant, that there is no distinction of any in the place of the great toe in other animals. The head and face exactly resemble the beaver, and the ears are small and placed under the eyes, near the upper jaw, as in the beaver; the neck is short, and equal in thickness to the head; the nose and corners of the mouth are furnished with very long whiskers; it has thirty-six teeth, six cutting and two canine above and below, and five grinders on each side in both jaws; the hair is short, and of a chesnut brown, but paler under the belly; and there are two small spots of white on each side of the nose, and another under the chin; the tail has shorter hair than that of the body, but longer than that of the legs.

The *otter* is supposed by some to be of the castor or beaver kind, being like it an amphibious creature, and living both in water and on land; beside that the resemblance in point of shape is such, as, if his tail were off, he would be in all respects like the beaver; differing in nothing but habitation, the beaver frequenting both the salt water and the fresh, but the *otter*, as some have supposed, only the fresh; but this is a mistake, for *otters* have often been seen in the sea, swimming and bringing their booty on shore.

Though the *otter* lives much in the water, he does not breathe like fishes, but after the manner of quadrupeds. He is web-footed, like our water-fowl, and can endure to be under water a long time without respiration; and yet in fishing he is frequently found to pop up his nose for breath. He has an admirable smell, whereby some say he will directly wind a fish in the water a mile or two off; and is a most pernicious beast to a fish-pond, his dexterity at diving, and hunting under water, being such, that scarce any fish can escape him: if by painful hunting ashore he cannot fill his belly, he will feed on herbs, snails, or frogs, and kill lambs, sucking pigs, and poultry. It is said that two *otters* will in concert hunt the salmon: one stations itself above, and the other below the place where the fish lies, and continue chasing it, till the salmon is wearied and becomes their prey.

The *otter* will swim a-fishing two miles together, always against the stream, that when his belly is full the current may carry him down again to his lodging, which is always near the water, and artificially built with boughs, sprigs, and flicks, couched together in fine order.

It always makes the entrance of its hole under water; makes upwards towards the surface, and forms, before it reaches the top, several lodges, that in case of high floods it may have a retreat; and it contrives to make a small orifice for the admission of air.

The *otter* brings four or five young at a time: and it is observable, that the male *otters* never make any noise when they are taken; but the pregnant females make a most shrill squeal.

The *otter* is capable of being tamed, so as to follow his master like a dog, and even to fish for him, and return with its prey.

The flesh of this beast is rank and fishy, as often feeding on stinking fish; for which reason it is not eaten among us: though among the Germans it is a pretty common food; and the Carthusian friars, who are forbidden to eat all manner of flesh beside, are allowed this. Some in England also have of late said much in praise of *otter* pye.

The skin of this animal is very valuable, if killed in the winter, and it is much used in cold countries for lining cloaths; but in England it is only used for covers for pistol furniture. The best furs of this kind are brought from the northen part of Europe and America. The Indians use their skin for pouches, and ornament them with bits of horn.

OTTER, *sea*, or *mustela lutris* of Linnæus, is said to differ from the common sort, in being larger, and having a rougher coat, which is very black and glossy; beneath this there is a soft down. This species is very harmless, affectionate to their young, which they breed once a year, and feed on shell-fish.

They are hunted for their skins, which are of great value; and the flesh of the young resembles a sucking lamb, and is reckoned very delicate meat. They are found in great numbers in the Aleutian, and Fox and Bering's islands, between Asia and America.

There is also another species, the *mustela lutreola* of Linnæus, which very much resembles the common *otter* in shape and colour, but is thrice as small. It is found in Poland and the North of Europe; and is the same animal with the minx of North America. It lives on fish, frogs, and water-insects. Its fur is very valuable, being in beauty next to that of the sable.

OTTER-*hunting*. See HUNTING.

OTTERPIKE, in *Zoology*, the name of a large species of the *draco marinus*, or *sea-dragon*, called in English the *weaver*: it is not much larger than the *weever*, but is of a great variety of beautiful colours; and, instead of the yellow side-lines which that fish has, this has rows of large black spots.

OTTOMAN, or OTHOMAN, an appellation given to the empire of the Turks, or rather to their emperors, from *Othomannus*, or *Osman*, the first prince of the present family.

OTTUPLA, in the *Italian Musick*, signifies *ottuple*, or the measure of four times: it is marked with a semi-circle, C; and sometimes thus: when it is to be played very quick. In this time, eight quavers are contained in a bar. But it often happens, that suddenly, instead of two quavers for every time of the bar, three are required; this

this is called *dodecupla*. It is enough to place a 3 over three quavers, or notes of equal value, to shew that the measure muſt be changed; and when this 3 is omitted, it ſufficiently demonſtrates the meaſure to be *octupla* again: this makes what is called by the Italians *ottupla e dodecupla*, thus:

Corelli, in the laſt movement of his tenth ſonata, opera terza, very often uſes an 8 after the *dodecupla*, to ſhew, that the triple there is changed to common time.

OTUS, in *Zoology*, the name of the common *horn*-OWL of the ſmaller kind, in many reſpects different from the great *horn-owl* or *eagle-owl*. It is a moderately large bird; it beak is black. It is common in Italy, and is ſometimes caught in ſome parts of England, and generally fixes its abode in mountainous places.

OVA, *eggs*, in *Natural Hiſtory*. See EGG.

OVA, in the *Human Anatomy*, are little ſpherical bodies, in form of bladders or bubbles; conſiſting each of two concentric membranulæ, replete with a limpid humour, like the white of an egg, found under the external membrane of the ovaries of women, and connected to the minute oſſicles of the veſicles that compoſe the ſubſtance of the ovaries themſelves, by a calix.

After the uſe of venery, the *ova* ſwell ſenſibly, become more and more pellucid, their membranes grow thicker, and at length raiſe that of the ovary in form of papillæ, till at laſt, breaking the membrane of the ovary, they are detached from their calix, taken into the cavities of the Fallopian tubes, and thence conveyed into the womb; where being cheriſhed and impregnated with the male ſeed, they commence embryos; or for want of that are again ejected.

The ingenious Dr. Kerkring was the firſt who advanced the generation of all animals to be from *ova*, and that even man himſelf was produced out of an egg. The ſyſtem occaſioned great raillery at the time, and the author found himſelf under a neceſſity of publiſhing all his obſervations by way of juſtification. The eggs which he found in the teſticles of all females countenanced his opinion, and he gave figures of the parts in their natural ſituation, and of the eggs which he found in women from the age of eighteen to more than forty, in his different diſſections. Among the other creatures he examined, he found many ſmall eggs in the teſticles of cows, and other creatures of the viviparous kind.

The *ova* in which the lineaments of the fœtus are found after conception, are themſelves formed without ſuch lineaments, not only in married women, but in maids who have had no commerce with men at all; and it is the ſame in creatures naturally oviparous. The pullet will even lay her eggs without any intercourſe with the cock, but then they will have none of the lineaments of the young fowl, which are found in the eggs laid after treading.

The eggs found in the teſticles of unmarried women are generally of the ſize of a pea, round, and containing a glutinous liquor, which will harden, on boiling, in the ſame manner as the yolk and white of a common egg. The taſte is rather unpleaſant than inſipid, and they are inveloped in two ſkins, which after they are fallen into the womb become two membranes, called the amnion and chorion, which enlarge as the contents enlarge.

Fallopius obſerved thoſe eggs in women before the time of Kerkring, but it was this author who carried on the conjectures of the other into a ſort of certainty, and added proofs to what he had firſt hinted from a number of experiments; and Wharton, in his account of human generation, is of opinion, that the ſemen penetrates into the teſtes of the female by means of the Fallopian tubes; in which caſe, the impregnation is in this inſtance performed exactly as in others of the oviparous creatures, and the whole difference amounts to no more than this, that in ſome the impregnated matter loſes its figure of the egg before it is excluded the parent; but, in others, it retains it till it is not only put forth out of the body, but hatched by its genial heat afterwards.

The egg being impregnated by the ſemen, admitted this way, deſcends into the womb, and there becomes, in a few days of the bigneſs of a cherry; and afterwards increaſes, as we have already obſerved. This author having an opportunity of opening the body of a woman who had died ſuddenly about four days after the end of one of the menſtrual diſcharges, found in the womb an egg, of the bigneſs of a black cherry: he aſked the huſband carefully, whether he had lain with his wife ſince the time of the menſes; and was informed that he had. This egg was evidently the produce of that impregnation; and though, at the utmoſt, it could be no more than four days old, the fœtus was plainly diſtinguiſhable in it, on an accurate inſpection; and the head in ſome ſort found: the reſt of the body ſeemed an unformed maſs of fleſh. The bones as they are afterwards to become, are at thoſe young periods mere griſtles, and harden by degrees afterwards; but they ſoon acquire that degree of firmneſs, that the fleſh may be taken off, and they may be preſerved as ſkeletons.

At about three weeks from the time of the conception, the fœtus has its cartilages for bones ſo perfect and ſo firm, that with due care in the management of ſo tender an object, the fleſh may be ſeparated, and a ſkeleton preſerved of this ſmall ſize. The head is very large, at this period, in proportion to the body; but what is afterwards to become the ſkull is only a membrane inflated with wind. The arms and hands are ſeen diſtinctly, and even all the fingers are formed. The number of the ribs may be eaſily counted, and the toes are as diſtinct as the fingers; but they are all ſo minute and tender, that a very nice hand, and very great art, are neceſſary for the diſplaying them. After another week, that is, when the fœtus is a month old, the bones are ſo well formed, that the whole figure preſerves its form, and is able to ſupport itſelf. The jaw-bones appear; the clavicles are formed; and all the ribs are very fair and diſtinct, except the firſt and laſt; and theſe two, even after another month, do not acquire the conſiſtence of bones. At this period of one month, the joints of the arms, and thoſe of the legs, are all very diſtinctly ſeen.

On examining a fœtus at two weeks beyond this period, that is, at ſix weeks from the time of conception, the inferior jaw-bone has in it ſomewhat very remarkable; for it is plainly ſeen to be compoſed of ſix little bones; whereas in the younger periods this is not obſervable; and when the child is born they are all joined together and make but one bone.

Theſe are the proportions of growth in fœtuſes, which have continued regularly growing to the time of the death of the parent, and have been taken out by diſſection afterwards: much leſs is to be judged from abortions, where the regular proceſs of nature, in the growth and formation of the fœtus, is perverted, and the child has, perhaps, been dead ſome months before it is excluded, or has been ſickly, and therefore not capable of taking nouriſhment, and growing as it ſhould have done. For theſe reaſons it not unfrequently happens, that an abortive fœtus of four months is not larger than one of theſe regular fœtuſes of ſix or eight weeks; nor the parts any thing more advanced in their ſtate and ſolidity, or if at all, but very imperfectly and irregularly.

Mr. Dennys has added ſome obſervations on this ſyſtem: he agrees that theſe eggs, in which the rudiments of the fœtus are firſt to be diſcerned, are generated in the teſticles of the female, and made to deſcend thence by the ſpirituous effect of the male-ſemen, making its way thither through the tubes; and adds, that they are of very different forms and ſizes in different women. The ſame woman often has, in her teſticles, eggs of very different ſizes; and as to the proportion in ſize, between different animals, no regard ſeems paid in it to their bulk, ſince not only thoſe of a cow are much ſmaller than thoſe of a woman, but thoſe of a duck, or a hen, are vaſtly larger than either. The firſt beginnings of things do not always bear a proportion to their ſtate and increaſe, in the animal or vegetable world: beans are a much larger ſeed than that of the apple or pear, though the latter raiſes a large tree, while the former only furniſhes a ſmall plant. The reaſon why the eggs of fowls are proportionably larger than thoſe of the human ſpecies or of quadrupeds is, that they are to contain not only the young animal, but alſo the food for it to live on in the firſt part of its life.

Monſieur Gaulois obſerves, that the veſicles or eggs, in all ſorts of females, are to be obſerved in three ſorts of ſtate or condition: firſt, while they are faſtened to the place where nature lodged them, as in a repoſitory: ſecondly, when they are looſened from the place: and thirdly, when they incloſe the embryo. See GENERATION.

OVA, among the ancients, a kind of verſes, wherein the verſes were reduced to the form of an egg.

OVA, in *Architecture*, are ornaments in form of eggs, carved on the contour of the ovolo, or quarter round;

and ſeparated from each other by anchors or arrows heads. The Engliſh uſually call theſe ornaments *eggs and anchors*. See *Tab. Archit. fig.* 16.

Inſtead of eggs, the ancients ſometimes carved hearts, on which occaſion it was that they introduced arrows, to ſymboliſe love.

OVAL, *elliptis*, an oblong curvilinear figure, with two unequal diameters; or, a figure incloſed with a ſingle curve line, imperfectly round, its length being greater than its breadth, like an egg; whence its name.

The proper *oval*, or egg-ſhape, is an irregular figure, being narrower at one end than the other; in which it differs from the ellipſis, which is the mathematical *oval*, and is equally broad at each end.

The common people confound the two together: the geometricians alſo call the *oval*, a *falſe ellipſis*.

The method of deſcribing an *oval* chiefly uſed among workmen is by a cord or ſtring, as E *f* M (*Tab.* III. *Geomet. fig.* 62.) whoſe length is equal to the greater diameter of the *oval*, and which is faſtened, by its extremes, to two points or nails, E, *f*, planted in its longer diameter; by which means the *oval* is made ſo much the longer, as the two points or nails are farther apart.

OVAL *column*. See COLUMN.

The ancients have been repreſented as authoriſing this deformed figure for the plan of a column: but this is a miſtake, probably occaſioned by the diſcovery of fragments, where flanked columns have been ſet back to back againſt a ſcreen or wall of nearly the ſame width with the diameter of the columns: theſe remains, defaced by time, might ſuggeſt, to a ſuperficial enquirer, that the column originally had an oval baſe.

OVAL *crown*. See CROWN.

OVAL *leaf*. See LEAF.

OVALE *foramen*, in *Anatomy*. See FORAMEN *ovale*.

OVARY, *ovarium*, in *Anatomy*, that part of a female animal wherein the ova or eggs are formed and lodged.—See *Tab. Anat. (Splanch.) fig.* 11. *lit. h b*.

The *ovaries* in women are alſo called *teſtes muliebres*, *female teſticles*, from their uſe, which the ancients ſuppoſed analogous to that of the teſticles in men.

They are two in number, lying near the ends of the Fallopian tubes, two fingers diſtance from the uterus, to which they are connected by a ſtrong ligament, called *vas deferens*, and in ſome meaſure by the Fallopian tubes, and the broad ligament about the region of the ileum. They are faſtened to the peritonæum by the ſpermatic veſſels; by which means they are kept ſuſpended about the ſame height with the fundus uteri.

Their figure is ſentional; their ſurface ſomewhat uneven; their ſize different in different ſtages of life. At the time of puberty, when largeſt, they uſually weigh about a drachm and a half.

They are covered with a common membrane from the peritonæum; their ſubſtance is whitiſh, compoſed of a number of little, thin, membranous, and ſlender fibres, interwoven with arteries, veins, and nerves.

Among theſe fibres and veſſels are interſperſed a number of little round bodies, like bladders, full of a limpid ſubſtance, and called ova or eggs, of great uſe in generation.

OVARY, *dropſy of the*. See DROPSY.

OVARIUM *of fiſhes*. All fiſh have *ovaria*, but they, as well as the eggs they contain, differ greatly in the different kinds, in number, ſituation, figure, and ſtructure. In the cetaceous, the cartilaginous, and moſt of the other kinds of fiſh, the *ovarium* is double, or there are two *ovaria*; but in ſome fiſh, as in the *ofmarus*, the *perca fluviatilis* of Bellonius, and perhaps in ſome others, it is ſingle. As to its ſituation, it generally occupies the whole length of the abdomen, as in moſt of the ſpinoſe fiſh; and in the petromyzum and accipenſer. In many of the cartilaginous fiſhes it occupies only the upper part of the abdomen: and finally, in the cetaceous fiſhes, it is placed at the corner of the uterus. As to its figure, it is generally oblong and compreſſed, and is ſeen in moſt of the ſpinoſe kinds: in thoſe fiſh which have it ſingle, it is oblong and cylindric, and in cetaceous fiſhes it is round.

The eggs themſelves are alſo very different in number and ſtructure. In regard to number, they are in ſome fiſh very few, as in the cetaceous kinds. In the cartilaginous kinds they are ſomewhat more numerous, amounting to fifty or a hundred; and in other kinds of fiſh they are ſo numerous, as to be beyond account. In regard to their ſize and ſtructure, they alſo differ conſiderably: in ſome fiſh they are large, and reſemble a hen's egg in their contents; having a white, and yolk, and cicatricula, all diſtinct in them, as in the cartilaginous fiſh of many kinds. In others, as in the cetaceous kinds, they are very ſmall and ſimple, and have no diſtinct appearance either of white, yolk, or of the cicatricula. Hence it is evident, that the fœtus of cetaceous fiſh, while included in the egg, receives its nouriſhment from the womb itſelf; but in the others, as the cartilaginous, and other fiſh, the white of the egg ſerves as nouriſhment to the fœtus while it remains in it.—Finally, in the generality of other fiſh, the eggs are very ſmall, and probably do contain a white and yolk, though their ſize makes it not eaſy to ſee their parts diſtinctly. All the ſpinoſe fiſh have theſe ſmall ſorts of eggs, and among the cartilaginous ones, the accipenſer and petromyzum. It has been ſuppoſed by ſome, that the eggs of theſe fiſh were ſimple bodies, and only anſwered to what Harvey, and other authors on theſe ſubjects, call the *cicatricula*; but this cannot be the caſe, for if ſo, the young fiſh muſt periſh; for the ſemen of the male fiſh is only ſcattered over the eggs while they lie in the water, and ſerves only to the rendering them prolific. The figure of all the eggs of fiſh, ſo far as is yet known, is round.

OVATED *leaf*, among *Botaniſts*. See LEAF.

OVATION, *ovatio*, in the *Roman Hiſtory*, a leſſer triumph allowed to commanders for victories won without the effuſion of much blood; or for the defeating of rebels, ſlaves, pirates, or other unworthy enemies of the republic.

Their entry was on foot; ſometimes on horſeback: but never in a chariot; and they wore crowns of MYRTLE, called *ovalæ*; having all the ſenate attending in their retinue.

The denomination *ovatio*, according to Servius, and Plutarch, in his life of Marcellus, is derived from *ovis*, *ſheep*; becauſe the conqueror ſacrificed a ſheep on this occaſion to Jupiter; whereas, in the greater triumph, they ſacrificed a bull.

Others derive it from the ſound or din of the acclamations and ſhouts of joy, made by the people. In honour of the ſolemnity, the people and ſoldiery, on this occaſion, redoubling the letter O, as in the great triumph they did the words *Io triumphe*.

The *ovation* was firſt introduced in the year of Rome 325, in honour of the conſul Poſthumius Tubertus, after his defeating the Sabines.

OUCH, in our old writers, a collar of gold, or ſuch like ornament, worn by women about their necks. Stat. 24 Hen. VIII. cap. 13.

OVELTY. See OWELTY.

OVEN, or *aſſaying* OVEN, in *Metallurgy*, is the particular ſort of furnace uſed by the aſſayers in their operations on metals. See *Aſſaying* FURNACE, and *Tab.* III. *Chemiſtry, fig.* 37.

OVER-*blow*, in the *Sea Language*. They ſay it *over-blows* when the wind blows ſo very hard that the ſhip can bear no top-ſails.

OVER-*board*, in *Sea Language*, denotes the ſtate of being thrown out of a ſhip or boat into the water on which ſhe ſwims; alſo the act of falling from ſuch a veſſel into the ſea, &c. as the ſhip ſprung a leak, and obliged us to throw the guns *over-board*; or, a heavy ſea broke over the deck, and carried two of our men *over-board*.

OVER-*caſt-ſtaff*, is a ſcale or meaſure, uſed by ſhipwrights, to determine the difference between the curves of thoſe timbers, which are placed near the greateſt breadth, and thoſe which are ſituated near the extremities of the keel, where the floor riſes and grows narrower.

OVER-*done*, in the *Manege*, in French, *outré*. A horſe is ſaid to be *over-done*, or *outré*, when his wind and ſtrength are broke and exhauſted with fatigue.

OVER-*flowing*, or *inundation*.

The farmers of England, having long obſerved how great an advantage it was to meadow and paſture land to be ſometimes *over-flowed* by the ſudden riſe of brooks, rivers, or the like, which brings the ſoil of the uplands upon them, and makes them need no other mending or manuring, though conſtantly mowed, have found an artificial method of working the ſame end, and by it producing the ſame good effect in many of their grounds without any ill one. The benefit of the natural *overflowings* of meadow lands, which lie in the way of floods, is in ſome ſort taken off, by their being ſubject alſo to theſe inundations at improper times; and when a winter flood has a cauſed a fine crop of graſs, a ſummer flood ſometimes comes and deſtroys it all before the hay-making ſeaſon.

There are ſome lands ſo advantageouſly ſituated, that with the aſſiſtance of art they may be laid under water or left dry, at the pleaſure of the farmer. Theſe are the moſt valuable of all graſs lands, and it is upon theſe that the farmer practiſes his artificial *over-flowings*; improving them in winter by letting in the floods to have their ſoil for manure upon them, and keeping them dry in ſummer when the graſs is long.

The artificial *over-flowing* of lands is commonly effected by directing the ſtreams of rivers, brooks, ſprings, or land floods, or ſome part of them, out of their proper channel; but where the ſtreams lie ſo low as to be incapable of *over-flowing* the lands, they are made uſe of to turn ſuch engines as may raiſe a quantity of water ſufficient to do it. The beſt and cheapeſt engine for effecting this, is that called the PERSIAN *wheel*; which may be made of any ſize, according to the height the water is to be raiſed to, and the ſtrength of the ſtream by which it is turned. This wheel is placed ſo, that its bottom only is immerſed in the ſtream; and there are open boxes at its cogs: theſe are all filled one after another with water, which is raiſed with them to the upper part of the wheel's circuit, and then naturally empties itſelf into a trough which carries it to the land.

Where there are not ſtreams to turn this wheel, the farmers have recourſe to pumps, and other engines, moved by wind. Lands that lie near brooks give more frequent opportunities for theſe practices, than thoſe which are near rivers; the brooks having greater falls, and the rivers running more ſlow and level; but when it can be effected by the water of large rivers, the land is yet more enriched by it, theſe waters being more fruitful than the others.

When the water is, by this engine, thrown into the trough, it is to be conducted by it to the higheſt part of the land; and when that is ſufficiently flooded, the water is to be let into a large but not deep trench, ſeveral ſmall ones running out of which to all parts of the land, may convey it every where, and every part may be enriched by it. It is always proper to contrive this matter ſo, that the *over-flowing* may be often repeated, and the water quickly carried off; for when it is ſuffered to lie long upon the land in winter, it is apt to breed ruſhes and other coarſe plants in the ground.

Some farmers graze their lands till Chriſtmas, and ſome longer; but as ſoon as ſed bare, from Allhallows till ſpring, that the graſs is not too high, is the propereſt time of *over-flowing*, except that it prove a dry time in April or May. If this happen, *over-flowing* the lands at this time will be of ſingular advantage; for the graſs will grow three times as faſt after it, in hot weather, as it would in cold. Land-floods are the beſt to *over-flow* with in winter, and warm fattening ſprings in ſummer; only it muſt be obſerved, that the water of one operation is dried in before any more is let on. It is always beſt alſo to do it at night, that the moiſture may be ſoaked into the ground before the heat of the day; for otherwiſe the land is often burnt. The waſhings of towns and of public highways is of great improvement to lands, as is alſo the waſhings of lands where ſheep feed.

All waters are not proper for this purpoſe of *over-flowing* of lands to enrich them: the waters of coal mines, and other places where there is any ſulphurous mineral mixed among them, being apt to deſtroy and kill the graſs wherever they come. Theſe waters are eaſily known from the healthful ſpring, by their leaving a reddiſh mud or ſediment behind them wherever they have paſſed; but it is poſſible, that even theſe may have their uſe when properly applied. They ſeem to contain a vaſt quantity of ſalt of ſome kind, and we know that urine, dung, and many other things, that are moſt fit of all others to enrich land, will burn up and deſtroy plants, if improperly laid on in large quantities: the caſe may be the ſame in theſe, and very probably theſe waters abounding in ſalt would do great good if they were properly blended with common water, and let in upon the lands with floods of ſweet water. The farmers have gone ſo far towards the proving the truth of this, that they have found ſome of theſe ſprings, when more diſtant from their ſource, not only more innocent than before, but beneficial.

Cold clay lands, and other ſtrong lands that lie flat, will only be improved by *over-flowing* them with land floods, and that only in ſummer, when the ſeaſon is very dry. Theſe lands will not bear water in ſuch quantity at any other time, becauſe it will not ſoak into them eaſily; and it is for the contrary reaſon, that the light and ſpungy lands are always moſt improved by *over-flowing*. Mortimer's Huſbandry. See LAND.

OVER-*grown*, in the *Sea Language*. When the waves of the ſea grow high, the ſailors call it *rough ſea*; but when the ſurges and billows grow vaſtly high, then it is an *over-grown ſea*.

OVER-*haul*, in the *Sea Language*. A rope is ſaid to be *over-hauled*, when drawn too ſtiff, or hauled the contrary way.

OVER-*haul the runner*, in the *Sea Language*. See RUNNER.

OVER-*haul the ſheet*, in the *Sea Language*. See SHEET.

OVER-*hauling*, in *Sea Language*, denotes the act of opening and extending the ſeveral parts of a TACKLE, or other aſſemblages of ropes, communicating with blocks or dead eyes. It is uſed to remove thoſe blocks to a ſufficient diſtance from each other, that they may be again placed in a ſtate of action, ſo as to produce the effect required.

OVER-*hauling* is alſo vulgarly expreſſed of an examination or inſpection into the condition of a perſon or thing.

OVER-MASTED, denotes the ſtate of a ſhip, whoſe maſts are too high, or too heavy for the weight of her hull to counterbalance.

OVER-RAKE, in the *Sea Language*. When a ſhip, riding at anchor, ſo over-beats herſelf into a head-ſea, that ſhe is waſhed by the waves breaking in upon her; they ſay, the waves *over-rake* her.

OVER-REACH, in the *Manege*, is when a horſe ſtrikes his hind-feet againſt his fore.

The word is alſo uſed for a ſtrain, or painful ſwelling, of the maſſer-ſinew of a horſe; occaſioned by ſuch *over-reach*.

OVER-RIDE, in the *Manege*, the ſame with OVER-*done*.

OVER-RULING *an objection*, in *Law*, is the rejecting or ſetting it aſide by the court.

OVER-RUNNING, among *Printers*. See PRINTING, and CORRECTION.

OVERSAMESSA, an ancient fine or penalty, impoſed before the ſtatute of hue and cry, on ſuch perſons, as, hearing of a murder or robbery, did not purſue the malefactor.

OVERSEERS *of the poor*, are public officers, who muſt be ſubſtantial houſholders, created by the ſtat. 43 Eliz. cap. 2. and nominated yearly in Eaſter-week, or within one month after Eaſter (though a ſubſequent nomination will be valid), under the hand and ſeal of two or more juſtices of the peace in the ſame county, and dwelling near the pariſh, whereof one to be of the *quorum*; to provide for the poor of every pariſh; and are ſometimes two, or three, or four, according to the largeneſs of the pariſh. The *overſeers* thus appointed, and taking upon them the office, ſhall within fourteen days, receive the books of aſſeſſments and accounts from their predeceſſors, and what money and materials ſhall be in their hands, and reimburſe them their arrears. 17 Geo. II. cap. 38.

Their office and duty, according to ſtat. 43 Eliz. are principally theſe: firſt, to raiſe competent ſums for the neceſſary relief of the poor, impotent, old, and blind, and ſuch as are not able to work: and, ſecondly, to provide for ſuch as are able, and ſuch as cannot otherwiſe get employment: but this latter part of their duty, which, according to the wiſe regulations of that ſalutary ſtatute, ſhould go hand in hand with the other, is now moſt ſhamefully neglected. However, for theſe joint purpoſes, they are empowered to make and levy rates upon the ſeveral inhabitants of the pariſh, by the ſame act of parliament, which has been farther enforced and explained by ſeveral ſubſequent ſtatutes. And by 17 Geo. II. cap. 38. if any perſon ſhall be aggrieved by anything done or committed by the churchwardens and *overſeers*, or by any of his majeſty's juſtices of the peace, he may, giving reaſonable notice to the churchwardens or *overſeers*, appeal to the next quarterly ſeſſions, when the ſame ſhall be heard and finally determined: but if reaſonable notice be not given, then they ſhall adjourn the appeal to the next quarter ſeſſions; and the court may award reaſonable coſts to either party.

Overſeers, neglecting their duty, ſhall forfeit for every default 20*s.* to the poor, to be levied by diſtreſs, or be committed to the common gaol. 43 *Eliz.* And by 17 Geo. II. any pariſh officer, neglecting to obſerve the directions of that act, ſhall forfeit on conviction, within two calendar months after the offence committed, a ſum not exceeding 5*l.* nor leſs than 40*s.* to the poor, by diſtreſs. *Overſeers* are indemnified in the performance of their duty by 43 Eliz. 1. Jac. cap. 5. and 21 Jac. cap. 12.

Churchwardens, by 43 Eliz. are called *overſeers of the poor*, and they join with the *overſeers* in making a poor rate, &c. But the churchwardens having diſtinct buſineſs of their own, uſually leave the care of the poor to the *overſeers* only; though anciently they were the ſole *overſeers of the poor*. See POOR.

OVER-*ſet*, or *overthrow*, in the *Sea Language*. A ſhip is ſaid to *over-ſet* when her keel turns upwards; which misfortune happens either by bearing too much ſail, or by grounding her, ſo that ſhe falls upon one ſide.

OVER-*werked*, in the *Manege*, is the ſame with OVER-*done*. It is called, in French, *eſtrapaſſer*.

OVER-*laying of children* may be prevented by a machine called ARCUCCIO.

OVERT *act*, a term in *Law*, ſignifying an *open act*; or an act capable of being manifeſted and proved.

The word is formed from the French, *overt*, *open*.

In which ſenſe it is diſtinguiſhed from an *intentional act*.

OVERT-*pound*. See POUND.

OVERT-*word*, denotes a plain open word, not to be miſtaken.

OVERTURE, or OUVERTURE, *opening*, or *preluding*; a term uſed for the ſolemnities at the beginning of a public act or ceremony; as of an opera, tragedy, concert of muſic, &c.

The *overture* of the theatre, or ſcene, is a piece of muſic, uſually ending with a fugue.

The *overture* of a jubilee is a general proceſſion, &c.

OVI *albumen*. See ALBUMEN.

OVICULUM, in the *Ancient Architecture*, a little *ovum*, or egg.

Some alſo uſe the word *oviculum* for OVOLO.

Baldus will have this to be the Leſbian ASTRAGAL of Vitruvius. Daviler.

OVIEDA, in Botany, the name given by Linnæus to a genus of plants, of the *didynamia angioſpermia* claſs; called by Plumier *valdia*. The characters of which are theſe: the perianthium is a ſhort and broad one-leaved cup, lightly divided into five erect and pointed ſegments, and remaining after the flower is fallen; the flower conſiſts of one petal, and is of the labiated kind; the tube is extremely long and ſlender, and ſtands upon the germen of the piſtil; it is ſomewhat thicker at the top than at the baſe, and the upper lip is hollow and emarginated; the lower is divided into three ſegments; the ſtamina are four filaments longer than the flower; the antheræ are roundiſh; the germen of the piſtil is globoſe, and ſtands between the cup and the flower; the ſtyle is capillary, and of the length of the ſtamina; and the ſtigma is bifid and acute; the fruit is a globoſe berry, placed in the cup, which grows larger to receive it, and is of a campaniform ſhape; the ſeeds are oval, and are two in number. There are two ſpecies.

OVILIA, or SEPTA, in ancient Rome, a place in the Campus Martius, at firſt railed in like a ſheep's pen; whence its name.

Afterwards it was mounted with marble, and beautified with walks and galleries; as alſo with a tribunal, or ſeat of juſtice.

Within this precinct, or incloſure, the people were called to give their ſuffrages for the election of magiſtrates.

The aſcent into the *ovilia* was not by ſtairs, but by pontes, a ſort of bridges made for the time; every curia, tribe, and century, as the aſſembly was centuriate or tribute, &c. having its proper bridge.

Whence the proverb, *de ponte dejiciendus*, where a perſon is to be debarred from giving his vote. See COMITIA.

OVIPAROUS, in *Natural Hiſtory*, a term applied to ſuch animals as produce their young *ab ovo*, *from eggs*; as birds, inſects, &c.

The *oviparous* kind ſtand in oppoſition to thoſe which bring forth their young alive, called *viviparous* animals, as man, quadrupeds, &c.

Oviparous animals may be defined to be ſuch as conceive eggs, which they afterwards bring forth, and from which, by the incubation of the parent, or ſome other principle of warmth and fermentation, at length ariſe animals; which, after they have ſpent the moiſture or humour they were ſurrounded withal, and are grown to a ſufficient bulk, firmneſs, and ſtrength, break their ſhell, and come forth.

The *oviparous* kind, beſide birds, include divers ſpecies of animals; as, ſerpents, lizards, tortoiſes, crabs, lobſters, frogs, &c. See EGG.

The diſtinction between *oviparous* and viviparous creatures, ſeems, in the inſect world, to be much leſs fixed and determinate than is ſuppoſed. It is evident, that ſome flies, which are naturally *oviparous*, if they are kept from the finding a proper nidus for their eggs, be it meat, or any thing elſe, will retain them ſo long beyond their due time of exclusion, that they will hatch into worms in the body of the parent, and be afterwards depoſited alive on fleſh, or in the manner of the young of the viviparous inſects. Bartholine gives an account, in his Medical Obſervations, of a hen, which, inſtead of eggs, brought forth no leſs than five living chickens; but ſhe died of it.

OVIS, in *Zoology*. See SHEEP.

OUMIEN, a name given by the Chineſe to a peculiar ſort of porcelain, of which they are very fond. It is black, ornamented with gold. They ſometimes alſo call the blue and gold, which is made in the ſame manner, by the ſame name. They colour it with three parts of the azure, and ſeven parts of oil of ſtone, and lay on the gold afterwards. If they would have it bluiſh, they add leſs of the azure, and ſome ceruſa white.

OUNCE, UNCIA, a little weight, the ſixteenth part of a pound avoirdupois; and the twelfth of a pound troy.

The word is derived from the Latin, *uncia*, the twelfth part of any whole, called *as*; particularly in geometrical meaſures, an inch, or the twelfth part of a foot.

The *ounce avoirdupois* is divided into ſixteen drachms.

The ounce *troy* into twenty penny weights, and the penny weight into *twenty-four grains*. See WEIGHT.

The *ounce troy*, makes the eighth part of the French mark, and is divided into three groſs or drachms; the drachm into three penny weights, or ſcruples; and the ſcruple into twenty-four grains; each grain being computed to weigh a grain of wheat.

All precious merchandizes, as gold, ſilver, ſilk, &c. are ſold by the *ounce*.

OUNCE *pearls*, are thoſe too ſmall to be ſold by tale; uſually called *ſeeds of pearl*, or *ſeed pearls*.

OUNCE *cotton*, brought from Damaſcus, are of a kind and quality ſuperior to any other COTTON.

OUNCE, in *Zoology*. See ONCA.

OUNCE is alſo the Engliſh name of the LYNX, or *lupus cervarius*, a very fierce beaſt of prey.

OVOLO, OVUM, in *Architecture*, a round moulding, whoſe profile or ſweep, in the Ionic and Compoſite capitals, is uſually a quadrant of a circle; whence it is alſo popularly called the *quarter-round*.

It is uſually enriched with ſculptures among the ancients, in form of cheſnut-ſhells; whence Vitruvius, and others of the ancients, call it *echinus*, *cheſnut-ſhell*. See *Tab. Archit. fig. 5. fig. 25. N° 5.*

Among us, it is uſually cut with the repreſentation of eggs and anchors, or arrows-heads, placed alternately; whence its Italian name, *ovolo*; Latin, *ovum*; and French, *œuf*; q. d. *egg*.

OUR *Lady*. See NOTRE DAME.

OUR *Lady of the Thiſtle*. See THISTLE.

OURAN, or URAN SOANGUS, the name of an imaginary ſect of magicians in the iſland Gromboccanore, in the Eaſt Indies.

The word implies *men-devils*: theſe people were ridiculouſly ſuppoſed to have had the art of rendering themſelves inviſible, and paſſing where they pleaſed, and, by theſe means, doing infinite miſchief; for which reaſon, the people hate and fear them exceedingly, and always kill them on the ſpot, when they can take them.

OURISSIA, in *Zoology*, a name by which Cluſius and ſome other authors have called the HUMMING-*bird*, or *guainumbi*.

OUROLOGY, in *Medicine*, a name given by authors to a treatiſe or diſcourſe on the ſubject of urine. The chemiſts have given us treatiſes on the analyſis of urine, and the preparations of it, ſuch as the phoſphorus, &c. under the name of *urologies*: and medical writers have, under the ſame name, given us treatiſes on the prognoſtics from the urine, and its various appearance in different diſeaſes.

The firſt ſtep towards judging by the urine is to fix ſomething as its ſtandard in a healthy ſtate, all the deviations from which, in whatever reſpect, are to be judged ſignals of diſtempers or diſtempered habits. This ſtandard is beſt taken from the urine of a perſon in health, of between thirty and forty years old, and it is of a citron colour and moderate conſiſtence, of a due and ſomewhat ſtrong ſmell, and made in a conſiderable quantity. This, when it has ſtood a proper time, is alſo to depoſit a natural ſediment. By being well acquainted with all the ſtages and changes of this, the diſeaſed urine will be eaſily judged of by its ſeveral peculiarities in difference from it.

It is ſaid by ſome, that people often die with good and healthful urine; but this is only ſaid by thoſe who are not ſkilful in urine: for it is as impoſſible for the urine to be healthful at the approach of death in diſeaſes, as for the blood to be ſo.

The time of inſpecting the urine, and the time that the urine is made that is to be inſpected, are alſo circumſtances of great conſequence. The urine by which the beſt judgment is to be formed, is that made after the firſt ſleep in the night; and the time of judging of this is not immediately when it is made, but about two hours after, when it has had time to ſettle. It muſt in the mean time be ſet to ſettle in a moderate air, neither too cold nor too hot. The firſt hinders the ſettling, and the latter rarifies the colour; and, if very great, it cauſes an ebullition, which deſtroys what ſhould ſwim upon the ſurface of the urine. The urine muſt not be judged of in the ſun, nor by candle light; for either of theſe lights will give falſe colours: but the proper place is, where there is a moderate, not glaring light; and when it is firſt received, it muſt be held very ſtill and ſteady; afterwards it will be proper to ſhake it, to ſee the whole that ſwims in it, and will ſeparate from it.

The colour of the urine is the moſt precarious of all its appearances, and to be judged of with the greateſt caution. What is taken to be the mark of a diſeaſe in this caſe, is often only the effect of medicines or the food: rhubarb or ſaffron will make the urine yellow, and a common ſallad will make it greeniſh; but theſe tinctures go off after a few hours from the time of taking the things which occaſion them. People who live in a hot air, and thoſe who uſe violent exerciſe, uſually make more high-coloured urine than others. The ſubſtance, the

quantity, the qualities, and the contents of the urine, will always discover to the attentive view the nature, cause, and symptoms of the person who made it. What is most to be observed as to the substance of the urine is, whether it be thick or thin, clear or turbid, oily or not oily. The copiousness of it is only to be judged of by comparison of the quantity voided within the twenty-four hours by the patient, with that he used to void in health, or that quantity which at a medium a man in health does usually void.

Among the qualities of the urine, the principal is the smell. This is affected not only by diseases, but by medicines taken for them. The urine is on many occasions rendered fœtid; and there are some things which communicate an agreeable smell to it, such as turpentine, and many of the distilled oils. Among the things which render the urine fœtid, the principal are ulcers and purulent matter. The taste of the urine also declares its qualities. It is naturally of a saltish and sulphureous taste; but this goes off, and a sweetness or insipidity is observed in it. The principal colours of the urine in its various states, as inflamed by diseases, are white, yellow, reddish, and black; to one or two of these, differing in degree, or to mixtures of two or more of them, in different proportions, may be referred the other less common colours of pale citron, high-red, green and blue, which last two, in any perfect degree, are very uncommon. The most dangerous of all urines are the blue and the black, particularly the last: the ancients, however, judged too severely of it. Galen says, he never knew any one recover who made black urine; but we meet with some instances of children escaping after this symptom.

The contents of the urine are of three kinds: the sediment or matter subsiding to the bottom; the matter hanging in the middle; and the matter swimming at the top. These differ according to their degrees of weight, and in all these the physician into observe, the substance, colour, uniformity, and likeness. For example: the best sediment is that which is moderate in substance and quantity, white, uniform, and alike both for matter and time. We are not to expect a sediment in the urine in all diseases; and in some a thinner, in others a thicker sediment, is the best symptom. Among all the appearances of the middle and the top of the urine, the worst is that of a sort of clouds forming themselves in the urine, and rising to the top entirely. These are the signs of light-headedness, and often of death itself.

Besides these, which are the general contents of urine, there are particular ones; such as mealy matter, scales, coagulated blood, purulent matter, ashes, slime, pieces of seeming fleshy matter, small hairs, woolly filaments, flying dust, tough stuff adhering to the sides of the vessel, and resembling the webs of spiders, bladders, froth, fat, or cream-like substances, and finally sandy or stony matter. This last is the most frequent of all, and is of two kinds; the one found in the body, the other only separated from the urine after it is discharged. It is of great consequence to know these, as they give great light into the nature of nephritic complaints. The sandy matter, generated in the body, always precipitates itself to the bottom in the urine, as soon as it is made, and remains loose in it; but the other only separates from it in the pot, and adheres to the sides of it in form of a sort of crust. It has been supposed by many, that prefages of the stone may be made from these separations from the urine, but there is no certainty in it; only this, that those who have been used to void grains of sand, if they suddenly leave it off, and from that time begin to make a whitish and thin urine, may be suspected to have a stone breeding within them.

The nature of the sand, voided at times by people afflicted with the stone, may serve as a guide to judge of the nature of the disease. When it is hard and red, the stone is likely to be situated in the bladder; if hard and white, the kidneys are likely to be the seat of the disorder. We have instances of very particular matters voided by urine, beside these: some wholly erroneous; others certain, though very strange. Plempius gives an account of a woman who voided a yellow fatty matter with her urine for several months after the going off of a quartan ague, and, though the discharged great quantities of this, was not at all the better for it. Phil. Transf. N° 100. See URINE.

OUSTED, formed from the French *oster, to remove*, or *take away*, in our *Ancient Law Books*, a being removed, or put out of poſſeſſion.

OUSTER, or *diſpoſſeſſion*, in *Law*, is an injury that carries with it the emotion of poſſeſſion; for thereby the wrong doer gets into the actual occupation of the land or hereditament, and obliges him that hath a right to ſeek his legal remedy, in order to gain poſſeſſion, and damages for the injury ſuſtained. This *ouſter* may either be of the freehold by abatement, intruſion, diſſeiſin, diſcontinuance, and deforcement; or of chattels real, as an eſtate by ſtatute-merchant, ſtatute-ſtaple, or elegit, or an eſtate for years.

OUSTER *le main, amovere manum*, in *Law*, denotes a livery of lands out of the king's hands; or a judgment given for him that traverſed, or ſued, a monſtrans le droit.

When it appeared, upon the matter diſcuſſed, that the king had no right or title to the land he had ſeized, judgment was given in chancery, that the king's hand be removed. Hereupon, *ouſter le main*, or *amoveas manum*, was awarded to the eſcheator, to reſtore the land, &c.

But now all wardſhips, liveries, *ouſter le mains*, &c. are taken away and diſcharged, by ſtat. 12 Car. II.

OUSTER *le mer*, in *Law*, a cauſe of exceſe, or eſſoin; where a man not appearing in court upon ſummons, it is alleged, that he is beyond the ſeas.

OUT-FIT, in *Sea Language*, is generally uſed to ſignify the expences of equipping a ſhip for a ſea-voyage; or of arming her for war, or both together. See FITTING-*out*.

OUT, OUTSIDE, or WITHOUT, in the *Manege*, is the contrary of *in, inſide, inner*, &c. See IN, INS, &c.

OUT, in *Sea-Language*. See IN.

OUTFANG THIEFE, a privilege whereby a lord was enabled to call any man dwelling in his fee, but taken for felony in another place, to judgment in his own court.

The word is formed from the Saxon *ut, extra, without*; *fang, capio, tollere*; and *theof, thief*; q. d. *fur extra-neus*. Spelm.

OUTIN, in *Ichthyology*, a name by which ſome call the fiſh known among authors by the name of OXYRYNCHUS.

OUTLAW, UTLAGATUS, one deprived of the benefit of the law, or put out of the king's protection.

Bracton ſays, an *outlaw* forfeits every thing he has; and that, from the time of his *outlawry*, he wears a wolf's head; and any body may kill him *impune*; eſpecially if he defend himſelf, or fly. But, in the beginning of king Edward III's reign, it was reſolved by the judges, that it ſhould not be lawful for any man, but the ſheriff alone (having lawful warrant for it), to put to death a man *outlawed*.

OUTLAWRY, or UTLAWRY, UTLAGARIA, the puniſhment of him who, being called into law, and lawfully ſought, does (after an original writ, and the writs of capias, alias & pluries, returned by a ſheriff with a non eſt inventus, and an exigent, with a proclamation awarded thereupon) contemptuouſly refuſe to appear.

He muſt alſo be called at five county court-days, a month between each other; and, if he appear not in that time, *per legem terræ bannitur, cum pœnis non abſolet, nec leges ſe extendi ſolebant*; i. e. he ſhall be pronounced to be out of the king's protection, and deprived of the benefit of the law.

The effect of which is, if he be *outlawed* at the ſuit of another, in a civil cauſe, he ſhall forfeit all his goods and chattels to the king, and the profits of his land, while the *outlawry* remains in force: and if in treaſon or felony, all his lands and tenements which he has in fee, or for life, and all his goods and chattels: and in this latter caſe, the law interprets his abſence a ſufficient evidence of his guilt, and without requiring farther proof, accounts him guilty of the fact, on which enſues corruption of blood, &c. And then according to Bracton, he may periſh without law, &c.

But now, to avoid ſuch inhumanity, it is holden that no man is intitled to kill him wantonly or wilfully; but in ſo doing he is guilty of murder, unleſs it happens in the endeavour to apprehend him: for any perſon may arreſt an outlaw, either of his own head, or by writ or warrant of CAPIAS *utlagatum*, in order to bring him to execution. But ſuch *outlawry* may be frequently reverſed by writ of error; the proceeding therein being very nice and circumſtantial; and if any ſingle minute point be omitted or miſconducted, the whole *outlawry* is illegal, and may be reverſed: upon which reverſal, the party accuſed is admitted to plead to, and defend himſelf againſt the indictment.

If after *outlawry*, in civil caſes, the defendant appears publicly, he may be arreſted by a writ of *capias utlagatum*, and committed till the *outlawry* be reverſed: which reverſal may be had by the defendant's appearing perſonally in court, (and in the king's bench without any perſonal appearance, ſo that he appears by attorney, according to ſtatute 4 and 5 W. and M. cap. 18.) and any plauſible cauſe, however ſlight, will in general be ſufficient to reverſe it; it being conſidered only as a proceſs to compel appearance. But then the defendant muſt pay full coſts, and put the plaintiff in the ſame condition, as if he had appeared before the writ of *exigi facias* was awarded. It is ordained by *Magna Charta*, that no freeman ſhall be outlawed, but according to the law of the land.

A minor, or a woman, cannot be *outlawed*. A woman is faid to be *outwed*, when a man is *outlawed*. See WAIVE.

OUTLAWRIES, *clerk of the*. See CLERK.

OUTLICKER, or OUTLIGGER, in a *Ship*, a ſmall piece of timber, three or four yards long, as occaſion ſerves, made faſt to the top of the poop, and ſtanding right out a-ſtern: at the uttermoſt end of it is a hole, into which the ſtanding part of the ſheet is received, and made faſt through the block of the ſheet; and then again received through another block, which is ſeized to this *outlicker*, hard by the end of it. This is ſeldom uſed in men of war, or in great ſhips; and whenever it is made uſe of, it is becauſe the mizen-maſt is placed ſo far aft, that there is not room enough within board to hale the ſheet flat.

Outligger ſeems the true orthography of the word, which appears to be derived from the Dutch *uitlegger*, q. d. *outlier*.

OUTNESS, is uſed by ſome for that relation of things by which one appears out of, or at a diſtance from another. Dr. Berkeley, in his Eſſay on Viſion, makes uſe of the word *outneſs*; and obſerves, that we form no notion of *outneſs* from the ſenſe of ſeeing merely, but only from motion.

OUT *of trim*, in *Sea Language*, the ſtate of a ſhip when ſhe is not properly balanced for the purpoſes of navigation; which is either occaſioned by the ſize or poſition of her maſts and ſails; or by the comparative quantity or arrangement of her cargo and ballaſt in the hold.

OUT-PARTERS, in our *Ancient Writers*, were a ſort of thieves, or highwaymen, on the frontiers of Scotland, who rode about to fetch in ſuch things as they could lay hold on.

OUT-POSTS, in a military ſenſe, a body of men poſted beyond the grand-guard, and ſo called, as being without the rounds or limits of the camp.

OUT-RIDERS are bailiffs errant, employed by ſheriffs, or their deputies, to ſummon people in the remoteſt parts of their hundreds, to the county or hundred courts.

OUT-RIGGER, in a *Ship*, a ſtrong beam of timber, of which there are ſeveral fixed on the ſide of a ſhip, and projecting from it, in order to ſecure the maſts in the act of CAREENING. The outer ends of theſe beams are firmly laſhed to a bolt in the ſhip's ſide beneath, by which they are enabled to ſupport the maſt, by counteracting the ſtrain it ſuffers from the effort of the careening tackles; which, being applied in the maſt-head, draws it downwards, ſo as to act upon the veſſel with the power of a lever, whoſe fulcrum is in her centre of gravity.

OUT-RIGGER is alſo a ſmall boom, occaſionally uſed in the tops, to thruſt out the breaſt back-ſtays to windward, in order to increaſe their tenſion, and thereby give additional ſecurity to the top-maſt. This boom is uſually furniſhed with a tackle at its inner end, communicating with one of the top-maſt-ſhrouds, and has a notch on the outer end to contain the back-ſtay, and keep it ſteady therein. As ſoon as the back-ſtay is drawn tight, by means of its tackle in the chains, the *outrigger* is applied aloft, which forces it out to windward, beyond the circle of the top, ſo as to increaſe the angle which the maſt makes with the back-ſtay, and accordingly enable the latter the better to ſupport the former. This machine is ſometimes applied without any tackle: it is then thruſt out to its uſual diſtance beyond the top-rim, where it is ſecurely faſtened: after which the back-ſtay is placed in the notch, and extended below. Falconer.

OUTWARD *ſtanking angles*. See ANGLE.

OUT-WORKS, in *Fortification*, all thoſe works made without-ſide the ditch of a fortified place, to cover and defend it. See FORTIFICATION *according to M. Vauban's method*.

Out-works, called alſo *advanced* and *detached works*, are thoſe which not only ſerve to cover the body of the place, but alſo to keep the enemy at a diſtance, and prevent their taking advantage of the cavities and elevations uſually found in the places about the counterſcarp; which might ſerve them either as lodgments, or as rideaux, to facilitate the carrying on their trenches, and planting their batteries againſt the place. Such are ravelins, tenailles, horn-works, queue d'arondes, envelopes, crown-works. The moſt uſual of theſe are ravelins, or half-moons, formed between the two baſtions, on the flanquant angle of the counterſcarp, and before the curtain, to cover the gates and bridges.

OUVERTURE. See OVERTURE.

OVUM *anguinum*, a name given by many authors to a foſſil, ſuppoſed by the vulgar to be the petrified egg of a ſerpent, but being really, like the brontiæ and ombriæ, ſpecies of the ECHINITES.

This ſome have ſuppoſed to be a head of glaſs, uſed by the Druids, to impoſe upon the vulgar, whom they taught to believe, that the poſſeſſor would be fortunate in all his attempts, and that it would give him the favour of the great.

OVUM *philoſophicum*, or *chymicum*, is a glaſs body of an oval form, reſembling an egg; uſed for the ſublimation of mercury.

OVUM *polypi*, in *Natural Hiſtory*, a name given by ſome of the earlier writers to the papyraceous or thin-ſhelled nautilus. The reſemblance of the body and arms of the fiſh which inhabits this ſhell, with thoſe of the ſea-polypus, gave occaſion to their ſuppoſing this creature the ſame animal, not yet got out of the egg. The ſhell of this ſpecies being very thin, and looking like an egg-ſhell, gave further countenance to this error in leſs knowing ages.

OVUM *Rumphii*, in *Natural Hiſtory*, the name of a ſpecies of *porcelain ſhell*, of the oblong kind, called an egg, from its ſhape, by that author. See PORCELAIN *ſhell*.

OUZELL, or *brook* OUZELL, in *Ornithology*, an Engliſh name for the *rallus aquaticus*, more uſually called the *water* RAIL.

OUZELL, or *ring* OUZELL, an Engliſh name for a bird of the *merula* or *blackbird* kind, the TURDUS *torquatus* of Linnæus, remarkable for a white ring about its neck, and thence called by authors *merula torquata*; it is more commonly called in Engliſh, the *ring ouzell*. See AMZELL, and *Tab.* III. *of Birds*, N° 30.

OUZELL, *roſe-coloured*, the TURDUS *roſeus* of Linnæus; is in ſize equal to that of a ſtare; the bill at the point is black, but at the baſe of a dirty fleſh-colour; the head is adorned with a creſt hanging backwards; the head, creſt, neck, wings, and tail, are black, gloſſed with a changeable blue, purple, and green; the breaſt, belly, back, and leſſer coverts of the wings are of a roſe colour, mixed with a few ſpots of black; the legs of a dirty orange-colour. This bird is found in Lapland, Italy, and Syria. About Aleppo, it is called the locuſt-bird. See *Tab.* IV. *Birds*, N° 40.

OUZEL, or *water* OUZEL, the Engliſh name of the *merula aquatica*, or TURNUS *aquaticus* of Linnæus. It is about the ſize of the common black-bird, but has a ſhorter body, and a thicker neck; it beak is ſtraight, ſharp, and black, and its head, and the upper part of its neck, are of a browniſh black; its back and wings are variegated with black and grey; its throat and breaſt are of a ſnow-white; but the belly toward the tail is black; its tail is ſhort, and it is very thick-feathered, as are in general all the water-birds. It frequents waters, and is very common in many parts of Germany, nor much leſs ſo in the northern counties of England. It feeds on fiſh, and ſometimes on inſects, and though not a web-footed fowl, will ſometimes dive under water after its prey.

OWELTY, or OVELTY *of ſervices*, in our *Law Books*, an equality of ſervices; as when the tenant paravail owes as much to the meſne, as the meſne does to the lord paramount.

OWL, *ſtrix*, in the Linnæan ſyſtem of *Ornithology*, a diſtinct genus of birds of the hawk-kind, the diſtinguiſhing characters of which are, that the head is large and round; the bill ſtrong and hooked, without cere; the noſtrils are covered with briſtly feathers; the eyes and ears are large, and the tongue bifid. Linnæus reckons twelve ſpecies.

Thoſe moſt known in our country are the following, viz.

OWL, *brown* or *ivy*, the *ſtrix ſtridula* of Linnæus. This is diſtinguiſhed from the other ſpecies of the *owl* kind by theſe characters: its beak is of a pale horn-colour, and ſhort, but the opening of its mouth is very wide; its eyes are remarkably large and protuberant, nearer to its ears than in any other animal, and the apertures of its ears are very large and covered with a membrane; the colour of the back, head, coverts of the wings, and ſcapular feathers is of a fine tawny red, elegantly ſpotted and powdered with duſky ſpots of various ſizes; on the coverts of the wings, and on the ſcapulars are ſeveral large white ſpots; the coverts of the tail are tawny, without any marks; the tail is barred and ſpotted with pale red and black; the breaſt and belly are yelloviſh mixed with white, and marked with narrow black ſtrokes pointing downwards; and the legs are covered with feathers down to the toes. This is what we call the *ſcreech-owl*; to which the folly of ſuperſtition had given the power of preſaging death by its cries.

Mr. Pennant calls this ſpecies the *tawny owl*; and he has given the appellation of *brown owl* to the *ſtrix ulula* of Linnæus, which agrees with the former in its marks, and differs only in colour. In this the head, wings, and back, are of a deep brown, ſpotted with black like the other; the coverts of the wings and the ſcapulars are adorned with ſimilar white ſpots; the exterior edges of the four firſt quill-feathers in both are ſerrated; the breaſt in this of a very pale aſh-colour, mixed with tawny, and

marked with oblong jagged ſpots; the feet are feathered down to the claws: and the circle round the face is aſh-coloured ſpotted with brown. Both theſe ſpecies inhabit woods, where they reſide the whole day; in the night they are very clamorous, make havock among pigeons, leverets, and moles, breed in hollow trees, or ruined edifices, and lay four eggs of an elliptic form and whitiſh colour. Pennant.

OWL, *churn*, the *caprimulgus Europæus* of Linnæus, is a moderately large *owl*; its head is not ſo large in proportion to the body as in the other *owls*; its beak is black, and very ſhort; its mouth extremely wide, and irides hazel; the plumage has a beautiful mixture of black, white, aſh-colour, and ferruginous, diſpoſed in lines, bars, and ſpots; the male is diſtinguiſhed from the female by a great oval white ſpot near the end of the three firſt quill-feathers, and another on the outermoſt feathers of the tail; the plumage is alſo more ferruginous; the legs are ſhort, ſcaly, and feathered below the knee; and the middle toe is connected with thoſe on each ſide by a ſmall membrane as far as the firſt joint; and the claw of the middle toe is thin, broad, and ſerrated. This bird makes a ſhort ſtay with us; appears in the latter end of May, and diſappears from the northern parts of our iſland in the latter end of Auguſt, but ſtays in the ſouthern parts above a month later. It is called *goat-ſucker* from a vulgar opinion that it ſucks the teats of goats; an error delivered down from the days of Ariſtotle. Its notes are very ſingular; the loudeſt reſembles that of a large ſpinning-wheel; and the other is a ſharp ſqueak, which it often repeats, and ſeems to be a note of love. Pennant.

OWL, *eagle*, *ſtrix bubo* of Linnæus, is in ſize almoſt equal to an eagle; the irides are bright yellow; the head and whole body are finely varied with lines and ſpots of black, brown, cinereous, and ferruginous: the wings are long, the tail ſhort and marked with duſky bars; the legs are thick, and covered to the ends of the toes with a cloſe and full down of a teſtaceous colour; and the claws are large, hooked, and duſky. This ſpecies inhabits inacceſſible rocks and deſert places, and preys on hares and feathered game. Its appearance in cities was deemed an unlucky omen, and it was thought by the ancients to be, like the ſcreech *owl*, the meſſenger of death. Pennant.

OWL, *grey*. See *Brown* OWL, above.

OWL, *horn*, or *long-eared* OWL, *ſtrix otus* of Linnæus, is the name of a ſpecies diſtinguiſhed by two cluſters of feathers ſtanding up over its ears, and reſembling horns: it is alſo called *noctua aurita*. The irides of this ſpecies are of a bright yellow, the bill black; the circle of feathers ſurrounding the eyes is white tipt with reddiſh and duſky ſpots, and the part next the bill black; the breaſt and belly are of a dull yellow, marked with ſlender brown ſtrokes pointing downwards; the thighs and vent-feathers are of the ſame colour, without ſpots; the back and coverts of the wings are varied with deep brown and yellow; the quill-feathers of the ſame colour, having a broad bar of red near the ends of the outermoſt; the tail is marked with duſky and reddiſh bars, but beneath appears aſh-coloured; the horns or ears are about an inch long, and conſiſt of ſix feathers variegated with yellow and black; and the feet are feathered down to the claws. Pennant. See *Tab.* IV. *Birds*, N° 41, and HORN-*coot*.

Mr. Pennant has alſo deſcribed a *ſhort-eared owl*, with ſmall horns conſiſting only of a ſingle feather, with long wings. It is a bird of paſſage, and has been obſerved to viſit Lincolnſhire, in the beginning of October, and to retire early in the ſpring; and therefore, as it performs its migrations with the woodcock, its ſummer retreat is Norway. In the day time it lies hid in long old graſs; and the farmers are fond of ſeeing theſe birds in the fields, as they clear them from mice.

OWL, *little*, *ſtrix paſſerina* of Linnæus, is an elegant ſpecies, ſcarcely exceeding a thruſh in ſize, though the falneſs of its plumage makes it appear larger. The irides are of a light yellow colour; the bill of a paper colour; the feathers that encircle the face are white tipped with black; the head brown ſpotted with white; the back and coverts of the wings of a deep olive brown, the latter ſpotted with white; on the breaſt is a mixture of white and brown; the belly is white, marked with a few brown ſpots; the tail of the ſame colour with the back, in each feather barred with white, and adorned with circular white ſpots; the legs and feet are covered with feathers down to the claws.

The Italians made uſe of this *owl* to decoy ſmall birds to the limed twig. Pennant.

OWL, *white*, or *common barn* or *church* OWL, the *ſtrix flammea* of Linnæus, and the *aluco minor* of Aldrovandus, is a domeſtic ſpecies, inhabiting barns and outhouſes; and very uſeful in clearing thoſe places from mice: at twilight it viſits the fields, and ſkims along the ground in ſearch of field-mice; and in the breeding ſeaſon reſorts to the caves of churches, holes in loſty buildings or hollows of trees.

This ſpecies, Mr. Pennant apprehends, does not hoot, but ſnores and hiſſes in a violent manner; and while it flies along will often ſcream moſt tremendouſly.—A circle of ſoft white feathers ſurrounds the eyes of this bird; the upper part of the body, the coverts, and ſecondary feathers of the wings are of a fine pale yellow; on each ſide the ſhaft are two grey and two white ſpots, placed alternately; the exterior ſides of the quill-feathers are yellow; the interior white, marked on each ſide with four black ſpots; the lower ſide of the body is wholly white; the interior ſides of the feathers of the tail are white; the exterior marked with obſcure duſky bars; the legs are feathered to the feet; the feet covered with ſhort hairs; and the edge of the middle claw ſerrated. Pennant.

OWL *fiſh*, or *ſea* OWL, in *Ichthyography*, an Engliſh name for the *lumpus*, more frequently called the LUMP-*fiſh*; and by the Scotch the *cock-paddle*.

OWL *pigeon*, the name of a particular ſpecies of *pigeon*, called by Moore the *columba bubo nominata*. It is a ſmall and ſhort-bodied pigeon: it has a ſhort round head, and has a ſeries of feathers that ſeparate and open two ways upon the breaſt: but its moſt remarkable character is its beak, the upper chop of which is bent, and hooked over like an owl's: this is the occaſion of its name. It is of various colours, as white, blue, or black, but is always of one colour, never pied.

OWLER, a maſter of a ſhip, or other perſon, who conveys wool, or other prohibited goods, in the night, to the ſea-ſide, in order to ſhip them off contrary to law.

The name is derived hence, that like owls they only ſtir abroad in the night-time.

OWSE, among tanners, is oaken bark, beaten or ground ſmall, to ſerve in the preparation of leather.

OX, *bos*, in *Zoology*. See BOS and BULL.

The *ox* is a very ſerviceable animal, in many reſpects; but his nature depends wholly on that of the bull and cow, from which he is bred. Derbyſhire and Lancaſhire are ſaid to have the beſt *oxen* in England. Wales and the iſland of Angleſea afford a kind that are very valuable to the farmers, as they will fatten upon middling land; and the Scotch *oxen* are yet hardier than theſe. The long-legged ſhort-horned cow, of the Dutch breed, is the beſt for milk; but then this kind needs to be very carefully kept. This ſort of cow will often yield two gallons of milk at a time.

The largeſt *oxen* are to be choſen for work, and for feeding, but then it muſt be where there is land rich enough to maintain them. When they are to draw, care muſt be taken to match them well, both for height and ſtrength; for if one be ſtronger than the other, the weakeſt will ſoon be deſtroyed. They *muſt never* be driven beyond their natural pace, for the beating of them throws them into ſurfeits, and many other diſeaſes. The time of putting *oxen* to work is at three years old; they muſt be worked gently the firſt year, eſpecially in hot weather, and fed with a large quantity of hay: this will enable them to bear their labour better than graſs; and they ſhould be always kept in a middle ſtate, neither too fat nor too lean. They may be worked till they are ten or twelve years old, and then ſold.

It is obſerved, that meat and fair treatment ſucceed much better with this animal than blows. The beſt way to break a young one to the yoke is to put him to it with an old tame *ox* of about his own height and ſtrength. If he prove unruly after this, he muſt be kept hungry, and made to feed out of the driver's hand. *Oxen* are much more profitable to keep than horſes, there being no loſs in them; and an old wrought *ox* fattening as well as a young one, and being as good meat. Their keeping alſo is cheaper, for they eat no oats: their harneſs and their ſhoes alſo are conſiderably cheaper, and they are not ſo ſubject to diſeaſes. They muſt always indeed have good graſs and good hay, and they are not ſo ſerviceable as horſes, when there is much working in carts, and where the ways are good; but for winter plowing, where the ground is heavy, an *ox* will do as much work as a horſe.

Every farmer, who can keep two teams, would do wiſely to have one of them of horſes, and the other of *oxen*; it is much better to yoke them together by the necks and breaſts, than by the horns as ſome do; and where a man keeps an *ox* team, he ſhould raiſe two *oxen* and two cow calves every year, to keep up his ſtock; for it is better for a farmer, in all neceſſary things, to be a ſeller than a buyer. Chalky lands ſpoil the feet of *oxen* more than any other.

Stealing OXEN, or creatures of the *ox* kind, old or young, whether

whether bull, cow, &c. ſtrictly ſo called, ſteer, bullock, heifer, or calf, is now felony without benefit of clergy; as is likewiſe killing any of theſe, with an intent to ſteal any part of their carcaſes. Stat. 15 & 16 Geo. II. cap. 34. and Stat. 14 Geo. II. cap. 6. See CATTLE.

OXEN, *diſeaſes of*. As ſcarce any creature is more uſeful to man than the *ox* kind, nothing is more worthy conſideration than the nature and origin of their diſeaſes, and the remedies for them. The ſame diſtemper that has of late years carried off ſuch vaſt numbers of theſe cattle, with us and elſewhere, has at other times raged in Italy. In the year 1710, and the ſucceeding one, there was a great mortality amongſt the horned cattle there, and the occaſion of it was evidently the unnatural ſeaſon preceding. The whole autumn before had been wet, and at the time of the winter ſolſtice there were continual cold winds, and ſmall but laſting rains. The ſpring that ſucceeded was alſo cold and rainy, and the defect of heat and abundance of moiſture made a change in the whole face of nature: the medicinal ſprings had not their wonted effect; and the fruits of the earth could not appear at their proper ſeaſons, nor in their due perfection. The graſs was injured by this, and the ground rendered continually damp and unwholeſome; and to this was evidently owing the malignant and contagious diſeaſe that raged among the cattle afterwards. It was ſuppoſed at that time with them, as of late with us and elſewhere, that the contagion was brought in among their *oxen* by ſtrange cattle coming from infected places: but this proved to be an error; for if an *ox* was removed to ever ſo diſtant a paſture, he never eſcaped the better for it: the whole earth and its productions were vitiated throughout the country, and there was no ſafety in any part of it. Michelotti de Morbis Boum.

The uſe of this obſervation muſt be, the keeping the cattle in ſucceeding years out of the way of thoſe things which occaſion their ſickneſs in ſuch as theſe. If the autumn or winter be extremely cold and wet, remove the cattle out of the low grounds, and put them to feed in ſandy dry ſoils on the high grounds; give them water from ſuch places where the ſun has moſt power, and it is leſs chilling cold than in others; and in caſes of imminent danger, always mix ſome ſalt in it. If the bad weather continues, let them always have clean ſtraw to lie on, and a dry covering; and in caſes where the contagion is already begun, the fumigating of the houſes where they are kept with bay leaves and cleutherian bark, is judged convenient. As to remedies, when they are once ſeized with the diſtemper, it is hard to underſtand what intention to preſcribe in, and how to aſcertain the doſes; and as the late practice, in attempting to cure, has been of very little ſervice, the cautions for the preſerving and preventing the diſeaſe, ought to be redoubled, to prevent an almoſt incurable misfortune.

The diſeaſes of *oxen* are much leſs frequent than thoſe of the human ſpecies; but wherever they appear, they uſually become more violent after a time, and generally are very contagious. In Italy, in the year 1711, there appeared a diſeaſe among the *oxen*, which carried off as great numbers as the diſtemper among us has done. Some acrid and cauſtic ſalts in the blood ſeem to have been one of the principal cauſes of this diſeaſe; as when the blood was let out at the ear of the dying cattle, and fell upon the ground, there were always found, as it dried up, certain concretions of ſalts, ſparkling like ſo many cryſtals.

In many of the creatures which were opened, after dying with this diſeaſe, the inſides of the ſtomach and inteſtines were found covered with tubercles like the puſtules of the ſmall-pox: the common people ſuppoſed this the cauſe of the diſeaſe; but upon farther enquiry, it appeared only one of the effects of it; for ſuch beaſts as died very ſuddenly, of this diſeaſe, when opened, had their inteſtines ſound: ſo that theſe puſtules on their ſurface appear to have been only a ſymptom of the diſeaſe in a very advanced ſtage. All medicines were found vain in this diſeaſe; and ſuch of the creatures as recovered had always puſtules of this kind on their ſkin, which ouzed out a bloody ichor.

From the whole it appears, that this diſeaſe was an acute fever in theſe creatures, of a malignant kind; and that the texture of the blood was always broke in it; and that its cauſe was to be attributed to various ſalts, taken in from the air, or in eating and drinking. Many had called it a plague among the cattle, but it appeared rather what we underſtand by the name of a contagious peſtilential fever, than an abſolute plague; and a peculiarly humid ſeaſon, joined with exhalations of mineral ſubſtances out of the earth, for ſome reaſon which we cannot comprehend, more frequent than uſual, brought it upon theſe creatures, whoſe noſes being continually near the ground, gave theſe exhalations immediate entrance.

The method of cure ſeems to conſiſt in two intentions; the firſt of abating the fever; the ſecond of reſtraining the acrimonious malignity of the ſalts.

Purges of all kinds are cautiouſly to be avoided; and bleeding in the beginning is always neceſſary, and muſt be more largely admitted in the more robuſt creatures. The common medicines given, as febrifuges and cephalics, all do harm; the fumigations of divers kinds all are idle or miſchievous; the moſt of theſe things intended as reliefs tend plainly to the increaſing of the diſeaſe, as they add to the accelerated motion of the blood, and break its texture more than before. The moſt rational method of treatment is this.

As ſoon as a beaſt is ſeen to be affected, let him be ſeparated from the reſt and kept warm. When his mouth begins to be ſore, let a clyſter be given; and if this does not work, then a gentle emollient may be given by the mouth, made of lenitive electary and cream of tartar, diſſolved in a large quantity of water-gruel; this is the more neceſſary if the creature be fat: if a lean beaſt be ſeized, bleeding is the firſt thing to be done; after this a ſeton muſt be made in the neck, and the parts about where the vein was opened ſhould be ſcarified. If the fever does not abate on theſe methods, the creature ſhould be blooded again: then, inſtead of the great quantities of watery liquors, which are uſually given, the creature ſhould have ſomething ſtrong, ſuch as a mixture of wine, with its liquor, and that in conſiderable quantity.—When the fever abates, he is to be allowed but little drink for the three firſt days, and that ſhould be a decoction of mallows, with a mixture of lemon juice, or ſome other ſuch acid. In caſes where the ſeton does not diſcharge kindly, a biſter muſt be applied over it. When by this means the creature begins to recover, elm leaves and olive leaves are to be mixed with the hay it eats; the creature muſt be walked out a little, and its litter changed for freſh: this ſhould be done every day, in caſes where the creature is weak and poor.

For the preſervation of cattle from the diſeaſe, nothing is ſo proper as the taking great care that they drink only clean and pure water, and that they eat only dry food till ſome hours after ſun-riſe: they muſt be carefully kept out of infected places, and their ſtables fumigated, by burning in them frankincenſe, juniper berries, and the like ingredients; or by firing off ſmall quantities of gun-powder at ſeveral times, or ſprinkling vinegar and camphor on a red-hot iron. The creatures mouths ſhould be waſhed at times with lemon-juice, and their ears with vinegar or urine; and no hogs, ſheep, or other animals ſhould be ſuffered to feed among them. Gazola de Peſte Boum.

Theſe were the ſentiments of Gazola on this fatal diſeaſe, which he had carefully attended to in all its ſtages. Lanciſi, however, diſſents from this author in ſome particulars. He ſays, that the diſtemper was a true plague among the cattle; and obſerves, that this very plague among the *oxen* was well known among the ancients. It was firſt brought into Italy from Hungary, and infected the cattle by the breath, by the pores of the ſkin, or by any other paſſage that it found open. He preſcribes for the preſervation, the taking great care that they have perfectly good food and drink; and adviſes the waſhing their mouth and noſtrils with a mixture of vinegar, garlic, ſulphur, ſalt, and juniper berries; and both he and Gazola agree in adviſing the rubbing the creatures over with ſweet oil. This author condemns all medicines and even bleeding, but greatly recommends ſetons, cauteries, and biſters. He adviſes theſe to be uſed as ſoon as ever the creature is perceived to be ſick, and that not only on the neck, but on the ſhoulders, the hips, and any other part. Lanciſi, ap. Acta Eruditor. Ann. 1715.

Franciſcus Fantaſti publiſhed a treatiſe on the ſame ſubject, about the ſame time; and by his writings it appears that the *oxen* were ſeized differently, and affected with different ſymptoms in different places, though the cauſe of the diſtemper was evidently the ſame in them all.

Some of the cattle, he obſerved, voided great quantities of blood by the urinary paſſages. Theſe uſually died, and on opening them the blood was always found fluid, and the brain was often decayed, or full of a fœtid matter; and the marrow in their bones was found dried up and waſted, and all the humours were found evidently tending to a ſtate of corruption.

This author rejects bleeding in all periods of the diſeaſe, as a practice that could be of no uſe in a caſe where the blood and humours had all loſt their due ſtate, and were tending to corruption. He recommends fcarification and cauteries; he alſo greatly recommends the trepanning the horns to the medullary part, and the making ſetons in the ears, on their necks, and in their breaſts: the only internal medicine he preſcribes is a mixture of the theriaca diateſſaron, two ounces; diaſcordium,

ſcordium, one ounce; powder of Peruvian bark, two ounces. This doſe is to be given every day, for three ſucceſſive days, diſſolved in three pints of the juice of brook-lime, water-creſs, and ſcurvy-graſs, with the addition of a pint of ſtrong white wine.

John Baptiſt Mazzini wrote in another part of the world, at the ſame time, on the ſame ſubject; with him we find, that the *even*, which were ſeized with the diſeaſe, continually had a running of a mucous matter from their noſe, and a weeping at the eyes; and that when the corners of theſe creatures eyes were waſhed with wine, in which ſage leaves had been infuſed, there came out ſeveral cluſters of ſmall and ſlender worms twiſted one among another, and forming little bundles of twenty and more. He obſerves alſo, that theſe creatures, when affected, uſually carried their heads upward, not bending to the earth as uſual. This author adviſes every thing to be done to promote perſpiration: he preſcribes contrayerva and angelica root, in white wine, in large doſes once or twice a day, warm; and recommends the fumigating their ſtalls with juniper and bay berries. The waſhing of their mouths and noſtrils with wine and ſulphur is alſo preſcribed in his treatiſe: a decoction of roſemary, fennel, and ſage, with white wine vinegar and ſalt, is alſo recommended as a drink to be often given; and he preſcribes the holding their heads forcibly in a depending poſture, that they may give opportunity to the ſaliva to run out, and the waſhing of their mouths with vinegar and ſalt to cleanſe it of the foulneſs. Mazzini, Litter. ad Vallifnier. de Peſte Boum.

Ox-*eye*, *buphthalmum*, in *Botany*, a genus of the *ſyngeneſia polygamia ſuperflua* claſs. Its characters are theſe: it hath a compound radiated flower, compoſed of hermaphrodite and female florets, and the hermaphrodite flowers compoſe the diſk and are funnel-ſhaped; in the center is ſituated an oval compreſſed germen, which becomes an oblong ſeed; the female florets which compoſe the rays are ſtretched out on one ſide like a tongue, and are indented at the top in three parts; theſe have no ſtamina, but a double-headed germen, which becomes a ſingle compreſſed ſeed, cut on each ſide. There are nine ſpecies.

An infuſion of the flowers of this plant is ſaid to be an excellent diuretic, and the leaves are eſteemed vulnerary; but neither are now in uſe.

Ox-*eye*, in the *Sea Language*, a name given by the ſeamen to thoſe dreadful ſtorms that are ſometimes met with on the coaſt of Guinea; for at firſt it appears in the form of an *ox's* eye, and not much bigger; but it deſcends with ſuch celerity, that in a very little ſpace of time, and often before they can prepare themſelves for it, it ſeems to them to overſpread the whole hemiſphere; and at the ſame time forces the air with ſo much violence, that the ſhips are ſometimes ſcattered ſeveral ways, ſome directly contrary, and ſometimes are ſunk downright.

Ox-*eye*, *certhia*, in *Ornithology*. See CREEPER.

Ox-*eye*, or *great titmouſe*. See FRINGILLAGO.

Ox-*eye*, in *Optics*. See SCIOPTIC and CAMERA *obſcura*.

Ox-*eye daiſy*. See *Corn* MARYGOLD.

Ox-*fly*, in *Natural Hiſtory*, a ſpecies of two-winged fly, bred from a fly-worm, hatched under the ſkin of oxen, from the egg of the parent fly lodged there.

The female of this fly makes a number of ſmall wounds in the backs of the horned cattle, and in each of theſe depoſits an egg; which is afterwards hatched by the warmth of the creature's body. As ſoon as hatched, the young worm finds itſelf in a very convenient lodging, and in a way to be furniſhed with all the neceſſaries of life.

The places where they lie are eaſily diſcovered, as there is ever a tumor about them, like that on the foreheads of children from falls; within this, and under the thick ſkin of the creature, is the worm lodged. The country-people know very well that a worm is contained within each of theſe tumors, but they are ſomething miſtaken as to the fly it comes from; the gad-fly being the moſt buſy about theſe creatures, and giving them moſt vexation, they naturally enough have ſuppoſed this the produce of the egg of that fly; but this is an erroneous opinion: Mr. Vallifnieri ſeems the firſt who underſtood the true ſtate of the caſe, and he has given a very full and excellent account of it.

Theſe worms may be properly enough ſtyled the inhabitants of animal galls, ſince the tumors which contain them are truly analogous to the galls of the oak and other the like vegetable excreſcences.

The hole in theſe tumors is not only uſeful to the animal for a breathing place, but it has another not leſs neceſſary uſe; which is to let off a quantity of abundant matter formed in the tumor, which would, if confined there, occaſion a large abſceſs, and choak and deſtroy the animal.

If theſe worms were endued with the qualities of thoſe of the common fleſh-fly, and had hooks at their head-part to tear and pull the fleſh in pieces, the creature who had thirty or forty of theſe gnawing devourers in its back, preying upon its fleſh at once, would be in a very miſerable ſtate: but this is by no means the caſe, the creatures having no organs to tear its fleſh with, they only live on the matter found in the abſceſs, and give the creature no great pain; being only like ſo many tents kept in a wound neceſſary to be preſerved open, or ſo many peas in iſſues.

The worms may at any time be diſlodged from theſe tumors, by a moderate preſſure, and made to come out at the hole of the tumor. This, though it appear conſiderably too little, yet anſwers the purpoſe; as the body of the worm will enough bears preſſure, and it is only neceſſary, in order to get them out whole, to renew the force upon the tumor, for the puſhing out every ſeparate ring of its body.

As ſoon as it is out of its habitation, it falls to the earth, where it crawls ſlowly about till it finds a place where it may reſt to go through its ſeveral changes, under a ſtone, or in any quiet place.

Stags and ſome other animals are ſubject to theſe worms in the ſame manner as oxen, and the ſeveral ſtages they go through in the tumors on theſe animals are the ſame with thoſe of the ox.

When they have fixed upon a place to reſt in for their changes, they loſe all motion, and their ſkin becomes black and hard, and makes a ſhell for their remaining in through their ſucceeding changes.

When the time of the egreſs of the fly is come, it appears a two-winged one indeed, but ſo extremely like the humble-bees of a middling ſize, that it is not eaſily to be diſtinguiſhed for what it is: one humble-bee cannot be more like another than theſe flies are to that ſpecies of them; their bodies are as ſhort, all of the ſame colours, and are even more hairy.

This fly, cloſely examined, appears to be of the ſecond claſs, and to have a mouth without teeth or lips, and its mouth very ſmall; the antennæ are ſhort, rounded at their ends, and of a gloſſy hue; the reticular eyes are of a deep cheſnut colour.

The female has, in the under and hinder part of her body, a cylindric tube, which ſhe can thruſt out at pleaſure, and which is the inſtrument with which ſhe pierces the ſkin of the animal to depoſit her egg. Reaumur Hiſt. Inſect. vol. iv. p. 503, ſeq. to 537.

Ox-*lip*. See PRIMROSE.

Ox-*tongue*. See PICRIS.

OXGANG, or OXGATE *of land*, is ordinarily taken, in our old law-books, for fifteen acres; being as much land as it is ſuppoſed one ox can plow in a year.

Bovata terræ, q. d. quantum ſufficit ad iter vel actum unius bovis.

In Lincolnſhire they ſtill corruptly call it *oxkin* of land. This term is uſed in Scotland for a portion of arable land, containing thirteen acres.

OXALIS, in *Botany*. See *Wood* SORREL.

OXALME, in the *Materia Medica of the Ancients*, the name of a compoſition of vinegar and brine, made by a ſolution of ſea-ſalt in water. This was uſed externally in ulcers, and ſuppoſed of great ſervice againſt the bites of venomous animals, and for the curing children's ſcabby heads. It was alſo uſed as a ſtyptic poured into wounds, and was ſometimes given warm in clyſters; but theſe were always followed by thoſe of milk.

OXELÆUM, a word uſed by many authors to expreſs a mixture of vinegar and oil, for outward application, in caſes of bruiſes, and other injuries.

OXUCLÆ, in *Natural Hiſtory*, the name of a genus of foſſils of the claſs of the *ſelenitæ*, but of the columnar, not the rhomboidal kind.

The word is derived from the Greek ὀξυς, *ſharp*, and κλαν, a *column*; and expreſſes a body of a columnar form, and pointed or ſharp at the ends.

The *ſelenitæ* of this genus conſiſt of ſix equal planes, having their top or bottom no broader or more depreſſed than the others; and in this differing from the *iſchnomhlaces*, or flatted columnar *ſelenitæ*, as they do from the *iſamblaces* or *cryſtalliform*, but broken-ended ones, by having their ends naturally tapering off to a point. See *Tab. of Foſſils, Claſs* 2.

The bodies of this genus, like thoſe of the other genera of the columnar *ſelenitæ*, are liable to a longitudinal crack in their middle; and this ſometimes includes a little clay, in form of an ear of graſs. See SELENITÆ.

Of this genus there are only two known ſpecies.

OXYA, in *Botany*, a name by which many authors, eſpecially the Greeks, have called the *fagus* or *beech-tree*.

OXYBLATTA, among the *Ancients*, is uſed to denote a bright and gloſſy kind of purple colour.

OXYCEDRUS, in *Botany*, a name given by ſome authors

to the *cedrus folio cupreſſi*, or the *berry-bearing cedar*. Chabræus, p. 72.

OXYCOCCUS, in *Botany*. See WHORTLE-*berry*.

OXYCRATE, *oxycratum*, ὀξυκρατον, formed of ὀξυς, *ſharp, ſour*, and κρασις, *I mix*, in *Pharmacy*, &c. a mixture of water and vinegar.

The uſual proportion is one ſpoonful of vinegar to five or ſix of water.

Oxycrate is proper to aſſuage, cool, and refreſh. They make fomentations of *oxycrate*, clyſters of *oxycrate*, &c.

OXYCROCEUM, formed from ὀξυς, *ſharp, ſour*, and κροκος, *ſaffron*, in *Pharmacy*, a preparation much uſed in plaſters for fractures, and to form callules: compoſed chiefly of ſaffron, with gums diſſolved in vinegar.

OXYGALA, ὀξυγαλα, formed from ὀξυς, *ſharp, ſour*, and γαλα, *milk*, ſour milk.

The Turks uſe this as a popular drink, and call it *igur*. Vigenere ſays, they drink ſour milk diluted with water; which is found to cool and nouriſh better than the milk alone.

OXYGARUM, a word uſed by the ancients to expreſs a mixture of vinegar and GARUM, which is a pickle for preſerving fiſh, or a ſimple mixture of ſea-ſalt and water.

OXYGLUCA, a word uſed by the ancients to expreſs a liquor made of a mixture of honey, water, and vinegar. The common way of making it was by macerating the combs, after the honey was preſſed out, in water; and then adding a ſmall portion of vinegar, to give it a tartneſs. It was ſometimes made without the addition of the acid, and made a weaker ſort of mead, uſed as a common drink in hot weather. Galen ſays it was the ſame with the *apomeli*.

OXYGONIUS, *oxygonus*, formed of ὀξυς, and γωνι, *angle*, in *Geometry*, *acute angled*: a figure conſiſting wholly of acute angles, or angles leſs than ninety degrees.

The word is chiefly applied to triangles, where the three angles are all acute, or leſs than ninety degrees each.

OXYLIPES, a word uſed by ſome authors as a name for bread, which has a mixture of vinegar in it; intended ſometimes for eating, ſometimes for medicinal uſes.

OXYMEL, ὀξυμελι, formed from ὀξυς, *ſour*, and μελι, *mel, honey*, in *Pharmacy*, a mixture of honey and vinegar boiled to the conſiſtence of a ſyrup.

There are two kinds of *oxymel*, the one *ſimple*, the other *compound*.

OXYMEL, *ſimple*, is compoſed of two pounds of good HONEY, and a pint of white-wine vinegar, boiled into the conſiſtence of a ſyrup; it is proper to incide and ſcour any phlegm adhering to the throat and breaſt.

OXYMEL, *compound*, only differs from the *ſimple*, in that to the honey and vinegar they add the decoction of the five greater opening roots; with the ſeeds of ſmallage, parſley, and fennel. It is uſed to open obſtructions of the liver and ſpleen.

OXYMEL *colchicum of Storck*. See COLCHICUM.

OXYMORON, or *ſeeming contradiction*, in *Rhetoric*, is a ſpecies of ANTITHESIS, when the parts of a ſentence diſagree in ſound, but are conſiſtent in ſenſe. Thus Ovid, lib. viii. ver. 47, ſays of Althea, *impietate pia eſt*.

OXYMYRSINE, in *Botany*, a name by which authors have called the *ruſcus*, or *butcher's broom*.

OXYPHŒNICON, in *Botany*, a name uſed by ſome authors for the tree whoſe fruit is the *tamarind* of the ſhops.

OXYPYCNI, ὀξυπυκνοι, in the ancient Greek *Muſic*, was a name given to ſuch chords as formed the higheſt ſounds of the *ſyſtta*. There were five *oxypycni* in the ſcale. See PYCNI and SYSTEMA.

OXYREGMIA, ὀξυρεγμια, formed from ὀξυς, and ερευγω, *ructo*, in *Medicine*, a ſourneſs of the ſtomach-liquor, occaſioning acid belches. See RUCTATION.

OXYRRHODON, *oxyrrhodinum*, compoſed of ὀξυς, *ſour*, and ῥοδον, *roſe*, a mixture of two parts of oil of roſes, and one part of vinegar, ſtirred together for ſome time.

To theſe are ſometimes added diſtilled waters. It is uſed for inflammations, and to dry up tetters.

Sculletus preſcribes it as follows: two whites of eggs beaten, one ounce and a half of vinegar of roſes, four ounces of roſe-water, and two ounces of oil of roſes.

OXYS, in *Botany*. See *Wood* SORREL.

OXYRYNCHUS, in *Ichthyology*, the name of a fiſh of the truttaceous kind, called by ſome *beutin*, and *outin*. It is caught frequently in the Engliſh and other ſeas, and is frequently carried to market in Holland among the whitings. It is very much of the ſhape and figure of the trout, but a little flatter, and is covered with large white ſcales.

OXYSACCHARUM, ὀξυσακχαρον, compounded of ὀξυς, *ſour*, and σακχαρον, *ſugar*, a liquid medicine, compoſed of ſugar and vinegar.

The name is more peculiarly given to a ſyrup prepared with vinegar, the juice of four pomegranates and ſugar; uſed to cool, refreſh, and reſiſt the malignity of peccant humours.

OXYSAL *diaphœniceum*, the name of a compound medicine greatly recommended by ſeveral authors, and invented by Angelus Sala. The manner of preparing it is this: take fine ſalt of carduus benedictus, put it into an earthen pot, and pour upon it gradually ſome ſtrong wine-vinegar, or ſpirit of ſugar; continue to pour this on till the ebullition ceaſes, and an agreeable ſmell ariſes, and the matter has an agreeable, though ſomewhat acid, taſte; let all the humidity from this mixture be evaporated over a gentle heat; and after this, let all the ſalt be again diſſolved in water, and ſet in digeſtion in balneo Mariæ for eight days: a liquor of a beautiful and pellucid colour is there produced, which, when poured carefully off into another veſſel, is to be again evaporated to a dryneſs with a very gentle heat, and the remaining matter, which is the ſalt, is to be collected together, and kept in a phial carefully ſtopt; for it is ſubject to run, if left to the acceſs of the air, like the common alcali ſalts.

OXYSCHÆNOS, in the *Materia Medica*, the name of the *juncus acutus capitulis ſorgli*; or *hard pricking large ſea-ruſh*.

OXYTOCHA, formed of ὀξυς, *ſharp*, and τικτω, *I bring forth*, in *Medicine*, a term uſed by many authors to expreſs ſuch medicines as are given to promote delivery.

OXYTRIPHYLLUM, in *Botany*, a name uſed by ſome authors for the *trifolium bituminoſum*, or *ſtinking trefoil*.

OYER ſeems to have been anciently uſed for what we call ASSISES.

OYER *and terminer*, a commiſſion directed to the judges and other gentlemen of the county to which it is iſſued, by virtue whereof they are impowered to hear and determine treaſons, and all manner of felonies and treſpaſſes. The term is French, and literally denotes to hear and determine. In our ſtatutes it is ſometimes written *oyer and determiner*.

It is the firſt and largeſt of the five commiſſions by which our judges of aſſize do ſit, in their ſeveral circuits.

Anciently it was only in uſe upon ſome ſudden outrage, or inſurrection, in any place.

OYER *de record* is a petition made in court, praying that the judges, for better proof-ſake, will be pleaſed to hear, or look upon, any record.

In the like ſenſe, a perſon may demand *oyer* of a bond, deed, covenant, or the like.

OYES, a corruption of the French *oyez, hear ye*, being a term, or formula, whereby the criers in our courts enjoin ſilence or attention, before they make proclamation of any thing.

OYSTER, *oſtrea*, in *Natural Hiſtory*, the name of a very large genus of ſhells, the characters of which are theſe: it is a bivalve ſhell, of a coarſe external ſtructure, and dirty appearance; each ſhell being compoſed of a great number of lamiæ not nicely cloſed down upon one another. It is in ſome ſpecies ſmooth, in others ſtriated, tuberous, or prickly; uſually flat, but ſometimes globoſe, plicated, and wrinkled into ſinuſes; the lower ſhell being always deeper than the other. Its animal is a TETHYS. Under this genus Linnæus enumerates thirty-one ſpecies. Aldrovand ſuppoſes this genus of ſhell-fiſh obtained the name *oſtreum*, from the Greek οστεον, a *bone*, as they are of a bony hardneſs. See *Tab. of Shells*, N° 17.

Moſt authors have confounded the two genera of *oyſters* and chamæ together, though there is an obvious and invariable diſtinction. The *oyſter* is rough, and has a ſort of beak; and notwithſtanding the roughneſs of both ſhells, it always ſhuts very evenly and firmly: add to this, that one of its ſhells is flat, the other convex; and is thus abſolutely diſtinguiſhed from the chamæ. Hiſt. Nat. Eclair. p 313.

Oyſters in their growth become faſtened to every ſolid ſubſtance which they happen to come into contact with; and rocks, ſmall ſtones, wood, ſea-plants, and a thouſand other things, are found at times with *oyſters* adhering to them, whoſe ſhells have fitted themſelves to the form of the thing itſelf, and loſt their natural ſhape. The people who fiſh for, and trade in *oyſters*, pretend to diſtinguiſh two kinds; one which is fecund, and will breed; the other, which is barren. They ſay, they diſtinguiſh theſe by a little black fringe, which always ſurrounds the good breeding *oyſters*.

The way to make *oyſters* green is, to put them into ſmall pits where the water is about three feet deep, in the ſalt marſhes, and where the ſun has great power; in theſe they become green in three or four days.

The ſpecies of *oyſters* being very numerous, they may be better underſtood by being arranged under ſome general heads.

1. Some *oyſters* are plane and ſmooth.

2. Some *oyſters* are ſmooth, yet foliated on the ſurface.

3. Some *oysters* are of a globose form, and carry spines on their shells.

4. Some *oysters* are of a globose figure, and jagged with high raised laminæ.

5. Some *oysters* are oblong and umbonated.

The *oyster* affords the curious in microscopic observations a very pleasing entertainment. In the clear liquor many little round living animalcules have been found, whose bodies being conjoined, form spherical figures, with tails not changing their place otherwise than by sinking to the bottom, as being heavier than the fluid; these have been seen frequently separating, and then coming together again. In other *oysters*, animalcules of the same kind were found, not conjoined, but swimming by one another, whence they seemed in a more perfect state, and were judged by Mr. Leewenhoek to be the animalcules in the row or semen of the *oyster*.

A female *oyster* being opened, incredible multitudes of small embryo *oysters* were seen, covered with little shells, perfectly transparent, and swimming along slowly in the liquor; and in another female the young ones were found of a browner colour, and without any appearance of life or motion.

Monsieur Joblot also kept the water running from *oysters* three days, and it appeared full of young *oysters* swimming about nimbly in it; these increased in size daily, but a mixture of wine, or the vapour of vinegar, killed them.

In the month of August *oysters* are supposed to breed, because young ones are then found in them. Mr. Leewenhoek, on the fourth of August, opened an *oyster*, and took out of it a prodigious number of minute *oysters*, all alive, and swimming nimbly about in the liquor, by means of certain exceeding small organs, extending a little way beyond their shells; and these he calls their beards. In these little *oysters* he could discover the joinings of the shells, and perceived that there were some dead ones, with their shells gaping. These, though so extremely minute, are seen to be like the large *oysters* in form.

As to the size of them, he computes, that a hundred and twenty of them in a row would extend an inch; and, consequently, that a globular body, whose diameter is an inch, would, if they were also round, be equal to a million seven hundred and twenty-eight thousand of them. He likewise found animalcules in the liquor five hundred times less than the embryo *oysters*. Leewenhoek, Arcan. Nat. tom. iv. p. 513.

It is not very uncommon to see an *oyster* shells, when in a dark place, a shining matter or bluish light, like a flame of brimstone, which sticks to the fingers when touched, and continues shining and giving light for a considerable time, though without any sensible heat. This shining matter being examined with a microscope, was found to consist of three different sorts of animalcules. Phil. Trans. N° 279. See OYSTER-*worm*, infra.

From another account, preserved in Sprat's History of the Royal Society, from p. 307 to 309, we learn, that the *oysters* cast their spawn, which the dredgers call their spat, in the month of May; this spat cleaves to stones, old *oyster*-shells, pieces of wood, &c. at the bottom of the sea, which they call cultch; and it is conjectured, that the spat in twenty-four hours begins to have a shell. In the month of May, the dredgers, by the law of the admiralty court, have liberty to take every kind of *oyster*, whatsoever be their size. When they have taken them, they gently raise with a knife the small brood from the cultch, and then they throw the cultch in again, to preserve the ground for the future, unless they be so newly spat, that they cannot be safely severed from the cultch: in this case they are permitted to take the stone or shell, &c. which the spat is upon, one shell having often twenty spats. After the month of May, it is felony to carry away the cultch, and punishable to take any other *oysters*, except those of the size of a half-crown piece; or such as when the two shells are shut will admit of a shilling to rattle between them. This brood, and other *oysters*, are carried to creeks of the sea, and thrown into the channel, which are called their beds or layers, where they grow and fatten; and in two or three years the smallest brood will become *oysters* of the forefaid size. There are great penalties, imposed by the admiralty court, upon those that fish out of the grounds which the court appoints, or that destroy the cultch, or that take any *oysters* that are not of the proper size, or that do not destroy a fish, which they call the five-finger, the common sea-star, because that fish gets into the *oysters* when they gape, and sucks them out. The reason of the penalty for destroying the cultch is, that they find, when this is taken away, the ooze will increase, and the muscles and cockles will breed there, and destroy the *oysters*, because they have no convenience for depositing their spat. The *oysters* are sick after they have spat; but in June and July they begin to mend, and in August they are perfectly well: the male *oyster* is black-sick, having a black substance in the fin; and the female white-sick, as they term it, having a milky substance in the fin. *Oysters* are salt in the pits, salter in the layers, and salter at sea. It is observed, that when the tide comes in, they lie with their hollow shell downwards, and when it goes out, they turn on the other side; they do not remove from their places, except in cold weather, to cover themselves in the ooze.

OYSTER *fishery*. See FISHERY.

OYSTERS, *fossile*. The greatest bed of fossile *oysters* any where known is that near Reading, in Berkshire. They have the entire shape, figure, and are of the same substance with the recent *oyster*-shells, and yet must have lain there for a long time, the oldest histories that mention the place giving an account of them. They are extended over no smaller a space than six acres of ground; and just above them there is a large stratum of a greenish loam, called by some writers a green earth, and by others a green sand. It is composed of a crumbly marle, and a very large portion of sand. Under them there is a thick stratum of chalk. They all lie in a level bed, and the strata above the shells are natural, and have never been dug through till the time of finding the shells.

The *oyster*-shells and green earth together make a stratum of about two foot thick; and over this a much thicker stratum, of a bluish and very brittle clay; but this has never been dug through, except where we find the shells. The people call this *pierry-clay*, and say it is fit for no use. This bed of clay is about a yard deep, and above it is a stratum of fuller's earth, about two foot and a half deep; it is of a very good kind, and is used by the clothiers. Over this there lies a stratum of a fine white sand, unmixed either with the clay or fuller's earth: this is near seven foot deep, and above this there is a stratum of a stiff red clay, of which they make tiles in the place. This is covered with a little vegetable mould, and the depth of this stratum of tile-clay cannot be ascertained, because of the unevenness of the hill.

These *oysters* are sometimes found whole, but more usually in single shells. When they are in pairs, there is usually some of the green sand found within them; they seldom stick very fast together; so that unless very carefully taken up, it is not easy to get them in pairs. Phil. Trans. N° 261, p. 883.

OYSTER-*shells*. These are an alkali of a more powerful kind than is commonly supposed, and probably are in reality much better medicines than many of the more costly and pompous alkalis of the same class. The proof of alkalis is in their solution by acid spirits; and Mr. Homberg found, that they dissolved much more easily in the acids of nitre and sea-salt than pearls, coral, and the rest; which he supposes owing to their containing in the body of the shell a considerable portion of sal-fossil, which is easily perceived upon the tongue, and which keeps the whole substance of the shell in a sort of half dissolved state. These shells are found to produce very great effects on the stomach, when injured by acid humours; and Mr. Homberg is of opinion, that this their easiness of solution is one great reason of their good effects, and that the quantity of sal-fossus which it contains, contributes not a little towards it, since we are not to look upon that as a mere salt, but a salt of a peculiar kind, formed of sea-salt by the organs of the animal, and the several fermentations it undergoes in the body of it, in the same manner as the nitrous and other salts of the earth cease to be nitrous, &c. as soon as they have been blended with the juices of plants, and form with them a salt peculiar to that plant; and this is plainly the case in regard to this salt, since it is evidently of a more penetrating taste, and of a different smell, from the salt left by the sea-water between the several external scales, or flakes of the shell.

As *oyster*-shells were found by Mr. Homberg to be a very valuable medicine, and as one of the common methods of preparing them is by calcination, which he observes cannot but much impair their virtues, he gives the following method of preparing them for taking inwardly, which was what he always used.

Take the hollow shells of the *oysters*, throwing away the flat ones, as not so good; wash them perfectly clean, and then lay them to dry in the sun; when they appear dry, beat them to pieces in a marble mortar, they will be then found to contain yet a large quantity of moisture; lay them again in the sun till perfectly dried, and then finish the powdering them, and sift the powder through a fine sieve. Give twenty or thirty grains of this powder every morning, and continue it three weeks or a month. Mem. Acad. Par. 1700.

For the method of calcining *oyster*-shells, and thus preparing a phosphorus, see *Canton's* PHOSPHORUS.

OYSTER-*worm*, in *Natural Hiſtory*, a name given by writers to a kind of ſmall worm found in *oyſters*, which ſhines in the dark, in the manner of the glow-worm; but with an univerſal light, and not in a peculiar part only.

The firſt obſerver of theſe *oyſter-worms* was M. De Lavoye, who, communicating his obſervations to M. Auzout, gave occaſion to a very diſtinct account of them from this author.

The firſt thing that preſents itſelf on the opening of the *oyſters* which contain theſe worms, is only a ſort of ſhining glammy moiſture, which appears like a ſtar of a blueiſh colour, and, being drawn out, will extend itſelf to near half an inch long, and ſhine as much for that whole length as in the contracted ſtate; it will alſo ſhine for ſome time after it is taken out of the *oyſter*.

On a ſtricter obſervation, theſe ſhining ſubſtances are found to be real living worms, and there are indeed three diſtinct ſpecies of them. One ſort is whitiſh, and has twenty-four or twenty-five feet on each ſide: there is a black ſpeck on one ſide the head, and the back exactly reſembles that of an eel, when the ſkin is ſtripped off. The black ſpeck in the head is certainly an eye; and it is remarkable that the creature has but one. The ſecond ſort of theſe worms is red: this alſo has but one eye; its body is made up of ſeveral rings; its noſe is like that of a dog, and it has the ſame number of feet with the former. The third ſort is very different from the other two; it is ſpeckled, and its head is like that of a foal, and has a tuft of hair on each ſide. There are other worms found alſo in the *oyſter*, particularly a large greyiſh one, with two horns, a great head, and ſeven or eight whitiſh feet; but theſe do not ſhine. This ugly ſort is more frequently in large, than in ſmall *oyſters*; there are few of theſe large ones that do not yield it in the ſhells, and in ſome it is ſeen in the *oyſters* themſelves. Journal de Sçavans, 1666.

OZE, a word uſed by ſome writers to expreſs a *ſoetor*, or *ill ſmell of the mouth*.

OZENA, οζαινα, in *Medicine*, a putrid and ſtinking ulcer, in one or both noſtrils; wherein the humour is very acrid, or corroſive, ſanious, and ſometimes mixed with a bloody mucus.

It ſometimes proceeds from neglected, or ill managed wounds, contuſions, &c. in the noſtrils; eſpecially in ſcorbutic, ſcrophulous, or venereal habits; and ſometimes follows the ſmall-pox.

It often ſpreads and eats through the alæ; and, at other times, preys into the ſeptum naſi, cartilage, and os palati, eſpecially in venereal caſes; whence the great danger of the noſe in that diſtemper.

Fixed AIR, ſays Dr. Percival, in his Eſſays, p. 275, conveyed by a proper tube into the noſtrils, ſeems likely to prove the beſt topical application in the *ozæna*, whether the diſeaſe be ſeated in the *antrum Highmorianum*, or in the frontal ſinuſes. It will be eaſy to guard the patient againſt drawing into his lungs too large a quantity of this air, by directing him to breathe with his mouth open during the operation.

P.

P, A labial conſonant, formed by a ſlight compreſſion of the anterior part of the lips, and retaining an uniform ſound, and the fifteenth letter in the Engliſh alphabet.

When the *P* is followed with an *H* in the ſame word, it has the ſound of an *F*; thus *P*hiloſophy is pronounced *F*iloſophy: and this is generally the caſe in words derived from the Greek.

P and *B* are ſo like each other, that Quintilian declares, that in the word *obtinuit*, his reaſon required him to put a *b*, but that his ears could hear nothing but a *p*, *optinuit*: hence in ancient inſcriptions, and old gloſſaries, it appears, that theſe two letters have often been confounded.

Several nations ſtill pronounce one for the other, the Welch and Germans particularly, who ſay, *ponum vinum*, for *bonum vinum*.

Plutarch obſerves, it was uſual for thoſe of Delphi to ſay βαῖτον for παῖτον, βιτρον for πιτρον; and among the Latins, as often as an *s* followed, the *b* was changed into a *p*, as *ſcribo*, *ſcripſi*.

P is ſometimes mute before *t*, as *accompt*; but in modern orthography it is uſually omitted.

P, in the *Italian Muſic*, frequently repreſents *piano*; which is what in our muſic we call *ſoft*, i. e. the force of voice or inſtrument is to be diminiſhed, ſo as to make a kind of echo.

P P ſignifies *piu piano*, i. e. *more ſoft*, or a ſecond echo weaker, or more remote than the former: and *P P P* ſignifies *pianiſſimo*, *ſofteſt of all*, or a third echo, the voice being as it were loſt in the air.

P. M. among *Aſtronomers*, is frequently uſed for *poſt meridiem*, or *afternoon*; and ſometimes for *poſt mane*, *after the morning*, i. e. *after midnight*.

P was alſo uſed among the ancients as a numeral letter, ſignifying the ſame with the G, viz. a hundred; according to the verſe of Ugutio.

P ſimilem cum G numerum monſtratur habere.

Though Baronius thinks it rather ſtood for ſeven. When a daſh was added a-top of P, it ſtood for four hundred thouſand.

St. Jerom obſerves, on Daniel, that the Hebrews had no *P*; but that the *ph* ſerved them inſtead thereof; adding, that there is but one word in the whole Bible read with a *P*, viz. *apadno*.

The Greek π ſignified 80. The Latins uſed P as an abbreviature. Thus P ſtood for Publius, pondo, &c. in S. P. Q. R. or Senatus populuſque Romanus, for populus; R. P. denoted reſpublica; P. C. patres conſcripti; PR. S. prætoris ſententia, &c. On the French coins, P denotes thoſe that were ſtruck at Dijon.

P, in *Medicinal Preſcription*, is uſed for *pugil*, or the eighth part of a handful.

P. Æ. ſignifies *partes æquales*, equal parts of any ingredients: otherwiſe denoted by ā or ana.

P. P. ſignify *pulvis patrum*, i. e. Jeſuit's powder, or the cortex Peruvianus in powder; which is ſo called, becauſe firſt brought into Europe by thoſe fathers; and *p. p. t. preparatus*, *prepared*.

PABOS, in *Botany*. See CAAMINI.

PABULUM is ſometimes uſed among naturaliſts for fuel, or that part in combuſtible bodies which the fire immediately feeds on, or is ſupported by.

PACA, *mus paca* of Linnæus, in *Zoology*, the name of an American animal of the GUINEA-*pig* kind, having the general characters of the rat kind, and the voice and hair of the hog.

This is the largeſt of all the animals of this kind, being of the ſize of a ſmall pig. The colour of the upper part of the body is dark brown; the lower part or ſides marked lengthways with lines of grey ſpots; and the belly white; it has five toes on each foot; and a very ſhort tail; it does not uſe its fore-feet in the manner of hands, as the other ſpecies do, but eats on the ground like the hog; and is in ſome places called the hog-rabbit; it is uſually fat, and the fleſh very well taſted.—This animal inhabits Braſil and Guiana, and burrows underground. There is a variety, quite white, found on the banks of the river St. Francis. Ray and Pennant.

PACALIA, a feaſt held among the ancient Romans, in honour of the goddeſs *Pax*, Peace.

Alnabelmus, de Laud. Virgin. ſpeaking of the impure feſtivals and ceremonies of the heathens, calls one of them *Pamolia*; which paſſage Gronovius charges as faulty, alleging, that there was no feaſt of that name, but that it ſhould have been *Pacalia*, or perhaps *Palilia*.

The ancients, who perſonified, and even deified every thing, were not forgetful of Peace: ſhe had an altar at Rome, and a ſtately temple; and religious rites were paid her with great ſolemnity.

PACAMO, in *Ichthyology*, the name of a long-bodied fiſh of the mauſtela-kind, caught among the rocks, and of a very well-taſted fleſh. It is uſually about eleven fingers long, and grows narrower and ſmaller toward the tail; its head is large, broad, and thick; its mouth is of the ſhape of a half-moon, and has very ſolid but not ſharp teeth; its ſkin eaſily ſlips off from the body like that of an eel.

PACE, *paſſus*, *ſtep*, a meaſure taken from the ſpace between the two feet of a man in walking.

The *ordinary pace* of a man is two feet and a half; though many reckon it a yard: the *geometrical* or *Roman pace*, called alſo the *greater pace*, is five feet.

The ancient Roman and modern Italic mile conſiſts of a thouſand *paces*, *mille paſſus*. The French league is 3000 *paces*, and the German 4000.

PACE, in the *Manage*, is a certain manner of motion, or progreſſion of a horſe.

The natural paces of a horſe are three, viz. the WALK, TROT, and GALLOP: to which may be added an AMBLE, becauſe ſome horſes have it naturally.

For the *artificial paces*, ſee AIRS.

Horſes that mix their *paces*, i. e. ſhuffle betwixt a walk and amble, &c. are ſeldom of any value. The defect proceeds from their fretful, fiery temper: and ſometimes from a weakneſs either in their reins or legs.

PACHAMAC, in *Mythology*, the name which the idolaters of Peru gave to the ſovereign being whom they worſhipped, together with the ſun and other imaginary deities. The principal temple of this deity was ſituated in a valley, about four leagues from Lima, and was founded by the incas of Peru. This idol was held in the greateſt veneration. Pizarro derived great riches from the temple of *Pachamac*; and the ruins that ſtill remain furniſh a very high notion of its magnificence.

PACHAMAMA, the name of a Peruvian goddeſs.

PACHODECARHOMBIS, in *Natural Hiſtory*, the name of a genus of foſſils, of the claſs of the ſelenitæ.

The word is derived from the Greek παχυς, *thick*, δεκα, *ten*, and ῥομβος, *a rhombus*, and expreſſes a thick rhomboidal body, compoſed of ten planes. See *Tab. of Foſſ. Claſs* 2.

The characters of this genus are, that the ſelenitæ of it conſiſt of ten planes; but as the top and bottom in the leptodecarhombes, or moſt common kind of the ſelenitæ, are broader and larger planes than any of the reſt, the great thickneſs of this genus, on the contrary, makes its four longer planes in all the bodies of it, meeting in an obtuſe angle from its ſides, its largeſt planes. Of this genus there are four ſpecies.

PACHUNTICA,

PACHUNTICA, formed of πάχυνω, *I incraſſate*, a term uſed by ſome medical writers to expreſs incraſſating medicines.

PACIFIC, peaceful, or free from troubles, tumults, &c.

PACIFIC *age* is a denomination given to that period in which our Saviour was born, on account of the general peace which then prevailed through the Roman empire.

PACIFIC *letters*, *literæ pacificæ*, in the *Ancient Church*, was a denomination given to all ſorts of letters teſtimonial, given by the biſhop or chorepiſcopus to their prieſts, when they had occaſion to travel abroad; certifying that the bearer was a catholic, and in communion with the church.

The life of pope Sixtus I. taken from the pontifical of pope Damaſus, mentions that pope as the firſt who introduced thoſe letters called *Formatæ*, *Canonicæ*, *Commendatitiæ*, *Communicatoriæ*, *Eccleſiaſticæ*, & *Pacificæ*.

PACIFIC *Ocean*, or South Sea, in *Geography*, that vaſt ocean which ſeparates Aſia from America; it is called *Pacific* from the moderate weather the firſt mariners, who ſailed in it, met with, between the tropics; and it was called South Sea, becauſe the Spaniards croſſed the iſthmus of Darien from north to ſouth. It is properly the weſtern ocean with regard to America.

Geographers call the South Sea, *Mare Pacificum*, the *Pacific Ocean*; as being leſs infeſted with ſtorms than the Atlantic. M. Frezier affirms, it does not deſerve that appellation; and that he has ſeen as violent tempeſts therein as in any other ſea: but Magellan happening to have a very favourable wind, and not meeting with any thing to ruffle him, when he firſt traverſed this vaſt ocean, in 1520, gave it the name which it has retained ever ſince. Maty, however, adds, that the wind is ſo regular there, that the veſſels would frequently go from Acapulco to the Philippine Iſlands, without ſhifting a ſail.

PACIFICATION, the act of reſtoring or re-eſtabliſhing the public peace and tranquillity.

The word is applied to many ordinances of the kings of France, deſigned to pacify the troubles that occurred in the kingdom, with regard to religion, during the ſixteenth century, and particularly appropriated to the period put to the religious broils raiſed in France, in the year 1598, by the edict of Nantz; and the civil commotions, between the Engliſh and Scots, ending in 1638.

PACIFICATOR is commonly underſtood in the ſame ſenſe with mediator; viz. one who endeavours to reconcile princes or powers at variance.

Wicquefort makes a difference between mediator and *pacificator*. The peace being concluded between France and England, in 1631, the inſtruments on each ſide were put in the hands of certain ambaſſadors, who had been employed as *pacificators*, not as mediators, to be kept till ſuch time as the ratification had been exchanged. So the archbiſhop of Piſa, the duke of Tuſcany's ambaſſador at Madrid, was never eſteemed a mediator, though the French ambaſſadors allowed him to be preſent at the conferences held with the commiſſioners of Spain, to act as a *pacificator* of the differences between them. The grand duke had not offered his mediation, nor would France have accepted it. Wicquefort, part ii. ſect. 11.

PACIFICATORS, in *Church Hiſtory*, a name given to thoſe who, in the ſixth century, followed the HENOTICUM of Zeno.

PACK, in *Commerce*, denotes a quantity of goods, made up in loads, or bales, for carriage. A *pack* of wool is a horſe's load, containing ſeventeen ſtone and two pounds, or 240 pounds weight. See WOOL.

PACKAGE. A duty ſet and rated in a table taken of goods and merchandizes; and all goods not ſpecified in the table are to pay for *package* duties, after the rate of one penny in the pound, according as they are valued in the book of rates.

PACKERS are really, what their title expreſſes, *packers* as well as preſſers of all ſorts of bale goods (intended for exportation), for the great trading companies and merchants, for which they are anſwerable, if they ſhould happen to receive any damage through bad package: beſides this, ſeveral of them are conſiderable dealers.

PACKET, or PACKET-BOAT, a veſſel appointed by government to carry the mail of letters, packets, and expreſſes, from one kingdom to another, by ſea, in the moſt expeditious manner. Thus the *packet-boats* under the direction of the poſt-maſter-general of Great Britain carry the mails from Dover to Calais, from Falmouth to Liſbon, from Harwich to Helvoetſluys, and from Parkgate to Dublin. See POST.

PACO *caninga*, in *Botany*, a coniferous ſpecies of Braſilian CANNA. Marg.

The ſtalk of this plant, being chewed, attracts humors from the head: thus uſed it is heating and breaks the ſtone; and being chewed frequently in a day and the juice ſwallowed is an excellent remedy againſt the gonorrhœa, which it cures in leſs than three days, without the help of any other medicine. It is offenſive to the ſtomach by its acor, and therefore the frequent uſe of it is to be avoided.

There is a ſecond ſpecies of this plant, which is diſtinguiſhed by the ſweetneſs of its leaves underneath, and by its red flowers: and a third ſpecies, known by its ceruleous tetrapetalous flowers. Ray.

PACO *ſerreca*, in *Botany*, Marg. *piſo*, a ſpecies of Braſilian CANNA, which bears its fruit in cluſters at the bottom of the ſtalk. The freſh leaves as well as the ſtalk and fruit, before it is ripe, being rubbed, give a ſmell like ginger, which is very grateful, and therefore ſerves inſtead of ſpices. They are alſo uſed in hot baths. Ray.

PACOS, in *Zoology*, the name of a ſpecies of camel, uſually, but very improperly, accounted a ſpecies of ſheep; and known among many by the name of the *Indian ſheep*, *or Peruvian ſheep*.

It very much reſembles that ſpecies of camel uſually known by the name of *glama*, and found in the ſame countries; but this is much ſmaller, and is much leſs tractable, and a very obſtinate animal.

The reaſon of this creature's having been accounted a ſheep is, that its hair is ſo long as to reſemble wool, and it is clothed prodigiouſly thick with it; its head and neck alone have more wool on them than the whole body of our largeſt ſheep; its body is clothed in the ſame proportion with a woolly hair, equally fine; it is a much weaker creature than the glama, and is ſeldom uſed for carrying burthens, though the tame ones will carry from fifty to ſeventy-five pounds; but is kept as our ſheep, for the ſake of its wool and its fleſh, which is very well taſted, and is a rich food.

Theſe animals live in large herds, are very timid and exceſſively ſwift. The Indians take them in a ſtrange manner: they tie cords, with bits of wool or cloth hanging to them, about three or four feet from the ground, acroſs the narrow paſſes of the mountains, then drive the animals towards them, which are ſo terrified by the flutter of the rags as not to dare to paſs, but huddling together, give the hunters opportunity to kill with their ſlings as many as they pleaſe.

PACOURII, in *Botany*, De Laet. a vaſt tree growing in the iſland of Maragnan, belonging to *Braſil*; it bears leaves like thoſe of the apple-tree, a white flower, and a fruit of the bigneſs of two fiſts. The rind or peel of this fruit, which is about an inch thick, being boiled or preſerved in ſugar, is reckoned a delicacy. Ray.

PACQUING, in *Natural Hiſtory*, a name given by the people of the Philippine iſlands to a ſmall bird of the ſparrow kind, but very beautifully variegated. It feeds on the ſeeds or graſs.

PACT, PACTUM, or PACTION, in *Law*, a covenant or convention between two or more parties.

Ulpian derives the word from the Latin verb *paciſci*, *to bargain*, *agree*, *contract*: others, with more probability, from *pax*, *I appeaſe* or *pacify*; or from *pango*, *I fix*, *eſtabliſh*.

The civil lawyers, after Ulpian, define the word *pact*, the conſent of two or more parties to the ſame thing. *Duorum aut plurium in idem conſenſus*, lib. iii. ſect. 2. *ff. de pactis*.

There are two ſpecies of conventions, viz. the *pact* and *contract*. A *pact* againſt good manners, againſt public or natural equity, is null. It is a maxim in law, *Ex nudo pacto non oritur actio*.

PACTA *conventa*, in Poland, are the articles agreed on between the king and the republic; and which they mutually oblige each other to obſerve.

PAD-*ſaddle*. See SADDLE.

PADDLE, a ſort of *oar*, uſed by the ſavages of Africa and America, to navigate their canoes. *It is much ſhorter* and broader in the blade than the oar of a boat, and irregularly employed in rowing and ſteering.

PADDLE, in *Glaſs-making*, the name of an inſtrument with which the workman ſtirs about the ſand and aſhes in the calcar.

PADDOCK, *or* PADDOCK-*court*, a piece of ground, conveniently taken out of a park, ordinarily a mile long, and a quarter of a mile broad, encompaſſed with pales or a wall, for the exhibiting of races with greyhounds, for wagers, plates, or the like.

At one end of the *paddock* is a little houſe, where the dogs are to be entered; and whence they are ſlipped; near which are pens to incloſe two or three deer for the ſport.

The deer when turned looſe, run all along by the pale; and the ſpectators are placed on the other ſide.

Along the courſe are ſeveral poſts; viz. the law-poſt, 160 yards from the dog-houſe and pens; the quarter of a mile poſt; half-mile poſt; and pinching poſt; beſide the

ditch, a place made to receive the deer, and preserve them from further purſuit.

Near the ditch are placed judges or triers. The keeper, to ſlip the dogs fairly, puts a ſtalling collar upon each, to ſlip through a ring; and the deer being turned looſe and put forward by a teazer, as ſoon as it is arrived at the law-poſt, the dog-houſe door is thrown open, and the dogs ſlipped.

If now the deer ſwerve ſo much, as that his head is judged nearer the dog-houſe than the ditch, before he arrives at the pinching-poſt, it is no match; but muſt be run over again three days after. If there be no ſuch ſwerve, but the deer runs ſtrait as far as the pinching-poſt, then the dog neareſt him, if he chance to ſwerve afterwards, or by any accident be blanched, or if there be no ſuch ſwerve, &c. the dog that leaps the ditch firſt wins the match.

PADLE, or PADLE-*ſtaff*, a ſmall ſtaff, ſhod with iron, for cleaning the plow from ſtubble, dirt, &c.

PADOGI, a ſpecies of puniſhment uſed in Ruſſia. In this puniſhment the body of the criminal is ſtripped to the waiſt, and then laid upon the ground; one ſlave holds the head between his knees, and another the lower part of the body; then rods are applied to the back, till ſome perſon gives notice to deſiſt, by crying out, enough.—This puniſhment is conſidered in Ruſſia merely as a correction of the police, exerciſed on the ſoldier by military diſcipline, by the nobility on their ſervants, and by perſons in authority over all ſuch as are under their command.

Ever ſince the acceſſion of Elizabeth to the throne of Ruſſia, the puniſhments were reduced to two kinds, viz. the *padogi* and KNOUT.

PADUAN, among *Medaliſts*, a modern medal made in imitation of the antique, or a new medal ſtruck with all the marks and characters of antiquity.

The name is taken from *Padua*, *Paduanus*, a famous Italian painter, who ſucceeded ſo well in the impoſture, if it may be ſo called, that the beſt judges are at a loſs to diſtinguiſh his medals from the genuine ones.

This *Paduan* was thus called from the place of his birth, Padua; his proper name was Giovanni Cavino; others ſay, Lewis Lee; he flouriſhed in the ſeventeenth century. Gotheb Rink adds, that he had an aſſociate in this forgery, called Alexander Baſſianus. His ſon Octavian, though born at Rome, was alſo called the *Paduan*.

PADUAN is properly applicable to thoſe medalsonly, which are ſtruck on the matrices of the elder *Paduans*, which are ſtill preſerved. Though it is frequently uſed in the general for all medals of this kind.

Joubert obſerves, that there have been a *Paduan* and *Parmeſan* in Italy, and a *Cortese* in Holland, who had the knack of imitating the antique in perfection. The Parmeſan was Laurentius Parmeſanus. We may alſo add another Italian who excelled in this way, viz. Valerius Belius Vicentinus; but his medals are not ſo common as thoſe of the reſt.

PADUS, in *Botany*. See LAUREL.

PÆAN, παιαν, in *Antiquity*, a hymn in honour of Apollo, or ſome other of the gods; chiefly uſed on occaſion of victory and triumph.

Feſtus derives the word απο του παιειν, *ferire*, *to ſmite*, *ſtrike*: but Heſychius rather takes Apollo to have been denominated *Paan*, from παιειν ιασεσθαι, *I heal*; in alluſion to his being the deity of medicine.

The *Paan* took its name from Apollo himſelf; who was denominated *Paan*, becauſe in his combat with the ſerpent Python, his mother Latona encouraged him to make uſe of his arrows by crying frequently, ιε παιαν, ιε παιαν, *do boy, bravely boy*.

PÆAN or PÆON is alſo the name of a foot in the ancient poetry; ſo called, as commonly ſuppoſed, becauſe appropriated to the hymn *Paan*; though Quintilian derives the name from its inventor *Paon*, a phyſician. There were four kinds of feet called *Paons*.

The firſt *Paon* conſiſts of four ſyllables, one of which is long, and the reſt ſhort, as *celligere*; the ſecond is compoſed of a ſhort, a long, and two ſhort, as *refolvere*; the third of two long, a ſhort, and a long, as *communicant*; and the fourth of three ſhort and one long, as *temeritas*.

PÆCILIA, in *Ichthyology*, a name given by Schoneveldt, and ſome others, to the fiſh called by moſt authors the *muſcle fiſhes*. It is properly a ſpecies of *cobitis*, and is called by Artedi the *bleikh cobitis*, with five longitudinal black lines on the body.

PÆDARTHROCACES, in *Surgery*, is a diſeaſe of the bones, raiſing them into tumors near the joints, and differing from the ſpina ventoſa, in that it is not attended either with violent pains, or eroſions of the bone and adjacent parts.

The word is derived from the Greek, παις, *a child*, αρθρον, *a joint*, and κακον, *an evil*, ſignifying that it is a diſorder of the joints, to which children are principally ſubject; which is the caſe, becauſe the bones of children being ſofter than thoſe of adults, are therefore the more eaſily diſtended by humors, and more frequently raiſed into tumors: theſe are hard in this caſe, and the adjacent ſoft parts are not inflated, and are free from redneſs, inflammation, and pain. It is, however, to be obſerved, that this diſorder, though at firſt very different from the SPINA *ventoſa*, is ſometimes known to degenerate into that diſorder. Heiſter.

PÆDERIA, in *Botany*, a genus of the *pentandria monogynia* claſs. It is of a twiſted form, the ſtyle is biſid, and the fruit is a brittle berry, containing two ſeeds. There is only one ſpecies.

PÆDEROTA, in the Linnæan ſyſtem of *Botany*, a genus of plants of the *diandria monogynia* claſs; the characters of which are, that the cup is a perianthium, divided into four ſegments, and remaining after the flower is fallen; the ſeveral ſegments are ſtrait and pointed; the flower is compoſed of a ſingle petal, which forms a cylindric tube, nearly of the length of the cup, placed erect at its extremity, and divided into two labia, the upper of which is long, hollow, and, narrow, the under expanded, but ſomewhat erect, broadeſt in its upper part, lightly divided into three ſegments, and thoſe all equal; the ſtamina are two filaments bent downward, and of the ſame length with the cup; the antheræ are ſomewhat erect; the piſtil has a roundiſh germen, a thread-like ſtyle of the ſame length with the ſtamina, and a truncated ſtigma; the fruit is a ſtatted capſule of an oval figure, but biſid and pointed at the top, conſiſting of two cells with four valves; the ſeeds are very numerous, oblong, and obtuſe, and adhere to a columnar receptacle. There are two ſpecies, one of which is the *bonorata* of Micheli.

PÆDEROTA, among ſome of the old botanical writers, is alſo a name given to the *acanthus*, or *bear's breech*.

PÆDO-BAPTISM, a compound of παις, παιδος, *infant*, and βαπτισμα, *baptiſm*, infant-BAPTISM, or that conferred on children.

PÆDO-BAPTISTS, formed of παις, παιδος, *infant*, and βαπτιζω, *I baptize*, are thoſe who maintain that BAPTISM ſhould be adminiſtered to infants. In ſupport of this opinion they plead, that if infants, under the Chriſtian diſpenſation were excluded from the privilege of baptiſm, the Chriſtian inſtitution muſt appear in this reſpect to be leſs complete and perfect than that of the Jews: and it is not likely, by arguing *a priori*, that God would appoint an external ſign of peculiar diſtinction and benefit for children under the patriarchal and Jewiſh conſtitution, without any ſimilar appointment under the Chriſtian diſpenſation; more eſpecially as the firſt proſelytes to Chriſtianity, and thoſe in particular who were converted from among the Jews, would naturally expect ſome token of diſtinction and privilege, comprehending their children, and reſembling in its deſign, though milder in its nature, that which Chriſtianity had abrogated. This expectation was further encouraged by the very condeſcending and affectionate manner in which our Lord expreſſes himſelf concerning infants; particularly when he ſays, Mark x. 14. "Of ſuch is the kingdom of God;" which ſome underſtand to ſignify, that the rights and privileges of the Chriſtian church belong to ſuch. With theſe views, it is eaſy to conceive to what ſubjects they would apply the general charge to baptize proſelytes, unleſs they had been directed and reſtricted by ſome expreſs order.

An order of limitation was abſolutely neceſſary to prevent their miſtaking the proper ſubjects of baptiſm, and miſapplying this ordinance, if infants were to be excluded. This would be the more likely, as they would explain the precepts of Chriſt, concerning baptiſm, by the cuſtom prevailing among the Jews, in his time: and as it was the practice, when proſelytes came over to the Jewiſh religion, to baptize the children with the parents, the apoſtles would naturally conclude, that children were included in the general commiſſion, Matt. xxviii. 19.

Mr. Wall has endeavoured to ſhew, from the books of the Jews themſelves, and thoſe of others that underſtood the Jewiſh cuſtoms, and have written concerning them, that it was the cuſtom of the Jews before our Saviour's time, and as they affirm from the beginning of their law, to baptize as well as circumciſe any proſelyte that joined them from other nations, and with him, at his deſire, his infant children likewiſe.

Moreover, the advocates for infant baptiſm urge more directly the argument from circumciſion after this manner: the covenant made with Abraham was a covenant of grace, by which ſpiritual and eternal bleſſings were promiſed to him, (ſee Matt. xxii. 31, 32. Heb. xi. 6. Rom. iv. 11—17. Gal. iii. 6—18, 29.) and as ſuch com-

prehended both Jews and Gentiles, and their seed. Circumcision was instituted by God as a token of that covenant, and as such, he commanded that it should be administered to the infant offspring of his covenant people. Gen. xvii. 1—4. And yet, though the covenant endureth, that ancient token of it is abolished; nor is there any external sign or seal of it, under the Christian dispensation, except baptism. We have, therefore, reason to think, that this ordinance was intended to succeed circumcision, as it resembles it in many respects, and seems to be called the circumcision of Christ, by the apostle Paul, Col. ii. 11, 12. And inasmuch as circumcision was administered to infants, in token of this covenant, baptism, being its substitute and antitype, ought to be administered to infants likewise. Consult Acts ii. 39. Rom. xi. 17, &c.

Another argument for infant baptism is deduced from the words of the apostle, 1 Cor. vii. 14. which are supposed to have a direct reference to infant baptism; because *holy* often signifies those that might be admitted to sacred rites, and *unclean* such as were to be excluded from them. Doddr. *in loc.*

The *Pædo-baptists* acknowledge that there is no direct and express command to baptize infants; but appealing to the history of the administration of baptism, they argue, that the apostles are said to have baptized whole families, Acts xvi. 15, 33. 1 Cor. i. 16. and, therefore, probably infants, comprehended under this general denomination. And they apprehend, that they have been able to trace such intimations at least of infant baptism, in the earliest ages of the church, as may, to a high degree of probability, prove it to be an apostolic, and consequently divine institution.

Irenæus, who was born about the time of St. John's death, and probably of Christian parents, mentions infants among the regenerate, i. e. the baptized, as the word generally signifies in his writings.

Justin Martyr, about forty years after the time of the apostles, speaks of some who had been *made disciples* from their infancy.

Tertullian, about one hundred years after the apostles, though he advises parents to defer baptizing their children, except when their lives were in danger, speaks of the practice, as generally received and observed in his time.

Cyprian, about one hundred and fifty years after the apostles, is allowed by all to speak expressly of infant baptism, as generally used in the church; and we learn, that, in his time, A. D. 253, a question being agitated among sixty-six bishops, in the council of Carthage, whether an infant must be kept till he was eight days old before he be baptized, all unanimously gave their opinion to the contrary.

There are many passages that expressly refer to infant baptism, in the works of Origen, who was born of Christian parents; and as his father was martyred in the year 202, when he was seventeen years old, the remoter Christians of his family must have been nearly contemporary with the apostles.

In the *Apostolic* CONSTITUTIONS, which are allowed to be very ancient, express mention occurs of infant baptism, as commanded by Christ. Matt. xix. 14.

The learned Wall, who took great pains in this inquiry, informs us, that, in the first four hundred years after the apostles, there appears to be only one, viz. Tertullian, who, in some cases, advised the delay of infant baptism; and another, viz. Gregory, who practised such delay in the case of his own children: but no society of men adopted this opinion, nor did any one person pretend to say it was unlawful to baptize infants: and in the next seven hundred years, there is not so much as one man to be found, that either spoke for or practised any such delay: and, if truth were to be determined by numbers, the general and uniform practice of the Christian church is very much in favour of infant baptism.

On the other hand, the Baptists plead, that infants are incapable of complying with the terms required in order to baptism, i. e. repentance and faith, and of receiving those instructions which Christ directed, as previous to it. Matt. xxviii. 19. compared with 1 Peter, iii. 21. But the *Pædo-baptists* reply, that those instructions and conditions were required only of those who were capable of them. Besides, the word μαθητευσατε, which some understand of *teaching*, previous to baptism, may signify *make disciples*: and that infants may be comprehended under that name, some have argued from Acts xv. 10. The word used by Justin Martyr, in the passage above cited, and applied to infants, is μαθητευθεντας. And it has been farther alledged, that the penmen of scripture, and other Christian writers, have commonly used the word to signify the reception of any one to the number and degree of disciples, as preparatory to subsequent instruction; so that persons, thus received in order to be taught, were, before the instruction itself, denominated disciples. Compare Luke iv. 57. and Matt. viii. 19, 20, 21. Eusebius Evang. Demonst. lib. iii. sect. 7. where he styles those who were desirous of learning of Christ, his disciples.

It is farther objected, that infants are incapable of receiving any benefit from baptism; and that, in this case the ordinance is exposed to contempt. The *Pædo-baptists* reply to this objection, by maintaining on the contrary, that there are many advantages resulting from baptism, administered to infants, both to them and principally to their parents, whose immediate act it is; that an ordinance, as in the case of Christ, who was himself baptized, may sometimes be administered to those who are not capable of *all* the purposes for which it was originally instituted, and which it may subserve with regard to others; and still farther, that this argument against baptizing infants, by proving too much, proves nothing; for if infants are incapable of the ends of baptism, under the Christian dispensation, infants, under former dispensations, were equally incapable of the ends of circumcision; and, therefore, such an institution was useless and improperly enjoined.

The objection founded on the silence of the New Testament, with regard to infants, as the subjects of baptism, is already answered, in the beginning of this article, and the objection retorted against the Baptists themselves. The history of the practice of baptizing infants has been already stated; and though it is urged, that Justin Martyr contends for a profession of faith as necessary in order to baptism, whence was derived the use of sponsors, in the case of infants, it is answered by the *Pædo-baptists*, that Justin speaks of the adult, or may consider the confession of the sponsor as the child's, being made in his name: and this is the more probable, as the subsequent fathers use the *same* language, long after infant baptism was the prevailing practice.

The *Pædo-baptists* also differ from the Baptists, as to the mode of administering this Christian ordinance. The former perform it by sprinkling or pouring on water; the latter by the immersion of the whole body, which they contest to be an essential circumstance. In favour of immersion it is pleaded, that the word βαπτιζω, being derived from βαπτω, properly signifies *to plunge*: on the other hand it is urged, that in this diminutive and derivative form it may signify any method of washing, and is sometimes used in scripture for washing things which were not dipped in water, but on which it was poured. Compare Luke xi. 38. Mark vii. 4. and those passages, in which the pouring out of the spirit is called baptism. Acts i. 5. 8. ch. xi. 15, 16. to which some add, 1 Cor. x. 2. observing that βαπτω is never used for baptism.

Farther, the Baptists argue, that John performed *his* baptism by immersion, and that his practice is obligatory upon all Christians. To this some have replied, that John's baptism is distinguished from Christian baptism, and that some, who had received his baptism, were again baptized in the name of Christ. Acts xix. 3, 4, 5. And, therefore, that his example does not bind Christians. However, it is at least doubtful, whether John, who was of the line of the priests that had been always used to perform their purifications by sprinkling, did really baptize by immersion. On the affirmative it is urged, that we read of his baptizing (ω) *in* Jordan: but to this is answered, that ω signifies *by*, *at*, or *with*, and consequently furnishes no proof that John plunged his disciples into the river of Jordan. It is farther pleaded, that he chose a place for this purpose, where there was much water; and this he might have done, for the convenience of sprinkling, as well as of plunging, considering the numbers that resorted to his baptism, Matt. iii. 5. It is improbable, that such multitudes of both sexes, and at a distance from their own habitations, should be baptized in any other mode.

Another argument, in favour of immersion, is drawn from the account of Philip and the eunuch; Acts viii. 38, 39. who went down (εις) *into* the water; and, after the baptism, they are both said to come up (εκ) *out of* the water. But many passages might be cited, where εις signifies *to* or *unto*, and εκ *from*. Matt. xv. 24. chap. xvii. 27. chap. iii. 11. John ix. 1. 2 Cor. v. 1. Rev. xix. 5.

It is farther argued, that plunging alone represents our being buried with Christ in baptism, and consequently that this ceremony is essential. Compare Rom. vi. 4. Col. ii. 12. The *Pædo-baptists*, though they allow that there is in these passages an allusion to the mode of baptism, which then generally prevailed, maintain, that in the institution of the ordinance, there is no declaration, that it was chiefly designed to represent this, and persons were baptized before it was generally known, that Christ should die and arise from the dead. Our being

cleansed

cleanſed from ſin ſeems to be the thing primarily intended, which may well be repreſented by pouring on water; and as this more naturally repreſents the pouring out of the ſpirit, the ſprinkling us with it, and the ſprinkling of the blood of Jeſus, it may anſwer as valuable purpoſes as that mode, which, more directly, repreſents a death and a reſurrection.

The moſt conſiderable argument in favour of immerſion is, that it was practiſed in the primitive ages. Several texts, in the New Teſtament, ſay the Baptiſts, plainly declare this. Matt. iii. 6, 16. John iii. 23. Acts viii. 36—39. But from thoſe paſſages, the *Pedo-baptiſts* reply, that no certain concluſion in favour of immerſion can be drawn; not from the ſubſequent hiſtory of the Chriſtian church. Though they allow that immerſion might be uſed, there are ſome caſes in which it is more probable, that the mode of baptiſm was ſprinkling; partly on account of the number baptized at once, and partly becauſe many of them were ſtrangers, and far from their own habitations, and therefore deſtitute of that change of raiment, which decency, convenience, and neceſſary, would have required. We might add farther, that baptiſm by ſprinkling is, in its nature and the circumſtances attending it, more ſuitable to the mild and benign genius of Chriſtianity, and to the deſigned extent of its ſpread through all the various climates of the earth, than baptiſm by immerſion. See, on this ſubject, Wall's Hiſtory of Infant Baptiſm, 4to. 1707. Wall's Defence of the Hiſtory againſt Gale, &c. 8vo. 1707. Towgood's Baptiſm of Infants a reaſonable Service. Fleming's Plea for Infants, &c. &c.

For a ſummary of the principal arguments in favour of baptizing adults, and by immerſion, ſee BAPTISTS.

PÆDOTHYSIA, *παιδοθυσια*, in *Antiquity*, an inhuman cuſtom, that prevailed among the ancient heathens, of ſacrificing their children. Thus it is related in the ſcriptures, that the king of Moab, being beſieged by the Iſraelites in his capital, and reduced to great ſtraits, took his eldeſt ſon, that ſhould have reigned in his ſtead, and offered him for a burnt-offering upon the wall, on which the ſiege was raiſed. 2 Kings iii. 27.

From Phœnicia this cruel practice paſſed into Europe, and Africa, and ſpread itſelf far and wide: and it is reported, that the Mexicans are, at preſent, guilty of it.

PÆNOE, in *Botany*, the name of a very large tree, which grows in Malabar.

The reſin, diſcharged from the root, bark, fruit, and other parts of this tree, when boiled with oil, is uſed either for a hard or liquid pitch; and is, in the Indian ſacrifices, ſometimes burnt inſtead of incenſe.

The kernels of the fruit when bruiſed, and, in conjunction with warm water, levigated on a marble, corroborate the ſtomach, remove a naufea and vomiting, allay racking pains of the belly, and cure the cholera. The reſin of this tree, when melted with the oleum ſeſami, is an excellent vulnerary balſam: when reduced to a powder, and exhibited, it alſo powerfully cures a gonorrhœa, and other venereal ſymptoms. Ray.

PÆNULA, or PENULA, among the Romans, a thick, ſhort, cloſe-bodied garment, fit for a defence againſt cold and rain.

PÆONIA, in *Botany*. See PIONY.

PÆONITES, in *Natural Hiſtory*, a name given by ſome writers to the ſtone called by others *paonites*, and eſteemed of great uſe to women in labour. It ſeems to have been called *paonites*, from Pæonia, in Macedonia, where it was found.

PAGAN, *paganus*, a heathen, gentile, or idolater, one who adores falſe gods.

Baronius derives the word *paganus*, *a pagis*, *villages*, becauſe, when Chriſtians became maſters of the cities, the heathens were obliged, by the edicts of Conſtantine and his ſons, to go and live in the country villages, &c. Salmaſius will have the word come from *pagus*, conſidered as originally ſignifying *gens*, or *natio*; whence, he obſerves, we ſay indifferently, *pagans* or gentiles.

The abbot de Fleury gives another origin of *pagan*: he obſerves, that the emperor Conſtantine, going from Antioch, againſt Maxentius, in 350, aſſembled all his troops, and adviſed ſuch as had not received baptiſm to receive it immediately; declaring withal, that ſuch as ſhould be found unbaptized ſhould quit the ſervice, and go home.

Hence, perhaps, ſays the abbot, the name *pagan* might be given to thoſe who choſe the latter; the Latin word *paganus* properly ſignifying *a perſon who does not bear arms*, in oppoſition to *miles*, *a ſoldier*.

And hence it might, in time, extend to all heathens. Or, continues he, the word might come from *pagus*, *village*, in regard the peaſants were thoſe who adhered longeſt to the idolatry of the heathens.

PAGANALIA, an ancient rural feaſt, thus called, becauſe celebrated in the villages, *in pagis*.

In the *paganalia*, the peaſants went in ſolemn proceſſion all around the village, making luſtrations to purify it. They had alſo their ſacrifices, wherein they offered cakes on the altars of the gods.

Halicarnaſſeus and St. Jerom refer the inſtitution of the *Paganalia* to Servius Tullus. They were held in the month of February.

PAGANELLUS, in *Ichthyology*. See GOBET.

PAGANINA, an Italian word, uſed by ſome authors to expreſs the firſt excrements of children: theſe dried and reduced to powder, are eſteemed by ſome a very great and powerful medicine againſt epileptics. It is to be taken in ſmall doſes, every day, for ſome time.

PAGANISM, the religious worſhip and diſcipline of pagans; or the adoration of idols and falſe gods.

The gods of *paganiſm* were either men, as Jupiter, Hercules, Bacchus, &c. or fictitious perſons, as Victory, Fame, Fever, &c. or beaſts, as in Egypt, crocodiles, cats, &c. or, finally, inanimate things, as onions, fire, and water, &c.

PAGARCHUS, *παγαρχος*, formed from *pagus*, *village*, and *αρχω*, *command*, among the ancients, a petty magiſtrate of a pagus, or little diſtrict, in the country.

PAGE, formed from *was*, *child*, *boy*, a youth of ſtate, retained in the family of a prince, or great perſonage, as an honourable ſervant, to attend in viſts of ceremony, carry meſſages, bear up trains, robes, &c. and at the ſame time to have a genteel education, and learn his exercites.

The *pages* in the king's houſhold are various, and have various provinces aſſigned them: as *pages* of HONOUR, *pages* of the preſence-chamber, *pages* of the back-ſtairs, &c.

Pages were anciently diſtinguiſhed from the other ſervants in livery, by their wearing drawers in lieu of breeches; and ſleeves turned up with velvet.

Cujas and Gothofred obſerve, that *pages* in the emperors families were called *paſſagenæ pueri*. Tacitus ſays, the word *page* was firſt given to the little boys who attend tilers, to bring them their tiles, &c. that till the time of Charles VI. or VII. the name was common to the baſeſt ſervants; and it is ſince then, that *page* is become a term of honour; and the meaner ſervants are diſtinguiſhed from them by the name of lacqueys, valets, &c.

PAGE is particularly uſed, in the Turkiſh ſeraglio, for the children of tribute, or ſlaves who wait on the grand ſignor.

They are commanded by the firſt aga, and conſtitute four claſſes, called ODAS.

PAGE *of a book*. See PRINTING.

PAGEANT, a triumphal car, chariot, arch, or other the like pompous decoration, variouſly adorned with colours, flags, &c. carried about in public ſhews, proceſſions, &c.

PAGEL, in *Ichthyology*, a name given by the Spaniards to that fiſh which authors in general call the ERYTHRINUS, or *rubellio*, and ſome the *anthus* and *pagrus*. It is properly a ſpecies of the *ſparus*, and is diſtinguiſhed by Artedi, from the reſt of that genus, by the name of the *ſilver-eyed red-bodied* SPARUS.

PAGOD, a name which the Portugueſe have given to all the temples of the Indians, and all the idolaters of the Eaſt.

The *pagods* of the Chineſe and Siameſe are exceedingly magnificent.

The revenues of the *pagod* of Jamigiade are ſo great, as to ſubſiſt, every day, from fifteen to twenty thouſand pilgrims.

PAGOD is alſo uſed for the idol adored in the temple.

Hence many give the name *pagod* to thoſe little porcelain images brought from China.

PAGOD is alſo the name of a gold coin, current in ſeveral part of the Indies, on the footing of the piece of eight.

The Engliſh coin *pagods* at Fort St. George, and the Dutch at Paliacate.

There are alſo ſilver *pagods* ſtruck at Narſingua, Biſnagar, &c. which uſually bear the figure of ſome monſtrous idol: whence their names. They are of various values.

PAGOXYUM, a word uſed by Paracelſus, and his followers, to expreſs an imaginary being, which preſides over, or is the occaſion of diſeaſes, whoſe cauſes are leſs known, and which have been ſuppoſed to ariſe from inchantment. Such is the doctrine of this ſtrange writer; and on this ſubject he has written a treatiſe called *Pagoxyum*.

PAGRUS, in *Ichthyology*, the name of a ſea-fiſh, the *ſparus pagrus* of Linnæus, known in Engliſh by the name of the *ſea-bream*, and the *red gilt-head*. It is a conſiderably large fiſh, growing ſometimes to ten or twelve pounds weight. It is very broad in proportion to its length, and is alſo conſiderably thick; its head is ſtatted

at top, and, at the baſis of the gill fins, it has on each ſide a large black ſpot; the irides are ſilvery; the inſide of the covers of the gills, the mouth and the tongue are of a fine red; the ſkin at the end of the dorſal and anal fins is gathered up, and hides the laſt rays; the ſcales are large, the tail forked, and the colour of the whole body is red. It is caught in conſiderable plenty in the Mediterranean, and is common in the markets of Italy. Some account it a very delicate fiſh, but many think it eats too dry. See *Tab.* III. *Fiſh*, N° 34.

PAGRUS is alſo uſed by Joannes Cuba, and others, for the fiſh commonly called *dentex*, the *ſynodus*, and *ſmegris* of the Greeks. It is a ſpecies of the ſparus, and is accurately diſtinguiſhed by Artedi, by the name of the *variegated ſparus*, with a ſharp back, and with four large teeth.

PAGRUS is alſo a name given by Paulus Jovius, and ſome other authors, to the fiſh called ERYTHRINUS and *rubellio*, and by Agnian, *eathus*. It is of the ſparus kind, and is diſtinguiſhed by Artedi, by the name of the *ſilver-eyed red-bodied ſparus*.

PAGRUS *indicus*, a name by which ſome authors have called the Eaſt Indian fiſh, more uſually known by the name of BRAMA *ſumatrenſis*.

PAHIE is one of the claſſes of canoes or boats uſed by the inhabitants of the iſlands in the South Sea. The *pahie* is of different ſizes, from ſixty to thirty feet long, but very narrow; a tranſverſe ſection of it reſembles the ſpade of cards, the whole being much wider in proportion to its length. The largeſt *pahies* are uſed for fighting, in which caſe they are fitted with a ſtage or platform; but principally for long voyages. Hawkſworth's Voy. vol. ii. p. 222, &c. See IVAHAH.

PAIGLES. See PRIMROSE.

PAIN, an uneaſy ſenſation, ariſing from a ſudden and violent ſolution of continuity, or other accident in the nerves, membranes, veſſels, muſcles, &c. of the body. *Pain*, according to ſome, conſiſts in a motion of the organs of ſenſe; and, according to others, it is an emotion of the ſoul, occaſioned by thoſe organs.

From the phyſical definition of *pain*, it follows, that whatever may diſtract or ſeparate the parts of the nerves or membranes from one another, may cauſe *pain*; but there is nothing in the compaſs of nature which may not do that, with whatever figures and properties it be endued: for ſince ſomewhat may always be applied, or added, to any other body, ſuch body may at length increaſe into a bulk too big to flow through a canal of a given diameter, and will therefore require more room: wherefore, while the ſides of a canal are thruſt outward beyond what they uſed to be, that is, while the parts compoſing thoſe ſides, before contiguous, become looſened and moved away from one another; if that body ſtrike upon thoſe ſides with a briſk impetus; and that impetus be continually renewed, the ſolution will be conſiderable, or the niſus towards a ſolution violent; that is, there will be *pain*. Wherefore the conſtituent parts of fluids, being ſufficiently augmented in dimenſion, and propelled with a continually repeated impetus againſt any canal of our body, may occaſion that ſolution, in which conſiſts the eſſence of *pain*.

For it comes to the ſame thing, whether ſome parts be added to a body; or the parts of that body be, by any cauſe whatſoever, ſeparated to ſo great an interval near the ſides of a canal, as to conſtitute a dimenſion equal to that which would ariſe from the addition of a new part; for the bulk may ſo far increaſe both ways, as that the natural capacity of the canal ſhall not be big enough to contain it, without ſome violent dilatation, and a diſtraction of the fibres it is compoſed of: and conſequently *pain* muſt enſue.

Farther, as there may be always ſomewhat added to another body; ſo from any body may ſomewhat be always taken away: a body ſo diminiſhed in dimenſion, and impelled with a conſiderable impetus, will break through the interſtices of the fibres, where it is leſs than the capacity of ſuch interſtices, and is moved obliquely: and becauſe the ſuperficies of the fibres, are not wont to be contained under geometrical right lines, but to have particles ſtanding out and prominent, theſe it divides from one another. And thus any body, of whatſoever figure, may occaſion in us *pain*, ſo it be big enough to diſtend the veſſels beyond their wonted meaſure, or ſmall enough to enter the pores in the ſides of a canal, with an impetus in the manner intimated.

And what is thus advanced, with relation to things within the veſſels, may be eaſily applied to others out of the veſſels.

PAIN, in *Medicine*, conſidered as a ſymptom of a diſeaſe, makes a conſiderable article in a palliative cure. See DOLOR.

PAINS, *after*. See DELIVERY, and LYING-*in women*.

PAIN-*d'abeilles*, a word uſed by ſome to expreſs what the ancients called *ambroſia*, or the yellow ſubſtance found concreted in lumps on the legs of bees, and ſuppoſed by the generality of the world to be real wax.

Experiments made by Mr. Reaumur and others, have ſufficiently proved that this ſubſtance is not wax, nor has it any of the properties of wax; but it has been conjectured, that this is the matter out of which wax is finally made.

In tracing this ſubſtance up to its origin, we find that the bees collect the farina of flowers, which when moulded by their feet into a lump, makes this matter. It is very probable, that they feed on this matter, and, as ſome imagine, after paſſing through certain changes in their bodies, it becomes wax. This was an opinion ſo old as the days of Pliny; ſome of the authors he quotes calling this ſubſtance *ambroſia*, or the food of theſe little deities; but later obſervations overthrew this opinion, till it again got credit under the more accurate examinations made by Mr. Reaumur, on the ſtructure and parts of the bee. This is a food not only eaten occaſionally by the bees, but neceſſary to their ſupport, and is found ſtored up in their hives againſt a bad ſeaſon. The combs have their different cells made for different purpoſes; and, beſide that, ſome are deſtined for receiving honey, and ſome for the young worms which are hereafter to become bees; there are ſome alſo which ſerve to contain this yellow matter, collected on the legs of theſe inſects. In fine weather, when more of this matter is collected than is eaten for immediate nouriſhment, the bees ſcrape off the lumps of it from their legs into ſome of the holes, or cells of the combs, where, others following their example, there finally become large reſerves of it; which are eaten on ſuch days when they cannot go out in ſearch of more.

The bee collects this yellow matter, which, according to Reaumur, is the prime conſtituent of the wax, from whatever flowers happen to be moſt plentiful about the hives; and though generally yellow, as the farina of moſt plants is ſo, yet it is ſometimes ſeen in red or green lumps on their thighs; but whatever be its natural colour, it is always turned yellow before it is diſcharged from the body of the animal; and when the ſtomach of any of them is diſſected, after feeding on a red ſubſtance collected from flowers, the farina of which is of that colour, the change is found to be made as to colour in this part, for the whole is found there in form of a yellow jelly. This matter, if taken out of the ſtomachs of ſeveral bees, and dried, is found to be of a diſagreeable ſmell, like fermented matter, and of a pungency ſomewhat reſembling that of the volatile ſalts. Mr. Reaumur was hence induced to try the effect of the volatile ſalts in turning the bees bread, or rough wax, into perfect wax by digeſtions, continued a long time, but in vain. If we may give credit, however, to the German Ephemerides, there is a much more eaſy way of reducing this matter, while yet contained in the apices of the plant, into true wax; and that without the aſſiſtance of the work of the bees. Mr. David Maja gives an account, in thoſe papers, that the perſons he employed in beating roſes into conſerve, always obſerved in the pounding of the roſes, before the ſugar was put to them, that a piece of ſolid but ſoft matter was found adhering to the peſtle of the mortar, which, on a ſtrict examination, proved to be true and genuine wax. It appeared from this experiment that the juice of the petals or leaves of the roſes, was able, by the aſſiſtance of beating, to convert into true wax the farina contained in the apices of that flower. Mr. Reaumur tried what effect the juice of roſes would have on the yellow matter collected on the legs of the bees, and on the farina of plants, but no treatment he could give theſe ſubſtances was ever able to produce wax. Mr. Reaumur alledges as an abſolute proof, that the bees eat the rough wax or bees bread; that, by obſerving the bees of a certain hive to come home loaded with it every day, ſeveral times over, during the month of April, and a great part of May; and after this, opening and examining the hive they belonged to, there were found no new combs, nor were the old bees enlarged in ſize: it is true, that there were ſome cells found, filled with magazines of this matter, but as the far greater part was brought to no ſort of account, it ſeems very plain that they had eat it. It is to be obſerved, that the bees have their ſeveral periods of going out in ſearch of this matter and of honey: it would be too fatiguing for them to be always thus at work; and to avoid this there is always a very large part of them, even more than half the hive, found at reſt within it; theſe are ſuch as have worked till they are tired, and the others in turn take this manner of reſting, and ſend theſe out to work again. Reaumur's Hiſt. Inſ. vol. x. p. 68.

But it is neceſſary to add, that Butler, Purchas, Ruſden,

and Thorley, very accurate obſervers of the various operations of bees, have urged ſeveral arguments to diſprove the identity of the ſubſtance now deſcribed, and wax. When the hives, they ſay, have been for a year or more filled with combs down to the floor, and there is no more room to build, the bees carry in this matter in the greateſt plenty; and even when no more wax is wanting, beſides the ſmall quantity which is required for ſealing up the honey and the breeding cells. They alſo urge, that this ſubſtance is very different from wax; as the particles of the former will ſeparate from each other, and be crumbled to powder when examined between the fingers, whereas thoſe of the latter will adhere, and cleave together; and if the one be carried to the fire, it will melt and diſſolve, whereas the other will be converted into aſhes and duſt. The diſſerence of the colours of this ſubſtance is an additional proof that it is not wax, which, when it is gathered and wrought into combs, is always white, and the change of its colour is owing merely to the age of the comb, and breath of the bees. Beſides, it is obſerved, that new ſwarms for the firſt, ſecond, or third day, carry in little or nothing of this matter; though in that ſpace of time they have conveyed into the hive ſufficient quantities of wax, formed into ſeveral large combs: on the contrary, when they carry in the greateſt quantity of this matter, they collect the leſs wax: becauſe the new ſwarms want the wax, and the old ſtocks want food and nouriſhment for their young. Moreover, Mr. Thorley found upon the belly of a bee, which he caught as it was entering the hive, within the plaits, no leſs than ſix pieces of ſolid wax, perfectly white and tranſparent: and he has alſo at other times found wax in the ſame ſituation. Thorley's Inquiry into the Nature, &c. of Bees, ed. 1774. p. 106. See WAX.

PAINE *fort, & dure*, in *Law*, an eſpecial puniſhment, formerly inflicted on one, who, being arraigned of felony, refuſed to put himſelf upon the ordinary trial of God and his country, and thereby ſtood mute by the interpretation of law.

This is vulgarly called *preſſing to death*. The proceſs whereof is thus deſcribed:

"He ſhall be ſent back to the priſon, whence he came; "and be laid in ſome low dark room, where he ſhall lie "naked on the earth, without any litter, ruſhes, or other "cloathing, and without any raiment about him, but "only ſomething to cover his privy members; and he "ſhall lie upon his back with his head covered, and his "feet; and one arm ſhall be drawn to one quarter of the "room, with a cord, and the other arm to another quarter, "and his legs in the ſame manner; then let there be "laid upon his body iron, or ſtone, as much as he may "bear, or more; and the next day following, he ſhall "have three morſels of barley-bread without drink; and "the ſecond day he ſhall have drink three times, as much "at each time as he can drink, of the water next unto "the priſon, except it be running water, without any "bread; and this ſhall be his diet, till he dies."

This ſpecies of puniſhment is now diſcontinued by 12 Geo. III. cap. 20. See MUTE.

PAINIM, the ſame with PAGAN.

PAINT, *black oil*, in the *Arts*, is prepared by grinding, with a proper quantity of oil, the charcoal or ſoot blacks, or the natural black earths, or the pit-coal, till they are united into a ſmooth, uniform, thick compound, which is occaſionally diluted with more oil to a due conſiſtence for being worked freely with the bruſh or pencil. The fineſt black colour is made with ivory black, ground before the addition of the oil, into an impalpable powder. The material moſt commonly made uſe of is lamp-black, the unctuoſity of which diſpoſes it to mix more eaſily and perfectly with oil than other pigments; but it derives hence the imperfection and diſadvantage of drying ſlowly, which may be remedied by a due preparation of the oil; as by ſetting it on fire, and boiling it, as in the method of making PRINTING-ink. An opake deep black *paint* with water, is made by grinding ivory-black with gum-water, or with the liquid which ſettles from white of eggs, after they have been beaten up and ſuffered to ſtand a little. Some uſe gum-water and the white of eggs together; and obſerve that a ſmall addition of the latter makes the mixture flow more freely from the pencil, and improves its gloſſineſs. Lewis's Com. Phil. Techn. p. 356, &c.

PAINTED *lady*, among the *Florifts*, a term for a particular ſort of carnations, the flowers of which have all their petals red or purple on the outſide, and white underneath.

PAINTER, in *Naval Language*, a rope employed to faſten a boat either along-ſide of the ſhip to which it belongs, or to ſome wharf, key, &c. as occaſion requires. See SHANK-*Painter*.

PAINTER, in the *Hiſtory of the Arts*, one who poſſeſſes and practiſes the art of PAINTING.

PAINTERS, *houſe*. The price of painters work is limited by ſtatute, and they ſhall not take above 16*d.* a-day, for laying any flat colour, mingled with oil or ſize, upon timber, ſtone, &c. and plaiſterers are forbid uſing the trade of a *painter* in London, or to lay any colours of painting, unleſs they are ſervants to *painters*, &c. on pain of 5*l.* But they may uſe whiting, blacking, red lead, oker, &c. mixed with ſize only, ſtat. 1 Jac. I. cap. 23.

Painting is meaſured by the ſquare yard in the ſame manner as WAINSCOTING. the mouldings being meaſured by a thread; the faſhes of windows are paid for by the piece.

PAINTING, PICTURA, the art of repreſenting all viſible objects by lines and colours, on an even and uniform ſurface.

Painting is ſaid to have had its riſe among the Egyptians: and the Greeks, who learned it of them, carried it to its perfection, if we may believe the ſtories related of their Apelles and Zeuxis.

The Romans were not without conſiderable maſters in this art, in the latter times of the republic, and under the firſt emperors: but the inundation of Barbarians, who ruined Italy, proved fatal to *painting*, and almoſt reduced it to its firſt elements: nor was it recovered in Europe till the age of Julius II. and Leo X. This laſt revolution in the hiſtory of *painting* has given occaſion for diſtinguiſhing it into ancient and modern. The ancient *painting* comprehends the Greek and Roman: the modern has formed ſeveral ſchools, each of which has its peculiar character and merit.

It was in Italy, however, that the art afterwards returned to its ancient honour, and about the middle of the thirteenth century; when Cimabue, born at Florence, A.D. 1240, betaking himſelf to the pencil, tranſlated the poor remains of the art, from a Greek painter or two, into his own country.

He was ſeconded by ſome Florentines: the firſt who got any reputation was Ghirlandaio, Michael Angelo's maſter, born in 1449; Pietro Perugino, Raphael Urbin's maſter, born in 1446; and Andrea Verocchio, Leonardo Da Vinci's maſter, born in 1432.

But theſe ſcholars vaſtly ſurpaſſed the maſters: they not only effaced all that had been done before them, but carried *painting* to a pitch from which it has ever ſince been declining.

It was not by their own noble works alone that they advanced *painting*, but by the number of pupils they bred up, and the ſchools they formed.

Angelo, born in 1474, in particular, founded the ſchool of Florence; Raphael, born in 1483, the ſchool of Rome; and Leonardo, born in 1445, the ſchool of Milan; to which muſt be added, the Lombard ſchool, eſtabliſhed about the ſame time, and which became very conſiderable under Giorgione, born in 1477, and Titian, born alſo in 1477.

Beſides the Italian maſters, there were other very great ones on this ſide the Alps, who had no communication with thoſe of Italy: ſuch were Albert Durer, in Germany; Holbens, in Switzerland; Lucas in Holland; and others in France and Flanders; but Italy, and particularly Rome, was the place where the art was practiſed with the greateſt ſucceſs; and where, from time to time, the greateſt maſters were produced.

To Raphael's ſchool ſucceeded that of the Caraccios, which has laſted, in its ſcholars, almoſt to the preſent time; wherein the French painters, by the munificence of Louis XIV. ſeem almoſt in a condition to vie with thoſe of Greece or Italy.

In Paris they have two conſiderable bodies of painters; the one, the *royal academy of painting and ſculpture*; the other, the *community of maſters in painting, ſculpture*, &c. Our own country has for the two laſt centuries been diſtinguiſhed by its artiſts, and by the encouragement it has afforded to perſons of diſtinguiſhed merit. See ACADEMY.

The art of *painting* is divided, by Freſnoy, into three principal parts; invention, deſigning and colouring; to which ſome add a fourth, viz. diſpoſition. Felibien divides *painting* into compoſition, deſigning, and colouring. M. Teſſlin, painter to the late king, divides it, ſomewhat more accurately, into the deſign or draught, the proportion, the expreſſion, the chair-obſcure, the ordonnance, and the colouring; to which his Engliſh tranſlator adds the perſpective. Under each of theſe heads, he gives us the rules and ſentiments of the beſt maſters. See DESIGN, PROPORTION, EXPRESSION, CLAIR-OBSCURE, ORDONNANCE, COLOURING, &c.

Painting is of various kinds, with regard to the materials uſed; the matter whereon they are applied; and the manner of applying them. Hence we diſtinguiſh *painting* in oil; *painting* in water-colours, or limning; *painting* in

in freſco; *painting* on glaſs; *painting* in enamel; and *painting* in miniature, &c.

PAINTING *in oil.* The art of *painting* in oil was unknown to the ancients, as writers on this ſubject have generally ſuppoſed; and the invention of it has been uniformly aſcribed to a Flemiſh painter, one John van Eyck, or John de Bruges, who is ſaid to have firſt diſcovered, and put it in practice in the beginning of the fourteenth century: before his time, all the painters wrought in freſco, or in water-colours.

A late writer has produced ſeveral arguments to prove, that *painting* in oil was known, if not to the ancients, long before the pretended diſcovery of John and Hubert van Eyck. The claims of this artiſt are founded on the teſtimony of Vaſari, in his Lives of the Painters, firſt publiſhed in 1566; a writer, who was neither a countryman of Van Eyck, nor a contemporary; as he wrote and publiſhed his book one hundred and fifty years after his death. Before Vaſari's time it does not appear, that any Flemiſh or Dutch hiſtorian has aſcribed this invention to their countryman, nor among the high encomiums on John Van Eyck as a painter, in his epitaph in the church of St. Donat at Bruges, is there any mention of his having invented *oil-painting*. Beſides, inſtances occur and are recorded by ſeveral writers of Flemiſh *oil-paintings*, which were executed before the time of the ſuppoſed inventor. And Mr. Horace Walpole, in his Anecdotes of Painting in England, has produced ſome unqueſtionable facts, which prove, that *oil-painting* was known and practiſed in this kingdom long before the time in which Van Eyck is reported to have invented it in Flanders. Among ſeveral arguments and facts to the ſame purpoſe, it is alledged, that Theophilus, in a Treatiſe De Arte *pingendi*, diſcovered in the library of Trinity-college, Cambridge, who is ſuppoſed to have lived in the tenth or eleventh century, deſcribes the method of making linſeed oil for the uſe of painters, and gives two receipts for making oil-varniſh. Raſpe's Critical Eſſay on Oil-Painting, 4to. 1781.

This, however, was an invention of the utmoſt advantage to the art; ſince, by means hereof, the colours of a *painting* are preſerved much longer and better, and receive a luſtre and ſweetneſs which the ancients could never attain to, what varniſh ſoever they made uſe of to cover their pieces.

The whole ſecret only conſiſts in grinding the colours with nut-oil or linſeed-oil; but it muſt be owned, the manner of working is very different from that in freſco, or in water; becauſe the oil does not dry near ſo faſt; which gives the painter an opportunity of touching and retouching all the parts of his figure, as often as he pleaſes: which, in the other kinds, is a thing impracticable.

The figures too are here capable of greater force and boldneſs; inaſmuch as the black becomes blacker, when ground with oil, than with water; beſides that, all the colours, mixing better together, make the colouring ſweeter, and more delicate and agreeable; and give an union and tenderneſs to the whole work, inimitable in any of the other manners.

It muſt be acknowledged that *paintings* in oil are liable to decay and fade; whereas the vehicle, whatever it was, uſed by the ancients, gave their works an advantage over thoſe of the moſt celebrated moderns in point of duration. Pauſanias deſcribes the paintings in the Poikile, at Athens, without the leaſt intimation that they were decayed or faded, in the courſe of ſix hundred years; and the ancient picture called the Aldobrandine Marriage, now to be ſeen in the palace of that name at Rome, continues to this day a fine picture, though probably painted two thouſand years ago. Beſides, the vehicle of the ancients did not change or corrupt the pigments tempered with it; the Aldobrandine picture, and thoſe at Herculaneum are evidences to this purpoſe.

The colours proper to be uſed in oil, for red, are vermilion, native cinnabar, lakes, ſcarlet oker, common Indian red, terra di Sienna burnt, and mixed with white, red oker, Spaniſh brown, Venetian red, and red lead: for blue, ultramarine, Pruſſian blue, ultramarine aſhes, verditer, indigo, and ſmalt: for yellow, king's yellow, Naples yellow, yellow oker, Dutch pink, light pink, maſticot, common orpiment, terra di Sienna unburnt, and mixed with white, and turpeth mineral: for green, terra verte, verdigriſe, diſtilled verdigriſe, or cryſtals of verdigriſe, and Pruſſian green: for purple, true Indian red: for brown, burnt terra di Sienna, unmixed with white, brown pink, brown oker, umbre, and aſphaltum: for white, white flake and white lead: for black, lamp black, ivory black, and blue black. See each deſcribed in its place.

As to oils, the beſt are thoſe of walnuts, poppies, linſeed, ſpike, and turpentine.

For the drying oils, ſee *Drying* OIL; and for the method of preparing varniſh, ſee VARNISH.

Painting in oil is performed on walls, on wood, canvas, ſtones, and all ſorts of metals; but more commonly on canvas, wood, or copper plate.

The pieces of canvas prepared by proper primings, and called by painters cloths, are the grounds for *oil-painting* moſt in uſe. Theſe are ſold by the colourmen, but may be prepared in the following manner: let the cloths be firſt well ſoaked with drying oil, laid on hot, and when nearly dry let two or three coats of drying oil and red oker, mixed as thick as they can be worked, be ſpread over it. Then, the laſt being dry, let the cloth be brubhed over with laſt drying oil, as long as it appears to ſink in; and, laſtly, let it be covered with a coat of white lead and oil, rendered grey or of any other colour deſired, by admixture of the proper pigments. This laſt coat may be poliſhed to a due degree, by rubbing with a pumice ſtone, or by glazing it with the glaſs poliſhers uſed for linen, and called callender ſtones.

The common method of preparing wood for oil colours is to clear-coat it with ſize and whiting, and then to cover it with white lead and oil. But for paintings of value, the wood ſhould be bruſhed over with hot drying oil, as long as it will ſoak in, and then covered with a coat of white lead, or flake, coloured according to what may be deſired.

When copper-plates are uſed, there is no occaſion for any other priming than one coat of oil, and lead, and oker, rendered of the colour deſired; and the ſurface of the priming made as ſmooth as poſſible by means of the pumice or callender ſtone. A fine ground for copper-plates may be prepared by uſing flake white and ſtet oil, with any colour required, which being laid on the plates, placed in a horizontal poſition to dry, will poliſh itſelf very highly by the running of the oil, which ſhould be very fat.

To PAINT *on a wall.* When well dry, they give it two or three waſhes with boiling oil, till the plaſter remain quite greaſy, and will imbibe no more. Over this they apply deſiccative or drying colours, viz. white chalk, red oker, or other chalks beaten pretty ſtiff. This layer being well dried, they ſketch out, and deſign their ſubject on it, and at laſt paint it over; mixing a little varniſh with their colours, to ſave the varniſhing afterwards.

Others, to fortify their wall better againſt moiſture, cover it with a plaſter of lime, marble-duſt, or a cement made of beaten tiles ſoaked with linſeed-oil; and at laſt prepare a compoſition of Greek pitch, maſtic, and thick varniſh boiled together, which they apply hot over the former plaſter; and when dry, they lay on the colours as before.

Others, in fine, make their plaſter with lime mortar, tile-cement, and ſand; and this being dry, they apply another of lime, cement, and iron ſcoriæ; which, being well beaten, and incorporated with whites of eggs, and linſeed-oil, makes an excellent plaſter. When this is dry, the colours are applied as before. See FRESCO.

To PAINT *on wood.* They uſually give their ground a layer of white tempered with ſize; or they apply the oil above mentioned; the reſt is done as in *painting* on walls. See PAINTING *in oil.*

To PAINT *on cloth or canvas.* The canvas being ſtretched on a frame, they give it a layer of ſize, or paſte-water; and when dry, they go over it with a pumice-ſtone, to ſmooth off the knots. By means of the ſize, the little threads and hairs are all laid cloſe on the cloth, and the little holes ſtopped up, ſo that no colour can paſs through. When the cloth is dry, they lay on oker in oil, which is a natural earth, and bears a body; ſometimes mixing with it a little white lead to make it dry the ſooner. When dry, they go over it again with the pumice-ſtone, to make it ſmooth.

After this, they ſometimes add a ſecond layer compoſed of white lead: and a little charcoal black, to render the ground of an aſh-colour: obſerving in each manner to lay on as little colour as poſſible; that the cloth may not break, and that the colours, when they come to be painted over, may preſerve the better.

In ſome *paintings* of Titian and Paolo Veroneſe, we find they made their ground with water, and painted over it with oil; which contributed much to the vivacity and freſhneſs of their works: for the water-ground, by imbibing the oil of the colours, leaves them the more beautiful; the oil itſelf taking away a deal of their vivacity. As little oil therefore is to be uſed as poſſible, if it be deſired to have the colours keep freſh: for this reaſon ſome mix them with oil of ſpike, which evaporates immediately, yet ſerves to make them manageable with the pencil. See PAINTING *in oil.*

To PAINT *on ſtones or metals*, it is not neceſſary to apply ſize, as on cloth; it ſuffices to add a ſlight layer of colours,

leurs, before you draw your *deſign*; not even in this done on ſtones where it is deſired the ground ſhould appear, as on certain marbles and agates of extraordinary colours.

PAINTING *in diſtemper, in enamel, encauſtic, in freſco, on glaſs, in miniature, in moſaic.* See the ſeveral articles.

PAINTING *in varniſh.* See JAPANNING.

It has been lately a practice with ſome eminent portrait painters, to make a compound vehicle, by mixing oils and varnith together; and this is called *painting in varniſh.*

PAINTING *in water-colours.* See LIMNING and MINIATURE.

PAINTING *china-ware.* See PORCELAIN.

PAINTING *paper marbled.* See PAPER *marbled*, and JAPANNING.

PAINTING, *imitating of, in colours.* See MEZZOTINTO.

PAINTING *on gloſs by means of mezzotinto prints.* See BACK-*painting.*

PAINTING, *to ſoil, method of taking off, &c.* The art of removing *paintings* in oil from the cloth or wood on which they are originally done, and transferring them to new grounds of either kind or ſubſtance, is of great uſe. For thoſe on cloth or canvaſs, the method is as follows: let the decayed picture be cleanſed of all greaſe that may be on its ſurface, by rubbing it very gently with crumb of ſtale bread, and then wiping it with a very fine ſoft linen cloth. It muſt then be laid, with the face downwards, on a ſmooth table covered with ſan-paper, or the India paper; and the cloth on the reverſe muſt be well ſoaked with boiling water, ſpread upon it with a ſponge, till it appears perfectly ſoft and pliable. Turn the picture with the face upwards, and having ſtretched it evenly on the table, pin it down with nails at the edges. Having melted a quantity of glue and ſtrained it through a flannel cloth, ſpread part of it, when a little ſtiffened, on a linen cloth of the ſize of the *painting*, and when this is ſet and dry, lay another coat over it; when this is become ſtiff, ſpread ſome of the glue, moderately heated, over the face of the picture, and lay over it the linen cloth already prepared in the moſt even manner, and nail it down to the picture and table. Then expoſe the whole apparatus to the heat of the ſun, in a place where it may be ſecured from rain, till the glue be perfectly dry and hard; when this is the caſe, remove the picture and linen cloth from the table. Turn the picture with the face downwards, and let it be ſtretched and nailed to the table as before; then raiſe round its edge a border of wax as in the ETCHING of copper-plates, forming a kind of ſhallow trough with the ſurface of the picture, into which pour a proper corroding fluid, as oil of vitriol, aqua fortis, or ſpirit of ſalt, but the laſt is to be preferred: dilute either of theſe with water to ſuch a degree, determined by previous trials, that they may deſtroy the threads of the original canvaſs or cloth of the picture, without diſcolouring it. When the corroding fluid has anſwered this purpoſe, drain it off through a paſſage made at one end of the border of wax, and waſh away the remaining part by repeatedly pouring quantities of freſh water on the cloth. The threads of the cloth muſt be then carefully picked out till the whole be taken away. The reverſe ſurface of the *painting*, being thus wholly freed from the old cloth, muſt be well waſhed with water by means of a ſponge, and left to dry. In the mean time prepare a new piece of canvaſs of the ſize of the *painting*; and having ſpread ſome hot glue, purified as before, and mixed with a little brandy or ſpirit of wine over the reverſe of the *painting*, lay the new canvaſs evenly upon it, while the glue is hot, and compreſs them together with thick plates of lead or flat pieces of poliſhed marble. When the glue is ſet, remove theſe weights, let the cloth remain till the glue is become perfectly dry and hard. Then the whole muſt be again turned with the other ſide upwards, and the border of wax being replaced, the linen cloth on the face of the *painting* muſt be deſtroyed by means of the corroding fluid; particular care is neceſſary in this part of the operation; becauſe the face of the *painting* is defended only by the coat of glue which cemented the linen cloth to it. The *painting* muſt then be freed from the glue by waſhing it with hot water, ſpread and rubbed on the ſurface by a ſponge. The *painting* may afterwards be varniſhed as a new picture; and if the operation be well conducted, it will be tranſferred to the new cloth in a perfect ſtate.

When the *painting* is originally on wood, it muſt firſt be detached from the ceiling or wainſcot where it was fixed; and the ſurface of it covered with a linen cloth, cemented to it by means of glue, as already directed. A proper table being then provided, and overſpread with a blanket, or thinner woollen cloth, laid on in ſeveral doubles; the *painting* muſt be laid upon it with the face downwards, and fixed ſteady; and the board or wood on which it was done, muſt be planed away, till the ſhell remains as thin as it can be made, without damaging the paint under it. The proceſs is afterwards the ſame as that in the caſe of *paintings* on canvaſs; till the *painting* on wood be in like manner tranſferred to a cloth or canvaſs. Doſſie's Hand. Arts vol. ii. p. 417, &c.

PAIR, PAR, a collective term, uſed for two equal or ſimilar things ordinarily joined together; though more frequently for artificial things than for natural ones. As, a *pair* of gloves, of ſtockings, of ſhoes, &c.

PAIR is alſo uſed in compound things, for two parts alike to each other, though they only make one whole. As, a *pair* of ſciſſars, &c.

PAIR is alſo uſed for a ſet or ſyſtem of ſeveral things joined to make another complete: as a *pair* of bagpipes, &c.

PAIR, again, is uſed, by extenſion, for a thing that is ſingle, as a *pair* of tables, &c.

PAIR, PAR, in *Anatomy*, denotes an aſſemblage or conjugation of two nerves, which have their origin together in the brain or ſpinal marrow; and are thence diſtributed into the ſeveral parts of the body, one on the one ſide, and the other on the other.

Thus we ſay, *the firſt pair*, *the ſecond pair*, &c. the *par vagum*, *par quintum*, &c. ſometimes *the olfactory pair*, *ophthalmic pair*, &c.

PALA, in *Botany*, a name by which ſome authors have called *the nutmeg-tree.*

PALA, in *Ichthyology*, a name uſed by ſome authors for a fiſh of the truttaceous kind, more uſually known by the name of *ſerra.* See GUINIAD.

PALACE, *palatium*, a name generally given to the dwelling-houſes of kings and princes.

Procopius derives the word from a Grecian called *Pallas*, who gave his own name to a magnificent houſe he had built; adding, that Auguſtus, after him, gave the name *palatium* to the houſe of the Roman emperors on the hill which for that reaſon was called the *Palatine* mount. Others take it the contrary way; and ſay that Romulus's houſe, wherein Auguſtus lived, was properly called *palatium*, becauſe ſituate on the *Palatine* mount. Be this as it will, it is certain, *palatium*, from a proper name, in time became common to all houſes of kings. And as the kings uſually heard and determined cauſes in their houſes, in what part of the realm ſoever they were ſituate; hence alſo *palatium* became a name for a court of juſtice, which uſage is ſtill retained, eſpecially in France.

In courſe of time the name *palace* has alſo been applied to the houſes of other perſons; taking different epithets, according to the quality of the inhabitants: as imperial *palace*, royal *palace*, pontifical, cardinal, epiſcopal, ducal *palace*, &c.

PALÆSTE, the name of a Greek meaſure of length, being the ſame with the *dochme* and *doron*, and containing four finger-breadths, or digits.

PALÆSTRA, παλαιστρα, among the ancient Greeks, a public building, where the youth exerciſed themſelves in wreſtling, running, playing at quoits, &c.

Some ſay, the *palæſtra* conſiſted both of a college, and an academy; the one for exerciſes of the mind, the other for thoſe of the body. But moſt authors rather take *palæſtra* to be a xyſtus, or mere academy for bodily exerciſes, according to the etymology of the word, which comes from παλη, *wreſtling*, one of the chief exerciſes among the ancients.

The length of the *palæſtra* was marked out by ſtadia, each equal to one hundred and twenty-five geometrical paces; and hence the name *ſtadium* was given to the arena whereon they ran.

PALÆSTROPHYLAX, formed from παλαιστρα, and φυλαξ, *guardian*, or *keeper*, among the *Ancients*, was the director of a PALÆSTRA; and of the exerciſes performed therein.

This officer was alſo called *xyſtarchus* and *gymnaſiarcha.*

PALALACA, in *Natural Hiſtory*, the name given by the people of the Philippine iſlands to a bird common among them, and ſomewhat reſembling the *upupa*, or HOOPOE. From the deſcription which father Camelli gives of this bird, it ſeems very plainly to be a ſpecies of *woodpecker*, of a very large and beautiful kind.

PALANQUIN, a kind of chaiſe, or chair, borne by men on their ſhoulders; much uſed by the people of China, and the Eaſt, as a vehicle for their eaſy conveyance from place to place.

PALAPARIJA, in *Zoology*, the name of a ſpecies of Eaſt India ſerpent, found in the iſland of Ceylon. It is a large kind, and beautifully variegated in colour, with a great deal of red about it. It is one of thoſe ſpecies which naturally live under ground.

PALARIA, among the Romans, a kind of exerciſe performed at a ſtake by the ſoldiers.

The ſtake being fixed immoveable in the ground, and ſix feet high above it; the young undiſciplined ſoldiers advanced againſt it armed with a hurdle and cudgel, in-

ftead of a fhield and fword, and went through all the rules of attack and defence, as if actually engaged with an adverfary. Sometimes they ftood at a diftance, and attacked it with miffive weapons, at the fame time ufing all the requifite motions for defending themfelves, and warding off what might be thrown againft them.

PALATE, *palatum*, in *Anatomy*, the flefh that compofes the roof, i. e. the upper and inner part of the MOUTH.

Du Laurence fays it has its name from the Latin *pals*; becaufe inclofed with two rows of teeth, refembling little ftakes, which the Latins call *pali*.

The *palate* is a little vaulted or concave; it is lined with a glandulous coat, under which are great numbers of pretty confpicuous glands, fcattered in the fore-part of it like grains of millet, with many interftices, whofe excretory ducts, piercing the membrane, open into the mouth; but towards the hinder part they lie much thicker; and about the root of the uvula they are gathered fo clofe together, that they appear to form one pretty large conglomerate gland, called by Vetheyen, *glandula conglomerata palatina*.

Towards the bottom of the *palate*, behind the UVULA, is a pretty large perforation, which, a little from its orifice, divides into two, each whereof goes to one of the noftrils. Many take the *palate* to be the organ of tafting.

Wounds of the *palate* and other parts of the mouth are only to be healed by being anointed with honey of rofes, either alone or mixed with balfam of Peru, or with oil of myrrh *per deliquium*.

PALATE, *bones of the*. There are two bones fituated in the pofterior part of the arch of the *palate*, between the *pterygoide apophyfis* and the *offa maxillaria*, and running up on the fides of the *nafal foffa* all the way to the bottom of each orbit. The figure of thefe bones is not fquare, as has been faid by thofe who have only feen that portion of them which belongs to the *palate*, and from thence have named them *offa palati*. The entire bone is crooked, hooked, pointed, and uneven, though of a fmall fize. Each of thefe may be divided into four portions, one fuperior, one middle, and two lower; whereof one is the anterior, the other the pofterior. The lower and anterior portion, to be called properly the *portio palatina*, is the bafis or body of the bone, and the only part of it which the ancient anatomifts, except Vidus Vidius, have obferved. It completes the arch of the *palate*, and the bottom of the *nafal foffa*; the inner edge of it is raifed, and that joined to the like edge of the other bone, forms a groove, which receives part of the *feptum narium*, in the fame manner as the other part of it is received in a like groove of the *offa maxillaria*. The pofterior edge is gently floped, and ends inward in a point, which joins a like point in the other bone.

The lower and pofterior portion, to be called properly the *pterygoide*, is pointed and hollowed on each fide, to join the *pterygoide apophyfis*, of which it completes the *foffa*, being fixed like a wedge in the irregular notch of that procefs. Exteriorly it is uneven, the better to be connected with the *os maxillare*. This portion is diftinguifhed from the *portio palatina*, and alfo from the middle portion, by an oblique half canal, which, with the half canal in the maxillary tubercle, forms an entire canal, the lower end of which is the pofterior *foramen palatinum*.

The middle portion, properly to be called the *nafal*, is very thin, and is fituated laterally. The internal fide of it is a little concave, the outfide a little convex; the concavity is turned towards the nares, and at the lower part of it there is a tranfverfe eminence or bony line, which diftinguifhes this portion from the *portio palatina*. The convex outfide partly covers the opening of the maxillary finus. At the lower part of it is a tranfverfe groove, anfwering to the eminence on the other fide, and moulded, as it were, by the tranfverfe exterior eminence of the *os maxillare*.

The upper portion, properly called the *orbitary portion*, is diftinguifhed from the *nafal portion* by a notch, which, together with the *pterygoide apophyfis* of the fphenoidal bone, forms an opening more or lefs conſiderable, which may be called the *foramen fphæno-palatinum*, or *pterygo-palatinum*. This portion has five little fides, three of which are rather cavities. One fuperior, which completes the extremity or the bottom of the orbit, and is more or lefs flat, very fmall, fmooth, and triangular. One anterior, which is a little hollow, covering the upper part of the maxillary tubercle, and by a fmooth raifed edge completing the *fiffura fphæno-maxillaris*. The third fide is likewife anterior, more hollow than the former, and joins the back part of the labyrinth of the *os ethmoides*. The fourth is pofterior, and more or lefs hollow, anfwering to the fphenoidal *finus*. The fifth is lateral and external, covering the pofterior and upper part of the maxillary *finus*. Thefe fides and cavities, however, fometimes vary; being in fome fubjects found fingle, in others complex: there is very little diploe in thefe bones, except in the *palatine* and *pterygoide* portions. They are joined to each other by the *portio palatina*; to the vomer by the common groove, formed by their raifed edges; to the maxillary bones before and laterally; and behind to the fphenoidal bone; to the inferior thells of the nares by their tranfverfe eminences; and, laftly, by their orbitary portions, to the *os ethmoides*, *offa maxillaria*, and *os fphenoides*. They complete the arch of the *palate*, the *pterygoids* and *nafal foffæ*, and the orbit. They aſſiſt alſo in ſupporting the vomer and the *cranium narium inferius*. Winſlow.

PALATINATE, PALATINATUS, a province, or ſignory, poſſeſſed by a *palatine*, and from which he takes his title and dignity.

The *palatinates* now ſubſiſting, are either thoſe of Germany, or Poland. Thoſe of Germany are the principalities of the Upper and Lower Rhine, i. e. of Bavaria, and the Rhine.

The *palatinates* in Poland are the provinces and diſtricts of the Poliſh grandees or ſenators, who are the governors thereof.

PALATINE, *count* PALATINE, *comes* PALATINUS, in *Ancient Cuſtoms*, was a title given to all perſons who had any office or employment in the prince's palace.

The appellation is derived hence, that anciently the emperors ſent the judges of their palace, whom they called *comites palatii*, or *palatgraves*, to correct the abuſes of the other judges in the provinces of Saxony, Bavaria, Franconia, and the Rhine.

Matthews ſays, that the *palatines* were originally thoſe who had the ſuperintendance of the palace; the ſame with what the Greeks called *curopalatæ*, and the French *maiſtres du palais*; though in time the name became more general.

The title of count *palatine* is now appropriated to the princes of Sultzbach, Deuxponts, and Berkenfeld, who are three branches of the ſame family. The elector *palatine* is a prince of the firſt of theſe branches, i. e. the prince *palatine* of the Rhine.

PALATINE was afterwards a title conferred on thoſe delegated by princes to hold courts of juſtice in the provinces; and on ſuch among the lords as had a palace, i.e. a court of juſtice, in their own houſes.

The French writers make the *palatines* of Champagne to be the firſt who bore that title; which, they will have it, the Germans and other people borrowed from them, not they from the Germans.

At preſent the word *palatine* is reſtrained to a prince of Germany, or a lord of Poland, poſſeſſed of a *palatinate*. In the code we find a title *De palatinis ſacrarum largitionum*. Theſe were a kind of treaſurers of the empire.

PALATINE *games*, *ludi* PALATINI, among the Romans, were games inſtituted in honour of Julius Cæſar, as ſome will have it; or, as others ſay, of Auguſtus.

It is pretended, that Dion calls them *Auguſtalia*; which ſhould ſeem to confirm the ſecond opinion. Indeed, it is certain, that he ſays Livia inſtituted particular games in the *Palatine* Mount, in honour of that prince, but he apparently diſtinguiſhes them from thoſe called Auguſtalia.

The Romans had alſo their Apollo *Palatinus*, a ſurname of that deity, given him in reſpect to the temple erected to him by Auguſtus, on the *Palatine* Mount, in conſequence of a report of the auſpices, which required it to be done: Auguſtus enriched it alſo with a noble library; as is intimated by Horace, lib. i. epiſt. iii. ver. 17.

PALATINE *tribe* was one of the four tribes into which Rome was anciently divided by Servius Tullus.

PALATINI. See ACOLYTHI.

PALATO-SALPINGÆUS, called alſo *muſculus tubæ nonus Valſalvæ*, and *pterygoſtaphylinus externus*, a muſcle ariſing broad and tendinous from the edge of the lunated part of the os palati, ſeveral of its fibres being ſpread on the membrane that covers the foramen narium; whence growing into a ſmall thin tendon, it is reflected about the hook-like proceſs in the inner-wing of the proceſſus pterygoideus internus, and is inſerted carnous, into all the membranous, fleſhy, and cartilaginous parts of the tube, which leads from the palate to the ear. It is uſed to dilate and keep open this tube.

PALATO-STAPHYLINUS, in *Anatomy*, a muſcle called alſo PTERYGOSTAPHYLINUS *internus*.

PALE, PALUS, a little pointed ſtake, or piece of wood, uſed in making incloſures, ſeparations, &c.

The pale was an inſtrument of puniſhment and execution among the ancient Romans; and ſtill continues ſo among the Turks. Hence IMPALEMENT; the paſſing a ſharp *pale* through the fundament up the body.

PALE, in *Heraldry*, is one of the honourable ordinaries of an eſcutcheon; being the repreſentation of a *pale* or ſtake, placed upright; conſiſting of two perpendicular lines, drawn from the top to the baſe of the eſcutcheon, and containing the third middle part of the field. *Tab.* II. *Heraldry*, *fig.* 49.

When there are several, more properly called *pallets*, they are proportioned so, as that two take up two fifths of the field; and three take up three sevenths: and, in those cases, the number of pieces are specified as well as that of those they are charged with, &c.

Pales are borne various ways, as *wavy*, *crenelle*, *fusilly*, *indented*, *ingrailed*, &c. There are also the *cometed*, and *flaming-pale*, which are pointed, sometimes waved, &c.

PALED, PALE, in *Heraldry*. A coat is said to be *paled*, when it is equally charged with pales of metal, and colour. It is *counter-paled* when it is cut, and the two *demi-pales* of the chief, though of colours the same with those of the point, yet differ in the place where they meet; so that if the first of the chief be metal, that corresponding *to it*, underneath, is of colour.

The coat is said to be *palissé*, when the *pales* are pointed like those used in the defence of places.

PALE, *in*, is applied to things borne one above another, in manner of a *pale*.

PALE, *party per*, is where the shield is divided by a single line through the middle, from top to bottom. See PALY.

PALED *flowers*, in *Botany*, are those which have thin leaves set about, or surrounding a head, or thrum: as in marigolds, &c.

PALES, or PILES, in *Carpentry*, denote rows of stakes driven deep in the ground, to make wooden bridges over rivers, and to erect other edifices on.

Du-Cange derives the word from the Latin name *palla*, *a hanging*, or *piece of tapestry*: the ancients gave the name *pales* to the hangings or lining of walls: thus a chamber was said to be *paled* with cloth of gold, with silk, &c. when covered with bands or stuffs of two colours. Hence also the original of the word *pale*, *a stake*, &c. The arms of Arragon are paled *or* and *gules*.

Tertullian observes, that the Romans planted *pales* to serve as boundaries of inheritances; and that they consecrated them to the god Terminus, under the name of *pali Terminales*.

Ovid tells us, they were crowned and adorned with flowers, festoons, &c. and that the god was worshipped before these *pales*. See TERMINALIA.

Pales for building, serve to support the beams which are laid across them, from one row to another; and are strongly bound together with cross-pieces.

PALFREYS, *palfredi*, *palafredi*, *palefridi*, were an elegant and easy sort of horses, which, for their gentleness and agreeable paces, were used upon common occasions by military persons and others: their pleasing qualities soon recommended them to the fair sex, who, having no coaches, used these *palfreys*, and always travelled on horseback. Camden says, that W. de Fauconberge held the manor of Cukeny, in the county of Nottingham, in serjeantry, by the service of shoeing the king's *palfrey*, when he came to Mansfield. Co. Lit. 149.

PALICI *dii*, in *Mythology*, were the sons of Jupiter by the nymph Thalia. The inhabitants of Sicily adopted these for their deities, and in honour of them erected a magnificent temple at Palica. Their altar became the asylum of the unhappy, and particularly of fugitive slaves. In this temple, according to Diodorus, the most important affairs were transacted, and the most severe punishment was inflicted on perjury.

PALILIA, a feast among the ancient Romans in honour of the goddess Pales.

The *Palilia*, by some called *Parilia*, were celebrated by the shepherds on the first of May, to beseech that goddess to take care of their flocks, and preserve them from wolves and diseases.

Part of the ceremony consisted in lighting heaps of straw, and jumping over them.

PALILICIUM, in *Astronomy*, a fixed star of the first magnitude, in the Bull's eye; called also ALDEBARAN.

Pliny gives the name *Palilicium* to the Hyades, of which the *Palilicium* is properly only one. See FAUNUS.

PALINCOTOS, a term used by Hippocrates to express such diseases as are wont to return with all their violence upon the patient, after their seeming to have left him, whether for a longer or shorter period of time.

PALINDROMIA, a term used by Hippocrates and many other writers to express a preternatural running of the peccant matter of diseases to the more noble parts.

PALINDROMUS, παλινδρομος, *retro current*, *running backward*; formed of παλιν, *again*, and δρομος, *course*, a verse or sentence, which runs the same, when read either backwards, or forwards.

Such is the verse,

Roma tibi subito motibus ibit amor.

Some people of leisure have refined upon the *palindromus*, and composed verses, each word whereof is the same backwards as forwards. As that instance in Camden:

Odo tenet malum, malidum mappam tenet Anna.
Anna tenet mappam malidum, malum tenet Odo.

PALING, or PALEING, in *Agriculture*, &c. a kind of fence-work for fruit-trees, &c. planted in fields, &c.

It consists of three small posts driven into the ground, at a foot and a half distance; with cross bars nailed to each other, near the top.

In fixing the pales, in form of a triangle, room is to be left for the tree to play and bow by the high winds without galling. The trees are to be bound to a stake for a year or two; after which fern or straw may be stuffed in betwixt the tree, and uppermost rails, to keep it upright.

If the place be open to deer, rabbits, or the like, a post is to be nailed to the bar between every two pales.

PALINGENESIA, παλιγγενεσια, formed of παλιν, *anew*, and γενεσις, *generation*, a new birth, or REGENERATION.

PALINGENESIA is also used by some for the migration or passage of the soul of a deceased person into another body.

The *palingenesia* is almost the same thing with the METEMPSYCHOSIS taught by Pythagoras, and still believed by the Brachmans, Banjans, and other philosophers of the East.

PALINGENESIA, is used among chemists for the reproducing a mixed body from its ashes.

This has been pretended to by many, as well as the philosopher's stone and other wonderful powers; but as to the *palingenesia*, or resuscitation of plants, the instances produced are no more than some of those artificial vegetations which the learned Monf. Homberg has observed and described many times. See Homberg in Mem. Acad. Sciences, 1710; and Boyle's Works Abridg. vol. i. p. 60.

PALINGMAN, in our *Old Statutes*, seems to be a merchant-denizen, one born within the English pale. Stat. 22 Edw. IV. cap. 23. and 11 Hen. VII. cap. 22.

PALINIDRYSIS, a word used by Hippocrates to express the subsiding of a tumor by the dispersion of the matter that occasioned it without its breaking.

PALINODY, Παλινῳδια, a discourse contrary to a preceding one.

Hence the phrase *Palinodiam canere*, *to sing palinody*, q. d. to make a recantation.

The word in the original Greek signifies *singing again*, or anew. Hence it has passed as a general name for any poem, or the like, which contains a retractation in favour of a person whom the poet had before offended.

The poet Stesichorus is said to be the first author of the *palinody*. The sixth ode of the first book of Horace, beginning, *O matre pulchra*, is a true *palinody*.

PALINTOCIA, Παλιντοκια, formed from παλιν, *anew*, and τοκος, of τικτω, *I bring forth*, in *Antiquity*, the birth or delivery of a child a second time.

Thus the second birth of Bacchus, proceeding out of Jupiter's thigh, was a *palintocia*.

PALINTOCIA, is also used for the restitution of usury, or the refunding of interests.

The Megareans, having expelled their tyrant, ordained the *palintocia*; that is, they made a law, that all the creditors should return to their debtors the interests they had received for money lent.

PALIRRHŒA, a word used by the old Greek authors to express the reflux or retrograde course of the humours, as in cases of the cholera morbus, where people vomit up their stools.

PALISADE, or PALISADO, in *Fortification*, an inclosure of stakes or piles driven into the ground, each six or seven inches square, and nine or ten feet long; three whereof are hid underground. They are fixed about six inches asunder, and braced together by pieces nailed across them near the tops, and secured by thick posts at the distance of every four or five yards.

Palisades are placed in the covert-way, at three feet from and parallel to the parapet or ridge of the glacis, to secure it from being surprised. They are also used to fortify the avenues of open forts, gorges, half-moons, the bottoms of ditches, the parapets of covert-ways; and, in general, all posts liable to surprize, and to which the access is easy.

Palisades are usually planted perpendicularly; though some make an angle inclining towards the ground next the enemy, that the ropes call over them, to tear them up, may slip.

PALISADES, *turning*, are an invention of M. Cochorn, in order to preserve the *palisades* of the parapet of the covert-way from the besiegers shot.

He orders them so, that as many of them as stand in the length of a rod, or in about ten feet, turn up and down like traps; so as not to be in sight of the enemy till they just bring on their attack; and yet are always ready to do the proper service of *palisades*.

PALISADE, in *Gardening*, denotes a sort of ornament; being a row of trees which bear branches and leaves from the

the bottom, cut and spread in manner of a wall, along the side of an alley, or the like; so as to appear like a wall covered with leaves.

These *palisades* are made of jessamine, phillyrea, &c.

PALISSE, in *Heraldry*, a range of *palisades* before a fortification represented on a fesse, rising up a considerable height; and pointed atop, with the field appearing through them. *Tab. Heraldr. fig.* 31.

PALLURUS, in *Botany*. See *Christ* THORN.

PALL, in *Heraldry*, denotes a kind of cruss, representing the *pallium*, or archiepiscopal ornament, sent from Rome to the metropolitans; which is blazoned thus: he beareth gules, a *cross pall* argent. *Tab.* II. *Heraldry, fig.* 55.

PALLS. See PALLIUM.

PALLA, among the old Romans, a mantle which women wore over the gown called STOLA.

It was borne on the left shoulder, whence passing to the other side, under the right arm, the two ends were bound under the left arm, leaving the breast and arm quite bare. It made abundance of plaits or wrinkles; whence, according to Varro, it had its name; viz. from *vacillo, vibro, I shake, or tremble.*

Among the Gauls there was also a kind of *palla* worn by the men, called *Gallica palla.*

PALLADIUM, in *Antiquity*, a statue of the goddess Pallas, preserved in Troy; whereon the fate of that city is said to have depended.

The tradition is, that in building a citadel, in honour of Pallas, and a temple in the most elevated part thereof, the *palladium* dropped from heaven, and marked out the place which the goddess was pleased to possess. After this, Apollo gave an oracle, importing, that Troy should never be taken while the *palladium* was found within its walls: which occasioned Diomede and Ulysses, in the time of the Trojan war, to undertake the stealing thereof. It is said, there was, anciently, a statue of Pallas preserved at Rome, in the temple of Vesta; which some pretended to be the true *palladium* of Troy, brought into Italy by Æneas: it was kept among the sacred things of the temple, and only known to the priests and vestals. This statue was esteemed the destiny of Rome; and there were several others made perfectly like it, to secure it from being stolen. See ANCYLE.

There was also a *palladium* in the citadel of Athens, placed there by Nicias.

These *palladiums*, in all probability, were no other than a kind of TALISMANS.

PALLAS, in *Mythology*. See MINERVA.

PALLAS, in *Astronomy*, a name given by some to the first satellite of Jupiter. Lowthorp's Abr. Phil. Transf. vol. i. p. 407.

PALLAS, a name given by some of the affected chemical writers to an imaginary factitious stone, composed of the heaven and earth, of the moon or silver, with an equal weight of the sun or gold. This is their own explication of it.

PALLET, among *Painters*, a little oval table, or piece of wood, or ivory, very thin and smooth; on and round which the painters place the several colours they have occasion for, to be ready for the pencil.

The middle serves to mix the colours on, and to make the tints required in the work. It has no handle, but, in lieu thereof, a hole at one end, to put the thumb through to hold it.

PALLET, among *Potters, Crucible-makers*, &c. is a wooden instrument, almost the only one they use, for forming, beating, and rounding their works.

They have several kinds; the largest are oval, with a handle; others are round, or hollowed triangularly; others, in fine, are in manner of large knives, serving to cut off what is superfluous on the moulds of their work.

PALLET, in *Gilding*, is an instrument made of a squirrel's tail; used to take up the gold leaves from the pillow, to apply and extend them on the matter to be gilt. See GILDING.

PALLET, in *Heraldry*, is the moiety, or half of the pale; or a small pale, half the breadth of the usual one.

The *pallet* must never be charged with any thing either quick or dead; neither can it be divided into two equal parts; but it may be into four; for one fourth part of the *pallet*, or two eighth parts of the pale, is called an endorse.

If the pale be upon any beast, they say, the beast is *debruised* with the pale; but if the beast be upon the pale, they say *he is supported* by it.

PALLETS, in *Clock* and *Watch-work*, are those pieces or levers which are connected with the pendulum or balance, and receive the immediate impulse of the swing-wheel, or balance-wheel, so as to maintain the vibrations of the pendulum in clocks, and of the balance in watches.

The *pallets* in all the ordinary constructions of clocks and watches, are formed on the verge or axis of the pendulum or balance, and are of various lengths and shapes, according to the construction of the piece, or the fancy of the artist. For the modern improvements, comparative advantages, and the manner of constructing *pallets*, see SCAPEMENT.

PALLET, in *Ship-building*, is a room within the hold, closely parted from it, in which, by laying some pigs of lead, &c. a ship may be sufficiently ballasted, without losing room in the hold; which, therefore, will serve for stowing the more goods.

PALLIATION, the act of mitigating, soothing, or disguising a thing.

Hence, in medicine, *palliation* is used for the quieting and assuaging of pain, and providing against the severer symptoms of a disease, when nothing can be directly levelled against the cause.

PALLIATIVE *indication*, is where the symptoms of a disease give too much trouble and danger, to have their cure deferred, till the disease whereon they depend is removed.

Here the symptoms themselves are to be cured, or mitigated, apart; and hence,

PALLIATIVE *cure*, is the answering of a *palliative* indication; or the removal or mitigation of the symptoms of a disease, the cause of the disease still remaining.

Boerhaave observes, that every mitigation of a symptom takes away somewhat from the disease itself; so that to cure all the symptoms together, is almost to cure the whole disease.

The principal symptoms, which call for such a sort of cure, are thirst, pain, too much waking, and fainting.

PALLIER, or PALLIER, in *Building*, a landing-place in a STAIRCASE; or a step, which, being broader than the rest, serves to rest upon.

The term is pure French, and is not much used in English. In persons, or large staircases, where there are, sometimes, several *palliers* in the same range, or line, they ought to have each at least the width of two steps.

Those, in the turns of staircases, ought to be as broad as long. Vitruvius calls the *palliers* or landing-places of the theatres, *diazomata.*

PALLIFICATION, or PILING, in *Architecture*, denotes the piling of the ground-work, or the strengthening it with piles, or timber driven into the ground; which is practised when people build upon a moist, or marshy soil.

PALLIO *Cooperire.* It was an ancient custom, where children were born out of lawful wedlock, and their parents afterwards intermarried, that those children, together with the father and mother, should stand *pallio cooperti*, under a cloth spread over them, while the marriage was solemnizing; which was a kind of adoption, and had the effect of a legitimation.

Thus Robert Grosthead, the famous bishop of Lincoln, in one of his letters, says: *In signum legitimationis, nati ante matrimonium, consueverunt poni sub* pallio *super parentes eorum extenso, in matrimonii solemnizatione.*

Selden, in his notes on Fleta, adds, that the children of John of Gaunt, duke of Lancaster, by Catharine Swinford, though legitimated by act of parliament, yet were *covered with the pall* at the time of the marriage of their parents.

PALLISADES. See PALISADE.

PALLISADOED *crown*. See CROWN.

PALLIUM, or PALL, a pontifical ornament worn by popes, patriarchs, primates, and metropolitans of the Romish church, over their other garments, as a sign of their jurisdiction.

It is in form of a band, or fillet, three fingers broad, and encompasses the shoulders; whence, by some authors, it is called *superhumerale.* It has pendants, or strings, about a palm long, both before and behind; with little lamine of lead rounded at the extremes, and covered with black silk, with four red crosses.

Some with Eusebius, will have the *pallium* to have been introduced by pope Linus; adding, that as the ephod was the mark of the pontifical authority in the Jewish synagogue, so is the *pallium* in the Romish church.

Others have observed, that there is no mention made hereof before the year 336.

Lastly, others will have it to have been first granted by Constantine the Great, to pope Sylvester; from whence it passed to the other patriarchs and archbishops.

The *pall*, it is certain, was originally part of the imperial habit, being a rich robe of state, very magnificent, and reaching quite to the ground; and it has been said, that the bishops of Rome were allowed to wear it by Constantine the Great; and that in process of time the same honour was granted by the emperors to the other patriarchs. Hence, when they were either driven from their sees, or voluntarily quitted them, they returned their *palls* to the emperors.

emperors. When the popes firſt took upon them to grant that honorary badge, which they did before the pontificate of Gregory the Great, choſen in 590. they did not preſume to do it till they had obtained leave of the emperor. But the ſucceſſors of Gregory, upon the deciine of the empire, took upon them to beſtow that mark of diſtinction, independently of them, and as a gift of their own. However, that it might no longer be deemed part of the imperial habit, which it was treaſonable to wear without leave from the emperors, they changed its ancient form to the preſent. At what time the popes aſſumed the diſpoſing of the *pall*, independently of the emperors, is not well known; but it is certain, that no biſhop was obliged to apply to Rome for it till the year 742, when Boniface, biſhop of Mentz, perſuaded the biſhops of France and Germany to paſs a decree, obliging their metropolitans to apply to the pope for that ornament, and to promiſe, upon their receiving it, a canonical obedience to the commands of St. Peter. This practice proving very favourable to the ambitious deſigns of the biſhops of Rome, they ſpared no pains to impoſe it upon all metropolitans; iſſuing, with this view, various decrees concerning the nature, virtue, and neceſſity of the *pall*; till, at length, they proceeded to declare it unlawful for a metropolitan, archbiſhop, or primate, to exerciſe any branch of his power, till he had received his *pall* from Rome; nay, in ſeveral decrees, the metropolitical juriſdiction and power were ſaid to be conferred by the *pall*; and thus they made the pope the fountain of all eccleſiaſtical power and authority. This doctrine ſeems to have been firſt broached in the ninth century, though vigorouſly oppoſed by Hincmar, archbiſhop of Rheims, and ſeveral others. However, the doctrine prevailed; and the *pall* was declared by Innocent III. in the thirteenth century, to be an enſign or token of the plenitude of the apoſtolic power, and ſaid to communicate a competent ſhare of that power to thoſe who received it from the hands of the popes. Till the time of Gregory VII. the new metropolitans were only required to ſend for their *palls*, within the ſpace of three months after their ordination; but this pope obliged all, unleſs prevented by ſome lawful impediment, to come for them in perſon to Rome; and the promiſe of canonical obedience, upon receiving their *palls*, was changed into an oath of allegiance, ſuch as vaſſals, by the feudal laws, were obliged to take to their princes. Gregory the Great conferred the *pall* without fee or reward; and in a council held at Rome in 595, decreed, that it ſhould be given gratis; but it is well known, that in ſucceeding times the grant of the *pall* became one of the chief funds of the popiſh fee. Exorbitant ſums were exacted not only for the *palls* that were ſent to preſbyters, or private biſhops, when raiſed to the archiepiſcopal dignity, but likewiſe for thoſe that were ſent to archbiſhops on their tranſlation from one ſee to another. For by the canons, an archbiſhop is not to carry away his *pall* with him, but to demand a new one; and his ſucceſſor is not to make uſe of the *pall*, which his predeceſſors had left, but to apply to Rome for another. Bower's Hiſt. of the Popes, vol. iii. p. 6. note *(e)*.

The pope pretends to the ſole right of conferring the *pallium*; though ſome patriarchs have granted it to their ſuffragans, having firſt received it themſelves from the Roman ſee.

Anciently, the pope uſed to ſend the *pallium* to certain of his diocеſan biſhops, on whom he laid a good part of his authority, and who were a kind of collaterals to him, as the patricii were to the emperors.

The firſt who received it in France was Vigilius, archbiſhop of Arles: this was done, in order, as Paſquier obſerves, to give him the precedency over the other biſhops.

Anciently they went to Rome to ſeek the *pallium* in perſon; afterwards it was ſent by the pope's legates. At laſt the cuſtom was introduced of ſending perſons expreſs to demand it, with this form, *Inſtanter, Inſtantius, Inſtantiſſime.*

By the popiſh canon laws, a metropolitan, till he have received the *pallium*, cannot conſecrate biſhops, or churches, and he may not be called archbiſhop, &c. Upon a tranſlation he muſt have the *pallium* afreſh; and till then he cannot hold a ſynod, nor perform any of his archiepiſcopal functions.

The *pallium* was anciently interred with the perſon.

The uſe of the *pallium* is reſtrained to certain ſeaſons and occaſions; none, but the pope, having a right of wearing it always, and in all places.

The pope, ſometimes, ſends it to biſhops of his own accord; and has, ſometimes, given the right hereof to particular churches.

Among the Greeks all the biſhops wear the *pallium*.

In ancient records, we find mention made of another *pallium*, which was a long garment ſpread over with croſſes. Tertullian ſays it was a diſtinguiſhing garment of the Chriſtians; that of the heathens being called *toga*.

PALLIUM *ducale*, in *Natural Hiſtory*, a name given by writers on ſhells to a kind of PECTEN or *ſcallop*, of a large ſize and beautiful appearance, though ſimple colour. There are two ſpecies of this, a red and a yellow one.

PALLIUM-*purpureum*, a name given by Baſil Valentine, and other of the affected writers in chemiſtry, to a powder of a purple colour, prepared from gold. It is made by preparing an amalgama of gold and mercury; and after the mercury is driven off by the retort, the remaining matter is mixed with ſulphur, and calcined by a well regulated fire till reduced to a purple powder. This is called alſo the *ſolar powder*, and has, like the other preparations of this metal, many imaginary virtues aſcribed to it.

PALM, *palma*, an ancient long meaſure, taken from the extent of the hand.

The Roman *palma* was of two kinds: the *great palm*, taken from the length of the hand, anſwered to our ſpan, and contained 12 fingers, digits, or fingers breadths, or 9 Roman inches, equal to about 8 Engliſh inches ½. See DIGIT, and SPAN.

The *ſmall palm*, taken from the breadth of the hand, contained 4 digits or fingers, equal to about 2 Engliſh inches, 9 tenths.

The Greek *palm* or *doron* was of two kinds. The ſmall contained four fingers, equal to little more than 3 inches. The great contained 5 fingers. The double Greek *palm*, called *dichas*, contained alſo in proportion. See MEASURE.

The modern *palm* is different in different places where it obtains. At Rome it contains 8 inches 3½ lines; at Naples, according to Riccioli, 8 inches, according to others 8 inches 7 lines; at Genoa, 9 inches 9 lines; at Morocco and Fez, 7 inches ½; in Languedoc, and ſome other parts of France, the *palm* is 9 inches 9 lines The Engliſh *palm* is 3 inches.

At Leghorn there are two kinds of *palms*, the one for woollens, the other for ſilks; the firſt one third ſhorter than the latter.

PALM, *palma*, in *Anatomy*, denotes the inſide of the HAND; called alſo *vola* and *metacarpion*.

PALM, *dwarf*, or PALMETTO, *chamærops*, in *Botany*, a genus of the *palmæ*, in the appendix to the Linnæan ſyſtem. Its characters are, that it hath male and hermaphrodite flowers in diſtinct plants; the hermaphrodite flowers are all included in one common ſpatha or hood, which is compreſſed and biſid, and the ſpadix or club is branching; each flower hath a ſmall three-pointed empalement; they have one thick upright petal, cut into three parts, and turning inward at the top, and five compreſſed ſtamina, which join at their baſe; they have three roundiſh germina, each having a diſtinct ſtyle, which become ſo many round berries, having one cell, each containing a ſingle ſeed; the male flowers are like the hermaphrodite, but the ſtamina are not diſtinct, nor have they any germen. Miller reckons two ſpecies, and Linnæus only one. The *palmetto* grows naturally in Spain, covering the ſandy land like the fern in England.

PALM-*tree*, *palma*, in *Botany*, belonging to a ſeparate claſs in Linnæus's appendix. Its characters are theſe: it hath male and female flowers, in ſome ſpecies, on the ſame plant, in others on different plants; and the empalements of the male flowers are divided into three parts; the flowers have three petals, and ſix ſtamina, terminated by oblong ſummits, with an obſolete germen, ſupporting three ſhort ſtyles, crowned by acute ſtigmas; theſe are barren; the female flowers have a common ſheath, but no empalement; they have ſix ſhort petals, and an oval germen ſitting upon an awl-ſhaped ſtyle, crowned by a triſid ſtigma; the germen becomes a fruit of various forms and ſizes in different ſpecies. There are fourteen ſpecies, of which are the date tree, the cocoa-nut tree, the macaw tree, the cabbage tree, and the dragon tree.

The common date tree grows plentifully in Africa, and ſome of the eaſtern countries; from whence the fruit is brought to England. See DATE.

The cocoa-nut is cultivated in moſt of the inhabited parts of the Eaſt and Weſt Indies, but is ſuppoſed to be a native of the Maldives, and the deſert iſlands of the Eaſt Indies. It is one of the moſt uſeful trees to the inhabitants of America, who have many of the common neceſſaries of life from it; the bark of the nut is made into cordage, the ſhell of the nut into drinking-bowls, the kernel affords a wholeſome food, and the milk contained in the ſhell a cooling liquor; the leaves of the tree are uſed for thatching houſes, and are wrought into baſkets, and other utenſils. See CACAO.

The macaw tree is very common in the Caribbee iſlands, where

where the negroes pierce the tender fruit, from whence flows a pleasant liquor, of which they are very fond; and the body of the tree affords a solid timber, with which they make javelins, arrows, &c. and is by some supposed to be a sort of ebony. Miller.

The famous cabbage tree of Barbadoes is a kind of *palm*; it grows to the height of three hundred feet, and though the sprouts of one year's growth are so tender, that they are eaten as cabbages, yet the tree itself is one of the most durable woods we are acquainted with, and will not rot on any account, but is so firm, that it is scarce possible to make a nail enter it. Phil. Trans. N° 36.

The dragon-tree, or *phœnix* of Linnæus, is a native of the Cape Verd islands; and is so called, because the inspissated juice of the plant becomes a red powder, very like that of the eastern dragon's blood, and is frequently used instead of it in the shops; but the tree, whence the dragon's blood is obtained, is of a very different genus.

The several species of this genus may be all raised with us from the seeds, which must be sown in pots of light earth, and plunged into a bark hot-bed. When the young plants come up, they must be transplanted into single pots, and preserved in the stove. The soil they succeed best in is made of one third pasture-land, one third sea-sand, and the other third rotten tanner's bark, or rotten horse-dung; and they must be planted in pots, in proportion to their size, but these should not be too large. They will require to be removed once a year; but this must be done with great care.

PALM-*oil*. See OIL.

PALM-*wine*, called in the East *toddi*, is obtained by incision of the trunk of a species of palm-tree, whence issues a liquor very grateful to the palate, but liable, especially on account of the heat of the climate, soon to turn sour. See MAMMEE-*tree*.

PALM, in *Naval Language*, is an implement used instead of a thimble, in making and mending sails. It is formed of a piece of leather or canvas, on the middle of which is fixed a round plate of iron of an inch in diameter, whose surface is pierced with a number of small holes, to catch the head of the sail-needle. The leather is formed so as to encircle the hand, and button on the back of it, while the iron remains in the *palm*; so that the whole strength of the hand may be exerted to thrust the needle through the canvas, when it is stiff, and difficult to be penetrated. Falconer.

PALMA *Christi*, *ricinus*, a genus of the *monœcia adelphia* class. Its characters are these: it hath male and female flowers disposed in the same spike; the male flowers, which are situated on the lower part of the spike, have swelling empalements, cut into three parts; the flowers have no petals, but have a great number of slender stamina, which are connected in several bodies, and are terminated by roundish twin summits; the female flowers, which are situated on the upper part of the spike, have empalements cut into five segments, and are armed with prickles; they have no petals, but in the centre is situated an oval germen, which is closely shut up in the empalement, supporting three short styles, which are bifid, crowned by single stigmas; the germen turns to a roundish fruit, having three furrows, divided into three cells, opening with three valves, and each cell containing one almost oval seed. Miller enumerates eight, and Linnæus only three species.

These plants deserve a place in every curious garden, for the singular beauty of their leaves (notwithstanding their flowers make no great appearance), especially those sorts which may be propagated every year from seeds, without requiring a greenhouse.

The inhabitants of the West Indies draw an oil for lamps from the seed of these plants; and as they come up as weeds in those warm countries, they are at no pains to propagate them. This oil is good to kill lice in children's heads.

The seed sold in the shops under the name of *catapatia major*, is the seed of a species of the *palma Christi*; these have been formerly given by some persons to purge watery humours, which they do both upwards and downwards with great violence, so that at present these seeds are rarely used. Miller. See CASTOR *oil*.

PALMARIS, in *Anatomy*, a muscle serving to contract the palm of the hand in grasping. See *Tab. Anat. (Myol.) fig.* 2. *n.* 25. It arises from the internal protuberance of the humerus, and, by a long and slender tendon, passes above the annular ligament to the palm of the hand, where it expands itself into a large aponeurosis, which cleaves close to the skin above, and to the sides of the metacarpus below, and to the first phalanx of the fingers; by which means it makes four cases for the tendons of the fingers to pass through.

The muscle is sometimes wanting, but the aponeurosis is always there.

PALMARIS *brevis*, or *quadratus*, a muscle that lies under the aponeurosis of the first. It arises from the bone of the metacarpus that sustains the little finger, and from that bone of the carpus which lies above the rest. It goes transversely, and is inserted into the eighth bone of the carpus. See the next article.

It serves to draw the palm of the hand into a concave figure.

PALMARIS *cutaneus*, a muscle commonly known by the name of the *palmaris brevis*. It is a small thin plane of fleshy fibres, situated transversely, or more or less obliquely, under the skin of the large eminence in the palm of the hand, between the carpus and the little finger; its fibres adhering to the skin, and being in some measure interwoven with the *membrana adiposa*. These fibres are fixed along the edge of the *aponeurosis palmaris*, from the large ligament of the *carpus* toward the little finger; and they run in for some space on the plane of the *aponeurosis*, but without any connection with the bones of the *metacarpus*. Near the *aponeurosis* these fibres are more or less tendinous, and some of them often cross each other. They are sometimes so thin and pale, as hardly to be sensible; and in some subjects the muscle seems to be divided into several parts. Winslow.

It is a doubt with some authors whether the *palmaris cutaneus* or *brevis* be a distinct muscle. Fallopius calls it, *cavo quadam quæ musculorum officium habet*; a portion of flesh which has the appearance of a muscle. And Douglas calls it, *cavo quadrata*; a square portion of flesh: though he adds the name *palmaris brevis*, given it, on its supposition of being a muscle, by another author.

PALMATED-*roots*, are tuberose roots of a flattish shape, and divided into several oblong and slender branches, resembling so many fingers. Of this sort are the roots of some of the orchis kind, called hence *palmated*.

PALMATED-*leaf*, among *Botanists*. See LEAF.

PALMATED-*stones*, *palmati lapides*, in *Natural History*, a name given by the ancients to a sort of stones which were always found of the shape of a hand with its fingers. They were frequent in Spain; and some, which were found of a fine black, were reputed to be a kind of marble. The greater number were white, and were composed of the matter of one of the softer and less beautiful quarry-stones.

PALMER, in our *Antient Writers*, is used for a pilgrim, and sometimes for a cruife, on account of a staff made of the palm-tree, which they ever afterwards bore as a badge of their devotion. See PILGRIM, and CROISES.

PALMETTO. See *Dwarf* PALM.

PALMETTO-*royal*, a name given by Ligon to a tree of the palm kind. Its trunk is very tall and straight, and hollowed regularly in the centre; yet so tough, that it is never blown down, nor destroyed by storms. It is recommended for making long telescopes for celestial observations.

PALMIPEDES, *web-footed*, in *Ornithology*, the name of a genus of birds living about waters, and furnished by nature with feet for swimming. The general characters of these birds are these: they have all short legs, excepting only three, the *flamingo*, *curlew*, and *woodsith*, which are singular, and of a peculiar genus. Their thighs are feathered to the joint; their hinder toes, if any, are short; their rumps are less prominent than in other birds; and they have in general broad beaks, and have an appendage on the extremity of their upper chap.

PALMIPES, among the Romans, a long measure, containing a foot and a *palm*, or five *palmi*; and was less than the cubit by one *palm*.

PALMISTRY, a kind of divination, performed by inspecting the lines and marks of the hands and fingers; called also *chiromancy*.

PALMS, among *Botanists*, white buds shooting out of willows, or sallows, before the leaf; of the expansions whereof the flowers of that tree are formed.

PALM-SUNDAY, *Dominica* PALMARUM, the Sunday next before Easter Sunday; or the last Sunday in LENT. It has been thus called from the primitive days, on account of a pious ceremony then in use, of bearing *palms*, in memory of the triumphant entry of Jesus Christ into Jerusalem, eight days before the feast of the passover, described by St. Matthew, chap. xxi. St. Mark, chap. xi. and St. Luke, chap. xix.

The ancients had other names for this day. For, 1. They called it *Dominica Competentium*, i. e. *Sunday of the Competents*; because, on that day, the catechumens came to ask the bishop leave to be admitted to baptism, which was conferred the Sunday following.

They had also then given them the symbol, or creed, to get off by heart, to be repeated to the bishop in the ceremony of baptism.

2. They called it *Capitilavium*, the Sunday of washing the head; because those who were to be baptized the

following Sunday, were prepared by washing their heads on this day.

Some time afterwards they called it *Indulgence Sunday*, because the emperors and patriarchs used to distribute gifts on that day.

PALMULARII, more properly called PARMULARII, in *Antiquity*, a sort of GLADIATORS, who fought armed with a sort of little buckler, called PARMA.

PALMYRENE *Ruins*, or *Ruins of* PALMYRA, in *Ancient* and *Modern Geography*, are the ruins of a famous city of this name, situate in a desert of Syria, about forty-eight leagues from Aleppo, and as far from Damascus, twenty leagues west from the Euphrates, and in the latitude of 34° N. This city appears to have been originally built by Solomon, and called Tadmor. 1 Kings ix. 18. 2 Chron. viii. 4. Josephus assures us, that this was the same city which the Greeks and Romans afterwards called Palmyra; and it is still called Tadmor by the Arabs of the country. But many circumstances, besides the style of the buildings, render it probable that the present ruins are not those of the city built by Solomon, though neither history nor tradition mention the building of any other. It is first mentioned by the Roman historians as a place which Mark Anthony attempted to plunder, pretending that it had not observed a just neutrality between the Romans and Parthians. In the time of Caracalla it was a Roman colony; and the *Palmyreni*, who assisted Alexander Severus against the Parthians, were again conspicuous in the reign of Gallienus, under Odenathus, who was made his associate in the empire. He was succeeded by Zenobia his queen, who broke the alliance with Gallienus, and made herself sole mistress of Syria and Mesopotamia. At length, Aurelian having taken Palmyra, after a long siege, carried the princess to Rome, to grace his triumphs, and with her, her secretary Longinus, known for his admirable work on the Sublime, who was put to death. The city revolting in her absence, Aurelian returned and destroyed it, putting to death most of the inhabitants, without regard either to age or sex. Little is known concerning the state of Palmyra since the time of Mahomet, except that it was considered as a place of strength, and that in the twelfth century there were two thousand Jews in it.

With respect to the ruins, they appear to be of two different and distinct periods; the oldest are so far decayed as not to admit of mensuration, and seem to have been reduced to that state by the hand of time; the other appear to have been broken into fragments by violence. Of the inscriptions none are earlier than the birth of Christ, and none are later than the destruction of the city by Aurelian, except one, which mentions Diocletian. It is scarcely less difficult to account for the situation of this city than for its magnificence; the most probable conjecture is, that as soon as the springs of Palmyra were discovered by those who first traversed the desart in which it is situated, a settlement was made there for the purpose of carrying on the trade of India, and preserving an intercourse between the Mediterranean and Red Sea. This trade, which flourished long before the Christian æra, accounts not only for its situation, but also for its wealth. As it lay between Egypt, Persia, and Greece, it was natural to expect, that traces of the manners and sciences of those nations should be discovered among the *Palmyreni*; who accordingly appear to have imitated the Egyptians in their funeral rites, the Persians in their luxury, and the Greeks in their buildings; and therefore the buildings, which now lie in ruins, were probably neither the works of Solomon, nor of the Seleucidæ, nor, few excepted, of the Roman emperors, but of the *Palmyreni* themselves.

Palmyra was formerly encompassed by palms and fig-trees, and covered an extent of ground, according to the Arabs, near ten miles in circumference; and might probably have been reduced to its present confined and ruined state by quantities of sand, driven over it by whirlwinds. The walls of the city are flanked by square towers; and it is probable, by their general direction, that they included the great temple, and are three miles in circumference. But of all the monuments of art and magnificence in this city, the most considerable is the temple of the Sun. The whole space containing its ruins is a square of two hundred and twenty yards, encompassed with a stately wall, and adorned with pilasters within and without to the number of sixty-two on a side. Within the court are the remains of two rows of very noble marble pillars, thirty-seven feet high; the temple was encompassed with another row of pillars fifty feet high, but the temple itself was only thirty-three yards in length, and thirteen or fourteen in breadth. This is now converted into a mosque, and ornamented after the Turkish manner. North of this place is an obelisk, consisting of seven large stones, besides its capital, and the wreathed work about it, about fifty feet high, and just above the pedestal, twelve in circumference. Upon this there was probably a statue, which the Turks have destroyed. At a small distance there are two others, and a fragment of a third, which gives reason for concluding that they were once a continued row. There is also a piazza forty feet broad, and more than half a mile in length, inclosed with two rows of marble pillars, twenty-six feet high, and eight or nine feet in compass; and the number of these, it is computed, could not have been less than five hundred and fifty. Near this piazza appear the ruins of a stately building, supposed to have been a banquetting house, elegantly finished, with the best sort of marble. In the west side of the piazza there are several apertures for gates into the court of the palace, each adorned with four porphyry pillars, thirty feet long, and nine in circumference. There are several other marble pillars differently arranged, on the pedestals of which there appear to have been inscriptions, both in the Greek and *Palmyrene* languages, which are now altogether illegible. Among these ruins there are also many sepulchres, which are square towers, four or five stories high, and varying in size and splendour. We are indebted for an account of these very magnificent remains of antiquity, partly to some English merchants who visited them in 1678 (Phil. Trans. N° 217, 218), but chiefly to M. Bouverie and Mr. Dawkins, accompanied by Mr. R. Wood, who travelled thither in 1751. The result of their observations was published in 1753, in the form of an Atlas, containing fifty-seven copper plates, admirably executed.

PALPABLE, something that may be perceived by the senses, especially by the sense of feeling.

Hence impalpable powder.

PALPEBRÆ, in *Anatomy*. See EYE-LIDS.

PALPEBRA *superioris primus*, in *Anatomy*, a name given by Cowperus and some others to one of the muscles of the face, whose office it is to lift up the upper eye-lid, and by that means open the eye: it is hence called by Cowper and Douglas, APERIENS *palpebram*; by some, *aperiens oculum*; and by Albinus, the *levator palpebræ superioris*.

PALPITATION, *palpitatio*, in *Medicine*, a preternatural beating, or pulsation, of any of the solid parts of the body, especially the heart.

The *palpitation* of the heart is an irregularity in the motions of that viscus, whereby it is driven with violence towards the ribs, in its contraction, attended with a great feebleness of pulse.

There are several degrees of this *palpitation*; sometimes it is great, sometimes moderate, sometimes small: it is sometimes so impetuous, as to be heard, and even seen, by the by-standers. The trepidation, or trembling, of the heart differs from the *palpitation*, or panting. In the former, the pulsations are faint, slow, and faltering; in the latter, the shakes are immoderate, violent, and convulsive.

This is sometimes idiopathic, or a disease in itself, and attendant on no other; but that rarely happens, and it is usually symptomatic, and merely an attendant on other disorders. In general we are to distinguish a *palpitation of the heart* thus considered as a disease, or at least as a symptom of one, from those commotions of the heart which we occasionally bring on by running or any other violent exercise, which throw the blood into commotions.

Signs of it. The evident and obvious symptom of this complaint, is the vehement pulsation of the heart against the solid parts of the breast, which is often so great, that it may be seen or even heard by the persons who stand by. To this there are usually joined an anxiety of the *præcordia*, which throws the person into a sweat, a languor and lassitude of the limbs in general, a paleness of the face, a difficulty of respiration and cardialgia, with frequent faintings; and, finally, there is usually a costiveness and flatulence of the abdomen attending on it.

Persons subject to it. It is a complaint that chiefly affects persons of sedentary lives, and of a plethoric habit of body. Scorbutic, hysteric, and hypochondriac persons are also frequently subject to it; and such as have obstructions of the menses. Those people who have been used to regular bleedings, and have afterwards neglected them, are also subject to this complaint; and those who are subject to sudden passions, and frequently suppress them. Sleeping in the open fields has also been known to bring it on; and persons of a melancholy habit are usually more than others subject to it. Young women, whose menses have not appeared, or who have had them suppressed by some accident, and in whom nature is labouring to bring them on again, are also very subject to violent *palpitations*; and such as have acute or intermittent fevers coming upon them. Persons of plethoric habits are often seized with *palpitations of the heart* in their sleep, and

when

when they wake they feel them for ſome minutes afterwards. Finally, perſons who have polypuſes of the heart are always grievouſly afflicted with *palpitations*, attended with difficulty of breathing.

Cauſes of it. Beſides what has been already obſerved, it is to be remarked, that the paſſions of the mind very frequently occaſion this diſorder: thus, ſudden terror, fear, a ſuppreſſion of anger, and the like, will at any time bring on a *palpitation*, without any other cauſe. A high diet and eaſe, with a ſedentary life, alſo often occaſion them; and in young people, not arrived at puberty, they are often found to be occaſioned by worms in the inteſtines.

The cauſe of the *palpitation*, according to Boerhaave, is uſually an inordinate and violent influx of the vital ſpirits into the villi of the heart; as in violent paſſions, ſudden fear, hyſteric affections, and in violent and ſudden motions. Sometimes it is owing to an irritation of the fibres of the heart, occaſioned by ſome ſharp ſtimulus; as an inflammation of the heart, or pericardium, or ſome other diſorder thereof, from a ſtone, worms, hairs, an aneuriſm, or the like.

Sometimes it ariſes from a thick, copious, polypous blood; and ſometimes from the arteries being become cartilaginous, or bony; or their extremities being obſtructed therewith.

In the Dictionary de Trevoux, an author, himſelf afflicted with this diſeaſe, makes a particular diſquiſition into its nature and cauſe.

Anatomy, he obſerves, ſhews us a great number of occaſional cauſes in this diſeaſe; but phyſicians are ſtill at a loſs to determine the efficient cauſe.

The moderns, with better reaſon than the ancients, ſeek for it in the blood of the pulmonary artery, which is ſuppoſed to rebound impetuouſly towards the right ventricle of the heart, by being prevented from purſuing its courſe towards the other veſſels of the lungs, on their being ſtopped by ſome obſtruction, or compreſſed, from various cauſes.

In opening the carcaſes of people dead of this diſeaſe, or ſubject to it while living, worms, or polypuſes, have been often found in the pericardium.

In ſome the heart is extraordinarily big, and the pulmonary artery dilated to double, or quadruple, its ordinary capacity, with obſtructions of the pulmonary vein, conſiſting of cartilaginous matters, which cram its cavities ſo cloſe, that, as Blancard tells us, in his Anatomy, it is ſometimes difficult even to get a pin in. From theſe obſervations ſome have concluded, that the capillary, and other veſſels of the lungs, oppoſing an impaſſable dike to the courſe of the thickeſt part of the blood, driven thither by the contraction of the heart, ſo that only a ſmall quantity can find a paſſage through them, the reſt muſt make an effort againſt their ſides, and oblige them to give way, and ſtretch them out, in proportion to the quantity of blood impelled againſt them by the contraction of the heart.

But becauſe the pulmonary artery cannot ſtretch wide enough to receive all the blood of the right ventricle, driven thither at a contraction; and ſince the blood, on account of obſtructions, cannot continue its progreſſive motion, in proportion to the velocity wherewith it is impelled by the contraction of the heart; the heart, at each contraction, fails to expreſs into the pulmonary artery all the blood it contained in its right ventricle. Thus that part of the blood which remains, receiving the whole ſtock impreſſed by the contraction, returns it again to the heart by reflection, ſtriking impetuouſly againſt its ſides, and making it bound and ſhoot towards the ribs.

The ſame conſequences will ariſe from obſtructions of the aorta, preventing the entire evacuation of the left ventricle; and, generally, from all obſtructions or compreſſions of the veſſels, as polypuſes, abſceſſes, and dropſies, in the parts near the heart. As to worms, their biting and gnawing the fibrous parts of the heart muſt occaſion violent refluxes of ſpirits towards the brain, followed with copious effluvia of other ſpirits into the nerves of the lungs, by the conſent of parts. And, by ſuch means, violent and convulſive contractions will be occaſioned throughout the whole texture of the lungs; which, oppoſing the free paſſage of the blood, may alſo occaſion a *palpitation* of the heart.

The ſame diſeaſe may alſo ariſe from a compreſſion of the lungs, occaſioned by the extraordinary rarefaction of vicious and fermentative juices ſojourning in the ſtomach and inteſtines; which dilate thoſe parts to that degree, that the diaphragm and lungs being extremely ſtreightened, the blood cannot circulate without a great deal of difficulty; a *palpitation* therefore muſt enſue, which will laſt as long as that rarefaction in the firſt paſſages.

Such, according to modern phyſicians, are the immediate cauſes of the *palpitation* of the heart: the remote, or occaſional cauſes, are whatever may occaſion ſuch obſtruction of the pulmonary artery, &c.

In the ſame work, another phyſician lays down winds, or flatuſes, as the cauſe of the *palpitation*: he adds, that the ancients, to a man, looked on that as the moſt ordinary occaſion thereof; in effect, ſays he, from this ſource may be deduced a multitude of cauſes of ſympathetic *palpitation*, by means of the ventricle, the diaphragm, mediaſtinum, &c.

Others will have the ſole cauſe of *palpitation* to be a viſcid blood; which, by its extraordinary rarefaction, dilating the pulmonary artery, and, by that means, opening the cavity of its capillary veſſels towards their extremes, or, by this dilatation, compreſſing the other little veſſels of the lungs, prevents the blood from continuing its circulating motion with freedom; and thus occaſions a *palpitation* of the heart.

All theſe authors hold the *palpitation* a dangerous diſeaſe; and Galen obſerves, that thoſe much troubled with it when young, never live to be old.

According to M. Piſon, a doctor of the faculty at Paris, the *palpitation* of the heart may ariſe, either from a too abundant ſerofity ſwelling the proper membrane of the heart; as Galen found to be the caſe in opening a monkey; or from too great a quantity of water contained in the pericardium; by which means the heart being ſtreightened, and diſabled from moving with its uſual freedom, is obliged to make ſeveral jerks, or half-beats, inſtead of the regular motions it had before: or, again, it may ariſe from a ſerofity thrown into the ventricles of the heart, either from the grand veſſels, which furniſh the blood, or from the lungs, or from the brain. Of theſe three cauſes the moſt ordinary ſeems to be, the too great extenſion of the pericardium, by water, as it is found to be in the bodies of moſt of thoſe opened after this diſeaſe.

The different cauſes have their different ſymptoms. The boiling ſerofity thrown out of the blood-veſſels into the heart, ſhews itſelf by ſudden beatings of the temples, whizzings in the ear, dimneſs of the ſight, and wandering pains in various parts of the body.

In that produced by the abundance of water in the pericardium, or from the humour ſwelling the proper membrane of the heart, the heart ſeems as if ſuffocated in water, the pulſe is weak, and the *palpitation* continual, or nearly ſo; together with a feveriſhneſs, and a difficulty of breathing. To which may be added, that the diſeaſe comes by little and little.

Prognoſtics in it. The beginnings of complaints of this kind, and ſlighter caſes, when they continue ſo, are attended with no great danger; but when the diſorder grows into a habit, it is not only very troubleſome, but very dangerous. When more cauſes than one conſpire to produce it, it is not only more violent, but the patient is more ſubject alſo to relapſes; and in the end, inflammations, ſpittings of blood, polypuſes of the heart, and infarctions of the viſcera come on; not unfrequently alſo are left fevers, which become dangerous. Sometimes alſo convulſions, and other affections of a like kind, even palſies, are brought on by theſe diſorders. Finally, when an habitual *palpitation of the heart* has been brought on by terror alone, it always proves very difficult of cure, whatever means are uſed.

Method of cure. The primæ viæ muſt be firſt cleanſed by infuſions of rhubarb and ſena, and other gentle purges: after this it is proper to bleed in the foot; but it is to be obſerved, that if the orifice be not large, nor the blood taken away in ſufficient quantity, it is of not the leaſt effect in this caſe. After this the blood is to be attenuated by drinking plentifully of warm and weak liquors, and by moderate exerciſe. After this, ſome of the gentle alexipharmics are to be given, and the ſpring juices of brook-lime, water-creſs, and the like. Finally, there are to be given freſh things as promote an equal diſtribution of the blood and humours; mixtures of volatiles and alkalis, as of ſpirit of hartſhorn, and tincture of ſalt of tartar, and gentle anodynes, if neceſſary. Beſides theſe, clyſters will often do great good, as will alſo the frequent waſhing the feet with warm water, and the hanging camphor near the part, and ſpirit of caſtor, ſaffron, and the like, do well to be rubbed on the breaſt.

Bleeding muſt never be omitted in this caſe, for without it no medicines will be able to take effect. In caſes when a hypochondriac habit conſpires in the cauſe of this complaint, the attemperating powders of nitre, cinnabar, and the like, always prove of very great ſervice. In caſes of a chlorotic with this complaint, bitters and chalybeates uſually prove a remedy; and when a ſuppreſſion of the menſes, or hæmorrhoids, is the cauſe, the bringing them to their priſtine regular ſtate is a cure. It is never proper to allay the motion till the plethora, which occaſions it, is removed, unleſs in caſes of its coming on merely

by the paſſions, without any antecedent cauſe in the blood; in this caſe, gentle opiates may be given without danger. Steel medicines, and the volatile ſalts, when they are given in an imprudent manner, always make the diſeaſe worſe, inſtead of doing any thing toward a cure. Finally, a change of a ſedentary life into a moderately active one, will do more than any medicines. Junck. Conſp. Med. p. 026, ſeq.

Monſieur de la Hire was cured of a chronical *palpitation* of the heart, by a quartan ague.

PALSGRAVE, a term uſed among the Germans, of the ſame import with PALATINE.

It is compounded of the Latin *palatium*, and the Dutch *grave, governor*, q. d. governor, or ſuperintendant of a prince's palace.

PALSY, *paraliſis*, in *Medicine*, a diſeaſe wherein the body, or ſome of its parts, loſe their motion, and ſometimes their ſenſation, or feeling.

The cauſes of the *palſy* are, an impeded influx of the nervous ſpirits into the villi of the muſcles, or of the arterious blood into their veſſels: this may happen from ſome fault, either in the brain, the nerves, the muſcles, or their veſſels.

The occaſional and prediſpoſing cauſes are various; as drunkenneſs, wounds of the brain or ſpinal marrow, preſſure upon the brain or nerves, very cold or damp air, the ſuppreſſion of cuſtomary evacuations, ſudden fear, want of exerciſe, and whatever relaxes the ſyſtem, as drinking much tea, coffee, &c. The *palſy* may likewiſe proceed from wounds of the nerves themſelves, from the poiſonous fumes of metals or minerals, as mercury, lead, arſenic, &c.

The *palſy* is ſaid to be *perfect*, or complete, when there is a privation of motion and ſenſation at the ſame time.

Imperfect, when one of the two is deſtroyed, the other remaining.

This diſeaſe is more or leſs dangerous, according to the importance of the part affected. A *palſy* of the heart, lungs, or any part neceſſary for life, is mortal. When it affects the ſtomach, the inteſtines, or the bladder, it is highly dangerous. If the face be affected, the caſe is bad, as it ſhews that the diſeaſe proceeds from the brain. When the part affected feels cold, is inſenſible, or waſtes away, or when the judgment and memory begin to fail, there is little hope of a cure. Buchan.

Hoffman diſtinguiſhes *paſſes* into ſerous and ſanguineous. In the firſt kind, raiſing an artificial fever by hot, acrid, nervous, and volatile medicines, by ſtrong exerciſe, and hot bathing, often effects a cure. But in the ſanguineous kind, accompanied with febrile motions, ſuch remedies ought not to be applied. Oper. tom. iii. p. 198, § 20.

The *palſy*, again, is either *univerſal*, *lateral*, or *partial*.

PALSY, *univerſal*, called alſo *paraplegia*, or *paroleſis*, is a general immobility of all the muſcles that receive nerves from the cerebrum, or cerebellum, except thoſe of the head. Its cauſe is uſually ſuppoſed to reſide in the ventricles of the brain, or in the root of the ſpinal marrow. Ermuller makes this a different diſeaſe from the *paraleſis*, which he ſuppoſes to conſiſt in a relaxation of the ligaments and membrances ſerving for motion; but the *paraplegia* is a mere obſtruction of the nerves.

The *paraplegia* is ſeldom a primary diſeaſe, uſually a ſecondary one, attending, or following, an apoplexy, ſcorbutus, caries, or arthritis.

PALSY, *lateral*, called alſo *hemiplegia*, is the ſame diſeaſe with the *paraplegia*, only that it affects but one ſide of the body. Its cauſe is the ſame, only that it is reſtrained to one ſide of the brain, or ſpinal marrow.

Mr. Boyle gives an account of an *hemiplegia*, or *palſy* of one ſide, occaſioned by a ſmall ſplinter of a bone preſſing on the dura mater. The patient in leſs than five hours after the bone was taken out, found himſelf able to move his finger, and within two or three days to fift his arm, which had been reduced to ſkin and bone, but ſoon recovered its proper ſize.

PALSY, *partial*, is that where ſome particular part, or member, alone is affected; e. gr. where the motion of the arm or leg is deſtroyed.

Quincy obſerves, that a *palſy*, where motion is deſtroyed, ſenſation remaining, may be produced, firſt, by too much humidity ſtretching the muſcular fibres in length; ſecondly, from cold things, which thicken the juices; thirdly, from external compreſſion; and, fourthly, from hot things, which ſtraighten the ſupple membranes and veſſels. All theſe cauſes affect either the blood or muſcles; the former, by thickening that humour, ſo that it cannot ſuddenly rarefy; and the latter, by relaxing the muſcles into too great a length by too much moiſture, or contracting them into too narrow dimenſions, by too much heat. But the ſenſation may yet be preſerved, becauſe, notwithſtanding all theſe hindrances, the animal ſpirits and nerves may not be at all affected.

The cauſes of the *palſy*, where ſenſation is deſtroyed, motion remaining, he obſerves, may be all thoſe things which ſo far thicken the animal ſpirits in the nerves, ariſing below the cerebellum, that though, indeed, they may flow into the muſcles through the nerves, and there, by the occurſion of ſome liquor ſecreted from the blood, may rarefy, yet they cannot alone flow in ſuch quantities into the nerves, as from a very ſlight cauſe to be made to undulate; whence ſenſation will ceaſe, without loſing the motion of the part.

The cauſes of this kind of *palſy* are alſo whatſoever render thoſe nerves more lax and moiſt, and ſo leſs apt for lively vibrations; the animal ſpirits flowing in the mean time into the muſcles, from whence motion is performed without ſenſation.

The cure of the *palſy*, according to Waldſchmidt, does not differ much from that of the general diſeaſe. Internally, mercurials, ſudorifics, and decoctions of the woods, are good; externally, unctions, particularly of ſpirituous and penetrating things, not on the part affected, but on the ſpina dorſi.

In young perſons of a full habit, the *palſy* muſt be treated in the ſame manner as the ſanguine APOPLEXY; the patient muſt be bled, bliſtered, and have his body opened by ſharp clyſters, or purgative medicines. But in old age, or when the diſeaſe proceeds from relaxation or debility, a quite contrary courſe muſt be purſued. The diet muſt be warm and attenuating, conſiſting chiefly of ſpicy and aromatic vegetables, as muſtard, horſe-radiſh, &c. The drink may be generous wine, muſtard-whey, or brandy and water. Friction with the fleſh-brush, or a warm hand, is extremely proper, eſpecially on the parts affected. Bliſtering plaſters may alſo be applied to theſe parts with advantage. When this cannot be done, they may be rubbed with the volatile liniment, or the nerve ointment of the Edinburgh Diſpenſatory. One of the beſt external applications is ELECTRICITY; the ſhocks of which ſhould be received on the part affected, and repeated daily for ſeveral weeks. Vomits ought alſo to be frequently adminiſtered; cephalic ſnuff, or any thing that makes the patient ſneeze, is likewiſe of uſe. If the tongue be affected, the mouth may be frequently gargled with brandy or muſtard, or the patient may hold a bit of ſugar in his mouth, wet with the *palſy* drops, or compound ſpirits of lavender. The wild valerian root is a very proper medicine in this caſe; and this may be taken either in an infuſion with ſage leaves, or half a dram of it in powder in a glaſs of wine three times a-day. If the patient cannot uſe the valerian, he may take of ſal volatile oleoſum, compound ſpirits of lavender, and tincture of caſtor, of each half an ounce; let them be mixed together, and forty or fifty drops taken in a glaſs of wine three or four times a-day. A table-ſpoonful of muſtard-ſeed, taken frequently, is a very good medicine; the patient ought likewiſe to chew cinnamon-bark, ginger, or other warm ſpices. Exerciſe is of the utmoſt importance, and a cold damp air ſhould be carefully avoided. Buchan.

This diſtemper, according to Dr. Cheyne, may be cured by a total cow-milk diet. He thinks the medicines commonly preſcribed in ſuch caſes may retard the progreſs of the diſtemper, but that it is never to be eradicated if the ſtroke be deep, or life far ſpent, but by cow-milk only.

Among ſeveral remarkable caſes of this terrible diſeaſe, we have, in the Philoſophical Tranſactions, one of a periodical *palſy*. The author quotes two inſtances of a like kind, by way of countenance to that which he relates. The German Ephemerides mention a young paralytic man who ſpoke only one hour in every four-and twenty, and that always at a regular time, beginning between twelve and one at noon every day, and his power of ſpeech ceaſing always between one and two: this continued twelve years upon him. The other caſe is not recorded in books, though well atteſted.

The caſe in the Tranſactions, is of a ruddy ſanguine young woman who fell into a *palſy*, in which ſhe loſt her voice, and the uſe of her legs. This was at firſt carried off by medicines, but afterwards returning again at times, at length became regularly periodical, ſeizing her on the Tueſday of every week, and going off again on the Friday. This courſe it obſerved very regularly for the firſt year, except twice.

After this, on taking proper medicines for ſome conſiderable ſpace of time, ſhe became ſo well, that her fits laſted only a day and a half, coming on always on a Tueſday morning, and going off again on a Wedneſday. In this manner ſhe continued to have them ſeveral months, but ſhe was at length perfectly recovered. Phil. Tranſ. N° 242. p. 60.

There is a kind of *palſy*, called *beriberi*, to which the natives of the Eaſt Indies are peculiarly ſubject.

The word in the Indian language ſignifies a *ſheep*; and Bontius

Bontius ſuppoſes it was attributed to this diſeaſe, becauſe the perſons afflicted with it thruſt out their knees, and lift up their legs ſo much in walking, as in ſome ſort to imitate the gait of sheep. It is a kind of tremor, or *palſy*, in which the uſe of the hands and feet are in a great meaſure taken away; and ſometimes it exceeds itſelf to the whole body.

The principal cauſe of this diſeaſe is ſaid to be a thick viſcous humour, which, in the night ſeaſon, eſpecially in the rainy time, which holds inceſſantly from November to May, falls upon the nerves, while people, fatigued with the heat of the day, throw aſide their cloaths, and ſleep without any covering; by which means the phlegmatic humour, which before generated principally in the brain, eaſily ſeizes upon the nerves; for the nights in theſe countries, compared to the days, are very cold. The conſequence of this is, that the joints become lengthened, the pituitous humours inſinuating themſelves between the junctures, ſo as to relax the nerves and ligaments. Though this diſeaſe for the moſt part comes on very gradually, and by ſlow advances, yet ſometimes it ſeizes a perſon all at once, as when any one, being very much fatigued and hot, drinks a vaſt quantity of any cold liquor. And thus we ſee, even in our own country, that when any one has been violently heated by exerciſe, and drinks an immoderate quantity of a cold liquor, it often throws him into the utmoſt hazard of his life.

The ſymptoms of this diſeaſe are always manifeſt, even to the ſight. There is ever an univerſal laſſitude of the whole body. All motion, but particularly that of the hands and feet, becomes vitiated and depraved; and the ſame ſort of throbbing and titillation is felt as we feel in our fingers and toes in cold weather, only the pain is leſs acute; and ſometimes the voice is ſo far affected, that the patient can ſcarce ſpeak articulately.

Bontius himſelf was once afflicted with this diſtemper, while in the Eaſt Indies, and had this particular ſymptom of it in ſo great a degree, that for a whole month thoſe who ſat cloſe by him could not, without great difficulty, hear what he ſaid. Theſe are the common ſymptoms of the diſeaſe; but beſide theſe, it is at times attended with all thoſe others which may be ſuppoſed to ariſe from a cold cauſe.

The cure is uſually very tedious; for theſe cold humours are very ſlowly, and with difficulty diſcuſſed. The diſeaſe is not naturally mortal, however, unleſs it affects the breaſt: in which caſe it ſometimes wholly ſtops the breath. In order to a cure, the patient is of all things to avoid confining himſelf to his bed; walking, riding, and all ſorts of exerciſe, are uſeful; ſtrong and ſmart frictions are alſo very uſeful, and the Bengal ſervants are uſed to theſe, and are very dextrous in the uſe of them.

There is alſo great relief had from fomentations made of decoctions of the herb *lagondi*, which has all the virtues of our chamomile and melilot, but in a much greater degree. The leaf of this plant is like that of our perſicaria or arſmart; and its ſmell very aromatic. The hands and feet are alſo to be anointed with oil of cloves, or mace mixed with oil of roſes. But more than all theſe, there is relief found in a kind of naphtha, which is very common in Sumatra, and is called *miniac tarnah*, or *oil of the earth*. This is of a ſtrong, but not very naufeous ſmell, and is ſo great a remedy, that being rubbed on the hands and legs, it is always an almoſt immediate relief. The Barbarians know as well as we the value of this precious balſam; and the king of Achin, who is the moſt powerful prince in that iſland, has forbidden its exportation, under the pain of death; ſo that the inhabitants can only bring it off by ſtealth in the dead of the night, to the Dutch and Engliſh ſhips which happen to lie in the way.

Theſe are the things which give temporary relief; but as the diſeaſe is of the chronic kind, the cure is to be performed by long courſes of the decoctions of the roots of China and ſarſaparilla, and guaiacum wood, which by their gentle heat diſcuſs the cold humours which are the root of the diſeaſe, and carry them off by perſpiration or urine. Purging at proper intervals is alſo highly neceſſary; and the cathartics moſt in uſe there in this caſe, are aloes and gamboge. Bleeding is by all means to be forbid; and the relics of the diſeaſe are uſually very happily carried off by Venice treacle, and other ſudorific and nervous medicines, and gentle exerciſe is the beſt remedy to prevent its return. Bontius, De Medicina Ind.

PALSY, *electary for the*, is made of powdered muſtard-ſeed and conſerve of roſes, of each an ounce, with as much ſyrup of ginger as is ſufficient to make an electary. A tea-ſpoonful of this may be taken three or four times a day.

PALSY *drops*. See LAVENDER.

PALSY, *infuſion for the*. See INFUSION.

PALUDAMENTUM, in *Antiquity*, a garment worn by the Romans in time of war; being the coat of arms of their principal men, eſpecially the generals; who, for that reaſon, were diſtinguiſhed by the appellation *paludati*.

The ſoldiers only having ſhort coats, were therefore named *ſagati*.

This garment was open on the ſides, with ſhort ſleeves, by ſome reſembled to angels wings; and came down no lower than the navel.

It was either white or red: Valerius Maximus remarks, it was an ill omen to Craſſus, that they gave him a black *paludamentum*: *Pullum ei traditum eſt* paludamentum, *cum in prætium cumulus album, aut purpureum, dari ſoleret*.

Cornutus ſays, the Romans wore the toga in peace, and the *paludamentum* in war. And hence the phraſe, *Togam* paludamento *mutavit*. See CHLAMYS.

PALUM *ſanctum*, in *Botany*, a name by which ſome authors have called a ſpecies of the *guaiacum-tree*, called the *lignum ſanctum*, or *holywood*.

PALUMBARIUS *accipiter*, in *Ornithology*. See GOSHAWK.

PALUMBES, in *Ornithology*. See RING-*dove*.

PALY, or PALE, in *Heraldry*. When an eſcutcheon is divided into ſix, eight, or ten diviſions, pale-wiſe, i. e. by perpendicular lines drawn from the top to the bottom, it is blazoned *paly* of ſix, eight, or ten, &c. pieces.

If the number be odd, then the field is firſt named, and the number of the pales ſpecified. See PALE.

The like is to be underſtood alſo of BARRY and BENDY.

PALY-BENDY is, when a coat is divided, both pale and bendwiſe: in *paly-bendy* the field is divided by perpendicular lines, which is called *paly*; and then, again, by diagonals croſſing the former, from the dexter ſide to the ſiniſter, which is the *bendy*. See *Tab. Herald. fig.* 30.

The field is *paly-bendy*, topaz and diamond.

PAMBŒOTIA, πανβοιωτια, in *Antiquity*, a feſtival celebrated by all the Bœotians, who aſſembled near Coronea, at the temple of Minerva, ſurnamed Itonia.

PAMMACHION, πανμαχιον, a name by which the exerciſe *pancratium* is ſometimes called, whence the combatants were likewiſe called *pammachi*, πανμαχοι.

PAMPINIFORME *corpus*, in *Anatomy*, a ſort of plexus, or knot of blood-veſſels, formed by the ſpermatic veins; which, in their progreſs through the teſtes, conſtitute a body called *corpus varicoſum pampiniforme*, or PYRAMIDALE.

PAMUCHILEN, in *Ichthyology*, a name by which ſome call the ſpecies of *cod-fiſh*, commonly named by authors *aſellus ſtriatus*.

PAN, in *Mythology*, the ſon of Mercury and Penelope, and the deity who preſided over huntſmen, ſhepherds, and thoſe whoſe occupations led them to frequent the fields. The fable ſays, that Mercury tranſformed himſelf into a he-goat to pleaſe Penelope; and to this circumſtance is attributed the origin of his horns and cloven feet, as well as the whole tribe of fauns and ſatyrs. He is called *Pan*, Παν, it is ſaid, becauſe Penelope, in the abſence of Ulyſſes, granted favours to *all* her lovers, and *Pan* himſelf was the fruit of this intercourſe. However, Epimenides ſays, that he was the ſon of Jupiter and Caliſta; others ſay, that he was the ſon of the Air and a Nereid, or of the Heaven and Earth. He is commonly repreſented with a ſhepherd's crook, and a kind of flute, with many pipes. He was particularly revered among the Arcadians, to whom he iſſued oracles, and who celebrated, in honour of him, the LUPERCALIA. Evander carried the worſhip and feaſts of *Pan* to Rome.

The Egyptians give a different account of this deity. According to them he was one of the generals of Oſiris, who engaged with Typhon; and whoſe army being ſituated in a valley, all the avenues of which were guarded by the enemy, he ordered his ſoldiers in the night to march with loud exclamations, which being returned in echos, terrified the enemy, and put them to flight; whence they ſay comes the expreſſion PANIC terror. Polyænus attributes to *Pan* the invention of the order of battle, of the phalanx, and of the diſtribution of an army into the right and left wings, or horns, whence, it is ſaid, he derived his horns. The name *Pan*, which ſignifies *all*, has led ſome to make him the ſymbol of nature. Encyclopedie.

PANACEA, Πανακεια, formed from πας, *all*, and ακεομαι, *I cure*, an univerſal medicine or remedy for all diſeaſes.

The ſecurate Boerhaave overturns the notion of *panacea*; and ſhews, from the different cauſes, natures, effects, ſeats, &c. of diſeaſes, that ſeveral may, indeed, be cured by one medicine; but all, by none.

He obſerves, that the moſt univerſal remedies known, are water, fire, mercury, and opium; and adds, that by theſe alone, cautiouſly diſguiſed, ſome have acquired the reputation of univerſal phyſicians.

PANACEA, Panaces, or Panax, *all-heal*, is also applied to several plants, by reason of the extraordinary virtues ascribed to them.

There are three of the *panaceas* peculiarly famed among the ancients; the *Heraclean*, *Asclepian*, and *Chironian*: these were so called from their inventors Hercules, Asclepias, and Chiron.

The first is the *panax Heraclea vero ficuleus folio*, in English, *true all-heal of Hercules*. From the root and stem of this is drawn, by incision, the gum opopanax.

The *Asclepian*, according to some botanists, is a kind of ferula, which Caf. Bauhin calls *Libanotis ferulæ folio & semine*.

The *Chironian*, according to some, is a kind of helianthemum: according to Bradley, it is Doria's woundwort.

PANACIA, Πανακεια, in *Antiquity*, a festival in honour of Panace.

PANADA, Panata, or Panatella, a diet consisting of bread boiled in water, to the consistence of a pulp; given to sick persons whose digestion is weak, or to whom stronger foods would be improper.

The word is formed from the name of the principal ingredient, *panis*, *bread*.

It is sometimes made thin, to serve as a drink; and sometimes, likewise, is sweetened, &c. to render it more palatable.

PANAGE, or Pannage, in our *Ancient Customs*. See Pannage.

PANALEITHES, a name used by many authors for a plaster, supposed to be of the greatest virtues. It is described by Aëtius.

PANAMA-*shell*, a species of dolium.

PANARIS, or Panaritium, formed probably of παρονυξ, q. d. an abscess at the root of the nails, derived from παρα, *juxta*, and ονυξ, *unguis*, a word used by some authors to express a whitlow, or *paronychia*.

PANATA, or Panatelia. See Panada.

PANATHENÆA, Πανάθηναια, *in Antiquity*, a feast celebrated at Athens, in honour of Minerva, whom the Greeks called *Athena*.

Harpocration and Suidas refer its institution to Erichthonius IV. king of Athens, who lived before Theseus. Theodoret, alone, says the feast was established by Orpheus.

Be this as it will, till Theseus, this was a particular feast of the city of Athens, and was called simply *Athenæa*: but that prince uniting all the people of Attica into one republic, they afterwards all assisted at the feast; whence the name *Panathenæa*, i. e. the feast of all Attica.

In effect all Attica was present; and each people sent a bullock for the sacrifices, and for the entertainment of the vast multitude of people assembled.

There were two kinds of *Panathenæa*; the *great*, celebrated every five years; and the *little*, every year, or every three years; if we may credit the author of the argument of Demosthenes's oration against Midias.

The ceremonies were the same in the *great*, and the *little Panathenæa*; excepting for a banner wherein the actions of the goddess were represented in embroidery performed by maids, with the names of those who had distinguished themselves in the service of the republic; which was only borne at the greater.

PANAX, *in Botany*. See Gin-*seng*.

PANCALA *aurea*, a name of a famous antidote, composed of many ingredients, described by Myrepsus.

PANCARPIA, the name of a sort of cake much used at Alexandria, and usually covered with paper for the sake of its keeping the longer.

PANCARPUS, in *Antiquity*, a sort of spectacle or shew which the Roman emperors frequently exhibited to the people.

The word is formed from the Greek πας, *all*, and καρπος, *fruit*. Whence the name was also given by the Athenians to a sacrifice, wherein all kinds of fruits were offered.

The *Pancarpus* of the Romans was a kind of chace, or hunt: for the performance hereof, a number of beasts, as hares, deer, bullocks, &c. were shut up in the circus, or amphitheatre; into which trees were frequently transplanted, so as to form a kind of forest, wherein the beasts were let loose; whence the *Pancarpus* was also called *Sylva*.

The beasts were thus abandoned to the people; i. e. to all who were disposed to share in the pleasure of the chace; who pursued, shot, killed, and cut in pieces, all they could lay hold of. Heliogabalus, the Gordians, and Probus, gave this diversion very frequently, and it continued till the time of the emperor Justinian, in the sixth century.

Casaubon, Cujas, Pithou, &c. make the *Pancarpus* and *Sylva* the same thing; Salmasius will have them different. The *Sylva*, according to him, was such a diversion, as that above described; but the *Pancarpus* a combat, wherein robust people, hired for that purpose, fought with wild beasts; which opinion he confirms from Cassian, Justinian, Claudian, Firmicus, Manilius, and Cassiodorus.

PANCH. See Paunch.

PANCHREAS. See Pancreas.

PANCHREATIC. See Pancreatic *juice*.

PANCHREST, Panchrestos, Παγχρηστος, formed of πας, *all*, and χρηστος, *useful*, in *Medicine*, a panacea, or remedy for all distempers.

PANACHRESTARII, among the Romans, those who prepared the *pancreſt*, or *universal remedy*.

PANCHRUS, the name given by some of the ancient writers on natural history to a gem which they say has all colours: probably the opal.

PANCHYMAGOGUE, Panchymagogum, formed from πας, *all*, χυμος, *juice*, *and* αγω, *to draw off*, in *Pharmacy*, a purging extract made from aloes, rhubarb, senna, scammony, jalap, agaric, coloquintida, and black hellebore.

Its name arises hence, that, being a composition of all the kinds of purgatives, it was supposed to have the virtue of purging all the sorts of humours of the body at once.

PANCLADIA, Πανκλαδια, in *Antiquity*, a festival celebrated by the Rhodians when they pruned their vines.

PANCRASIUM, in the *Materia Medica*, a name used by some authors for the *fquill*, of the root of which the oxymel of squills is made.

PANCRATIAN *verſe*, the name of a sort of Greek verse, consisting of two trochees and a supernumerary syllable: *ουτε διωκειν*.

It is so called from its supposed inventor Pancrates, who is said to have lived before the time of Meleager, another poet who flourished under the first successors of Alexander.

PANCRATIASTES, in *Antiquity*, a combatant in the exercise called Pancratium.

Pancratiastes was also applied to one who had gained the victory in all the kinds of exercise used in the Pancratium.

PANCRATIUM, Παγκρατιον, compounded of πας, *all*, and κρατος, *strength*, among the *Ancients*, a kind of intermixed exercise, consisting of the leaps or wrestling, and the boxing or pugnace.

The *pancratium* was the third gymnastic exercise, and was not introduced till long after the others.

The people, who were engaged in these exercises, were called *Pancratiastæ*; which name was also given to such as did not confine themselves to one exercise, but succeeded in several different ones.

Pancratium, in *Botany*. See *Sea* Daffodil.

PANCREAS, Παγκρεας, formed of πας, *all*, and κρεας, *flesh*, in *Anatomy*, popularly called the *sweet-bread*, a great conglomerate gland; or a body composed of an infinite number of little glands, tied up in the same common membrane; situate at the bottom and hind-part of the stomach, and reaching from the duodenum to the spleen. See *Tab. Anat. (Splanch.) fig.* 1. *lit. f.*

The glands it consists of are bound together both by the vessel, and by a membrane proper to each of them; and all together are loosely clothed with a thin membrane, from the peritonæum.

Its colour is a pale red; its form like that of a dog's tongue; it is eight or nine fingers long, 2½ broad, and one thick; its weight four or five ounces, but the dimensions in weight vary in different subjects. Its arteries come from the pylorica, duodenalis, and chiefly from the splenica; its veins (which are rami of the splenica) go to the porta; its nerves some partly from the hepatic plexus, partly from the plexus splenicus, and partly from the plexus mesentericus superior.

Each gland has an excretory duct, which, uniting, form one common excretory duct, called *ductus pancreaticus Virſungii*, from Wirtsungius, professor of anatomy at Padua, the discoverer thereof.

This duct, running along the middle of the *pancreas*, opens into the cavity of the duodenum, generally by two mouths, the one four or five fingers below the pylorus, sometimes at the same orifice with the ductus choledochus; the other lower. It is of the bigness of a raven's quill, near the intestines; but less farther off. De Graaf observes, that it is frequently double.

Mr. Winslow observes, that where the great extremity of the *pancreas* is connected to the curvature of the duodenum, it sends down an elongation, which adheres very closely to the following portion of the intestine; and upon a careful examination, he found a particular pancreatic duct, ramified like the large one, which ran toward and intersected this great duct, into the extremity of which it opened, after having perforated the duodenum. This portion he calls *pancreas minus*, and it sometimes opens separately into the duodenum, in which there are several small holes, round the ductus choledochus, which answer to the *pancreas*.

The

The *pancreas* ſerves to ſeparate a peculiar humour from the blood, which is called the PANCREATIC *juice*.

PANCREAS *Aſellii*, in *Comparative Anatomy*, is a large gland in the middle of the meſentery of ſome brutes, eſpecially dogs; to which moſt of the lacteals reſort; and whence the chyle is conveyed, by large veſſels, that have their riſe immediately from the inteſtines, and are called *lactea ſecundi generis*.

It has its name from the author who firſt took notice of it, Aſellius. Mr Perrault obſerves, that the fiſh called *plaiſe*, has four hundred and forty *pancreaſes*; though it has but five ducts opening into the inteſtines, three of which correſpond to eighty *pancreaſes*, and two of them to one hundred a piece.

PANCREATIC *juice*, an inſipid, limpid juice or humour ſeparated from the blood, and prepared in the *pancreas*.

This juice is not acid, as moſt authors have ſuppoſed; nor alkaline, as ſome others have thought; but a little ſaline, and much reſembling the ſaliva in its origin, veſſels, and properties.

It is carried by the *pancreatic* duct into the duodenum, where it ſerves to dilute the chyle, to render it more fluid, and fit to enter the mouths of the lacteals; and perhaps to temper and dilute the bile, to change its viſcidity, bitterneſs, colour, &c. and make it mix with the chyle, in order to reduce the ſeveral taſtes, odours, and properties of the ſeveral foods into one homogeneous one.

Janſon ab Almeloveen will have the *pancreatic juice* to have been known to Hippocrates and Galen. De Graaf, a Dutch phyſician, has found means of collecting a quantity of it for experiments; and has publiſhed a treatiſe expreſs, de Succo Pancreatico.

Brunner relates, that the *pancreatic* duct, in ſeveral dogs, having been tied and cut, they ſtill continued to eat and drink, and perform all the other functions of life as uſual.

One of them ſeemed only to have the better ſtomach forit.

PANDA, in *Mythology*, a goddeſs who was invoked and honoured as the protectreſs of travellers and navigators.

The goddeſs of peace was alſo called *Pandor*, becauſe ſhe opened the gates of cities which were ſhut in time of war. According to Varro, *Panda* is a ſurname of Ceres, derived *à pane dando*, becauſe ſhe gave bread to mankind.

PANDALEON, in *Medicine*, a remedy appropriated to diſorders of the breaſt and lungs, invented by the Arabians and later phyſicians; conſiſting of grateful ingredients anſwering the ſame end with a linctus, but differing from it in form, in which it agrees with troches: it differs however in this, that troches are made in a certain figure, whereas the *pandaleon*, after the ſugar is duly boiled, and the ingredients ſufficiently mixed, is poured into a box, and becomes indurated, and a ſufficient quantity is to be taken out either in a ſpoon, or on the point of a knife.

The *pandaleon* therefore is a ſolid medicine like a cake, receiving its form from the box into which it is poured: and it conſiſts of powders, pectoral conſerves, and lozenges of ſugar.

PANDECTS, PANDECTÆ, in *Juriſprudence*, the DIGEST, or collection made by Juſtinian's order, of five hundred and thirty-four deciſions, or judgments of the ancient lawyers, on ſo many queſtions occurring in the CIVIL *law*; to which that emperor gave the force and authority of law by an epiſtle prefixed to them.

The word is Greek, Πανδεκται, compounded of πας, *all*, and δεχομαι, *capio*, *I take*; q. d. a compilation, or a book containing all things. Though others, as Bartoli, will have it formed from πας, and δεκτικος; as if theſe books contained the whole doctrine of the law.

The *Pandects* conſiſt of fifty books, and make the firſt part of the body of the civil law.

They were originally denoted by two ππ; but the copiſts taking thoſe ππ for ff, the cuſtom aroſe of quoting them by ff. The *Florentine Pandects* are thoſe printed from a famous ancient manuſcript at Florence.

Papias extends the denomination of *Pandects* to the Old and New Teſtament.

There are alſo PANDECTA *medicinæ*, *Pandects of medicine*: theſe are a kind of dictionary of things relating to medicine, compiled by Mat. Sylvaticus, of Mantua, who lived about the year 1297. Leunclavius has publiſhed *Pandects* of Turkey; and biſhop Beveridge *Pandects* of the canons, Pandecta Canonum.

PANDEMON, Πανδημον, in *Antiquity*, the ſame with the feſtival Chalceia and ATHENÆA.

It was ſo called from the great concourſe of people that uſed to meet at this ſolemnity.

PANDIA, Πανδια, in *Antiquity*, an Athenian feſtival in honour of Jupiter. For the origin of this ſolemnity, ſee Potter, Archæol. Græc. lib. ii. cap. 20. tom. i. p. 422.

PANDICULATION, PANDICULATIO; in a general ſenſe, is a violent and tenſive motion of the ſolids, which uſually accompanies the act of yawning; and is otherwiſe called *ſtretching*.

PANDICULATION is alſo uſed in a peculiar ſenſe, for reſtleſſneſs, ſtretching, and uneaſineſs, which uſually accompany the cold fit of an intermitting fever.

It is ſuppoſed to ariſe from a convulſive dilatation of the muſcles, whereby nature endeavours to throw off ſomething that diſturbs her.

PANDORA, in *Mythology*, the name of the firſt woman, according to Heſiod; ſo called from πας, *all*, and δωρα, *gift*; becauſe the gods united to confer upon her every quality and endowment that could conduce, as the fable ſays, to the miſery of mankind. *Pandora*, it is farther ſaid, kept theſe gifts in a veſſel, the cover of which ſhe opened, and they were diſperſed over the face of the earth.

PANDROSOS, Πανδροσος, in *Antiquity*, an Athenian feſtival in honour of *Pandroſia* the daughter of king Cecrops.

PANDURA, or PANDORA, a muſical inſtrument, uſed among the ancients, much reſembling the lute.

The word, according to ſome, is formed from the Greek πας, and δωρα, i. e. all gifts, all ſorts of gifts. Iſidore derives the name from its inventor *Pandarus*; others from *Pan*, to whom they attribute its invention, as well as that of the flute.

It has the ſame number of ſtrings with the lute; but they are of braſs, and of conſequence give a more agreeable ſound than thoſe of the lute. Its frets are of copper, like thoſe of the ciſtre; its back is flat, like thoſe of the guittar; and the rims of its table, as well as its ribs, are cut in ſemicircles.

Du-Cange obſerves, that Varro, Iſidore, and others of the ancients, mention it as having only three ſtrings; whence it is ſometimes alſo ſpoken of under the denomination τριχορδον, *trichordum*.

PANDYSIA, Πανδυσια, in *Antiquity*, public rejoicings when the ſeaſon, through its coldneſs and intemperance, forced the ſailors to ſtay at home.

PANEGYRIC, PANEGYRIS, or PANEGYRICUS, an oration in praiſe of ſome extraordinary thing, perſon, or virtue.

The name is Greek, πανηγυρις; formed of πας, *all*, and αγειρω, *I aſſemble*; becauſe anciently held in public and ſolemn aſſemblies of the Greeks, either at their games, their feaſts, or their religious meetings.

The *panegyric* is ranked among the demonſtrative kind of orations.

To make their *panegyrics* the more ſolemn, they uſed to begin with the praiſes of the deity in whoſe honour the games, &c. were celebrated; then they deſcended to the praiſe of the people or country where they were celebrated; then to the princes or magiſtrates who preſided at them; and at length to the champions, eſpecially the conquerors who had gained the prizes in them.

F. De Colonia lays down two methods, or ſeries, obſerved in *panegyrics*. The *artificial*, where, without any regard to the order of time, every thing is reduced to certain heads. Thus Tully refers the whole praiſe of Pompey to his ſkill in war, his virtue, authority, and felicity.

The other *natural*; wherein the order and time of hiſtory are obſerved. This ſeries he divides into three periods: the ſpace before the perſon's birth; that wherein he lived; and, if he be dead, that which followeth his death. This natural ſeries requires much leſs art, genius, &c. than the other.

The topics or ſources of *panegyric* are, chiefly, the family and country of the hero, auguries at his birth, his virtues, the talents of his body and mind, honours, riches, manner of his death, and the conſequences thereof.

PANEGYRIC, πανηγυρικος, is alſo the name of a church-book, in uſe among the Greeks; ſo called, as conſiſting of *panegyrics*, or diſcourſes in praiſe of Jeſus Chriſt, and the ſaints. It is found in MS. in moſt churches, but is not the ſame in all; each church having its particular ſaints; and the compilers of this kind of books uſually ſuited their collections to the taſte of their own devotion.

They are diſpoſed according to the order of months, and frequently conſiſt of twelve volumes, anſwering to the twelve months of the year.

PANEGYRIS, Πανηγυρις, among the Greeks, a fair, or feſtival day, on which the people uſed to meet together. It exactly correſponded to the NUNDINÆ of the Romans.

PANEL, PANELLA, PANELLUM, in *Law*, is derived, by Spelman, from *pagella*, *a ſchedule*, or *page*; in which ſenſe we ſay, a *panel* of parchment, a *counterpane* of an indenture, &c.

PANEL, or PANNEL, is more commonly uſed for a ſchedule, or roll, containing the names of ſuch jurors as the ſheriff returns to paſs upon any trial.

Hence the impannelling of a JURY, is the entering of their names, by the ſheriff, into a *panel*, or little ſchedule of parchment; called alſo the *panel of aſſiſe*, *panellum aſſiſæ*. Coke on Littleton will have *panel* to be an Engliſh word, ſignifying a little part; as being a diminutive of the word *pane*, *part*; but Spelman takes this for an overſight.

PANEL,

PANEL, in *Joinery*, &c. See PANNEL.

PANELLENIA, Πανελλήνια, in *Antiquity*, a public festival celebrated by an assembly of people from all parts of Greece.

PANEMUS, in *Chronology*, the Bœotian name of the Athenian month METAGITNION, which was the second of their year, and answered to the latter part of our July and beginning of August.

PANEMUS among the Corinthians, answered to the Attic month BOEDROMION, or according to Petavius, to our November. In the ancient Macedonian calendar, it was the ninth month of the year: but after the conquest of Arabia, they gave this name to the sixth month.

PANEROS, the name of a beautiful stone dedicated to Venus. It was called also by some *pausthestas*, and was probably one of the beautiful agates.

PANES, in the *Ancient Theology*. See FAUNI.

PANGOLIN of Buffon, in *Zoology*, is the short-tailed *manis*, or MANIS *pentadactyla* of Linnæus, with back, sides, and legs, covered with blunt scales, with bristles between each; tail not longer than the body; ears not unlike the human; and skin, belly, and inside of the legs hairy. See LACERTA *squamosa*.

It inhabits the islands of India, and is probably a native of Guinea: it feeds on lizards and insects, and is esteemed very delicate food. *Tab.* IV. *Quadrupeds*, N° 46.

PANGONIA, in *Natural History*, the name of a genus of crystal. See *Tab. of Fossils*, *class* 3.

The word is derived from the Greek πας, *numerous*, and γωνια, *an angle*, or *bending*, and expresses a crystal composed of many angles.

The bodies of this genus are single-pointed, or imperfect crystals, composed of dodecangular or twelve-planed columns, terminated by twelve-planed pyramids, and the whole body, therefore, made up of twenty-four planes.

Of this genus there are only three known species. Hill.

PANIC, or PANIC *fear*, a term used for a needless or ill-grounded fright.

Polyænus fetches the origin of the phrase from *Pan*, one of the captains of Bacchus, who, with a few men, put a numerous enemy to rout, by a noise which his soldiers raised in a rocky valley, favoured with a great number of echos. This stratagem making their number appear much greater than it really was, the enemy quitted a very commodious encampment, and fled. Hence all ill-grounded fears have been called *panics*, or *panic fears*; and it was this that gave occasion to the fable of the nymph Echo's being beloved by the god PAN.

Others derive the origin of the expression hence; that, in the wars of the Titans against the gods, PAN was the first who struck terror into the hearts of the giants. Theon on Aratus says, he did it by the means of a sea-shell, which served him for a trumpet, whereof he was the inventor.

PANIC, *panicum*, in *Botany*, a genus of the *triandria digynia* class. Its characters are these: there is one flower in each chaff; the chaff opens with three valves, which are oval, ending in acute points: the petals open with two oval acute-pointed valves; the flowers have three short hair-like stamina, terminated by oblong summits; and a roundish germen supporting two hair-like styles, crowned by feathered stigmas; the germen becomes a roundish seed, fastened to the withered petals. Miller enumerates five, and Linnæus thirty species.

PANICASTRELLA, in *Botany*, the name by which Micheli has called a genus of plants named by Linnæus CENCHRUS.

PANICLE, PANICULA, in *Botany*, a soft woolly beard, or string, whereon the seeds of some plants hang pendulous; as in reeds, millet, &c.

Such are hence called *paniculated plants*.

According to Mr. Miller, the *panicula*, or panicle, is a stalk diffused into several pedicles, or foot-stalks, sustaining the flowers or fruits, as in oats, &c.

PANIONIA, Πανιωνια, in *Antiquity*, a festival in honour of Neptune, celebrated by a concourse of people from all the cities of Ionia.

One thing is remarkable in this festival, that if the bull offered in sacrifice happened to bellow, it was accounted an omen of divine favour; because that sound was thought to be acceptable to Neptune.

PANIS *& cervisiæ assisa*. See ASSISA.

PANIS *& cervisiæ emendatio*. See EMENDATIO.

PANIS *ustionum*, in *Natural History*, a name given by authors to a sort of coarse stone, common in Sweden, and some other places, and usually found in roundish, but sometimes flattish masses, resembling a loaf in form.

PANNAGE, PANAGE, or PAWNAGE, are used in our law-books, &c. for the MAST of woods: as of beech, acorns, &c.

As also for the running and feeding of swine, or other cattle, in forests.

And for the money taken by the agistors for the same.

PANNAGIUM *liberum*, or *free pannage*, was a liberty of free running of swine in certain forests or woods, granted, by privilege to certain private persons, and several religious houses.

Linwood defines *pannagium*, by *fastus pecuum in memoribus, & in silvis, utpote de glandibus, & aliis fructibus arborum sylvestrium, quarum fructus aliter non solent colligi*. It is also mentioned, 20 Car. II. *Quilibet villanus habens decem porcos, dat unum porcum de pannagio*; by which it appears, that one hog in ten was given for the *pannage*.

PANNEL, in *Law*. See PANEL.

PANNEL, in the *Scotch Law*, denotes the prisoner at the bar, or person who takes his trial before the court of justiciary for some crime.

PANNEL, or PANEL, in *Joinery*, &c. a tympan, or square piece of wainscot, sometimes carved, framed or grooved in a larger piece, between two mounters or upright pieces, and two travelses or cross pieces.

Hence also *panels*, or panes of glass, are compartiments or pieces of glass of various forms; square, hexagonal, &c.

PANNEL, in *Masonry*, denotes one of the faces of a hewn stone.

PANNELS *of a saddle* are two cushions full of hair, or flocks, placed under the saddle, one on each side, next the horse's back, to prevent the bow from hurting the horse.

The word is formed from the French *panneau*, of *pan*, *flat side*.

PANNICULUS, in *Anatomy* a term frequently used for a MEMBRANE.

The word is formed, by diminution, from *pannus*, *cloth*, q. d. a little cloth, or fine web.

Hence *panniculus adiposus*, &c. is the same with *membrana adiposa*, &c.

PANNICULUS *carnosus* is a fleshy membrane, which the ancient anatomists supposed to be common to the whole body, and to be the fourth integument or covering thereof, after the epidermis, cutis, and the adipose.

This *fleshy panniele*, according to them, is a thick membrane, which covers the whole body, and even becomes musculous, in some parts; but the latest anatomists deny any such membrane in the human body; maintaining, that what the ancients called the *fleshy panniele* is only the fatty or adipose one. Dr. Drake makes it a double membrane, one half of which forms the membrana adiposa, the other half the membrana communis of the muscles.

The use the ancients ascribed to the *fleshy panniele* was, to wrinkle and contract the skin; but the truth is, wherever the skin wrinkles, there are particular muscles for that purpose, called *cutaneous muscles*.

These muscles the ancients owned; but they said, their office was confined to particular motions: adding, that there are places where no fat is found between the cutis and the *fleshy panniele*, which is false.

Farther, even in animals which do move the skin, this *panniele* is no more than a cutaneous muscle, as well as the dartos.

Some of the modern anatomists, however, admit the *fleshy panniele*, and deny the adipose one; supposing the latter, in reality, only a part of the former.

PANNIER, in *Architecture*. See CORBEL.

PANNONICA *bolus*, in the *Materia Medica*, a name by which Kentman, and some others, have called the earth more usually known by the name of *bolus* TOCCAYIENSIS.

PANNUS, derived from πανος, *a web*; a Latin word signifying cloth, web, &c.

PANNUS, in *Medicine*, a disease of the eye, popularly called the *web*.

The *pannus* is an excrescence arising on the adnata or conjunctiva, less hard and membranous than the unguis; and representing a web, or plexus of little veins swelled with blood.

Its cause is, an obstruction of the blood in the minute vessels of that tunic.

Its cure is much the same with that of the OPHTHALMIA.

A chief difference is, that, in the UNGUIS, the membranous excrescence only covers part of the eye, after the manner of a nail; whereas in the *pannus* it covers the whole.

PANOCHIÆ, a name by which some chirurgical authors call *buboes* in the groin.

PANOMPHÆUS, Πανομφαιος, in *Antiquity*, a designation given to Jupiter, because he was looked upon as the original author of all sorts of divination, having the books of fate, and out of them revealing either more or less, as he pleased, to inferior dæmons.

PANOPSIA, Πανοψια, in *Antiquity*. See PYANEPSIA.

PANORPA, in *Zoology*. See SCORPION *Fly*.

PANSAPAN, in *Botany*, a name by which some authors have called the tree whose wood is the LOGWOOD, used in dying and in medicine.

PANTALOON, or PANTALON, the name of an ancient garment frequent among our forefathers, consisting of breeches and stockings all of a piece.

The denomination comes from the Venetians, who first introduced this habit, and who are called *Pantaloni*, from St. *Pantaleon*, who was formerly their patron.

PANTALOON, on the *Theatre*, is a buffoon or masked person who performs high and grotesque dances, and shews violent and extravagant postures and airs.

The word is also used for the habit or dress these buffoons usually wear; which is made precisely to the form of their body, and all of a piece from head to foot.

And hence those who wear a habit of this kind, for conveniency, under their other cloaths, are called *pantaloons* of Venice.

PANTARBE, in *Natural History*, a name given by authors to an imaginary stone, the virtues of which were similar to those of the magnet; but exerted upon gold as those of the load-stone upon iron. The ancients, as well as later writers, seem to have all had an opinion, that there was such a stone as this, and the *amphitone* of Pliny is described as possessing this remarkable quality; but neither they nor we ever found reason from any experiment to believe that there was any such stone.

PANTHEA, Πανθεα, among the *Ancients*, were single statues, composed of the figures, or symbols of several different divinities combined.

Father Joubert, who calls them *Panthea*, and who has observed them on several medals, says their heads are most commonly adorned with the symbols or attributes belonging to several gods.

An instance hereof we have in a medal of Antoninus Pius; which at the same time represents Serapis, by the bushel it bears; the Sun, by the crown of rays; Jupiter Ammon, by the ram's horns; Pluto by the large beard; and Æsculapius by the serpent twisted in his hand.

M. Baudelot, in a dissertation on the Lares, will have the *Panthea* to have had their rise from the superstition of those, who, taking several gods for the protectors of their houses, united them all in the same statue, by adorning it with the several symbols proper to each of these deities.

PANTHEISTS, is a denomination by which the followers of Spinoza are distinguished, and derived from the nature of their doctrine, which confounds God with the universe; representing them as one and the same being, and admitting only one substance whence all things proceed, and into which they all return. See SPINOZISM.

PANTHEON, Πανθειον, thus named from πας, *all*, and θεος, *God*, in *Architecture*, a temple, or church, of a circular form; dedicated to all the gods, or to all the saints.

The *Pantheon* of ancient Rome is of all others the most celebrated, and that whence all the rest take their names.

It was built by Agrippa, son-in-law of Augustus, in his third consulate, twenty-five years before Christ: though several antiquarians and artists have supposed that the *pantheon* existed as long ago as the common-wealth, and that Agrippa only embellished it and added the portico. To this purpose they alledge the authority of Dion Cassius, who, speaking of Agrippa, says, he also finished or perfected the *Pantheon*.

It was dedicated by him to Jupiter Ultor, Jupiter the Revenger; and had the name *Pantheon*, on account of the great number of statues of the gods ranged in seven niches all round it; and because built of a circular form, to represent heaven, the residence of the gods. It has but one door, and one window, receiving all its light from the top of its dome. It is one hundred and forty-four feet diameter within, and just as much in height, and of the Corinthian order. Before each nich are two columns of antique yellow marble fluted, and of one entire block. The whole wall of the temple, as high as the grand cornice inclusive, is cased with divers sorts of precious marble in compartiments: and the frieze is entirely of porphyry.

The eruption of Vesuvius, in the reign of Tiberius, damaged the *Pantheon* very considerably: but it was successively repaired by Domitian, Adrian, and Septimius Severus: and it subsisted in all its grandeur till the incursion of Alaric, in the time of Honorius: on this occasion it was stripped of several of its statues and ornaments of gold and silver. About thirty-nine years after this, Genseric, king of the Vandals, took away part of its marbles and statues: at length pope Boniface IV. obtaining this *Pantheon* of the emperor Phocas, converted it into a church, without any alteration in the building; and dedicated it to the Virgin, and all the martyrs. And it still subsists at Rome under the title of Notre Dame de la Rotonda. However in 655, Constantius II. stripped it of its inside and outside brazen coverings, which he transported to Syracuse.

There was also at Rome another *Pantheon*, dedicated to Minerva, as the goddess of Medicine. It was in the form of a decagon, and the distance from one angle to another measured 214 feet. Between the angles there were nine chapels of a round figure, designed for so many deities; and over the gate there was a statue of Minerva.

The *Pantheon* of Athens was in many respects little inferior to that of Rome, built by Agrippa. The Greek Christians converted it into a church, dedicated to the Virgin, under the name of *Panagia*. The Turks changed it into a mosque.

The *Pantheon* of Nismes, was a temple in that city, wherein were twelve niches, or statues, supposed to have been destined for the twelve great gods.

In the ESCURIAL is a magnificent chapel, called *Pantheon*, thirty-five feet in diameter, and thirty-eight high, from the pavement, which is of marble and jasper inlayed. The whole inside of the chapel is of black marble, except the luthern, and some ornaments of jasper, and red marble.

In this chapel are deposited the bodies of the kings and queens: there are only places made for twenty-six: eight of which are already filled.

PANTHERA, *panther*, in *Zoology*. See LEOPARD, and *Tab.* IV. *Quadrupeds*, N° 47. ONCE, and *Tab.* IV. *Quadrupeds*, N° 42. See also PARDALIS.

PANTHERA *lapis*, in *Natural History*, the name of a species of stone found in Egypt, and the East-Indies, and described to be of a yellow tish colour, variegated with dusky spots of the colour of those on the skin of the panther. The writers of the middle ages have attributed many absurd properties to it: it seems to have been a species of agate.

PANTHERINE *tables*, *pantherinæ mensæ*, among the Romans, tables made of citron-wood, which were held in such high esteem, as to equal the value not only of silver and gold, but likewise of pearls. They had this name from their being spotted after the manner of panthers.

PANTICES, a word used by some medicinal writers to express the intestines.

PANTOMIME, Παντομιμος, among the *Ancients*, a person who could imitate all kinds of actions and characters by signs and gestures, without speaking.

The *pantomimes* made a part in the theatrical entertainments of the ancients; their chief employment was to express, in gestures and action, whatever the chorus sung, changing their countenance and behaviour as the subject of the song varied.

They were very ancient in Greece, being derived from the heroic times, according to some; but however this may be, they were certainly known in Plato's time. In Rome it was so late as the time of Augustus before they made their appearance.

As to their dress, it was various, being always suited as near as possible to that of the person they were to imitate. The crocota was much used among the Roman *pantomimes*, in which, and other female dresses, they personated women. See MIME.

PANTON-*shoe*, in the *Manege*, a horse-shoe contrived for receiving narrow and hoof-bound heels. Its spunges are much thicker on the inside than on the outside; to that the part which rests upon the horn or hoof, runs slopewise to the end, that the thickness of the inside of the shoe may bear up the heel, and throw or push it to the outside.

Panton-shoes are likewise proper for horses that have false quarters.

PANZY, in *Botany*. See VIOLET, and HEART'S *Ease*.

PAPA. See POPE.

PAPACY. See POPEDOM.

PAPAL *crown* is a deep cap, or mitre of cloth of gold, encompassed with three cornets, or circles of gold, adorned with flowers; and the whole enriched with precious stones; having a globe at top, finished with a cross. See CROWN.

PAPAN, in *Natural History*, the name given by the inhabitants of the Philippine Islands, to a species of duck common in their lakes and marshes. This is very large and beautiful, and is called by father Camelli *anas regia*, or the *royal duck*: it is not so common, however, as the little kind which they call SALAYASIK.

PAPAVER, in *Botany*. See POPPY.

PAPAW, *carica*, in *Botany*, a genus of the *dioecia decandria* class. Its characters are these: it is male and female in different plants; the flowers of the male are funnel-shaped, and of one leaf, having a long slender tube, which expands at the top, where it is divided into five narrow obtuse parts; it hath ten stamina, five of which are alternately longer than the other; the female flowers have

a ſmall permanent empalement, indented in five parts, with five long ſpear-ſhaped petals; the oval germen afterwards becomes a large oblong fleſhy fruit, having five longitudinal cells, which are full of ſmall, oval, furrowed ſeeds, incloſed in a glutinous pulp. There are two ſpecies.

The whole plant abounds, with a milky acrid juice, which is eſteemed good for the ringworm; the flowers of the female *papaw* come out between the leaves, toward the upper part of the plant, upon very ſhort foot-ſtalks, ſitting cloſe to the ſtem; they are large and bell-ſhaped, compoſed of ſix petals, and are commonly yellow; when theſe fall away the germen ſwells to a large fleſhy fruit, the ſize of a ſmall melon, which are of different forms; ſome angular, and compreſſed at both ends, others oval or globular, and ſome pyramidal; the fruit alſo abounds with the ſame acrid milky juice as the plants. This fruit when ripe, is by the inhabitants of the Caribbee Iſlands, eaten with pepper and ſugar, as melons, but is much inferior to a common melon in flavour, in its native country; but thoſe which have ripened in England were deteſtable. The only uſe made of this fruit, was, when they were about half grown, to ſoak them in ſalt water to get out the milky juice, and pickle them for mangos, for which they have been a good ſubſtitute.

Theſe plants, being natives of hot countries, will not thrive in England, unleſs they are preſerved in a warm ſtove, which ſhould be of a proper height to contain the plants; when they are grown to a large ſize, they make a noble appearance, with their ſtrong upright ſtems, which are garniſhed on every ſide near the top, with large ſhining leaves, ſpreading out near three feet all round the ſtem; the flowers of the male ſort come out in cluſters on every ſide; and the fruit of the female growing round the ſtalks, between the leaves, being ſo different from any thing of European production, may intitle them to the care of the curious. When theſe plants are ſhifted from ſmall pots into larger, care muſt be taken to preſerve the ball of earth to the roots, for whenever their roots are left bare, they rarely ſurvive it. Miller.

PAPAW-*tree* of North America. See *Coſtard* APPLE.

PAPER, a thin flexible leaf, uſually white, artificially prepared of ſome vegetable ſubſtance, chiefly to write upon, with ink.

The word is formed from the Greek πάπυρος, *papyrus*, the name of an Egyptian plant, called alſo βίβλος, *biblus*, whereon the ancients uſed to write.

Various are the materials, on which mankind in different ages and countries have contrived to write their ſentiments; as on ſtones, bricks, the leaves of herbs and trees, and their rinds or barks; alſo on tables of wood, wax, and ivory; to which may be added plates of lead, linen rolls, &c. At length the Egyptian *papyrus* was invented; then parchment, then cotton *paper*, and laſtly, the common, or linen *paper*.

Vide Maffei Iſtor. Diplom. lib. ii. § 3. 10 Bibl. Ital. tom. ii. p. 242. Leo Allat. Antiq. Hetruſc. p. 127, ſeq. Hug. de Scrib. Origin. Alex. ab Alexand. lib. ii. cap. 30. Barthol. Diſſ. 4. de Libr. Legend. p. 90, ſeq.

In ſome places and ages they have even written on the ſkins of fiſhes; in others, on the inteſtines of ſerpents; and in others, on the backs of tortoiſes. Mabill. de Re Diplom. lib. i. cap. 8. Fabric. Biblioth. Nat. cap. 21, &c.

There are few ſorts of plants but have at ſome time been uſed for *paper* and books: and hence the ſeveral terms, *biblus*, *codex*, *liber*, *folium*, *tabula*, *tiltura*, *philura*, *ſchedo*, &c. which expreſs the ſeveral parts on which they were written: and though in Europe all theſe diſappeared upon the introduction of the *papyrus* and parchment, yet in ſome other countries the uſe of divers of them obtains to this day. In Ceylon, for inſtance, they write on the leaves of the talipot. And the Bramin MSS. in the Tulinga language, ſent to Oxford from Fort St. George, are written on leaves of the ampana, or palma Malabarica: Hermannus gives an account of a monſtrous palm-tree called *codda pana*, or *palma montana Malabarico*, which about the thirty-fifth year of its age, riſes to be ſixty or ſeventy feet high, with plicated leaves nearly round, twenty feet broad; wherewith they commonly cover their houſes; and on which they alſo write; part of one leaf ſufficing to make a moderate book. They write between the folds, making the characters through the outer cuticle. Knox. Hiſt. Ceyl. lib. iii. Le Clere. Bibl. Univ. tom. xviii. p. 242. Phil. Tranſ. N° 246. p. 422, ſeq. Vide Hort. Ind. Malab. p. 3. Phil. Tranſ. N° 145. p. 108.

In the Maldivee Iſlands, the natives are ſaid to write on the leaves of a tree called *macoroquan*, which are a ſathom and a half long, and about a foot broad. And in divers parts of the Eaſt Indies, the leaves of the muſa arbor, or plantain-tree, dried in the ſun, ſerved for the ſame uſe, till of late that the French have taught them the uſe of European *paper*. Ray, in fine, enumerates divers kinds of Indian and American trees which bear leaves proper to be uſed as *paper*; particularly one called *augua*, which has ſomething in it extraordinary; its leaves are ſo large, and of ſo cloſe a texture, that they cover a man from top to toe, and ſhelter him from the rain, and other inclemencies of the weather, like a cloak; and from the intermoſt ſubſtance of theſe leaves, a *paper* is taken; being a white and fine membrane like the ſkin of an egg, as large as a ſkin of our vellum or parchment, and nothing inferior for beauty and goodneſs to the beſt of our *papers*.

Vide Savar. Dict. de Comm. tom. ii. p. 967. Vide Ray Hiſt. Plantar. tom. ii. lib. 32. Nouv. Rep. Let. tom. xii. p. 361.

Paper is chiefly made among us of linen, or hempen rags, beaten to a pulp in water, and moulded into ſquare ſheets, of the thickneſs required. But it may alſo be made of nettles, hay, turnips, parſnips, colewort-leaves, aſbeſtus, or any thing that is fibrous; nay, it may be made of white woollen rags; though this would not ſerve for writing, becauſe of the hairineſs. The Chineſe *paper* is ſo fine, that many of the Europeans have thought it was made of ſilk; not conſidering, ſays du Halde, that ſilk cannot be beat into ſuch a paſte, as is neceſſary to make *paper*; but it is to be obſerved, that the ſame author afterwards ſpeaks of a *paper*, or parchment, made of the balls of ſilk-worms; and the like we are aſſured by others is done at Cathay.

Hought. Collect. N° 360. tom. ii. p. 418, ſeq. Deſcrip. of Chin. p. 360, ſeq. Vide Bulbeq. Legat. Turc. Epiſt. 4. p. 329.

PAPER, with regard to the manner of making it, and the materials employed therein, is reducible to divers kinds: as the *Egyptian*, *European*, and *Chineſe paper*: we alſo find mention of *cotton-paper*, *bark-paper*, and *aſboſtine* or *incombuſtible paper*.

PAPER, *Egyptian*, is that which was principally uſed among the ancients: it was made of a ruſh called *papyrus*, or *biblus*, growing chiefly in Egypt, about the banks of the Nile: though it was alſo found in India; and Guilandinus aſſures us, he ſaw in Ciuſdem, at the confluence of the Tigris and Euphrates, large ſedge, wherein with his own hands he plucked a *papyrus* differing in nothing from that of the Nile. Strabo likewiſe ſpeaks of a ſort of *papyrus* growing in Italy; but we do not find that this was ever uſed for making *paper*.

The deſcription given by Pliny of the *papyrus*, or *paper-reed*, is ſomewhat obſcure. Its root, according to him, is of the thickneſs of a man's arm, and ten cubits long: from this ariſe a great number of triangular ſtalks ſix or ſeven cubits high, each thick enough to be eaſily ſpanned; its leaves are long like thoſe of the bulrush; its flowers ſtaminous, ranged in cluſters at the extremities of the ſtalks; its roots woody and knotty like thoſe of ruſhes, and its taſte and ſmell near akin to thoſe of the CYPERUS, under which genus Linnæus has claſſed the *papyrus*.

Vide Plin. Hiſt. Nat. lib. xiii. cap. 11. Vid. Theophr. Hiſt. Plant. lib. iv. cap. 9. and Delecamp. who gives us a figure of it, Hiſt. lib. xviii. p. 1883. See alſo Banhin. lib. xviii. cap. 186. who, with Gefner, makes it a ſpecies of cyperus. Grew Muſ. Reg. Societ. p. 2. ſect. 2. p. 225, ſeq. Maffei Iſtor. Diplom. Bibl. Ital. tom. 2. p. 246.

Beſides *paper*, they made ſails, ropes, and other naval rigging; as alſo mats, blankets, cloaths, and even ſhips, of the ſtalk of the *papyrus*. Moſes, we are told, when a child, was expoſed on the banks of the Nile, in βύινον κιβωτὸν, i. e. in a baſket of *papyrus*. The Egyptian prieſts wore ſhoes of *papyrus*.

Guilandinus, a Pruſſian phyſician before mentioned, has a celebrated work expreſly on the ancient *papyrus*, by way of commentary on three chapters of Pliny, wherein is amply, and with great learning, explained all that relates to this ſubject; yet Scaliger has written a ſevere critique on it, in which ſome inaccuracies of Guilandinus are pointed out; but this has not hindered Kirchmayer from adopting almoſt Guilandinus's whole book in his diſſertation on the *papyrus*. Add, that the moſt ingenious and learned count Scipio Maffei has lately vindicated Guilandinus againſt the exceptions of Scaliger, as well as of Voſſius and Hardouin. Vide Iſtor. Diplomat. lib. ii. Bibl. Ital. tom. ii. p. 248.

Melch. Guilandini Papyrus, h. e. Commentarius in tria C. Plinii Majoris de Papyro capita, ſc. lib. xiii. cap. 11, 12, 13, firſt publiſhed at Venice in 1572, and afterwards at Amberg, in 1613, by Salmuth. It ſeems, Guilandinus intended a commentary on the whole of Pliny's Natural Hiſtory; but this ſmall part, not exceeding a moderate page, taking him up full ſix months, it is no wonder he was diſcouraged from proceeding with the reſt.

In theſe three chapters he has reſtored above twenty paſſages in the text of Pliny, not merely from his own conjecture, or the help of MSS. but from the nature of the things deſcribed, and the teſtimonies of authors of the firſt rank: beſides that, he had been upon the ſpot, where formerly the *papyrus* was manufactured, and had carefully examined all the acient Greek and Latin authors who ſpeak of it.

Joſ. Juſt. Scaligeri Animadverſiones in Melchioris Guilandini Commentarium in tria C. Plinii capita, lib. xiii. Hiſtoriæ Mundi ſive Naturalis, quibus agit de Papyro, firſt publiſhed in the Lectiones Bibliothecariæ Memorabiles, of Rudolphus Capellus, at Hamburgh, in 1682. Where he follows Guilandinus ſtep by ſtep, finds as many faults in him as his father had done in Cardan, and uſes him altogether as coarſely; every-where pointing out his literary miſtakes, and labouring to ſhew, that inſtead of reſtoring Pliny, he has often miſtaken and corrupted him.

M. Seb. Kirchmaieri Uſſenhaimenſis Franci Diſſertatio Philologica de Papyro veterum, Wittebergæ 1666, 4to. He had done better ſervice, if, beſides Guilandinus, he had conſulted others, and particularly Scaliger. But as he choſe to follow one rather than many, and that too as the blind follow their guides, his fate has been much the ſame.

The origin of the art of making *paper* of the *papyrus* is very obſcure: no doubt it was firſt diſcovered in Egypt. Iſidore fixes it more particularly to the city Memphis, Orig. lib. vi. cap. 10 in which he ſeems to be countenanced by Lucan, where he ſays,

Nondum flumineas Memphis contenere biblos
Noverat —— Pharſal. lib. iii. v. 222.

The æra of this invention is warmly diſputed: Varro, the moſt learned of the Romans, fixed it to the time of Alexander the Great, after the building of the city of Alexandria by that conqueror; but ſeveral objections, of no ſmall weight, are brought againſt this deciſion. Pliny recites a paſſage out of a very ancient annaliſt, one Cæſius Hemina, wherein mention is made of *paper* books found in Numa's tomb, five hundred and thirty-five years after his death, which had been buried with him: now Numa was prior to Alexander by above three hundred years. Guilandinus, in effect, maintains, with great erudition, that the name and uſe of the *papyrus* were known to the Greeks long before Alexander conquered Egypt; and that the words βύβλος and βύβλινον occur in their received ſignification in authors prior to, or at leaſt older than Alexander; particularly Anacreon, Alcæus, Plato the comedian, Ariſtomenes, Cratinus, Antiphanes, Plato the philoſopher, Æſchylus, and Ariſtotle. And whereas ſome ſpeak of a kind of unknown *pſeudo-biblus*, in uſe before the diſcovery of the true ſort, he argues, on the contrary, that the *biblus* mentioned by thoſe authors, prior to the conqueſt of Alexander, appears from Herodotus, Theophraſtus, and others, to be the very ſame plant with the *biblus*, or *papyrus*, of which *paper* was afterwards made: even Homer and Heſiod, the moſt ancient Greek poets, and who, by Herodotus's teſtimony, lived about four hundred years before himſelf, appear to have been no ſtrangers to the *papyrus*, ſince they both make expreſs mention of it.

Vide Plin. lib. xiii. cap. 13. Guiland. Papyr. Membr. 2. Reim. Idea Syſt. Antiq. Liter. p. 285, ſeq. Kirchman. Diſſ. de Papyr. art. 11. ſect. 2.

To this it may be anſwered, that ſuppoſing the plant *papyrus* known in Greece long before Alexander's conqueſt of Egypt; it no more follows, that they had then the uſe of *paper*, than it follows that men had wine immediately on the diſcovery of the vine.

In reality, Guilandinus produces teſtimonies, from Anacreon and Alcæus, in which the *papyrus* is employed for binding, and not for *paper*: add, that he ill tranſlates πυρσὸν λαμπὸν, *ellychnium*; ſince λαμπὸς here is the torch itſelf. Nor does the poet ſay it was made of *papyrus*, but tied up with it. Vide Scalig. lib. cit. Reimm. ubi ſupra, p. 305, ſeq.

Some have even doubted whether the art of manufacturing the *papyrus* was ſo ancient as Alexander's time; chiefly on this ground, that, for two hundred years after Alexander, men wrote on ſkins, and on the barks of trees: but this is no-wiſe concluſive. The ſcarcity of the new manufacture may account for it: for ſome ages afterwards, even as low as Tiberius, we read of ſuch a ſcarcity of *paper*, that its uſe, even in contracts, was diſpenſed with by a decree of the ſenate, and the opinion of the judges. The ſame conſideration may be carried farther: *paper* might have been known in Egypt, Judæa, Syria, and Aſia on this ſide Taurus, long before the birth of Alexander, though not in common uſe: but it might be later before the Europeans received it; and probably it was by means of Alexander's conqueſt that it firſt became publicly known there.

When the manufacture of the Ægyptian *paper* ceaſed, is another queſtion; for, at preſent, the *papyrotechnia Ægyptiaca* may be reckoned among thoſe arts that are loſt. Euſtathius, the learned commentator on Homer, teſtifies, that even in his time, viz. in 1170, it was diſuſed: Mabillon, indeed, maintains, that it continued till the eleventh century after Chriſt; and cites one Fridegod, a monkiſh poet of the tenth century, as ſpeaking of it as ſubſiſting in the age before his, that is in the ninth: and that it continued longer, the ſame Mabillon endeavours to evince, from ſeveral papal bulls wrote on it as low as the eleventh century.

Vide Euſtath. ad Homer. Odyſſ. ρ. Voſſ. De Art. Gram. lib. i. cap. 37. Vide Mabill. De Re Diplomat. lib. i. cap. viii. ſect. 6. ſeq. Reim. Idea Syſt. Antiq Litter. p. 311.

Maffei, on the other hand, maintains, with more probability, that the *papyrus* was generally diſuſed before the fifth century; for that we find no authentic records, written on it, dated ſince that time; thoſe bulls of popes, cited by Mabillon, appearing rather to be written on cotton *paper*. But this we may obſerve, relates only to the general and legal uſe of the *papyrus*. For that it ſhould have continued to be made by particular perſons ſeveral hundred years after it firſt began to give way, is not to be wondered at. Vide Maffei Iſtor. Diplomat. loc. cit. Bibl. Ital. tom. ii. p. 251.

In reality, a more commodious ſort of *paper*, made of cotton, having been invented ſome ages before in the Eaſt, and coming to be introduced into Europe, ſeems to have brought the *papyrus* into diſuſe. To which the continual wars with the Saracens, by which the traffic to Alexandria was rendered precarious, might poſſibly not a little contribute.

Yet ſeveral books, written on leaves of the *papyrus*, have even continued to our days: Mabillon ſays, he had one of them; and adds, that there was another in the Peteavian library, being a volume in ſmall folio, containing ſeveral ſermons of St. Auguſtine; he alſo mentions a third, containing that father's epiſtles, formerly belonging to the church of Narbonne, and now in the cuſtody of madame De Phirmacon; beſides the homilies of Avitus, biſhop of Vienne, and divers diplomas or charters, all written on the *papyrus*, which appear not to be leſs than eleven hundred years old. But the deciſions of this learned father concerning MSS. notwithſtanding all his diplomatic ſkill ſo highly boaſted of, are not always infallible: witneſs his taking the MS. of St. Mark's goſpel, at Venice, to be written on the Egyptian *papyrus*; and that of Joſephus, at Milan, not to be ſo. Maffei ſhews, on the contrary, that the former is cotton *paper*; and that the latter appears, at firſt ſight, to be Egyptian: not but the Venetian MS. is very old; but it has been ſo much uſed, that its leaves are, as it were, transformed into the original paſte from whence they were made.

Vide Mabill. Suppl. ad Libr. de Re Diplomat. Journ. des Scav. tom. xxxii. p. 2. p. 992. Maffei lib. cit. Bibl. tom. ii. p. 252. And Montfaucon, Paleog. Græc. p. 14.

PAPER, *manner of making the Egyptian.* They began with lopping off the two extremes of the *papyrus*, viz. the head and root, as of no uſe in this manufacture; the remaining ſtem they ſlit lengthwiſe into two equal parts, and from each of theſe they ſtripped the thin ſcaly coats or pellicles, whereof it was compoſed, with the point of a penknife. The innermoſt of thoſe pellicles were looked on as the beſt, and thoſe neareſt the rind or bark the worſt: they were kept apart accordingly, and conſtituted different ſorts of *paper*.

Theſe pellicles are called, in Pliny, by twelve different names; viz. *peilura, vomentum, ſcheda, cutis, plagula, corium, tænia, ſubſcgmen, ſtatumen, pagina, tabula*, and *papyrus*.

The generality of critics, in lieu of a penknife, employ a needle to ſeparate the pellicles; in which they are warranied by the common text of Pliny: *Præparantur ex eo chartæ, diviſo acu in pretenues, ſed quam latiſſimas philuras.* But Guilandinus makes a correction here: he had found, by experiment, that the pellicles of *papyrus* cannot be ſeparated by a needle; but that a very ſharp knife is required: for which reaſon, inſtead of *diviſo acu*, he reads *diviſo ſcapo*. In which he is followed by Maffei; though Hardouin, Voſſius, Pitiſcus, and others, retain the ancient reading.

Vide Guiland. Papyr. Membr. 10 ſect. 3. & 5. Maffei Iſtor. Diplom ap. Bibl. Ital. tom. ii. p. 247, ſeq. Voſſ. De Art. Grammat. lib. i. cap. 37. Pitiſc. L. Ant. tom. i. p. 413. voc. Charta. Hardou. ad Plin. lib. xiii. cap. 12. As the pellicles were taken off, they extended them on a table; then two or more of them were laid over each other tranſverſely, ſo as that their fibres made right angles: in this ſtate they were glued together by the muddy waters

waters of the Nile. Theſe, being afterwards preſſed to get out the water, then dried, and laſtly flatted and ſmoothed by beating them with a mallet, conſtituted *paper*: which they ſometimes poliſhed farther by rubbing it with an hemiſphere of glaſs or the like.

In other countries, where the waters of the Nile were not to be had, the pellicles were faſtened together with a paſte made of the fineſt wheat flour, mixed with hot water, and a ſprinkling of vinegar.

The ingenious and learned count de Caylus, in his account of the *papyrus*, informs us, that the intermediate part of the ſtalk was cut and ſeparated into different laminæ, which were ſet apart, and dried in the ſun for the manufacture. Theſe laminæ were joined together horizontally and tranſverſely, in ſheets or leaves, upon a ſmooth board; then moiſtened with water, which diſſolved a kind of viſcous glue in the pores of the plant, ſerving to cement and render the whole uniform. The ſheet, being thus formed, was put into a preſs, and afterwards dried for uſe. Such, he ſays, was the proceſs of making *paper* in Egypt; but as the ſheets were coarſe, brown, unequal, and imperfect, the Romans invented methods to bring the fabric to perfection. They contrived a glue or gum, by means of which they could occaſionally enlarge the ſize and volume. They bleached it to a ſurpriſing degree of whiteneſs; they beat it with hammers, ſo as to render it more thin and leſs porous; they ſmoothed and poliſhed it with ivory; and by a ſort of caltender gave it a ſhining gloſs, like that of the Chineſe *paper*. According to the different degrees of delicacy, whiteneſs, and ſize, it acquired different appellations, either from the names of particular manufacturers, from the great perſonages who uſed it, or from the particular uſes to which it was applied; ſuch as the Fannian, the Livian, the Claudian, the Imperial, the Hieratic, and the Amphitheatric.

There were *paper* manufactures in divers cities of Egypt; but the greateſt and moſt celebrated was that at Alexandria, where, according to Varro's account, *paper* was firſt made. It is certain at leaſt it was from hence that Greece and Italy were furniſhed, on account of the convenient ſituation of that port: and it is more than probable it was this that gave the Romans occaſion to conclude the art had been invented there. It was not till late, when Egypt was reduced into a Roman province, that they had much intercourſe, or even knowledge of the inland cities of Egypt, where *paper* was alſo made. The trade and conſumption of this commodity were in reality incredible. Vopiſcus relates, that the tyrant Firmus, who rebelled in Egypt, publicly declared he would maintain an army only with *paper* and glue, *papyro & glutine*. This, Caſaubon underſtands as ſpoken of the produce and revenue of *paper*; though Salmaſius takes it to be meant of the *papyrus* itſelf, which could ſupply moſt of the neceſſaries of life. Vide Montfauc. Palæogr. Græc. lib. i. cap. 2. p. 14.

We find divers ſpecies of Egyptian *paper* mentioned in ancient writers: ſome denominated from the places where they were manufactured; as, 1. the *Amphitheatrica*, ſuppoſed to have been made in ſome building belonging to an amphitheatre at Alexandria: though Guillandinus, with more probability, reads it *Anthribitica*, from Anthribis, a city in the middle of the Delta, which was the place of its manufacture. What countenances this correction, is, that we find mention of this *paper* before there was ſo much as an amphitheatre at Rome, much leſs at Alexandria. 2. *Saitica*, made in the city Saïs. 3. *Tanitica*, or, according to others, *Taitica*, whoſe place authors are not agreed on. There were alſo other ſorts denominated from the makers; as, 1. the *Fannianæ*, from the grammarian Rhem. Fannius Palæmon, who kept a *paper* work. This kind was ſmall, but finer than the Amphitheatrical *paper*; being firſt wrought at Alexandria, and afterwards finiſhed at Rome. 2. *Claudia*, firſt made by order of the emperor Claudius. This was reputed the beſt of all, in that, beſides the two pellicles, in common with the reſt, it had a third. Others were denominated from the uſes they were intended for; as, 1. *Hieratica*, the firſt or oldeſt ſort, which was appropriated to religious uſes; this was afterwards denominated *Auguſta* and *Liviana*, in compliment to the emperor of that name, and his wife; who, according to ſome, improved and made it whiter than before. 2. *Emporetica*, or *Emporica*, a ſmall and coarſe ſort, ſerving for ſhopkeepers uſes, to tie up goods, &c. The qualities for which the ancient *papers* were prized, were their thinneſs, cloſeneſs, whiteneſs, and ſmoothneſs; though their breadth alſo conſiderably enhanced their value. That ſort called *chartæ Claudiæ* was thirteen inches wide; the *Hieratica*, eleven; the *Fannianæ*, ten; and the *Amphitheatrica*, nine: as to the *Saitica*, it exceeded not the diameter of the mallet it was beaten with.

See farther, concerning the ancient *paper*, in Nigriſoli Diſſ. de Charta, ejuſque Uſu apud Antiquos. Ext. in Galer. de Minerv. tom. iii. p. 249. ſeq. Other authors are enumerated in Fabric. Bibl. Antiq. cap. xxi. ſect. 9. p. 609. Pitiſc. L. Ant. loc. cit.

PAPER, *bark*, if it may be ſo called, was only the *liber*, or inner whitiſh rind incloſed between the outer *bark* and the wood of divers trees, as the maple, plane, beech, and elm, but eſpecially the *tilia*, φιλύρα, or *lindten-bric*, which was that moſtly uſed for this purpoſe. On this, ſtripped off, flatted, and dried, the ancients wrote books; ſeveral of which are ſaid to be ſtill extant.

Vide Plin. Hiſt. Nat. lib. xiii. cap. 11. Hardou. Not. ad eund. Suid. Lex. in voc. φιλύρα. Iſid. Orig. lib. vi. cap. 13. Alexand. ab Alexand. lib. ii. cap. 30. Salmuth. ad Pancirol. lib. ii. tit. 13. p. 232. ſeq.

Mabillon and Montfaucon ſpeak frequently of manuſcripts and diplomas on *bark*, and are very expreſs in diſtinguiſhing between the *papyrus* uſed by the Egyptians, and the *liber* or *bark* in uſe in other countries. The two are alleged to differ in this, that the *bark paper* was thicker and more brittle than the *papyrus*, as well as more apt to cleave or ſhiver, by which the writing was ſometimes loſt; as is the caſe in a *bark* manuſcript in the abbey of St. Germains, where the bottom of the *paper* remains, but the outer ſurface, on which the letters had been drawn, is in many places peeled off.

Vide Montfauc. Palæogr. Gr. lib. i. cap. 2. p. 15. Mabill. de Re Diplom. lib. i. cap. 8. Reimm. Idea Syſt. Antiq. Liter. p. 311.

But Maffei, it muſt not be forgot, combats the whole ſyſtem of *bark* manuſcripts and charters as a popular error; and maintains, that the ancients never wrote diplomas on *bark*; that the diſtinction between the *papers* made of *papyrus* and of *cortices*, is without foundation; that the only uſe of the *tilia*, or *linden*, was for making thin boards or tablets for diptycha or pocket-books, wherein they wrote on both ſides, as is done among us: an advantage which they could not have in the Egyptian *paper*, by reaſon of its thinneſs.

A late French writer on the rules of criticiſm wanders ſtill farther out of the way, when he ſpeaks of a ſort of *paper*, in Egypt, made of the pith of the cyperus: he deſcribes the manner of preparation, which was by reducing this pith to a pulp, and then ſpreading it out in leaves. Vide Hon. St. Marie Reflex. ſur les Regl. de la Crit. tom. ii. diſſ. 77. This we ſuſpect for a chimera hatched only in the critic's brain.

Not but there occur divers anomalous ſorts of *paper*, which antiquaries are not a little puzzled with what ſpecies to refer them to; ſuch is that of two bulls in the archives of the church of Gironne iſſued by the antipopes Romanus and Formoſus, between the years 891, and 895. They are two ells long, and one broad; and conſiſt of two leaves or pellicles glued together tranſverſly, and are ſtill legible in moſt places. The conjectures of the French literati, in regard to theſe, are numerous: the abbot Hiraut de Belmont has a diſcourſe expreſs on the occaſion. Some will have them made of the leaves of the *alga*, or *ſea-wreck*; others of the leaves of a ruſh, called *la bega*, growing in the marſhes of Rouſſillon; others of *papyrus*; others of *cotton*; and others of *bark*. Solittle certainty does there really appear to be in theſe things, on which the critics never theleſs often lay a great ſtreſs. Vide Mem. de Trev. Sept. 1711. p. 1559, ſeq.

PAPER, *cotton*, *charta bombycina*. βαμβακινον (thus called from βαμβαξ, a word which anciently ſignified *ſilk*, though in after-times βαμβαξ and βαμβυξ came to denote *cotton*), is a ſort of *paper* which has been in uſe upwards of ſeven hundred years ago, as is ſhewn by Montfaucon from ſeveral authorities: what is more, *cotton paper* appears to have been very common at the beginning of that time, and conſequently muſt have been invented long before, probably about the cloſe of the ninth, or the beginning of the tenth century.

In the French king's library are MSS. on this *paper*, which, by the character, and other circumſtances, appear to be of the tenth century. Be this as it will, from the twelfth century, *cotton* MSS. were more frequent than parchment ones.

Vide Montfauc. Palæogr. Græc. lib. i. cap. 2. p. 17, ſeq. item, lib. iv. cap. 6. p. 209. Maffei, lib. cit. Bibl. Ital. tom. ii. p. 252.

PAPER, *incombuſtible*, is made of the *lapis* ASBESTOS, or *linum vivum*, which will bear burning without being injured.

Dr. Bruckman, profeſſor at Brunſwick, has publiſhed a natural hiſtory of the *aſbeſtine* or *incombuſtible paper*; and, what is moſt remarkable, has printed four copies of his book on this *paper*: they are depoſited in the library of Wolfembuttel. Vide Bibl. Germ. tom. xiv. p. 190.

The manner of making this extraordinary *paper* is deſcribed by Mr. Lloyd, from an eſſay made by himſelf. He pounded a quantity of the aibeſtos in a ſtone mortar, till it became a downy ſubſtance; then ſifted it in a fine ſearce, and by this means purged it indifferent well from its terrene parts; becauſe the earth or ſtones he could not pick out of it before, or at the pounding, being reduced to a powder, came through the ſearce, the linum remaining. This done, he brought it to the *paper*-mill; and putting it in water, in a veſſel juſt big enough to make a ſheet with ſuch a quantity, he ſtirred it pretty much, and deſired the workmen to proceed with it in the uſual method, with their writing-*paper* mould; only to ſtir it about always before they put their mould in; conſidering it as a far more ponderous ſubſtance than what they uſed; and that conſequently, if not immediately taken up after it was agitated, it would ſubſide.

The *paper* made of it proved but coarſe, and was very apt to tear: but this being the firſt trial, there is reaſon to believe it might be much improved; nor did the workmen doubt, but in caſe it were pounded in one of their mortars, for twenty hours ſpace, it would make good writing-*paper*. Vide Phil. Tranſ. N° 166. p. 824. See ABBESTOS.

PAPER, *linen* or *European*, is chiefly made of linen rags beaten to a pulp with great hammers, and the foil carried off by a continual ſupply of freſh water, conveyed among the pulp in little troughs, till it be rendered perfectly white.

Beſides the chief uſe of this *paper*, which is for writing and printing on, there is a great conſumption of it in packing up goods, and on other occaſions.

The manufacture of *paper* has got footing in moſt countries; though France, Holland, and Genoa, are the places where it ſucceeds beſt. In the general it depends much on the quality of the linen worn in the country where it is made: where that is coarſe and brown, &c. the rags, and conſequently the *paper* made thereof, muſt be ſo too. Hence the whiteneſs of the Dutch and Flemiſh *papers*, beyond the Italian and French, and much more the German *papers*. The Engliſh manufacture was a long while in no great reputation; but it is every day improving; inſomuch that we now import little of the ordinary ſorts, which were formerly all brought from abroad. Yet *paper*-mills are of ſome ſtanding among us. We find one erected at Dartford, as early as the year 1588, which we believe was the firſt, and which is celebrated by a noted poet of that age, Tho. Churchyard, in a work in verſe, intitled, A Deſcription and Diſcourſe of *Paper*, and the Benefits it brings; with the ſetting forth of a *Paper*-Mill, built near Dartford, by a High-German, called Mr. Spilman, Jeweller to the Queen. Lond. 1588. 4to.

In reality, the deficiency of the Engliſh *paper* manufacture did not ſeem owing ſo much to the quality of our rags, as to the want of ſkill and attention in the makers: but the manufacture of *paper* has been very conſiderably encouraged in our country, and has already arrived to a great degree of perfection.

Anderſon, in his Hiſt. of Com. vol. ii. p. 197. ſays, that till about the year 1690, there was ſcarce any other kind of *paper* made in England, but the coarſe brown ſort. But the war with France occaſioning high duties on foreign *paper*, the French proteſtant refugees ſettled in England chiefly, and alſo our own *paper*-makers now began to make white writing and printing *paper*, which, he adds, in length of time, has been brought to ſo great perfection, both for beauty and ſubſtance, that in our own time we import only certain kinds of Genoa and Dutch *paper*, which bears but a very ſmall proportion to all the *paper* uſed in the Britiſh dominions. This has produced, it is ſaid, a ſaving to Britain of 100,000 *l.* which was paid annually to France for *paper* only.

Another writer ſays, that the Engliſh manufactures now provide above ſeven-eighths of the whole quantity of *paper* conſumed in Great Britain.

When and by whom *linen paper* was invented is a ſecret, which Polydore Virgil owns he could never trace. Scaliger will have it to have been found out by the Germans. Maffei affirms it certain, that the invention is owing to the Italians. Others aſcribe it to ſome refugee Greeks at Baſil, who took the hint from the manner of making *cotton paper* in their own country. Conringius takes the Arabs to have firſt brought it among us. Perhaps the Chineſe have the beſt title to the invention; who for many ages have made *paper* much after the ſame manner; and even, in ſome provinces, of the ſame materials, viz. hemp, &c.

Vide Polyd. Virg. de Inventor. Rer. lib. ii. cap. 8. Secund. Scaliger. p. 7. Fabric. Bibl. Antiq. cap. 9. ſect. 21. Iſtor. Diplom. lib. ii. Bibl. Ital. tom. ii. p. 253. Phil. Tranſ. N° 288. p. 1515. Conring. Epiſt. ap. Act. Erud. Lipſ. an. 1720. p. 94. Savar. D. Comm. tom. ii. p. 963. Du Hald. Deſcr. Chin. tom. i. p. 363.

Linen paper appears to have been firſt introduced among us towards the beginning of the fourteenth century.—The learned Conringius denies, that there are many manuſcripts of this *paper* above four hundred years old; with whom agrees the count Maffei, who finds no marks of its uſe before the year 1300.

Vide Conring. Epiſt. ap. Act. Erud. Lipſ. an. 1720. p. 94. Maffei Iſtor. Diplom. lib. ii. Bibl. Ital. tom. ii. p. 253.

Some indeed go much farther back; and take the *libri lintei*, mentioned by Livy, and other Roman writers, to have been written on *linen paper*: but Guillandinus, and after him Alſatius, and others, have ſufficiently refuted this notion; and ſhewn, that the *libri lintei* were written on actual pieces of linen cloth, or canvas, prepared for this purpoſe, ſuch as painters ſtill uſe; and not on paper made of linen rags.

Vide Liv. Dec. 1. lib. iv. Plin. Hiſt. Nat. lib. xiii. cap. 11. Pitiſc. L. Ant. tom. ii. p. 85. Guiland. Papyr. Memb. 25. Salmuth. ad Pancirol. lib. ii. tit. 13. p. 253.

Others run into the contrary extreme, and make *paper* the invention of a very late date. The Jeſuit Iinchofer dates its origin about three hundred years ago: with whom agrees Milius, in his Hortus Philoſophicus, who maintains, that the art of making *paper* was not invented till about the year 1470. Of the ſame opinion ſeems Ray, who tells us the art of making this *paper* was not known in Guernſey, till the year 1470, and when two perſons, named Anthony and Michael, firſt brought it to Baſil, out of Galicia in Spain. In effect, if the invention be owing to the refugee Greeks at Baſil, who fled thither after the ſacking of Conſtantinople, it muſt at leaſt be poſterior to the year 1452, when that city was taken. Some add a farther argument for the novelty of *paper*, drawn from the novelty of hempen cloth, which Rabelais, who died in 1553, mentions as firſt found out about a hundred years before him; and which was ſo ſcarce in the time of Charles VII. of France, who died in 1461, that the queen, his wife, was the only woman in France that had a couple of ſhifts of it.

Vide Mabill. de Re Diplom. lib. i. cap. 8. Reimm. Idea Syſt. Antiq. Liter. p. 373. ſeq. Balbin. Miſcell. Hiſt. Bohem. cap. 22. Act. Erud. Lipſ. 1682. p. 243. Ray Hiſt. Plant. lib. xxii. Phil. Tranſ. N° 288. p. 1515. Naudæan. p. 82. Nouv. Rep. Let. tom. xxvi. p. 571.

But theſe ſuggeſtions are refuted by Mabillon, from the teſtimonies of writers prior to the time here ſpoken of, and from many manuſcripts of about four hundred years old, which are written on *linen paper*. The Jeſuit Balbinus produces divers inſtances of *paper* manuſcripts, written before the year 1340. An ingenious writer of our own country aſſures us, he had a piece of *paper* which agreed well with the charter dated in 1338, in the thirty-ſecond year of Edward III. He adds, that in the archives of the library belonging to the dean and chapter of Canterbury, is an inventory of the goods of Henry, prior of Chriſt-Church, who died in 1340, written on *paper*; and that in the Cotton Library there are ſeveral writings on our *paper*, in the times of moſt of our kings and queens, as high as the fifteenth of Edw. III. which coincides with the year 1335. And Dr. Prideaux aſſures us he has ſeen a regiſtration of ſome acts of John Cranden, prior of Ely, made on *paper*, which bears date in the fourteenth year of king Edward II. that is, anno Domini, 1320.

Mabill. loc. cit. Balbin. lib. cit. Phil. Tranſ. N° 288. p. 1515. Prid. Connect. p. 1. l. 7. p. 710.

Add, that the invention of *paper* may appear more modern than it is, becauſe records were not uſed to be written on it, but it was a conſiderable time confined to letters, and other fugacious compoſitions; which is ſo true, that, to this day, few inſtruments of any conſequence are written on it, though it have been ſo long in uſe. It is even alledged, that Peter, the venerable abbot of Cluny, who died in 1157, has a paſſage in his book againſt the Jews, which plainly indicates *paper* books to have been then known; on the authority whereof Valeſius, in his notes on the panegyric of Berengarius Auguſtus, ſcruples not to make *paper* upwards of 500 years old.

Father Hardouin aſſures us, he had ſeen records or diplomas on it prior to the thirteenth century. But this will hardly be credited. Count Maffei aſſures us, that in all his reſearches he could never meet with one more ancient than the year 1367. It is highly probable the learned Jeſuit miſtook a cotton manuſcript for a linen one: a miſtake eaſily made, as the chief difference between the two conſiſts in the greater thinneſs of the linen *paper*. But it is known we have linen *papers* of

very different degrees of thickneſs; and the like may be ſaid of thoſe of cotton.

Vide Maffei Hiſtor. Diplom. lib. ii. Bibl. Ital. tom. ii. p. 253, ſeq.

The invention, according to Prideaux, ſeems to have been brought from the Eaſt; becauſe moſt of the old manuſcripts, in Arabic, and other Oriental languages, are written on this ſort of *paper*: ſome of which are certainly much older than any of the dates above mentioned. This author thinks it moſt probable, that the Saracens of Spain firſt brought it out of the Eaſt into that country; from whence it was propagated through the reſt of Europe.

PAPER, *linen, method of making.* The proceſs begins with preparing the rags. Theſe, when brought to the *paper-mills*, are firſt to be ſorted into what they call the *groſſer ſort*, *groſſer ſecond*, and *groſſing tewes*: for, among the reſt, there will be ſome linſey-woolſey, which the dirt makes indiſcoverable till they are once waſhed. The way of waſhing is, by putting them in a puncheon with many holes in the bottom, and grates on the ſide made of ſtrong wires. Here the rags are to be often ſtirred, that the dirt may run from them.

When ſufficiently waſhed, they are laid in ſquare heaps, and covered cloſe with pieces of clean ſacking, till they thoroughly ſweat and rot, which is called *fermenting*, and is uſually performed in four or five days; if they be not taken up from theſe heaps in due time, they are apt to mildew, diſcolour, and take fire. When duly fermented, they twiſt them in handfuls, then cut them with a ſharp hook ſet faſt in a frame, with the point upwards, and the edge from the workman; ſtill drawing them upwards, and cutting them piece by piece about half an inch long, or as ſhort as the fingers will allow.

With the rags thus prepared, they prime or feed the mortars, which are made oval, and about half a yard deep, of heart of oak, well ſeaſoned. At the bottom of each is an iron plate, an inch thick, eight inches broad, and thirty long; ſhaped inward like a mould for a ſalmon, with head and tail rounded. In the middle is a waſhing block grooved, with five holes in it, and a piece of hair ſieve faſtened on the inſide. This keeps the hammers from touching it, and prevents any thing going out except the foul water.

The mortars are ſupplied with water night and day by little troughs, from a ciſtern, fed by buckets fixed to the ſeveral floats of a wheel, ſo long as the wheel goes. In theſe mortars the rags being beaten fit for a remove to the preſſes juſt by, they take them out with little iron-hooped pails; this they can do out of any of the mortars, whole hammer they can ſtop whilſt the others work. This makes what they call the *firſt ſtuff*.

From the mortars, this firſt ſtuff is lodged in boxes of five feet high, made, like the corn-chandlers bins, with the bottom board aſlant, and a little ſeparation on the front, for the water to drain away. The pulp of rags being in, they take away as many of the front boards as are neceſſary, and preſs the maſs down hard with their hands: the next day they put on another board, and add more pulp, till the box is full. And here it remains mellowing a week, more or leſs, according to the weather.

In the whole proceſs, there muſt be no iron work where it may be liable to grow ruſty, which would iron-mould the ſtuff, and ſtain the *paper*.

After this, the ſtuff is again put into clean mortars, and is beaten afreſh, and removed into boxes, as before; in which ſtate it is called the *ſecond ſtuff*.

The like we are to underſtand of the third time, which fits it for the pit mortar, when it is again beaten, till ſome of it being mixed in fair water, and brewed to and fro, appears like flour and water without lumps in it.

Thus prepared, it is fit for the pit mortar, which has flat hammers without nails. Into this, by a trough, runs water continually whilſt they work at the ſtuff; and here the beating and water diſſolve it perfectly: after which it is carried into the fat, and more is brought from the boxes. And thus they do ſucceſſively.

The fat is primed according to art, when the liquor has ſuch a proportion of the pulp, as that a mould dipped in it will take up as much as will make the ſheet of *paper* of the thickneſs deſired. A mould is a ſquare ſieve about an inch deep, bottomed with braſs-wire-cloth, ſupported with ſticks to prevent the wire from bagging down, and to keep it perfectly horizontal: becauſe if it any way bags, one part of the ſheet of *paper* will be thicker than the other.

This mould the maker dips, with a deckle on, into the fat; and takes it out again, ſhaking it, that the water may run clear from the pulp in the ſieve; and thus he delivers it to the coucher, who couches it upon a felt laid on a plank, and lays another felt on it; and ſo ſucceſſively, a ſheet and a felt, a ſheet and a felt, till a poſt, i. e. one preſſing, containing ſix quires, be made. Of poſt *paper* they may make twenty poſts or more per day. The coucher, having done his office, returns the mould to the maker, and the maker to the coucher ſucceſſively.

A poſt being made, either the maker or coucher whiſtles, upon which four or five men advance, one whereof draws the poſt under the preſs with two little hooks; and the reſt preſs it with great force till no water is left, which is quickly done with two or three pulls.

This being done, the poſt is pulled from the preſs, and ſet on the right ſide by the laying ſtool; then the layer takes off the firſt felt, returns it to the coucher, and lays the firſt ſheet on the laying ſtool, over which he lays the ſecond, then the third very regularly; and thus ſucceſſively till the whole poſt be laid out. Which done, it is ſet by till toward the end of the day; and then the whole day's work is preſſed again, and the *ſheets* are ſet exactly one on another, ſo that the whole looks like one ſolid paſteboard.

This, after two or three pulls, as before, is taken out again by the dry workman, and carried up into the loft, and hung ſix or ſeven ſheets together, upon lines faſtened to a thing called a *tribble*, each tribble containing thirty lines ten or twelve feet long.

When thus dried, it is taken down, laid on a three-footed ſtool, and there rubbed ſmooth with the hands; and afterwards placed in heaps, ſeven or eight feet high, in a very dry place: where it ſtands till the ſizing, which is the next operation.

Chooſing a fine, dry, temperate day, they put into a copper two barrels of water; and into this, when juſt warm, they put ſixty pounds weight of clean parchment, or vellom ſhavings; which they boil till it be reduced to a perfect ſize; they then ſtrain it through a fine cloth, on which is ſtrewed a due proportion of white vitriol, and roch-alum finely powdered, into a tub a foot deep.

Near to this tub are brought four or five reams of the *paper*; and a full gage, or ſo much as can be taken up with the hands at a time, is dipped into the ſize, being as hot as the hands can well bear it; and by a certain gentle quick management, it is ſo ordered, that every ſheet ſhall be ſized: after which it is put regularly into the preſs, and when preſſed, moved thence into the drying loft, and hung uſually ſheet by ſheet till dry.—But care is taken, that the direct rays of the ſun come not nigh it till it be dry, which would otherwiſe endanger the evaporation of the ſize. When thoroughly dry, it is taken down, ſmoothed with the hands as before, heaped, preſſed hard, and ſo it ſtands all night. Next morning it is taken out, and carried into the ſtore-houſe, where it is ſorted: what is fit for inſide quires, are laid by themſelves, and the outſide by themſelves; and then it is preſſed again, and ſo commonly ſtands all night. In the morning it is carried into the ſtorehouſe again, where it is told into quires of twenty-four or twenty-five ſheets each, folded, laid by in heaps; and when there is a preſs full it is preſſed again, double for a while, and then made into reams of twenty quires each, and bales of ten reams to a bale.

Vide Hought. Collect. tom. ii. p. 412, ſeq. Moor's Mathem. Comp. p. 16.

The broken ſheets are commonly put together, and two of the worſt quires are placed on the outſides of the ream, called *outſide* quires; thus being tied up in wrappers, made of the ſettling of the fat, it is fit for ſale.

With ſome of the aforeſaid pulp, is alſo made PASTE-BOARD, after the ſame manner as *paper*, only that it is thicker.

With a fine ſort of this paſteboard, they alſo make playing CARDS.

Dr. Lewis recommends to the conſideration of the *paper*-makers, whether a particular *paper* might not be prepared for thoſe uſes, with regard to which the long duration of the writing is of principal importance, by impregnating it with galls, or other aſtringents, in ſome of the operations which it undergoes before it receives the glazing: as for inſtance, by uſing an aſtringent infuſion, inſtead of common water, in the laſt operation, when the matter is reduced into a pulp, for being formed into ſheets. Com. Phil. Techn. p. 304.

Paper is ſold by the ream, every where, we think, except in the *paper*-works of Auvergne, where it is ſold by weight, at the rate of fourteen ounces to the pound; each ream, according to its kind, being to weigh a certain number of pounds, preſcribed by authority.

The

The acts of the 10 Ann. cap. 19. and 12 Ann. ſtat. 2. cap. 9. altered and explained by 12 Ann. ſtat. 2. cap. 19. 11 Geo. cap. 7. and 13 Geo. III. cap. 67. by which certain duties were laid on *paper* imported, and on all *paper* made and painted in Great Britain, are repealed by 21 Geo. III. cap. 24. except ſo much as relates to the duty impoſed upon *paper* to be printed, painted, or ſtained, in Great Britain, to ſerve for hangings, or other uſes: and the following duties are impoſed; viz. for every ream (at twenty quires of twenty-four ſheets each to the ream, the ream of double demy for news-*papers* excepted, each quire of which is to contain twenty-five ſheets,) of imperial writing *paper*, 9*s.* ſuper-royal, 6*s.* 9*d.* royal, 5*s.* medium, 4*s.* demy, 2*s.* 9*d.* thick poſt, 2*s.* 3*d.* thin poſt, 1*s.* 9*d.* ſmall poſt, 1*s.* 3*d.* fool's-cap, 1*s.* 6*d.* pot, 1*s.* double atlas, for writing and copper-plate printing, 30*s.* demy, for ditto, 1*s.* 9*d.* copy or baſtard, 1*s.* fool's-cap, 10*d.* little fool's-cap, 10*d.* pot, 8*d.* grand eagle or double elephant, 11*s.* colombier, 7*s.* atlas (worth 3*l.*), 10*s.* atlas (worth 2*l.*), 6*s.* 6*d.* ſmall atlas, 5*s.* imperial, 4*s.* 9*d.* ſuper-royal, 3*s.* 6*d.* long royal, 3*s.* royal, 2*s.* 6*d.* demy, 1*s.* 9*d.* ſhort demy or crown, 1*s.* 3*d.* large fan, 2*s.* ſmall fan, 1*s.* 6*d.* elephant, 2*s.* 3*d.* *paper* for bank or bankers bills or notes, 2*s.* double demy, for printing, 5*s.* 6*d.* per bundle (each bundle conſiſting of forty quires;) royal, 3*s.* 6*d.* per ditto; royal inferior, 2*s.* medium, 2*s.* 9*d.* demy ſingle, 2*s.* 6*d.* demy inferior, 1*s.* 6*d.* double crown, 2*s.* 4*d.* double crown inferior, 1*s.* 9*d.* ſingle crown, 2*s.* ſingle crown inferior, 1*s.* 3*d.* demy tiſſue, 1*s.* 3*d.* crown tiſſue, 10*d.* double pot, 1*s.* 6*d.* cartridge, 1*s.* 9*d.* ſquare cartridge, 2*s.* ſmall cartridge, 1*s.* 6*d.* elephant common, 1*s.* 3*d.* ſugar blue, 2*s.* per ream; ſugar blue of ſmaller ſize, 1*s.* 6*d.* per ream; ſugar blue, crown ſize, 1*s.* 3*d.* purple royal, 1*s.* blue elephant, 1*s.* 6*d.* blue royal, 2*s.* per bundle; blue demy and bloſſom, 1*s.* 3*d.* per bundle; blue crown ſingle, 9*d.* royal hand thick, 10*d.* per ream; royal hand, 1*s.* per bundle; lumber hand, 1*s.* double two pound, 9*d.* ſingle two pound, 4*d.* middle hand double, 1*s.* 6*d.* middle hand, 9*d.* ſmall hand double, 1*s.* ſmall hand, 6*d.* couples, pound and half-pound, 4*d.* imperial cap, 1*s.* per ream; havon cap, 9*d.* bag cap, 8*d.* Kentiſh cap, 6*d.* four pounds, 6*d.* ſmall cap, 4*d.* double four pounds, 1*s.* ſingle two pounds, 6*d.* per bundle; couples, pound and half pound, 4*d.* paſteboard, mill-board, ſcale-board, and glazed *paper*, 4*s.* 6*d.* per hundred-weight.

Theſe duties are to be paid by the makers, and managed by the commiſſioners of exciſe; and they are ſubject to an additional duty of 10 cent. on the produce thereof. Stained *paper* (beſides the duty paid for the *paper* before ſtaining) is ſubject, by the former acts, to a duty of 1½*d.* a yard ſquare.

Paper-makers are enjoined to give notice to the proper officers of their names, places of abode, ſtore-houſes, &c. and to make regular entries, on oath, every ſix weeks, of all *paper*, &c. made by them, on penalty of 50*l.* and the duty ſhall be paid in ſix weeks after entry, on pain of double duty.

Paper-makers are forbid to remove or to conceal their *paper*, &c. till the officer has taken account thereof, on penalty of 50*l.* and forfeiture of the *paper*, &c. The commiſſioners are to provide ſtamps for ſtamping ſuch *paper* for which the duty is paid: and *paper* removed from one place to another, without a proper ſtamp, ſhall be forfeited.

Perſons moleſting officers in the execution of this act incur a penalty of 50*l.* and the penalties and forfeitures ſhall be appropriated, one moiety to the king, and the other moiety to the informer.

There is a drawback of the duties on *paper* exported; and alſo for books, printed at Oxford or Cambridge, and in the univerſities of Scotland, in the Latin, Greek, Oriental or Northern languages.

Paſteboard, made of *paper* that hath paid the duty, ſhall not be charged with farther duty.

PAPERS are of various kinds. With regard to colours, they may be divided into *white*, *brown*, *blue*, &c. With regard to quality, into *fine*, *ſecond*, *baſtard*, *ſuper-fine*, &c. With regard to uſe, into *writing*, *printing*, *preſſing*, *cap*, *cartridge*, *copy*, *chancery*, *poſt*, &c. With regard to dimenſions, into *demy*, *medium*, *fool's-cap*, *pot*, *royal*, *ſuper-royal*, *imperial*, *elephant*, *atlas*, &c. With regard to country, into *German*, *Lombard*, *Rochelle*, *Genoa*, *Holland*, &c.

French *papers* are divided into *large*, *middle*, and *ſmall*. To the ſmall belong thoſe called *petit Romaine*, *petit Raiſin*, or *Bâton royal*, *petit nom de Jeſus*, and *petit à la main*, all thus nominated from the marks impreſſed on them in making. Alſo the *tertier*, for the backs of playing cards; *pot*, for the figure ſide; *couronne*, which has commonly the arms of the comptroller-general of the finances; *tellieres*, with the arms of the late chancellor *Tellier*, and a double T; and *champy*, or *à chaſſe la ſerpente*, ſo called from its mark, the ſerpent; which, being extremely fine and thin, is uſed by fan-makers.

To the middling ſort belong the *grand raiſin ſimple*, *carré ſimple*, *cavalier*, and *lombart*, the three laſt of which are for printing; *Peru*, or *de compte ſimple*, *carré double*, *Peru double*, *grand raiſin double*, and *couronne double*, which three laſt are denominated *double* on account of their ſtrength and thickneſs. Add to theſe the *pantalon*, or *paper* with the Dutch arms; and grand *cornet*, ſo denominated from the impreſſion on it.

To the large belong the *grand Jeſus*, *petit & grand fleur-de-lis*, *chapelet*, *colombier*, *grand aigle*, *dauphin*, *ſoleil*, and *Etoile*, which are thus called from the figures they bear, being all proper for printing either at the letter-preſs or rolling-preſs; alſo for merchants books, and for drawing on. The *grand monde* is the largeſt of all. Vide Savar. D. de Comm. tom. ii p. 965, ſeq.

We have alſo *printed-paper*, for hanging rooms. See PAPER-*hangings*. *Stamped-paper*, to write obligations, deeds, and contracts upon. *Ruled-paper*, for books of accounts, &c. To which may be added *tea-paper*, and *gilt-paper*, for letters, &c. See GILDING *of paper*.

PAPER, *blue*, is a ſort uſed by tradeſmen to wrap up goods; as ſugar-loaves, pieces of linen, &c.

PAPER, *blotting*, is *paper* not ſized, and in which therefore ink readily ſinks or ſpreads. It is uſed in books of account, &c. in lieu of ſand, to prevent blotting and diſfiguring the oppoſite pages. The ſame kind is likewiſe uſed by apothecaries in filtrating juices, and other matters, for which the *manica Hippocratis* is not ſo proper.

PAPER, *teint*, or *demi-teint*, for deſigning on, is either *brown*, *blue*, or *biſtre'd*.

PAPER, *biſtre'd*, is white *paper* waſhed over with a ſponge dipped in foot-water. Its uſe is to ſave the labour of the crayon, in places which are to be ſhadowed the ſame depth with the teint of this *paper*. For light places, they are made thereon with white chalk. Vide Cornell. Elem. de la Peint.-Prat. cap. 15. p. 34, ſeq.

PAPER, *marbled*, is a ſort of *paper* variouſly ſtained, or painted as it were with divers colours; made by applying a ſheet on the ſurface of a liquor wherein colours diluted with oil or ox's gall are ſuſpended.

The manner of making it is thus: a trough is provided of the ſhape and dimenſions of a ſheet of the *paper* to be marbled, and about four fingers deep: this is made of lead or wood well joined, and pitched or primed to contain the liquor. For the liquor, a quarter of a pound of gum tragacanth is macerated four or five days in fair water; this they ſtir from time to time, and add to it daily freſh water, till it be of a conſiſtency ſomewhat thinner than oil; then they ſtrain it into the trough.

The colours to be applied thereon, for blue, are indigo ground up with white lead, or Pruſſian blue and verditer may be uſed: for green; indigo and orpiment, the one ground and the other tempered, mixed and boiled together with common water: or verdigriſe, a mixture of Dutch pink and Pruſſian blue, or verditer, in different proportions: for yellow; orpiment bruiſed and tempered; or Dutch pink and yellow oker: for red; the fineſt lake, ground with raſpings of Braſil wood, which has been prepared by boiling half a day; or carmine, roſe pink, vermilion, and red-lead; the two latter of which ſhould be mixed with roſe pink or lake, to bring them to a ſofter caſt: for orange; *orange* LAKE, or a mixture of vermilion, or red-lead, with Dutch pink: for purple; roſe pink and Pruſſian blue. Into all theſe colours, properly ground with ſpirit of wine, they put a little ox or fiſh gall, which is two or three days old; and if the colours dilate not of themſelves ſufficiently, they add more gall: on the contrary, if they ſpread too much, the gall is over-doſed, and muſt be corrected by adding more of the colour without gall.

For the operation of marbling: when the gum is well ſettled in the trough, they extend a ſheet of *paper*, and plunge it very ſhallow into the liquor, ſuddenly lifting it out again, in order to ſtir up, and raiſe the ſubſiding gum towards the ſurface, and for the more univerſal impregnating of the liquor.

This done, and all the colours ranged in gallipots on the table, where alſo the trough is placed, they begin by dipping a bruſh of hog's hair into any colour, commonly the blue firſt, and ſprinkle it on the ſurface of the liquor: if the colour has been rightly prepared, it will dilate itſelf duly therein. This done, the red is applied in the like manner, but with another pencil: after this the yellow: laſtly the green. For white, it is made by only ſprinkling fair water, mixed with ox's gall, over the liquor.

When all the colours are thus floating on the liquor, to give them that agreeable cambletting which we admire in marble-*paper*, they uſe a pointed ſtick; which, being

applied

applied by drawing it from one ſide of the trough to the other, with addreſs, ſtirs up the liquor, and fluctuating colours; then with a comb, made of wood, about five inches long, with braſs teeth, about two inches in length, and a quarter of an inch diſtant from each other, taken by the head with both hands, they comb the ſurface of the liquor in the trough, from one extreme to another, permitting only the teeth to enter: this being performed with a gentle and uniform motion makes thoſe clouds and undulations on which the beauty of the *paper* depends.

If it be farther deſired to have the colours lie in any other fantaſtical poſture, repreſenting ſerpents, or the like, it is effected with the pointed ſtick above mentioned, by drawing it over what has been already combed; but this muſt be done with a dexterous hand, and with a ſhallow dip into the liquor, circling, as if you would draw ſome flouriſh, or figured letter.

Laſtly, the colours being in this poſture, the operator diſplays and applies on them a ſheet of white moiſtened *paper*; to do which, artiſt-like, requires a ſleight only to be obtained by practice; becauſe the ſurfaces of the liquor and the *paper* are to meet equally in all parts: which done, before the colours have time to ſoak through, which, unleſs the *paper* be very thick, will be in the ſpace of two or three pulſes, he lifts up the *paper* nimbly, and with an even hand; and then, after ſpreading it a while on a board, hangs it on a line to dry; which when ſufficiently done, they firſt rub it with a little ſoap, and then poliſh it with a marble ſtone, ivory knob, or glaſs poliſhers; or with a burniſher of jaſper or agate.

It muſt be obſerved, that the ſprinkling of the colours is to be renewed, and all the other ceremonies performed with the ſtick and comb, at every application of freſh *paper*, by reaſon that every *paper* takes off all the colour from the liquor.

Vide Kirch. de Luce & Umbra, lib. x. pat. 2. cap. 4. Merr. Obſerv. on Neri de Art. Vitr. cap. 42. p. 312. Hought. Collect. tom. ii. p. 419, ſeq.

Some eſſays have been made to enrich the marbling, by mixing gold and ſilver with the colours; which ſucceeded well in many attempts in the French king's library, though the expence has hindered the practice from obtaining. Savar. ubi ſupra.

Mr. Boyle tells us, that *paper*, beſides its common uſes may be made into frames for pictures, fine emboſſed work, and other parts of furniture. For this purpoſe, a convenient quantity of the beſt white ſort may be ſteeped for two or three days in water, till it becomes very ſoft; then reducing it by the mortar and hot water into a thin pulp, it is laid on a ſieve to draw off its ſuperfluous moiſture; then putting it into warm water, wherein a conſiderable quantity of freſh glue, or common ſize, has been diſſolved, it may afterwards be put into moulds to acquire the deſigned figure; and when taken out may be ſtrengthened, as occaſion requires, with plaſter or moiſtened chalk, and when dry painted or overlaid.

This hint is ſince improved into a regular manufacture, under the name of PAPIER *machée*.

Another uſe of *paper* is to ſtop up cracks or fiſſures in wooden veſſels to hold water; for, in this caſe, it will forcibly diſtare, and fill the place wherein it is to lodge.

PAPER, *Chineſe*, is of various ſorts; ſome is made of the rinds or barks of trees, eſpecially thoſe abounding in ſap, as the mulberry-tree and elm, but chiefly of the bamboo and cotton-tree; but, in reality, almoſt each province has its peculiar *paper*: that of Se-chwen is made of hemp; that of Fo-kyang, of ſoft bamboo; that uſed in the northern provinces, of the bark of the mulberry-tree; that of the province of Che-kyang, of wheat or rice-ſtraw; that of the province of Kyang-nang, of the ſkin found in the ſilk-worms balls: in fine, in the province of Hu-quang, the tre-chu, or ko-chu, furniſhes the principal material for *paper*.

For PAPERS *made of the barks of trees*; the manner of their preparation may be exemplified in the inſtance of that of the bamboo, a tree of the cane or reed kind, being hollow, and divided into joints; but much larger, ſmoother, harder, and ſtronger, than any other ſort of reed.

For this *paper*, they ordinarily only uſe the ſecond coat or ſkin of the bark, which is ſoft and white; this they beat in fair water to a pulp, which they take up in very large moulds or frames, ſo that they have ſheets ten or twelve feet long, and ſometimes more. They are completed by dipping them ſheet by ſheet in alum-water, which ſerves inſtead of the ſize uſed among us; and not only hinders the *paper* from too freely imbibing the ink, but gives it that luſtre which at firſt ſight makes it look ſilvered, or at leaſt varniſhed over.

The *paper* thus made is white, ſoft, and cloſe, without the leaſt roughneſs to ſtop the motion of the pen, or occaſion the riſing of any of its fibres; though being made of the bark of a tree, it cracks more eaſily than the European *paper*: add that it is more apt to take moiſture, that the duſt ſticks to it, and that the worms ſoon get into it; to prevent which laſt inconveniency, they are obliged often to beat their books and expoſe them to the ſun. Add, that its thinneſs making it liable to be ſoon worn out, the Chineſe are under a frequent neceſſity of renewing their books, by freſh impreſſions taken from their blocks.

Vide Le Compt. Nouv. Mem. ſur Chin. lett. 7. Kuſt. Bibl. Nov. Libr. an. 1697. p. 67, ſeq. Lett. Edif. & Cur. tom. xix. p. 479.

But the *paper* of the bamboo, it is to be obſerved, is neither the beſt, nor the moſt uſed, in China. In the former of theſe reſpects, it yields the priority to the *paper* made of the cotton-ſhrub, which is the whiteſt and fineſt, and at the ſame time leaſt ſubject to the inconveniencies above mentioned; becauſe it keeps as well, and is as durable, as the European *paper*.

Dr. Grew thinks we have many plants in England, which contain a down that in all probability would make as fine a *paper* as that made by the Chineſe, from their cotton-ſhrub. By which it appears he miſtakenly imagined that the Chineſe *paper* was made not from the rind of the cotton-ſhrub, but from the down or cotton itſelf. Vide Grew Muſ. Reg. Soc. par. ii. ſect. 1. cap. 5. p. 215.

But the *paper* in moſt common uſe in China, is that made of the tree called *chu-ku*, or *ku-chu*, which du Halde compares, firſt to a mulberry-tree, then to a fig-tree, then to a ſycamore-tree, and laſtly, to increaſe the embarraſſment, to a ſtrawberry-tree. By all which, we know no more of it than if he had ſaid nothing about it.

The method of preparing it for *paper* is by firſt ſcraping off lightly the thin outſide of the tree, which is greeniſh: then they take off the inner rind in long thin ſlips, which they blanch in water, and in the ſun; and afterwards prepare them in the ſame manner as the bamboo.

It muſt not be forgot, that in the other trees it is only the inward bark that ſerves for making *paper*; but the bamboo, as well as the cotton-ſhrub, have this peculiarity, that not only their bark, but their whole ſubſtance, may be employed, by means of the following preparations.

Out of a wood of the largeſt bamboos, they ſelect ſhoots of a year's growth, which are about the thickneſs of the calf of a man's leg: theſe they ſtrip of their firſt green rind, and ſplit them into ſtrait pieces of ſix or ſeven feet long: the pieces thus cleft, they ſteep in a pond of muddy water, till they rot and grow ſoft by the maceration. In a fortnight they take them out, waſh them in clean water, ſpread them in a large dry ditch, and cover them in with lime for a few days; then they take them out again, and having waſhed them a ſecond time, they ſlip them into ſmall filaments, which they expoſe in the ſun to dry and whiten: then throw them into large coppers, where they are thoroughly boiled: and laſtly, reduce them by the ſtrokes of large hammers to a thin paſte or pulp.

After this, they take ſome ſhoots of a plant called *ko-teng*; they ſoak them four or five days in water, till there come out an unctuous ſizy ſort of juice; this they mix with the pulp of which the *paper* is to be made, ſomewhat in the ſame manner as painters temper their colours; care being taken not to put in too much, nor too little of it; on which the goodneſs of the *paper* much depends.

When they have mixed the juice of ko-teng with the cleft bamboo, and beaten the whole till it reſembles a thick clammy water, they pour it into a large deep reſervoir, conſiſting of four walls, raiſed breaſt high, and having the ſides and bottoms ſo cemented, that the liquor cannot run out, nor ſoak in.

This being done, and the workmen placed at the ſides of the reſervoir, they dip in their moulds, and take up the ſurface of the liquor, which almoſt inſtantly becomes *paper*; the mucilaginous and glewy juice of the ko-teng binding the parts, and rendering the *paper* compact, ſoft, and gloſſy, qualities which the European *paper* never has when firſt made.

To harden the ſheets, and make them bear ink, they dip them into alum-water: this operation is called *faming*, from the Chineſe word *fan*, which ſignifies *alum*. The manner is this: ſix ounces of iſh glue, cut very ſmall, are put in divers porringers of water, which they afterwards boil up, ſtirring it all the time to prevent lumps: when the whole is reduced to a liquid ſubſtance, they throw into it three quarters of a pound of calcined alum, which they melt and incorporate with it.

This

This mixture is next poured into a wide baſon, acroſs which is laid a ſmall round ſtick; then they ſhut the edge of each ſheet in another cleft from end to end, and in this manner dip the ſheet, gently drawing it out as ſoon as it is wetted, by ſliding it over the round ſtick. When the whole ſheet has been paſſed nimbly through this liquor, which makes it whiter, and more compact, the long ſtick that holds the ſheet by the edge, is ſtuck into a hole in the wall, and the ſheet hung up to dry.

For the mould, wherewith they take up the ſheet, its frame is ſo contrived, that it may be raiſed or lowered at pleaſure; and its bottom is not made with wire as ours, but with little ſlender ſlips of bamboo, drawn ſeveral times through holes made in a ſteel plate, whereby they are rendered as fine as wire: they are then boiled in oil till thoroughly ſoaked, that the mould may enter lightly into the water, and not ſink deeper than is requiſite to take up matter enough for a ſheet.

To make ſheets of any extraordinary ſize, care is taken to have a reſervoir and mould large in proportion. This mould is ſuſtained by ſtrings which paſs over the pulley; and the moment theſe pull up the frame, the workmen, placed aſide the reſervoir, aſſiſt to take the ſheet off; working together in a regular manner.

For drying the ſheets when taken off, they have a hollow wall, whoſe ſides are well whitened: at one end hereof is an aperture, through which, by means of a pipe, they convey the heat of a neighbouring furnace; and at the oppoſite end is a ſmall vent to let out the ſmoke. By help of this ſort of ſtove, they dry the *paper* almoſt as faſt as it is made.

Silvering of *paper*, as it is called, is another ſecret among the Chineſe, practiſed at a very ſmall charge, and without uſing any ſilver. In order to this, they take two ſcruples of glue, made of neats-leather, one ſcruple of alum, and half a pint of clean water: theſe they ſimmer over a ſlow fire, till the water is conſumed, that is, till no more ſteam ariſes; then on a ſmooth table they ſpread ſome ſheets of *paper*, and on this, with a pencil, they apply two or three layers of the glue: then they take a powder made of talc boiled, and mixed with ¼ the quantity of alum; the two are ground together, ſifted, and the powder boiled again in water, then dried in the ſun, and laſtly pounded again. This powder they ſift through a fine ſieve, ſpreading it uniformly on the ſheets prepared as above: after which they hang them in the ſhade to dry; and this effected, they lay them again on the table, and rub them gently with clean cotton to take off the ſuperfluous talc, which ſerves a ſecond time for the ſame purpoſe. With this powder, diluted in water, mixed with glue and alum, they draw any figures at fancy on the *paper*. Vide Du Halde, Deſcrip. Chin. tom. i. p. 368.

The æra of the invention of *paper*, among the Chineſe, was, according to Martini, about 100 years before Chriſt.

PAPER, *Japan*. *Paper* is made in Japan of the bark of the *morus papyrifera ſativa*, or *true paper-tree*, after the following manner: every year, when the leaves are fallen off, or in the tenth Japaneſe month, which commonly anſwers to our December, the young ſhoots, which are very ſucculent, are cut off into ſticks about three feet long, or ſomething leſs, and put together in bundles to be afterwards boiled with water and aſhes. If they ſhould grow dry before they can be boiled, they muſt be firſt ſoaked in common water, for about twenty-four hours, and then boiled. Theſe bundles, or faggots, are tied cloſe together, and put upright into a large kettle, which muſt be very well covered, and then they are boiled till the bark ſhrinks ſo far as to let about half an inch of the wood appear naked at the top. When the ſticks have all been ſufficiently boiled, they are taken out of the water, and expoſed to the air till they grow cold, then they are ſlit open lengthways, for the bark to be taken off, which being done, the wood is thrown away as uſeleſs, but the bark dried and carefully preſerved, as being the ſubſtance out of which they are in time to take their *paper*, by letting it undergo a farther preparation, conſiſting in cleaſing it a-new, and afterwards picking out the better from the worſe. In order to this, it is ſoaked in water three or four hours, and being grown ſoft, the blackiſh ſkin which covers it is ſcraped off, together with the green ſurface, of what remains, which is done with a knife, which they call *kaadſi kuſuguri*, that is, *a kaadſi razor*; at the ſame time alſo the ſtronger bark, which is a full year's growth, is ſeparated from the thinner, which covered the younger branches, the former yielding the beſt and whiteſt *paper*, the latter only a dark and indifferent ſort. If there is any bark of more than a year's growth, mixed with the reſt, it is likewiſe picked out, and laid aſide as yielding a coarſer and worſe ſort of *paper*; all groſs knotty particles, and whatever elſe looks in the leaſt faulty and diſcoloured, is picked out at the ſame time, to be kept with the laſt coarſe matter.

After the bark has been ſufficiently cleanſed, and prepared and ſorted according to its differing degrees of goodneſs, it muſt be boiled in clear ley. From the time it begins to boil, they keep perpetually ſtirring it with a ſtrong reed, pouring from time to time ſo much freſh ley in as is neceſſary to condenſe the evaporation, and to ſupply what hath been already loſt by it; this boiling muſt be continued till the matter is grown ſo tender, that being but ſlightly touched with the finger it will diſſolve and ſeparate into flocks and fibres. Their ley is made of any ſort of aſhes, in the following manner: two pieces of wood are laid acroſs over a tub and covered with ſtraw, on which they lay wet aſhes, and then pour boiling hot water upon it, which, as it runs through the ſtraw into the tub underneath, is imbued with the ſaline particles of the aſhes, and makes what they call ley.

After boiling the bark as above deſcribed, follows the waſhing of it, which is of no ſmall conſequence in *paper*-making, and muſt be managed with great judgment and attention; if it hath not been waſhed long enough, the *paper* will be ſtrong, indeed, and of a good body, but coarſe and of little value; and if, on the contrary, the waſhing has been too long continued, it will afford a whiter *paper*, but ſuch as will not bear ink. This part of *paper*-making, therefore, muſt be managed with the greateſt care and judgment, ſo as to keep to a middle degree, and avoid either extreme. They waſh it in a river, putting the bark into a ſort of ſieve, which will let the water run through, and ſtirring it continually with the hands and arms, till it comes to be diluted into a delicate ſoft pulp, or mucilage. For the finer ſort of *paper* the waſhing muſt be repeated; but the bark muſt be put into a piece of linen, inſtead of a ſieve, becauſe the longer the waſhing is continued the more the bark is divided, and would come at laſt to be ſo thin and minute, that it would run out at the holes of the ſieve and be loſt, and at the ſame time alſo, what hard knots or flocks, and other heterogeneous uſeleſs particles remain, muſt be carefully picked out, and put up with a coarſer ſort of bark for worſe *paper*. The bark having been ſufficiently waſhed, is put upon a thick, ſmooth, wooden table, in order to its being beaten with ſticks of the hard *kunoki* wood, which is commonly done by two or three people, until it is wrought fine enough, and becomes withal ſo thin, as to reſemble a pulp of ſoaked *paper*, which being put into water will diſſolve and diſperſe like meal.

The bark, being thus prepared, is put into a narrow tub, with the fat ſlimy infuſion of rice, and the infuſion of the *oreni* root, which likewiſe is very ſlimy and mucilaginous. Theſe three things being put together muſt be ſtirred with a thin clean reed, till they are thoroughly mixed and wrought into an uniform liquid ſubſtance, of a good conſiſtence; this ſucceeds beſt in a narrow tub, but afterwards the mixture is put into a larger one, which is not unlike thoſe made uſe of in our *paper*-mills; out of this tub the leaves are taken off one by one, on proper patterns made of bulruſhes, inſtead of braſs wire, called *mys*. Nothing remains now but a proper management in drying them; in order to this they are laid up in heaps, upon a table covered with a double matt, and a ſmall piece of reed is put between every leaf, which ſtanding out a little way, ſerves, in time, to lift them up conveniently, and take them off ſingly. Every heap is covered with a ſmall plank or board, of the ſame ſhape and ſize with the *paper*, on which are laid weights, firſt, indeed, ſmall ones, leſt the leaves, being then wet and tender, ſhould be preſſed together into one lump, but, by degrees, more and heavier, to preſs and ſqueeze out all the water. The next day the weights are taken off, the leaves are lifted up one by one, by the help of the ſmall ſtick above mentioned, and with the palm of the hand, clapped to long rough planks made for this purpoſe, which they will eaſily ſtick to, becauſe of the little humidity ſtill remaining. After this manner they are expoſed to the ſun, and when quite dry, taken off, laid up in heaps, pared round, and ſo kept for uſe or ſale.

It has been obſerved, that the infuſion of rice, with a gentle friction is neceſſary for this operation, becauſe of its white colour, and a certain clammy fatneſs, which at once gives the *paper* a good conſiſtence, and pleaſing whiteneſs. The ſimple infuſion of rice-flour will not do it, becauſe it wants that clamminеſs, which, however is a very neceſſary quality. The infuſion ſpoken of is made in an unglazed earthen pot, wherein the rice grains are ſoaked in water, and the pot afterwards ſhaken,

ſhaken, gently at firſt, but ſtronger by degrees; at laſt, freſh cold water is poured upon it, and the whole percolated through a piece of linen. The remainder muſt go under the ſame operation again, freſh water being put to it, and this is repeated ſo long as there is any clamminess remaining in the rice. The Japaneſe rice is by much the beſt for this purpoſe, as being the whiteſt and fatteſt ſort growing in Aſia.

The infuſion of the *orani* root is made after the following manner: the root pounded, or cut ſmall, is put into freſh water, which in one night's time turns mucilaginous, and becomes fit for uſe, after it has been ſtrained through a piece of linen. The different ſeaſons of the year require a different quantity of water to be mixed with the root. They ſay the whole art depends entirely upon this. In the ſummer, when the heat of the air diſſolves the jelly, and makes it more fluid, a greater quantity is required, and leſs in proportion in the winter, and in cold weather; too much of this infuſion mixed with the other ingredients will make the *paper* thinner in proportion; too little, on the contrary, will make it too thick, therefore a middle quantity is required to make a good *paper*, and of an equal thickneſs; however, upon taking out a few leaves, they can eaſily ſee whether they have put too much or too little of it. Inſtead of the *orani* root, which ſometimes, at the beginning of the ſummer, grows very ſcarce, the *paper*-makers make uſe of a creeping ſhrub, called *fano kadſura*, the leaves whereof yield a mucilage in great plenty, though not altogether ſo good for this purpoſe, as the mucilage of the above mentioned *orani* root. They alſo uſe the *juncus ſativus*, which is cultivated in Japan with great care and induſtry. It grows tall, thin, and ſtrong; the Japaneſe make ſails of it, and very fine matts to cover their floors.

It hath been obſerved above, that when the leaves are freſh taken off from their patterns, they are laid up in heaps, on a table covered with two matts. Theſe two matts muſt be of a different fabric, one which lies lowermoſt is coarſer, but the other, which lies uppermoſt, is thinner, made of thin, ſlender bulruſhes, which muſt not be twiſted too cloſe one to another, but ſo as to let the water run through with eaſe, and very thin, not to leave any impreſſion upon the *paper*.

A coarſer ſort of *paper*, proper to wrap up goods, and for ſeveral other uſes, is made of the bark of the *kadſe kadſura* ſhrub, after the method above deſcribed. The Japaneſe *paper* is very tight and ſtrong, and will bear being twiſted into ropes.

A thick ſtrong ſort of *paper* is ſold at Siriga (one of the greateſt towns in Japan, and the capital of the province of that name), which is very neatly painted and folded up, ſo much in a piece as is wanted for a ſuit; it looks ſo like ſilken or woollen ſtuff, that it might be miſtaken eaſily for them. A thin neat ſort of *paper*, which hath a yelloviſh caſt, is made in China and Tonquin, of cotton and bamboos: at Siam, the Samnies make their *paper* of the bark of the *ſhoh-khi* tree, of which they have two ſorts, one black and the other white, both very coarſe, rude, and ſimple, as they themſelves are. They fold it up into books, much after the ſame manner fans are folded, and write on both ſides, not, indeed, with a pencil, in imitation of thoſe more polite nations who live farther eaſt, but with a rude ſtylus made of clay.

Thus far we have given a deſcription of the way of making *paper* in the Eaſt, which the late learned Bergmannus was ſo deſirous to know, and ſo earneſtly entreated travellers to enquire into, being, however, miſtaken in ſuppoſing that it was made of cotton, whereas it evidently appears by this account, that all the nations beyond the Ganges make it of the bark of trees and ſhrubs. The other Aſiatic nations on this ſide the Ganges, the black inhabitants of the moſt ſouthermoſt parts excepted, make their *paper* of old rags of cotton ſtuff, and their method differs nothing from ours in Europe, except that it is more ſimple, and the inſtruments they make uſe of are groſſer.

PAPER-*books*, in *Law*, are the iſſues in law, &c. upon ſpecial pleadings, made up by the CLERK of the *papers*, who is an officer for that purpoſe.

PAPER-*cloaths* became a mode a few years ago in France. M. Flachs has a diſſertation expreſs on the ſubject, wherein he tells us, this faſhion ſcarce outlived half a day; and undertakes to ſhew, that it is no new thing, but had been practiſed among the ancients. But then it ſhould be conſidered, that the old Egyptian *paper* was a very different thing from our's; as being likewiſe uſed for ſails, ropes, &c.

PAPER, *flock*, is a kind of *paper*-hanging, lately invented, which is embroſſed by means of chopt cloth. The *paper* deſigned for receiving the flock is generally firſt prepared with a varniſh ground, of a proper colour; and it is not uncommon to print ſome moſaic, or other ſmall running figure, in colours, on the ground, before the flock is laid on: this may be done with any pigment of the colour deſired, tempered in varniſh, and laid on by a print cut for the purpoſe.

The manner of laying on the flock is either by means of a print, or by a ſtencil. But as the ſtencil can execute nothing but detached parts, and conſequently is unfit for all deſigns where running work, ſcrolls, or other more complicated ornaments, are introduced; it is extremely confined, with reſpect to the nature of the deſigns for which it can be employed; and the print is therefore moſt generally preferred. The method of laying on the flock by means of a print is this: a wooden print being cut (ſee PAPER-*hangings*) in ſuch manner, that the part of the deſign, which is intended for the flock, may project beyond the reſt of the ſurface, the varniſh is put on a block covered with leather, or oil cloth, and the print is then uſed to lay the varniſh on all the parts where the flock is to be fixed. The ſheet, thus prepared by the varniſhed impreſſion, is now to be removed to another block or table; and to be ſtrewed over with flock; which is afterwards to be gently compreſſed by a beard, or ſome other flat body, to make the varniſh take the better hold of it. Then the ſheet is to be hung on a frame till the varniſh be perfectly dry; at which time the ſuperfluous part of the flock is to be brushed off by a ſoft camel's-hair brush, and the proper flock will be found to adhere in a very ſtrong manner. When the ſtencil is uſed, the ſame method is to be purſued: the varniſh for holding the flock being laid on by that, inſtead of a print; and the flock afterwards ſtrewed upon it, as in the other caſe.

The uſual method of preparing the flock is, by cutting woollen rags, or pieces of cloth, with the *hand*, by means of a large bill or chopping knife. But it is much more eaſily and better done by a machine; which may be worked by a horſe-mill, at the ſame time ſuch mill is employed for cutting diamonds, or any other ſimilar purpoſe. In ſuch caſe, the conſtruction of that part of the machine, which is made for the cutting the flock is this.

A box is made for containing the rags or cloth to be cut; which is open at the top; and of ſuch ſize, as may beſt ſuit the quantity of rags that the force employed can cut. A blade is alſo to be made, the length of which is to be equal to the breadth of the box; and it ſhould be ſtrong; and muſt be charged with as great a weight as the force employed can be made to raiſe with a quick motion. The box, being filled with the rags or cloth to be cut, is placed under the blade, and made to move by hitches, after the ſtroke of the blade is given, juſt ſo far as where it is proper the blade ſhould again cut the cloth or rags: while, at the ſame time, the blade is lifted up, and let fall on the cloth, which it cuts through, till by ſucceſſive ſtrokes, and the progreſſive motion of the box under it, the whole quantity of cloth or rags in the box has been cut. The box muſt then be turned, ſo that one of the ſides may become the front; and the operation muſt be repeated; by which means the cloth or rags, having been cut both ways, will be reduced to the ſtate in which the matter is called flock; and fit to be employed for the purpoſe of *paper*-hangings. The work neceſſary for conveying from the principal mover in the mill, the motion for thruſting forward the box, and raiſing the blade, may be eaſily ſupplied by any ingenious wheelwright, and need not therefore be particularly deſcribed here.

There is a kind of counterfeit *flock paper*, which, when well managed, has very much the ſame effect to the eye as the real; though done with leſs expence. The manner of making this ſort is, by laying a ground of varniſh on the *paper*; and having afterwards printed the deſign of the flock in varniſh, in the ſame manner as for the true; inſtead of the flock, ſome pigment, or dry colour, of the ſame hue with the flock required by the deſign, but ſomewhat of a darker ſhade, being well powdered, is ſtrewed upon the printed varniſh, and produces greatly the ſame appearance. Handmaid to the Arts, vol. ii. p. 458, &c.

PAPER-*hangings* are of ſeveral kinds; ſome of which are made in repreſentation of ſtucco work, for covering ceilings, on the ſides of halls, ſtair-caſes, paſſages, &c. and others in imitation of velvet, damaſk, brocades, chints, or ſuch ſilks and ſtuffs as are employed for hanging rooms.

The principal difference in the manufacture lies in the grounds; ſome of which are laid in varniſh, and others in the common vehicles for water-colours.

The kind of *paper* employed for this uſe is a ſort of car-

toon,

toon, manufactured for the purpoſe, which muſt be ſtamped before it be painted. 1 Geo. ſtat. 2. cap. 36. The colours proper to be uſed for painting *paper*-hangings are all thoſe that can be uſed in water and varniſh. But for common deſigns done with water only, the following are moſt proper.

For red: lake, vermilion, roſe-pink, and red-oker: for blue: Pruſſian blue, verditer, and indigo: for yellow: the yellow-berry waſh, Dutch pink, and yellow oker: for green: verdigriſe, or a mixture of the blue colours with the yellow colours, particularly with the yellow-berry waſh: for orange: vermilion, or red-lead, with Dutch pink: for purple: a waſh made of logwood, or a mixture of the lake, or roſe-pink, with deep-coloured Pruſſian blue, or with indigo: for black: ivory black, and in ſome nicer caſes lamp-black: for white: whiting: and for the heightnings: white-lead.

Where great brightneſs is required, the lake ſhould be uſed for the crimſon red, and Pruſſian blue for the blue: but for many purpoſes, roſe-pink uſed alone for the crimſon red, and indigo mixt with whiting for the blue, will anſwer the purpoſe with greatly leſs expence. The lake, roſe-pink, Pruſſian blue, and Dutch pink, intended for this uſe, ſhould be procured in a moiſt ſtate.

The colours uſed in varniſh may be the ſame as thoſe uſed in water; but for this purpoſe, thoſe juſt mentioned ſhould be obtained dry.

As for the vehicles of the colours; when water is uſed, it muſt be impriſoned with ſize and gum Arabic or Senegal. When burniſh is uſed, it muſt be formed of oil of turpentine, and the reſins and gums which will diſſolve in that menſtruum. With reſpect to the grounds for *paper* hanging, thoſe that are laid in water are made by mixing whiting with the ſize above mentioned, and laying it on the *paper*, with a proper bruſh, in the moſt even manner. Nothing more is neceſſary, when the ground is to be left white; and the *paper* being hung on a proper frame, till it be dry, is fit to be painted.

When coloured grounds are wanted, the ſame method muſt be purſued; and the ground of whiting firſt laid; except that, in paler colours, a ſecond coating may ſometimes be ſpared, by mixing ſome ſtrong colour with the whiting. But where a greater force of colour is wanted, the pigment or colouring ſubſtance muſt be tempered with the proper vehicle, and then ſpread over the white coat.

The varniſh grounds are made much in the ſame manner, by mixing the proper colour with the varniſh, and ſpreading it on the *paper*.

There are three methods, by which *paper*-hangings are painted: the firſt by printing on the colours; the ſecond by uſing the ſtencil; and the third by laying them on with a pencil, as in other kinds of painting.

When the colours are laid on by printing, the impreſſion is made by wooden prints; which are cut in ſuch manner, that the figure to be expreſſed is made to project from the ſurface, by cutting away all the other part. This, being charged with the colours tempered with their proper vehicle, by letting the print gently down on a block, on which the colour is previouſly ſpread, conveys it from thence to the ground of the *paper*, on which it is made to fall more forcibly by means of its weight, and the effort of the arm of the perſon who uſes the print. The manner of doing this, when more particularly explained, is thus.

The *paper*, being properly prepared by a ground of whiting, colour, or varniſh, is laid on a proper block, on which a piece of leather is ſtrained. The colour, mixt with its proper vehicle, is ſpread on another piece of leather or oil cloth, laid on a flat block, ſomewhat larger than the print; which is done by a boy or man who attends for that purpoſe; and having the colour by him, in a pot, ſpreads it with a bruſh on the block betwixt every ſtroke and impreſſion the printer makes. The print is previouſly cut in ſuch manner, correſpondently to the deſign of the painting, that there ſhall be a projection on the ſurface anſwering to every part, where that colour intended to be conveyed by this print is neceſſary. The printer then takes the print either in his right hand, or, when too heavy to be ſo managed, in both, and drops it gently on the block, juſt charged with colour; from whence he again immediately raiſes it in the moſt perpendicular direction, and lets it fall in the ſtrongeſt, though moſt even manner, he can, on the *paper*; increaſing the force by all the additional velocity he can give the print. When this is done, the ſheet printed is immediately taken off the block, and hung up to dry; and another being put in its place, the ſame operation is repeated, till the whole quantity of *paper* be printed. It is eaſy to conclude, that there muſt be as many ſeparate prints, as there are colours to be printed; and they are to be uſed ſucceſſively in the ſame manner as the firſt. But where there are more than one, great care muſt be taken, after the firſt, to let the print fall exactly in the ſame part of the *paper*, as that which went before: otherwiſe the figure of the deſign would be brought into irregularity and confuſion. In common *paper* of low price it is uſual, therefore, to print only the outlines, and lay on the reſt of the colours by ſtencilling; which both ſaves the expence of cutting more prints; and can be practiſed by common workmen, not requiring the great care and dexterity neceſſary to the uſing prints.

The manner of ſtencilling the colours is this. The figure, which all the parts of any particular colour make in the deſign to be painted, is to be cut out, in a piece of thin leather, or oil cloth. Theſe pieces of leather, or oil cloth, are called ſtencils; and being laid flat on the ſheets of *paper* to be printed, ſpread on a table or floor, are to be rubbed over with the colour properly tempered, by means of a large bruſh. The colour paſſing over the whole is conſequently ſpread on thoſe parts of the *paper* where the cloth or leather is cut away, and give the ſame effect as if laid on by a print. This is nevertheleſs only practicable, without great care, in parts where there are only detached maſſes, or ſpots of colours: for where there are ſmall continued lines, or parts that run one into another, it is difficult to preſerve the connection or continuity of the parts of the cloth, or to keep the ſmaller corners cloſe down to the *paper*; and therefore, in ſuch caſes, prints are preferable.—Stencilling is indeed a cheaper method of ridding coarſe work than printing; but without ſuch extraordinary attention and trouble, as render it equally difficult with printing, it is far leſs beautiful and exact in the effect. For the outline of the ſpots of colour want that ſharpneſs and regularity that are given by prints; beſides the frequent extralineations, or deviations from the juſt figure, which happen by the original miſplacing of the ſtencils, or the ſhifting the place of them during the operation.

Pencilling is only uſed in the caſe of nicer work, ſuch as the better imitations of the India *paper*. It is performed in the ſame manner as other paintings in water, or varniſh.

It is ſometimes uſed only to fill the outlines already formed by printing; where the price of the colour, or the exactneſs of the manner in which it is required to be laid on, render the ſtencilling or printing it leſs proper: at other times it is uſed for forming or delineating ſome parts of the deſign, where a ſpirit of freedom and variety, not to be had in printed outlines, are deſired to be had in the work.

The manner of proceeding with theſe ſeveral methods is, in common work, to ſtencil firſt all parts of each colour in the deſign, and to give an outline to the whole at laſt, by printing with brown or black; but where there is any running part of the deſigns, ſuch as ſcrolls, or the ſtems or ſtalks of creeping plants, or flowers, which are to be printed in any other colour than brown or black, a print muſt be uſed for them; though, if they require only brown or black, they may be done by the ſame print which makes the outlines.

In the finer *paper*, where ſeveral colours are laid on with the prints, the principal colour is begun with; and the reſt taken ſucceſſively; the print for the outline being laid on laſt. In caſes where the pencil is to be uſed, the outline is nevertheleſs to be made before the colours are laid on by the pencil, if ſuch outline is to be made at all; becauſe that is the guide to the perſon who lays on the colour; and confines them to a correctneſs.

In *paper* printed with deſigns in *chiaro oſcuro*, ſuch as the imitation of ſtucco work, and baſs-reliefs, the order of printing muſt be, to lay on the ground-colour firſt; afterwards the ſhades; and laſtly the lights; and the ſame rule of ſucceſſion ſhould be obſerved where the colours are pencilled. Handmaid to the Arts, vol. ii. p. 445, &c.

Paper-hangings may be ſpangled with that kind of tale called iſinglaſs, which being reduced to a groſs flaky powder, has a great reſemblance to thin ſilver ſcales or powder. It is laid on by ſtrewing over the varniſh, which forms the ground, before it begins to dry. When it is laid on in a figure, for the repreſentation of embroidery, the figure muſt be printed in varniſh, and the tale ſtrewed upon it, and treated like flock. Smalt may alſo be uſed in the ſame manner as flock or ſpangles.—But hangings of this kind are now little uſed.

PAPER-*mills* (in the court of king's bench) is where the writings belonging to that court are repoſited.

PAPER-*office* (in the palace of Whitehall) is where all the public writings, matters of ſtate and council, proclamations,

tions, letters, intelligences, negociations of the king's miniſters abroad, and generally all the *papers* and diſpatches that paſs through the offices of the ſecretaries of ſtate, are lodged, and diſpoſed in the way of library. It was chiefly from this noble repoſitory that biſhop Burnet had materials for his Hiſtory of the Reformation.

PAPER *portraits and pictures*. One Elizabeth Pyberg, who lived at the Hague, in 1699, cut in *paper* not only towns, as Loo and Hounſlerdyke, but even faces to an extreme likeneſs. Mr. Ellys aſſures us, ſhe did king William and queen Mary better than any limner he had ever ſeen, and refuſed 1000 guilders for the pieces; which were ſo curious, that he could not believe the queen's drapery not to be point till he had moſt accurately examined it. Vid. Phil. Tranſ. N° 286, p. 1418.

PAPER, *ſtamped*. See STAMP.

PAPERS is a term alſo uſed for writings, eſpecially thoſe relating to a man's eſtate, property, dealings, or the like. In which ſenſe, *papers* include books of accounts, invoices, and orders; alſo deeds, bonds, charters, and the like.

PAPERS is alſo ſometimes uſed for manuſcript books.

PAPERS is more particularly uſed of late days for gazettes, journals, and other public news-writings.

We have daily *papers*, weekly *papers*, morning *papers*, evening *papers*, occaſional *papers*, political *papers*, literary *papers*, *papers* of entertainment, &c.

PAPER, among *Bankers*, and other negociants, is alſo uſed for bills of exchange, bank, and promiſſory notes, &c. Subſtituting *paper* for money, and giving the *paper* an arbitrary value, was the way of paying debts introduced in France by Mr. Law. A royal BANK was eſtabliſhed, to which people were to carry their money, and receive the value of it in bills, which were to paſs current in trade as ſo much money. Vide Chevign. Scienc des Perſ. de la Cour, tom. ii. p. 292. It was made confiſcation of goods, and the gallies, for any man to keep above forty livres by him of any but *paper money*. When the regent was told what a rage was ſpirited up againſt him about the arrets for making *paper* current, and how openly the people threatened him, he anſwered coolly, the French were like watch-dogs, they would bark, but not bite: *Les François reſſemblent aux chiens à garde, ils aboyent, mais ne mordent pas*. Miſc. Miſc. Lett. tom. iv. p. 16. Hence,

PAPER-*credit* is uſed to ſignify any kind of property that is tranſferred or circulated from one perſon to another, by means of any written *paper* obligation, inſtead of hard money, merchandizes, or lands: ſuch as exchequer bills, bank notes, bills of exchange, promiſſory notes, bonds, and mortgages; under which denomination ſome include all tranſfers made by ſtocks, &c.

PAPHIA, in *Ichthyology*, a name by which ſome have called the gar-fiſh.

PAPIA, in *Botany*, the name of a genus of plants, called by Linnæus ORVALA.

PAPIAN-*Poppæan Law*, in *Roman Antiquity*, was enacted by the conſuls M. Papius Mutilus, and Q. Popæus Secundus. This law obliged all men to marry at a certain age, eſtabliſhed great exemptions and privileges in favour of thoſe that had children, and laid heavy fines on all who, after a certain age, continued ſingle. It was alſo called the Julian law, becauſe it had been publiſhed by the order of Auguſtus, who was of the Julian family. The ſeverity of this law was mitigated by Tiberius.

PAPIER *maché* is made of cuttings of white or brown paper, boiled in water, and beaten in a mortar, till they are reduced into a kind of paſte, and then boiled with a ſolution of gum arabic or of ſize, to give tenacity to the paſte, which is afterwards formed into different toys, and by preſſing it into oiled moulds either of wood or of plaſter of Paris. When dry, it is done over with a mixture of ſize and lamp-black, and afterwards varniſhed. See GILDING, JAPANNING, and VARNISH.

PAPILIO, in *Zoology*, the generical name, including a numerous genus of four-winged inſects of the LEPIDOPTERA order, comprehending in the Linnæan ſyſtem no leſs than two hundred and ſeventy-three ſpecies, diſtinguiſhed by clavated antennæ, popularly known by the names of butterflies, and moths, though the moth is claſſed under a diſtinct genus by Linnæus. See PHALÆNA.

For the ſeveral parts of the butterfly, ſee FEELERS, WING, TRUNK, &c. and INSECTS.

Their arrangement into genera and claſſes are in a great meaſure taken from theſe ſeveral parts, and from the great uſes which they make of them. The general diſtinction is that which divides them into the day and night kinds; we have among the birds ſome few that fly abroad only by night, but theſe bear only a ſmall proportion in number to the day-fliers: on the contrary, the number of butterflies which we ſee fluttering about the fields and gardens, are ſcarce ſo many as thoſe which fly abroad only by night. We often meet with theſe even in our houſes, flying about the candles, and the hedges ſwarm with them: in the day-time we find them hid under the leaves of plants, and often, as it were, in a torpid ſtate. In this condition they remain till evening, but they are ſo cunning in hiding themſelves at this time, that it is difficult to ſee one even in places where there are a great number. The way to diſcover them is to beat and diſturb the buſhes, or ſhake the branches of trees in places where they are ſuſpected to be, and they will often be driven out in ſwarms. In this caſe, they never fly far, but ſettle again upon the firſt tree or buſh they come to; and in ſummer, if any one goes out into the fields or gardens, with a candle, in a calm ſtill night, there will numbers of different kinds of them almoſt immediately gather about it. Theſe are called by naturaliſts *night-butterflies*, *phalænæ*, and *moths*.

The ſeveral kinds of butterflies that have thoſe various inclinations, have alſo external characters by which they may be diſtinguiſhed; all thoſe which have buttoned antennæ, or club antennæ, are of the diurnal kind, and are never ſeen flying about candles in the night. There are other forms of the antennæ alſo, which are peculiar to the day butterflies; and the night ones are diſtinguiſhed by their having the plumoſe, the prismatic, or the conic ones. See FEELERS.

Thoſe which fly about our candles are always of one of theſe three kinds. It is not, indeed, to be wholly affirmed, that no one of theſe kinds is ever ſeen flying by day-light, ſince in woods and thickets we often ſee them fluttering about without having been diſturbed; but all that are thus caught flying are males, and are at that time ſeeking after the females to couple with them, theſe being all fixed immoveably under the leaves and on the branches of trees.

The common kinds that we ſee fly about from flower to flower are all of the day kind; a few ſpecies of the *phalænæ* ſometimes flutter about the thiſtle flowers, and ſeem to ſuck them; but theſe are ſeldom ſeen; and among the moths or night kinds, as we call them, there are a great many that never fly about by night any more than by day, and, indeed, make no uſe of their wings at all.

It is alſo a ſingular obſervation, that the moths which fly about our candles, whether in the houſe or abroad in the gardens, are all males; the females never do it. The male of the glow-worm flies in the ſame manner at a candle, thinking it is the light of his female; and it is poſſible, that the female moths may, in the night, yield a light that affects the eyes of the male of the ſame ſpecies, though it be inſenſible to our view. See *Tab. of Inſects*, N° 10.

The great general diſtinctions of the butterflies into day and night kinds being made, it is neceſſary to have recourſe to numbers of other ſub-diſtinctions, in order to arrange them in any method; and theſe can by no means be taken from them in their prior ſtate of caterpillars, many of them being in that ſtate alike in all their general characters, though of different genera in their flying ſtate.

As the antennæ ſerve for diſtinctions of the butterflies into claſſes, ſo do their trunks into genera; but theſe are only capable of diſtinguiſhing a few, the flat and the round being their principal diſtinction. Mr. Reaumur has obſerved, that the day butterflies all have theſe trunks, but that many of the night kinds want them. The wings, however, give the greateſt variety of generical characters among theſe animals. The ſhape of theſe, and the manner in which theſe creatures carry them, when walking and at reſt, ſerve as great and eſſential diſtinctions.

The differences in the manner of the butterflies carrying their wings has been more conſidered by Reaumur than by any author who went before him. He obſerves, that ſome of the ſpecies carry their wings perpendicular to the thing they ſit upon; others carry them plain or level with the horizon; and others let them fall below that level; theſe are called the drooping-wing kind. Some others form a ſort of canopy with them, to cover their bodies; and others make them as it were embrace their bodies. The colours of the wings make excellent diſtinctions for the ſeveral ſpecies; but they are not at all fit for generical diſtinctions.

It has been already obſerved, that there are three kinds of antennæ which are peculiar to the day butterfly, but the diſtribution under theſe alone would be too large; the ſpecies of the button-horned ones being alone greatly too numerous to be held altogether. It is neceſſary,

therefore, to take in with theſe the poſitions of the wings, according to the preceding diſtinctions, and the day butterflies, or *papiliæ*, are thus diſtinguiſhed into ſeven claſſes.

Claſs 1. Contains thoſe *papiliones* whoſe antennæ are terminated by buttons, and whoſe wings, when at reſt, are placed in a perpendicular direction to the thing the creature ſits upon, the under edges of which embrace the lower part of the body, and whoſe ſix legs are all employed in ſuſtaining the body, and in walking. The black-ſpotted white butterfly, produced from the beautiful cabbage caterpillar, is one of the *papiliones* of this claſs.

Claſs 2. Contains the *papiliones* of the ſame characters with the former in all reſpects, except that they uſe only four of their legs in ſuſtaining the body and in walking. The two anterior legs in the flies of this claſs are held in a bent poſture, and are furniſhed with a downy part at their ends, and ſeem to ſerve as a ſort of arms. Theſe *papiliones* in general are produced from the prickly caterpillars. The ſolitary nettle kind gives us an inſtance in its *papilio*.

Claſs 3. Contains thoſe *papiliones* which agree in all reſpects with the former, except that their two anterior legs, which they uſe as arms, and never in walking, are not terminated by downy ends, but are faſhioned like the other legs at the extremity, only ſo ſmall, that it requires a microſcope to diſtinguiſh them. There is an inſtance of this claſs in a common grey and yellow *papilio*, that is found in paſtures among the graſs in June, July, and Auguſt.

Claſs 4. Contains thoſe *papiliones* which have buttoned antennæ, as the others, and which carry their wings, when at reſt, in a perpendicular direction to the thing they ſit upon; but as the former have the inferior edge of their wings bent round the under part of their body, ſo in theſe the inferior edge is bent upwards in both pair of wings, and embraces and covers the upper part of the body. However obvious this diſtinction may be, there is another yet more plain one in this, that all of this claſs have one of the edges of the wing ſo far extended beyond the reſt of the verge, that it forms a kind of tail, and they are called the tailed *butterflies*.* Theſe uſe all their ſix legs in walking.

Claſs 5. Contains thoſe *papiliones* which have ſix real legs, which they uſe as ſuch, and their forms terminated by buttons as the others; but whoſe wings, when they are in repoſe, are not elevated perpendicularly to the thing they ſit on, as in the four preceding claſſes, but are held in an horizontal direction, or at the utmoſt never meet in an angle over the back. We have an inſtance of this claſs in a butterfly bred from a ſmooth caterpillar of the marſhmallow.

Claſs 6. Contains thoſe *papiliones* which have club antennæ, that is, ſuch antennæ as gradually increaſe in thickneſs from their origin to their extremity. See FEELERS.

Theſe are that claſs of *papiliones* which are always upon the wing, and buzz about flowers without ever ſettling upon them. They dart their trunks into the flower while they ſuſtain themſelves in the air, and have a way of holding themſelves in poize, like a kite or other bird of prey; but when they are buſy about the flowers, they have their wings in continual motion, and make a humming noiſe, like the humble bees. Mad. Merian has called all theſe *phalænæ*, or night butterflies, but they are all truly of the day kind. The French, from their poizing themſelves on the wing, and making that humming noiſe, call them *eperviers*, and *papillons-bourdons*. Of this claſs are thoſe ſmall ſpecies called the fly butterflies, whoſe wings are only covered in part with duſt or ſcales, the remainder being tranſparent and gladſy, as ſome expreſs it.

Claſs 7. In this laſt claſs are comprehended thoſe *papiliones* whoſe antennæ are large at their origin, ſmaller afterwards, and finally terminated by an oval head; and which differ from the club antennæ in having no pencils of hairs at the end. This claſs is not very numerous; and the moſt frequent inſtance we have of it is in a painted kind, which we frequently find on blades of graſs, in meadows in July. This flies little in the day time, but is uſually found fixed to a plant, as the moths are. Mad. Merian and others have thence called it a *phalæna*, or *night-fly*; but the truth is, that it flies no more by night than by day-light, but is a lazy creature, which makes very little uſe of its wings.

There is ſome appearance from one of Mad. Merian's tables, viz. the twentieth, that an eighth claſs of theſe day *papiliones* ſhould be found, the having figured one with conic granulated antennæ, common to ſome of the moths. If this obſervation be juſt, or if any new ones of a like kind ſhould demand it, the claſſes may be eaſily enlarged.

Linnæus has diſtributed the genus of *papiliones* into five claſſes, viz. 1. The *equites*, with the four wings, whoſe length is greater than their breadth at the baſe, and whoſe antennæ are moſt commonly filiform; under this claſs he comprehends the *reges*, with ſanguineous or black ſpots on the breaſt, and the *nobiles*, without ſuch ſpots, but having an ocellus (ſee INSECTS) at the anus; ſome of which have faſciæ, or bands, on the wings, and ſome without any. 2. The *heliconii*, with narrow entire wings, that are moſt commonly denudated; the fore-wings being oblong, and the hind ones very ſhort. 3. The *dianæ*, with entire wings, to which claſs belong the *candidi*, with whitiſh wings, and the *feſtivi*, with variegated wings. 4. The *nymphales*, with denticulated wings, comprehending the *gemmati*, with ocelli in all the wings, in the fore-wings, or in the poſterior ones; and the *plebeii*, whoſe wings have no ocelli. 5. The ſmall *plebeii*, the larva of which is commonly contracted, comprehending the *ruricolæ*, with dark ſpots in the wings; and the *urbicolæ*, which have commonly pellucid ſpots in them.

The world is well acquainted with the beauties of this part of the animal creation; but Mr. Reaumur has given accounts of ſome very ſingular ſpecies, which deſerve a peculiar regard.

One ſpecies of theſe he has called the *bundles of dry leaves*. This, when it is in a ſtate of reſt, has wholly the appearance of a little cluſter of the decayed leaves of ſome herb. The poſition and colour of its wings greatly favour this reſemblance; and they have very large ribs, wholly like thoſe of the leaves of plants, and are indented in the ſame manner as their edges, as the leaves of many plants are. This ſeems to point out the care of nature for the animal, and frequently may preſerve it from birds, &c.

The ſkull butterfly is another ſingular ſpecies, ſo called from its head reſembling, in ſome degree, a death's head, or human ſkull. This very remarkable appearance is terrible to many people, but it has another yet greater ſingularity attending it; which is, that, when frighted, it has a mournful and harſh voice. This appeared the more ſurprizing to Mr. Reaumur, as no other known butterfly had any the leaſt voice at all; and he was not ready of belief that it was a real voice, but ſuſpected the noiſe, like that of the cicada, to be owing to the attrition of ſome part of the body; and, in fine, he, by great pains, diſcovered that this noiſe was not truly vocal, but was made by a hard and briſk rubbing of the trunk againſt two hard bodies between which it is placed.

Another butterfly there is, ſo ſmall, that it might be miſtaken for a very ſmall fly. This is certainly the extreme in degree of ſize of all the known butterflies, and cannot but have been proportionably ſmall in the ſtate of a caterpillar and chryſalis: this creature ſpends its whole life in all the three ſtages of caterpillar, chryſalis, and butterfly, on the leaf of the celandine. It lives on the under ſide of the leaf; and though in the caterpillar ſtate it feeds on it, yet it does no damage. It does not eat the ſubſtance of the leaf, but draws from it only a fine juice, which is ſoon repaired again, without occaſioning any change in the appearance of the leaf. This ſpecies is very ſhort lived, and paſſes through its three ſtates in ſo ſhort a time, that there are frequently ten generations of it in one year; whereas in all the other butterflies, two generations in the year are all that are to be had. Theſe two generations are ſufficient to make a prodigious increaſe: in a large garden, if there are twenty caterpillars in ſpring, theſe may be overlooked, and there may be eaſily concluded to be none there, even on a narrow ſcratch; but if theſe twenty caterpillars afterwards become twenty butterflies, ten of which are male and ten female, and each female lay the ſame number of eggs that the common ſilk-worm does, that is, four hundred; if all the caterpillars hatched of theſe become butterflies, and theſe lay eggs in the ſame proportion, which remain the winter, and come to be hatched in the ſucceeding ſpring; then from theſe twenty, in only one year, you will have eight hundred thouſand; and if we add to this the increaſe of theſe in a ſucceeding year, the account muſt appear terrible, and ſuch as no art could guard againſt. The great ruler of the world has put ſo many hinderances in the way of this over-abundant production, that it is very rare ſuch years of deſtruction happen. Some ſuch have happened, however, and miſchief-miſchief has been dreaded from them, not only from their eating all the herbage, but from themſelves being eaten with herbs in ſallads and other wiſe; but experiments have proved this an erroneous opinion, and they are found to be innocent, and eatable as ſnails or oyſters. Reaumur. The butterfly, whoſe whole life in that ſtate is employed only in the propagation of its ſpecies, gives the curious obſerver much cauſe of wonder in the manner of it. In

all the ſpecies, the male, in the time of coupling, throws out from the laſt ring of his body a part which enters into the hinder part of the female. This organ may be ſeen on preſſing lightly with the fingers the body of a male butterfly. The end of the body where this is ſituated is extremely flexile, and the creature turns it with great facility upward or downward, or to either ſide; and to this it is owing, that there are many different attitudes in the generation of different butterflies. In many ſpecies the male lays his body in a parallel beſide the body of the female, and their wings being ſpread horizontally, make a ſort of cloſe covering for both their bodies; and the hinder part of the body of the male being capable of turning ſideways, is now able to perform all its functions. In other ſpecies the male gets upon the body of the female, and the work is then performed, by means of his power of bending the end of his body downwards. In this ſtate, if any thing diſturbs them, the female ariſes from her ſeat, and flies away with the male upon her back; and this ſeems almoſt the only uſe the female has for wings, for the is too heavy to fly with any pleaſure. The power the male has of bending this part of his body upwards, is of uſe when he meets the female on the wing; but this is ſeldom the caſe, and that only in a few ſpecies. But beſides all theſe forms of generation, they are not unfrequently ſeen joined tail to tail, with their bodies in a ſtraight line, and their heads ſtanding oppoſite ways. The act of generation in moſt ſpecies of butterflies, paſſes without any emotion, and ſeemingly in a ſtate of reſt and perfect tranquility; but this is not the caſe in all; for in the butterfly bred of the ſilkworm caterpillar, the male raiſes and falls his wings all the time with great celerity. Mr. Malpighi has had the patience to count the number of theſe vibrations of the wings of the butterfly of this ſpecies, and found them a hundred and thirty in number; after this the creature falls into a languor and faintneſs, which laſts about a quarter of an hour, and ſometimes ſeparates himſelf from the female; if not, at the end of this time, he recovers himſelf, and renews the agitations of his wings, but for a leſs number of times. The ſame author uſually counted at this latter time thirty-ſix; and after this he becomes languid again, and afterwards revives ſeveral other times, but the intervals are longer, and the clappings of the wings leſs numerous. Memoirs Acad. Scienc. Par. 1736. See AURELIA.

Caterpillars, in general, are by ſome ſuppoſed poiſonous to the touch. Mr. Reaumur has proved, by repeated experiments, that all the ſmooth ones are perfectly clear from this accuſation, and may be handled with perfect ſafety; but the hairy ones are capable of producing great pain and itching after the touching them. Theſe pains are not only felt in the hands, but alſo in the face, or any other part; and that even though the animal have not been touched, if it have only been brought near the part. The ſpolia, or caſt ſkin of theſe animals, have alſo the ſame effect; but then it is abſolutely neceſſary they ſhould be touched. This unqueſtionably carries the appearance of the effect of a poiſon to vulgar eyes; but the caſe will appear otherwiſe to thoſe who will examine into the whole more nearly. The miſchief occaſioned by theſe creatures comes on very quick, and ſometimes continues many hours, ſometimes even three or four days.

The explication of this by Mr. Reaumur, is only this: that theſe caterpillars have, beſide their coarſe and large hairs which we ſee them covered with, a vaſt number of others, which are ſo extremely ſmall and fine, as to be inviſible to our eyes. Theſe are ſharp-pointed, very rigid, and are looſely faſtened to the creature's body; ſo that they ſeparate from it on the lighteſt touch: theſe make a ſort of atmoſphere of fine darts ſurrounding them every way; and when the hand of any one is put toward this creature, ſo as to come within the reach of theſe ſmall darts, it immediately diſcharges a whole ſhower of them, and of theſe a great number enter the pores of the ſkin, and a great number more lie along upon it, ready to enter, as ſoon as any accident changes their poſture. If while the hand be thus covered with theſe weapons, whoſe ſmallneſs, though it makes them inviſible, yet does not incapacitate them from being very troubleſome, be moved up to the face, or the cheeks, or eyes, rubbed with it, it is eaſy to conceive, that many of theſe little darts will be made to lodge in the ſkin on which the hand where they lie is rubbed; and the conſequence muſt be a greater itching, pain, and ſwelling, in theſe tender parts, than on the hand; and thus is produced by ſimple means, what is by many eſteemed the effect of a piercing and penetrating poiſon; and thus are the ſtrangeſt appearances often explained by the moſt ſimple means. Many of the ſpecies are great devourers, and feed on one another; but they have all much more deſtructive enemies; theſe are reptiles like themſelves, a ſort of worms, in a ſtate of paſſage, at the end of which they are to paſs through the cryſtalis ſtate into that of flies or beetles. Even the ſmall ſpecies of butterfly, which lives on the celandine, has its enemies proportioned to its own ſize; and the ſame leaf of the plant is uſually covered at the ſame time with theſe butterflies, their chryſaliſes, and their caterpillars; and with theſe ſmall beetles, their chryſaliſes and worms all confuſedly together; and by their ſmallneſs they are not eaſily diſtinguiſhed one from another. The caterpillars of this ſmall ſpecies are very unhappily circumſtanced; they have not only an open war to carry on with the worms of theſe beetles, which are continually attacking them, and piercing their bodies, and ſucking their juices, but they have much more terrible inteſtine enemies, a ſort of ſmall worms which they carry within their bodies, and which eat away their fleſh within the ſkin. See CATERPILLAR, and *Tab. Inſects.*

PAPILIO-*muſca*, in *Natural Hiſtory*, a name given by ſome authors to a ſeries of ſmall inſects, which ſeem to be of a middle nature, between the fly and the butterfly claſſes. Its wings are in part covered with thoſe ſcales in form of duſt, which render the wings of the butterfly kinds opake, and in part are tranſparent and glaſſy. Reaumur has called the wings *ailes vitrées, glaſſy wings*. Reaumur's Hiſt. of Inſects.

PAPILION-*bourdon*, in *Natural Hiſtory*, a name given by the French authors to a ſort of butterflies, which while they feed keep upon the wing with a humming noiſe like that of the humble-bee. Reaumur. See EPERVIERS and PAPILIO.

PAPILION-*a-queue*, *tailed butterflies*, a name given by the French naturaliſts to a ſort of butterfly, of which there are ſeveral ſpecies. The ſides of the wings of theſe butterflies are jagged, and one of the jaggs runs out ſo far beyond the reſt as to repreſent a ſort of tail iſſuing from the creature. Reaumur.

PAPILLA, in *Anatomy*. See NIPPLE.

PAPILLÆ *pyramidales* are little eminences ariſing from the ſubcutaneous nerves.

Under the cutis lies a thick congeries of nerves, woven into a kind of membrane; together with arteries, veins, and lymphatics: theſe nerves, ſtanding out above the level, form little *papillæ*, which, laying aſide the outer coat given them by the dura mater, form the corpus reticulare, firſt obſerved by Malpighi in the feet, hands, and tongue; and ſince ſhewn by Royſch, throughout the whole body. *See Tab. Anat. (Myol.) fig.* 8. *lit. a a*, &c. *b b*.

Theſe *papillæ* are always the moſt numerous and conſpicuous in the places of moſt acute ſenſe, as the tongue, glans of the penis, vagina, labia, oeſophagus, ventricle, ſmall inteſtines, and tips of the fingers and toes, where the cutis they are covered with is extremely thin.

In the other parts of the body the cutis is thicker, and the *papillæ* are much fewer, ſmaller, &c.

Theſe *papillæ* are ſuppoſed to be the immediate organ of *feeling*.

PAPILLÆ *of the tongue*, are little eminences of the tongue, ſo called from their reſemblance to the *papillæ* of the breaſt.

From the papillary tunic of the tongue ariſe numerous nervous *papillæ*, which, penetrating the viſcous ſubſtance over them, terminate under the ſurface of the tongue.

It is by means of theſe *papillæ*, that the tongue is ſuppoſed to have its faculty of taſting.

PAPILLÆ, or *Carunculæ* PAPILLARES, *of the kidneys*. See CARUNCULÆ.

They end in ſhort tubulous bodies, or larger pipes, anſwering in number to the *papillæ*, which are uſually twelve, and are called *fiſtulæ membranoſæ*; being only productions of the membranous cell called the *pelvis*.

The *papillæ* ſerve to diſtil the URINE ſeparated from the arteries, and brought them by the urinary pipes into the pelvis.

PAPILLARIS, in *Botany*, a name uſed by ſome authors for the common *lampana*, or NIPPLE-*wort*.

PAPILLARY, *papillaris*, in *Anatomy*, an epithet given to a tunic or membrane of the tongue, called *papillary tunic*, *papillary membrane*, or *papillary body*.

The *papillary* tunic, or body, is the third tegument, placed beneath the exterior membrane which lines the tongue, and the viſcous ſubſtance next under the ſame.

It is full of nerves, derived from the fifth and ninth pair. From this tunic ariſe little eminences, called PAPILLÆ, or *papillary eminences*.

The ſalts and juices of bodies, ſtriking againſt theſe prominences, occaſion undulations therein, which are immediately communicated to the ſpirits contained in the nerves, and theſe carry them to the brain, &c.

PAPILLARY *proceſſes*, is a name which the ancients gave to the olfactory nerves, from the place of their origin, to the os cribroſum.

Dr. Drake thinks this name becomes them better in this place than that of nerves, in regard they rather appear as productions of the medulla oblongata, whence the olfactory nerves ariſe, than as diſtinct nerves; againſt which their manifeſt cavities, and their communication with the ventricles, argue.

PAPILIONACEOUS, in *Botany*. See FLOWERS.

PAPILLOSE, among *Botaniſts*. See LEAF.

PAPIO, in *Zoology*, the name of thoſe ſpecies of monkies which we call *baboons*. The word ſeems not yet properly determined as to the ſpecies which are to be comprehended under it; but what we uſually acknowledge for *papiones* or BABOONS, are ſuch as have ſhort tails, to diſtinguiſh them from the common MONKIES; which have very long ones. Theſe are all ſpecies of the SIMIA in the Linnæan ſyſtem. Of theſe Pennant deſcribes the *ribbed noſe baboon*, or *ſimia maimon* of Linnæus, which inhabits Guinea; the *little baboon*, or *ſimia ſpecioſa* of Linnæus, inhabiting India, and the *pig-tail baboon*, or *ſimia nemeſtrina* of Linnæus, found in the iſle of Sumatra and Japan. Synopſis of Quadrupeds, p. 103—106.

PAPIRIAN *Code*, a collection of imperial conſtitutions, &c. made by a private lawyer, whoſe name was *Papirius*. See CODE.

PAPISTS, in *Eccleſiaſtical Hiſtory*, are thoſe who acknowledge the POPE to be ſupreme head of the church, or who profeſs the popiſh religion. See POPERY.

The ſtate of the penal laws now in force againſt the *papiſts*, is compriſed in the following ſummary of them. Beſides the penalties to which they are liable as NONCONFORMISTS, for not frequenting their pariſh-church, they are obliged, at the age of twenty-one, to regiſter their eſtates, under the penalty of forfeiture, and to inroll all future conveyances and wills relating to them; they are incapable of preſenting to any advowſon, or granting to any other perſon avoidance of the ſame, in prejudice of the two univerſities; they are liable alſo in ſome inſtances to pay double taxes; and if they willingly ſay or hear maſs, they forfeit the one two hundred, the other a hundred marks, and each ſhall ſuffer a year's impriſonment. Beſides, if any perſon ſends another abroad to be educated in the popiſh religion, or to reſide in any religious houſe abroad for that purpoſe, or contributes any thing to their maintenance when there; the ſender, the ſent, and the contributor, are diſabled to ſue in law or equity, to be executor or adminiſtrator to any perſon, to take any legacy or deed of gift, and to bear any office in the realm, and ſhall forfeit all their goods and chattels, and likewiſe all their real eſtate for life. If any perſon defends the pope's juriſdiction in this realm, it is, for the firſt time, a high miſdemeanor, and if the offence be repeated, high treaſon. If any natural born ſubject be withdrawn from his allegiance, and reconciled to the pope or ſee of Rome, or any other prince or ſtate, both he and all ſuch as procure ſuch reconciliation, ſhall incur the guilt of high treaſon; and if any popiſh parent ſhall refuſe to allow his proteſtant child a fitting maintenance, with a view to compel him to change his religion, the lord chancellor ſhall, by order of court, conſtrain him to do what is juſt and reaſonable. Farther, popiſh recuſants, convicted in a court of law of not attending the ſervice of the church of England, are ſubject to the following diſabilities, penalties, and forfeitures, over and above thoſe already mentioned. They can hold no office or employment; they muſt not keep arms in their houſes, but the ſame may be ſeized by the juſtices of the peace; they may not come within ten miles of London, on pain of 100*l.*; they can bring no action at law, or ſuit in equity; they are not permitted to travel above five miles from home, unleſs by licence, upon pain of forfeiting all their goods; and they may not come to court, under pain of 100*l.* No marriage or burial of ſuch recuſant, or baptiſm of his child, ſhall be performed otherwiſe than by the miniſters of the church of England, under other ſevere penalties. A married woman, when recuſant, ſhall forfeit two-thirds of her dower or jointure, may not be executrix or adminiſtratrix to her huſband, nor have any part of his goods; and during the coverture, may be kept in priſon, unleſs her huſband redeems her at the rate of 10*l.* a month, or the third part of all his lands. And as a feme-covert recuſant may be impriſoned, ſo all others muſt, within three months after conviction, either ſubmit, and renounce their errors, or, if required ſo to do by four juſtices, muſt abjure and renounce the realm; and if they do not depart, or return without the king's licence, they ſhall be guilty of felony, and ſuffer death as felons. There is alſo an inferior ſpecies of recuſancy (refuſing to make the DECLARATION againſt popery, when tendered by the proper magiſtrate) which, if the party reſides within ten miles of London, makes him an abſolute recuſant convict; or if at a greater diſtance, ſuſpends him from having any ſeat in parliament, keeping arms in his houſe, or any houſe above the value of five pounds. Any popiſh prieſt, born in the dominions of the crown of England, who ſhall come over hither from beyond ſea, or that ſhall be in England three days without conforming and taking the oaths, is guilty of high treaſon; and all perſons harbouring him are guilty of felony, without the benefit of clergy. 1 Geo. ſtat. 2. cap. 55. 3 Geo. cap. 18. 10 Geo. cap. 4. 3 Jac. cap. 5. 1 Wil. cap. 26. 12 Ann. ſtat. 2. cap. 14. 11 Geo. II. cap. 17. Yearly land-tax acts. 23 Eliz. cap. 1. 27 Eliz. cap. 2. 1 Jac. cap. 4. 3 Jac. cap. 5. 3 Car. cap. 2. 25 Car. II. cap. 2. 11 & 12 W. cap. 4. 5 Eliz. cap. 1. 3 Jac. cap. 4. cap. 5. 1 W. cap. 1. cap. 15. 35 Eliz. cap. 2.

Moreover, the following farther proviſions were made againſt *papiſts*, by 10 & 11 W. cap. 4. viz.

1. If any perſon ſhall apprehend any popiſh biſhop, prieſt, or Jeſuit, and proſecute him till he be convicted of ſaying maſs, or exerciſing any other part of the office or function of a popiſh biſhop or prieſt, he ſhall receive 100*l.* reward.

2. If any popiſh biſhop, prieſt, or Jeſuit, ſhall ſay maſs, or exerciſe any other part of the office or function of a popiſh biſhop or prieſt (except in foreign miniſters houſes); or if any *papiſt*, or perſon making profeſſion of the popiſh religion, ſhall keep ſchool, or take upon himſelf the education or government, or boarding of youth, he ſhall be adjudged to perpetual impriſonment.

3. If any perſon educated in the popiſh religion, or profeſſing the ſame, ſhall not within ſix months after he ſhall be eighteen years of age, take the oaths of allegiance and ſupremacy, and ſubſcribe the declaration of the 30 Car. II. in the chancery, king's bench, or quarter ſeſſions, he ſhall (in reſpect of himſelf, but not of his heirs) be incapable to inherit or take any lands, by deſcent, deviſe, or limitation; but the next of kin, being a proteſtant, ſhall have the ſame.

4. And every *papiſt*, or perſon making profeſſion of the popiſh religion, ſhall be diſabled to purchaſe any lands, or profits out of the ſame, in his own name, or in the name of any other to his uſe, or in truſt for him; but the ſame ſhall be void. But by the 18 Geo. III. cap. 60. all theſe clauſes are repealed; provided that nothing in this ſame act of 18 Geo. III. ſhall extend to any perſon but ſuch who ſhall within ſix calendar months after paſſing of the act, or of accruing of his title, being of the age of twenty-one years, or being of unſound mind, or in priſon, or beyond the ſeas, then within ſix months after ſuch diſability removed, take and ſubſcribe an oath in the words following:

" I A.B. do ſincerely promiſe and ſwear, that I will " be faithful and bear true allegiance to his majeſty king " George the Third, and will him defend, to the ut" moſt of my power, againſt all conſpiracies and at" tempts whatever that ſhall be made againſt his perſon, " crown, or dignity. And I will do my utmoſt endea" vour to diſcloſe and make known to his majeſty, his " heirs and ſucceſſors, all treaſons and traiterous con" ſpiracies which may be formed againſt him or them. " And I do faithfully promiſe to maintain, ſupport, and " defend, to the utmoſt of my power, the ſucceſſion of " the crown in his majeſty's family, againſt any perſon " or perſons whatſoever; hereby utterly renouncing and " abjuring any obedience or allegiance unto the perſon " taking upon himſelf the ſtyle and title of prince of " Wales, in the life-time of his father, and who, ſince " his death, is ſaid to have aſſumed the ſtyle and title of " king of Great Britain, by the name of Charles the " Third, and to any other perſon claiming or pretend" ing a right to the crown of theſe realms. And I do " ſwear, that I do reject and deteſt, as an unchriſtian " and impious poſition, that it is lawful to murder or " deſtroy any perſon or perſons whatſoever, for or un" der pretence of their being heretics; and alſo that un" chriſtian and impious principle, that no faith is to be " kept with heretics. I further declare, that it is no ar" ticle of my faith, and that I do renounce, reject, and " abjure, the opinion, that princes excommunicated by " the pope and council, or by any authority of the ſee of " Rome, or by any authority whatſoever, may be de" poſed or murdered by their ſubjects, or any perſon " whatſoever. And I do declare, that I do not believe " that the pope of Rome, or any other foreign prince, " prelate, ſtate, or potentate, hath, or ought to have, " any temporal or civil juriſdiction, power, ſuperiority, " or pre-eminence, directly or indirectly, within this " realm. And I do ſolemnly, in the preſence of God, " profeſs, teſtify, and declare, that I do make this de" claration,

" claration, and every part thereof, in the plain and or-
" dinary sense of the words of this oath; without any
" cestion, equivocation, or mental reservation whatever,
" and without any dispensation already granted by the
" pope, or any authority of the see of Rome, or any
" person whatever; and without thinking that I am
" or can be acquitted before God or man, or absolved of
" this declaration, or any part thereof, although the
" pope, or any other persons or authority whatsoever,
" shall dispense with or annul the same, or declare that
" it was null or void."

Which oath shall be competent to the courts at Westminster, or any general or quarter sessions to administer; of which a register shall be kept in like manner as for the oaths required from persons qualifying for offices. And provided also, that nothing herein shall extend to any popish bishop, priest, jesuit, or schoolmaster, who shall not have taken and subscribed the above oath, before he shall have been apprehended, or any prosecution commenced against him.

PAPPOSE *plants*, such whose seed is covered with a pappus or down.

PAPULÆ, a name used by many authors for eruptions of various kinds upon the skin, but appropriated by Bontius to those reddish and rough eruptions thrown out upon the body by sweat in the East Indies. These are thrown out all over the surface of the body, and at their first appearance are accompanied with an intolerable itching and desire of scratching.

Strangers are more exposed to these eruptions, at their first arrival in those countries, than the natives, or those who have long resided there; as they are also to the bitings of the muiquitos, than which they are not less frequent: hence a new comer into the country is distinguished by these troublesome maladies. The natives call him *organ bourou*, that is, a new arrived man; and tell him these complaints are a tax upon him for consuming the provisions. They call themselves *organ homme*, or *veteravi*, and honour with the same name such strangers as have lived long in the country.

The *papulæ* are in themselves no way dangerous; but when they are rashly and ignorantly treated, or when the skin is torn off from them by the nails, they often are the occasion of malignant and very troublesome ulcers, that are not easily cured.

Bontius, whose long residence in this part of the world gave him many opportunities of observing these *papulæ* in all their stages, advises people, to prevent danger, and remove their troublesome itching, to foment all the parts where they appear with a mixture of vinegar, water, and saltpetre; or, if this be required yet more acrid, to add to it juice of lemons, and use it as before. The effect of this application is at first an intense pain, but this soon decreases so far, as to become less troublesome than the intolerable itching of the part. He gives great caution also against purging medicines, however mild; for by these the matter which causes the *papulæ* is often carried to the bowels, and produces dysenteries. The cure is either to be wholly left to nature, or assisted by fudorifics. Bontius, De Med. Ind.

PAPPUS, in *Botany*, that soft light down, which grows out of the seeds of some plants, as thistles, dandelion, hawkweed, &c. and which buoys them up so in the air, that they may be blown any where about with the wind. This distinguishes a class of plants, which are hence denominated *papposæ*, or *pappiferæ*.

PAPYRUS, in *Botany*. See PAPER.

PAR, in *Commerce*, an equality between different monies; or so much as a person must give of one kind of specie, to render it just equivalent to a certain quantity of another.

The *par* differs from the course of exchange, in this, that the *par* of exchange shews what other nations should allow in exchange; which is certain and fixed, by the intrinsic values of the several species to be exchanged; but the course shews what they will allow in exchange; which is uncertain and contingent, sometimes more, sometimes less. See EXCHANGE.

PAR, in *Anatomy*. See PAIR.

PAR *vagum*, or *the eighth pair*, is a very notable conjugation of nerves, of the medulla oblongata; thus called from their wide and vague distribution throughout the several parts of the body. See their origin, course, distribution, &c. under NERVE.

PAR, a term of nobility. See PEER.

PARABLE, παραβολὴ, formed from παραβάλλω, *to oppose*, or *compare*; a fable, or allegorical instruction, founded on something real, or apparent, in nature, or history; from which a moral is drawn, by comparing it with some other thing, wherein the people are more immediately concerned. Or, it is that FIGURE of sentences, which illustrates a thing by comparing it with some other, to which it bears a resemblance.

Such are those *parables* of the ten virgins, of Dives and Lazarus, of the prodigal son, &c. in the New Testament.

Aristotle defines *parable*, a similitude drawn from form to form. Cicero calls it a collation, others a simile. F. de Colonia calls it a rational fable.

The Hebrews call it מָשָׁל, from a word which signifies either *to proverbialize*, or *to assimilate*: the Proverbs of Solomon are by them also called מִשְׁלֵי *parables*, or *proverbs*.

Grotius defines *parable* a simile wherein a fictitious thing is related as real, and compared with some spiritual thing, or accommodated to signify it.

Some make *parable* differ from fable; Grotius and others use the two terms promiscuously. Kircher derives the use of *parables* from the Egyptians.

In the New Testament, the word *parable* is used variously. In Luke iv. 23. for a proverb, or adage; in Matth. xv. 15. for a thing darkly and figuratively expressed; in Heb. ix. 9. &c. for a type; in Luke xiv. 7. &c. for a special instruction; Matth. xxiv. 32, for a similitude or comparison.

Parables, or similitudes, are of two sorts, simple and compound. Those are called simple, in which one thing only is likened or compared to another in this manner: as swallows appear in summer, but in winter retreat; so false friends shew themselves in prosperity, but fly all away, when adversity approaches. Compound similitudes are such wherein one thing is likened or compared to several others, as thus: what light is to the world, physic to the sick, water to the thirsty, and rest to the weary; that is knowledge to the mind. The more exact the agreement is between the things thus compared, they give the greater beauty and grace to the figure. Ward's Orat. vol. ii. p. 76.

PARABOLA, in *Geometry*, a figure arising from the section of a cone, when cut by a plane parallel to one of its sides. See CONIC *Section*.

From the same point of a cone, therefore, only one *parabola* can be drawn; all the other sections within those parallels being ellipses; and all without them hyperbolas.

Wollius defines the *parabola* to be a curve wherein $ax = z^2$, that is, the square of the semi-ordinate is equal to the rectangle of the abscisse, and a given right line called the *parameter* of the axis, or *latus rectum*: whence its name from παραβάλλω, *to equal*.

Hence, a *parabola* is a curve of the first order; and as the abscisses increase, the semi-ordinates increase likewise; consequently the curve never returns into itself.

Hence also the abscisse is a third proportional to the parameter and semi-ordinate; and the parameter is a third proportional to the abscisse and semi-ordinate; and the semi-ordinate is a mean proportional between the parameter and the abscisse.

PARABOLA, *to describe a*. The parameter AB, *Tab. Conics, fig.* 8. being given; continue it to C, and from B let fall a perpendicular to N. From centres taken at pleasure in AC, with the compasses open to A, describe arches cutting the right line BV in I, II, III, IV, V, &c. And the right line BC in 1, 2, 3, 4, 5, &c. Then will B1, B2, B3, B4, B5, &c. be abscisses; and BI, BII, BIII, BIV, BV, &c. semi-ordinates. Wherefore, if the lines B1, B2, B3, &c. be transferred from the line BC to BN, and in the points 1, 2, 3, 4, &c. perpendiculars be raised 1I=BI, 2II=BII, 3III=BIII, &c. the curve passing through the points, I, II, III, &c. is a *parabola*; and BN its axis.

Every point of the *parabola* may also be determined geometrically; e. g. if it be enquired, whether the point M be in the *parabola* or not? from M to BN let fall a perpendicular, make PN=AB the parameter, and on the diameter BN describe a semicircle. For if that pass through M, the point M is in the *parabola*: because from the nature of the circle PM is a mean proportional between BP and PN; i. e. between the abscisse and parameter; and consequently must be an ordinate in the *parabola*.

In a *parabola* the distance of the focus from the vertex is to the parameter, in a subquadruple ratio: and the square of the semi-ordinate is quadruple the rectangle of the distance of the focus from the vertex, into the abscisse. See FOCUS.

PARABOLA, *to describe a, by a continual motion*. Assuming a right line for an axis, as *f A*, *fig.* 9. =AF=$\frac{1}{4}r$. In A fix a ruler DB cutting the axis *f* D at right angles. To the extremity of another ruler EC, fasten a thread fixed at its other extreme in the focus F, which is to be =AD+AF. If then a style or point be fixed to the ruler EC, and the ruler be carried first to the right, then to the left, according to the direction of the other DB; the style will mark out a *parabola*. For, FM will be constantly

conſtantly $=E\,M=x+\frac{1}{2}a$; and conſequently the point M is in a *parabola*.

PARABOLA, *properties of the.* The ſquares of the ſemi-ordinates are to each other as the abſciſſes; and the ſemi-ordinates themſelves in a ſubduplicate ratio of the abſciſſes. For, *a* being the parameter, *x* and X the abſciſſes, *y* and Y the correſponding ordinates: we have, from the definition of the curve, $ax=y^2$, and $aX=Y^2$, therefore, $Y^2 : y^2 :: aX : ax :: X : x$, and $Y : y :: \sqrt{X} : \sqrt{x}$.

The rectangle of the ſum of two ſemi-ordinates into their difference, is equal to the rectangle of the parameter into the difference of the abſciſſes: the parameter therefore is to the ſum of the two ſemi-ordinates, as their difference to the difference of the abſciſſes. For $Y+y \times Y-y$ $(=Y^2-y^2=aX-ax)=a \times \overline{X-x}$: and $a : Y+y :: Y-y : X-x$.

In a *parabola*, the rectangle of the ſemi-ordinate into the abſciſſe, is to the ſquare of the abſciſſe, as the parameter to the ſemi-ordinate. For $ax=y^2$, and $ax^2=x \times y^2$; therefore $xy=x^2 : ax$.

In a *parabola*, the ſquare of the parameter is to the ſquare of one ſemi-ordinate, as the ſquare of another ſemi-ordinate is to the rectangle of the abſciſſes. For $ax=y^2$, and $aX=Y^2$; therefore $a^2 \times X=Y^2 \times y^2$, and $a^2 : Y^2 :: y^2 : x \times X$.

In a *parabola*, the ſubtangent is double the abſciſſe, and the ſubnormal ſubdouple of the parameter. See SUBTANGENT. For the other properties of the *parabola*, ſee CONIC *ſection*. It appears that the common *parabola*, whoſe property is $ax=y^2$, is only part of an ellipſe, whoſe diameter is infinite. For, let the diameter of the ELLIPSE be *r*, and we ſhall have $y^2=ax-\frac{ax^2}{r}$; but *r* being infinitely great in proportion to *a* and *x*, the term $\frac{ax^2}{r}$ muſt be $=0$, and the equation of the curve be $ax=y^2$, or that of the *parabola*.

PARABOLA, *quadrature of the.* See QUADRATURE.

PARABOLA, *rectification of the.* See RECTIFICATION.

PARABOLA, *center of gravity of a.* See CENTER *of gravity.*

PARABOLA, *center of oſcillation of the.* See CENTER *of oſcillation.*

PARABOLAS *of the higher kinds*, are algebraic curves, defined by $a^{n-1}x=y^n$. E. gr. by $a^2x=y^3$, $a^3x=y^4$, $a^4x=y^5$, $a^5x=y^6$, &c. See CURVE.

Some call theſe *parabolas*: more particularly, if $a^2x=y^3$; they call it a *cubical parabola*. If $a^3x=y^4$, &c. they call it a *biquadratical parabola*, or a *ſurſolidal parabola*. And in reſpect of theſe, the *parabola of the firſt kind*, above explained, they call the *Apollonian*, or *quadratic parabola*. Theſe curves are likewiſe to be referred to *parabolas*, wherein $a^{n-1}x=y^n$; as, E. gr. $ax=y^2$, $a^2x=y^3$, which ſome call *ſemi-parabolas*. They are all comprehended under the common equation, $a^{n-2} \times x=y^n$, which alſo extends to other curves, v. gr. to thoſe wherein $a^2x^2=y^3$, $a^3x^2=y^4$, $a^3x^3=y^4$, &c.

Since in *parabolas* of the higher kinds, $y^n=a^{n-1}x$; if any other ſemi-ordinate be called *v*, and the abſciſſe correſponding thereto *z*, we ſhall have $v^n=a^{n-1}z$, conſequently $y^n : v^n :: a^{n-1}x : a^{n-1}z$, i. e. $::x : z$. It is a common property, therefore, of theſe *parabolas*, that the powers of the ordinates are in the ſame ratio of the abſciſſes. But in *ſemi-parabolas*, $y^n : v^n :: ax^{n-1} : az^{n-1} :: x^{n-1} : z^{n-1}$. Or, the powers of the ſemi-ordinates are as the powers of the abſciſſes, one degree lower. E. gr. In *cubical ſemiparabolas* the powers of the ordinates y^3 and v^3 are as the ſquares of the abſciſſes x^2 and z^2.

PARABOLA, *helicoid.* See HELICOID.

PARABOLA, *oſculatory*, in *Geometry*, is uſed particularly for that *parabola* which not only oſculates or meaſures the curvature of any curve at a given point, but alſo meaſures the variation of the curvature at that point.

See Mac Laurin's Appendix to his Algebra, p. 17. Cramer, Analyſ. des Lignes Courbes, p. 559. See CURVATURE.

A curve, ſtrictly ſpeaking, may have an indefinite number of *oſculatory parabolas* at any of its points; but the appellation may be reſtrained to that particular *parabola* which meets the curve ſo cloſely, that no other parabolic arc can be drawn between them; and this *parabola* will meaſure the variation of the curvature of the curve at that point. See VARIATION *of curvature.*

PARABOLA, *reſiſtance of a.* See RESISTANCE.

PARABOLAN, PARABOLANUS, among the *Ancients*, was a ſort of gladiator, called alſo the CONJECTOR.

The name was given them from the Greek, παραβολος, of παρα, *to throw*, *precipitate*; becauſe they threw themſelves on danger and death.

PARABOLANI, or PARABOLARII, is alſo uſed in *Church-Hiſtory*, for a ſet of people, eſpecially in Alexandria, who devoted themſelves to the ſervices of churches and hoſpitals.

The *parabolani* were not allowed to withdraw themſelves from their function, which was the attendance on the ſick. They made a kind of fraternity, amounting ſometimes to ſix hundred perſons, dependent on the biſhop. The deſign of their inſtitution was, that the diſeaſed, eſpecially thoſe infected with the plague, might not be without attendance.

PARABOLIC *aſymptote*, in *Geometry*, is uſed for a *parabolic* line approaching to a curve, ſo that they never meet; yet by producing both indefinitely, their diſtance from each other becomes leſs than any given line.

There may be as many different kinds of theſe *aſymptotes* as there are parabolas of different orders.

When a curve has a common parabola for its *aſymptote*, the ratio of the ſubtangent to the abſciſſe approaches continually to the ratio of two to one, when the axis of the parabola coincides with the baſe; but this ratio of the ſubtangent to the abſciſſe approaches to that of one to two, when the axis is perpendicular to the baſe. And by obſerving the limit to which the ratio of the ſubtangent and abſciſſe approaches, *parabolic aſymptotes* of various kinds may be diſcovered. See Mac Laur. Flux. art. 337.

PARABOLIC *conoid*, a ſolid figure generated by the rotation of a parabola about its axis.

The circles conceived to be the elements of this figure, are in an arithmetical proportion, decreaſing towards the vertex.

A *parabolic conoid* is to a cylinder of the ſame baſe and height, as 1 to 2; and to a cone of the ſame baſe and height, as 1 to 1.

PARABOLIC *cuneus*, a ſolid figure, formed by multiplying all the DS's, *Tab. Conics, fig.* 10. into the DS's; or, which amounts to the ſame, on the baſe APB erect a priſm, whoſe altitude is AS: this will be a *parabolical cuneus*, which of neceſſity will be equal to the *parabolical* pyramidoid; inaſmuch as the component rectangles, in one, are ſeverally equal to all the component ſquares, in the other.

PARABOLIC *pyramidoid*, a ſolid figure, generated by ſuppoſing all the ſquares of the ordinate applicates in the *parabola*, ſo placed, as that the axis ſhall paſs through all their centres at right angles; in which caſe the aggregate of the planes will form the *parabolic pyramidoid*.

The ſolidity hereof is had by multiplying the baſe, by half the altitude; the reaſon whereof is obvious; for the component planes being a ſeries of arithmetical proportionals beginning from 0, their ſum will be equal to the extremes multiplied by half the number of terms, that is, in the preſent caſe, equal to the baſe multiplied by half the height.

PARABOLIC *ſpace*, the ſpace or area contained between any entire ordinate, as VV. *Tab. Conics, fig.* 8. and the curve VBV of the *parabola*.

The parabolic ſpace is to the rectangle of the ordinate into the abſciſſe, as 2 to 3: to a triangle inſcribed on the ordinate as a baſe whoſe altitude is the abſciſſe, the *parabolic ſpace* is as 4 to 3.

Segment of a PARABOLIC *ſpace*, is that ſpace included between two ordinates.

Quadrature of a parabolical ſegment. See QUADRATURE.

PARABOLIC *ſpeculum or mirror.* See MIRROR.

PARABOLIC *ſpindle.* See PYRAMIDOID.

PARABOLIC *ſpiral*, in *Conics*. See HELICOID *parabola.*

PARABOLIFORM *curves*, a name ſometimes given to the parabolas of a higher kind.

PARABOLOIDES, in *Geometry*, parabolas of the higher kinds. See PARABOLAS *of the higher kinds.*

PARABOLOID, *centre of gravity of a.* See CENTER.

PARABOLOID, *quadratic. Cubical parabolaid, ſurſolidal parabaloid.* See PARABOLAS *of the higher kinds.*

PARABRAMA, is a name given to the firſt of the gods of India.

PARABYSTE was one of the five principal civil tribunals of Athens.

PARACELSISTS. See FIRE-*Philoſophers.*

PARACENTESIS, παρακεντησις, formed from παρα, *with*; and κεντεω, *to prick*, an operation in ſurgery, commonly called TAPPING.

PARACENTESIS is alſo a name applied by ſome authors to all operations either with the lancet, the needle, or punch; not excepting the operation of couching for cataracts: this ſenſe is founded on the etymology of the word. Others reſtrain it to apertures made in the head, breaſt, belly, and ſcrotum; and others to the ſingle operation of tapping in dropſies.

PARACENTRIC *motion*, in *Aſtronomy*, a term uſed for ſo much as a revolving planet approaches nearer to, or recedes farther from, the ſun, or centre of attraction.

Thus if a planet in A, *Tab. Aſtronomy, fig.* 24. move to B, then SB—SA $=b$B, is the *paracentric* motion of that planet.

PARACENTRIC *ſolicitation of gravity*, amounts to the ſame

with the *vis centripeta*; and in *Astronomy*, is expressed by the line A L, *fig.* 24. drawn from the point A parallel to the *ray* S B (infinitely nearer S A) till it intersect the tangent B L.

PARACLET, a name which the church has given to the Holy Spirit; from the Greek Παράκλητος, q. d. *comforter*, or *advocate*.

PARACME, Παρακμὴ, a Greek word signifying *declension*, or a thing's being past its height.

PARACOPE, a word used by Hippocrates to express a slight delirium in fevers.

PARACRUSIS, a word used by Hippocrates, and by many other writers, and expressing the same as *paracope*, a slight delirium in a fever.

PARACYNANCHE, in *Medicine*. See ANGINA.

PARADE, the shew, or exposal of any thing to view, in all its advantages and ornaments.

Bed *of parade*, is that wherein a person lies in state.

PARADE, in *War*, a place where troops assemble, or draw together, in order to exercise or go on any service.

PARADE is more properly the appearance of the officers and soldiery at a post assigned them, to put themselves under arms, in the best order they can; either to mount, or break up the guard, or to form a battalion, or on some other occasion.

PARADE, in *Fencing*, is the action of parrying or turning off any push or stroke.

There are as many kinds of *parades*, as of strokes and attacks; as the *parade* inward, outward, above, below, feigned, &c.

PARADE is used in France for a species of farce, which was merely designed to amuse, and excite mirth.

PARADIGM, PARADIGMA, formed from παραδείκνυμι, *exemplar*, of παρὰ, and δείκνυμι, *ostendo*, q. d. *juxta ostendo*, an example, or instance, of something said or done. See EXAMPLE.

Grammarians have appropriated the word *paradigm* to examples of declensions and conjugations, which may serve as models for other words of a like kind.

PARADIGRAMMATICE, is used by some for the art of making all sorts of figures in plaister. The artists in this are called *sygraphi*.

PARADISE, a term primarily used for the place wherein Adam was seated, during his innocence; and from which he was expelled for disobeying God: this is called, in a stricter manner, the *Terrestrial Paradise*.

The word is formed of παραδεισος, *orchard*, a place stored with apples, and all kinds of fruit. Moses calls it the *Garden of Eden*, q. d. garden of delight, from עדן, *voluptas, pleasure*.

The critics are in dispute about the precise place of *Paradise*. Some, as Hardouin, &c. will have it in Judea, in the place where now is the lake Genesareth; others, as Le Clerc, &c. in Syria, towards the springs of the Orontes, and Chrysorrhoe; but in neither of those places do we discover any track of the rivers wherewith the *Paradise* in Moses's description was watered. Calmet and some other ingenious critics have placed the terrestrial *Paradise* in Armenia, near mount Ararat, where Noah's ark was left; and imagine they there discover the sources of the four rivers which watered the garden of *Eden*, viz. Euphrates; Hiddekel, now the Tigris; Gihon, now Araxes; and Pison, now Phasso. But Sir J. Chardin assures us in his travels, that the Phasso springs out of the mountains of Caucasus, northward of the kingdom of Imeretti, and far enough from mount Ararat: beside, that in Armenia we have no signs of the countries of Havilah and Ethiopia, which those rivers washed after their departure from Eden.

There are various other opinions, as to this point. Postellus will have *Paradise* placed under the north-pole; grounding his notion upon an ancient tradition of the Egyptians and Babylonians, that the ecliptic or sun's way was at first at right angles to the equator; and so passed directly over the north-pole. Others are against limiting it to any one place, and contend, that it included the whole face of the earth, which was then, as it were, one continued scene of pleasure, till altered upon Adam's transgression.

However, both these opinions are equally incompatible with the account in the book of Genesis: others, as Origen, Philo, &c. interpret the scripture relation of *Paradise* allegorically.

But the most common and probable opinion is that of Hopkinson, Huet, Bochart, &c. who place *Paradise* between the confluence of the Euphrates and Tigris, and their separation. These rivers are two of those wherewith the garden of Eden was watered: Pison was a branch arising out of one of them after their separation; and Gihon another branch arising from the other, on the side of Armenia, or the west: accordingly Ethiopia, one of the countries which these rivers washed, was incontestably Arabia Deserta; for Moses calls his wife, who was of this country, an Ethiopian; and Havilah, the other country, must have been the Chusistan in Persia; where were anciently found gold, bdellium, the onyx, &c. mentioned in Moses's description.

The great difficulty in this system is, that Moses speaks expressly of four rivers, each of which had its source in the garden of Eden; whereas this gives us only two rivers, which were separated into four branches.

PARADISE is also used in the New Testament and by Christian writers, for the final habitation of the blessed, or HEAVEN.

PARADISE, *bird of*, *paradisea*, in *Ornithology*, a bird called *manucodiata* by others. In the Linnæan system this makes a distinct genus of birds of the order of the *picæ*, the distinguishing characters of which are, that they have two singular and extremely long feathers, which are neither inserted in the wings nor rump; and that the beak is covered with a kind of woolly feathers. Of these he enumerates three species, *the apoda*, or *manucodiata major* of others, found in the Molucca islands; *the regia*, or *manucodiata minor* of Brisson, inhabiting Amboyna; and the *rubra*, which is met with in the Philippine islands.

Of this bird many fabulous accounts have been propagated, as that it had no legs, that it took in no food, and lived only on the dews; that it was always on the wing, and had no other way of resting than as it hung in the air; that it was never taken alive, and that the male had a cavity in his back, which served for the female to lay her eggs, and hatch her young in; all which are wholly fabulous. The bird is a bird of prey, but of a peculiar kind, the use of whose long feathers is not well known. See *Tab.* IV. *of Birds*, N° 43.

There are several species of this beautiful bird; Mr. Ray has reckoned eleven, and others have mentioned more, which were unknown to that author; but it is much to be questioned whether many of these are not rather the varieties of age and sex in the same species. The distinguishing characters of these birds is their extremely long feathers which they carry behind. It is well known now that they feed on small birds, and build in the woods, perching upon trees like other birds, most of those now brought into Europe being killed while sitting. Linnæus gives the name of *paradisea* to a species of the upupa or HOOPOE, called by others the Oriental cristated manucodiata.

PARADISIACA, in *Botany*, a name given by some authors to the *arbor vitæ*, or *thuya*.

PARADISUS, among *Ancient Church Writers*, denoted a square court, before cathedrals, surrounded with piazzas, or porticoes for walking under, supported by pillars. Matthew Paris calls it *porticus*.

PARADOX, Παράδοξος, formed from παρὰ, *against*, and δόξα, *opinion*, in *Philosophy*, a proposition seemingly absurd, because contrary to the received opinions; but yet true in effect.

The Copernican system is a *paradox* to the common people; but the learned are all agreed as to its truth.

Geometricians have of late been accused of maintaining *paradoxes*; and it must be owned, that some use very mysterious terms in expressing themselves about asymptotes, the sums of infinite progressions, the areas comprehended between curves and their asymptotes, and the solids generated from those areas, the length of some spirals, &c. But all these *paradoxes* and mysteries amount to no more than this; that the line or number may be continually acquiring increments, and those increments may decrease in such a manner, that the whole line or number shall never amount to a given line or number.

The necessity of admitting this is obvious from the nature of the most common geometrical figures: thus, while the tangent of a circle increases, the area of the corresponding sector increases, but never amounts to a quadrant. Neither is it difficult to conceive, that if a figure be concave towards a base, and have an asymptote parallel to the base (as it happens when we take a parallel to the asymptote of the logarithmic curve, or of the hyperbola, for a base), that the ordinate in this case always increases while the base is produced, but never amounts to the distance between the asymptote and the base. In like manner, a curvilinear area may increase while the base is produced, and approach continually to a certain finite space, but never amount to it; and a solid may increase in the same manner, and yet never amount to a given solid. See *Logarithmic* CURVE.

A spiral may in like manner approach to a point continually, and yet in any number of revolutions never arrive at it; and there are progressions of fractions which may be continued at pleasure, and yet the sum of the terms shall be always less than a given number. See Mac Laurin's Fluxions, book i. ch. 10. seq. where various rules are demonstrated, and illustrated by examples,

for

for determining the asymptotes and limits of figures and progressions, without having recourse to those mysterious expressions which have of late years crept into the writings of mathematicians. For, as that excellent author observes elsewhere, though philosophy has, and probably always will have, mysteries to us, geometry ought to have none.

PARADOXES, *hydrostatical*. See FLUID.

PARADOXI, or PARADOXOLOGI, among the *Ancients*, were a kind of mimes or buffoons, who diverted the people with their drolling.

They were also called *ordinarii*, for this reason apparently, that, as they spoke without study or preparation, they were always ready.

They had another denomination, viz. *nænicologi*, q. d. tellers of children's tales: and, beside, were called *aretologi*, of ἀρετὴ, *virtue*, or talking much of their own rare talents, and qualifications.

PARÆA, in *Zoology*, the name of a species of serpent, called also *anguis Æsculapii*. It is a perfectly innocent and harmless creature, and is so little dreaded by the inhabitants, that it is common about their houses, and even sometimes gets into their beds. Its mouth is full of very small teeth, and when much provoked, it is sometimes known to bite, though without any bad symptoms attending the wound; it is a very long kind, and is of a yellowish green colour on the sides, and blackish on the back: it has two small eminences on the neck, and between them two small sinews. It is very common in Spain, Italy, and most other of the warm countries.

PARÆNESIS, παραίνεσις, formed of παρὰ, and αἰνέω, *I praise*, a Greek term, signifying adoration or exaltation.

PARAGAUDÆ, among the Romans, a sort of wreaths, either wholly of gold, or of silk adorned with gold, which were interwoven in garments, and not sewed to them. The garment was sometimes of one colour, in which was woven one *paragauda*; others were of two colours, and had two *paragaudæ*; and some had three colours, and three *paragaudæ*. They were worn both by men and women.

PARAGE, PARAGIUM, in *Law*, an equality of blood, or dignity, but more especially of land, in the partition of an inheritance between coheirs.

PARAGE, PARAGIUM, is more properly used, in ancient customs, for an equality of condition among nobles, or persons holding nobly.

Thus, when a fief is divided among brothers; in this case, the younger hold their part of the elder *by parage*, i. e. without any homage, or service.

This still obtains, in some measure, in Scotland, where the husbands of the younger sisters are not obliged to any faith or homage to the husband of the elder; nor their children, to the second degree.

This *parage* being an equality of duty, or service among brothers and sisters, some have called it *fraterage* and *parentage*.

The Customary of Normandy defines tenure by *parage* to be, when a noble fief being divided among daughters, the eldest does homage to the chief lord for all the rest, and the youngest hold their parts of the eldest by *parage*, i. e. without any homage or fealty.

Parage ceases at the sixth degree inclusively. It likewise ceases, when any of the sharers sell their part.

PARAGOGE, παραγωγὴ, in *Grammar*, a figure whereby a word is lengthened out, by adding a syllable at the end thereof: as in *dicier* for *dici*.

PARAGOGE is also a word used by medical writers to express a reduction of luxated bones.

PARAGOGIC, formed of παρὰ, *I prolong*, compounded of παρὰ and ἀγω, in *Grammar*, denotes something added to a word without adding any thing to the sense thereof. In the Hebrew, the ה is frequently *paragogic*; as in אברכה, for אברך, *I will praise*.

The use of *paragogic* letters is only to give a more full and agreeable sound to words, either for the sake of the verse, or the smoothness of the period.

PARAGONE, in *Natural History*, the name given by many to the BASALTES, a black marble, used as a touch-stone.

PARAGORICS. See PAREGORICS.

PARAGOUY. See PARAGUAY.

PARAGRAPH, παραγραφὴ, a term in *Jurisprudence*, signifying a section, or division of the text of a law: otherwise called an *article*.

Such a law is *said* to be divided into so many *paragraphs*. The character of a *paragraph* in quotation, is ¶.

Among the Greek poets, *paragraphi*, παραγραφοὶ, were a species of critical notes, serving to mark the couplets, strophes, and other divisions of odes, and other poetical compositions. This *paragraph*, as described by the scholiast of Aristophanes, was a short line with a dot at the extremity of it.

PARAGUA, in *Zoology*, the name of a Brasilian parrot, of the size of our common green parrot; but its back is all black, and its breast and the forepart of its belly are of a beautiful red; its eyes are black, with a red circle round them; its beak brown, of a very dusky grey, and legs and feet grey.

PARAGUAY, or PARAGOUY, in *Natural History*, a celebrated plant of the shrub-kind, growing in some provinces of South America, especially in that of *Paraguay*, whence its name; though better known among us under the denomination of *South-sea tea*: being a species of the *cassine* or CASSIBURY *buff*.

This plant, which does not rise above a foot and a half high, has very slender branches, and leaves somewhat like those of lena; it may be looked on as a kind of occidental tea, which, like the oriental, is taken infused in hot water, to which it communicates a colour and smell nearly like those of the best tea seen in Europe.

There are two kinds of *paraguay*, the one called simply *paraguay*; the other CAAMISI; by the Spaniards, *yerba-mini*; which last is most esteemed, and sold for a third more than the other.

The first the Spaniards called *yerba-en-palos*, i. e. *herb with little sticks*, because full of broken branches: this is chiefly used by domestics and slaves: the latter is the drink of the richest. But both are of so much use, and esteemed of such absolute necessity, that nobody in that part of America will live without them. The works of the mines of Potosi would stand still, but that the masters take care to supply the poor slaves that labour therein, with *paraguay*, which is their constant remedy against those mineral steams, wherewith they would otherwise be suffocated. Nor will a servant engage himself with any master, but upon this among other conditions, that he have nothing but *paraguay* for drink.

The *paraguay* makes one of the most considerable articles of the South American commerce. At Peru, Chili, and Buenos Ayres, there are above two millions worth sold per annum; which used to pass almost altogether through the hands of the Jesuits.

The preparation of the plant, and the making it into drink, is much the same with that of tea, except that they infuse both the leaves, and the wood; that they drink it immediately out of the vessel it is made in, without letting it have time to infuse, by reason of the black tincture it gives; and that, to prevent leaves and all from coming, they suck it through a silver or glass pipe, which goes round the company one after another. Frezier.

Beside all the virtues which the eastern people ascribe to their tea, as to be good in diseases of the head, breast, and stomach, against phlegm, and to relieve sleep; the Americans attribute to their's this likewise, of purifying all kinds of water, how foul and corrupt soever, by only infusing it therein, either hot or cold. Thus, having always some of it with them, if they meet with none but the worst waters in the vast deserts to be crossed in going from Buenos Ayres to Peru and Chili, they are not afraid to drink them, after steeping some of the plant a little while therein. It is also held sovereign against the scurvy, and putrid fevers.

PARALAMPSIS, a word used by medical writers to express a cicatrix in the transparent part of the cornea of the eye.

PARALEPSIS, παραλειψις, in *Rhetoric*, a pretence of omitting, or passing over a thing, and yet expressing it by the way.

The design of this figure, according to Hermogenes, is to possess the minds of the audience with more than the words express, and it is principally made use of on three occasions; either when things are small, and yet necessary to be mentioned; or well known, and need not be enlarged on; or ungrateful, and therefore should be introduced with caution, and not set in too strong a light.

When the imagination is warmed, and reasons and arguments present themselves in abundance, the orator would willingly lay them all down, in form; but, for fear of wearying his audience, he only produces some of them *en passant*, and without dwelling on them: and this is called a *paralepsis*, by the Latins *pretexitio*, by the Greeks *apophasis*.

For instance, I pass over in silence the many injuries I have received, &c. I won't insist on this last outrage. See Ep. to Philemon. v. 19.

PARALIA, Παραλία, in *Antiquity*, a day kept in memory of an ancient hero, called Paralus.

PARALIA was also the name of one of the Athenian tribes.

PARALIPOMENA, Παραλειπόμενα, a supplement of things omitted, or forgot, in some preceding work, or treatise.

The word is formed from the Greek παραλείπω, *praetermitto*, *I pass by*. Some authors use the word *subsectivum* instead of *paralipomena*.

In the canon of Scripture, there are two books of *Paralipomena*,

Iponena, called in the Engliſh verſion, Chronicles; being a ſupplement to the four Books of Kings, the two firſt whereof are alſo called Books of Samuel.

Quintus Calabar has a work, intitled, the Paralipomena of Homer.

PARALLACTIC *angle*, called alſo ſimply PARALLAX, is the angle made in the centre of a ſtar by two right lines, drawn, the one from the centre of the earth, T B *(Tab. Aſtron. fig.* 27.); the other from its ſurface, E B.

Or, which amounts to the ſame, the *parallactic* angle is the difference of the angles C E A, and B T A, under which the real and apparent diſtances from the zenith are ſeen.

The ſines of the *parallactic* angles A L T and A S T, *(Tab. Aſtron. fig.* 30.) of the ſame or equal diſtances from the zenith S Z, are in a reciprocal ratio of the diſtances of the ſtars from the centre of the earth T L and T S.

PARALLAX, Παραλλαξις, in *Aſtronomy*, an arch of the heavens intercepted between the true place of a ſtar, and its apparent place.

The true place of a ſtar is that point of the heavens B, *(Tab. Aſtron. fig.* 27.) wherein it would be ſeen by an eye placed in the centre of the earth as at T. The apparent place is that point of the heavens C, wherein the ſtar appears to an eye on the ſurface of the earth, as at E. Now, as, in effect, we view the celeſtial bodies not from the centre, but from the ſurface of our earth, which is a ſemi-diameter diſtant from the centre; we ſee it by a viſual ray, which, paſſing through the centre of the ſtar, and proceeding thence to the ſurface of the mundane ſphere, marks out another point C, which is its apparent place.

This difference of places, is what we call abſolutely the *parallax*, παραλλαξις, or the *parallax of altitude*; by Copernicus it is called the *commutation*; which, therefore, is an angle formed by two viſual rays, drawn, the one from the centre, the other from the circumference of the earth, and traverſing the body of the ſtar; and is meaſured by an arch of a great circle intercepted between the two points of true and apparent place, C and B.

PARALLAX *of declination*, is an arch of a circle of DECLINATION S I, *fig.* 28. whereby the *parallax* of altitude increaſes or diminiſhes the declination of a ſtar.

PARALLAX *of right aſcenſion and deſcenſion* is an arch of the equator D *d*, *fig.* 28. whereby the *parallax* of altitude increaſes the aſcenſion, and diminiſhes the deſcenſion.

PARALLAX *of longitude*, is an arch of the ecliptic T *t*, *fig.* 29. whereby the *parallax* of altitude increaſes or diminiſhes the longitude.

PARALLAX *of latitude*, is an arch of a circle of latitude S I, whereby the *parallax* of altitude increaſes or diminiſhes the latitude.

PARALLAX, *menſtrual, of the ſun*, is an angle formed by two right lines; one drawn from the earth to the ſun, and another from the ſun to the moon, at either of their quadratures.

PARALLAX *of the annual orbit* of the earth, is the difference between the heliocentric and geocentric place of a planet, or the angle at any planet, ſubtended by the diſtance between the ſun and earth.

PARALLAX is alſo uſed for the angle made in the centre of the ſtar, by two right lines, drawn, the one from the centre, the other from the ſurface of the earth.

This alſo called PARALLACTIC *angle*. Hence, tho *parallax* diminiſhes the altitude of a ſtar, or increaſes its diſtance from the zenith; and has, therefore, a contrary effect to the REFRACTION.

The *parallax* of altitude C B, *fig.* 27. is, ſtrictly, the difference between the true diſtance from the zenith C A, and the apparent diſtance B A.

The *parallax* is greateſt in the horizon; in the zenith, or meridian, a ſtar has no *parallax* at all; the true and apparent places then coinciding.

The horizontal *parallax* is the ſame, whether the ſtar be in the true, or the apparent horizon.

The fixed ſtars have no ſenſible *parallax*, by reaſon of their immenſe diſtance, to which the ſemidiameter of the earth is but a mere point.

Hence alſo, the nearer a ſtar is to the earth, the greater is its *parallax*, at an equal elevation above the horizon; and Saturn is ſo high, that it is difficult to obſerve in him any *parallax* at all.

The *parallax* increaſes the right and oblique aſcenſion, diminiſhes the deſcenſion; diminiſhes the northern declination, and latitude in the eaſtern part, increaſes them in the weſtern; increaſes the ſouthern in the eaſtern and weſtern part; diminiſhes the longitude in the weſtern part, increaſes it in the eaſtern. The *parallax*, therefore, has juſt oppoſite effects to the refraction.

Hence the *parallax* of the remoter ſtar S *(fig.* 30.) is leſs than the *parallax* of the nearer I., at the ſame diſtance from the zenith; as before obſerved.

The ſines of the *parallactic* angles M and S, of ſtars equally diſtant from the centre of the earth T, are as the ſines of the diſtances ſeen from the vertex Z M, and Z S. Hence, the diſtances from the vertex decreaſe, i. e. as the altitudes decreaſe, the *parallax* increaſes; and hence, alſo, the *parallax* affects the altitude of the ſtar, from the horizon to the zenith.

The doctrine of *parallaxes* is of the utmoſt importance, in aſtronomy, for determining the diſtances of the planets, comets, and other phenomena of the heavens; for the calculation of eclipſes, and for finding the longitude. Methods of finding the *parallaxes* of the celeſtial phenomena, are various: ſome of the principal, and eaſier follow.

To obſerve the PARALLAX *of a celeſtial phenomenon.* Obſerve when the phenomenon is in the ſame vertical with a fixed ſtar which is near it, and meaſure its apparent diſtance from the ſtar; obſerve, again, when the phenomenon and fixed ſtar are in equal altitudes from the horizon; and again meaſure their diſtance. The difference of thoſe diſtances will be, very nearly, the *parallax* ſought.

The *parallax* of a phenomenon may be likewiſe found by obſerving its azimuth, and altitude; and by marking the time between the obſervation, and its arrival at the meridian.

All required to find the *parallax* of the moon is, the *parallax* of right aſcenſion: to find the effect of the magnitude of the ſemidiameter of the earth, with regard to the phenomena of its motion, it is ſufficient to know how far the meridian, to which the eye refers it, deviates from the true meridian. This is what M. Caſſini found and practiſed, with regard to Mars; and what M. Maraldi has ſince practiſed, with regard to the moon. The whole myſtery here conſiſts in having the moon's true motion, which refers to the centre of the earth; and its apparent motion which refers to the place of obſervation: the difference of theſe, which is greateſt in the horizon, or horary circle of 6 o'clock, gives the horizontal *parallax* for that latitude; whence the general *parallax*, or that under the equator, is eaſily found: the *parallax* of any parallel being to that of the equator, as the ſemidiameter of this parallel is to that of the equator. See the practice of this method exemplified in *finding the* PARALLAX *of Mars*.

PARALLAX, *to obſerve the moon's.* Obſerve the moon's meridian ALTITUDE, with the greateſt accuracy, and mark the moment of time: this time being equated (ſee EQUATION), compute her true longitude and latitude, and from theſe find her DECLINATION, and from her declination, and the elevation of the equator, find her true meridian altitude: if the obſerved altitude be not meridian, reduce it to the true altitude for the time of obſervation; take the refraction from the obſerved altitude, and ſubtract the remainder from the true altitude; and the remainder is the moon's *parallax*.

By this means Tycho, in 1583, Oct. d. 12 hor. 5. 19′. from the moon's meridian altitude obſerved, 13° 38′, found her *parallax* to be 54 minutes.

To obſerve the moon's PARALLAX *in an eclipſe.* In an eclipſe of the moon, obſerve when both horns are in the ſame vertical circle; in that moment take the altitudes of both horns; the difference of the two being halved, and added to the leaſt, or ſubtracted from the greateſt, gives nearly the viſible altitude of the moon's centre: but the true altitude is nearly equal to the altitude of the centre of the ſhadow at that time. Now we know the altitude of the centre of the ſhadow, becauſe we know the ſun's place in the ecliptic, and its depreſſion under the horizon, which is equal to the altitude of the oppoſite point of the ecliptic in which the centre of the ſhadow is: thus have we both the true and apparent altitude; the difference whereof is the *parallax*.

PARALLAX, *in order to find the moon's.* Let a graduated inſtrument, as D A F (the larger the better), *Tab.* III. *Aſtronomy, fig.* 82. having a moveable index with ſight-holes, be fixed in ſuch a manner, that its plane ſurface may be parallel to the plane of the equator, and its edge A D in the meridian: ſo that when the moon is in the equinoctial, and on the meridian A D E, ſhe may be ſeen through the ſight-holes, when the edge of the moveable index cuts the beginning of the diviſions at 0, on the graduated limb D E; and when ſhe is ſo ſeen, let the preciſe time be noted. Now, as the moon revolves about the earth from the meridian to the meridian again, in about 24 hours, 48 minutes, ſhe will go a fourth part round it in 6 hours 12 minutes, as ſeen from C, or from the earth's centre or pole. But as ſeen from A, the obſerver's place on the earth's ſurface, ſhe moon will ſeem to have gone a quarter round the earth when ſhe comes to the ſenſible horizon at O; for the index, through the ſights of which ſhe is then viewed, will be at 90° from D, where it was when ſhe was ſeen at E. Now, let the exact moment when the moon is ſeen at O, be

near the ſenſible horizon, be carefully noted; that it may be known in what time the has gone from E to O; which time ſubtracted from 6 hours 12 minutes, (the time of her going from E to L) leaves the time of her going from O to L, and affords an eaſy method for finding the angle OAL, or the moon's horizontal *parallax*, which is equal to the angle ALC, by the following analogy: as the time of the moon's deſcribing the arc EO is to 90°, ſo is 6 hours 12 minutes to the degrees of the arc *D d* E, which meaſures the angle EAL: from which ſubtract 90°, and there remains the angle OAL=ALC, under which the earth's ſemidiameter AC is ſeen from the moon.

Aſtronomers have propoſed the following method, though not yet practiſed, for more accurately determining the moon's *parallax*: let two obſervers be placed under the ſame meridian, one in the northern hemiſphere, and the other in the ſouthern, at ſuch a diſtance from each other, that the arc of the celeſtial meridian included between their two zeniths, may be at leaſt 80 or 90 degrees. Let each obſerver take the diſtance of the moon's centre from his zenith, by means of an exceeding good inſtrument, at the moment of her paſſing the meridian: add theſe two zenith diſtances of the moon together, and their exceſs above the diſtance between the two zeniths, will be the diſtance between the two apparent places of the moon. Then, as the ſum of the natural ſines of the two zenith diſtances of the moon is to the radius, ſo is the diſtance between her two apparent places to her horizontal *parallax*. If the two places be not exactly under the ſame meridian, their difference of longitude muſt be accurately taken, that proper allowance may be made for the moon's declination, while ſhe is paſſing from the meridian of the one to the meridian of the other. Ferguſon's Aſtr. p. 307. quarto, 1773.

From the moon's PARALLAX ASI, *Tab. Aſtron. fig.* 30. *and altitude* SR; *to find her diſtance from the earth.* By her apparent altitude given, we have her apparent diſtance from the zenith, i. e. the angle ZAS; or, by her true altitude, the angle ATS: wherefore, ſince at the ſame time, we have the *parallactic* angle S; and the ſemidiameter of the earth AT is reputed as 1; by plane trigonometry we ſhall have the moon's diſtance in ſemidiameters of the earth, thus: as the ſine of the angle S is to the oppoſite ſide given, ſo is the ſine of the other angle T, to the ſide AS: or ſo is the ſine of TAS (=180°−T+S) to the ſide TS, the diſtance from the centre.

Hence, according to Tycho's obſervation, the moon's diſtance at that time from the earth was ſixty-two ſemidiameters of the earth.

Hence, alſo, ſince, from the moon's theory, we have the ratio of her diſtances from the earth in the ſeveral degrees of her anomaly; thoſe diſtances being found by the rule of three in ſemidiameters of the earth, the *parallax* is thence determined to the ſeveral degrees of the true anomaly.

De la Hire makes the greateſt horizontal *parallax* 1° 1′ 25″ the ſmalleſt 54′ 5″. The moon's diſtance, therefore, when in her perigee, is, according to his calculation, 55¾; that is, almoſt 56 ſemidiameters; in her apogee 63¼; that is, 63¼ ſemidiameters of the earth. M. le Monnier determined the mean *parallax* of the moon to be 57′ 12″. Others have made it 57′ 18″.

To obſerve the PARALLAX *of Mars.* 1. Suppoſe Mars in the meridian and equator, in H, *Tab. Aſtronomy, fig.* 31. and that the obſerver, under the equator in A, obſerves him culminating with ſome fixed ſtar. 2. If now the obſerver was in the centre of the earth, he would ſee Mars conſtantly in the ſame point of the heavens with the ſtar; and therefore, together with it, in the plane of the horizon, or of the ſixth horary: but ſince Mars here has ſome ſenſible *parallax*, and the fixed ſtar has none, Mars will be ſeen in the horizon, when in P, the plane of the ſenſible horizon; and the ſtar, when in R, the plane of the true horizon: obſerve, therefore, the time between the tranſits of Mars and of the ſtar through the plane of the ſixth hour. 3. Convert this time into minutes of the equator; by this means we ſhall have the arch PM, to which the angle PAM, and conſequently the angle AMD, is nearly equal; which is the horizontal *parallax* of Mars.

If the obſerver be not under the equator, but in a parallel IQ, that difference will be a leſs arch QM: wherefore, ſince the little arches QM and PM are as their ſines AD and ID; and ſince ADG is equal to the diſtance of the place from the equator, i. e. to the elevation of the pole; and therefore AD to ID, as the whole line to the co-ſine of the elevation of the pole; ſay, as the co-ſine of the elevation of the pole ID is to the whole line AD, ſo is the *parallax* obſerved in I, to the *parallax* to be obſerved under the equator.

Since Mars and the fixed ſtar cannot be commodiouſly obſerved in the horizon; let them be obſerved in the circle of the third hour: and ſince the *parallax* there obſerved, TO, is to the horizontal one PM, as IS to ID; ſay, as the ſine of the angle IDS, or 45° (ſince the plane DO is in the middle between the meridian DH and the true horizon DM), is to the whole ſine; ſo is the *parallax* TO to the horizontal *parallax* PM.

If Mars be likewiſe out of the plane of the equator, the *parallax* found will be an arch of a parallel; which muſt, therefore, be reduced, as above, to an arch of the equator. Laſtly, If Mars be not ſtationary, but rather direct, or retrograde, by obſervations for ſeveral days; find out what his motion is every hour, that his true place from the centre may be aſſigned for any given time.

By this method Caſſini, to whom we owe this noble invention, obſerved the greateſt horizontal *parallax* of Mars to be twenty-five ſeconds, or a little leſs: but, by the ſame method, Mr. Flamſteed found it near thirty ſeconds. By the ſame method, the ſame author, Caſſini, obſerved alſo the *parallax* of Venus.

It muſt be here noted, that the obſervation is to be made with a teleſcope, in whoſe focus are ſtrained four threads, cutting each other at right angles. A, B, C, D, *fig.* 45. N° 2. and the teleſcope is to be turned about, till ſome ſtar near Mars be ſeen to paſs over ſome of the threads, that the threads AB and CD may be parallel to the equator, and therefore AC and BD may repreſent circles of declination; thus, by means of the perpendicular threads, the ſituations of the ſtar, and of Mars, in the meridian, and circle of three o'clock, will be determined.

PARALLAX, *to find the ſun's.* The great diſtance of the ſun renders its *parallax* too ſmall to fall under even the neareſt immediate obſervation; indeed, many attempts have been made, both by the ancients and moderns, and many methods invented for that purpoſe. The firſt was that of Hipparchus, followed by Ptolemy, &c. this was founded on the obſervation of lunar eclipſes: the ſecond was that of Ariſtarchus, whereby the angle ſubtended by the ſemidiameter of the moon's orbit, ſeen from the ſun, was ſought from the lunar phaſes: but theſe both proving deficient, aſtronomers are now forced to have recourſe to the *parallaxes* of the planets nearer us, as Mars and Venus; for from their *parallaxes* known, that of the ſun, which is inacceſſible by any direct obſervation, is eaſily deduced. For from the theory of the motions of the earth and planets, we know, at any time, the proportion of the diſtances of the ſun and planets from us; and the horizontal *parallaxes* are in a reciprocal proportion to thoſe diſtances: knowing, therefore, the *parallax* of a planet, that of the ſun may be found from it.

Thus Mars, when oppoſite to the ſun, is twice as near as the ſun is: his *parallax*, therefore, will be twice as great as that of the ſun; and Venus, when in her inferior conjunction with the ſun, is ſometimes nearer us than he is; her *parallax*, therefore, is greater in the ſame proportion. Thus, from the *parallaxes* of Mars and Venus, the ſame Caſſini found the ſun's *parallax* to be ten ſeconds; which implies his diſtance to be 22000 ſemidiameters of the earth.

The moſt accurate method of determining the *parallaxes* of theſe planets, and of deducing from thence the true *parallax* of the ſun is that of obſerving their tranſit: however Mercury, though frequently to be ſeen on the ſun, is not fit for this purpoſe; becauſe it is ſo near the ſun, that the difference of their *parallaxes* is always leſs than the ſolar *parallax* required. But the *parallax* of Venus, being almoſt four times as great as the ſolar *parallax*, will cauſe very ſenſible differences between the times in which ſhe will ſeem to be paſſing over the ſun at different parts of the earth. With a view of engaging the attention of aſtronomers to this method of determining the ſun's *parallax*, Dr. Halley communicated to the Royal Society, in 1691, a paper, containing an account of the ſeveral years in which ſuch a tranſit may happen, computed from the tables which were then in uſe: thoſe at the aſcending node occur in the month of November, O. S. in the years 918, 1161, 1396, 1631, 1639, 1874, 2109, 2117: and at the deſcending node in May, O. S. in the years 1048, 1283, 1291, 1518, 1526, 1761, 1769, 1996, 2004. Phil. Tranſ. Abr. vol. i. p. 435, &c.

Dr. Halley even then concluded, that if the interval in time between the two interior contacts of Venus with the ſun could be meaſured to the exacteſt of a ſecond, in two places properly ſituated, the ſun's *parallax* might be determined within its 500th part. But this concluſion was explained more fully in a ſubſequent paper, (Phil. Tranſ. N° 348. or abr. vol. iv. p. 214.) concerning the tranſit of Venus in the year 1761. It does not appear that any of the preceding tranſits had been obſerved; except that of 1639, by our illuſtrious country-

man Mr. Horrox, and his friend Mr. Crabtree, of Manchester. But Mr. Horrox died on the 3d of January, 1640-1, about the age of twenty-five, just after he had finished his treatise, intitled Venus in sole visa, in which he discovers a more accurate knowledge of the dimensions of the solar system, than his learned commentator Hevelius.

In order to give our readers, not much conversant with subjects of this kind, a general idea of this method of determining the horizontal *parallax* of Venus, and from thence, by analogy, the *parallax* and distance of the sun, and of all the planets from him; it may be briefly illustrated in the following manner: let DBA, *Tab.* III. *Astronomy, fig.* 83. be the earth, V Venus, and TSR the eastern limb of the sun. To an observer at B the point *t* of that limb will be on the meridian, its place referred to the heaven will be at E, and Venus will appear just within it at S. But, at the same instant, to an observer at A, Venus is east of the sun, in the right line AVF; the point *r* of the sun's limb appears at *e* in the heaven, and if Venus were then visible, she would appear at F. The angle CVA is the horizontal *parallax* of Venus; and is equal to the opposite angle FVE, measured by the arc FE. ASC is the sun's horizontal *parallax*, equal to the opposite angle *e*SE, measured by the arc *e*E; and FA*r*, or VA*v*, is Venus's horizontal *parallax* from the sun, which may be found by observing how much later in absolute time her total ingress on the sun is, as seen from A, than as seen from B, which is the time she takes to move from V to *v*, in her orbit OVu. If Venus were nearer the earth as at U, her horizontal *parallax* from the sun would be the arch *f e*, which measures the angle *f*A*e*; and this angle is greater than the angle FA*r*, by the difference of their measures *f*F. So that as the distance of the celestial object from the earth is less, its *parallax* is the greater. Now it has been already observed, that the horizontal *parallaxes* of the planets are inversely as their distances from the earth's centre, therefore as the sun's distance at the time of the transit is to Venus's distance, so is her horizontal *parallax* to that of the sun; and as the sun's mean distance from the earth's centre is to his distance on the day of the transit, so is his horizontal parallax on that day, to his horizontal *parallax* at the time of his mean distance from the earth's centre. Hence his true distance in semidiameters of the earth may be obtained by the following analogy: as the sine of the sun's *parallax* is to radius, so is unity or the earth's semidiameter to the number of semidiameters of the earth in the sun's distance from the centre; which number multiplied by 3985, the number of miles in the earth's semidiameter, will give the number of miles in the sun's distance. Then from the proportional distances of the planets, determined by the theory of gravity, (see DISTANCE) we may find their true distances. And from their apparent diameters at these known distances, their real diameters and bulks may be found. See PLANETS.

Mr. Short with great labour deduced the quantity of the sun's *parallax* from the best observations that were made of the transit of June 6th, 1761, (for which see Phil. Transf. vol. li. and lii.) both in Britain and abroad, and found it to have been 8″.52 on the day of the transit, when the sun was very nearly at his greatest distance from the earth; and consequently 8″.65 when the sun is at his mean distance from the earth. See Phil. Transf. vol. lii. art. 100. p. 611, &c. Whence we shall have radius or 10.0000000—5.621914 or sine of 8″.65 taken out of Gardiner's tables = 4.3786860 the logarithm of the number 23882.84 or the number of semidiameters of the earth contained in its distance from the sun; and multiplying 23882.84 by 3985, the number of English miles contained in the earth's semidiameter, we shall have 95,173,127 miles for the earth's mean distance from the sun. And from the analogies under the article DISTANCE, we shall find the mean distance of all the rest of the planets from the sun in miles to be as follows, viz. Mercury's distance, 36,841,468; Venus's distance, 68,891,486; Mars's distance, 145,071,148; Jupiter's distance, 494,990,976; and Saturn's distance, 907,956,130. In another paper, (Phil. Transf. vol. liii. p. 169.) Mr. Short fixes the mean horizontal *parallax* of the sun at 8″.69. Mr. Hornsby from several observations of the transit of June 3d, 1769, (for which see Phil. Transf. vol. lix. &c.) deduces the sun's *parallax* for that day equal to 8″.65 and the mean *parallax* 8″.78, whence he makes the mean distance of the earth from the sun to be 93,726,900 English miles; Mercury's distance 36,181,700; Venus's distance, 67,795,500; Mars's distance 143,818,000; Jupiter's distance, 487,473,000; and Saturn's distance, 894,162,000 miles. Phil. Transf. vol. lxi. part 2. p. 579. Others, however, by taking the results of those observations that were most to be depended on, have made the sun's *parallax* at his mean distance from the earth to be 8″.6045; and others again make it 8″.54. According to the former of these, the sun's mean distance from the earth is 95,109,736 miles; and according to the latter is 95,854,742 miles. Upon the whole there seems reason to conclude, that it may be fairly reckoned at more than ninety-five millions of miles, and less than ninety-six. Ferguson's Astr. p. 354. See PLANETS.

The PARALLAX *of the fixed stars, with regard to the earth's natural orbit*; called their *annual parallax*. The stars have no *parallax*, with regard to the earth's semidiameter; yet, with regard to the earth's annual orbit, it is justly expected, that some *parallax* be found.

The axis of the earth, in its natural motion, describes a kind of cylinder, which being prolonged to the heaven of the fixed stars, there draws a circular circumference; each point whereof is the pole of the world for its respective day: so that the situation of the apparent pole, with regard to any of the fixed stars, changes very considerably in the course of a year.

Could this be found by observation, it would irrefragably evince the annual motion of the earth round the sun, and remove that only objection which lies against it, urged by Ricciolus, from no such *parallax* being observed.

Accordingly Dr. Hook attempted to find it by observing the various distances of a fixed star from the zenith, in different parts of the earth's orbit; and Mr. Flamsteed, from the access and recess of a fixed star from the equator at different times of the year, and with imagined success; the result of his observations being, that a fixed star, near the pole, was found 40 or 45 seconds nearer it, at the winter solstice, than at the summer one, for seven years successively.

M. Cassini the younger allows the observations of Flamsteed to agree with those made at the Royal Observatory; but he denies the consequences: he says, that the variations in the distance of the pole-star are not such as they should be, supposing the motion of the earth. Fontenelle accounts for them from a supposition, that the stars, like the sun, turn or revolve on their centres; and that some of them have their hemispheres equally luminous: whence, when the more shining hemisphere is turned towards us, the stars appear bigger, consequently nearer the neighbouring stars, than when the darker is towards us.

Dr Bradley has accounted for this supposed *parallax* in another way; and conceives it to proceed from the progressive motion of the star's light. See *Motion of the* EARTH and LIGHT.

PARALLAX is also used, in *Levelling*, for the angle contained between the line of true level, and that of apparent level.

PARALLAXIS, in the *Medical Writers*, expresses a mutual change in the situation of the parts of a broken bone, as when the two fragments slip to the sides of one another.

PARALLEL, in *Geometry*, is applied to lines, figures, and bodies, which are every-where equidistant from each other; or which, though infinitely produced, would never either approach nearer, or recede farther from, each other.

PARALLEL *right lines* are those which, though infinitely produced, would never meet.

Thus the line OP, *Tab.* III. *Geometry, fig.* 56. is *parallel* to QR.

Parallel lines stand opposed to lines converging, and diverging.

Some define an inclining or converging line, that which will meet another at a finite distance; and a *parallel line*, that which will only meet it at an infinite distance.

A perpendicular is by some said to be the shortest of all lines that can be drawn to another; and a *parallel* the longest.

Geometricians demonstrate, that two links, *parallel* to the same third line, are also *parallel* to one another; and that if two *parallels* OP and QR, be cut by a transverse line ST in A and B; 1. The alternate angles *x* and *y* are equal; 2. The external angle *n* is equal to the internal opposite one *y*; and, 3. That the two internal opposite ones *x* and *y* are also equal to two right ones.

It is shewn, on the principles of optics, that if the eye be placed between two *parallel* lines, they will appear to converge towards a point opposite to the eye, because the apparent magnitudes of their perpendicular intervals are perpetually diminished; for the same reason they appear to converge towards an imaginary line, drawn *parallel* to them from the eye: and if they run to such a length, as that the distance between them be but as a point thereto, they will there appear to coincide.

This is the reason that the remoter parts of a walk or floor appear to ascend gradually, and the ceiling to descend towards the horizontal line; and that the surface of the sea seen from an eminence, appears to ascend gradually

in going from the shore; and that the upper parts of very high buildings seem to lean forward over the eye below. *Parallel lines* are described by letting fall equal perpendiculars, and drawing lines through their extremes, by sliding the compasses open to the desired width along a line, &c.

PARALLEL *planes* are those planes which have all the perpendiculars drawn betwixt them equal to each other.

PARALLEL *rays*, in *Optics*, are those which keep at an equal distance in respect to each other, from the visible object to the eye, which is supposed to be infinitely remote from the object.

PARALLEL *rulers*, called also *parallelism*, an instrument consisting of two wooden, brass, or steel rulers, AB and CD, *Tab.* III. *Geom. fig.* 63. equally broad every-where, and so joined together by the cross blades EF and GH, as to open to different intervals, and accede and recede, yet still retain their *parallelism*. The use of this instrument is obvious: for one of the rulers being applied to RS, and the other withdrawn to a given point V; a right line AB, drawn by its edge through V, is a parallel to RS: and thus, having given only one line, and erected a perpendicular upon it, we may draw any number of *parallel* lines, or perpendiculars to them; by only observing to set off the exact distance of every line with the point of the compasses.

But the best *parallel* rulers are those whose bars cross each other, and turn on a joint at their intersection; one end of each bar moving on a centre, and the other ends sliding in [illegible]es as the rulers recede. See *fig.* 64.

PARALLEL *of arms*, in a siege, are deep trenches fifteen [illegible]even feet wide, joining the several attacks together; and serving to place the guard of the trenches in, to be at hand to support the workmen when attacked. There are generally three in an attack; the first is about three hundred toises from the covert-way, the second one hundred and sixty, and the third near *or* on the glacis. They are said to have been first invented or used by M. Vauban.

Thus, in *Tab.* VII. *Fortification, fig.* 38. let A, B be the bastions to be attacked, whose capitals, as well as that of the ravelin C, being indefinitely produced towards the field, set off three hundred fathoms from the saliant angles *r*, *s* of the covert-way to the points *l*, *m*; and from the centre *o* of the place, describe an arc of a circle through the points *l*, *m*, whose intersections with the capitals will terminate the several parts of the first *parallel* E, which is terminated at twenty fathoms beyond the faces produced of the two adjacent ravelins *z*, X, next to the front attacked. Take *ln*, *m q*, each equal to one hundred and forty fathoms, and describe from the centre *o* another part of a circle through the points *n*, *q*; and its intersection with these capitals will terminate the several parts of the second *parallel* F, which extends only ten fathoms beyond the faces of the ravelins *z*, X. Lastly, draw lines through the saliant angles of the glacis, and they will give the third *parallel* G. When this is done, take the points *d*, *e*, in the capitals of the bastions, at about eight hundred fathoms from the saliant angles *r*, *s* of the covert-way, and join them by a right line, which will express the beginnings of the attacks. From the point *f* in *de*, at about twenty-four or twenty-six fathoms from the point *e*, draw a line *fg* or H of any length, as one hundred and twenty or one hundred and twenty-six fathoms, for the first approach, but so as when produced to fall ten or twelve fathoms from the farthest saliant angle of the covert-way: from the point *g* draw *gb*, so as to fall as much from the farthest saliant angle on the other side of the place: and the point *b* is taken so as to be nearly at the same distance from the capital *se* as the point *g*: and from the point *b* drawn the line *bi*, so as to fall again as far from the farthest saliant angle in the first side, and that the point *i* be equally as distant from the capital *se* as the point *b*; and thus continue the approaches to the third *parallel*. The approaches are traced after the same manner as the capital *dr*, and also on the capital of the ravelin C, from the second *parallel* to the third: always observing that no part of them is to be seen or enfiladed from any part of the fortification, nor to desile too much, which would occasion unnecessary labour. As the approaches advance nearer the place, they become shorter, as they make smaller angles with each other. Between the second and third *parallels*, at the returns of the approaches, are made places of arms, such as I, about thirty or forty fathoms long, nearly PARALLEL to the third *parallel*, which serve to receive the troops that are to cover the workmen till the third *parallel* is quite finished. When the principal or outlines of the trenches are thus traced, *parallels* are drawn to them on the side towards the field, at twelve feet distance in the approaches, fifteen in the first and second *parallels*, and at eighteen in the third; and the intervals between these and the former lines will express the width of the trenches. At the ends of the second *parallel* are made square redoubts at K, K, of about ten or twelve fathoms on each side, to protect it more effectually from the sallies of the besieged. The first part *A o* of the trenches is an epaulement of about ten feet high to cover the horse designed to guard the trenches. Muller's Attack and Def. of Fortified Places, p. 21, &c.

PARALLELS, or PARALLEL *circles*, in *Geography*, called also *parallels of latitude*, and *circles of latitude*, are lesser circles of the sphere, conceived to be drawn from west to east through all the points of the meridian; commencing from the equator, to which they are *parallel*, and terminating with the poles.

They are called *parallels of latitude*, &c. because all places lying under the same *parallel*, have the same LATITUDE.

PARALLELS *of latitude*, in *Astronomy*, are lesser circles of the sphere *parallel* to the ecliptic, imagined to pass through every degree and minute of the colures.

They are represented on the globe by the divisions of the quadrant of altitude, in its motion round the globe, when screwed over the poles of the ecliptic.

PARALLELS *of altitude*, or *almicantars*, are circles *parallel* to the horizon, imagined to pass through every degree and minute of the meridian between the horizon and zenith, having their poles in the zenith.

On the globe these are represented by the divisions on the quadrant of altitude, in its motion about the body of the globe, when screwed to the zenith.

PARALLELS *of declination*, in *Astronomy*, are the same with *parallels* of latitude in geography.

PARALLELS, *antic.* See ANTI-PARALLELS.

PARALLEL *sphere*, that situation of the sphere wherein the equator coincides with the horizon, and the poles with the zenith and nadir.

In this sphere all the *parallels* of the equator become *parallels* of the horizon; consequently no stars ever rise or set, but all turn round in circles *parallel* to the horizon; and the sun, when in the equinoctial, wheels round the horizon the whole day.

After his rising to the elevated pole, he never sets for six months; and after his entering again on the other side of the line, he never rises for six months longer.

This position of the sphere is their's who live under the poles, if any such there be; their sun being never above 23° 30′ high.

PARALLEL *sailing*, in *Navigation*, is the sailing under a *parallel* of latitude.

Of this there are but three cases. 1. Given, the departure, and distance; required, the latitude. The canon for which is, as the difference of longitude is to the radius, so is the distance to the co-sine of the latitude.

2. Given, the difference of longitude between two places under the same *parallel*; required, their distance. The canon is, as radius to difference of longitude, so is co-sine of latitude to distance.

3. Given, the distance between two places in the same latitude; required, their difference of longitude. The canon is, As the co-sine of latitude to distance, so is radius to difference of longitude.

PARALLELA, a word used by medical writers to express a sort of scurf or leprous appearance, affecting only the palms of the hands. It is a symptom of the pox.

PARALLELEPIPED, in *Geometry*, one of the regular bodies, or solids, comprehended under six parallelograms, the opposite ones whereof are similar, parallel, and equal: as in *Tab.* III. *Geometry, fig.* 65.

A *parallelepiped* is by some defined, a prism, whose base is a parallelogram.

PARALLELEPIPED, *properties of the*. All *parallelepipeds*, prisms, and cylinders, &c. whose bases and heights are equal, are themselves equal.

A diagonal plane divides the *parallelepiped* into two equal prisms: a triangular prism, therefore, is half a *parallelepiped* upon the same base, and of the same altitude.

All *parallelepipeds*, prisms, cylinders, &c. are in a ratio compounded of their bases, and altitudes: wherefore, if their bases be equal, they are in proportion to their altitudes; and converſly.

All *parallelepipeds*, cylinders, cones, &c. are in a triplicate ratio of the homologous sides; and also of their altitudes.

Equal *parallelepipeds*, prisms, cones, cylinders, &c. are in the reciprocal ratio of their bases and altitudes.

To measure the surfaces and solidity of a parallelepiped. Find the areas of the parallelograms I L M K, I M O N, and O M K P (see PARALLELOGRAM); add these into one sum, and multiply that sum by 2: the product will be the surface of the *parallelepiped*.

If, then, the base I L M K be multiplied by the altitude M O, the product will be the solidity.

Suppose, *v. gr.* I M = 36, M K = 15, M O = 12. Then

I. I K M

LIKM = 36×15 = 540; LMON = 36×12 = 432; MOKP = 15×12 = 180. The ſum of which is = 1152, which multiplied by 2, gives the ſuperficies equal to 2304. And 540×12 gives the ſolidity equal to 6480.

The parallelepiped with oblique angles, is a figure very common to many kinds of ſtones, eſpecially of the ſofter ſort. The common cryſtallizations of grottos break naturally into fragments of this ſhape; and the ſtalactite which hang down from their roofs in form of icicles, are originally ſmall hollow pipes formed by the water which continually trickles down drop by drop; and whoſe outer ſurfaces, fixing themſelves by their ſmall baſes, form by degrees a ſort of blunted pyramids, which like ſo many rays from the axis, which is the hollow pipe, grow hollow at laſt. This axis ſeems to be compoſed of plates, almoſt cylindrical, laid one over another; but, if broken, the whole divides into fragments of a *parallelepiped* figure: the blunted pyramids that are about the axis divide themſelves at firſt into other blunted pyramids; but afterwards almoſt all theſe fragments divide of themſelves into other fragments of a *parallelepiped* figure, this ſeeming every where the ultimate ſhape of the particles.

In the mountain of Barege there is found a vaſt quantity of aſbeſtos; the ſtone upon which this grows, though in itſelf of no determinate figure externally, always breaks into regular *parallelepipeds*: nor is this peculiar to theſe ſtones found naturally concreted on the ſurface or within the bowels of the earth, but it is alſo found in ſuch as are concreted by means of art out of the water in which they are originally ſuſpended.

The water of the fountain de Salut, near Bagneres in Gaſcony, when evaporated to a certain degree, yields a ſcum on the ſurface, which alſo adheres to the ſides of the veſſel; and this ſcum, examined by the microſcope, is found to be compoſed of many regular *parallelepipeds*. If the ſame waters, and thoſe of ſeveral other ſprings, be evaporated to a dryneſs, there remains a white ſhining powder, out of which the microſcope can direct us to ſeveral the like regular figures. Phil. Tranſ. N° 472. p. 32.

PARALLELISM, the quality of a PARALLEL, or that which denominates it ſuch: or it is that whereby two things, v. gr. lines, rays, or the like, become equidiſtant from one another.

Thus, we ſay, remote objects are ſcarce perceptible, by reaſon of the *parallelism* of their rays.

PARALLELISM *of the earth's axis*, in *Aſtronomy*, or *motion of* PARALLELISM, is that invariable ſituation of the earth's axis, in its progreſs through its orbit, whereby it ſtill looks to the ſame point of the heavens, viz. towards the pole-ſtar; ſo that if a line be drawn parallel to its axis, while in any one poſition; the axis, in all other poſitions or parts of the orbit, will always be parallel to the ſame line. This *parallelism* is the neceſſary reſult of the earth's double motion; the one round the ſun, the other round its own axis. Nor is there any neceſſity to imagine a third motion, as ſome have done, to account for this *parallelism*.

It is to this *parallelism* that we owe the viciſſitude of ſeaſons, and the inequality of day and night.

PARALLELISM *of rows of trees*. The eye placed at the end of an alley bounded by two rows of trees, planted in parallel lines, never ſees them parallel, but always inclining to each other, towards the farther extreme.

Hence mathematicians have taken occaſion to enquire, in what lines the trees muſt be diſpoſed, to correct this effect of the perſpective, and make the rows ſtill appear parallel? To this purpoſe parallel they muſt not be, but diverging; but according to what law muſt they diverge? The two rows, in fine, muſt be ſuch, as that the unequal intervals of any two oppoſite or correſponding trees may be ſeen under equal viſual angles.

On this principle, F. Fabry has aſſerted, without any demonſtration; and F. Tacquet, after him, has demonſtrated by a long and intricate ſyntheſis, that the two rows of trees muſt be two oppoſite ſemi-hyperbolas.

M. Varignon has ſince, in the Memoirs of the Royal Academy, ann. 1717, found the ſame ſolution by an eaſy and ſimple analyſis. But he renders the problem much more general, and requires not only that the viſual angles be equal, but to have them increaſe, or decreaſe, in any given ratio: provided the greateſt do not exceed a right angle. The eye he requires to be placed in any point, either juſt at the beginning of the ranges, or beyond, or on this ſide.

All this laid down, he ſuppoſes the firſt row to be a right line, and ſeeks what line the other muſt be, which he calls the *curve of the ranges*. This he finds muſt be an hyperbola, to have the viſual angles equal. The ſtrait and hyperbolical rows will be ſeen parallel to infinity; and if the oppoſite ſemi-hyperbola be added, we ſhall have three rows of trees (the ſtrait one in the middle), and all three parallel.

Nor is it required this ſecond hyperbola be the oppoſite of the firſt, i. e. of the ſame kind, or have the ſame tranſverſe axis: it is enough, if it have the ſame centre, its vertex in the ſame right line, and the ſame conjugate axis. Thus the two hyperbolas may be of all the different kinds poſſible; yet all have the ſame effect.

Again, the ſtrait row being laid down as before; if it be required to have the trees appear under decreaſing angles, M. Varignon ſhews, that if the decreaſe be a certain ratio, which he determines: the other line muſt be a parallel ſtrait line.

But he goes yet farther, and ſuppoſing the firſt row any curve whatever, he ſeeks for another that ſhall make the rows have any effect deſired, i. e. be ſeen under any angles equal, increaſing, or decreaſing.

Notwithſtanding the ingenuity of this ſpeculation, it has been ſatisfactorily demonſtrated by M. D'Alembert, and M. Bouguer, that in order to produce the effect propoſed the trees are to be ranged merely in two diverging right lines. Encyclopedie.

PARALLELOGRAM, in *Geometry*, a quadrilateral right-lined figure, whoſe oppoſite ſides are parallel, and equal to each other.

A *parallelogram* is generated by the equable motion of a right line always parallel to itſelf.

When the *parallelogram* has all its four angles right, and only its oppoſite ſides equal, it is called a *oblong*, or an *oblong*.

When the angles are all right, and the ſides are all equal, it is called a *ſquare*, which ſome make a ſpecies of *parallelogram*, others not.

If all the ſides be equal, and the angles unequal, it is called a *rhombus*, or *lozange*.

If both the ſides and angles be unequal, it is called a *rhomboides*.

Every other quadrilateral whoſe oppoſite ſides are neither parallel nor equal, is called a *trapezium*.

PARALLELOGRAM, *properties of the*. In every *parallelogram*, what kind ſoever it be of, e. gr. A B C D, *Tab.* III. *Geometry, fig.* 66. a diagonal D A divides it into two equal parts; the angles diagonally oppoſite B, C, and A, D, are equal; the oppoſite angles of the ſame ſide, C, D, and A, B, &c. are, together, equal to two right angles; and each two ſides together are greater than the diagonal.

Two *parallelograms* A B C D, and E C D F, on the ſame, or on an equal baſe C D, and of the ſame height A C, or between the ſame parallels A F, C D, are equal. And hence two triangles C D A, and C D F, on the ſame baſe, and of the ſame height, are alſo equal.

Hence, alſo, every triangle C F D is half a *parallelogram* A C D B upon the ſame, or an equal baſe C D, and of the ſame altitude, or between the ſame parallels. Hence alſo a triangle is equal to a *parallelogram*, having the ſame baſe, and half the altitude, or half the baſe, and the ſame altitude.

Parallelograms therefore, are in a given ratio, compounded of their baſes and altitudes; if then the altitudes be equal, they are as the baſes; and converſly.

In ſimilar *parallelograms* and triangles, the altitudes are proportional to the homologous ſides; and the baſes are cut proportionably thereby. Hence, ſimilar *parallelograms* and triangles are in a duplicate ratio of their homologous ſides, alſo of their altitudes, and the ſegments of their baſes: they are, therefore, as the ſquares of the ſides, altitudes, and homologous ſegments of the baſes.

In every *parallelogram*, the ſum of the ſquares of the two diagonals is equal to the ſum of the ſquares of the four ſides.

This propoſition, M. de Lagny takes to be one of the moſt important in all geometry; he even ranks it with the celebrated forty-ſeventh of Euclid, and with that of the ſimilitude of triangles; and adds, that the whole firſt book of Euclid is only a particular caſe hereof. For if the *parallelogram* be rectangular, it follows, that the two diagonals are equal; and of conſequence, the ſquare of a diagonal, or, which comes to the ſame thing, the ſquare of the hypothenuſe of a right angle, is equal to the ſquares of the ſides.

If the *parallelogram* be not rectangular, and, of conſequence, the two diagonals be not equal, which is the moſt general caſe, the propoſition becomes of vaſt extent; it may ſerve, for inſtance, in the whole theory of compound motions, &c.

There are three ways of demonſtrating this propoſition; the firſt by trigonometry, which requires twenty-one operations; the ſecond geometrical and analytical, which requires fifteen. M. de Lagny gives a more conciſe one, in the Memoires de l'Acad. which only requires ſeven

To find the area of the rectangled parallelogram, A B C D Find the length of the sides A B and A C; multiply A B into A C, the product will be the area of the *parallelogram*. Suppose, e. g. A B to be 345; A C 123; the area will be 42435.

Hence, 1. rectangles are in a ratio compounded of their sides A B and A C. 2. If, therefore, there be three lines continually proportional; the square of the middle one is equal to the rectangle of the two extremes: and if there be four proportional lines, the rectangle under the two extremes is equal to that under the two middle terms.

Other *parallelograms*, not rectangular, have their areas found by resolving them, by diagonals, into two triangles, and adding the areas of the separate triangles into one sum; or by multiplying their bases into their altitudes.

PARALELLOGRAM, *complement of a*. See COMPLEMENT.

PARALLELOGRAM, *center of gravity of a*. See CENTER *of gravity* and CENTROBARYC *method*.

PARALLELOGRAM, *Newtonian* or *analytic*, in *Algebra*, an appellation used for an invention of sir Isaac Newton, to find the first term of an infinite converging series.

This is sometimes called the method of the *parallelogram* and *ruler*; because a ruler or right line is also used in it.

This *analytic parallelogram* is formed by dividing any *parallelogram* into equal squares or *parallelograms*, by lines drawn horizontally and perpendicularly through the equal divisions of the sides of the *parallelogram*. The cells, thus formed, are filled with the dimensions of the species x and y, and their products.

The powers, $y^0 = 1$, y, y^2, y^3, y^4, &c. of y, for instance, being placed in the lowest horizontal range of cells, and the powers of x, or $x^0 = 1$, x, x^2, x^3 &c. in the vertical column to the left, or vice versa; so that these powers and their products will stand as in *Tab.* II. *Analysis*, *fig.* 58.

Thus, when any literal equation is proposed, mark such of the *parallelograms* or cells as correspond to all its terms; and let a ruler be applied to two, or perhaps more of the *parallelograms* so marked, of which let one be the lowest in the left hand column at A B, the other touching the ruler towards the right hand; and let all the rest not touching the ruler lie above it. Then select those terms of the equation which are represented by the *parallelograms* that touch the ruler, and from them find the quantity to be put in the quotient.

This is sir Isaac Newton's famous rule, of the application of which he has left us some examples in his Method of Fluxions and Infinite Series, p. 9 and 10, but without demonstration; which has been since supplied by others. See Mr. Colson's Comment on that treatise, p. 192, seq. Maclaurin's Algebra, p. 251, seq. and particularly Mons. Cramer's Analys. des Lignes Courbes, chap. vii. p. 148, seq.

This learned author observes, that this invention, which is the true foundation of the method of series, was but imperfectly understood, and not valued as it deserved for a long time. He thinks it more convenient in practice to use the *analytic triangle* of the abbé de Gua, which takes in no more than the diagonal cells lying between A and C, and those which lie between them and B.

PARALLELOGRAM, or PARALLELISM, also denotes a machine used for the ready and exact reduction or copying of designs, schemes, prints, &c. in any proportion; which is done hereby without any knowledge or habit of DESIGNING.

The *parallelogram* is also called *pentagraph*. See its description and use under PENTAGRAPH.

PARALLELOGRAM *of the hyperbola*, in *Geometry*, is used for the *parallelogram* formed by the two asymptotes of an hyperbola, and the parallels to them, drawn from any point of the curve. A *parallelogram* thus formed is of an invariable magnitude in the same hyperbola; and the rectangle of its sides is equal to the power of the hyperbola. L'Hopital, Sect. Coniq. Art. 99—101. See POWER.

This *parallelogram* is the modulus of the logarithmic system; and if we take it as unity, the hyperbolic sectors and segments will correspond to Napier's, or the natural logarithms. If the *parallelogram* be taken = 0.43429. &c. these sectors and segments will represent Briggs's logarithms. See LOGARITHM.

Huygens has made use of this term, De Caus. Gravitat. in fin. See *Logarithmic* CURVE.

PARALLELOGRAM *protractor*, a mathematical instrument, consisting of a semicircle of brass, with four rulers in form of a *parallelogram*, made to move to any angle: one of these rulers is an index, which shews on the semicircle the quantity of any inward or outward angle.

PARALLELLOPIPEDIA, in *Natural History*, the name of a genus of spars, thus called, because regularly of a *parallelepiped* form.

They are pellucid crystalline spars, externally of a determinate and regular figure, always found loose, detached, and separate from all other bodies, and in form an oblique *parallelepiped*, with six parallelogram sides and eight solid angles, easily fissile, either in an horizontal or perpendicular direction, being composed of numbers of thin plates, and those of very elegantly and regularly arranged bodies, each of the same form with the whole mass, except that they are thinner in proportion to their horizontal planes; and naturally fall into these and no other figures, on being broken with a slight blow.

Of this genus there are four known species. 1. The hard pellucid and colourless one, called the island crystal of authors. *See Island* CRYSTAL. 2. A dull and whitish kind, found in France, Germany, and England, particularly in the Derbyshire and Yorkshire lead-mines, and about Scarborough. This has the same property with the former, of giving a double refraction; but it is so dull and opake, that it does not shew it so elegantly. 3. A soft, whitish, and very bright one, found principally in the lead-mines of Yorkshire, and about the seashores of that county. And, 4. a dull, hard, and pale brown one: this is found in the lead-mines of the same county, and in some parts of Ireland. All these species have the same power of double refraction with the first, but are too opake to shew it so beautifully, and often have not transparence enough to make it at all distinguishable. Hill's Hist. Foss. p. 333.

PARALLELOPLEURON, a term used by some writers for an imperfect parallelogram, or a kind of trapezium, having unequal angles and sides, but which observe a certain regularity and proportion.

PARALOGISM, παραλογισμὸς, in *Logic*, a false reasoning, or a fault committed in demonstration, when a consequence is drawn from principles that are false, or, though true, are not proved; or when a proposition is passed over, which should have been proved by the way.

A *paralogism* differs from a *sophism* in this, that the sophism is committed out of design and subtlety; and *paralogism* out of mistake, and for want of sufficient light and application.

Yet Messieurs du Port Royal do not seem to make any difference between them.

PARALOPHIA, a word used by Keil, and some other anatomical writers, to express the lower and lateral part of the neck.

PARALOURGES, παραλοργίσις, among the ancients, a kind of garment, with a purple clavus on each side.—See CLAVUS.

PARALYSIS, in *Botany*. See PRIMROSE.

PARALYSIS, παράλυσις, formed from παραλύω, *I unbind*, this disease being supposed to unbind the nerves and muscles, in *Medicine*, a disease popularly called PALSY.

The *paralysis* only differs from the PARESIS, as the greater from the less.

Authors distinguish the *paralysis* into a paraplegia or paraplexia, and a hemiplegia, and partial *paralysis*.

The first is a palsy of the whole body. See PARAPLEGIA.

The second, of one side of the body. See HEMIPLEGIA.

The third of some particular member; which is the proper palsy. See PALSY.

PARALYTIC, a person afflicted with the paralysis, or PALSY.

PARAMECIUM, in *Zoology*, a name given, by Dr. Hill, to a genus of animalcules of the gymnia kind, and of an irregular oblong figure. Of this genus authors describe several species.

PARAMERIA, a word used by the ancients to express the internal part of the thighs.

PARAMESE, παραμέσων, in the *Ancient Music*, the ninth chord, or sound in the diagramma, or scale of music.

The word is Greek, and signifies *juxta mediam*, *next to the middle*; its situation in the first state of the scale, being next the mese, or middle chord.

It was the note above the mese, which answers to a-la-mi-re of Guido's scale. Hence, as the *paramese* was the first of the diazeugmenon tetrachord, it will be equivalent to Guido's highest ♮ mi. See DIAGRAM.

PARAMESOS, a word used by some to express the ring-finger, that next the little one.

PARAMETER, in *Geometry*, a constant right line in each of the three conic sections; called also *latus rectum*.

In the parabola V B V, *Tab. Conics*, *fig.* 8. the rectangle of the *parameter* A B, and an abscisse, e. g. B 3. is equal to the square of the correspondent semi-ordinate 3 III. See PARABOLA.

In an ellipsis and hyperbola, the *parameter* is a third

proportional to a conjugate, and transverse axis. See ELLIPSIS and HYPERBOLA.

PARAMOUNT, in our *Law*, signifies the supreme lord of the fee.

There may be a tenant to a lord, who holdeth himself of another lord; in respect whereof, the former lord is called *lord* MESNE, and the latter *lord paramount*.

All honours, which have manors under them, have the lord *paramount*.

But even the term *lord paramount* is only comparative: for as one man may be great, compared to a less; and little, being compared with a greater; so none truly seems to be lord *paramount* but the king, who is patron *paramount* to all the benefices in England.

PARANETE, in the *Ancient Music*, was a name sometimes used to signify the next note or chord to the nete, or last note of a TETRACHORD.

Hence it might be called the penultimate chord. It was otherwise, and more properly called LICHANOS, or index.

PARANETE *diezeugmenon*, in the *Greek Music*, was the penultimate note of the *diezeugmenon* tetrachord, and answers to Guido's de-la-sol-re. See DIAGRAM.

PARANETE *hyperboleon*, in the *Greek Music*, was the penultimate note of the *hyperboleon* tetrachord, and answers to Guido's g-sol-re-ut. See DIAGRAM.

PARANOMASIA is a figure that occurs when two words, very near in sound, but different in sense, respect each other in the same sentence: this usually called a pun.

PARANYMPH, *paranymphus*, among the ancients, the person who waited on the bridegroom, and directed the nuptial solemnities; called also *pronubus* and *auspex*, because the ceremony began with taking auspicia.

In strictness, the *paranympho*, παρανυμφος, only officiated on the part of the bridegroom; on the part of the bride, it was a woman officiated, who was called *pronuba*.

The Jews had likewise a kind of *paranymphs*, which the Talmud and rabbins call שושבים *schuschebim*, q. d. *companions of the spouse*.

The fourth council of Carthage appoints, that when the married couple come to ask the priest's blessing, they be presented either by their fathers and mothers, or by their *paranymphs*.

PARAPET, *breastwork*, in *Fortification*, a defence or screen, on the extreme of a rampart, or other work, serving to cover the soldiers, and the cannon from the enemy's fire. See *Tab. of Fortification, fig.* 15. N° 2. *lit. x x.*

Borel gives us, from Jos. Maria Subresius, a curious collection of names, which the ancients and moderns have given to this kind of *parapet*: the Latins call them *fibarræ*, and *bastiæ*, whence the names bastion and bastile. They also call them *pegmaumata*, *lorica*, and *antemuralia*. The Spaniards call them *barbacanes*; the Italians, *parapetti*, because of their defending the breast, *petto*; whence our *parapet*.

Parapets are raised on all works, where it is necessary to cover the men from the enemies fire, both within and without the place, and even in the approaches. See FORTIFICATION, *according to Mr. Vauban's method*.

The thickness of the *parapet* should be about eighteen or twenty feet, in order to be cannon proof, and it should be about seven or eight feet high, when the enemy has no command above the battery; otherwise, it should be raised high enough to cover the men, while they load the guns. Its length depends on the number of guns to be employed in the battery: for one gun, it is common to allow eight yards in length, and six yards more for every other gun. The *parapet* consists of two parts, the wall contained in one piece from end to end and about two and a half or three feet high, and the MERLONS, which are detached pieces of the *parapet*, leaving openings, called EMBRASURES, through which the cannon deliver their shot.

The *parapet* of the wall is sometimes of stone. The *parapet* of the trenches is either made of the earth dug up; or of gabions, fascines, barrels, sacks of earth, or the like.

PARAPET is also a little wall, breast-high, raised on the brinks of bridges, quays, or high buildings; to serve as a stay, and prevent people's falling over.

PARAPH, a particular character, knot, or flourish, which people habituate themselves to make always in the same manner at the end of their name, to prevent their signature from being counterfeited.

The *paraph* of the kings of France is a grate, which the secretaries always place before their own, in all letters, &c. Menage derives the word from *paragraphus*. See PARAGRAPH.

PARAPHERNALIA, or PARAPHERNA, in the *Civil Law*, those goods which a wife brought her husband, besides her dower, and which were still to remain at her disposal, exclusive of her husband, unless there was some provision made to the contrary in the marriage-contract.

The word is formed from the Greek παρα, *beyond*, or *over*, and φερνη, *dos*, *dower*. *In his rebus quæ extra dotem mulier habet, & quas Græci παραφερνα vocant, nullam, nisi prohibente, vir habeat communionem.* Cod. de Pactis.

The Grand Customary of Normandy gives a different sense to the word; it calls *paraphernalia* the moveables, linen, and other female necessaries, which are adjudged to a wife, in prejudice to the creditors, when she renounces the succession of her husband.

Some of our English lawyers give a still different sense to the word *paraphernalia*, defining it to be such goods as a wife challengeth over and above her dower, or jointure after her husband's death; as furniture for her chamber, wearing apparel, and jewels, which are not to be put in the inventory of her husband's goods.

PARAPHIMOSIS, παραφιμωσις, formed of παρα, *much*, and φιμοω, *I bind*, in *Medicine*, a disorder of the penis, wherein the prepuce is shrunk, and withdrawn behind the glans, so as not to be capable of being brought to cover the same.

This happens often in venereal disorders, where the humours discharged frequently prove so sharp, as to cause this retraction. There sometimes arises a necessity, in this case, to snip or cut the prepuce open, otherwise the humours will be pent up under it, and do a great deal of mischief.

The treatment of the PHIMOSIS and *paraphimosis* is nearly the same with that of the virulent GONORRHŒA. In general, bleeding, purging, poultices, and emollient fomentations are sufficient. If these fail of removing the stricture, and the parts indicate symptoms of a mortification, twenty or thirty grains of ipecacuanha, and one grain of emetic tartar, may be given for a vomit, and worked off with warm water, or thin gruel. If the inflammation still increases, and mortification commences, the prepuce must be scarified with a lancet, and, if necessary, divided, in order to prevent a strangulation, and set the confined glans at liberty. It will be also necessary to foment the parts frequently with cloths wrung out of a strong decoction of chamomile flowers and bark, and to give the patient a dram of the bark in powder, every two or three hours. Buchan.

PARAPHONIA, in *Music*, is that species of concord, which results from different sounds, as the fifth and fourth: and thus it differs from *homophonia*, which is produced by the same sounds, as in the unison, and from *antiphonia*, or the replication of the same sounds, as in the octave.

PARAPHORA, a word used by the ancients to express a slight kind of delirium, or light-headedness in a fever: some have made it to signify a delirium in general.

PARAPHRASE, παραφρασις, an explanation of some TEXT in clearer and more ample terms, whereby we supply what the author might have said or thought on the subject.

Colomesius looks on Erasmus's *Paraphrase* on the New Testament, as so extraordinary a work, that he makes no scruple to declare, he thinks the author to have been divinely inspired, when he penned it.

PARAPHRASE, *Chaldee*, is a phrase frequent among the critics and divines, denoting an ancient version of the Bible, in Chaldee. There are three *Chaldee paraphrases* on the Pentateuch: that of Onkelos, whom some take to be the same with Aquila, and whom others take to have been that Onkelos whom the Talmudists, in the Treatise *Gittin*, make a nephew of the emperor Titus.

The second is the *Paraphrase* of *Jonathan*. The third is called the TARGUM of *Jerusalem*.

The *Chaldee Paraphrase* on the prophets is that of Jonathan son of Uziel, whom some confound with Theodotio.

The author of the *Chaldee Paraphrase* on the Hagiographers is unknown. Some attribute it to one Joseph, surnamed the Squinter; others to rabbi Akiba. Others say, there is so much difference in the style, that no one person can have been the author of the whole.

The *Paraphrase* of Onkelos is that which is most esteemed by the modern Jews, and read in their synagogues.—See Walton Pref. Polyglott.

PARAPHRENESIS, or PARAPHRENITIS, παραφρενησις, in *Medicine*, a secondary kind of PHRENSY, supposed by the ancients, to be owing not to any immediate disorder of the brain, or meninges, but to an inflammation of the ventricle, and the liver, and especially of the diaphragm, whereby the brain and meninges come to be affected by consent of parts.

The ancients called it a *pseudo-phrenesis*, *false phrenesis*, to distinguish it from the true one, which they made to consist

conſiſt in an inflammation of the brain, and its meninges.

The moderns do not make any ſuch diſtinction in phrenſies: they determine that all come from the ſame cauſe; but that cauſe is neither an inflammation of the brain, nor of the diaphragma.

Signs of it. This is always attended with a moſt violent and painful cardialgia, or heart-burn; inſomuch, that the perſon cannot bear the leaſt touch of a finger on the region of the breaſt or ſtomach. It always brings on alſo a tumor of the præcordia, and often an alienation or roving of the mind, which is always ſenſible in the words and actions of the perſon, but is not ſo great as in the true *phrenitis*. The reſpiration is interrupted by frequent ſighings; belchings are very frequent; as alſo the diſcharge of a black matter by vomit. The mouth is dry and parched, and the tongue very white and furred; and there is great thirſt. A convulſive laugh, or rather a kind of involuntary grin, is no uncommon ſymptom of this diſeaſe.

Cauſes of it. The moſt frequent cauſe of this is a ſudden tranſlation of the morbific matter in fevers to the diaphragm; a ſuppreſſion of natural hæmorrhages by the noſe, the hæmorrhoidal veſſels, or by the menſes; an omiſſion of habitual bleedings, and the drinking cold liquors when the blood is heated by exerciſe; and finally a tranſlation of the matter of a quinſey to this part.

Prognoſtics in it. This is a dangerous diſeaſe, but it has three ways of terminating, according to the diſpoſition of the patient's blood and humours. 1. Sometimes the matter which cauſed the obſtruction is eaſily diſcuſſed, and ſweats, happening on the critical days, carry off the diſtemper. 2. Sometimes the matter is reſolved, indeed, but not ſo happily; the reſolution takes longer time, and the matter finally does not evacuate itſelf by ſweat, but is tranſlated to the ears, where it occaſions deafneſs, tumors, and other accidents; or to the joints, where it brings on either the gout or eryſipelatoſe diſorders. Or, 3. the matter comes to a ſuppuration; in which caſe, the perſon dies either within ſeven days, or at the utmoſt within fourteen. The ſigns which preſage a gangrene, in this diſeaſe, are violent hiccoughs, coldneſs of the extremities, violent internal heat, and clammy ſweats.

Method of cure. When, by a preceding error in the perſon's diet, the peccant matter remains in the primæ viæ, a gentle emetic is to be given, with the digeſtive medicines before it; and if the vomit does not operate, a few grains of emetic tartar are to be given afterwards. When the patient is of a plethoric habit, bleeding is extremely neceſſary; and ſometimes, where the ſymptoms require it, may be repeated to a third time. Twenty drops of a mixture ſimplex may afterwards be given at a doſe, every four hours, in the morning; and, in the afternoon, powders of purified nitre, with vitriolated tartar and crab's eyes ſated with juice of lemons: beſides theſe, there may be externally applied, plaſters, with a large portion of camphor, to the breaſt and back; finapiſms, and other hot cataplaſms, to the ſoles of the feet; ſtimulating clyſters, and acrid ſuppoſitories, have alſo their uſe in this caſe; and the application of leeches to the hæmorrhoidal veins, in people who have been ſubject to diſcharges from thence, are very often of ſingular ſervice. All the while there muſt be kept up a gentle tranſpiration, either by copious draughts of warm and weak liquors, or by lightly acidulating medicines. Junker.

In this diſeaſe the regimen and medicine are in all reſpects the ſame as in the PLEURISY. Emollient clyſters are peculiarly uſeful, as they relax the bowels, and by that means make a derivation from the part affected. Buchan.

PARAPHRENITIS, among *Modern Phyſicians*, is ſometimes uſed for an inflammation of the mediaſtinum, or pleura about the diaphragm, attended with a continual fever, and exquiſite pain in the parts affected on contracting the abdominal muſcles; as alſo a delirium, and a riſing of the hypochondria.

PARAPHROSYNE, a word uſed by ſome medical writers to expreſs a delirium, or an alienation of mind, in fevers, or from whatever cauſe.

PARAPLEGIA, or PARAPLEXIA, παραπληξια, or παραπληξια, from παρα, *much*, and πλησσω, or πληττω, *I ſtrike*, in *Medicine*, a ſpecies of paralyſis, or PALSY, uſually ſucceeding an apoplexy.

The *paraplegia* is a general palſy, affecting the whole body, the head alone excepted. Boerhaave defines it an immobility of all the muſcles below the head, that have nerves, from the cerebrum and cerebellum.

Sometimes, all ſenſe, as well as motion, are deſtroyed hereby; ſometimes only the one of them is loſt.

Its original is uſually ſuppoſed to be ſome diſorder, or obſtruction, in the fourth ventricle of the brain, or in the beginning of the ſpinal marrow.

Etmuller diſtinguiſhes the *paraplegia* from the *paralyſis*. The paralyſis, according to him, is a relaxation or reſolution of the ligaments and members miniſtering to motion, not from any obſtruction of the nerves, but from a reſolution of the nervous parts. Whereas the *paraplegia* ariſes from ſome obſtruction of the nerves.

The latter uſually ſucceeds an apoplexy, epilepſy, convulſions, or vertigos; the formier, the ſcorbutus, hypochondriacal diſeaſe, colic, &c.

PARAPLEXIA, in *Medicine*. See PARAPLEGIA.

PARAPOTAMIA, in the *Materia Medica of the Ancients*, a word uſed at firſt as an epithet of diſtinction for a kind of œnanthe, from which the œnanthine ointment of the Greeks was made; but afterwards uſed ſimply as the name of that plant. This kind of œnanthe was the moſt fragrant of all the kinds, and was therefore uſed for making the ointment preferably to the reſt.

Theophraſtus makes a very great difference in the œnanthe of different places, obſerving, that the Cyprian kind was fragrant, and fit for making this ſweet ointment; but that the Grecian had no ſmell at all: and thence it probably aroſe, that the Greeks uſed afterwards the flowers of the wild vine for this purpoſe, and called them by the ſame name.

Pliny's account of this ointment is by no means to be depended upon. The whole paſſage where he names it, and the others of the like kind, is taken from the account of Apollodorus, in Athenæus; but it is ſo carelefly tranſlated by Pliny, that the author's ſenſe can ſcarce any where be made out.

PARAPROSDOCIA, παραπροσδοκια, in *Rhetoric*, the ſame with PARADOX.

PARATHREMA, a word uſed by medical writers to expreſs a ſlight luxation.

PARARYTHMOS, an epithet uſed by the ancients to expreſs any kind of pulſe, which did not ſeem ſuitable to the age and ſtate of the perſon.

PARASANG, παρασαγγης, an ancient Perſian meaſure different at different times, and in different places; being uſually thirty, ſometimes forty, and ſometimes ſixty ſtadia, or furlongs.

The word, according to Littleton, has its riſe from *parafch angarius*, q. d. the ſpace a poſt-man rides from one ſtation, *angaria*, to another.

Cauſabon cites a fragment of the architect Julian, who ſays, that the moſt common meaſure of the *paraſang*, in his time, was forty ſtadia; and reckoning each ſtadium at one hundred and twenty-five geometrical paces, they would hereby avoid fractions in the computation of diſtances; forty ſtadia, of one hundred and twenty-five paces each, making five thouſand Roman paces. The authors of the Univerſal Dictionary, vol. ii. p. 19. fol. aſcribe the introduction of this meaſure to Keykobad, one of the Perſian kings of the ſecond race, who employed his ſoldiers in making great roads through the empire, ſetting up public marks at the end, as they ſay, of every four thouſand paces, which ſpace was called, by the Perſians, *pherſengh*, and from thence, by the Greeks, *paraſang*.

PARASCENIUM, among the Romans, was a place behind the theatre, whither the actors withdrew to dreſs, undreſs, &c. more frequently called *poſticenium*.

PARASCEVE, παρασκευη, the ſixth day of the laſt week of Lent, popularly called *Good Friday*.

St. John ſays, our Saviour was crucified on the *paraſceve* of the Paſſover, i. e. on the eve or day of *preparation* of the Paſſover: for Iſidore and Papias obſerve, that the word in the original Greek ſignifies *preparation*, and was applied among the Jews to Friday, becauſe on that day they uſed to prepare what was neceſſary for the celebration of the Sabbath. Exod. xv. 23. xxxv. 2, 3.

Hence, what our tranſlation of the New Teſtament renders preparation of the Sabbath, M. Simon, and ſome others, call *paraſceve*.

PARASCHE, from פרש, *to divide*, a name which the Jews give to that portion of the Pentateuch, which they read every Sabbath. They divide their five books of the law, not into chapters, as we do, but into fifty-four parts, which they call *paraſches*: and thus go through the whole in a year. To theſe they have added ſome verſes of the prophets, which they made uſe of under the perſecution of Antiochus Epiphanes, when they were prohibited the uſe of the law.

PARASCHIDES, a word uſed by chirurgical writers to expreſs the ſplinters of fractured bones, or the fragments of bones corroded by ſharp humours.

PARASEISMA, a ſort of exerciſe preferibed by the Greek phyſicians in many caſes. It was a general concuſſion of the body.

PARASELENE, formed from παρα, *near*, and σελην, *moon*,

in *Phyſiology*, a mock moon: a meteor, or phenomenon encompaſſing or adjacent to the moon, in form of a luminous ring; wherein are ſometimes obſerved one, ſometimes two apparent images of the moon.

The *parheliones* are formed after the ſame manner as the parhelia, or mock-ſuns.

Pliny mentions three moons, which were ſeen in the year of Rome, 632. Eutropius alſo informs us, that he ſaw three moons at Rimini, in the year 234 before Chriſt. Hevelius alſo ſaw three moons at Dantzick, in 1660. And ſimilar phenomena have been obſerved at different times, by many others. See HALO and PARHELION.

PARASEMUM, παρασημον, among the ancients, a ſign painted or carved on the prow of ſhips, by which they were diſtinguiſhed from one another. This ſign was commonly the figure or picture of ſome animal, as the bull, lion, &c. or of any other thing, as a mountain, tree, flower, &c.

PARASIOPESIS, παρασιωπησις, in *Rhetoric*. See PARALEPSIS.

PARASITE, παρασιτος, among the Greeks, was originally a very reputable title: the *paraſites* being a kind of prieſts, or at leaſt miniſters of the gods; in the ſame manner, as at Rome were the epulones.

They took care of the ſacred corn; or the corn deſtined for the ſervice of the temples, and the gods; viz. ſacrifices, feaſts, &c. They had even the intendance over ſacrifices, and took care that they were duly performed.

At Athens there was a kind of college of twelve *paraſites*; each people of Attica furniſhing one, who was always choſen out of one of the beſt families.

Polybius adds, that *paraſite* was alſo an honourable name among the ancient Gauls, and was given to their poets; but of late it has been made a term of reproach, and uſed for a flatterer and mean dependant.

PARASITES, PARASITICAL *plants*, in *Botany*, a kind of plants, growing on trees, and ſo called from their manner of living and feeding, which is altogether on others.

Such is moſs, which was anciently ſuppoſed the effect of a diſcompoſure of the texture of the bark; or a kind of ruſt, or, at moſt, little filaments ariſing from the bark; but from many obſervations of the moderns, it appears, that moſſes are real plants, whoſe ſeed is exceedingly fine, and incloſed in very little capſulæ; which, burſting of themſelves, the ſeed is driven by the wind, and at length detained in the inequalities of the barks of trees, where it takes root, and is fed at the expence thereof.

Of theſe moſſes M. Vaillant reckons no leſs than a hundred and thirty-ſeven ſpecies common in the neighbourhood of Paris; which, with the lichens and other moſſes diſcovered ſince his time, make the family of *paraſite* plants very large.

The moſt pernicious of theſe *paraſites*, to the trees that ſupport them, are the lichens; which appear on the barks of trees in form of a cruſt, mixed with yellow and a dirty white.

M. de Reſſons gives us a remedy for this diſeaſe, in the French Memoires of the Acad. Roy. It conſiſts in making an inciſion through the bark to the very wood, from the firſt branches to the earth; the bark cloſes again in a little time, and after this always preſerves itſelf clean and free from moſſes for the future.

This aperture renders the courſe of the ſap more free, and prevents the forming of thoſe inequalities ſo favourable to the production of moſſes. The inciſion, he adds, is to be made, from March to the end of April, and on that ſide turned moſt from the ſun. See MISTLETOE.

PARASITEUM, among the ancients, a granary or place where the ſacred corn, deſigned for religious purpoſes, was preſerved. See PARASITE.

PARASOL, a little moveable, in manner of a canopy, borne in the hand to ſcreen the head from the ſun, rain, &c. more uſually called *umbrella*.

It is made of leather, taffety, oil-cloth, &c. mounted on a ſtick, and opened or ſhut at pleaſure, by means of pieces of whalebone that ſuſtain it. The Eaſt Indians never ſtir without a *paraſol*.

The word is French; and that uſed againſt rains is ſometimes called *paraplue*.

PARASPHAGIS, a word uſed by ſome anatomical writers to expreſs that part of the neck which is contiguous to the clavicles.

PARASTATA, in the *Ancient Architecture*, a kind of pier, or piedreit, ſerving as a defence or ſupport to a column or arch.

Mr. Evelyn makes the *paraſtata* the ſame with pilaſter. Barbaro, and others, the ſame with anta; and Daviler, the ſame with piedroit. See PILASTER.

PARASTATÆ, in *Anatomy*, *epididymidæ*, two tuberous, varicoſe bodies, lying upon, and adhering to, the upper part of the teſticles, whereof they properly appear to be a part, though different from the reſt in form and conſiſtence.

The *paraſtatæ* conſiſt, like the teſticles, of a convolution of ſeminal tubuli, mixed with blood-veſſels; the difference between them lying only in this, that in the *paraſtatæ* the tubuli are united into one; the various convolutions of which being more firmly bound together by a ſtrong membrane, ariſing from the tunica albuginea, they feel more compact than the teſticles.

The *paraſtatæ* and teſticles are ſaid to be incloſed in three proper membranes; the firſt muſculous, derived from the cremaſter muſcle; the ſecond, called the *vaginalis*; and the third the *albuginea*. See each under its proper heads.

PARASTREMMA, a name given by medical writers to a convulſive diſtortion of the mouth, or of any part of the face.

PARASYNANCHE, from παρα, συν, αγχω, *to ſuffocate*, in *Medicine*, a kind of ANGINA or ſquinancy, whereint the exterior muſcles of the throat are inflamed.

PARATHENAR *major*, a pretty long muſcle forming part of the outer edge of the ſole of the foot. It is commonly called *hypothenar*, but very improperly, according to the proper ſignification of that word. It is fixed backward by a fleſhy body to the outer part of the lower ſide of the os calcis, from the ſmall poſterior external tuberoſity all the way to the anterior tuberoſity, where it joins the metatarſus; and at the baſis of the fifth metatarſal bone, ſeparates from it again, and forms a tendon which is inſerted in the outſide of the firſt phalanx of the little-toe near its baſis, and near the inſertion of the *parathenar minor*. Winſlow.

PARATHENAR *minor*, a fleſhy muſcle fixed along the poſterior half of the outer and lower ſide of the fifth bone of the metatarſus; it terminates under the head of that bone in a tendon which is inſerted in the lower part of the baſis of the firſt phalanx of the little toe.

The tendinous inſertion of this muſcle is very cloſely united to the cartilaginous ligament; and the ſame thing is to be obſerved of the other muſcles, which go to the baſis of the firſt and ſecond phalanges of the toes. In aged perſons, ſome part of theſe ligaments are often turned to bone, and thereby form thoſe bony portions which many have taken for diſtinct ſeſamoide bones. Winſlow.

This muſcle is more expreſſively named by Albinus, the *flexor brevis digiti minimi pedis*.

PARATHESIS, in the Greek *Church*, the prayer which the biſhop rehearſes over the catechumens, ſtretching his hands over them to give them benediction; and which they receive, bowing their heads under his hands.

PARATHESES (popularly called *brackets* or *crotchets*) is alſo the name of a kind of point or mark, as [ ] uſed in writing, chiefly to include ſynonyma, explicatives, and the like matters, not eſſential to the diſcourſe. See PARENTHESIS.

PARATHESIS, in *Grammar*, *appoſition*; or a figure whereby two or more ſubſtantives are put in the ſame caſe.

PARATI, in *Ichthyology*, the name of a Braſilian fiſh of the mullet kind, much reſembling that ſpecies called *curema*, or *tainira*, in all reſpects but ſize, and in the colour of its eyes, the iris of which, inſtead of the ſilvery colour it has in the *curema*, is of a fine yellow. Its fleſh alſo, when dreſſed, is drier than that of the CUREMA.

PARATILMUS, in the *Ancient Greek Juriſprudence*, a name given to a ſort of puniſhment impoſed on adulterers, who were poor, and unable to ſtand the common penalty.

It conſiſted either in making them run a horſe-raditi up the anus, which they called ανασυρμος; or in tearing up by the roots the hair about the pudenda, which they called παρατιλμος, of παρατιλλειν, *to tear, pluck up*.

PARATITLES, *paratitla*, in *Juriſprudence*, ſhort notes, or ſummaries of the titles of the Digeſt, and Code; which have been made by ſeveral lawyers, in order to compare and examine the connexion of the ſeveral parts with one another.

We have *paratitles* of Cujas, of Maran, &c. Chaſſaneus has a ſecond comment on the *paratitles* of Cujas.

PARAVAIL, *paravaile*, in *Law*, the loweſt TENANT of a fee; or he that is immediate tenant to the land.

He is called *tenant paravail*, becauſe, it is preſumed, he hath profit and avail by the land.

PARAZONIUM, παραζωνιον, or *Scipio*, among *Medaliſts*, a ſceptre, rounded at the two ends in manner of a truncheon, or commander's ſtaff; or a kind of poniard, or ſhort ſword, repreſented as worn at the girdle, on ſeveral ancient medals.

Antiquaries are much divided on the explication of the *parazonium*; as, indeed, the form and manner of bearing it are very different. It is ſometimes thrown across the ſhoulders in manner of a quiver.

PAR

PARBOILING, in *Pharmacy*, &c. a term applied to fruits, herbs, &c. which are boiled a little while, to draw out the firſt juices, in order to be afterwards inſpiſſated or thickened. See BOILING.

PARBUNCLE, or PARBUCKLE, in a *Ship*, the name of a rope almoſt like a pair of ſlings; it is ſeized both ends together, and then put double about any heavy thing that is to be hoiſted in or out of the ſhip, having the hook of the runner hitched into it to hoiſe it up by.

PARCÆ, goddeſſes who, according to the ancient *Pagan Theology*, preſide over the periods or durations of human lives. Theſe the ancients frequently confounded with the Fates, or Deſtinies; and, in effect, the *Parcæ*, according to Plato, were the daughters of Neceſſity and Deſtiny.

The *Parcæ* were three, Clotho, Lacheſis, and Atropos; becauſe, forſooth, all things have their beginning, progreſs, and end. Hence, the poets tell us, the *Parcæ* ſpun the thread of men's lives; that Clotho held the diſtaff, and drew the thread; Lacheſis twirled the ſpindle, and ſpun it; and Atropos cut it,

Clotho colum retinet, Lacheſis net, & Atropos occat.

The ancients repreſent the *Parcæ* divers ways: Lucian, in the ſhape of three poor old women, having large locks of wool, mixed with daffodils, on their heads; one of which holds a diſtaff, the other a wheel, and the third a pair of ſciſſars, wherewith to cut off the thread of life. Others repreſent them otherwiſe; Clotho appearing in a long robe of divers colours, wearing a crown upon her head, adorned with ſeven ſtars, and holding a diſtaff in her hand; Lacheſis in a robe beſet with ſtars, with ſeveral ſpindles in her hand; and Atropos, clad in black, cutting the thread with large ſciſſars.

The ancients imagined, that the *Parcæ* uſed white wool for a long and happy life; and black, for a ſhort and unfortunate one.

PARCEL-*makers*, two officers in the exchequer, who make *parcels* of the eſcheators accounts, wherein they charge them with every thing that they have levied for the king's uſe, within the time of their office, and deliver the ſame to one of the auditors of the court to make their accompts therewith.

PARCELS, *bill of*. See BILL.

PARCELLING, in *Ship-Building*, is caulking the ſeam of a ſhip, then laying over it a narrow piece of canvas, and then pouring on it hot pitch and tar. See PAYING.

PARCELLING is alſo a name given to long narrow ſlips of canvas, daubed with tar, and often bound about a rope, when it is intended to be ſewed. For this purpoſe the *parcelling* is laid in ſpiral turns as ſmoothly upon the ſurface as poſſible, that the rope may not be uneven, and full of ridges. It is alſo employed to raiſe the mouſes, which are formed on the ſtays and on the voyal, being firmly faſtened, by marling it from one end to the other.

PARCENERS, *quaſi* PARCELLERS. See CO-PARCENERS.

PARCHMENT, in *Commerce*, &c. ſheep or goat's ſkin prepared after a peculiar manner, which renders it proper for ſeveral uſes; particularly for writing on, and for the covering of books, &c.

The word comes from the Latin *Pergamena*, the ancient name of this manufacture; which it is ſaid to have taken from the city Pergamos, to Eumenes, king whereof, its invention is uſually aſcribed; though, in reality, that prince appears rather to have been the improver than the inventor of *parchment*; for the Perſians of old, according to Diodorus, wrote all their records on ſkins; and the ancient Ionians, as we are told by Herodotus, made uſe of ſheep-ſkins and goat-ſkins in writing, many ages before Eumenes' time. Nor need we doubt, that ſuch ſkins were prepared and dreſſed for that purpoſe, after a manner not unlike that of our *parchment*, though, probably, not ſo artificially. Vide Diod. Sicul. lib. ii. p. 84. Herodot. lib. v. Prid. Connect. part i. lib. vii. p. 708.

Dr. Prideaux is a ſtrenuous advocate for the antiquity of *parchment*; and he imagines that the authentic copy of the law which Hilkiah found in the Temple, and ſent to king Joſiah, was formed of this material; becauſe no other uſed for writing, *parchment* excepted, could be of ſo durable a nature as to laſt from the time of Moſes till that period, for eight hundred and thirty years. But it has been replied to this argument, that the Egyptians wrote on linen thoſe things which they deſigned for long duration; and thoſe who have examined mummies with attention, aſſure us, that the characters ſo written continue to this day. It is not, therefore, improbable, that a copy of the law of Moſes, written after this manner, might have laſted eight hundred and thirty years. Beſides, it is not very likely that thoſe ſkins which were uſed, according to the teſtimony of Diodorus and Herodotus, by the Perſians and Romans for writing, long before the time of Eumenes, were dreſſed like *parchment*. They muſt have been prepared in a much ruder manner, and have little reſembled the *parchment*, of which Eumenes is ſaid to be the inventor; becauſe if it had been found out before, it would have rendered the want of the Egyptian papyrus no inconvenience to that prince. Such ſkins might do for records, and ſome occaſional writings, but would have been by no means proper for books. Hence ſome writers have concluded, that *parchment* was a later invention than the Egyptian paper.

Parchment conſtitutes a very conſiderable article in the French commerce; it is made in moſt of their cities; and, beſides the conſumption at home, they ſend vaſt quantities abroad, particularly to England, Flanders, Holland, Spain, and Portugal.

That called *virgin parchment* is a ſomewhat thinner and finer ſort than the reſt; and is moſt proper for certain purpoſes, as fans, &c. and made of the ſkin of an abortive lamb, or kid.

PARCHMENT, *manufacture of*. The ſkin having been ſtripped of its wool, and having paſſed the lime-pit (after the manner deſcribed under the article SHAMMY), the ſkinner ſtretches it on a kind of frame, conſiſting of four pieces of wood, mortiſed into each other at the four angles, and perforated lengthways from diſtance to diſtance, with holes furniſhed with wooden pins that may be turned at pleaſure, like thoſe of a violin.

To ſtretch the ſkin on this frame, they make little holes all around it, and through every two holes draw a little ſkewer; to this ſkewer they tie a ſmall piece of packthread, and tie that over the pins; ſo that coming to turn the pins equally, the ſkin is ſtrained tight every way, like that of a drum.

The ſkin being thus ſufficiently ſtretched on the frame, the fleſh is pared off with a ſharp inſtrument for that purpoſe; this done, it is moiſtened with a rag; and a kind of white ſtone or chalk, reduced to a fine duſt, is ſtrewed over it; then, with a large pumice-ſtone, flat at bottom, much after the manner of a mullet for grinding colours, they rub over the ſkin as if about to grind the chalk; and thus they ſcour off the remains of the fleſh. Then they go over it again with the iron inſtrument; again moiſten it as before, and again rub it with the pumice-ſtone without any chalk underneath; this ſmoothens and ſoftens the fleſh-ſide very conſiderably. They then drain it again, by paſſing over it the iron inſtrument as before.

The fleſh-ſide being thus drained, they paſs the iron on the wool or hair-ſide; then ſtretch it right on the frame, by means of the pins, and go over the fleſh-ſide again with the iron; this finiſhes its draining; and the more the ſkin is drained, the whiter it always becomes.

They now throw on more chalk, ſweeping it over with a piece of lamb-ſkin that has the wool on; this ſmoothens it ſtill farther, and gives it a white down or knap. It is now left to dry, and when dried, it is taken off the frame, by cutting it all round.

The ſkin, thus far prepared by the ſkinner, is taken out of his hands by the *parchment*-maker, who firſt ſcrapes or pares it dry on the ſummer with an iron inſtrument like that above mentioned, only finer and ſharper; with this, worked with the arm from top to bottom of the ſkin, he takes away about one half of its thickneſs. The ſkin thus equally pared on both ſides, they paſs the pumice-ſtone over both ſides, to ſmoothen it. This laſt preparation is performed on a kind of form or bench covered with a ſack ſtuffed with flocks, and it leaves the *parchment* in a condition for writing on.

The paring the ſkin dry on the ſummer is the moſt difficult preparation in the whole proceſs of *parchment*-making; for which reaſon the ſkinners ſeldom dare meddle with it, but uſually leave it to thoſe more experienced in it: the ſummer, whereon it is performed, is a calf-ſkin well ſtretched on a frame, ſerving as a ſupport to the ſkin, which is faſtened a-top of it with a wooden inſtrument, that has a notch cut in it. Laſtly, that the iron knife may paſs the eaſier between the ſummer and the ſkin to be pared, they put another ſkin, which they call the counter-ſummer. The parings, thus taken off the ſkin, are uſed in making glue, &c. &c.

What we call *vellum* is only *parchment* made of the ſkins of abortive calves, or, at leaſt, of ſucking calves; it is finer, whiter, and ſmoother, than the common *parchment*; but it is prepared in the ſame manner as that, except that it is not paſſed through the lime-pit.

PARCHMENT, *to make a green tranſparent*. Waſh the *parchment* in cold ley, till it come clear from it; then ſqueeze out the liquor as much as poſſible; and if you would have it of a fine green colour, take diſtilled verdigriſe, ground with vinegar, and add a little ſap-green to it; temper it neither too thick nor too thin; then ſoak your *parchment* in this colour thoroughly a whole night; rinſe it afterwards in water, ſtrain it immediately on a frame,

and ſet it to dry; take clear varniſh, lay it on both ſides, ſet it in the ſun to dry; after this cut the *parchment* out of the frame into leaves, as large as you pleaſe, and lay them in a book under preſs, to keep them fine and ſtrait. The effect of this parchment is, to make a ſmall letter, when put over it, appear as big again; and it is a great preſerver of the eyes, eſpecially to thoſe that read much by candle-light. The varniſh muſt be prepared of linſeed-oil, and boiled with frankincenſe, maſtich, and ſandarac. If you would have the *parchment* of a clear, tranſparent, and white colour, only waſh, ſtrain, and varniſh it, as above. If you would colour it yellow, ſteep your *parchment*, after it has been waſhed, in a yellow liquid, made of ſaffron; for which purpoſe tie ſaffron in a thin linen rag, hang it in a weak ley, and warm it over a ſlow fire, and when you ſee the ley tinctured yellow, it is fit for uſe.

For a tranſparent red. Take brazil, as much as you will; put it into a hot ley, which is clear, and not too ſtrong, and it will tincture the ley of a fine red; then pour to it about half an egg-ſhell full of clean wine; draw the *parchment* through the colour; and when it is as deep as you would have it, ſtrain it as before.

For a blue. Take Lombard indigo, grind it with vinegar on a ſtone, and mix ſal ammoniac among it, to the quantity of a pea; with this wet your *parchment*, and proceed as has been directed for the green.

For a violet or purple colour. Temper two-thirds of the above red, and one-third of the blue, and uſe it as before directed.

For a black colour. Take Roman alum, beat it into powder, and boil it in rain-water to a fourth part; add Roman vitriol, or atrament, with ſome Roman galls, and boil them together; with this ſtain your *parchment* twice or three times over, and, when dry, lay the Spaniſh varniſh over it.

N. B. With theſe tranſparent *parchments* you may make curious bindings. One ſort, uſed at Rome, is made thus: lay the board or paſteboard over with leaf-gold, leaf-ſilver, ſtanial, metal-leaves, &c. then binding the parchment over it, it will give it an uncommon luſtre and beauty.

Dr. Lewis informs us, that, in order to render the ink durable on *parchment*, a thick piece of it ſhould be ſteeped in water, with ſome oak-bark, for three or four days, and then preſſed ſmooth and dried. When the ſurface of this *parchment* was pared off, and the internal part written upon, the characters continued of a good black, while thoſe made with the ſame ink, on unprepared *parchment*, were changed into a yelluwiſh brown. Vellum may alſo be treated in the ſame manner.

It is ſaid, that writing upon *parchments* decayed by time, may be recovered, and rendered legible, by dipping the obliterated *parchment* into a veſſel of cold water, freſh drawn from the well: let it be taken out in about a minute, and preſſed between two papers, in order to prevent its crumpling up in drying. As ſoon as it is moderately dry, if it be not legible, repeat the operation two or three times.

PARCHMENT, *roll of*. See ROLL.

PARCO *fracto*, in *Law*, a writ which lies againſt him who violently breaks open a POUND, and takes out beaſts thence, which, for ſome treſpaſs done, were lawfully impounded.

PARDALIS, in *Ornithology*, a name by which many authors call the bird more commonly known by the name of *pluvialis*, and called in Engliſh the *grey* and *green* PLOVER; birds of the ſize of the lapwing, and much eſteemed at table.

PARDALIS is alſo uſed as the name for the LEOPARD, called alſo *pardus*, *panthera*, and *catus*, by ſome. It is diſtinguiſhed from the lion by its variegation of colour, and from the tyger by the diſpoſition of thoſe colours; which are in the back, ſides, and flanks of this creature, always in round ſpots like eyes, as in the tyger they are in long ſtreaks; and on the top of the back there is a row of oblong ſpots; the leopard is alſo leſs than the tyger, though next to it in ſize, cruelty, and general enmity to the animal creation. It inhabits Africa, from Barbary, to the remoteſt parts of Guinea. See *Tab.* IV. *Quadrupeds*, N° 47.

PARDON, in *Law*, a remiſſion or forgiveneſs of a felonious or other offence, againſt the king, or the laws.

This, our lawyers make twofold; the one, *ex gratia curiæ*; the other, *per cours de ley*. The firſt is that which the king, out of ſome ſpecial regard to the perſon, or ſome other circumſtance, grants, by his abſolute prerogative or power, either before conviction of the offender, or after.

A *pardon* may be pleaded in arreſt of judgment; in which caſe it has the ſame advantage, as when pleaded upon arraignment, viz. the ſaving the attainder, and of courſe the corruption of blood, which nothing can reſtore but parliament, when a *pardon* is not pleaded till after ſentence. And certainly, on all accounts, when a man hath obtained a *pardon*, *he is in the right to plead it as* ſoon as poſſible. With regard to the object of *pardon*, judge Blackſtone obſerves, that the king may *pardon* all offences merely againſt the crown, or the public; excepting, 1. That, to preſerve the liberty of the ſubject, the committing any man to priſon out of the realm is, by the HABEAS *corpus* act, made a præmunire, unpardonable even by the king. Nor, 2. Can the king *pardon*, where private juſtice is principally concerned in the proſecution of offenders; therefore, in APPEALS of all kinds (which are the ſuit, not of the king, but of the party injured) the proſecutor may releaſe, but the king cannot *pardon*. Neither can he *pardon* a common nuſance, while it remains unredreſſed, or ſo as to prevent an abatement of it; though afterwards he may remit the fine. Neither, laſtly, can the king *pardon* an offence againſt a popular or penal ſtatute, after information brought; for thereby the informer hath acquired a private property in his part of the penalty. Nor, farther, can the king's *pardon* be pleaded to any parliamentary impeachment, ſo as to impede the enquiry, and ſtop the proſecution of great and notorious offenders. But after the impeachment has been ſolemnly heard and determined, it is not underſtood that the king's royal grace is farther reſtrained and abridged. As to the manner of *pardoning*, it is a general rule, that wherever it may be reaſonably preſumed that the king is deceived, the *pardon* is void; ſo that any ſuppreſſion of truth, or ſuggeſtion of falſhood, in a charter of *pardon*, will vitiate the whole; for the king was miſinformed. A *pardon* of all felonies will not *pardon* a conviction or outlawry of felony, but theſe muſt be particularly mentioned. Nor will a *pardon* of felonies include piracy, which is not puniſhable at the common law. It is alſo enacted by 13 Ric. II. ſtat. 2. cap. 1. that no *pardon* for treaſon, murder, or rape, ſhall be allowed, unleſs the offence be particularly ſpecified; and in murder it ſhall be expreſſed, whether it was committed by lying in wait, aſſault, or malice prepenſe. A *pardon* may be conditional, or the king may extend his mercy upon what terms he pleaſes. It may be alſo obſerved, that a *pardon* by act of parliament is more beneficial than by the king's charter; for a man is not bound to plead it, but the court muſt *ex officio* take notice of it; neither can he loſe the benefit of it by his own laches or negligence, as he may of the king's charter of *pardon*. The effect of ſuch *pardon* by the king is to make the offender a new man; to acquit him of all corporal penalties and forfeitures annexed to that offence for which he obtains *pardon*, and to give him a new credit and capacity. Blackſt. Comm. book iv. p. 401, &c.

PARDON *by courſe of law*, is that which the king grants as the law and equity perſuades, for a ſlight offence; as homicide, caſual, &c.

PARDON, *charter of*. See CHARTER.

PARDON, in the *Canon Law*, is an indulgence which the pope grants to ſuppoſed penitents, for remiſſion of the pains of purgatory, which they have merited for the puniſhment of their ſins.

The grand time for the diſpenſation of *pardons* is the jubilee.

In this ſenſe, *pardon* is properly the angelic ſalutation ſaid to the Virgin at the ſound of three little ſtrokes of a bell rung in the morning, at noon, and night, in order for the perſon to be entitled to indulgences.

PARDONERS, in our *Ancient Cuſtoms*, were perſons who carried about the pope's indulgences, and ſold them to the beſt bidders.

PARDUS, in *Zoology*, a name uſed by many for the LEOPARD; the more accurate authors, however, uſe the word PARDALIS.

PARDUS, in *Conchyliology*, a name given by authors to a kind of ſhells, of the genus of the volutæ. We have three kinds of this ſhell. 1. A voluta ſpotted with black. 2. Another ſpotted with yellow. And, 3. A very elegant one ſpotted with a reddiſh colour. They are called *pardi*, or *leopard-ſhells*, from their diſtinct ſpots reſembling thoſe on the ſkin of a leopard.

PARE, in the *Manege*. To *pare* a horſe's foot is to cut his nails; i. e. the horn and ſole of his foot; which is done with a KNIFE, in order to ſhoe him.

In England, the ſmith or farrier holds the horſe's foot between his knees; in which poſture he *pares* the foot, ſets on the ſhoe, drives the nails, and rivets them; and this all alone, without any aſſiſtance from the groom.

PARECBASIS, *παρέκβασις*, in *Rhetoric*, is uſed to ſignify the explanation of a crime, and not a digreſſion from the queſtion in hand, as ſome have thought.

PARECHESIS, *παρήχησις*, in *Rhetoric*, the too frequent repetition of the ſame ſyllable, thus, *perire me malet malitia mulcri*.

PAREDRIA, a term uſed by Hippocrates to expreſs an aſ-

ſociation of two or more diſeaſes in the ſame patient, making what we call a complicated illneſs.

PAREDRI, *παρεδροι*, among the *Athenians*. When the archon, baſileus, or polemarchus, by reaſon of their youth happened not to be ſo well ſkilled in the laws and cuſtoms of their country as might have been wiſhed, it was cuſtomary for each of them to make choice of two perſons of age, gravity, and reputation, to ſit with them upon the bench, and direct them as there was occaſion. And theſe aſſeſſors, or *paredri*, were obliged to undergo the ſame probation in the ſenate-houſe and public forum, with the other magiſtrates; and like them too, to give an account how they had behaved themſelves in their reſpective truſts, when their office was expired.

PAREGORICS, *παρηγορικα*, formed of *παρηγορεω, I appeaſe, or mitigate*, in *Medicine*, remedies which aſſuage pain. The ſame with what we otherwiſe call *anodynes* and *opiates*.

PAREGORIC *elixir*. See ELIXIR *paregoricum*.

PAREIRA BRAVA, the root of a plant, which is a ſpecies of CONVOLVULUS, growing in the Weſt-Indies, chiefly in Mexico and Brazil; eſteemed a ſpecific for the cure of the ſtone and gravel.

The name, which, in the original Portugueſe, ſignifies *wild vine*, or *baſtard vine*, bears a good deal of analogy to the plant which bears branches loaden with leaves perfectly like thoſe of the vine; and which, like them, creep along walls and trees. The Portugueſe value this root on an equal footing with the ipecacuanha. Some druggiſts call it, by corruption, *parada brava*.

M. Geoffroy attributes the efficacy of this root, in nephritic caſes, to its diſſolving the viſcid matters, whereby the particles of the ſand, &c. were cemented together; and hence he gives it with the ſame intention in jaundices, aſthmas, &c. It is adminiſtered in decoction.

The Portugueſe hold it alſo a remedy for dyſenteries, quinſies, bites of venomous beaſts, &c.

Mr. Geoffroy examined its virtues carefully, and alſo its characters and diſtinctions; he found that there were properly two kinds of it; the one brown on the outſide, and yelloweſh within. This is what was then moſt frequent in uſe; and the other white on the outſide, and of a paler yellow or lemon-colour within. This is ſaid to be of a fleſh-colour on the outſide, where recent, and to turn white in drying; both are of a ſpongy or porous texture, yet conſiderably hard and woody; of a bitter taſte, but with an admixture of a ſweetiſh flavour like that of liquorice; and their uſual ſize is from that of one's middle finger, to that of one's thumb.

The Portugueſe were informed of the virtues of this root by the natives of the Braſils; and on trial extolled it above all the medicines in uſe. Their accounts of its efficacy were too exaggerated to gain credit with the judicious part of the world; but Mr. Geoffroy's experiments, which ſet its virtues in a much modeſter light, yet ſhew them to be very great; and that the root deſerves to be for ever continued in uſe in medicine, and reckoned among the moſt valuable ſimples. The Portugueſe pretend, that it diſſolves the ſtone in the bladder; but though this is not true, Mr. Geoffroy found that it was admirable for breaking the common weaker fabulous concretions in the kidneys and ureters; and that the taking it was always attended with the voiding of large quantities of gravel. He gave it alſo with great ſucceſs to perſons afflicted with ulcers in the kidneys and bladder, and whoſe urine was purulent, and at many times totally ſuppreſſed: theſe ſuppreſſions of urine were always cured by it, and their urine became leſs thick and purulent; many alſo were perfectly cured of theſe complaints by a courſe of it, with the addition of balſam of capivi toward the end of the courſe.

This property of the *pareira brava*, of diſſolving thick humours, gave Mr. Geoffroy an opinion of trying it in humorous aſthmas; and theſe obſtinate caſes often were greatly abated, and ſometimes perfectly cured by it. The uſual way of taking it is in decoction, ſweetening it in the manner of tea. Of the root in ſubſtance he preſcribes from twelve grains to half a dram, and in decoction or infuſion, two or three drams: this quantity of the root bruiſed he directs to be boiled in a pint and a half of water, till only a pint remains, which is to be ſtrained off, ſweetened with a little ſugar, divided into three portions, and drank as tea at intervals of half an hour. Mem. Acad. Par. 1710.

PARELCON, in *Grammar*, a figure, whereby a word or ſyllable is added to the end of another.

PARELIA, or rather PARHELIA, in *Phyſiology*. See PARHELIUM.

PAREMBOLE, *παρεμβολη*, in *Rhetoric*, a figure wherein ſomething relating to the ſubject is inſerted in the middle of a period. All the difference between the *parembole* and *parenthеſis*, according to Voſſius, is, that the former relates to the ſubject in hand, whereas the latter is foreign to it. An example of each we have in Virgil, and firſt of the *parembole*.

Æneas (neque enim patrius conſiſtere mentem
Paſſus amor) rapidum ad naves præmittit Achatem.

The following is an inſtance of the *parenthеſis*:

——— *ipſique ſuos jam morte ſub ægra*
(Di meliora piis, erroremque hoſtibus illum)
Deſſiſſos artus Iamiduam dentibus urit.

See PARENTHESIS.

PARENCEPHALIS, a name given by ſome authors to the *cerebellum*.

PARENCHYMA, *παρεγχυμα, effuſion*, q. d. generated by a collection and condenſation of juice, in *Anatomy*, a peculiar kind of ſubſtance different from fleſh, whereof ſeveral parts of the body, as the heart, lungs, liver, ſpleen, kidneys, &c. were anciently ſuppoſed to be formed.

Eraſiſtratus firſt uſed the word; as imagining the ſubſtance of theſe parts not to be vaſcular like the reſt, but to conſiſt of a maſs or coagulum of blood, ſtagnated in the veſſels of the parts. But the moderns univerſally reject this opinion; the obſervations made by microſcopes, injections, &c. clearly ſhewing, that the heart is a true muſcle, the lungs and ſpleen, cluſters of membranous veſicles and veſſels, and the liver and kidneys, compoſitions of glands, through which the bile and urine are ſtrained.

Beſides the veſſels and canals of the human body, the ancients ſuppoſed a ſimple homogeneous and firm matter, peculiar to each part, and thereby diſtinguiſhing the habit of one part from that of another. But ſome moderns have denied the exiſtence of a *parenchyma*, or pulpy matter, and have aſſerted, that the whole body is compoſed of veſſels and canals. The chief promoter of this opinion was Ruyſch, who having laid the injected parts of the body in rectified ſpirit of wine, and then dried them in the air; whatever was not injected, was thereby diſſipated, and the remainder conſiſted merely of veſſels; from whence he concluded, that the whole was compoſed of veſſels. But it ſeems certain, that a freſh muſcle can never be ſo injected, as to appear wholly compoſed of canals. If, indeed, after injection, it be ſuffered to dry, the parts not injected will exhale, and the more the muſcle is dried, the more it will appear compoſed of veſſels.

What is here ſaid of a muſcle, holds true of all other parts of the body. Thus many veſſels run through the ſubſtance of a bone; but no one has yet been able to demonſtrate, that the whole bone is compoſed of veſſels. There always remains a ſubſtance peculiar to bones, which has never yet been ſhewn to be vaſcular. In the brain alſo there always remains ſomething which cannot be demonſtrated vaſcular.

The *parenchyma* is ſenſibly full of juices, ſo that very little of truly ſolid matter remains, when theſe juices are exhaled.

PARENCHYMA *of plants*. Dr. Grew gives the name *parenchyma*, to the pith or pulp, or that inner part of a fruit or plant, through which the juice is ſuppoſed to be diſtributed.

This, when viewed with a microſcope, appears to reſemble marrow, or rather a ſponge, being a porous, flexible, dilatable ſubſtance.

Its pores are innumerable, and exceedingly ſmall; receiving as much humour as is requiſite to fill and extend them; which diſpoſition of pores it is, that is ſuppoſed to fit the plant for vegetation and growth.

The *parenchyma* of roots is white at firſt; but it changes its colour, in proportion as the root grows thicker. Thus it becomes yellow in the root of the baſtard rhubarb, and red in that of the biſtort.

PARENT, *parens*, a term of relation, applicable to thoſe from whom we immediately receive our being. See FATHER and MOTHER.

The duties of *parents* to legitimate children conſiſt in three particulars; viz. their maintenance, their protection, and their education. It is a principle of law, as well as of nature, that every man is obliged to provide for thoſe deſcended from his own loins. By 43 Eliz. cap. 2. the father, mother, grandfather, and grandmother of poor impotent perſons, ſhall maintain them at their own charges, if of ſufficient ability, according as the quarter-ſeſſions ſhall direct; and by 5 Geo. I. cap. 8. if a *parent* runs away, and leaves his children, the churchwardens and overſeers of the pariſh ſhall ſeize his rents, goods, and chattels, and diſpoſe of them towards their relief. But no perſon is bound to provide a maintenance for his iſſue, unleſs where the children are unable to work, through infancy, diſeaſe, or accident; and then is only obliged to find them with neceſſaries, the penalty on refuſal being no more than 20s. a month. (See PA-

PIST and JEWS.) Our law has made no provision to prevent the diſinheriting of children by will; but by the cuſtom of London, formerly univerſal, the children of freemen are intitled to one-third of their father's effects, to be equally divided between them; of which he cannot deprive them. Farther, a *parent*, by our laws, may ſupport his children in their law-ſuits, without being guilty of the legal crime of maintaining quarrels; and a man may juſtify aſſault and battery in defence of the perſons of his children. With regard to the education of children, though our laws are defective, yet in one inſtance they have made a wiſe proviſion for breeding up the riſing generation; ſince by the ſtatutes for apprenticing poor children, ſuch children may be apprenticed out by the overſeers, &c. See APPRENTICE. And, in the caſe of religion, all parents are under peculiar reſtrictions. See PAPIST.

By the ancient Roman laws, the father had a power of life and death over his children; but the rigour of theſe laws was ſoftened by ſubſequent conſtitutions. By our Engliſh laws, parental authority is much more moderate, but ſtill ſufficient to maintain order and obedience. A *parent* may lawfully correct his child, being under age, in a reaſonable manner. The conſent or concurrence of the *parent* to the MARRIAGE of his child under age was alſo directed by our ancient law to be obtained; but now it is abſolutely neceſſary, and without it the contract is void. A father has no other power over his ſon's eſtate than as a truſtee or guardian; for, though he may receive the profits during the child's minority, yet he muſt account for them when he comes of age. He may, indeed, have the benefit of his children's labour while they live with him, and are maintained by him; but this is no more than he is entitled to from his apprentices or ſervants. Moreover, the legal power of a father (for a mother, as ſuch, is entitled to no power, but only to reverence and reſpect) over the perſons of his children ceaſes at the age of twenty-one. Yet, till that age arrives, this empire of the father continues even after his death; for he may by his will appoint a guardian to his children. He may alſo delegate part of his authority, during his life, to tutors and ſchoolmaſters. Blackſt. Comm. book i. chap. xvi. See CHILD.

PARENTALIA, in *Antiquity*, funeral obſequies; or the laſt duties paid by children to their deceaſed parents.

PARENTALIA is alſo uſed for a ſacrifice or ſolemn ſervice offered annually to the manes of the dead.

PARENTELA—*De parentela ſe tollere*, in *Ancient Cuſtoms*, ſignified a renunciation of one's kindred and family.

This was done in open court, before the judge, and in the preſence of twelve men, who made oath, they believed it was done for a juſt cauſe.

We read of it in the laws of Henry I. After ſuch abjuration, the perſon was incapable of inheriting any thing from any of his relations, &c.

PARENTHESIS, παρένθεσις, formed of παρα, *inter*, *between*, and ἔθεσις, *poſition*, q. d. *putting between*, in *Grammar*, certain intercalary words inſerted in a diſcourſe, which interrupt the ſenſe or thread, but which ſeem neceſſary for the fuller underſtanding of the ſubject. The pooleſt of our modern writers avoid all *parentheſes*; as keeping the mind in ſuſpenſe, embarraſſing it, and rendering the diſcourſe leſs clear, uniform, and agreeable. Long and frequent *parentheſes* are intolerable, eſpecially in verſe, which they ever render dull and languid, and like to proſe.

The proper characteriſtic of a *parentheſis* is, that it may be either taken in, or left out, the ſenſe and grammar remaining entire.

In ſpeaking, *parentheſes* are to be pronounced in a different tone; and in writing they are incloſed between ( ), to diſtinguiſh them from the reſt of the diſcourſe.

The character itſelf, whereby they are diſtinguiſhed, is alſo called a *parentheſis*. See PARENBOLE.

PARERGON. See PARERGA.

PARER, in the *Manege*, a term formerly uſed as a command to ſtop, but now exploded; all the riding-maſters, when they have a mind the ſcholar ſhould ſtop the horſe, calling out *hola*. See STOP.

PARERE, in *Commerce*, an Italian term, which begins to be naturalized. It ſignifies the advice or counſel of a merchant, or negotiant; becauſe ſuch a perſon, being conſulted on any point, introduces his anſwer, in Italian, with *mi pare*, i. e. *I think, it ſeems to me*.

The method of negociating, eſpecially that of bills of exchange, being borrowed from the Italians, moſt trading cities, eſpecially Lyons, retain the uſe of *pareres*; which are the advices or opinions of merchants and negociants, and which ſerve as acts before notaries, when given by authority of a judge-conſervator, or at a particular conſultation, for maintaining the right of the conſulter.

M. Savary has an excellent treatiſe, intitled, *Parere, ou Avis & Conſeils ſur les plus importantes Matieres du Commerce*; containing the reſolution of the moſt difficult queſtions relating to bankrupts and failures, bills of exchange, orders without date, or expreſſion of value, bank-ſignings, renewing of bills of exchange, thoſe drawn or accepted by women in behalf of their huſbands, or during the minority of the drawer, &c.

PARERGA, παρεργα, a term ſometimes uſed in architecture, for additions, or appendages, made by way of ornament to a principal work.

It is ſometimes alſo uſed in painting, for little pieces, or compartiments, on the ſides, or in the corners, of the principal pieces.

PARESIS, πάρεσις, in *Medicine*, a diſeaſe called alſo PARALYSIS, and PALSY.

PARETONIUM, in *Natural Hiſtory*, the name of an earth anciently found on the ſhores of Egypt, Cyrene, and the iſland of Crete; and uſed by the ancients in painting.

It had its name either from a part of Egypt, near which it was gathered, or from the name of a town in that kingdom, where it was uſually ſold. Vitruvius is of the firſt opinion, and Volaterrus of the other.

Of late we have been taught to think it loſt; but it is ſtill common on the ſhores of moſt of the iſlands of the Archipelago, though not obſerved or regarded; and is truly a very heavy and tough clay of a fine white colour, found in maſſes of different ſizes, generally as ſoft as the ſofter clays within the ſtrata; and, by rolling about on the beach in this ſtate, it gathers up the ſand, ſmall ſhells, and other ſoulneſſes, we always find about it. It is moſt probable, that there are ſtrata of it fine and pure in the cliffs there, and that the ſea waſhes off maſſes of them in ſtorms and high tides, which are what we find. Hill.

PARGET, in *Natural Hiſtory*, a name given to the ſeveral kinds of gypſum or plaiſter-ſtone, which, when ſlightly calcined, make what is called *plaiſter of Paris*, uſed in caſting ſtatues, in ſtuccoing floors and ceilings, and many other like occaſions.

The word *parget*, though generally underſtood of all the gypſums, is, however, by the workmen principally applied to the two ſpecies which make up the firſt genus of that claſs, called by Dr. Hill the *pholides*. Theſe are the Montmartre kind, and that of Derbyſhire. See PHOLIS.

PARGETING, in *Building*, is uſed for the plaiſtering of walls; ſometimes for plaiſter itſelf.

Pargeting is of various kinds: as, 1. White lime and hair mortar laid on bare walls. 2. On bare laths, as in partitioning, and plain cielings. 3. Rendering the inſides of walls, or doubling partition-walls. 4. Rough-caſting on heart-laths. 5. Plaiſtering on brick-work, with finiſhing mortar, in imitation of ſtone-work; and the like upon heart-laths.

PARHELION, or PARHELION, formed from παρα, *near*, and ἡλιος, *ſun*, in *Phyſiology*, a mock ſun, or meteor, in form of a very bright light, appearing aſide of the ſun; and formed by the reflexion of his beams in a cloud properly poſited.

The *parhelia* uſually accompany the coronæ, or luminous circles, and are placed in the ſame circumference, and at the ſame height. Their colours reſemble thoſe of the rainbow; the red and yellow are on the ſide towards the ſun, and the blue and violet on the other. Though there are coronæ ſometimes ſeen entire, without any *parhelia*; and ſometimes *parhelia* without coronæ.

The apparent ſize of *parhelia* is the ſame as that of the true ſun; but they are not always round, nor always ſo bright as the ſun; and when ſeveral appear, ſome are more bright than others. They are tinged externally with colours like the rainbow, and many of them have a long fiery tail oppoſite to the ſun, but paler towards the extremity. Some *parhelia* have been obſerved with two, and others with three tails. Theſe tails appear for the moſt part in a white horizontal circle, which generally paſſes through all the *parhelia*; and, if it were entire, would go through the center of the ſun. Sometimes there are arcs of leſſer circles, concentric to this, touching thoſe coloured circles which ſurround the ſun. They are alſo tinged with colours, and contain other *parhelia*. *Parhelia* are generally ſituated in the interſections of circles; but Caſſini ſays, that thoſe which he ſaw in 1683, were on the outſide of the coloured circle, though the tails were in the circle that was parallel to the horizon. M. Æpinus apprehends, that *parhelia* with elliptical coronæ are more frequent in the northern regions, and thoſe with circular ones in the ſouthern. They have been viſible for one, two, three, and four hours together; and in North America they are ſaid to continue ſome days, and to be viſible from ſun-riſe to ſun-ſet. When the *parhelia* diſappear, it ſometimes rains, or there falls ſnow in the

the form of oblong ſpiculæ, as Maraldi, Weidler, Krafft, and others, have obſerved; and becauſe the air in North America abounds with ſuch frozen ſpiculæ, which are even viſible to the eye, according to Ellis and Middleton, ſuch particles have been thought to be the cauſe of all coronæ and *parhelia*. PARASELENÆ have alſo been ſeen, accompanied with tails and coloured circles, like thoſe which attend the *parhelia*. An account of ſeveral, and a particular deſcription of a fine appearance of this kind, may be ſeen in Muſchenbroeck's Introductio, &c. p. 1046.

Parhelia are ſometimes double, triple, &c.

Ariſtotle obſerves, that two were ſeen in Boſphorus from morning to evening, though, in general, he obſerves, they are not ſeen, except when the ſun is near the horizon. Pliny relates under what conſuls this phenomenon was ever ſeen at Rome.

In the year 1629, was ſeen at Rome, by Scheiner, a *parhelion* of four ſuns; Gaſſendi ſays, that in 1635 and 1636, he often ſaw one mock ſun; in 1661, Hevelius obſerved at Dantzick one of ſeven ſuns; and 1666, another was ſeen at Arles, of ſix.

Phenomena of this kind have alſo been obſerved by M. de la Hire at Paris, in 1689, and by M. Caſſini, in 1693; by Mr. Grey, in 1700; by Halley, in 1702; and Maraldi, in 1721.

The Roman phenomenon obſerved by Scheiner, is repreſented *Tab.* V. *Optics*, *fig.* 86. in which A is the place of the obſerver, B his zenith, C the true ſun, AD a plane paſſing through the obſerver's eye, the true ſun, and the zenith. About the ſun C, there appeared two concentric rings, not complete, but diverſified with colours. The leſſer of them, DEF, was fuller, and more perfect; and though it was open from D to F, yet thoſe ends were perpetually endeavouring to unite, and ſometimes they did ſo. The outer of theſe rings was much fainter, ſo as ſcarcely to be diſcernible. It had, however, a variety of colours, but was very inconſtant. The third circle, KLMN, was very large, and all over white, paſſing through the middle of the ſun, and every where parallel to the horizon. At firſt this circle was entire; but towards the end of the appearance it was weak and ragged, ſo as hardly to be perceived from M towards N.

In the interſection of this circle, and the outward its GKI, there broke out two *parhelia*, or mock ſuns, N and K, not quite perfect; K being rather weak, but N ſhone brighter and ſtronger. The brightneſs of the middle of them was ſomething like that of the ſun, but towards the edges they were tinged with colours, like thoſe of the rainbow, and they were uneven and ragged. The *parhelion* N was a little wavering, and ſent out a ſpiked tail NP, of a colour ſomewhat fiery, the length of which was continually changing.

The *parhelia* at L and M, in the horizontal ring, were not ſo bright as the former, but were rounder, and white, like the circle in which they were placed. The *parhelion* N diſappeared before K; and while M grew fainter, K grew brighter, and vaniſhed the laſt of all.

It is to be obſerved, farther, that the order of the colours in the circles DEF, GKN, was the ſame as in the common halos, namely, red next the ſun; and the diameter of the inner circle was alſo about 45 degrees; which is the uſual ſize of a halo.

M. Mariotte accounts for the appearance of *parhelia* from an infinity of little particles of ice floating in the air, which multiply the image of the ſun, either by refracting or breaking his rays, and thus making him appear where he is not; or by reflecting them, and ſerving as mirrors.

The known laws of reflexion and refraction have given a handle for geometrizing on theſe phenomena; and M. Mariotte has determined the preciſe figure of the little icicles, and their ſituation in the air, the ſize of the coronæ, or circles, which accompany the *parhelia*, and the colours wherewith they are painted, by a geometrical calculus.

The hypotheſis of Des Cartes, to account for that horizontal circle, in which mock ſuns appear, has leſs probability than any of his conjectures. He ſuppoſes that a great quantity of frozen vapours, crouded together by contrary winds, form a prodigious cylinder, which reflects the light that falls from it on all ſides, ſo as to exhibit that lucid appearance in all the ſurrounding clouds. M. Huygens, on applying his attention to theſe appearances, was ſoon ſenſible that they could not ariſe from ſuch globules as formed the halos; yet ſince *parhelia* are always attended with halos, he was ſatisfied that their cauſes muſt be much alike. Conſidering, then, what other figures hail-ſtones might poſſibly have, beſides a ſpherical one, he could find no other ſo ſimple as that of a cylinder; and, indeed, he had often obſerved, that ſnow did conſiſt of ſeveral ſlender oblong particles, mixed with thoſe of other ſhapes; and ſeeing that ſmall globules were ſufficient for the production of halos, he imagined that a great number of ſmall cylinders, floating in the air, might produce ſimilar appearances. He alſo remembered that Deſcartes had taken notice of certain ſmall columns, or cylinders, which he had ſeen falling on the ground, the extremities of which were bounded with flat ſtars, conſiſting of ſix rays or points.

The large and white horizontal circle, in the Roman phenomenon, M. Huygens ſuppoſed to be produced by the reflexion of the ſun's rays from the outſides of the upright cylinders; ſince, when the ſun ſhines upon a great number of ſuch cylinders, ſuſpended in the air, a white circle muſt neceſſarily appear to paſs through the ſun, parallel to the horizon, and of the ſame breadth with that of the ſun. This he ſhews very diſtinctly by a large figure of a cylinder, and by pointing out the progreſs of the ſun's rays reflected from it. For every point of the ſun's vertical diameter, as well as his center, will illuminate a circle of cylinders, of the ſame apparent height as the illuminating point. It is obſervable that no thick clouds are ſeen in the air when theſe circles appear, but only ſuch as are very thin, and ſcarce viſible. For in moſt of theſe obſervations the ſky is ſaid to have been very clear and ſerene, which very well agrees with this hypotheſis; ſince theſe minute cylinders muſt conſtitute a very thin cloud, uniformly extended; through which the ſun, and even the blue colour of the ſky, may be ſeen.

M. Huygens ſuppoſes that the *parhelia* at K and N are produced by the ſame upright cylinders, which produce the great white circle; but not in the ſame manner as that was cauſed, viz. by ſimple reflexion, but by means of two refractions, exactly in the ſame manner as halos are produced; the center of the cylinder being ſnow, and the outer part ice. The interval between theſe *parhelia*, he ſays, will be greater, as the cylinder of ſnow is thicker in proportion to the whole cylinder; and becauſe the ſun appears brighteſt through thoſe cylinders which are on the outſides of the arch KN; and this brightneſs decays gradually to a certain diſtance, it exhibits the appearance of a *parhelion* with a tail, always tending towards the white circle, and making it brighter as far as it extends. The tail NP, of the *parhelion* at N, is drawn out of this circle; but this was a miſtake, as Hevelius obſerves; and though it is not ſaid that the *parhelion* at K had any tail, yet it is plain that a certain part of the white circle was its tail, though but a dull one; becauſe this *parhelion* is ſaid to have been fainter than the other; and it appears by the obſervations of Hevelius, and his own, that theſe *parhelia*, or mock ſuns, as well as *paraſelenæ*, or mock moons, always have tails. Laſtly, the extraordinary brightneſs of theſe *parhelia*, which was ſaid to rival that of the ſun, he ſuppoſed might eaſily be accounted for, by conſidering that every cylinder ſhines through its whole length; whereas the round grains in the halo, or the rainbow, emit but little light; ſo that the cylinder may probably afford more light than ten of thoſe round grains; and if there be great plenty of cylinders in the air, it is no wonder that thoſe images of the ſun ſhould appear ſo bright.

He then proceeds to demonſtrate his hypotheſis, by an accurate conſideration of the refraction of the rays of light through the ſides of ſuch cylinders as have been deſcribed; and he inveſtigates the diſtance at which the *parhelia* muſt appear from the ſun; ſhewing that it is ſo much the greater, as the internal cylinder of ſnow is thicker in proportion to the whole cylinder; and that this diſtance muſt become greater as the ſun riſes higher; and he ſubjoins a table of theſe diſtances, in proportion to any given altitude of the ſun; from which it appears, that if a ſufficient number of cylinders be placed one above another (ſome of which are melted more and ſome leſs) beſides the collateral *parhelia* next the ſun, two or more may appear farther from him, but ſtill in the ſame white circle; which was alſo confirmed by the obſervations of Hevelius in 1661, and of Scheiner in 1630. It appears alſo, from the ſame tables, that while the cylinders remain in the ſame ſituation, as the ſun riſes higher the intervals between him and the two *parhelia* will increaſe, which was the very thing which he himſelf had obſerved. But a greater alteration of theſe intervals may happen, if the cylinders be more melted; and from hence might ariſe that very remarkable phenomenon, which is ſaid to have appeared in the time of Auguſtus, when three ſuns were ſeen at the ſame time, all of which were ſoon contracted into one; which, he obſerves, would be effected by the warmth of the air melting the ſnow in the cylinders; by which means both the *parhelia* would draw nearer to the ſun, till they coincided with it; at which time all the cylinders would be melted, and changed into round drops.

In the next place our author proceeds to explain the cauſe of that corona in the Roman phenomenon, of which the ſun is the center. And here his former hypotheſis concerning halos, he acknowledges, will not anſwer the purpoſe. For though, when ſmall cylinders are produced in the air, it is probable that half-thawed globules are lodged there at the ſame time, for the production of coronas; yet it is difficult to conceive how they can be thawed in ſo exact a proportion, as to produce a corona that ſhall paſs preciſely through thoſe very *parhelia*. Neither, as he obſerves, can this appearance be produced by cylinders obliquely ſituated, but only by the round ends of upright cylinders. And to ſuppoſe the above mentioned cylinders to be always terminated by plain baſes, he ſays, is by no means agreeable to nature; for, ſince their tops and bottoms will be thawed, as well as their ſides, and to the ſame degree quite round, the water at their extremities will neceſſarily aſſume a round figure; ſo that not only thoſe upright cylinders which lie on each ſide of the ſun, and produce the collateral *parhelia*, will tranſmit his rays to the eye; but alſo thoſe that lie quite round beyond him, to a certain diſtance, which will, therefore, produce a corona.

To verify this hypotheſis by experiment, he ordered a glaſs cylinder to be made with round ends; and, incloſing in it an opaque body of the ſame ſhape, he found that it did, in reality, refract the light in ſuch a manner as would produce this appearance. Conſidering, therefore, the neceſſity there is for the cylinders being of this particular ſhape, in order that the rays, paſſing through their extremities, may produce coloured circles, he did not doubt, but that theſe circles are thoſe very coronas. Otherwiſe ſome irregular and ill ſhaped circles would be ſeen.

Hevelius had remarked, that the circle which paſſes through the *parhelia*, frequently appears fainter above and below, and brighteſt next the *parhelia*. The reaſon of this M. Huygens thought to be very plain from his glaſs cylinder, ſince the rays which paſſed through the round tops and bottoms of them produced only a ſmall round image of the ſun, as round grains do; whereas thoſe which paſſed towards the ends of the cylindrical ſurfaces, where they juſt began to turn round, were formed into a broader and brighter pencil, like thoſe which produce the *parhelia*; and this muſt make the corona grow gradually brighter and brighter towards the *parhelia*, both above and below, and to be more intenſely coloured.

Having explained the cauſes of this corona, he proceeds to account for the two *parhelia* L and M, which appeared in the back part of the great white circle. And theſe, he thought, were produced, not by the reflexion, but by the refraction of the ſun's rays in the upright cylinders. The inner opaque cylinders, he obſerves, are ſo far from contributing to the production of theſe *parhelia*, that they ſometimes hinder their appearances. But yet this inner cylinder of ſnow is abſolutely neceſſary, whether the outward ſhell that contains it be made of water or of ice; for without the ſnow, the watery cylinders would be immediately changed into round drops, and the whole cylinders could not be ice, becauſe then they could not be every where tranſparent, without ſuppoſing them to have been quite liquid before they were frozen, which is inconſiſtent with a cylindrical figure.

He then ſhews, that theſe back *parhelia* muſt be in the large white circle; and determines, geometrically, that the diſtance between them muſt be ſixty degrees. Indeed, in Scheiner's ſcheme, the diſtance of theſe *parhelia* exceeds ninety degrees; but it was neither meaſured, nor eſtimated; nor indeed, ſo much as mentioned, and therefore M. Huygens does not doubt but that it is drawn much too large. In the Roman phenomenon theſe *parhelia* are ſaid to have been white, whereas according to this hypotheſis, they ought to have been coloured. M. Huygens ſuppoſes that the whiteneſs aroſe from the weakneſs of their light; on which account halos ſometimes appear white, and ſometimes alſo the lateral *parhelia*, as appears by the accurate obſervations of Kechelius. But that theſe back *parhelia* do ſometimes appear coloured, is evident from the account we have of one in Mat. Paris's hiſtory; in which we are told that beſides the true ſun, four mock ſuns appeared red, in a great circle, of the colour of cryſtal. That two of theſe were back *parhelia* is evident from the figure, though it may be faulty in other reſpects.

The ſcarcity of cylinders, M. Huygens ſuppoſes, may be the reaſon that, in many obſervations, theſe *parhelia* have not appeared, though the white circle was plain enough to be ſeen. But there is another circumſtance which may hinder their appearance, viz. the inner cylinders of the back part of the white circle being too thick in proportion to the water that ſurrounds them. For then, the rays which ſhould produce the *parhelia* will be ſtopped; and he found by calculation, that when the ſun is twenty-five degrees high, if the diameter of the opaque cylinder bear a greater proportion to that of the whole, than 590 to 1000, no back *parhelia* can appear.

That the back *parhelia* in the Roman phenomenon appeared rounder than the lateral ones, M. Huygens ſuppoſes to ariſe from this circumſtance, that though ſome cylinders in the arch I M, which lie not far from L and M, do ſend ſome refracted rays to the eye, yet they are not ſo numerous as thoſe which come from the cylinders at L and M; and therefore that theſe *parhelia* can have no tails that are far extended, like the lateral ones. Beſides the refractions through the cylinders that produced the back *parhelia* are more regular; for the rays are not confined in their courſe by the opaque cylinders within, but receive their directions from the refractions at the moſt exact figure and poliſh of the outward watery ſurface of the cylinders. For the dark cylinders within, not being exactly equal to one another, are the cauſe of the irregular and inconſtant ſhape of the lateral *parhelia*.

The reaſon of the fluctuating motion of the tail of the *parhelion* N, he ſuppoſes to be, that, ſometimes fewer, and ſometimes more cylinders were carried into that place; which alſo accounts for the corona D E F being ſometimes entire, and ſometimes open below, and that the *parhelion* K grew brighter while N grew duller.

The phenomenon obſerved in 1661 by Hevelius, exhibited in *Tab.* V. *Optics*, *fig.* 87. ſeems to compriſe all the real varities of this magnificent ſpectacle, parts of which have often been ſeen ſeparately. The greateſt difference between this appearance and that at Rome, conſiſts in the arches Q & R and T H S, which are convex towards the ſun, and which Huygens accounts for by cylinders lying in a horizontal ſituation. The *parhelia* in theſe inverted arches, he ſays, are nothing more than the brighteſt parts of them; and therefore they never appear quite diſtinct nor much brighter than the adjoining parts of the arches. Accordingly, Hevelius, in all his obſervations of this kind, took notice, that they appeared rather dull, heavy, and faint; and he was not ſure whether there was a *parhelion* at H, or not. The reaſon why the middle part of the arch ſhould appear a little diſtinct from the reſt, he ſuppoſed to be this, that though there be great plenty of horizontal cylinders in the air, yet they may be ſo ſhort, as to have but little of a cylindrical ſurface, or perhaps may be like oblong ſpheroids. Beſides it is perfectly agreeable to the obſervations of Hevelius, that the higher the ſun or moon, and conſequently the more the coronas are elevated above the horizon, the flatter theſe inverted arches appear. It is confeſſed by M. Huygens, that the upper parts of theſe arches are repreſented by Hevelius as being much leſs than his calculations require them to be; but he imagines, that the ſight of the obſerver was impoſed upon, by the arches being ſo much elevated above the horizon; in conſequence of which they would appear to be parts of much leſſer circles than they really are.

M. Muſchenbroeck ſays, that nothing has been advanced concerning the cauſe of *parhelia*, more probable than the hypotheſis of M. Huygens, except that frozen cylinders or ſpiculæ are always found tranſparent, and are never opaque at the centre. The coloured arcs that accompany *parhelia*, he thinks to be not at all different from the common coronæ, ſo that if there be a quantity of icy ſpiculæ in a thin fog, the whole of this appearance will be produced, the coronæ being formed in the fog, and the *parhelia* in the ſpiculæ.

See Huygens's Diſſertation on this ſubject in Smith's Optics, book i. chap. 11. See alſo Prieſtley's Hiſt. of Light, &c. p. 613, &c. and Muſchenbroeck's Introduction, &c. vol. ii. p. 1038, &c. quarto.

PARHOMOLOGY, παρομολογια, in *Rhetoric*, a figure wherein part is yielded to the opponent, and the reſt denied; thus, *Sume hoc ab judicibus noſtris voluntate: neminem illi proborem cognatum quam te fuiſſe, concedimus: officia tua nonnulla in illum extitiſſe, ſtipendia vos una feciſſe aliquamdiu nemo negat; ſed quid contra teſtamentum dicis, in quo ſcriptus hic eſt.* See CONCESSION.

PARIAN *marble*. See MARBLE.

PARIETALIA *oſſa*, in *Anatomy*, the third and fourth bones of the cranium; ſo called becauſe they form the *parietes*, or ſides of the head.

They are alſo denominated *oſſa bregmatis*, and *oſſa ſincipitis*.

Their ſubſtance is finer and thinner than that of the coronal and occipital bones. The figure is ſquare; their ſize ſurpaſſes that of the other bones of the head; and their ſituation is in the lateral parts, which they poſſeſs entirely.

The ſagittal ſuture connects them at the upper part; the coronal joins their fore-part to the os frontis; the lam-

lambdoidal joins them by the hind-part to the occipital bone; and, laſtly, the ſquammous ſuture joins them by the lower part of the oſſa petroſa.

The outer ſurface of theſe bones is very ſmooth and poliſhed; the inner rough and uneven, being full of impreſſions, which the arteries of the dura mater made, by their continual pulſation before the bones were oſſified. They have each an external and convex ſide, and an internal and concave one, four edges, one ſuperior or ſagittal, one inferior or temporal, one anterior or frontal, and one poſterior or occipital. The ſuperior edge is the longeſt; the inferior the ſhorteſt; in this laſt there is a very ſquammoſe ſlope, which may be properly named the temporal ſlope; the upper and poſterior edges are indented through their whole length; the anterior edge is indented alſo, except at its lower part; and all the lower edge is ſquammous, except a ſmall portion next the os occipitis. It has four angles, the anterior and upper, the anterior and lower, the poſterior and upper, and the poſterior and lower: the anterior and lower angle ends in a ſquammous production, which from its ſituation may be called the *temporal angle*, or *apophyſis*. On the outſide, above the temporal ſlope, is ſeen the moſt conſiderable portion of the ſemicircular plane of the temporal muſcle; near the upper edge toward the poſterior angle, is a ſmall hole, called the *parietal hole*, which is ſometimes found only in one of the bones, ſometimes in the ſagittal ſuture, and in ſome ſubjects it is entirely wanting. In ſome, this hole goes only to the diploe, in others it perforates both tables.

Theſe bones are weakeſt of all the eight that compoſe the ſkull. The diploe is found between the tables, through the whole length of the ſagittal and occipital edges, and through the upper half of the coronal ſuture. Theſe bones contain a large portion of the brain, form part of the temples, and ſerve for the inſertion of the temporal muſcles. Winſlow.

PARIETARIA, in *Botany*. See PELLITORY.

PARIETES, in *Anatomy*, a term uſed for the incloſures or membranes, that ſtop up or cloſe the hollow parts of the body; eſpecially thoſe of the heart, the thorax, &c. The *parietes* of the two ventricles of the heart are of unequal ſtrength and thickneſs, the left exceeding the right, becauſe of its office, which is to force the blood through all parts of the body; whereas the right only drives it through the lungs.

PARIS, *herb, true love*, or *one berry*, in *Botany*, a genus of the *octandria tetragynia* claſs. Its characters are theſe: the empalement of the flower is compoſed of four leaves which expand in form of a croſs; the flower has alſo four leaves which ſpread open in the ſame manner; in the centre of the flower is ſituated a roundiſh four-cornered germen, ſupporting four ſpreading ſtyles, crowned by ſingle ſummits; this is ſurrounded by eight ſtamina, each having an oblong ſummit, faſtened by threads on each ſide of the ſtamina; the germen changes to a roundiſh berry, having four cells filled with ſeed. We know but one ſpecies, which grows wild in the woods. Miller.

Though this plant has been reckoned of a poiſonous nature; being ranked among the aconites; yet late authors attribute quite other properties to it; eſteeming it to be a counter poiſon, and good in malignant and peſtilential fevers. James.

PARIS, *herb, of Canada*, or *of America*, *trillium*, in *Botany*, a genus of the *hexandria trigynia* claſs; the characters are, that it has a three-leaved ſpreading empalement, and three oval petals; it has ſix awl-ſhaped ſtamina, terminated by oblong ſummits, and a roundiſh germen with three ſlender recurved ſtyles, crowned by ſingle ſtigmas; the germen afterwards becomes a roundiſh berry, with three cells filled with roundiſh ſeeds. There are three ſpecies. Miller.

PARISH, the precinct, or territory, of a parochial church; or the circuit of ground within which the people belonging to any church, or under the care of one parſon or vicar, do inhabit.

The word comes from the Latin *parochia*, of the Greek παροικια, *habitation*; compounded of παρα, *near*, and οικος, *houſe*. Accordingly, Du-Cange obſerves, that the name παροικια, was anciently given to the whole territory of a biſhop, and derives it from neighbourhood; becauſe the primitive Chriſtians, not daring to aſſemble openly in cities, were forced to meet ſecretly in neighbourhouſes.

In the ancient church, there was one large edifice in each city, for the people to meet in; and this they called *parochia*, *pariſh*. But the ſignification of the word was afterwards inlarged, and by *pariſh* was meant a dioceſe, or the extent of the juriſdiction of a biſhop, conſiſting of ſeveral churches; unleſs we will ſuppoſe as ſome do, that thoſe biſhops were only paſtors of ſingle churches.

Du Pin obſerves, that country *pariſhes* had not their origin before the fourth century; but that thoſe of cities are more ancient. The city of Alexandria is ſaid to have been the firſt that was divided into *pariſhes*. Baronius ſays, that in the time of pope Cornelius there were forty-ſix *pariſhes* in Rome.

How ancient the diviſion of *pariſhes* is, it is not eaſy to aſcertain; for, in the early ages of Chriſtianity in this iſland, *pariſhes* were unknown, or at leaſt ſignified the ſame that a dioceſe does now. There was then no appropriation of eccleſiaſtical dues to any particular church; but every man was at liberty to contribute his tithes to whatever prieſt or church he pleaſed, provided only that he did it to ſome; or if he made no ſpecial appropriation thereof, they were paid into the hands of the biſhop, whoſe duty it was to diſtribute them among the clergy, and for other pious purpoſes, according to his own diſcretion. Camden ſays England was divided into *pariſhes* by archbiſhop Honorius, about the year 630. Sir Henry Hobart maintains that *pariſhes* were firſt erected by the council of Lateran, held A. D. 1179. But Mr. Seldet has ſhewn, that the clergy lived in common without any diviſion of *pariſhes*, long after the time mentioned by Camden; and it appears from the Saxon laws, that *pariſhes* were in being long before the council of Lateran, in 1179. The diſtinction of *pariſhes* occurs in the laws of king Edgar, about the year 970. It ſeems pretty clear and certain, ſays judge Blackſtone, Com. vol. i. p. 112. that the boundaries of *pariſhes* were originally aſcertained by thoſe of a manor or mimors; becauſe it very ſeldom happens, that a manor extends itſelf over more *pariſhes* than one, though there are often many manors in one *pariſh*. The lords, he adds, as Chriſtianity ſpread itſelf, began to build churches upon their own demeſnes or waſtes, to accommodate their tenants in one or two adjoining lordſhips; and in order to have divine ſervice regularly performed therein, obliged all their tenants to appropriate their tithes to the maintenance of the one officiating miniſter, inſtead of leaving them at liberty to diſtribute them among the clergy of the dioceſe in general; and this tract of land, the tithes of which were ſo appropriated, formed a diſtinct *pariſh*; and this will account for the frequent intermixture of *pariſhes* one with another. For if a lord had a parcel of land detached from the main of his eſtate, but not ſufficient to form a *pariſh* of itſelf, it was natural for him to endow his newly-erected church with the tithes of ſuch lands. Extra-parochial waſtes and marſh lands, when improved and drained, are by 17 Geo. II. cap. 37. to be aſſeſſed to all parochial rates in the *pariſh* next adjoining.

Camden reckons nine thouſand two hundred and eighty-four *pariſhes* in England. And Chamberlayne makes, at preſent, nine thouſand nine hundred and thirteen.

PARISH-*Prieſt*, the parſon or miniſter who holds a *pariſh* as a benefice.

If the predial tithes be appropriated, the parſon is called RECTOR. If they be impropriated, he is called VICAR.

PARISH-*clerk*. In every pariſh the parſon, vicar, &c. hath a *pariſh-clerk* under him, who is the loweſt officer of the church. Theſe were formerly clerks in orders, and their buſineſs at firſt was to officiate at the altar; for which they had a competent maintenance by offerings; but now they are laymen, and have certain fees with the parſon on chriſtenings, marriages, burials, &c. beſides wages for their maintenance.

The law looks upon them as officers for life; and they are choſen by the miniſter of the pariſh, unleſs there is a cuſtom for the pariſhioners or churchwardens to chuſe them; in which caſe the canon cannot abrogate ſuch cuſtom; and when choſen it is to be ſignified, and they are to be ſworn into their office by the archdeacon, for which the court of king's bench will grant a mandamus.

PARISH-*clerks*, *company of*. See COMPANY.

PARISIS, a French money of account, formerly a real coin ſtruck at Paris, at the ſame time with the Tournois, ſtruck at Tours.

The *Pariſis* exceeded the Tournois by one fourth; ſo that the livre, or pound *Pariſis*, was twenty-five ſols; and the livre Tournois twenty. The ſols and deniers *Pariſis*, &c. were in proportion. See COIN.

PARISTHMIA, a word uſed by ſome authors to expreſs the TONSILS.

PARK, *parcus*, a large incloſure, privileged for wild beaſts of chaſe, either by the king's grant, or by preſcription.

The word is originally Celtic; where it ſignifies an incloſure, or place ſhut up with walls.

Manwood defines a *park* a place of privilege for beaſts of venery, or hunt, and other wild beaſts of the foreſt, and of chaſe; *tam ſylveſtres, quam campeſtres*. A *park* differs from a foreſt, in that, Crompton obſerves, a ſubject may hold a *park* by preſcription, or the king's grant; which he cannot do with reſpect to a foreſt.

A *park* differs from a chaſe alſo; becauſe a *park* muſt be

inclosed; if it lie open, it is a good cause of seizing it into the king's hand, as a free chase may be, if it be inclosed. Nor can the owner have any action against such as hunt in his *park* if it lie open. See CHASE.

Du-Cange refers the invention of *parks* to king Henry I. of England; but Spelman shews, it is much more ancient, and was in use among the Anglo-saxons. Zosimus assures us also, that the ancient kings of Persia had *parks*.

No man can now erect a *park*, without a license under the broad seal; for the common law does not encourage matters of pleasure, which brings no profit to the commonwealth. Wood's Inst. 207.

But there may be a *park* in reputation, erected without lawful warrant; and the owner of such *park* may bring his action against persons killing his deer. Ibid.

To a *park* three things are required. 1. A grant thereof. 2. Inclosures by pale, wall, or hedge. 3. Beasts of a *park*, such as the buck, doe, &c. and where all the deer are destroyed, it shall no more be accounted a *park*. For a *park* consists of vert, venison, and inclosure; and if it is determined in any of them, it is a total dis-parking; and the king may by letters patent dissolve his *park*.

Parks as well as chases are subject to the common law, and are not to be governed by the forest laws. 4 Inst. 318. Offenders pulling down *park*-walls or pales, shall be liable to the same penalty as for killing deer, &c. by 11 Rich. See DEER *stealers*.

A *park* ought to have three sorts of ground in it. 1. Mountainous and barren. 2. Hilly and yet fertile. And 3. Plains that are sufficiently fruitful. The mountainous part should be well covered with high woods over at least a third part of it. The downs and hilly part should have one third part coppices and low woods; and the plains should be at least one third part pasture ground, with some arable or corn land. There should be a river contrived to run through some part of it, and a spring or brook to go through a great part, and at length fall into the river.

These are the natural advantages to be wished in a *park*; but when they are wanting, they are to be supplied as far as may be by art, as by ponds to preserve rain water, to supply the place of rivers and springs, and proper plantations and exposures for the rest: only the person who is to make a *park* should know what the natural advantages are, that he may take in as many of them as he can. When ponds are to be made to supply the place of natural brooks and rivers, they should be made large enough: the extraordinary expence in this will be easily reprid, by breeding fish in them, and fowl may also be kept in plenty on them. The *park* should also be well stored with trees; oaks should not be wanting in it, but beech and chesnut are the quickest of growth, and are easy to be had: these, therefore, should be planted in considerable numbers. Apple-trees and plum-trees also should be planted, as generally thriving very well, and affording good food to the deer, &c.

The best inclosure for a *park* is a brick or stone wall; but as the expence of this is very great, it may be done by paling; the pales must, in this case, be of sound heart of oak; and so close planted, that no animal of prey can make its way in between them; and for a farther defence, a good quick-set hedge is very proper, and should be kept in good order. Some part of the mountain and high wood, may conveniently be made a heronry, and some part of the middle may be a warren for hares and rabbits. Colts and horses may be bred at large in the *park*, and in the summer season it will be proper to have cows in the pasture-ground on the plains.

There should be at least five or six inclosures in the *park*, that the deer may be shut out or let in as occasion requires. In the coldest seasons they should always be kept altogether in the high woods, where they have good shelter, and are to be fed constantly with provender by the keepers. In the summer such a number as are intended to be used may also be kept on the best ground, that they may thrive quicker than those intended only for store. Some artificial holes and caverns should also be made for the deer to retire into in the hot weather, as well as in the cold.

PARK is also used for a moveable pallisade, set up in the fields to inclose sheep in to feed, and rest in, during the night.

The shepherds shift their *park* from time to time, to dung the ground, one part after another.

PARK is also used for a very large net, disposed on the brink of the sea, with only one hole, which looks towards the shore; and which becomes dry after the flood is gone off; so that the fish once got in have no way left to escape.

PARK, in *War*. PARK *of Artillery*, a post in a camp, out of cannon-shot of the enemy, and fortified, to incamp the train of ARTILLERY, and to secure the magazines and ammunition, as well as the battalions of artillery, appointed for its service and defence.

The figure of the *park* of artillery is commonly a parallelogram, unless the situation of the ground renders another necessary. The artillery is generally placed in the centre of the second line of encampment, and sometimes in the rear-line, or corps of reserve. In both places the muzzles of the guns are in a line with the fronts of the serjeants tents of the regiments of artillery and infantry. Some generals place the *park* about three hundred paces before the centre of the front line of the army: some place all the cannon and mortars in the front, together with their spare carriages; others are for dividing the equipage into brigades, and place the first in the front line, the second in the next, &c. But the most approved method, says Mr. Muller, Artill. p. 281, is to divide the artillery into brigades, and to place the guns of the first to the right of the front line, and their ammunition behind them; then those of the second brigade next to the first in the front, leaving five paces between them, and their ammunition behind them; and all the rest in the same order: the pontoons forming the last line. The artillery companies and miners are half encamped to the right, and the other half to the left of the *park*, with some of the lieutenants in the rear. At about twelve paces in the rear of the *park*, are encamped the civil list in one line; behind them, at the distance of thirty paces, is a line of the remaining lieutenants, and behind these the captains and commissaries. Opposite to the centre, and thirty paces behind the captain's line is the major's tent; and behind this at twenty paces, the colonel's to the right, and the comptroller's to the left. Opposite to the centre, and fifty paces before the *park*, is placed the army guard; and opposite to the right wing, the artillery guard at the same distance. In the middle of the front, two light pieces are advanced at a distance of twenty paces, loaded with powder for the alarm guns, which are ready to be fired when required. To the right of the *park* are placed the artificers with their tools, materials, and baggage, in a line from the front to the rear. To the left of the *park*, the commissaries and their baggage: to the right of the artificers is encamped the first battalion of artillery, with their baggage and officers behind them; and to the left of the commissaries the second battalion in the same manner. The horses are placed behind the first battalion, except those of the picket in the rear of the *park*.

Every attack, at a siege, has its *park* of artillery.

PARK *of provisions*, is a place in the camp, on the rear of every regiment, which is taken up by the sutlers, who follow the army with all sorts of provisions, and sell them to the soldiers.

PARK-*boys*, in our *Old Writers*, signifies to be quit of inclosing a *park* or any part thereof. 4 Inst. 308.

PARK-*leave*. See ST. JOHN'S *wort*.

PARKINSONIA, in *Botany*, the name of a genus of plants of the *decandria monogynia* class, so called in honour of the English botanist, Parkinson. Its characters are these: the empalement of the flower is of one leaf, indented in five parts at the top; the flower has five equal petals placed circularly, the four upper are oval, the under kidney-shaped; it has ten declining stamina, terminated by oblong summits; and a long taper germen, with scarcely any style, crowned by an obtuse stigma; the germen becomes a long taper pod with the swelling joints, in each of which is lodged one oblong seed: we know but one species of this plant, which is very common in the Spanish West Indies, but has of late years been introduced into the English settlements, for the beauty and sweetness of its flowers. In the countries where it grows naturally, it rises to be a tree of twenty or more feet high, and bears long slender bunches of yellow flowers; which have a most agreable sweet scent. Miller.

PARLEY, formed of the French *parler*, *to speak, talk*, a conference with an enemy, &c.

Hence to beat or sound a *parley*, is to give a signal for the holding such a conference, by beat of drum, or sound of trumpet. See CHAMADE.

PARLIAMENT, PARLIAMENTUM, in England, a grand assembly or convention, of the three estates of the kingdom, viz. lords spiritual, lords temporal, and commons, summoned to meet the king, to consult of matters relating to the common-weal; and particularly to enact, and repeal, laws.

The word *parliament*, or *colloquium*, as some of our historians translate it, is comparatively of modern date, derived from the French, and signifying the place where they met and conferred together. It was first applied to general assemblies of the state under Louis VII. in France, about the middle of the twelfth century. The first mention of it in our statute law is in the preamble to the statute of Westm. 1. 3 Edw. 1. A. D. 1272.

The two houſes of *parliament* are the king's grand council.

Till the conqueſt, the great Council, conſiſting only of the great men of the kingdom, was called *magnatum conventus*, and *prælatorum procerumque concilium*, *aſſiſa generalis*, and ſometimes *communitas regni Angliæ*. The Saxons, in their own tongue, called it *wittenagemote*, i. e. *aſſembly of the wiſe*; and it hath ſubſiſted immemorially under theſe appellations and others, as *michel-ſynoth*, or *great council*, and *michel-gemote*, or *great meeting*.

We have inſtances of its aſſembling to order the affairs of the kingdom, to make new laws and to amend the old, ſo early as the reign of Ina, king of the Weſt Saxons, Offa, king of the Mercians, and Ethelbert, king of Kent, in the ſeveral realms of the heptarchy. And after their union, the Mirror informs us, that king Alfred ordained for a perpetual uſage, that theſe councils ſhould meet twice in the year, or oftener if need be, to treat of the government of God's people: how they ſhould keep themſelves from ſin, live in quiet, and receive right. Our ſucceeding Saxon and Daniſh monarchs held frequent councils of this ſort, as appears from their reſpective codes of laws: the titles whereof ſpeak them to be enacted, either by the king with the advice of his *wite-nagemote* or wiſe men, or by thoſe ſages with the advice of the king, or by them both together. Theſe great councils were alſo, without doubt, held regularly under the firſt princes of the Norman line. Glanvil, who wrote in the reign of Henry II. ſpeaking of the particular amount of an amercement in the ſheriff's court, ſays, it had never yet been aſcertained by the general aſſize, or aſſembly, but was left to the cuſtom of particular countries. In Edward the Third's time, an act of *parliament*, made in the reign of William the Conqueror, was pleaded in the caſe of the abbey of St. Edmundſbury, and judicially allowed by the court. Hence it appears, that *parliaments* or general councils are co-eval with the kingdom itſelf. And this is a practice, which ſeems to have been univerſal among the northern nations, particularly the Germans, and carried by them into the countries of Europe, which they over-ran at the diſſolution of the Roman empire. Though the high antiquity of *parliaments* in this kingdom muſt be univerſally allowed, it does not ſo clearly appear how they were compoſed; and particularly, whether the commons were ſummoned at all, or, if ſummoned, at what period they began to form a diſtinct aſſembly. Nevertheleſs it is generally agreed, that in the main the conſtitution of *parliament*, as it now ſtands, was marked out ſo long ago as the ſeventeenth year of king John, A. D. 1215, in the great charter granted by that prince, wherein he promiſes to ſummon all archbiſhops, biſhops, abbots, earls, and greater barons, perſonally; and all other tenants in chief under the crown, by the ſheriff and bailiffs; to meet at a certain place, with forty days notice, to aſſeſs aids and ſcutages when neceſſary. And this conſtitution has ſubſiſted in fact at leaſt from the year 1266, 49 Hen. III. there being ſtill extant writs of that date, to ſummon knights, citizens, and burgeſſes to *parliament*.

Sir Walter Raleigh, in his Prerogative of *Parliament*, thinks the commons were firſt called in the 17th of Henry I. and Dr. Heylin fixes the time of their firſt admiſſion to the reign of Henry II.

Indeed, ſir Edward Coke, Doddridge, Prynn, and others, have ſhewn, that the commons of England had always a ſhare in the legiſlature, and a place in the great aſſemblies; though not on the preſent footing, as making a diſtinct houſe, and as compoſed of knights, citizens, and burgeſſes.

Parliaments are to be ſummoned, prorogued, and diſſolved, by the king alone: nor can a *parliament* begin without the king's preſence, or that of his commiſſioners.

At firſt, new *parliaments* were called every year; by degrees their term grew longer. In the time of king Charles II. they were held a long time with great interruptions between. Both which methods were found of ſuch ill conſequences, that in the beginning of the reign of king William, an act was paſſed whereby the term of all *parliaments* was reſtrained to three ſeſſions, or three years; this was hence called the *triennial act*. Since that, from other views, the period of *parliaments* is lengthened to ſeven years.

A *parliament* is called by the king's writ, or letter directed to each lord, commanding him to appear; and by other writs directed to the ſheriffs of each county, to ſummon the people to elect two knights for each county, and one or two burgeſſes for each borough, &c.

This writ is iſſued out of chancery by advice of the privy council, at leaſt forty days before it begins to ſit. This right of ſummons is a branch of the royal prerogative; ſo that no *parliament* can be convened by its own authority, or by the authority of any, except the king alone. Nor is it an exception to this rule that, by ſome modern ſtatutes, on the demiſe of a king or queen, if there be then no *parliament* in being, the laſt *parliament* revives, and is to ſit again for ſix months, unleſs diſſolved by the ſucceſſor; becauſe this revived *parliament* muſt have been originally ſummoned by the crown. There are, it muſt be acknowledged, two capital exceptions to this rule, which were juſtifiable on a principle of neceſſity, that ſuperſedes all law. The convention *parliament*, that reſtored king Charles II. met above a month before his return; the lords by their own authority, and the commons in purſuance of writs iſſued in the name of the keepers of the liberty of England by the authority of *parliament*; and this *parliament* ſat full ſeven months after the Reſtoration, and enacted many laws ſtill in force. But the firſt thing done after the king's return was to paſs an act declaring this to be a good *parliament*, notwithſtanding the defect of the king's writs. And it was thought farther neceſſary to confirm its acts in the next *parliament*, by 13 Car. II. cap. 7. and cap. 14. The other exception occurs at the time of the Revolution, A. D. 1688, when the lords and commons by their own authority, and upon the ſummons of the prince of Orange (afterwards king William), met in a convention, and diſpoſed of the crown and kingdom. The throne at this time was vacant by the abdication of king James II. and it was declared by 1 W. and M. ſtat. 1. cap. 1. that this convention was really the two houſes of *parliament*, notwithſtanding the want of writs, and other defects of form.

As the king only can convoke a *parliament*, he is bound to do this every year, or oftener, if need be. And by 16 Car. II. cap. 1. it is enacted, that the ſitting and holding of *parliaments* ſhall not be intermitted above three years at the moſt: by 1 W. and M. ſtat. 2. cap. 2. it is declared to be one of the rights of the people, that for redreſs of all grievances, and for the amending, ſtrengthening and preſerving the laws, *parliaments* ought to be held frequently; and this indefinite frequency is reduced to a certainty by 6 W. and M. cap. 2. which enacts, that a new *parliament* ſhall be called within three years, after the determination of the former.

As to the conſtituent parts of *parliament*, theſe are the king, who ſits there in his royal political capacity, and the three eſtates of the realm; the lords ſpiritual, the lords temporal, who ſit, together with the king in one houſe, and the commons, who ſit by themſelves in another. And the king and theſe three eſtates together, form the great corporation or body politic of the kingdom, of which the KING is ſaid to be *caput*, *principium*, and *finis*. For upon their coming together the king meets them, either in perſon or by repreſentation, without which there can be no beginning of a *parliament*; and he alſo alone has the power of diſſolving them.

The ſpiritual lords conſiſt of two ARCHBISHOPS and twenty-four BISHOPS, who are ſuppoſed to hold certain ancient baronies under the king, in right of which they obtain their ſeats in the houſe of lords: where they intermix in their votes with the temporal lords, ſo that in every eſſential ſenſe they form one eſtate. The lords temporal conſiſt of all the PEERS of the realm, as dukes, marquiſes, earls, viſcounts, and barons. Some of theſe ſit by deſcent, as do all ancient peers; ſome by creation, as do all new made ones; others, ſince the union with Scotland, by election, which is the caſe of the ſixteen peers, who repreſent the body of the Scotch nobility. Their number is indefinite, and may be increaſed at will by the power of the crown.

The COMMONS conſiſt of all ſuch men of any property in the kingdom as have not ſeats in the houſe of lords; every one of whom has a voice in *parliament*, either perſonally, or by his repreſentative.

The number of Engliſh repreſentatives is five hundred and thirteen (viz. ninety-two knights of ſhires, fifty citizens for twenty-five cities, Ely ſending none, and London four, three hundred and thirty-four burgeſſes for one hundred and ſixty-ſeven boroughs, two each, five for five boroughs, one each, and twelve for twelve boroughs in Wales, Pembroke ſending two, and Merioneth none, four for the two univerſities, and ſixteen for the eight cinque ports,) and of Scots forty-five; in all five hundred and fifty-eight.

The juriſdiction of *parliament* thus compoſed and conſidered as an aggregate body, is ſo tranſcendent, that it makes, enlarges, abrogates, repeals, and revives laws, and ſtatutes, concerning matters eccleſiaſtical, civil, criminal, martial, maritime, &c. And for making of laws, and in proceeding by bill, this ſupreme court is not confined either for cauſes or perſons within any bounds; nor is it tied down to any certain rules or forms of law, in proceedings and determinations: the court of *parliament* hath power to judge in matters of law; and redreſs miſchiefs and grievances that happen, eſpecially ſuch as

have no ordinary remedy; to examine into the corruption of judges and magiſtrates, and illegal proceedings of other courts; to redreſs errors, and determine on petitions and appeals, &c. and from this high court there lies no appeal.

It can regulate or new model the ſucceſſion to the CROWN; as in the reign of Henry the VIII. and William III. It can alter the eſtabliſhed religion of the land, as was done in the reigns of king Henry VIII. and his three children. It can change and create afreſh even the conſtitution of the kingdom, and even of *parliaments* themſelves, as was done by the act of union, and the ſeveral ſtatutes for triennial and ſeptennial elections. And, therefore, ſome have not ſcrupled to call its power, by too bold a figure, the omnipotence of *parliament*. It is therefore, as judge Blackſtone obſerves, a matter moſt eſſential to the liberties of the kingdom, that ſuch members be delegated to this important truſt, as are moſt eminent for their probity, their fortitude, and their knowledge: for it was a known apothegm of the great lord treaſurer Burleigh, "that England could never be ruined but by a *parliament*;" and as ſir Matthew Hale obſerves, this being the higheſt and greateſt court, over which none other can have juriſdiction in this kingdom, if by any means a miſgovernment ſhould any way fall upon it, the ſubjects of this kingdom are left without all manner of remedy. To the ſame purpoſe the preſident Monteſquieu preſages; that as Rome, Sparta, and Carthage, have loſt their liberty and periſhed, ſo the conſtitution of England will in time loſe its liberty and periſh: it will periſh, whenever the legiſlative power ſhall become more corrupt than the executive.

Affairs of *parliament* are to be determined by the *parliament*; and though the *parliament* err, it is not reverſible in any other court: and not only what is done in the houſe of commons, but what relates to the commons during the *parliament*, and ſitting of the *parliament*, is no where elſe to be puniſhed but by themſelves, or a ſucceeding *parliament*. Every court of juſtice having laws and cuſtoms for its direction, the high court of *parliament* hath its own proper laws and cuſtoms, called the laws and cuſtoms of *parliament*; inſomuch that no judges ought to give any opinion of matters done in *parliament*, becauſe they are not to be decided by the common law: but the *parliament*, in their judicial capacity, are governed by the common and ſtatute laws, as well as the courts in Weſtminſter-hall.

The lords and commons in their reſpective houſes have power of judicature, and ſo have both houſes together: and in former times, both lords and commons ſat together in one houſe of *parliament*. The king cannot take notice of any thing ſaid to be done in the houſe of commons but by the report of the houſe; and every member of the houſe of *parliament* has a judicial place, and can be no witneſs.

The houſe of lords is a diſtinct court of judicature from the commons, to ſeveral purpoſes; they try criminal cauſes on impeachments of the commons, and have an original juriſdiction for the trial of peers upon indictments found by a grand jury: they alſo by cauſes upon appeals from the court of chancery, or upon writs of error to reverſe judgments in the king's bench, &c. Alſo the houſe of commons is a diſtinct court to many purpoſes; they examine the right of elections, expel their own members, and commit them to priſon, and ſometimes other perſons, &c. And the book of the clerk of the houſe of commons is a record.

In order to prevent the miſchief that might ariſe from repoſing ſuch extenſive authority with incompetent perſons, it is provided by the cuſtom and law of *parliament*, that no one ſhall ſit or vote in either houſe, unleſs he be twenty-one years of age. 7 and 8 W. III. cap. 25. No member ſhall ſit or vote in either houſe, till he hath in the preſence of the houſe, taken the oaths of allegiance, ſupremacy, and abjuration, and ſubſcribed and repeated the declaration againſt tranſubſtantiation, and invocation of ſaints, and the ſacrifice of the maſs. 30 Car. II. ſtat. 2. 1 Geo. I. cap. 13. No alien, even though he be naturalized, ſhall be capable of being a member of either houſe of *parliament*, 12 and 13 W. III. cap. 2. As to the qualifications of members of the houſe of commons, beſides the above qualifications, it is declared and required by the law of *parliament* or ſpecial ſtatutes, that they muſt not be any of the twelve judges, becauſe they ſit in the lords houſe, nor of the clergy, becauſe they ſit in convocation, nor perſons attainted of treaſon or felony, becauſe they are unfit to ſit any where: that ſheriffs of counties, and mayors, and bailiffs of boroughs are not eligible in their reſpective juriſdictions, as being returning officers: that no perſons concerned in the management of any duties or taxes created ſince 1692, except the commiſſioners of the treaſury, nor any of the officers following, viz. commiſſioners of prizes, tranſports, ſick and wounded, wine licences, navy and victualling; ſecretaries or receivers of prizes, comptrollers of the army accounts, agents for regiments, governors of plantations and their deputies, officers of Minorca or Gibraltar, officers of the exciſe and cuſtoms, clerks or deputies in the ſeveral offices of the treaſury, exchequer, navy, victualling, admiralty, pay of the army or navy, ſecretaries of ſtate, ſalt, ſtamps, appeals, wine licences, hackney-coaches, hawkers and pedlars; nor any perſons that hold any new office under the crown created ſince 1705, are capable of being elected members: that no perſon having a penſion under the crown during pleaſure, or for any term of years, is capable of being elected: that if any member accepts an office under the crown, except an officer in the army or navy accepting a new commiſſion, he vacates his ſeat, but is capable of being re-elected: and moreover, perſons in particular circumſtances have forfeited the right of choice, and have been declared ineligible for *that parliament* by a vote of the houſe of commons, or *for ever*, by an act of the legiſlature. It has been alſo required, in ſtrictneſs, that all members ſhould be inhabitants of the places for which they are choſen, but this is altogether diſregarded. For other qualifications, and for the qualifications of electors, ſee BURGESS and KNIGHTS *of the Shire*.

As for the method of proceeding in elections; when the *parliament* is ſummoned, the lord chancellor, (or if a vacancy happens during *parliament*, the ſpeaker, by order of the houſe) ſends his warrant to the clerk of the crown in chancery; who iſſues out writs to the ſheriff of every county, for the election of all the members to ſerve for that county, and every city and borough in it. Within three days after the receipt of this writ, the ſheriff is to ſend his precept, under his ſeal, to the proper returning officers of the cities and boroughs, commanding them to elect their members: and the ſaid returning officers are to proceed to election within eight days from the receipt of the precept, giving four days notice of the ſame; and to return the perſons choſen, together with the precept, to the ſheriff. But elections of knights of the ſhire muſt be proceeded to by the ſheriffs themſelves in perſon, at the next *county* COURT that ſhall happen after the delivery of the writ. If this court falls upon the day of delivering the writ, or within ſix days after, the ſheriff may adjourn the court and election to ſome other time, not longer than ſixteen days, nor ſhorter than ten; but he cannot alter the uſual place without conſent of the candidates: and in all ſuch caſes, ten days public notice muſt be given of the time and place of election. In order to prevent all undue influence, as ſoon as the time and place of election, in counties or boroughs, are fixed, all ſoldiers quartered in the place, are to remove, at leaſt one day before the election, to the diſtance of two miles or more; and not to return till one day after the poll is ended. By vote of the houſe of commons, no lord of *parliament*, or lord lieutenant of a county, hath any right to interfere in the election of commoners; and by ſtatute, the lord warden of the cinque ports ſhall not recommend any members there. If any officer of the exciſe, cuſtoms, ſtamps, or other branches of the revenue preſumes to intermeddle in elections, by perſuading or diſſuading any voter, he forfeits 100*l.* and is diſabled to hold any office.

For the proviſions againſt bribery. See BRIBERY.

On the day of election, the returning officer firſt takes an oath againſt bribery, and for the due execution of his office; the candidates alſo, if required, muſt ſwear to their qualifications; and the electors, both in counties and boroughs, are compellable to take the oaths of abjuration and that againſt bribery and corruption. When the election is cloſed, the returning officer in boroughs returns his precept to the ſheriff with the perſons elected by the majority: and the ſheriff returns the whole, together with the writ for the county, and the knights elected, to the clerk of the crown in chancery, before the day of meeting, if it be a new *parliament*; or within fourteen days after the election, if it be an occaſional vacancy; under penalty of 500*l.* If the ſheriff does not return ſuch knights only as are duly elected, he forfeits by the old ſtatutes of Henry VI. 100*l.* and the returning officer in boroughs for a like falſe return, 40*l.* and they are beſides liable to an action, in which double damages ſhall be recovered, by the later ſtatutes of king William: and any perſon bribing the returning officer ſhall alſo forfeit 300*l.* But the members returned by him are the ſitting members, until the houſe of commons, upon petition, ſhall adjudge the return to be falſe and illegal.

The privileges of *parliament* are very large and indefinite: the chief of theſe are privilege of ſpeech, of perſon, of their domeſtics, and of their lands and goods. Privilege

of ſpeech is declared to be one of the liberties of the people, and it is declared by ſtatute 1 W. and M. ſtat. 2. cap. 2. that the freedom of ſpeech and debates, and proceedings in *parliament*, ought not to be impeached or queſtioned, in any court or place out of *parliament*.—And this freedom of ſpeech is particularly demanded of the king in perſon, by the ſpeaker of the houſe of commons, at the opening of every new *parliament*. So likewiſe are the other privileges, which are immunities as ancient as Edward the Confeſſor, and the old Gothic conſtitution. To aſſault by violence a member of either houſe, or his menial ſervants, is a high contempt of *parliament*, and there puniſhed with the utmoſt ſeverity: and there are alſo penalties annexed to it in the courts of law, by 5 Hen. IV. cap. 6. and 11 Hen. VI. cap. 11. Neither can any member of either houſe be arreſted, and taken into cuſtody, nor ſerved with any proceſs of the courts of law; nor can his menial ſervants be arreſted; nor can any entry be made on his lands; nor can his goods be diſtrained or ſeized; without a breach of the privilege of *parliament*. Theſe privileges laſt, however, only during the ſeſſion of *parliament*, excepting as they reſpect the freedom of perſon, which in a peer is always inviolable, and in a commoner for forty days after every prorogation, and forty days before the next meeting; and this is commonly as long as the *parliament* ſubſiſts. See farther, on this ſubject, under the article COMMONS.

As to the ſpecial privileges and claims of peers, we may obſerve, that, by the *charter of the* FOREST, confirmed in *parliament*, 9 Hen. III. every lord ſpiritual or temporal, ſummoned to *parliament*, and paſſing through the king's foreſts, may, both in going and returning, kill one or two of the king's deer without warrant. They have alſo a right to be attended by the judges of the court of king's bench and common pleas, and ſuch of the barons of the exchequer as are of the degree of the coif, or have been made ſerjeants at law, and likewiſe by the maſters of the court of chancery, for their advice in point of law, &c. The ſecretaries of ſtate, the attorney and ſolicitor general, and the reſt of the king's learned counſel, being ſerjeants, were alſo uſed to attend the houſe of peers, and have, to this day, their regular writs of ſummons iſſued out at the beginning of every *parliament*: but as many of them have of late years been members of the houſe of commons, their attendance here is fallen into diſuſe. Every peer, by licence obtained from the king, may make another lord of *parliament* his proxy, to vote for him in his abſence; which no member of the houſe of commons can do, becauſe he is himſelf but a proxy for a multitude of other people. Each peer has alſo a right, by leave of the houſe, when a vote paſſes contrary to his ſentiments, to enter his diſſent on the journals of the houſe, with the reaſons for ſuch diſſent, which is uſually ſtyled his PROTEST. All bills, likewiſe, that may in their conſequences affect the rights of the peerage, are by cuſtom of *parliament* to have their commencement in the houſe of peers, and to ſuffer no amendment or changes in the houſe of commons. Moreover, the ſtatute 6 Ann. cap. 23. which regulates the election of the ſixteen repreſentative peers of North Britain, peculiarly relates to the houſe of lords.

The ſpecial privilege and right of the houſe of commons comprehend all grants of ſubſidies or parliamentary aids, which begin with them, and are firſt beſtowed in their houſe. See MONEY *bills*.

The place where the *parliament* meets is wherever the king pleaſes: of late it has been in the palace of Weſtminſter, the lords and commons each in a diſtinct apartment. In the lords houſe the princes of the blood are placed in diſtinct ſeats; the great officers of ſtate, dukes, marquiſes, and biſhops, on benches, and the viſcounts and barons on others acroſs the houſe; all according to their order of creation, place, &c.

The commons ſit promiſcuouſly, forty members conſtituting a houſe; only the ſpeaker has a chair at the upper end; and the clerk and his aſſiſtant at a table near him. See SPEAKER.

As to the manner of debating and paſſing bills in PARLIAMENT.

To bring a BILL into the houſe, if relief ſought by it is of a private nature, it is firſt neceſſary to preſer a petition; which muſt be preſented by a member, and uſually ſets forth the grievance deſired to be remedied. This petition (when founded on facts that may be in their nature diſputed) is referred to a committee of members, who examine the matter alleged, and accordingly report it to the houſe; and then (or otherwiſe upon the mere petition) leave is given to bring in the bill. In public matters the bill is brought in upon motion made to the houſe, without any petition at all. Formerly, all bills were drawn in the form of petitions, which were entered upon the *parliament rolls*, with the king's anſwer thereunto ſubjoined; not in any ſettled form of words, but as the circumſtances of the caſe required: and at the end of each *parliament* the judges drew them into the form of a ſtatute, which was entered on the *ſtatute rolls*. In the reign of Henry V. to prevent miſtakes and abuſes, the ſtatutes were drawn up by the judges before the end of *parliament*; and, in the reign of Henry VI. bills in the form of acts, according to the modern cuſtom, were firſt introduced.

The perſons, directed to bring in the bill, preſent it in a competent time to the houſe, drawn out on paper, with a multitude of blanks, or void ſpaces, where any thing occurs that is dubious, or neceſſary to be ſettled by the *parliament* itſelf (ſuch, eſpecially, as the preciſe date of times, the nature and quantity of penalties, or of any ſums of money to be raiſed); being indeed only the ſkeleton of the bill. In the houſe of lords, if the bill begins there, it is (when of a private nature) referred to two of the judges, to examine and report the ſtate of the facts alleged, to ſee that all neceſſary parties conſent, and to ſettle all points of technical propriety. This is read a firſt time, and at a convenient diſtance a ſecond time; and after each reading the ſpeaker opens to the houſe the ſubſtance of the bill, and puts the queſtion, whether it ſhall proceed any farther. The introduction of the bill may be originally oppoſed, as the bill itſelf may at either of the readings; and, if the oppoſition ſucceeds, the bill muſt be dropped for that ſeſſions: as it muſt alſo, if oppoſed with ſucceſs in any of the ſubſequent ſtages.

After the ſecond reading it is committed, that is, referred to a committee; which is either ſelected by the houſe in matters of ſmall importance, or elſe, upon a bill of conſequence, the houſe reſolves itſelf into a committee of the whole houſe. A committee of the whole houſe is compoſed of every member; and, to form it, the ſpeaker quits the chair (another member being appointed chairman), and may ſit and debate as a private member. In theſe committees the bill is debated clauſe by clauſe, amendments made, the blanks filled up, and ſometimes the bill entirely new modelled. After it has gone through the committee, the chairman reports it to the houſe with ſuch amendments as the committee have made; and then the houſe reconſider the whole bill again, and the queſtion is repeatedly put upon every clauſe and amendment. When the houſe have agreed or diſagreed to the amendments of the committee, and ſometimes added new amendments of their own, the bill is then ordered to be engroſſed, or written in a ſtrong groſs hand, on one or more long rolls (or preſſes) of parchment ſewed together. When this is finiſhed, it is read a third time, and amendments are ſometimes then made to it; and, if a new clauſe be added, it is done by tacking a ſeparate piece of parchment to the bill, which is called a rider. The ſpeaker then again opens the contents; and, holding it up in his hands, puts the queſtion whether the bill ſhall paſs. If this is agreed to, the title to it is then ſettled; which uſed to be a general one for all the acts paſſed in the ſeſſion, till, in the fifth year of Henry VIII. diſtinct titles were introduced for each chapter. After this, one of the members is directed to carry it to the lords, and deſire their concurrence; who, attended by ſeveral more, carries it to the bar of the houſe of peers, and there delivers it to their ſpeaker, who comes down from his woolſack to receive it.

It there paſſes through the ſame forms as in the other houſe (except engroſſing, which is already done), and, if rejected, no more notice is taken, but it paſſes *ſub ſilentio*, to prevent unbecoming altercations. But, if it is agreed to, the lords ſend a meſſage, by two maſters in chancery (or ſometimes two of the judges), that they have agreed to the ſame: and the bill remains with the lords, if they have made no amendment to it. But if any amendments are made, ſuch amendments are ſent down with the bill to receive the concurrence of the commons. If the commons diſagree to the amendments, a conference uſually follows between members deputed from each houſe; who for the moſt part ſettle and adjuſt the difference: but, if both houſes remain inflexible, the bill is dropped. If the commons agree to the amendments, the bill is ſent back to the lords, by one of the members, with a meſſage to acquaint them therewith. The ſame forms are obſerved, *mutatis mutandis*, when the bill begins in the houſe of lords. But, when an act of grace or pardon is paſſed, it is firſt ſigned by his majeſty, and then read once only in each of the houſes, without any new engroſſing or amendment. And when both houſes have done with any bill, it always is depoſited in the houſe of peers, to wait the royal aſſent; except in the caſe of a money-bill, which

which, after receiving the concurrence of the lords, is ſent back to the houſe of commons.

The royal aſſent may be given two ways. 1. In perſon; when the king comes to the houſe of peers, in his crown and royal robes, and ſending for the commons to the bar, the titles of all the bills that have paſſed both houſes are read; and the king's anſwer is declared by the clerk of the *parliament* in Norman-French. If the king conſents to a public bill, the clerk uſually declares, "*le roy le veut; the king wills it ſo to be*" if to a private bill, "*ſoit fait come il eſt deſiré; be it as it is deſired.*" If the king refuſes his aſſent, it is in the gentle language of "*le roy s' aviſera; the king will adviſe upon it.*" When a money-bill is paſſed, it is carried up and preſented to the king by the ſpeaker of the houſe of commons; and the royal aſſent is thus expreſſed, "*le roy remercie ſes loyal ſubjects, accepte leur benevolence, et auſſi le veut; the king thanks his loyal ſubjects, accepts their benevolence, and wills it ſo to be.*" In caſe of an act of grace, which originally proceeds from the crown, and has the royal aſſent in the firſt ſtage of it, the clerk of the *parliament* thus pronounces the gratitude of the ſubject; "*les prelats, ſeigneurs, et commons, en ce preſent* parliament *aſſembles, au nom de tous vous autres ſubjects, remercient tres humblement votre majeſte, et prient a Dieu vous donner en ſante bone vie et longue; the prelates, lords, and commons, in this preſent* parliament *aſſembled, in the name of all your other ſubjects, moſt humbly thank your majeſty, and pray to God to grant you in health and wealth long to live.*" 2. By the ſtatute 33 Hen. VIII. cap. 21. the king may give his aſſent, by letters patent, under his great ſeal, ſigned with his hand, and notified, in his abſence, to both houſes, aſſembled together in the high houſe. And, when the bill has received the royal aſſent, in either of theſe ways, it is then, and not before, a ſtatute or act of *parliament*. A copy of which is uſually printed at the king's preſs, for the information of the whole land. See, on this article, Blackſt. Com. book i. chap 2.

PARLIAMENT, *adjournment of*, is a continuance of the ſeſſion from one day to another, as the word ſignifies, which is done by the authority of each houſe ſeparately, every day, and ſometimes for a fortnight or a month together: but the adjournment of one houſe is no adjournment of the other.

PARLIAMENT, *diſſolution of*, is the civil death of the *parliament*, which may be effected either by the king's will, expreſſed in perſon, or by repreſentation: or by the demiſe of the crown, in which caſe it is enacted, by 7 & 8 Will. III. cap. 15. and 6 Anne, cap. 7. that the *parliament* in being ſhall continue for ſix months after the death of any king or queen, unleſs ſooner prorogued or diſſolved by the ſucceſſor; and that if, at the time of the king's death, it ſtands adjourned or prorogued, it ſhall aſſemble immediately; and that, if no *parliament* is then in being, the members of the laſt *parliament* ſhall aſſemble, and be again a *parliament*: or, laſtly, by length of time, which, by 6 W. & M. cap. 2. was three years; but, by 1 Geo. I. ſtat. 2. cap. 38. is now ſeven years; ſo that the *parliament* muſt expire or die a natural death at the end of every ſeventh year.

PARLIAMENT, *prorogation of*, is the continuance of it from one ſeſſion to another. This is done by the royal authority, expreſſed either by the lord chancellor, in his majeſty's preſence, or by commiſſion from the crown, or frequently by proclamation. Both houſes are neceſſarily prorogued at the ſame time? it not being a prorogation of the houſe of lords or commons, but of the *parliament*. The difference between a prorogation and an adjournment is obvious: the former puts an end to the ſeſſion, and then ſuch bills as are only begun, and not perfected, muſt be reſumed *de novo* (if at all) in a ſubſequent ſeſſion: whereas, after an adjournment, all things continue in the ſame ſtate, and may be proceeded on without any freſh commencement.

PARLIAMENT-*houſe, porter of*. See PORTER.

PARLIAMENT, *rolls of*. See ROLLS.

PARLIAMENT, *ſeſſion of*. See SESSION.

PARLIAMENT is ſometimes alſo uſed for other aſſemblies beſide thoſe of the ſtates of the realm. Thus we read, that the abbot of Croyland was uſed to call *parliaments* of his monks, to conſult of the affairs of the monaſtery. And, at this day, an aſſembly of the two Temples, called to conſult of their common affairs, is called a *parliament*.

PARLIAMENTS *of France* are courts, or aſſemblies, eſtabliſhed by the kings to judge of the differences between particular perſons, and to pronounce on appeals from ſentences given by inferior judges.

There are twelve of theſe *parliaments* in France: that of Thouloufe, eſtabliſhed in 1302; that of Dijon, in 1476; that of Grenoble, in 1453; that of Rouen, in 1499; that of Rennes, in Bretagne, in 1553; that of Bourdeaux, according to Du-Cange, in 1460; that of Aix, in 1501; that of Metz, in 1633; that of Pau, in Bearn, in 1519; that of Beſançon, in 1422; that of Douay, in 1668; and that of Paris, about 1254.

The *parliament* of Paris is the principal, and that whoſe juriſdiction is of the greateſt extent. This is the chief court of juſtice throughout the realm. It conſiſts of eight chambers: the grand chamber, where cauſes of audience are pleaded; the chamber of written law; the chamber of counſel; the Tournelle criminelle, for judging criminal affairs; the Tournelle civile, in aid of the grand chamber; and three chambers of inqueſts, where proceſſes are adjudged in writing: beſides theſe, there is alſo the chamber of vacations, and thoſe of requeſts. In 1771, the king thought fit to branch the *parliament* of Paris into ſix different *parliaments*, under the denomination of ſuperior courts, each *parliament* having ſimilar juriſdiction.

Under their ſecond race of kings, this *parliament*, like that of England, was the king's council; it gave audience to ambaſſadors, and conſulted of the affairs of war and government.

The king, like our's, at that time preſided in them, without being at all maſters of their reſolution. But, in after-times, their authority has been abridged; the kings having reſerved the deciſion of the grand affairs of the public to their own councils: leaving none but private ones to the *parliaments*.

PARLIAMENTUM *indoctorum*, a denomination given to a *parliament*, held at Coventry, 6 Henry VI. whereunto, by ſpecial precept to the ſheriffs of the ſeveral counties, no lawyer, or perſon ſkilled in the law, was to be called.

PARLIAMENTUM *inſanum*, was a *parliament* held at Oxford, anno 41 Henry III. thus called, ſay our chronicles, becauſe the lords came with great retinues of armed men to it; and many things were violently tranſacted therein, againſt the king's prerogative.

PARLIAMENTUM *diabolicum*, was a *parliament* held at Coventry, 38 Henry VI. wherein Edward, earl of March (afterwards king), and ſeveral others, were attainted.—The acts paſſed herein were annulled by the ſucceeding *parliament*.

PARLIAMENTUM *de la bande*, was a *parliament* in Edward II.'s time, whereto the barons came armed againſt the two Spencers, with coloured bands on their ſleeves, for diſtinction.

PARLIAMENT-*heel*, in *Sea-Language*, the ſituation of a ſhip, when ſhe is made to ſtoop a little to one ſide, ſo as to clean the upper part of her bottom on the other ſide, and cover it with a new compoſition; and afterwards to perform the ſame office on that part of the bottom which was firſt immerſed. See BOOT-*topping*.

PARLIAMENTARIAN is a term uſed to denote thoſe, who, in the time of the civil war, were attached to the *parliament*, in oppoſition to the royaliſts, devoted to the king.

PARLOUR, *parloir*, from the French *parler*, *to talk*, in nunneries, a little room or cloſet, where people talk to the nuns, through a kind of grated window.

Anciently there were alſo *parlours* in the convents of monks, where the novices uſed to converſe together at the hours of recreation; but there were liſtening-places over, from whence the ſuperiors could hear every thing they ſaid. Such a one there ſtill ſubſiſts in the abbey St. German de Prez.

In the order of Feuillans, the *parlour* is a little room open on all ſides, placed at each end of the dormitory, where the monks talk together, it not being allowed them to ſpeak in the dormitory.

PARMA, among *Antiquaries*, a kind of ancient buckler. Polybius deſcribes the *parma* as very ſtrong, round, three feet in diameter, and big enough to cover the whole body; yet Servius on the Æneid, and even Virgil himſelf, mention it as a light piece of armour, in compariſon of the clypeus, though bigger than the pelta.

PARMASITTY, the popular name for *ſperma ceti*.

PARMENIDES's *philoſophy*. See ELEATIC.

PARMESAN. See PADUAN.

PARMESAN is a name given to cheeſe, much eſteemed among the Italians, and made at *Parmeſan*, whence it is conveyed to various parts of Europe.

The excellent paſture grounds of this country are watered by the Po: and the cows, from whoſe milk this cheeſe is made, yield a great quantity of it. Of this cheeſe there are three ſorts, the *fromaggio di forma*, about two palms in diameter, and ſeven or eight inches thick; and the *fromaggio di ribiole* and *di ribolini*, which are not ſo large. This cheeſe is of a ſaffron colour, and the beſt is kept three or four years.

PARNASSIA, in *Botany*. See GRASS *of Parnaſſus*.

PARNASSUS, in *Geography* and *Mythology*, a mountain in Greece, conſecrated, by the poets, to the Muſes, thence called Parnaſſides, to Apollo, and to Bacchus. It is deſcribed as having two ſummits, between which ariſes the Caſtalian fountain. The Greeks call this mountain Licaoura.

PARNOPS, in *Natural Hiſtory*, the name of a ſpecies of waſp, found very frequently in vineyards, and among the wine-preſſes, eſpecially in hot countries. It is diſtinguiſhed from all the other waſps by the roundneſs of its body, which is not ſlender or flatted in the common way, but round and tumid.

PAROCHETEUSIS, from παρα and οχεϝω, from οχεϝ, *a canal*, a term uſed by Hippocrates to expreſs a derivation of the humours from one part, in order to the evacuating them by another not far diſtant. This is often a very happy cura for the cure of a diſeaſe.

PAROCHIAL, ſomething belonging to a pariſh. See PARISH and EXTRAPAROCHIAL.

Every church is either cathedral, collegiate, or *parochial*.

Cathedral is where there is a biſhop's ſee, or ſeat, called *cathedra*. Collegiate conſiſts either of regular clerks, profeſſing ſome religious order; or of a dean and chapter.

Parochial church is that inſtituted for the performing of divine ſervice to the people who dwell within a certain compaſs of ground. See PARISH.

PAROCHUS, among the Romans, one who provided mules, tents, and carriages, with all other neceſſaries, for the provincial magiſtrates in their journies, as alſo for ambaſſadors. For, in the early times of the republic, they had their charges born by the public, that the allies or provincials might not be burthened.

PARODIC *degrees*, in an equation, the ſeveral regular terms in the quadratic, cubic, biquadratic, or other equation, the indices of whoſe powers aſcend or deſcend orderly in an arithmetical progreſſion.

Thus, $Z^4 + Z^3M + Z^2r = S$ is a cubical equation where no term is wanting, but having all its *parodic degrees*; the indices of the terms regularly deſcending thus, 3, 2, 1, 0. Harris.

PARODY, *parodia*, formed from παρα, and ωδη, *via, way*, as being trite, or paſſing among the people, a popular maxim, adage, or proverb.

PARODY, παρῳδια, is alſo a poetical pleaſantry, conſiſting in applying the verſes written on one ſubject, by way of ridicule, to another; or in turning a ſerious work into burleſque, by affecting to obſerve, as nearly as poſſible, the ſame rhymes, words, or cadences.

The *parody* was firſt ſet on foot by the Greeks; from whom we borrow the name. It comes near to what ſome of our late writers call *travelly*.

Others have more accurately diſtinguiſhed between a *parody* and burleſque: and they obſerve, that the change of a ſingle word may *parody* a verſe; or of a ſingle letter a word. Thus, in the laſt caſe, Cato expoſed the inconſtant diſpoſition of Marcus Fulvius Nobilior, by changing *Nobilior* into *Mobilior*.

Another kind of *parody* conſiſts in the mere application of ſome known verſe, or part of a verſe of a writer, without making any change in it, with a view to expoſe it.

A fourth inſtance is that of writing verſes in the taſte and ſtyle of authors, little approved.

The rules of *parody* regard the choice of a ſubject, and the manner of treating it. The ſubject ſhould be a known and celebrated work: as to the manner it ſhould be by an exact imitation, and an intermixture of good-natured pleaſantry. Mem. de l'Acad. Belles Lettres, tom. vii. p. 39, &c.

PAROEMIA, παροιμια, formed from παρα and ομη, *way*; *away*, παρα ομην, *juxta viam*, i. e. *tritam*, a PROVERB.

PAROL, *parole*, in *Law*, is ſometimes uſed in antient writers for a plea in court.

PAROL *evidence*. See EVIDENCE.

PAROL *demurrer*, in *Law*, is a privilege allowed to an infant, who is ſued concerning lands, which came to him by deſcent: and the court thereupon will give judgment, *Quod loquela predicta remaneat quouſque* the infant comes to the age of twenty-one years. And where the age is granted on *parol demurrer*, the writ doth not abate, but the plea is put *ſine die*, until the infant is of full age; and then there ſhall be a reſummons.

The granting of a *parol demurrer* is in favour of an infant, and for his benefit, that he may not be prejudiced in his right, for want of well knowing his eſtate, &c.

PAROL, *leaſe*, or *per* PAROL, is a LEASE by word of mouth; thus called to diſtinguiſh it from one in writing.

PAROLE, in *War*, &c. when a priſoner of war is allowed to go into his own country, or to his own party, upon his word and promiſe to return at a time appointed, if not exchanged, he is ſaid to be out upon *parole*, i. e. upon his word.

PAROLE, *paſs*. See PASS-PAROLE.

PAROLI, in *Gaming*, the double of what was laid at ſtake, before. Hence to offer the *paroli*, &c.

PARONOMASIA, παρονομασια, formed from παρα, *near*, and ονομα, *name*, q. d. proximity or reſemblance of two names, in *Rhetoric*, a pun, or figure whereby words nearly alike in ſound, but of very different ſenſes, are affectedly or deſignedly uſed.

As, not *friends* but *fiends* were here. So Tully to Antony, *cum in gremio mimarum* mentem & mentum *depones*: and to Atticus, *conſul ipſe* parvo *animo* & pravo, facie *magis quam* facetiis *ridiculus*. And that of P. Chryſologus, *monachorum cellulæ jam non* eremiticæ, *ſed* aromiticæ. And, in another place, *hoc agant in* cellis *quod angeli in* cœlis.

Among the Greeks the *paronomaſia* was very familiar. Thus Herodotus, αναθηκεσι, μεθυσασι, *quæ nocent, docent*. And thus that inſcription of Apollodorus, a celebrated painter, on one of his pieces.

Μωμησεσθαι της μαλλον, η μιμησεσθαι.

It will be eaſier to deride, than to imitate.

PARONYCHIA, *whitlow*, in *Medicine*. See WHITLOW.

PARONYCHIA, in *Botany*. See WHITLOW-*graſs*.

PARONYMA, in *Grammar*, are words which have ſome affinity in their etymology.

PAROTIDES, παροτιδες, formed from παρα, *near*, and ους, *ear*, in *Anatomy*, two large glands ſituate behind the two ears; and filling all the ſpace between the poſterior angle of the under-jaw, and the maſtoidal apophyſis.

They are of a conglomerate kind, and by divers excretory ducts, which at laſt coaleſce into one trunk, they diſcharge a humour ſeparated in them from the arterious blood, called *ſaliva*, into the mouth, by two veſſels, formed of ſeveral branches, uniting at the iſſue of theſe glands, and which run along the cheek to the third grinder.

PAROTIDES, in *Medicine*, tumors or inflammations, ariſing behind the ears, on the *parotid* glands.

Parotides are very frequent after malignant and peſtilential fevers: children alſo are particularly liable to them. They are to be treated like buboes. See BUBO.

Alexander Trallianus lays down a very good rule, in relation to a *paretis*, that is, at firſt to be ſure to bleed, before any diſcuſſing or drawing application be made; as thoſe who have been forward in doing this without bleeding have been the inſtruments of ſtrangling their patients: and upon the ſame principle he very juſtly explodes the uſe of ſtrong repellers and aſtringents; ſuch as ſolanum, alum, &c. he deſcribes the medicines, which are proper to make theſe *parotides*, yield to diſcuſſion: an application which ought always to be attempted, where the caſe is capable of being cured by it, rather than ſuppuration: but if upon this the tumor does not in the leaſt ſubſide, and the pain continues, all endeavours, he ſays, ſhould be uſed to bring it to ſuppurate; and it is a ſign that matter is forming if a rigor and fever, which were not before, come on unexpectedly, and the pain increaſes. And Hippocrates pronounces thoſe *parotides*, which ſucceed long fevers, mortal, unleſs they ſuppurate. When theſe are obſtinate, and cannot be ripened by external applications, there have been inſtances, where burning has brought them to ſuppurate. And Severinus, and Valeſius before him, have given an account how they have tried this practice in malignant *parotides*, with ſucceſs. Freind's Hiſtory of Phyſic.

In a ſuppuration of theſe, one caution only is needful; namely, to open the abſceſs, as ſoon as it can be ſuppoſed to have formed matter, without waiting for a fluctuation, or even ſoftneſs of the tumor, that may never happen, the pus being here ſo very viſcid, that after it is ripe, the part will feel as hard as if the ſuppuration had not begun. Pringle, Obſerv. on the Diſeaſes of the Army, p. 277.

PAROXYSM, παροξυσμος, formed from παρα, *much*, and οξυς, *acute*, in *Medicine*, the ſevere fit of a diſeaſe, under which it grows higher, or exaſperates; as of the gout, &c.

PAROXYSM is ſometimes alſo uſed for the acceſs or return of a diſeaſe that intermits; as an ague.

PARREL, in a ſhip, are frames made of trucks, ribs, and ropes, which, having both their ends faſtened to the yards, are ſo contrived as to go round about the maſts, that the yards by this means may go up and down upon the maſts. Theſe alſo, with the breaſt-ropes, faſten the yards to the maſts.

There are four different ſorts of *parrels*; one of which is formed of a ſingle rope; another of a rope communicating with an aſſemblage of ribs and trucks; a third of a rope paſſing through ſeveral trucks, without

any ribs; and the fourth of a truſs, by which the yard may be at any time ſlackened from the maſt, or confined to it as cloſe as poſſible. Theſe laſt are peculiar to the lower yards. The third are calculated for the checks of a gaff. The ſecond are always uſed for the top-ſail yards, and frequently for the lower yards, in merchant ſhips. And the firſt are ſeldom employed but for the top-gallant yards.

PARRHESIA, in *Rhetoric*, a figure in which a perſon admoniſhes or reproves another with art and addreſs, and in ſuch circumſtances as render it difficult to diſpleaſe. See Revelation, chap. ii. 2—5.

PARRICIDE, PARRICIDA, or PATRICIDA, in ſtrictneſs, denotes the murder or murderer of a father: as matricide does of a mother.

Though the word *parricide* is alſo ordinarily extended to both. The Romans, for a long time, had no law againſt *parricides*; which was alſo the caſe at Athens; from an opinion, that nobody could be ſo wicked as to kill his parents. L. Oſtius was the firſt who killed his father, five hundred years after Numa's death; and then the Pompeian law was made, which ordained, that the perſon convicted of this crime, after he had been firſt whipped till the blood came, ſhould be tied up in a leathern ſack, together with a dog, an ape, a cock, and a viper, and ſo thrown into the ſea, or the next river. By the Engliſh laws, this crime is treated no otherwiſe than as ſimple murder, unleſs the child was alſo the ſervant of his parent.

PARRICIDE is alſo extended to the murder of any near relation, as a huſband, wife, brother, ſiſter, child, grandchild, uncle, &c. and even to that of great or ſacred perſons, though no way allied in blood, as a king, &c.

PARROQUET. See PARROT *infra*.

PARROT, in *Ornithology*, the Engliſh name expreſſing in general the whole plittacus kind, but appropriated by uſe to that claſs only of them, which is of a middle ſize between the macaw and parroquet.

The *parrot*, in the Linnæan ſyſtem of zoology, makes a particular and diſtinct genus of birds, of the order of the *pices*; the diſtinguiſhing characters of which are, that the beak is hooked; that the upper mandible is furniſhed with a moveable cere; that the noſtrils are in the baſe of the beak; that the tongue is fleſhy, obtuſe, and entire, and that the feet are formed for climbing. Linnæus enumerates forty-ſeven ſpecies.

The *parrot* is a very well known bird, of which there are ſeveral very beautiful ſpecies.

Its head is large, and beak and ſkull extremely hard and ſtrong.

It might ſeem a wonder why nature has deſtined to this, which is not naturally a bird of prey, but feeds on fruits and vegetable ſubſtances, the crooked beak, allotted to the hawk and other carnivorous birds; but the reaſon ſeems to be, that the *parrot*, being a heavy bird, and its legs not very fit for ſervice, it climbs up and down trees by the help of this ſharp and hooked bill, with which it lays hold of any thing and ſecures itſelf, before it ſtirs a foot; and beſides this, it helps itſelf forward very much, by pulling its body on with this hold.

Of all animals, the *parrot* and crocodile are the only ones which move the upper jaw; all creatures elſe moving the lower only. As ſome particular animals beſides are fond of particular foods, ſo the *parrot* loves nothing ſo much as the ſeeds of the carthamus, or baſtard ſaffron; and eats them without any hurt, though they are a purge when given to other creatures.

The *parrots* are common both in the Eaſt and Weſt Indies: they are a very briſk and lively bird in the warmer countries, but with us loſe much of their vigour. They lay two or three eggs in the hollow of a tree.

In all the known *parrots* the noſtrils are round, and placed very high upon the beak, and very near one another.

Parrots are divided into three kinds. 1. The larger, which are as big as a moderate fowl, called *macaos* and *cockatoos*; theſe have very long tails. 2. The middle ſized ones, commonly called *parrots*, which have ſhort tails, and are little larger than a pigeon. And, 3. the ſmall ones, which are called *parroquets* or *perroquets*, and have long tails, and are not larger than a lark or blackbird. Ray.

PARRYING, in *Fencing*, the action of defending a man's ſelf, or of ſtaving off the thruſts, ſtrokes, &c. offered him by another. See FENCING.

Good fencers puſh and *parry* at the ſame time.

The Spaniards *parry* with the pontiard. The ancients *parried* with their bucklers.

PARSLEY, in *Botany*. For the characters, ſee APIUM.

The common *parſley* ſhould be ſown early in the ſpring, for the ſeeds remain a long time in the earth, the plants ſeldom appearing in leſs than ſix weeks after the ſeeds are ſown. It is generally ſown in drills, by the edges of the borders, in the kitchen gardens, near London; becauſe it is much eaſier to keep it clear from weeds, than if the ſeeds were ſown promiſcuouſly on a border; and the *parſley* is much ſooner cut for uſe: but when the roots are deſired for medicinal uſe, then the ſeeds muſt be ſown thin; and, when the plants are come up, they ſhould be hoed out ſingle, as is practiſed for carrots, onions, &c. obſerving alſo to cut up the weeds: if this be obſerved, the roots will become fit for uſe by July or Auguſt.

The common *parſley* is, by ſome ſkilful perſons, cultivated in fields for the uſe of ſheep, it being a ſovereign remedy to preſerve them from the rot, provided they are fed twice a week, for two or three hours each time, with this herb; but hares and rabbits are ſo fond of it, that they will come from a great diſtance to feed upon it; and in countries where theſe animals abound, they will deſtroy it, if it is not very ſecurely fenced againſt them: ſo that whoever has a mind to have plenty of hares in their fields, by cultivating *parſley*, will draw all the hares of the country to them. Miller.

The root of *parſley* is one of the five opening roots. *Parſley* is eſteemed opening, attenuating, diuretic, but liable to produce flatulencies; and is uſed for obſtructions of the liver and ſpleen; it helps the jaundice; and is of ſervice againſt the ſtone, gravel, and ſtrangury. The ſeeds are ſaid to be carminative, reſolvent, and diuretic; and commended, in the German Ephemerides, for deſtroying cutaneous inſects in children.

A diſtilled water of *parſley*, which partakes of the virtues of the plant, is directed by the college to be kept in the ſhops. James.

PARSLEY, *baſtard*, *canvalli*, in *Botany*, a genus of the *pentandria digynia* claſs, one of the umbelliferous plants, with oblong ſeeds a little furrowed and prickly; the petals of the flower are unequal and heart-ſhaped.

There is no great uſe or beauty in this plant; it may ſuffice, therefore, to ſay, that whoſoever chuſes to cultivate them ſhould ſow the ſeeds in autumn ſoon after they are ripe. Miller. Linnæus enumerates ſeven ſpecies. They grow wild in England.

PARSLEY, *corn*, *field* PARSLEY, or *baſtard ſtone* PARSLEY, *ſiſon*, in *Botany*, a genus of the *pentandria digynia* claſs. The characters are, that it has an umbellated flower; the general umbel is compoſed of ſix thin rays, or unequal ſmall umbels, and the ſmaller have ten; the involucra of both are four-leaved and unequal; and the empalement of the flower is ſcarce diſcernible; the flowers have five equal pear-ſhaped and inflexed petals; and five hair-like ſtamina, terminated by ſingle ſummits; the oval germen, which ſupports two reflexed ſtyles, crowned by obtuſe ſtigmas, becomes an oval ſtreaked fruit, dividing into two parts, each containing one oval ſtreaked ſeed, convex on one ſide and plain on the other. Miller enumerates four, but Linnæus ſix ſpecies.

PARSLEY, *fool's*. See ÆTHUSA and HEMLOCK.

PARSLEY, *Macedonian*. See BUBON and PETROSELINUM *Macedonicum*.

PARSLEY, *milky*, *ſelinum*, in *Botany*, a genus of the *pentandria digynia* claſs. Its characters are theſe: it has an umbellated flower; the general umbel is plain and ſpreading; the particular umbels are the ſame; the involucrum is compoſed of many linear ſpear-ſhaped leaves, which ſpread open; the umbel is uniform; the flowers have five inflexed heart-ſhaped petals, which are unequal, and five hair-like ſtamina, terminated by roundiſh ſummits; the germen is ſituated under the flower, ſupporting two reflexed ſtyles, crowned by ſingle ſtigmas; it afterward becomes a plain compreſſed fruit, channelled on both ſides, parting in two, containing two oblong elliptical plain ſeeds, channelled in the middle, and having membranes on both ſides. Miller enumerates two, and Linnæus four ſpecies.

Theſe plants are preſerved in botanic gardens for variety, but are rarely cultivated any where elſe: they are eaſily propagated by ſeeds, which ſhould be ſown in autumn, and the plants afterward treated in the ſame way as angelica. Miller.

PARSLEY, *mountain*. See SESELI.

PARSLEY-*piert*. See APHANES.

PARSLING, on ſhip-board. See PARCELLING.

PARSNEP, *paſtinaca*, in *Botany*, a genus of the *pentandria digynia* claſs. Its characters are theſe: it has an umbellated flower; the principal umbel is compoſed of many ſmaller, and theſe are likewiſe compoſed of ſeveral rays; they have no involucrum; and the empalement is ſcarcely viſible; the umbel is uniform; the flowers have five ſpear-ſhaped incurved petals, and five hair-like ſtamina; the germen is ſituated under the flower, ſupporting two reflexed ſtyles; the germen afterward

ward becomes an elliptical, plain, compreſſed fruit, dividing in two parts, having two bordered elliptical ſeeds. There are three ſpecies.

The *parſnep* is to be propagated by ſowing the ſeeds in February or March, in a rich mellow ſoil, which muſt be deep dug, that the roots may be able to run deep without hindrance.

It is a common practice to ſow carrots at the ſame time, upon the ſame ground with the *parſneps*; and if the carrots are deſigned to be drawn young, there is no harm in it. The *parſneps*, when they are grown up a little, muſt be thinned to ten inches or a foot diſtance, and carefully kept clear of weeds. They are fineſt taſted juſt at the ſeaſon when the leaves are decayed; and ſuch as are deſirous to eat them in the ſpring, ſhould have them taken up in the beginning of February, and preſerved in ſand, where they will remain good till the middle of April or later. When the ſeeds are to be ſaved, ſome very ſtrong and fine plants ſhould be left for it, at two feet diſtance; and towards the end of Auguſt, or the beginning of September, the ſeeds will be ripe: they muſt then be carefully gathered and dried on a coarſe cloth. They ſhould always be ſown the ſpring following, for they do not keep well.

The common wild *parſnep* is frequent by road-ſides and in dry paſtures; it flowers in June and July, and ripens its ſeeds in September. The ſeeds are warm and carminative, though not ſo violently hot as the caraway-ſeeds and others which we commonly uſe on theſe occaſions. They diſpel flatules, and are in great eſteem among the country people for curing the colic. They alſo are diuretic and aperient, and gently promote the menſes.

Haller reports, that, made into pills, with extract of liquorice, they were much uſed by Boerhaave againſt nephritic complaints and ulcerations of the bladder.

PARSNEP, *cow*, *ſphondylium* or *heracleum*, in *Botany*, a genus of the *pentandria digynia* claſs. Its characters are theſe: it has an umbellated flower; the principal umbel is compoſed of many ſmaller, which are flat; the involucrum of the general umbel has many leaves, which decay; the particular ones have from three to ſeven leaves; the general umbel is deformed; the flowers in the middle of the diſk have five equal, crooked, inflexed petals; thoſe of the rays are unequal; they have five ſtamina which are longer than the petals, terminated by ſmall ſummits, and an oval germen ſituated under the flower, ſupporting two ſhort ſtyles, crowned by ſingle ſtigmas; the germen turns to an elliptical compreſſed fruit, furrowed on each ſide, containing two compreſſed leafy ſeeds. Miller enumerates five, and Linnæus ſix ſpecies.

The common *cow parſnep*, which is frequent in our meadows and paſtures, and flowers in July and Auguſt, is recommended by Dr. Willis, and many others, as one of the beſt nervous ſimples our nation produces, and it is pity that it is not brought more into practice. The ſeed is the part in which its virtues are contained in greateſt perfection, and is a very good medicine in hyſteric caſes, given in powder or infuſion.

PARSNEP, *prickly*, *echinophoros*, in *Botany*, a genus of the *pentandria digynia* claſs. Its characters are theſe: it hath an umbellated flower, the flowers have five unequal petals; they have each five ſtamina, terminated by roundiſh ſummits; under the perianthium is ſituated an oblong germen, within the empalement, which turns to two ſeeds, which are incloſed in the empalement.—There are two ſpecies.

PARSNEP, *water*, the name of a ſpecies of *ſium*. See SKIRRET.

PARSON, *perſona*, the rector or incumbent of a pariſh-church.

He is ſaid, by ſome, to be thus called by way of eminence; the revenues of a church being deſtined to maintain *magnum perſonam*; or, as ſome will have it, becauſe he is bound by virtue of his office, *in propria perſona ſervire Deo*; whence *imperſonare*, in old charters, is to put in poſſeſſion of a parſonage, &c. Or, according to others, becauſe the original *parſons*, *perſonæ*, were, in reality, only dignitaries, and poſſeſſed benefices, which gave them ſome perſonal pre-eminences in the church or chapter, but no power. Or, laſtly, according to others, becauſe the *parſon*, for his time, repreſents his church, being in himſelf a body corporate, and ſuſtaineth the perſon thereof, as well in ſuing, as being ſued, in any action touching the ſame.

Some diſtinguiſh between a rector and *parſon*: the rector, ſay they, is where the vicarage is endowed; and the *parſon*, *perſona*, where the parſonage is without a vicarage; the diſtinction ſeems new and ſubtle. Bracton apparently uſes rector and *perſon* as ſynonymous terms.

For the difference between a *parſon* and vicar, ſee VICAR.

Formerly, he who had a church by inſtitution and induction, only for his own life, was called *parſon mortal*: but any collegiate or conventual body, to whom the church was for ever appropriated, was called *parſon immortal*.

Some, again, make a diſtinction between *parſon* ſimply, and *parſon imperſonee*, or imperſonated.

Parſon imperſonee is the rector or incumbent in poſſeſſion of a pariſh-church, whether preſentative or impropriate, and with whom the church is full: or a *parſon imperſonee* is a clerk preſented, inſtituted, and inducted into a rectory, and, therefore, in complete poſſeſſion.

Parſon ſimply, they contend, is properly the patron, or he that has the right of preſentation: called *parſon*, becauſe, before the Lateran council, he had a right to the tythes, in reſpect of his liberality in erecting or endowing the church, *quaſi ſuſtinens perſonam eccleſiæ*.

It is certain, in the regiſter of writs, *perſona impersonata* is uſed for the rector of a benefice preſentative: and, in Dyer, a dean and chapter are ſaid to be *parſons imperſonee* of a benefice appropriated to them. So that *perſonata* ſeems only changed into *imperſonata*, in reſpect of the poſſeſſion of the benefices. See Coke on Litt. fol. 300.

PARSONAGE, a rectory, or pariſh-church, endowed ordinarily with houſe, glebe, and tythe, for the maintenance of a miniſter, with cure of ſouls, within ſuch pariſh.

There may alſo be a rectory or *parſonage* without any glebe land, except the church and church-yard; and without any tythes, or other fixed income, except an annual payment, or pound rate.

PARSONAGE, in its original, and, at this day, in other countries, is a benefice, which gives ſome prerogative, or pre-eminence in a church or chapter, but without any juriſdiction.

The ancient *parſonages* gave a little honour and dignity as to the perſon, but they gave no power: whence, apparently, the name, intimating the effect of the dignity to be reſtrained to the perſon, *perſona*, *parſon*.

Such are ſtill the chantries in ſeveral churches, and the ſubchantries in others.

Some, as Oldrade, &c. extend the word *parſonage* to dignitary, and comprehend under it the archdeacons, deans, &c. in cathedrals; but this ſeems to be ſtraining the ſenſe of the word.

In effect, the canoniſts uſe the term very differently; ſome applying it to all who have any prerogative in the choir or chapter, over the other canons, either in options, ſuffrages, elections, or barely in place and proceſſion; thus confounding it with dignity; while others apply it to ſimple rectors, &c.

PART, *pars*, a portion of ſome whole, conſidered as divided, or as diviſible.

Quantity is diviſible into an infinite number of *parts*; not equal *parts*, but proportional ones. Philoſophy is divided into four *parts*; viz. logics, ethics, phyſics, and metaphyſics.

The ſchoolmen uſually diſtinguiſh *parts* into logical and phyſical.

PART, *logical*, is that referring to ſome univerſal as its whole; in which ſenſe, the ſpecies are *parts* of a genus; and individuals or ſingulars are *parts* of the ſpecies.

PART, *phyſical*, is that, which, though it enter the compoſition of a whole, may yet be conſidered apart, and under its own diſtinct idea; in which ſenſe, a continuum is ſaid to conſiſt of *parts*.

Phyſical parts, again, are of two kinds, homogeneous and heterogeneous; the firſt are thoſe of the ſame denomination with ſome other; the ſecond of a different one. See HOMOGENEOUS, &c.

Parts, again, are diſtinguiſhed into ſubjective, eſſential, and integrant.

PART, *ſubjective* or *potential*, is the ſame with logical *part*; viz. that contained in ſome univerſal whole, not in act, but only in power. As, man and horſe are in animal; Peter and Paul are in man.

PART, *eſſential*, is that, whereby, with the concurrence of ſome other, an eſſential whole is conſtituted. Thus, the body and ſoul are eſſential parts of men.

PART, *integrant* or *integral*, is that which is neceſſary to the integrity of the whole. As, a head is of a man, &c.

Anatomiſts divide the *parts* of the human body into containing and contained; ſimilar and diſſimilar; and the ſimilar, again, into ſpermatic and ſanguineous, &c.

PARTS, *noble* or *eſſential*, are thoſe abſolutely neceſſary to life. As, the heart, lungs, liver, brain, &c.

PARTS, *natural* or *genital*, popularly called *priſcy parts*, are thoſe miniſtering to generation.

The ſheſt writings of phyſicians are thoſe which treat of the uſe of the *parts*. Galen's works, *De Uſu Partium*, afford infinite arguments of the being and wiſdom of God.

Nature, we ſay, always diſcharges itſelf on the weak *part*, the diſeaſed *part*, the *part* affected, &c.

PARTS, *conſent of*. See CONSENT.

In chemiſtry, bodies are ſaid to be reſolved into their minute *parts*, their component *parts*, &c.

That art is ſaid to ſeparate the homogeneous *parts* from the heterogeneous; and the volatile, ſubtile, ſulphureous, mercurial, &c. *parts*, from the fixed, craſs, earthy, viſcid, &c. *parts*.

PART, in *Geometry* and *Aſtronomy*, is applied to the diviſions of lines and circles.

The ſemidiameter of the circle, called alſo the radius, and whole line, is divided into a hundred thouſand *parts*; and the circumference of the circle into three hundred and ſixty *parts* or degrees; in which two diviſions all the celeſtial computations are made.

PARTS, *aliquant* and *aliquot*. See the adjectives.

PART, *proportional*, is a *part* or number agreeable and analogous to ſome other *part* or number; or a medium to find ſome number or *part* unknown by proportion and equality of reaſon.

PARTS, *ſimilar*, are thoſe which are to one another as their wholes are to one another.

PART, *organical*. See ORGANICAL.

PART, in *Muſic*, denotes a piece of the ſcore or partition, written by itſelf, for the convenience of the muſician; or it is one or more of the ſucceſſions of ſounds which make the harmony, written apart.

Or, the *parts* are ſounds made by ſeveral perſons ſinging or playing in a concert.

Muſic in *parts* was unknown to the ancients; they had but one *part*; all their harmony conſiſted in the ſucceſſion of notes, none in the contonance.

There are four principal *parts*; the treble, baſs, tenor, and counter-tenor.

Some compare the four *parts* in muſic, to the four elements: the baſs, they ſay, repreſents the earth; the tenor, water; counter-tenor, air; and the treble, fire.

PART, in *Trigonometry*. In a rectangular ſpherical triangle, A B C, *Tab. Trigon. fig.* 22. that *part* lying between two others, conſidered as extremes, is called, by ſome authors, the middle *part*. Thus, if A B and B C be the extreme *parts*, the angle B will be the middle *part*.

If the *parts*, conſidered as extremes, be contiguous to the middle *part*, and one of the extremes; thoſe are called conjunct *parts*. Thus, if B be in the middle *part*, A B and B C will be in the conjunct *parts*.

If, between the extremes and the middle *part*, there lie another, beſides a right angle; then the *parts* are ſaid to be diſjunct or ſeparate; e. g. if B be the middle term, A C and C will be diſjunct *parts*; becauſe, beſween the middle *part* B, and the extreme C, there lies the hypothenuſe B C; and between the middle *part* B, and the other extreme A C, beſides the right angle, there lies the leg A B.

Thoſe *parts*, either joined to the middle *part*, or ſeparated from it, are called lateral *parts*. See CIRCULAR *parts*, TRIANGLE, and TRIGONOMETRY.

PARTS *of ſpeech*, in *Grammar*, are all the ſorts of words which enter the compoſition of diſcourſe.

The grammarians uſually admit of eight *parts of ſpeech*; viz. noun, pronoun, verb, participle, adverb, conjunction, preposition, and interjection. See each in its proper place, NOUN, PRONOUN, &c.

PART *of fortune*, in *Judiciary Aſtrology*, is the lunar horoſcope; or the point wherein the moon is, at the time when the ſun is in the aſcending point of the eaſt.

The ſun in the aſcendant is ſuppoſed, according to this ſcience, to give life; and the moon diſpenſes the radical moiſture, and is one of the cauſes of fortune. In horoſcopes the *part of fortune* is repreſented by a circle divided by a croſs.

PART, in the *Manege*, in French *partir*, is uſed to ſignify the motion and action of a horſe when put on at full ſpeed. From the horſe's *parting* to his ſtop there are commonly two hundred paces of ground. To make your horſe *part* with a good grace, you muſt put your bridle three fingers lower, and preſs gently with your heels, or only with the calves of your legs. See ECHAPER.

To PART *again*. See REPART.

PART *owners*, thoſe that are concerned in ſhip matters, and who have joint ſhares therein.

Art and PART, in *Law*. See ART.

En PARTE. See EN.

PARTERRE, in *Gardening*, that open part of the garden into which we enter, generally coming out of the houſe, uſually ſet with flowers, or divided into beds, encompaſſed with platbands, &c.

The *parterre* is a level diviſion of ground, which, for the moſt part, faces the ſouth and beſt front of a houſe, and is generally well furniſhed with greens, flowers, &c.

There are divers kinds of *parterres*; as bowling-green or plain *parterres*; *parterres* of embroidery; and *parterres* cut in ſhell-work, in ſcroll-work, &c. with ſand-alleys between.

Plain *parterres* are moſt valuable in England, becauſe of the firmneſs of the Engliſh graſs turf, which is ſuperior to that of any other part of the world; and the *parterres* of embroidery are cut into ſhell and ſcroll work, with alleys between them.

An oblong, or long ſquare, is accounted the moſt proper figure for a *parterre*; and a *parterre* ſhould, indeed, be always, at leaſt, twice or twice and a half as long as it is broad, becauſe, according to the known laws of perſpective, a long ſquare always ſinks to a ſquare; and an exact ſquare always appears leſs than it really is. As to the breadth of a *parterre*, it is to be proportionable to the front of the houſe: if the breadth of the houſe is a hundred feet, it ſhould be a hundred and fifty feet; and if it be two hundred feet, it ſhould be fifty feet broader; but if the breadth of the front of the houſe is greater, the *parterre* may be made of the ſame dimenſion with the front.

PARTHENIUM, in *Botany*. See *Baſtard* FEVERFEW.

PARTI, PARTY, or PARTED, in *Heraldry*, is applied to a ſhield or eſcutcheon, denoting it divided, or marked out into partitions.

The French heralds, from whom we borrow the word, have but one kind of *parti*, the ſame with our *parti per pale*, which they ſimply call *parti*: but with us the word is applied to all the ſorts of partitioning; and is never uſed without ſome addition to ſpecify the particular kind intended.

Thus we have *parti*, or *parted per croſs*, *per chief*, *per pale*, *per feſs*, *per bend dexter*, *per bend ſiniſter*, *per chevron*, &c. See QUARTERING.

The humour of our anceſtors, Colombiere obſerves, turning much upon exploits of arms and chivalry, they uſed to preſerve their battered and hacked armour as honourable ſymbols of their hardy deeds; and thoſe who had been in the hotteſt ſervice were diſtinguiſhed by the moſt cuts and bruiſes that appeared on their ſhields. To perpetuate the memory hereof, ſays the ſame author, they cauſed them to be painted on their ſhields, and thus handed down to poſterity. And when heraldry grew into an art, and officers were appointed to direct the manner of bearing, and blazoning; they gave names to thoſe cuts, anſwerable to the nature thereof, appointing four, from which all the others proceed; theſe are *parti* (called, by our heralds, *parti per pale*), *coupe* (*parti per feſs*), *tranche* (*parti per bend dexter*), and *taille* (*parti per bend ſiniſter*). See COUPED, TRANCHE, &c.

PARTI *per pale*. See PALE.

PARTI *per feſſe*. See FESSE.

PARTI *per bend dexter* is when the cut comes from the upper corner of the ſhield on the right hand, and deſcends athwart to the oppoſite lower corner.

PARTI *per bend ſiniſter* is when the cut coming from the upper left corner, deſcends acroſs to the oppoſite lower one.

From theſe four partitions have proceeded an infinite number of others of various and extravagant forms.

Spelman, in his Aſpilogia, obſerves, that the preſent diviſions of eſcutcheons were unknown in the reign of the emperor Theodoſius; and were brought up in the time of Charlemagne, or later; they were little uſed among the Engliſh in the days of king Henry II. but more frequently under Edward III.

The erect or upright ſection, he obſerves, is called in Latin *polaris*, from its reſemblance to a *palus*, or *ſtake*; and two coats are often entire on the ſides, the huſband's on the right, and the wife's on the left. The direct ſection acroſs, being in the place of a belt, is called *baltica*, &c.

When the ſhield is *parti*, and *coupée*, it is ſaid to be *ecartelé*.

It is ſaid to be *parti one from the other*, when the whole ſhield is charged with ſome honourable bearing divided by the ſame line that parts the ſhield. Here it is a rule, that one ſide be of metal, and the other of colour. Thus he bears ſable *parti* d'argent, a ſpread eagle *parti* from one to the other.

PARTIAL *cauſe*. See CAUSE.

PARTIAL *eclipſe*. See ECLIPSE.

PARTICIPATION, *participatio*, that which gives us a part or ſhare in any thing, either by right or grace.

In Italy they diſtinguiſh *participating officers*, as prothonotaries,

taries, &c. which have a real function; from *honorary* ones, which have only a title, without any duty or employ.

PARTICIPATIONIS *medium*. See MEDIUM.

PARTICIPLE, *participium*, in *Grammar*, an adjective formed of a verb; so called because it still participates of some of the properties of the verb; retaining the regimen and signification thereof: whence most authors confound it with the verb.

Mr. Harris observes, that, as a complete VERB is expressive of an attribute, of time, and of an assertion, if we take away the assertion, there will remain the attribute and the time, which make the essence of a *participle*. There are two kinds of *participles*, the one called *active*, because expressing the subject which makes the action of the verb; as *legens, audiens, reading, hearing*. The other, called *passive*, because expressing the subject that receives the action of the verb; as *lectum, auditum, read, heard*.

As our adjectives are not declined, the *participles*, being real adjectives, are also not declined: in the Latin, &c. where the adjectives are declined, the *participles* active are declined likewise. Thus they say *audiens, audientis, audienti*, &c. and in the French the *participles* passive are declinable like their adjectives, as *foy lu, elle a lue, nous avons lus*, &c.

In our language, the *participles* and gerunds are not at all distinguishable.

The English grammar lays down a good rule with respect to its *participles* of the past, that they all terminate in *d*, *t*, or *n*; which analogy is liable to as few exceptions as any.

PARTICLE, PARTICULA, in *Physics*, the minute part of a body, or an assemblage or coalition of several of the atoms whereof natural bodies are composed.

PARTICLE, in the *New Philosophy*, is frequently used in the same sense with *atom* in the ancient Epicurean philosophy; and *corpuscle* in the latter.

Some of the most accurate writers, however, distinguish them; making *particle* an assemblage or composition of two or more primitive, and physically indivisible, corpuscles or atoms; and *corpuscle*, or little body, an assemblage or mass of several *particles*, or secondary corpuscles. Indeed, the distinction is of no great moment; and, as to most purposes of physics, *particle* may be understood as synonymous with corpuscle.

Particles are then, as it were, the elements of bodies; it is the various arrangement and texture of these, with the difference of the cohesion, &c. that constitute the various kinds of bodies, hard, soft, liquid, dry, heavy, light, &c. The smallest *particles* or corpuscles cohere with the strongest attractions, and always compose bigger *particles* of weaker cohesion; and many of these, cohering, compose bigger *particles*, whose vigour is still weaker; and thus on for divers successions, till the progression end in the biggest *particles*, whereon the operations in chemistry, and the colours of natural bodies, depend, and which, by cohering, compose bodies of sensible bulks.

The cohesion of the PARTICLES *of matter*, the Epicureans imagined, was effected by means of hooked atoms; the Aristotelians by rest, that is, by nothing at all. But Sir Isaac Newton shews it is done by means of a certain power whereby the *particles* mutually attract, or tend towards each other.

By this attraction of the *particles* he shews that most of the phenomena of the lesser bodies are affected; as those of the heavenly bodies are by the attraction of gravity.

PARTICLES, *for the laws of this attraction of the*. See ATTRACTION and COHESION.

All bodies, the same great author shews, consist of the same solid perfectly hard *particles* or corpuscles.

PARTICLE, in *Grammar*, denotes a little indeclinable word, consisting of one or two syllables at the most.

Those are properly *particles* which are neither declined nor conjugated.

Brightland calls *particles*, *manners of words*, because rather serving to express the circumstances and manners of other ideas and objects of the mind, than to represent any distinct objects of their own.

Particles may be reduced under three heads: the first shew the manners or qualities of words, by being added to them; called *adverbs*.

The second denote some circumstances of actions, and join words to words, sentence to sentence, &c. See CONJUNCTION.

The third express the emotions of the soul. See INTERJECTION.

It is in the right use of *particles*, Mr. Locke observes, that more particularly consists the clearness and beauty of a good style. To express the dependence of his thoughts and reasonings one upon another, a man must have words to shew what connection, restriction, distinction, opposition, emphasis, &c. he gives to each respective part of his discourse. This cannot be rightly understood, without a clear view of the postures, stands, turns, limitations, exceptions, and several other thoughts of the mind. Of these there is a great variety, much exceeding the number of *particles* that most languages have to express them by; for which reason it happens that most of these *particles* have divers, and sometimes almost opposite significations. Thus the *particle* BUT, in English, has several very different significations: as in, *but* to say no more, where it intimates a stop of mind in the course it was going, before it came to the end of it. I saw *but* two planets; here it shews, that the mind limits the sense to what is expressed with a negation of all other. You pray, *but* it is not that God would bring you to the true religion, *but* that he would confirm you in your own: the former of these intimates a supposition in the mind, of something otherwise than it should; the latter shews, that the mind makes a direct opposition between that and what goes before. All animals have sense, *but* a dog is an animal: here it signifies the connexion of the latter proposition with the former.

PARTICLES is also a term in *Theology*, used in the Latin church for the crumbs or little pieces of consecrated bread, called *μιγματα* in the Greek church.

In the Greek church they have a particular ceremony, called *του μερισμου, of the particles*, wherein certain crumbs of bread not consecrated, are offered up in honour of the Virgin, St. John Baptist, and several other saints. They also give the name *προσφορα, oblation*, to these *particles*. Gabriel, archbishop of Philadelphia, has a little treatise expressly, *περι του μερισμου*, wherein he endeavours to shew the antiquity of this ceremony, in that it is mentioned in the liturgies of St. Chrysostom and Basil.

There has been a considerable dispute on this head, between the reformed and the catholic divines. Aubertin and Blondel explain a passage in the theory of Germanus, patriarch of Constantinople, where he mentions the ceremony of the *particles* as in use in his time; in favour of the former: Messieurs de Port Royal contest the explanation: but M. Simon, in his notes on Gabriel of Philadelphia, endeavours to shew, that the passage itself is an interpolation; not being found in the ancient copies of Germanus: and consequently that the dispute is very ill grounded.

PARTICLE *of the fluxes*, in *Astronomy*. See PARTICULA *exfars*.

PARTICULA *exfars*, in *Astronomy*, the difference between the equatorial triangle LAC (*Sub. Astron. fig.* 32.) and its fellow BLZ.

To find the *particula exfars*, the mensirual eccentricity AC, and the annual argument of the longitude HAD, being given; from the data in the triangle BCA, find the hypothenuse AB to the angle C, and to the angle CAB find the subtense CB. Multiply CB into half the mensirual eccentricity AC; the product is the area of the triangle ACB. Find likewise the area of a circle described by the radius of the eccentric BL. Then as the area of the circle is to 360° or 1296000″; so is the area of the triangle ACB to its value in those seconds: which value is the *particula exfars*.

PARTICULAR, *particularis*, a relative term, referring to species, or individual; and opposed to general, or universal. See GENERAL, &c.

In the schools, *particular* is defined to be something included under an universal; as man under animal.

Though sometimes it is also taken for an INDIVIDUAL, as Peter.

There is a difference between *particular* and *singular*, that *particular* denotes a thing taken as a part; as Peter in respect of mankind. Whereas singular denotes the part taken after the manner of a whole; as Peter considered in himself.

PARTICULAR *averment, character, geography, gravity, maps, nature, proposition, quality, rheumatism, tenant, theorem*, and *words*. See the several substantives.

PARTICULARIST, among *Polemical Divines*, a person who maintains particular grace, i. e. who teaches or believes, that Christ died for the elect only; and not for mankind in general. See GRACE.

PARTIES, in *Law*, are those who are named in a deed, or fine, as *parties* to it; e. gr. those who levy the fine, and to whom the fine is levied.

So they who make any deed, and they to whom it is made, are both called *parties* to the deed.

PARTILE *aspect*, in *Astrology*. See ASPECT.

PARTING, in *Chemistry*, is an operation by which gold and silver are separated from each other. The three agents employed for this purpose are the nitrous acid, marine acid, and sulphur. The former is the most convenient and generally used by goldsmiths and coiners: and, therefore, the operation with this solvent is called simply *parting*: that made with the marine acid is made by cementation, and called *concentrated parting*: and *parting* by sulphur is made by fusion, and denominated *dry parting*. For the method of *parting* by aqua fortis, com-

pare the articles DEPART, and QUARTATION. See alſo ASSAYING and GOLD.

PARTING, *concentrated*. See CEMENTATION.

PARTING, *dry*, or *parting* by fuſion, is performed by ſulphur, which has the property of uniting eaſily with ſilver, while it does not attack gold. The moſt advantageous method, ſays Dr. Lewis, of ſeparating a ſmall portion of gold from a large one of ſilver appears to be by means of ſulphur, which unites with and ſcorifies the ſilver without affecting the gold: but as ſulphurated ſilver does not flow thin enough to ſuffer the ſmall particles of gold diffuſed through it to reunite and ſettle at the bottom, ſome addition is neceſſary for collecting and carrying them down.

In order to the commixture with the ſulphur, fifty or ſixty pounds of the mixed metal, or as much as a large crucible will receive, are melted at once, and reduced into grains by lading out the fluid matter, with a ſmall crucible made red-hot, and pouring it into cold water ſtirred with a rapid circular motion. From an eighth to a fifth of the granulated metal, according as it is richer or poorer in gold, is reſerved; and the reſt well mingled with an eighth of powdered ſulphur. The grains enveloped with the ſulphur are again put into the crucible, and the fire kept gentle for ſome time, that the ſilver, before it melts, may be thoroughly penetrated by the ſulphur; if the fire was haſtily urged, great part of the ſulphur would be diſſipated, without acting upon the metal.

If to ſulphurated ſilver in fuſion pure ſilver be added, the latter falls to the bottom, and forms there a diſtinct fluid, not miſcible with the other. The particles of gold, having no affinity with the ſulphurated ſilver, join themſelves to the pure ſilver, wherever they come in contact with it, and are thus transferred from the former into the latter, more or leſs perfectly according as the pure ſilver was more or leſs thoroughly diffuſed through the mixed. It is for this uſe that a part of the granulated metal was reſerved. The ſulphurated maſs being brought into perfect fuſion, and kept melted for near an hour in a cloſe covered crucible, one third of the reſerved grains is thrown in; and as ſoon as this is melted, the whole is well ſtirred, that the freſh ſilver may be diſtributed through the mixed, to collect the gold from it. The ſtirring is performed with a wooden rod; an iron one would be corroded by the ſulphur, ſo as to deprive the mixed of its due quantity of ſulphur, and likewiſe render the ſubſequent purification of the ſilver more troubleſome. The fuſion being continued an hour longer, another third of the unſulphurated grains is added, and an hour after this the remainder; after which the fuſion is farther continued for ſome time, the matter being ſtirred at leaſt every half hour from the beginning to the end, and the crucible kept cloſely covered in the intervals.

The ſulphurated ſilver appears in fuſion of a dark brown colour: after it has been kept melted for a certain time, a part of the ſulphur having eſcaped from the top, the ſurface becomes white, and ſome bright drops of ſilver, about the ſize of peas, are perceived on it. When this happens, which is commonly in about three hours after the laſt addition of the reſerved grains, ſooner or later, according as the crucible has been more or leſs cloſely covered, and the matter more or leſs ſtirred, the fire muſt be immediately diſcontinued; for otherwiſe more and more of the ſilver, thus loſing its ſulphur, would ſubſide and mingle with the part at the bottom in which the gold is collected. The whole is poured out into an iron mortar greaſed and duly heated; or if the quantity is too large to be ſafely lifted at once, a part is firſt laded out from the top with a ſmall crucible, and the reſt poured into the mortar. The gold, diffuſed at firſt through the whole maſs, is now found collected into a part of it at the bottom, amounting only to about as much as was reſerved unſulphurated. This part may be ſeparated from the ſulphurated ſilver above it by a chiſſel and hammer; or more perfectly, the ſurface of the lower maſs being generally rugged and unequal, by placing the whole maſs with its bottom upwards in a crucible: the ſulphurated part quickly melts, leaving unmelted that which contains the gold, which may thus be completely ſeparated from the other. The ſulphurated ſilver is eſſayed, by keeping a portion of it in fuſion in an open crucible, till the ſulphur is diſſipated; and then diſſolving it in aqua fortis. If it ſhould ſtill be found to contain any gold, it is to be melted again; as much more unſulphurated ſilver is to added as was employed in each of the former injections, and the fuſion continued about an hour and a half.

The gold thus collected into a part of the ſilver may be farther concentrated into a ſmaller part, by granulating the maſs and repeating the whole proceſs. The operation may be again and again repeated, till ſo much of the ſilver is ſeparated, that the remainder may be parted by aqua fortis without too much expence.

The foregoing proceſs, according to Mr. Schlutter, is practiſed at Rammelſberg, in the Lower Hartz. The prevailing metal in the ore of Rammelſberg is lead: the quantity of lead is at moſt forty pounds in a quintal or hundred pounds of the ore. The lead worked off on a teſt or concave hearth yields about a hundred and ten grains of ſilver, and the ſilver contains only a three hundred and eighty-fourth part of gold; yet this little quantity of gold, amounting ſcarcely to a third of a grain in a hundred weight of the ore, is thus collected with profit. The author above mentioned confines this method of ſeparation to ſuch ſilver as is poor in gold, and reckons parting with aqua fortis more advantageous where the gold amounts to above a ſixty-fourth of the ſilver: he adviſes alſo not to attempt concentrating the gold too far, as a portion of it will always be taken up again by the ſilver. Mr. Scheffer, however, relates (in the Swediſh Memoirs for the year 1752), that he has by this method brought the gold to perfect fineneſs; and that he has likewiſe collected all the gold which the ſilver contained; the ſilver of the laſt operations, which had taken up a portion of the gold, being reſerved to be worked over again with a freſh quantity of gold-holding ſilver. The ſulphurated ſilver is purified by continuing it in fuſion for ſome time with a large ſurface expoſed to the air; the ſulphur gradually exhales, and leaves the ſilver entire. Lewis's Comp. Phil. Techn. p. 161, &c. See GOLD and REFINING.

PARTING-*glaſſes* are uſed in the operation of *parting*: they have the form of truncated cones, the bottom being commonly about ſeven inches wide, the aperture about one or two inches wide, and the height about twelve inches. Theſe glaſs veſſels ought to have been well annealed, and choſen free from flaws; as one of the chief inconveniencies attending the operation is, that the glaſſes are apt to crack, by expoſure to cold, and even when touched by the hand. Some operators ſecure their glaſſes by a coating. For this purpoſe they ſpread a mixture of quick-lime flaked with beer and whites of eggs upon linen cloth, which they wrap round the lower part of the veſſel, leaving the upper part uncovered, that they may ſee the progreſs of the operation; and over this cloth they apply a compoſition of clay and hair. Schlutter adviſes to put the *parting-glaſſes* in copper-veſſels containing ſome water, and ſupported by trevets, with fire under them. When the heat communicated by the water is too great, it may be diminiſhed by adding cold water, which muſt be done very carefully by pouring againſt the ſides of the pan, to prevent too ſudden an application of cold to the *parting-glaſs*. The intention of this contrivance is, that the contents of the glaſſes, if theſe ſhould break, may be received by the copper veſſel. Into a glaſs fifteen inches high, and ten or twelve inches wide at bottom, placed in a copper-pan twelve inches wide at bottom, fifteen inches wide at top, and ten inches high, he uſually put about eighty ounces of metal, with twice as much aqua fortis.

PARTING, in *Sea Language*, denotes the ſtate of being driven from the anchors, when the ſhip has broke her cable by the violence of the wind, waves, or current, or of all of them together.

PARTISAN, in the *Military Art*, the commander of a *partiſan*-party.

PARTISAN-*party*, a ſmall body of infantry given to a *partiſan*, to make an incurſion upon the enemy, to lurk about their camp, to diſturb their foragers, and to interrupt their convoys.

PARTITION, the act of parting, dividing, or diſtributing, a thing.

The denomination *partitiones oratoriæ* is alſo given to a dialogue of Cicero's, between him and his ſon; in regard the diſcourſe is, as it were, parted or divided between them.

PARTITION, in *Architecture*, that which divides or ſeparates one room or apartment from another.

PARTITION, in *Heraldry*. See QUARTERING.

PARTITION, in *Huſbandry*. The *partitions* in land ſown with wheat by the drill, for the horſe-hoeing huſbandry, are different according as the wheat is ſown, in double, treble, or quadruple rows. The double row has but one *partition*, and this is beſt to be uſed in caſes where the land is ſuſpected to be full of the ſeed of weeds, which muſt be taken out with the hand hoe. This *partition* ſhould be twelve or fourteen inches wide. Whole fields drilled in theſe rows may be hand-hoed at the expence of four ſhillings an acre; and when there is but one foot in ſix, the price of that work ought to be proportionably leſs. The common width of the two *partitions*, when the wheat is ſown in treble rows, is ſix or eight inches. Care is to be taken in this particular; for if they are planted cloſer, they will ſtarve one another before the intervals are hoed to give them a freſh ſupply of nouriſhment; and, if they

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are planted too far aſunder, the two outer rows will thrive well, but the middle row will be ſtarved, and look worſe and weaker, becauſe of its being at ſo great a diſtance from the hoed intervals.

In quadruple rows the *partitions* are beſt to be ſeven inches wide each: at this diſtance the plants will thrive ſufficiently, and if they are ſet nearer, the whole will be worſe; and, if farther off, the two outer rows will thrive, but the two inner ones will be ſtarved, by reaſon of their diſtance from the plowed intervals. See ALLEY, and HUSBANDRY.

PARTITION, in *Law*, a dividing of lands deſcended by common law, or cuſtom, among coheirs, where there are two at leaſt.

The *partition* is made ſeveral ways; whereof four are by agreement, and one by compulſion.

The firſt *partition* by agreement is, when the parceners divide the land equally themſelves into ſo many parts as there are coheirs: and each has a determinate part.

The ſecond is, when they agree to chuſe ſome of their friends to make the diviſion for them: and each takes a part according to ſeniority of age, or otherwiſe, as ſhall be agreed. In this caſe ſeniority is perſonal; ſo that if the eldeſt ſiſter be dead, the next ſiſter, and not the iſſue of the firſt, chuſes. However with reſpect to an advowſon, it is otherwiſe; the eldeſt and her iſſue, and even her huſband, or her aſſigns, ſhall preſent alone, before the younger.

The third method of *partition* is, when the eldeſt divides, but chuſes laſt.

The fourth is by drawing lots, thus: having firſt divided the land into as many parts as there are perſons, they write every part ſeverally in a diſtinct ſcroll, and, wrapping it up, throw each into a hat, or ſuch a thing; out of which each one draws according to ſuperiority; and ſo the land is ſeverally allotted.

The other *partition*, which is by compulſion, is, when one or more of the heirs, by reaſon of the refuſal of ſome other, ſues out a writ of PARTITIONE *facienda*, upon which the ſheriff ſhall go to the lands, and make *partition* thereof by a verdict of the jury there impanelled; and aſſign to each of the parceners her part in ſeveralty. In Kent, where land is of gavelkind nature, they call their *partition*, ſhifting.

Partition alſo may be made by joint-tenants, and tenants in common, by aſſent, by deed, or by writ.

PARTITION, in *Muſic*, is the diſpoſition of the ſeveral parts of a ſong, ſet on the ſame leaf; ſo as upon the uppermoſt ranges of lines are found the treble; in another the baſs; in another the tenor, &c. that they may be all ſung or played either jointly or ſeparately.

PARTITION, *partitio*, in *Rhetoric*, otherwiſe called ENUMERATION, is that part in which the orator acquaints his hearers with the ſeveral parts of his diſcourſe, upon which he deſigns to treat. Some alſo comprehend under this head ſeparation, in which the orator ſhews in what he agrees with his adverſary, and wherein he differs from him. The requiſites of a good *partition* are the following: it muſt be ſhort, ſo that each propoſition contains in it nothing more than what is neceſſary; it ought to be complete, no neceſſary part being omitted in the enumeration; and it ſhould conſiſt of as few members as is conſiſtent with the nature of the ſubject. The ancient rhetoricians preſcribe three or four at the moſt; and Cicero never exceeds that number. It may be afterwards convenient to divide theſe general heads of a diſcourſe, or at leaſt ſome of them, into ſeveral parts or members: and this is beſt done, as the ſpeaker comes to each of them, in the order at firſt laid down. Inſtances of this kind occur in Cicero's oration for the Manilian Law.

A good *partition* is attended with conſiderable advantages: it gives light and ornament to a diſcourſe, and affords great relief and aſſiſtance to the hearers. However ſome orations, particularly of the demonſtrative kind, do not require any particular propoſition, being little more than a continued narrative or illuſtration of the ſubject. Ward's Orat. vol. i. p. 210, &c.

PARTITIONE *facienda*, in *Law*, a writ which lies for thoſe who hold lands or tenements *pro indiviſo*, and would ſever to every one his part, againſt them that refuſe to join in *partition*, as copartners, &c. F. N. B. 61. 31 H. 8. cap. 1. Cowel.

PARTITURA, in the *Italian Muſic*, the ſame as PARTITION.

PARTIUM *precc.* See PRECE.

PARTNER, and PARTNERSHIP. See COMPANY, COPARCENER, and FELLOWSHIP.

PARTNERS, in a *Ship*, are ſtrong pieces of timber nailed round the ſeveral ſcuttles or holes, in a ſhip's deck, wherein are contained the maſts and capſterns. They are uſed to ſtrengthen the deck, where it is weakened by ſuch breaches, but particularly to ſupport it when the maſt leans againſt it, as impreſſed by a weight of ſail, or when the capſtern bears forcibly upon it, whilſt charged with a great effort.

Some ſhips do not ſail well unleſs their maſts are looſe, and have leave to play in the *partners*; but in a ſtorm this is dangerous, leſt the *partners* ſhould be wronged (as they ſay) i. e. forced out of their places; for then there is no help but to cut the maſt by the board.

PARTNERS is alſo a name given occaſionally to the ſcuttles themſelves, wherein the maſts and capſterns are fixed.

PARTRIDGE, *perdix*, the TETRAO *perdix* of Linnæus, in *Ornithology*, a bird well known and eſteemed at table, of which ſome naturaliſts enumerate five ſpecies. 1. The common *partridge*. 2. The Braſilian *partridge*, called JAMBU, of a duſky yellow colour, ſpotted with brown: of this there are two ſpecies, a larger and a ſmaller. 3. The *perdix damaſcena* of Aldrovand, which reſembles our *partridge*, but its feet are yellow and its beak longer. 4. The red-legged PARTRIDGE, common in France and Italy, and called there *cotumo*. And, 5. The Grecian *partridge*, which is twice as large as our's, and not ſeeming to differ from the *cotumo* in any thing but ſize: they are all very finely taſted birds, but none are ſo delicate as the *cotumo*. Ray's Ornithol. p. 119.

The bill of the *partridge* is whitiſh; the crown of the head is brown ſpotted with reddiſh white; behind each eye is a naked reddiſh ſkin; the chin, cheeks, and forehead are of a deep orange colour, but much paler in the female than in the male; the neck and breaſt are prettily marked with narrow undulated lines of aſh-colour and black; and in the hind part of the neck is a ſtrong mixture of ruſt-colour; on the breaſt of the male is a broad mark in form of a horſe-ſhoe, of a deep orange hue; in the female it is leſs diſtinct; each feather on the back is finely marked with ſemicircular lines of reddiſh brown and black; the ſcapulars with a narrow white line along their ſhafts, and with black and cinereous undulated lines on the webs, whoſe ſides are marked with a large ſpot of ruſt colour; the greater quill-feathers are duſky, ſpotted on each web with pale red; it has eighteen feathers in the tail; the ſix outermoſt on each ſide are of a bright ruſt colour, tipt with white; the others marked tranſverſely with irregular lines of pale reddiſh brown and black; the legs are of a whitiſh caſt. Pennant.

The *partridge* is a timorous and ſimple bird, and is ſo valuable at the table, that there are a great many ways of taking it invented by ſportſmen, all of which ſucceed from the folly and fear of the animal.

The places that *partridges* moſt delight in, are corn-fields, eſpecially while the corn grows; for that is a ſafe retreat, where they remain undiſturbed, and under which they uſually breed. They frequent the ſame fields after the corn is cut down, and that with another intent; for they then feed on the corn that has fallen from the ears, and find a ſufficient ſhelter for them under cover of the ſtalks, eſpecially thoſe of wheat ſtubble. When the wheat ſtubble is much trodden by men or beaſts, they retire to the barley ſtubble, and will there hide themſelves in coveys of twenty or thirty. When the winter comes on, and the ſtubble fields are trodden down or plowed up, they can retire to the upland meadows, where they lodge in the high graſs, and among the ruſhes; ſometimes they reſort to the low coppice woods, eſpecially if there be corn lands near them.

In the harveſt-time, when the corn fields are full of men, they are found in the fallow fields next to the corn fields, where they lie lurking among the weeds till evening, and then they get over into the corn, and feed late and early on the corn in the ſheaves. When the proper haunts are known, the next thing is to find the birds in them: this is done variouſly; ſome will do it by the eye only; and this art can never be taught, but can be had only from long obſervation: the colour of the birds being ſo like that of the earth at a diſtance, that no eye but a very converſant one could diſtinguiſh them. When they are once ſeen, the buſineſs is to keep an eye upon them, and then to keep in continual motion. They are a very lazy bird, and by this means will let a perſon almoſt tread upon them; though, if the perſon ſtands ſtill to eye them, they will riſe immediately, though they are at a conſiderable diſtance.

Another method of obſerving them is by going to their haunts very early in the morning, or at the cloſe of the evening, which is called jucking-time. The noiſe of the cock *partridge* is to be attended to at this time, and is very loud and earneſt. The hen will ſoon come up to the cock after her making the noiſe, which ſhe does by way of anſwer; and when they are got together, their chattering will diſcover them. Thus they may always be found at theſe times: but there is a yet better method of finding this bird, which is by the call. The buſineſs, in order to have ſucceſs in this way, is carefully to learn the notes of the *partridge*, and be able to imitate all the ſeveral

several sounds. When perfect in this, the person is to go to the haunts morning and evening, and, placing himself in some place where he can see the birds without being seen by them, he is to listen to their calling; and, when they are heard, he is to answer in the same notes, doubling again as they do: by continuing this, they may be brought so near, that the person, lying down on his back, may count their whole number. Having in this manner found where the birds are, the next care is to catch them.

They are so foolish, that it is extremely easy to take them in nets. In order to this, there needs no more than the going out, provided with two or three nets, with meshes somewhat smaller than those of the pheasant nets, and walking round about the covey, a net is to be fixed so as to draw over them, on pulling a line at a distance. All this may be easily done; for so long as the sportsman continues moving about, and does not fix his eyes too intently upon them, they will let him come near enough to fix the nets, without moving. If they lie so straggling, that one net will not cover them, then two or three must be fixed in the same manner. The sportsman may then draw the nets over them; and they will often lie still with the nets upon them till he comes up to fright them, then they will rise, and be entangled in the net.

A second method of taking them is with bird-lime: this is done by means of wheat straws. These must be large, and cut off between knot and knot; they must be well limed with the best and strongest bird-lime, and the sportsman must carry a great number of them out with him. Having found a field where there are *partridges*, he is to call; and, if they answer, he is then to stick up the limed straws in rows across two or three lands, and, going backward, call again to them, leading them on in the road where the straws are: they will follow one another like a flock of chickens, and come out to the call; and will in their way run upon the straws, and liming themselves, they will daub one another by crowding together, so that very few of them will be able to escape.

But there is yet a pleasanter way of taking them than this, that is, by driving of them: in order to this, an engine is to be made of canvas stuffed with straw, to represent a horse; this horse and nets are to be taken to the haunts of the *partridges*, and the nets being placed slanting or slopewise in the lower part of the field, the sportsman is to take the wind in his back, and get above them, driving them downwards; his face is to be covered with something green or blue; and, placing the horse before him, he is to go towards them slowly and gently; and by this means they will be raised on their legs, but not on their wings, and will run before the horse into the nets. If in the way they go into a wrong path, the horse is to be moved to face them; and they will be thus turned back again, and driven every way the sportsman pleases.

PARTRIDGE, *Indian, american Indian*, the name given by the Spaniards to a bird of the West Indies, of which there are three or four species; all of which Nieremberg says, are properly of the *partridge* kind. See COLIN, and QUAHUITZONECOLIM.

PARTRIDGE, *red-legged*, a very delicate and valuable bird, called *coturne* by the Italians.

It is distinguished from the common *partridge* by the redness of its beak and legs; it is of a greyish ash colour on the back; its throat is white near the head, but has a small black spot on each side at the angle of the bill, and this white space is surrounded by a black line; its breast is of a yellowish brown, and its wings are variegated with black, yellowish, and white. It is not found in England, but is sometimes shot in the islands of Guernsey and Jersey.

PARTRIDGE, *white, perdix alba*, a name given by many to the *lagopus*, a rough-footed bird of the gallinaceous kind, common on the snowy mountains, and by some called the *rabelmé*. See PTARMIGAN.

PARTRIDGE, *sea, perdix marina*, in *Ichthyology*, a name given by some authors to the toad-fish, from the firmness and delicacy of its flesh.

PAR-TOUT. See PASS-*par-tout*.

PARTURITION, the act of bringing forth, or being delivered of young. See DELIVERY.

PARTUS, in *Medicine* and *Law*, the delivery of a woman, or the birth of a child.

PARTUS, *Cæsareus*, is that where the mother is cut open, and the child taken out at one side. See CÆSARIAN.

PARTY, or PARTIE, a FACTION, interest, or power, considered as opposite to another.

The French and Spaniards were always of opposite *parties*. England has, for upwards of a century, been divided into two *parties*. See WHIG and TORY.

PARTY, in *Law*. See PARTIES and CHARTER-PARTY.

PARTY, in the *Military Sense*, is used for a small body of men, whether cavalry, infantry, or both, commanded out on any expedition.

By the French military law, those who go out on *parties* must have an order in writing from the commanding officer, and be at least twenty in number, if foot, or fifteen, if horse, otherwise they are reputed as robbers.

PARTY *arches*, in *Building*, are arches built between separate tenures, where the property is intermixed, and apartments over each other do not belong to the same estate.

PARTY *blew*, in the *Military Art*, a name given to a party of robbers, who infested the roads in the Netherlands. They belonged to neither army, but robbed both sides, without any regard to passes.

PARTY *china*, a name given by the English merchants, and others, to a sort of porcelain or china-ware, which is elegantly painted on the outside with some bright colour, and blotted or variegated with round or square spots of a different tinge. The manner in which the Chinese do this *is* a very simple and easy one, and may be imitated in our potteries with great ease.

They prepare as many pieces of paper as they intend to have spots on the vessel, and cut them exactly into the shape of those spots: they wet these, and then spread them smoothly on the places where the spots are to be. When this is done, they cover the vessel with the brown and gold, or any other varnish, and then take off the papers; in the places which they covered no varnish has come; so that they are so many regular white spaces. These they cover with some other colour, laying it on carefully with a pencil: when this is done, they varnish over the whole vessel with the common varnish, and bake it. In some vessels they lay on only plain blue, or plain black, in the spaces destined for spots; and after the first baking, they cover these with gold, and make them so many figures of squares, triangles, or globes, pure gold.

PARTY *walls*, in *Building*, are partitions of brick made between buildings in separate occupations, for preventing the spread of fire.

By an act of 14 Geo. III. for better regulating buildings, and preventing mischiefs by *fire*, within the cities of London and Westminster, and parishes within the bills of mortality, it is enacted, in what manner buildings of all denominations shall be built; and surveyors are appointed to execute the directions of the act; the principal of which are as follows: buildings are of different rates, as, first, comprehending every church, chapel, or meeting-house; every building for distilling liquors, for making soap, melting tallow, dying, distilling turpentine, casting brass or iron, refining sugar, making glass, or chemical preparations, for sale; and all buildings, not being dwelling houses, which exceed three clear stories above ground, or which are thirty-one feet high in either front; and dwelling houses, exceeding the value of 850*l.* or more than nine squares on the ground plan. Second rate, warehouses whose height exceeds twenty-two feet, and is not thirty-one feet, whose value is more than 500*l.* and which are more than five squares on the ground plan. Third rate, warehouses not exceeding two clear stories, and more than one story, more than thirteen feet in height; or dwelling houses which contain three and a half squares on the ground plan, and not valued at more than 150*l.* Fourth rate, all warehouses under thirteen feet high, and one clear story; and all dwelling houses under three and a half squares on the ground plan, and under the value of 150*l.* Those of the fifth rate may be of any dimensions, but must be fifteen feet from any other building, not in the same possession, &c. and four feet from any public way. Those of the sixth rate must be thirty feet from any other building not in the same possession, and eight feet from the public way: these may be made of any dimensions and materials. Those of the seventh rate are under no restraint, excepting that they must not be covered with pitch or tar, &c. The following table shews the dimensions of the *party* and external walls:

	first rate		2d rate		3d rate		4th rate	
	Party.	External.	Party.	External.	Party.	External.	Party.	External.
Foundation or footing	3½	3	3	2½	2½	2	2	1½
Pavement	3½	3	3	2½	2½	2	2	1½
Ground floor	2	2	1½	1½	1½	1½	1	1
One pair floor	2	1½	2	1	1½	1	1	1
Second pair ditto	2	1½	1	1	1	1	1	1
Third pair ditto	2	1½	1	1	1	1	1	1
Through the roof	1½	1	1½	1	1	1	1	1

Bricks

No *party* wall is to be cut into without giving twenty-four hours notice to the surveyor, under penalty of 20*l.* on the master, and 20*s.* on the workman for every offence. See BUILDING, and FIRE-*cocks*.

PARTY *jury*, in *Law*. See MEDIETAS *linguæ* and JURY.

PARTY, in *Heraldry*. See PARTI, PALE, and FESSE.

PARU, in *Natural History*, the name of a very singular American fish.

It is broad, flat, and roundish; of no great thickness, and is usually of about five or six inches long, and more than four broad: it has six fins, one large and long, one on the back, and another on the belly, behind the anus; each of these reaches to the tail, and has, toward the end, a long string or cord, made of a single filament; that on the back fin being longer than that on the belly; behind the gills it has also two fins, of two fingers breadth long, and one broad; and two others on the belly, which are very narrow; its head is small, and its mouth elevated and small, and furnished with small teeth; its scales are of a moderate size, and are half black and half yellow; so that the fish appears of a black colour, variegated with yellow half moons; its gills, and the beginning of its fins, are also yellow; and it has, on each side near the head, a yellow spot; it is an eatable fish.

PARUS, in *Ornithology*. See TITMOUSE.

PARVISE. See PERVISE.

PARULIS, παρουλὶς, formed of παρὰ, *near*, and οὖλον, *gum*, in *Surgery*, an inflammation of the gums, attended with a violent pain, and an imposthume; sometimes ending in an ulcer, and sometimes in a cancer, fistula, gangrene, &c.

Sennertus orders it to be cured by revulsion, derivation, and proper gargarisms. Care is to be taken in the beginning to prevent an imposthumation. See GUM-*boils*.

PARVUM *cape*. See CAPE.

PARVUS *nasi musculus*, in *Anatomy*, a name given by Casserius, and some others, to a small muscle of the nose, called, by Albinus, *compressor naris*; by Winslow, *transversalis*, or *inferior nasi*; and by Cowper, *elevator alæ nasi*.

PARVUS *et tenuis palpebræ*, in *Anatomy*, a name given by Fallopius to one of the muscles of the face, called by Cowper and Douglas, APERIENS *palpebram rectus*; and, by Albinus, the *levator palpebræ superioris*.

PARYPATE, in the *Ancient Music*, was the name of that note or chord of a tetrachord which lay next to the hypate.

As the hypate was the *principalis*, the first or principal sound, according to Martianus Capello's translation; so the *parypate* was, according to him, the *sub-principalis*. See TETRACHORD.

The name *parypate* was given to this second note when a tetrachord was considered separately from others; but, when combined, this chord sometimes took the name *trite*. See DIAGRAM and TRITE.

PARYPATE *hypaton*, in the *Ancient Greek Scale of Music*, was the second note of the hypaton tetrachord, and answers to the C-fa-ut of Guido's scale. See DIAGRAM, and PARYPATE.

PARYPATE *meson*, in the *Greek Music*, was the second note of the *meson* tetrachord, and answers to F-fa-ut of the Guidonian scale. See DIAGRAM.

PAS *de fourir*, in the *Military Art*, the same with EZIERRE.

PASCHAL, *paschalis*, something belonging to the Jewish Passover, or to the Christian Easter.

The *paschal* lamb was a lamb which the Jews eat with great ceremony, in memory of their having been brought out of slavery in Egypt. It should be eaten standing, their loins girt, the staff in hand.

PASCHAL *canon*. See CANON.

PASCHAL *taper*. See TAPER.

PASCHAL *rents*, are rents or annual duties paid by the inferior clergy to the bishop, or archdeacon, at their Easter visitations.

They are also called *synodals*.

PASCHAL *letter*, in *Church History*, a circular letter, which the patriarch of Alexandria first, and afterwards the pope, anciently wrote to all the metropolitans; to inform them of the day whereon the feast of Easter was to be celebrated.

PASHA. See BASHAW.

PASHAUNA *beach*, in *Natural History*, a name given by the people of the East Indies to a kind of fibrose talc, found in the sides of the mountains, and used in medicine with them. They calcine it, and then powder and boil it in milk, and give half a dram for a dose mixed in milk, for the gravel and stone.

PASPALUM, in *Botany*, a genus of the *triandria digynia* class. Its characters are, that the calyx is orbiculated, and has two valves; the corolla is of the same magnitude; and the filgmata are pencil-shaped. There are five species.

PASQUE *flower*, *pulsatilla*, in *Botany*. See CAMPANA *florea*.

PASQUIN, a mutilated statue, seen at Rome, in a corner of the palace of the Ursini. It takes its name from a cobler of that city, called *Pasquin*, famous for his sneers and gibes; and whose shop was the resort of a number of idle people, who diverted themselves with bantering folks as they passed by.

After *Pasquin*'s death, as they were digging up the pavement before his shop, they found a statue of an ancient gladiator, well cut, but maimed, and half spoiled. This they set up, in the place where it was found, at the corner of the deceased *Pasquin*'s shop; and, by common consent, called it by the name of the deceased.

From this time all satires and lampoons are ascribed to this figure, and are put in its mouth, or pasted against it; as if they came from *Pasquin redivivus*. *Pasquin* usually addresses himself to Marforio, another statue in Rome; to Marforio to *Pasquin*, whom they then make reply.

The answers are usually very short, poignant, and unlucky. When Marforio is attacked, *Pasquin* comes to his assistance; but *Pasquin* is assisted by Marforio in his turn; i. e. the people make the statues speak just what they please.

PASQUINADE, or PASQUIL, is properly a satirical libel fastened to the statue of Pasquin.

Hence, by extension, the term becomes used for any satire, lampoon, or sneer upon the public, or upon the ruling powers.

There is no difference between a *pasquinade* and a *satire*; that the end of the latter is to correct and reform; whereas that of the former is only to scoff and expose.

The Italians have published several books, which they call *Pasquin in estasi*, *Pasquin in an ecstacy*.

PASS. See PASSPORT.

PASS, PASSADE, in *Fencing*, a leap, or advance upon the enemy.

Of these are several kinds; as *voluntary passes*, commencing from the left foot out of measure of the firm foot; as when the enemy is not expected.

Others, *necessary*, made after a push from the right foot; where, being so pressed by the enemy as not to have time to retire, we endeavour to seize the guard of his sword.

The measure of the *pass* is, when the two points of the swords are near, that they may touch one another.

There are *passes* within, above, beneath, to the right, the left; and *passes* under the sword, over the line, &c.

PASS, among *miners*, a frame of boards consisting of two or three room boards, and two side ones, let slopewise; through which the ore slides down into the coffer of the stamping-mill.

PASS *of arms*, in *Chivalry*, a place which the ancient knights undertook to defend, e. gr. a bridge, road, &c. which was not to be passed without fighting the person who kept it.

The knights who held the *pass*, hung up their arms on trees, pales, plumns, &c. erected for the purpose: and such as were disposed to dispute the *pass*, touched one of these armories with his sword, which was a challenge the other was obliged to accept. The vanquished gave the victor such price as was before agreed on.

PASSA, *Uva* PASA, in *Pharmacy*, a term applied to those dried grapes, which we call RAISINS.

Uvæ PASSÆ is sometimes also used, with less propriety, for figs.

PASSACAGLIO, in the *Italian Music*, is properly no more than a CHACONE.

The only difference is, that the movement of the *passacaglio* is somewhat grave, the time softer, and the expression less lively: they are for the most part in the minor modes, or flat keys.

PASSADE, or PASSADO, in *Fencing*, a thrust or PASS.

PASSADE is also a benevolence or alms given to poor passengers.

PASSADE, in the *Manage*, signifies a turn or course of a horse backwards or forwards on the same plot of ground, passing or repassing from one end to the other.

This cannot be performed without changing the hand, or turning and making demi-tour at each of the extremities of the ground. Hence it is, that there are several sorts of *passades*, according to the different ways of turning, in order to part out again, and return upon the same piste, or road, which we call closing the *passade*.

The *passades* are the truest proofs a horse can give of his goodness. By his going off, you judge of his swiftness; by his stops, you discover the goodness or imperfection of his mouth; and by the readiness with which he turns, you are enabled to decide upon his address or grace.

A *passade of five times*, or a demivolt of five times, is a demitour made at the end of the straight line, one hip in, in five time of a gallop upon the haunches; and, at the fifth time, he ought to have closed the demivolt, and to present upon the *passade* line straight and ready to return.

The demivolts of five times or periods are the most common airs of changing the hand, or turning, that are now practised.

A *perfect passade* is made in this manner: your horse standing

ſtanding ſtraight and true upon all his feet, you go off with him at once, you ſtop him upon his haunches, and in the ſame time or cadence in which he made his ſtop, being exactly obedient to the hand and heels, he ought to make the demivolt, balancing himſelf upon his haunches, and ſo waiting, till you give him the aid to ſet off again. In this caſe it is neceſſary, that the leaſt motion or hint of the rider ſhould be an abſolute command to the horſe. If you would have him go off at full ſpeed, yield your hand, and cloſe the calves of your legs upon him; if he does not anſwer to this aid, give him the ſpurs, in ſuch a manner as not to remove them from the place where they were, and without opening or advancing your legs before you ſtrike.

Raiſed, or *high paſſades*, are thoſe which a horſe makes, when, being at the end of his line, he makes his demivolt in any air he has been taught, either in the *manage*, or in curvets. In high *paſſades*, let your horſe go off at full ſpeed; let your ſtop be followed by three curvets; let the demivolt conſiſt of the ſame number, and demand of him three more before he ſets off again. It is uſual to make nine curvets, when you work a horſe alone.

Furious, or *violent paſſades*, are when a horſe gallops at his utmoſt ſpeed ſtraight forward, and makes his half ſtop, bending and playing his haunches two or three times before he begins his demivolt, which is made upon one line in three times; for at the third time he ſhould finiſh the demivolt, and be ſtraight upon the line of the *paſſades*, in order to go off again, and continue it. This kind of *paſſade* was formerly uſed in private combats.

Paſſade at one time, is a demivolt or turn, made by the horſe, in one time, of his ſhoulders and haunches.

In all *paſſades* the horſe ſhould, in making the demivolt, gather and bring in his body, making his haunches accompany his ſhoulders, without falling back or not going forward enough each time; and he muſt go in a ſtraight line, without traverſing or turning his croupe out of the line. Berenger's Horſemanſhip, vol. ii. chap. 1.

PASSAGE, in *Sea-Language*, denotes a voyage from one place to another by ſea; an outward or homeward bound voyage.

PASSAGE, in *Commerce*, or *Rights* of PASSAGE, is an impoſition, which ſome princes exact by their officers or farmers, in certain narrow, cloſe places of their territories, either by land or ſea, on all veſſel vehicles, and carriages of all kinds; and even ſometimes on perſons or paſſengers coming in or going out of port, &c.

The *paſſage* of the Sound (that famous ſtreight, which carries us out of the German into the Baltic ſea) is the moſt celebrated *paſſage* in Europe. It does thereof belong to the king of Denmark, and is ſeated at Elſinore or Cronenburg.

PASSAGE, *birds of*, are ſuch as only come to us at certain ſeaſons, and then diſappear again, being ſuppoſed to paſs the ſea to ſome other climate.

Among the *birds of paſſage* are the ſtork, ſwallow, nightingale, martin, woodcock, quail, hooded crow, cuckoo, wry-neck, ſeveral ſpecies of the pigeon and thruſh, ſnipe, curlew, ſeveral ſpecies of ſandpipes, long-legged plover, land-rail, ſeveral ſpecies of gobe, divers, terns, merganſers, many ſpecies of ducks, &c.

Mr. Pennant remarks, that every ſpecies of the genera of curlews, woodcocks, ſand-pipers, and plovers, that forſake us in the ſpring, retire to Sweden, Poland, Pruſſia, Norway, and Lapland, to breed; and as ſoon as the young can fly, they return to us again; becauſe the froſts which ſet in early in thoſe countries, deprive them of the means of ſubſiſtence; all the dryneſs and hardneſs of the ground, in general, during our ſummer, prevent them from penetrating the earth with their bills in ſearch of worms, which are the natural food of theſe birds. Of the numerous ſpecies of migrating fowl, there are ſcarcely any that may not be traced to Lapland, a country of lakes, rivers, ſwamps, and all covered with thick and gloomy foreſts, that afford ſhelter during ſummer to theſe fowls, which in winter diſperſe over the greateſt part of Europe. In thoſe northern regions, by reaſon of the thickneſs of the woods, the ground remains moiſt and penetrable by the woodcocks, and other ſlender-billed fowl; and for the web-footed birds the waters afford larvæ without number of the gnat. The days are long, and the light nights are favourable to their collecting this food; to which we may add, that mankind are very ſparingly ſcattered over that vaſt northern waſte. Britiſh Zoology, vol. ii. Appendix. See MIGRATION.

Beſide the migratory birds, which live in different countries a whole winter, or a whole ſummer, there are ſome others which annually appear in particular places, at the time of the ripening of particular kinds of grain which their own country is deſtitute of; and theſe depart after a ſhort ſtay, and are no more ſeen till that time the following year. Of this kind are the rice-bird, and bluewing of Carolina. Birds, like men, purſue their ſearches after food, or whatever elſe is neceſſary and agreeable, through diſtant climates; and, when they diſcover ſome new grain, or pleaſing food, they return and acquaint their community of the good fortune; and then, joining in numerous flights, make annual excurſions to ſolace themſelves on this exotic food.

Since the diſcovery of America, there have been introduced from Europe ſeveral ſorts of grain which were before unknown there, and which, not before ſome length of time, were found out, and coveted by birds of this migratory kind. Of this ſort there is a very beautiful ſpecies, which has very lately made its firſt appearance in Virginia; theſe arrive annually at the time that the wheat is ripe, or nearly ſo; and conſtantly, ſince they found it out, have appeared in great droves every year, at the ſeaſon of its ripening; the inhabitants call them, for this reaſon, *wheat-birds*. Phil. Tranſ. N° 483.

There are alſo fiſhes of *paſſage*, as herrings, mackarel, &c. See FISHERY.

PASSAGE, in the *Manege*, an action, wherein the horſe raiſes two legs together, a hind and a fore-leg, in form of St. Andrew's croſs; when, ſetting thoſe two on the ground again, he raiſes the other two; and thus alternately, never gaining above a foot of ground at a time.

The beauty of the *paſſage* conſiſts in keeping the legs a good while in the air; ſetting that aſide, the motion of the legs in the *paſſage* is the ſame as in pacing and trotting.

As the *paſſage* is the key which opens to us all the juſtneſs of the art of riding, and is the only means of adjuſting and regulating horſes in all ſorts of airs, it is neceſſary to obſerve, that there are many kinds of it. In that which is derived from the trot, the action of the horſe's legs is the ſame as in the trot; and this *paſſage* is diſtinguiſhed from the trot, merely by the extreme union of the horſe, and by his keeping his legs longer in the air, and lifting them both equally high, and being neither ſo quick nor violent as in the action of the trot. In the *paſſage*, which is founded on the walk, the action of the horſe is the ſame as in the trot, with this difference, that he lifts his fore-feet a good deal higher than his hinder; that he makes a certain time or interval ſufficiently long between the motion of each leg; his action being much more together and ſhortened, more diſtinct and ſlow than the ordinary walk, and not ſo extended as in the trot, ſo that he is, as it were, kept together, and ſupported upon himſelf. There is another ſort of *paſſage*, to which the trot likewiſe gives birth, and in which the action is ſo quick, ſo diligent, and ſo ſupported, that the horſe ſeems not to advance, but to work upon the ſame ſpot of ground. No horſe ſhould be put to *paſſage* till he has been well-trotted out, is ſupple, and has acquired ſome knowledge of the UNION. Berenger's Horſemanſhip, vol. ii. chap. 1.

To *paſſage* a horſe upon his own length, ſee LENGTH.

PASSAGE, or PASSO, in *Muſic*, a portion of an air or tune, conſiſting of ſeveral ſhort notes, as quavers, demi-quavers, &c. falling one, two, or, at moſt, three meaſures. What the Italians call *contrapunto d'un ſol paſſo*, is a portion conſiſting of one, two, or three meaſures, compoſed in the firſt notes of a piece, and which is to be afterwards imitated on the other notes of the piece, not with the ſame chords or tones, but only by obſerving the ſame motion, number, and figure, as in the notes of the firſt *paſſage*. This makes one of the kinds of *contrapunto perfidiato*.

PASSAGERS. See ALBIGENSES.

PASSAGIO, in the *Italian Muſic*. See PASSAGE.

PASSAGO, in the *Glaſs Trade*, the inſtrument with which the workman makes the bowl of the drinking-glaſſes, or other the like veſſels.

PASSALORHYNCHITES, *Paſſalorhynchitæ*, a ſect of Montaniſts in the ſecond century, who made profeſſion of perpetual ſilence, and, the better to maintain it, kept the thumb continually upon the lips; founding their practice on that of the Pſalmiſt, *Set a guard, O Lord, on my mouth.*

St. Jerom mentions his having met with ſome of them in his time.

PASSAMEZZO, from *paſſer, to walk*, and *mezzo*, the *middle*, in *Muſic*, is a ſlow dance, differing little from the action of walking. As a GALLIARD conſiſts of five paces, or bars, in the firſt ſtrain, and is, therefore, called a cinque pace, the *paſſamezzo*, which is a diminution of the galliard, has juſt half that number, and from that peculiarity takes its name.

PASSANT, in *Heraldry*, a term applied to an animal in a ſhield, appearing to walk leiſurely; or, to the ordinary poſture of terreſtrial animals.

Thus

Thus we say, he bears gules two lions *passants* in pale. For most beasts, except lions, they frequently use the word *stepping*, instead of *passant*.

PASSARADO, or PASSAREE, in a *Ship*, is a rope whereby all the fheet-blocks of the main and fore-fails are haled down; the clew of the main-fail to the cubbridge-head of the main-mast, and the clew of the fore-fail to the cat-head. This is to be done when the ship goes large; and they are alfo kept firm down, and hindered from flying up, by this *paſſarado* rope.

PASSEPIED, from *paſſer*, *to walk*, and *pied*, a *foot*, in the *French Muſic*, an air like a MINUET, except that it is more brisk and lively, faid to be invented in Bretagne. The meafure is $\frac{3}{8}$, and often $\frac{6}{8}$. It has three or more ſtrains, the firſt conſiſting of eight bars.

PASSER, in *Ichthyology*, the name of the common FLAIER.

PASSER *aquaticus*, in *Ornithology*. See *Water*-SPARROW.

PASSER *arundinaceus*, *& arundinaceus torquatus*. See *Reed* SPARROW.

PASSER *aſper*, in *Ichthyology*. See DAB.

PASSER *Britannicus*, a name given by Charleton to the SOAL-*fiſh*, and by ſome others to the TURBOT.

PASSER *Canadenſis*, or *Canarius*, in *Ornithology*. See CANARY-*bird*.

PASSER *fulvus*, in *Ornithology*, a name given by Nieremberg to a bird, the genus of which is not certainly known; it being alſo called *turdus chiappa*. It is remarkable for penetrating the bark of the pines, and lodging its acorns there, which it afterwards occaſionally eats.

PASSER *fluviatilis*, in *Ichthyology*. See FLOUNDER.

PASSER *Indicus*, *maximus alius* of Aldrovand, or the other long-tailed Indian ſparrow, is a very beautiful bird, with a blue beak, and a black head; the body being moſtly of a fine ſcarlet. See *Tab.* IV. *Birds*, N° 44.

PASSER *moſquitus*, in *Ornithology*, a name by which ſome have called the *guainumbi*, or HUMMING-*bird*.

PASSER *ſolitarius*, the *ſolitary ſparrow*, a name given by authors to a bird properly of the merula or black-bird kind, and of the ſame ſize and ſhape with the common black-bird, and not very different from it in colour. Its head and neck are large and thick; the upper part of its head of a duſky grey, and its back of a deep bluiſh black, but with a little whiteneſs at the ends of the feathers; its tail is of a browniſh black, and its wings are variegated with brown, black, and a little white; its breaſt, throat, and belly, are beautifully variegated with black, white, and grey; its beak is long and ſtrong, and its legs of a blackiſh brown, and very ſhort; it feeds on berries, and other vegetables; the male is more beautiful than the female, and has a caſt of purple in the hide of his back; it ſings very ſweetly, and loves the tops of old buildings; it builds in the ſame places, and is the bird mentioned in the book of Pſalms; it is much eſteemed for its ſinging, and will learn to imitate the human voice, and talk as the ſtarling, parrot, &c. Ray. See *Tab.* III. *Birds*, N° 29.

PASSER *ſtultus*, in *Ornithology*, a name given by Nieremberg to a ſpecies of the *larus*, or SEA-GULL, ſo tame and fooliſh, that it will ſtand ſtill for any one to lay his hand upon it.

PASSER *troglodites*, in *Ornithology*, the name by which authors call the WREN.

PASSERES, in the Linnæan ſyſtem of *Ornithology*, is the name of a whole order of birds, whoſe diſtinguiſhing characters are, that they have a conic, ſharp-pointed bill, and that the noſtrils are ovated, wide, and naked.

To this order belong fifteen genera, viz. the *columba* or PIGEON; the *alauda* or LARK, comprehending eleven ſpecies; the *ſturnus* or STARLING, including five ſpecies; the TURDUS, including twenty-eight ſpecies; the AMPELIS, including ſeven ſpecies; the LOXIA, comprehending forty-eight ſpecies; the EMBERIZA, comprehending twenty-four ſpecies; the TANAGRA, including twenty-four ſpecies; the FRINGILLA, including thirty-nine ſpecies; the *muſcicapa* or FLY-*catcher*, with twenty-one ſpecies; the *motacilla* or WATER-*wagtail*, whoſe number of ſpecies is forty-nine; the PIPRA, with thirteen ſpecies; the *parus* or TITMOUSE, comprehending fourteen ſpecies; the *hirundo* or SWALLOW, including twelve ſpecies; and the *caprimulgus*, *goat-ſucker*, or *churn*-OWL, of which there are two ſpecies.

PASSERINA, in *Botany*. See SPARROW-*wort*.

PASSERINE, in *Botany*, a name by which Ruellius and ſome other authors have called the common *aſpne* or *elm tree*.

PASSION, *paſſio*, *wathos*, or *nathos*, is applied to the different motions and agitations of the ſoul, according to the different objects that preſent themſelves to the ſenſes. In propriety, all thoſe motions, whereby the ſoul is carried towards any thing; as love, ambition, revenge, &c. are rather actions than *paſſions*.

Thoſe motions, whereby the ſoul finds itſelf interrupted in its actions, as grief, &c. are the only real *paſſions*.

We find various modifications and impreſſions of pleaſure and pain inſeparably annexed, by an eſtabliſhed law of nature, to the ſeveral judgments we form concerning good and evil: theſe judgments, with their reſpective modifications of pleaſure or pain annexed, according to the various appearances and relations of the object conſidered, either as good or evil, preſent or abſent, certain or uncertain, probable or improbable, poſſible or impoſſible, and affecting the machine in a certain manner peculiar to ſuch modifications, make what we call the *paſſions*.

How, or by what means, this mutual action and communication between ſoul and body is effected, we are, in a great meaſure, ignorant: we have but very obſcure and faint notions of any thing prior, or more ſimple, to reſolve it into, except the immediate will and agency of the firſt cauſe itſelf.

Malebranche defines the *paſſions* to be all thoſe emotions naturally ariſing in the ſoul, on occaſion of extraordinary motions of the animal ſpirits, and the blood. In oppoſition to thoſe motions of the ſoul, which are common to us with pure intelligences, and which he calls *natural inclinations*.

Though the *paſſions* be inſeparable from inclinations; and though a man be only capable of ſenſible love or hatred, becauſe he is capable of ſpiritual ones; yet does it appear juſt in that author to diſtinguiſh between them. *Paſſions* are much ſtronger and warmer than inclinations; their objects alſo are different, and ſo are their cauſes: in truth, *paſſions* and inclinations differ juſt as much as ſenſe and imagination.

In effect, the *paſſions* of the ſoul are the impreſſions of the Author of nature, which incline us to our bodies, and all things that may be of uſe to their preſervation: natural inclinations are the impreſſions of the Author of nature, which determine us primarily to love him, as our ſupreme good.

An ingenious writer has accurately diſtinguiſhed between our affections and our *paſſions*: the former, which we apply indiſcriminately to all reaſonable beings, may moſt properly ſignify the deſires and inclinations, founded in the reaſonable nature itſelf, and eſſential to it; ſuch as ſelf-love, benevolence, and the love of truth. Theſe, when aided and ſtrengthened by additional, inſtinctive determinations, are, properly, *paſſions*. Thoſe tendencies within us, that are merely arbitrary and inſtinctive, ſuch as hunger and thirſt, and the deſires between the ſexes, we commonly call appetites or *paſſions*, indifferently, but ſeldom or never affections. Price's Rev. of Morals, p. 125, &c.

Paſſion, ſays another excellent writer, is a kind of medium between a ſimple affection of the mind, and the appetites and ſenſations of the body. *Paſſion* is an affection of the mind, which diſtinguiſhes it from the appetites of the body, hunger and thirſt, and from bodily ſenſations; and it is attended with a peculiar and extraordinary emotion of the animal ſpirits, by which it is diſtinguiſhed from pure affection, and from the ſeveral ſenſations; in all which, though there be ſome motion of the blood and ſpirits, yet that motion is natural and regular; whereas in the agitation, occaſioned by the *paſſions*, the ſpirits are moved after a more vehement and tumultuous manner. Grove's Syſtem of Moral Philoſophy, vol. i. chap. 7.

Philoſophers are not agreed about the number and diviſion of the *paſſions*: the ordinary diſtribution is into *paſſions of the concupiſcible appetite*, which are pleaſure and pain, deſire and averſion, love and hatred; and thoſe *of the iraſcible appetite*, which are anger, courage, fear, hope, and deſpair. See the authors on the ſubject of the *paſſions*: Deſcartes, who conſiders them phyſically; Coffeteau, who gives us the tableau, or picture, of the *paſſions*; La Chambre, the characters of the *paſſions*; Senault, the uſes of the *paſſions*; and Hutcheſon, Watts, and others, who conſider them in a moral and religious view. Some writers have diſtinguiſhed the *paſſions* into two claſſes, viz. *primitive* and *derivative*. The primitive *paſſions* are admiration, love, and hatred. If an object be rare or uncommon, either in its kind or qualities, it excites our admiration or wonder: if ſuch an object is preſented to us in a ſudden and unexpected manner, the *paſſion* is called ſurprize; and when our wonder riſes to a high degree, it is called aſtoniſhment. Moreover, admiration, according to the different character of its object, is denominated eſteem or contempt; though ſome writers make eſteem and contempt to be particular ſpecies of love and hatred. Eſteem is the admiration of an object, on account of its excellence; contempt, for its inſignificance or worthleſſneſs, whence proceed veneration, and ſlight or ſcorn.

If we look on any object as good, or in any reſpect agreeable to us, it may engage our LOVE; but if it be evil or diſagreeable, it excites our hatred, or an endeavour of the

the ſoul to diſunite itſelf from the apprehended evil. When the evil is preſent, it produces GRIEF; and a deſire of its removal: this deſire of eſcaping an evil may be conſidered as ſolitary, without deſiring it may befal another perſon, in which caſe it is called averſion; but when accompanied with ſuch a deſire, it is denominated malevolence. The antient philoſophers meant much the ſame by their ὀρεξιν and ἔκκλισιν, the concupiſcible and the iraſcible part.

The *paſſions* already enumerated are ſimple in their nature: there are others, called the mixed *paſſions*, of which ſome have admiration blended with them, and others are compounded only of the *paſſions* which fall under love and hatred. Thoſe *paſſions*, in which admiration is a principal ingredient, are AMBITION, glory (made up of joy, ſelf-love, and eſteem), ſhame, (compounded of ſorrow, ſelf-love, and contempt), EMULATION, HORROR, and CONSTERNATION. The other *paſſions*, compounded of love and hatred, may be diſtributed into ſuch as more immediately regard ourſelves, and ſuch as have others for their object, of thoſe which concern ourſelves, the principal are the following, viz. fluctuation, conſiſting of deſire and grief; RESOLUTION, HOPE, FEAR; ſecurity, which is hope advanced beyond the fear of a diſappointment; deſpair, which is fear without any mixture of hope; JEALOUSY, and diſguſt. Of thoſe which expreſs our diſpoſitions towards others, the chief are the following; viz. irriſion, or that mirth which is excited in us by the ſight of another's abſurdities or miſfortunes; commiſeration, which is a compound of love and ſorrow; congratulation, or that joy which our love to another makes us receive from the gifts of nature or Providence beſtowed upon him; ENVY, ANGER, GRATITUDE, and that which the Latins call *deſiderium*, or fondneſs for the memory of perſons and things that have been greatly beloved by us, ſpringing from the reflection on a paſt good, which we deſpair of enjoying again.

Dr. Cheyne conſiders the *paſſions* as either ſpiritual or animal. *Spiritual paſſions* he defines to be thoſe ſentiments produced in the ſoul by external objects, either ſpiritual ones, immediately; or material ones, by the mediation of the organs of the body.

Animal paſſions he defines to be thoſe effects produced by ſpirits, or bodies, immediately on the body.

Hence, as outward objects may be conſidered either as goods or evils, the moſt natural diviſion of the *paſſions*, whether ſpiritual or natural, as they regard thoſe objects, is into *pleaſurable* and *painful*.

And, in this ſenſe, all the *paſſions* may be reduced to love and hatred; of which joy and ſorrow, hope, and fear, are only ſo many modifications or complexions, according to the various appearances, poſitions, &c. of the object.

In effect, all the *paſſions* may not only be reduced to two, viz. love and hatred, but, perhaps, to one, love; and even that may be all reſolved into ſelf-love; and this into a principle of ſelf-preſervation, or neceſſary invincible deſire of pleaſure and happineſs. The reſt are only rivulets from this ſource, or ſpecial applications of this principle to particular occaſions.

Thus, the deſire of any thing, under the appearance of its goodneſs, ſuitableneſs, or neceſſity to our happineſs, conſtitutes the *paſſion* of love; the deſire of eſchewing or avoiding any thing apprehended to be miſchievous, hurtful, or deſtructive, conſtitutes hatred or averſion; the deſire of a good, which appears at the ſame time probable, and in our power, conſtitutes hope; but, if the good appear improbable, difficult, or impoſſible, it conſtitutes fear or deſpair; the unexpected gratification of deſire is joy; the deſire of happineſs to another under pain, or ſufferings, is compaſſion; and the deſire of another's puniſhment, is revenge or malice, &c.

The ſingle deſire of happineſs, then, is the ſpring or motive of all our *paſſions*, as thoſe are of all our actions. Some wiſe and reaſonable motive, or end of action, ſays Dr. Morgan, is certainly neceſſary to all wiſe and reaſonable action: to act without a motive, would be the ſame thing as not to act at all, that is, ſuch an action could anſwer no further or better end than not acting; and conſequently the action, as well as the agent, would be ſo far inſignificant and uſeleſs. He, who ſhould have no object at all of his love or averſion, hope or fear, joy or grief, muſt be ſimply and purely indifferent to all action; and, conſequently, he muſt either be in a ſtate of perfect reſt and inaction, or in a ſtate equivalent thereto; wherein the action of ſuch a being could be of no more ſignificancy than the uncertain fluctuation of an atom, or the quivering of a feather in the air.

But we can by no means approve the opinion of thoſe, who will allow no ultimate object of deſire, or motive to action, beſides private good. It is juſtly obſerved by a writer already cited, that this opinion ſprung from not carefully diſtinguiſhing between deſire, and the pleaſure implied in the gratification of it. The latter is ſubſequent to the former, and founded in it; that is, an object ſuch as fame, knowledge, or the welfare of a friend, is deſired, not becauſe we foreſee, that, when obtained, it will give us pleaſure, but ſince EVERY the obtaining it gives us pleaſure, becauſe we previouſly deſired it, or had an affection carrying us immediately to it, and reſting in it. And if there were no ſuch affections, the foundations of private enjoyment and happineſs would be deſtroyed. Of our ſeveral *paſſions* and appetites, ſome are ſubordinate to ſelf-love, and given with a view to the preſervation and welfare of individuals: others are ſubordinate to BENEVOLENCE, and given in order to ſecure and promote the happineſs of the ſpecies; and both the one and the other are eſſentially diſtinct parts of our intelligent frame. Price's Rev. p. 127, &c.

The natural or occaſional cauſe of all the *paſſions*, Malebranche makes to be the motion of the animal ſpirits, which are diffuſed through the body, to produce and preſerve a diſpoſition therein ſuitable to the object perceived; to the end that the body and mind may mutually aſſiſt each other on this occaſion, it being the order of the Creator, that our wills be followed by motions of the body proper to execute them; and that the motions of the body, mechanically excited in us by the view of external objects, be accompanied with a *paſſion* of the ſoul, which inclines to will or nill what appears ſerviceable or noxious to the body.

It is a continual impreſſion of the will of the Creator, that unites us thus intimately to a piece of matter, and occaſions this reciprocation of motions and ſenſations: were this impreſſion of the Creator's will ſuſpended a moment, we ſhould be delivered from all dependence, all *paſſions*, &c. For what people uſually imagine of a neceſſary connection between the motions of the ſpirits and blood, and the emotions of the ſoul, is wholly inconceivable.

Certain little parts of the bile, ſay they, move with ſome violence among the fibres of the brain; therefore, the ſoul muſt neceſſarily be agitated by ſome *paſſion*, and this *paſſion* muſt be anger rather than love. What relation can we conceive between the faults of an enemy, a *paſſion* of contempt or hatred, and a bodily motion of the parts of the blood ſtriking againſt certain parts of the brain? How can the union or alliance of two things ſo different as ſpirit or matter be effected but ſolely by the omnipotent will of the Author of nature?

There has been much controverſy about the ſeat of the *paſſions*; but when we conſider that *paſſion* ſignifies a ſenſation of the ſoul, it muſt be lodged there, and not in any part of the body. As this ſenſation is joined with a tumult or agitation of the ſpirits, the *paſſion* muſt go along with the ſpirits moved. Thoſe in admiration, which ſeems to be a more ſpeculative *paſſion*, on being employed chiefly about the novelty or grandeur of objects, are in the brain, the great inſtrument or condition rather of thought and contemplation. In other *paſſions*, which, reſpecting the good or evil of objects, proceed from a principle of ſelf-preſervation, the ſpirits agitated are in the heart, the fountain of life, and fitteſt reſidence of thoſe motions of the animal ſpirits, which are intended for the benefit and preſervation of life.

It is a point, about which the divines and philoſophers can never agree, whether this relation and connection of thoughts of the mind, and motions of the body, be the gift of nature, or the puniſhment of the firſt ſin; and whether the *paſſions* be the inſtitution of nature, or the corruption thereof. Indeed, conſidering the good and wiſe purpoſes the *paſſions* ſerve, with regard to knowledge, virtue, and happineſs, and that abſolute neceſſity they are of, it is ſurpriſing it ſhould ever be doubted, that they are eſſential to human nature.

This union or relation is found in all men, but in different degrees, and of different extent, according to the different temperaments, conditions, ages, ſexes, occaſions, objects, &c.

In every *paſſion* there may ſeven things be diſtinguiſhed: the firſt, the judgment the mind makes of an object, or the view of the relation the object bears to us. The ſecond, a new determination of the will towards that object, ſuppoſing it to appear as good or evil. The third, the peculiar ſenſation of modification, which accompanies them; as the ſenſation of love, hatred, deſire, or joy; which ſenſations are always different in the different *paſſions*, and are, as it were, the characteriſtics thereof. The fourth, a new determination of the courſe of the blood and ſpirits towards the ſeveral parts of the body; before the ſight of the object of the *paſſion*, the animal ſpirits were pretty equally diffuſed throughout the body; but the preſence of the new object diſturbs the whole œconomy; and the greateſt part of the ſpirits are ſent into the muſcles of the arms, legs, face, &c. The fifth

is, the ſenſible emotion of the ſoul, which finds itſelf ſhaken by this ſudden overflowing of ſpirits. The ſixth is, the different ſenſation of love, hatred, &c. cauſed not by the intellectual view of good or evil, but by the different ſhakes or movements the animal ſpirits occaſion in the brain. The laſt is, a certain ſenſation of joy, or an inward ſatisfaction, which detains the ſoul in its *paſſion*, and atteſts its being in the ſtate it ought to be in with regard to that object.

PASSIONS, in a view to *Medicine*, make one of the ſix non-naturals, and are of the utmoſt conſequence with reſpect to health or diſeaſe.

In conſequence of the ſeveral judgments we form concerning objects, as either good or evil, the organs of ſenſation and motion, i. e. the nervous fibres, are variouſly impreſſed or ſtimulated; whence ariſe certain ſenſations, and certain modifications of motion, which, it is apparent, are reciprocal, and follow mutually from each other, whether the impreſſion be ſuppoſed firſt made on the body, or on the mind; that is, any ſtrong, violent motion, made on the organs, will excite a painful ſenſation in the mind; or any ſuch painful ſenſation firſt excited in the mind, from the bare conſideration of an object, will impreſs a violent motion on the organs; and, on the contrary, an eaſy and placid undulation, impreſſed originally by the actual impulſe of objects, will excite a pleaſurable ſenſation in the mind: or a pleaſurable ſenſation excited in the mind, from the mere contemplation of an object, will be followed with a like eaſy, placid undulation of the organs.

The painful *paſſions*, then, as well as bodily pain, impreſs the nervous fibres with a violent motion, which brings them alternately into forcible contractions and dilatations, or ſtrengthens and increaſes their muſcular force and action. While then this pain or uneaſineſs of deſire, annexed to the *paſſions*, and impreſſed on the nerves, is moderate, and reſtrained within the bounds of nature, ſuch ſtimulating deſires have a good effect, as they ſtrengthen muſcular motion, keep up the circulation of the blood, promote the natural ſecretions, and excite a man to thoſe actions and exerciſes, wherein animal life, health, and vigour, conſiſt. But where the uneaſineſs, annexed to the *paſſion*, is too violent, ſuch a continual ſtimulus will gradually derive a too great proportion of blood to the ſtimulated organs, by which the veſſels will be overſtretched and diſtended, their muſcular force will be gradually impaired, and the equilibrium of the blood and juices will be interrupted. And hence, from a mere painful ſenſation, will ariſe a complicated train of bodily illneſſes and pains, in conſequence of the eſtabliſhed laws of the union and communication of ſoul and body.

Again, while we are wearing off the uneaſineſs of deſire annexed to any *paſſion*, we feel a ſenſible pleaſure, or agreeable emotion; and the organs, hereupon, falling into eaſy, uniform, placid undulations, the too great current of the blood towards them is diverted, and the equilibrium is reſtored. As ſoon as the uneaſineſs is all gone, the pleaſure ceaſes, and terminates in mere indolence, which diſpoſes the perſon to reſt and inaction, till the return of ſome freſh deſire, ſtimulating to farther action, renews the ſame ſucceſſion and interchangeable ſeries of pain and pleaſure.

And this is the circle of animal life: as the ſtimulus of deſire throws off the indolence of reſt, and excites to action; ſo the gratification moderates the pain of deſire, creates a pleaſure at firſt, and then terminates in the former indolence and inaction, till freſh deſires returning, ſtimulate to farther action, and continue the ſame round.

Dr. Cheyne divides the *paſſions* into acute and chronical, after the ſame manner, and for the ſame reaſon, as diſeaſes are ſo divided.

The acute *paſſions*, whether pleaſurable or painful, he obſerves, have much the ſame effect, and operate after much the ſame manner as diſeaſes do. They produce a briſk circulation of the fluids, and conſtringe the ſolids for ſome ſhort time. Thus, ſudden guſts of joy, or of grief, ſtimulate the nervous fibres, and the coats of the animal tubes, and thereby give a greater celerity to their included fluids; and the functions of the heart and lungs being involuntary, they have their more neceſſary and immediate effects on them. Thus, both ſudden joy and grief make us breathe ſhort and quick, and render the pulſe ſmall and frequent; though retaining our breath ſome time, to reflect more intenſely on a painful object, forces at length a ſtrong expiration, which becomes a ſigh. Thus, a ſudden painful idea, making a quick circulation, and thereby throwing a great quantity of blood upwards, makes it appear in the ſuperficial veſſels of the face, neck, and breaſt, and ſo produces a bluſh. The ſame principles will account for the effects of fear and anger, which makes us change colour, and look red or pale, as the blood is accelerated or retarded in its courſe. Sudden and great fear doth ſo convulſe the nervous ſyſtem, that it ſometimes alters the poſition of the parts: thus, the hair ſhall ſtand on end in a fright, and the nerves be rendered ſo ſtiff and rigid, as to ſtop at once the animal functions; whence fainting, and ſometimes even death.

Chronical paſſions waſte the nervous ſyſtem gradually. Thoſe nerves employed in conſidering, brooding over, and fixing ſuch a ſet of ideas in the imagination, muſt be at length worn out and impaired; and the reſt, by diſuſe, rendered reſty and unactive, lifeleſs, and deſtitute of a ſufficient flux of warm blood, and due nouriſhment. Thus do long grief, dark melancholy, hopeleſs love, over-weening pride, &c. impair the habit, and ſometimes, when long indulged, terminate in madneſs: the reaſon is, that a conſtant habit of fixing one thing in the imagination begets a ready diſpoſition in the nerves to produce again the ſame image, till the thought of it become ſpontaneous and natural, like breathing, or the motion of the heart. Thus the Paquirs in India fix one or both hands by long holding them up ſo, as that they cannot bring them down again. Eſſay on Health, &c.

Dr. Morgan ſeems to have gone beyond any body in explaining the origin and effects of the *paſſions*. From a courſe of actual obſervations of the ſeveral phenomena in the body, which attended the ſeveral *paſſions*, viz. the ſtate of the pulſe, reſpiration, warmth, digeſtion, &c. that author draws theſe general concluſions:

1. That all the grateful or pleaſurable *paſſions* raiſe the vital tide, ſtrengthen and quicken the pulſe, diffuſe the natural heat, and take off any antecedent ſtimulus, or preſſure upon the abdomen and inferior organs: and, on the contrary, the painful *paſſions* ſink and depreſs the blood, weaken the pulſe, recall and concentre the natural heat, and fix a ſtimulus or compreſſion on the inferior organs.

2. All the *paſſions* impreſs their characteriſtic ſenſations, or modifications of pleaſure and pain, eſpecially upon the œſophagus, and upper orifice of the ſtomach.

3. That they impreſs the different modifications on the muſcles of the larynx, and thus diſcover themſelves by the different modulation and tone of the voice.

And hence he infers, that the nerves of the eighth conjugation, or par vagum, are the principal inſtruments of the *paſſions*; by means whereof they are variouſly impreſſed, modified, and organized: theſe, therefore, which are diſperſed to all parts of the breaſt and abdomen, particularly to the heart, lungs, ſtomach, liver, œſophagus, diaphragm, inteſtines, the organs of generation, &c. he conſiders as *pathetics of the firſt order*; the intercoſtal, which accompany all the diviſions of the par vagum, he calls *pathetics of the ſecond order*; the nerves, which ſerve the muſcles employed in reſpiration, and have the neareſt communication with thoſe of the par vagum, by means of the intercoſtal, he calls *pathetics of the third order*; and the nerves, which immediately diſpenſe ſenſe and motion to the ſeveral parts of the head, and have a remoter communication with the par vagum, *pathetics of the fourth order*.

According to this gradation, then, the organs, which are immediately ſupplied with nerves from the par vagum, or *pathetics of the firſt order*, will be firſt affected in the *paſſions*, and that with the ſmalleſt degree of impreſſed motion; with which the parts communicating immediately with the intercoſtal, or *ſecond order of pathetics*, keep pace, and are affected almoſt at the ſame time, and with the ſame motion; then the organs ſupplied with the *third order of pathetics*, or the nerves employed in the muſcles of reſpiration, are affected; and, laſtly, the organs of ſenſe and motion in the brain itſelf, by which ſenſation and imagination are performed, are put in a forcible emotion; by which the ordinary operations of ſenſe, judgment, &c. are much diſturbed.

This gradual riſe and progreſs of the *paſſions* is confirmed by fact, obſervation, and experience; but how they are generated, and by what ſteps they make theſe advances, requires ſome farther conſideration.

It may be obſerved then, that the quantity of motion impreſſed on the pathetic nerves in any *paſſion* is always proportional to the ſtrength of the deſire; but ſuch impreſſed motion is not always uniform, or equally diffuſed through the whole pathetic ſyſtem; for, as the largeſt and moſt numerous branches of the pathetic nerves are ſpent on thoſe parts, which derive their blood from the deſcending trunk of the aorta, viz. the ſtomach, ſpleen, kidneys, &c. upon any motion too forcibly impreſſed, or too long continued, theſe inferior organs are the firſt and greateſt ſufferers; whence the blood flowing impetuouſly and irregularly to the parts thus ſtimulated, they become overſtretched; and hence ariſes a ſenſe of pain, weight, and oppreſſion. By theſe means alſo the head and ſuperior parts being deprived of their due ſhare of blood, the pulſe muſt ſink, the natural heat diminiſh and retire, and

a ſenſe of cold and conſtriction be felt about the œſophagus, where the branches of the par vagum are very numerous; and hence the patient will be excited to ſigh, groan, moan, cry out, and complain, and will diſcover it in the tone of the voice, and modulation of the muſcles of the larynx, the characteriſtics of the prevailing *paſſion*.

Such is the ſtate of nature under the painful *paſſions*, where the ſtrong deſire of good is attended with an appearance of difficulty, or improbability: where the ſame deſire is attended with a ſeeming probability of obtaining or effecting it, this appearance, by moderating the intenſeneſs of the pain of the deſire, and taking off the too violent action of the pathetic nerves on the inferior organs, puts the pathetic ſyſtem in an eaſy, natural, uniform undulation; by which, the equilibrium of the blood being reſtored, the pleaſurable *paſſions* of love, joy, hope, &c. will be raiſed; and, in this caſe, the pulſe will riſe, and the natural heat will be diffuſed, and, by the action of the pathetic nerves on their proper organs, the ſeveral ſymptoms will be produced, which diſcover their placid emotions. Where the deſire is very keen and intenſe, we ſee what a prodigious force it will impreſs on the nerves, by the actions of madmen, and men in a fright. In this caſe, the ſtimulus of deſire being exceeding ſtrong, and the impreſſed motion univerſal, the pathetic nerves of the fourth or laſt order come to be affected; that is, the organs of ſenſation and imagination in the brain are brought into ſuch violent vibrations, as to diſturb the operations of reaſon.

From this violent perturbation of the pathetic nerves in the brain, madmen have their imagination as ſtrong and vivid as ſenſation itſelf.

Hence alſo we may obſerve the heights, or extremes, of the two contrary painful and pleaſurable *paſſions*; the one riſing at length into a mania, or raving madneſs, and the other ſinking into a hypochoudriacal melancholy. The principal ſeat of the one is the brain; and of the other, the viſcera of the abdomen, eſpecially the ſpleen and meſentery. The one inflames and overheats, the other chills and freezes the imagination: the one hangs over the underſtanding like a glaring, dazzling light, which animates and leads us on with zeal and vehemence; the other like a *thick, black*, and diſmal cloud, that ſinks all the powers of nature in the depths of miſery and deſpair. See on this ſubject Buchan's Dom. Med. chap. x.

PASSION, *cœliac*. See COELIAC.

PASSION, *hypochondriac*. See HYPOCHONDRIAC.

PASSION, *hyſteric*. See HYSTERIC.

PASSION, *iliac*. See ILIAC.

PASSIONS, in *Poetry*, denote the *paſſionate* ſentiments, geſtures, actions, &c. which the poet gives his perſons.

The *paſſions* are, as it were, the life and ſpirit of the longer poems. Their neceſſity in tragedy and comedy is obvious; nor can the epopœia ſubſiſt without them.

It is not enough that the epic narration be ſurpriſing; it muſt likewiſe be moving and *paſſionate*, hurrying away the reader's mind, and filling it with anxiety, joy, terror, or ſome other violent *paſſion*, and this for ſubjects which it knows are feigned. Though *paſſions* be always neceſſary, yet all are not equally neceſſary, or ſuitable to all. Comedy has joy, and agreeable ſurprizes, for its part: tragedy, on the contrary, has terror and compaſſion. The proper *paſſion* of the epopœia is admiration; though the epopœia, as a medium between the two others, takes in both their kinds of *paſſions*; as we ſee in the griefs of the fourth book of the Æneid, and the games and diverſions of the fifth. Admiration, in effect, is conſiſtent with eaſe; we admire with joy the things that ſurpriſe us agreeably, and with terror and grief thoſe that amaze and afflict us.

Beſides the general *paſſion*, which diſtinguiſhes the epic from dramatic poems, each epopœia has its peculiar *paſſion*, which diſtinguiſhes it from other epic poems. This peculiar *paſſion* ſtill follows the character of the hero. Thus, wrath and terror reign in the Iliad, becauſe Achilles is wrathful, and *πάντων ἀνθρώπων φοβερώτατος ἐστιν, the moſt terrible of men*. Anſt, on the contrary, the Æneid is all in the tender, ſofter *paſſions*; ſuch being the character of Æneas. The prudence of Ulyſſes not allowing theſe exceſſes, we find none of them in the Odyſſey.

As to the conducting of the paſſions, to make them have their effect, there are two things required; viz. that the audience be prepared or diſpoſed to receive them; and that ſeveral incompatible *paſſions* be not mixed together. The neceſſity of diſpoſing the audience is founded on the natural neceſſity of taking up things where they are, in order to remove them elſewhere. The application of this maxim is eaſy; a man is calm and at eaſe, and you would put him in a *paſſion* by a diſcourſe made on purpoſe. You muſt begin, then, in a calm manner; by this means you join yourſelf to him; and afterwards, walking together, he will not fail to follow you in all the *paſſions*, to which you lead him inſenſibly.

If you ſhew your anger at firſt, you will be as ridiculous, and will have as little effect, as Ajax in the Metamorphoſes; in whom the ingenious Ovid gives a fine example of this failing. He begins his harangue in the height of *paſſion*, and with the moſt violent figures, before his judges, who are in the deepeſt tranquillity:

Sigeia terræ,
Littora proſpexit, claſſemque in litore, vultu;
Protendenſque manu, Agimus, proh Jupiter! inquit,
Ante reos cauſam, & mecum confertur Ulyſſes.

The neceſſary diſpoſitions ariſe from ſome preceding diſcourſe, or, at leaſt, from ſome action, which has already begun to raiſe the *paſſions* before they are mentioned. The orators themſelves ſometimes uſe this laſt means; for though ordinarily they do not raiſe the *paſſions* till the end of their diſcourſe, yet, when they find their audience already moved, it would be ridiculous in them, by an unſeaſonable tranquillity, to lay them again.

Thus, the laſt time Catiline came to the ſenate, the fathers were ſo ſhocked at his preſence, that thoſe near the place where he ſat down, roſe up, retired, and left him alone. On this occaſion, Cicero had too much ſenſe to begin his oration with the uſual tranquillity and coolneſs of exordiums; by this means, he would have palied and abated the indignation of the ſenators againſt Catiline, which it was his buſineſs to ſpirit up and inflame; and he would have eaſed the parricide of that conſternation the behaviour of the ſenators had given them, and which it was Cicero's buſineſs and deſign to aggravate. Omitting, therefore, the firſt part of this oration, he takes his auditors in the condition he finds them, continues and augments their *paſſions*: *Quouſque tandem abutere, Catilina, patientia noſtra? Quamdiu nos etiam furor iſte tuus eludet? Quem ad finem ſeſe effrenata jactabit audacia? Nihilne te nocturnum præſidium palatii, nihil urbis vigiliæ, nihil timor populi, nihil, &c.*

The poets are full of inſtances of this kind, where the *paſſion* is prepared or kept up by actions. Dido, in Virgil, begins a diſcourſe like Ajax: *Proh Jupiter, ibit hic, ait*, &c. But then the motions are here well diſpoſed; Dido is before repreſented under terrible apprehenſions of Æneas's quitting her, &c.

Seneca's conduct, indeed, is quite oppoſite to this rule. If he has a *paſſion* to raiſe, he is ſure firſt to take from his audience any diſpoſition they might have to be affected. If they be in grief, fear, or the expectation of ſomething horrible, &c. he will begin with ſome fine deſcription of the place, &c. In the Troades, Hecuba and Andromache being prepared to hear the violent and barbarous death of their ſon Aſtyanax, whom the Greeks precipitated from the top of a tower; of what avail was it to tell them, that, of the ſpectators that crouded from all quarters to ſee the execution, ſome placed themſelves on ſtones, which the ruins of the walls made to project; that others ſhook their legs, as being placed too high, &c.

Alta rupes, cujus e cacumine
Ereƈta ſummos turba lacerat pedes.

The ſecond thing required in the management of the *paſſions* is, that they be found pure, and diſengaged from any thing that might prevent their effect.

Polymythy, therefore, i. e. a multiplicity of fables, actions, or hiſtories, muſt be avoided: all adventures much broken, and hard to be retained, and all intrigues intricate, and difficult to conceive, are at once to be excluded. Theſe embarraſs the mind, and require ſo much attention, that there is none to ſpare for the *paſſions*. The ſoul muſt be free and diſengaged to feel; on the contrary, we divert ourſelves even from our real ſorrows, by an application to other things.

But, of all others, the greateſt enemies to the *paſſions* are the *paſſions* themſelves: they oppoſe and deſtroy each other; and if two oppoſite ones, e. gr. joy and ſorrow, meet in the ſame object, they will neither of them ſtand it. It is the nature of theſe habits that impoſe this law: the blood and ſpirits cannot move gently and equally, as in a ſtate of tranquillity, and, at the ſame time, be ſtopped and ſuſpended with a violence occaſioned by admiration. Nor can they be in either of thoſe ſituations, while fear calls them from the outer parts of the body, to aſſemble them about the heart, or rage ſends them into the muſcles, and makes them act there with violences very oppoſite to the operations of fear.

The cauſes and effects, therefore, of the *paſſions* in the ſoul are to be ſtudied, in order to be able to manage them with all their force. Virgil furniſhes two examples of what we have ſaid about the ſimplicity and engagement of each *paſſion*, in the deaths of Camilla and Pallas. See the Æneid.

PASSION, in *Heraldry*. *Croſs of* PASSION is a croſs thus called, becauſe in ſhape of that whereon our Saviour ſuffered; i. e. not croſſed in the middle, but nearer the top; with arms ſhort, in proportion to the length of the ſhaft.

PASSION *flower*, *paſſiflora*, in *Botany*, a genus of the *gynandria pentandria* claſs. Its characters are theſe: the flower has a plain coloured empalement of five leaves, and five half ſpear-ſhaped petals, which are large, plain, and obtuſe; the nectarium has a triple crown; the outer, which is longer, is faſtened to the inſide of the petal, but is larger, and compreſſed above; it has five awl-ſhaped ſtamina, faſtened at their baſe to the column of the ſtyle annexed to the germen; the ſtyle is an erect cylindrical column, upon whoſe top ſits an oval germen, with three ſmaller ſtyles, which ſpread out; the germen afterward becomes an oval fleſhy fruit, with one cell, ſitting at the end of the ſtyle, filled with oval ſeeds, faſtened longitudinally to the ſkin or ſhell. Miller reckons nineteen, and Linnæus twenty-ſix ſpecies.

The different ſpecies of this plant cultivated in the gardens of the curious are very numerous, and moſt of them very beautiful.

The three more common kinds, which are what we ſee in moſt gardens, are very hardy, and bear all the ſeverities of our climate as well as if natives of it; for though the tender branches, and ſometimes even the main ſtem, are deſtroyed in our ſeverer winters, yet it always ſhoots up again from the root.

Theſe are propagated by laying down their branches, which in one year's time will take good roots, and may be removed to the places where they are deſigned to remain. The beſt ſeaſon for tranſplanting them is the latter end of March, or the beginning of April: they ſhould be planted againſt a wall, or other building, which faces the ſouth-eaſt or ſouth-weſt; or elſe mixed among the flowering ſhrubs in quarters of large gardens: in this caſe they muſt be trained up to poles fixed in the earth for that purpoſe, and thus will flower well, and appear extremely beautiful. The beſt ſeaſon for pruning them is in the ſpring, and it is a good cuſtom to lay a foot thickneſs of mulch at the roots, which will effectually preſerve them from the ſeverity of the winter, and is neceſſary when they are planted in open quarters, and have not the defence of a wall behind them. The manner of pruning is to cut entirely off all the weak ſhoots, and ſhorten the ſtrong ones to about three feet in length. When they are planted againſt high buildings, they may be left ſomething longer than this, to fill up the wall; but this is not very neceſſary, for they are very quick-growing plants, and in open quarters they ſhould be always pruned much ſhorter than this, to bring their flowers nearer the ground.

The moſt common kind with us never bearing fruit in this climate can never be propagated any way but this; but there is another ſpecies which has by ſome been miſtaken for the ſame, though really very different, which conſtantly bears fruit with us; and the plants of this may be raiſed from ſeeds in the common way.

PASSION *week*, the week next preceding Eaſter.

It is thus called from our Saviour's *paſſion*, i. e. his crucifixion, &c. which happened on the Friday of this week, now called *Good Friday*.

PASSIONATO, in the *Italian Muſic*, intimates that the part to which it is annexed ought to be played paſſionately, or in a moving and affecting manner.

PASSIVE, a term of relation, implying a thing to ſuffer, or undergo the action of ſome other; which, in reſpect hereof, is denominated *active*.

In all generations, philoſophers conceive an *active* power, and a *paſſive*.

In civil life, we ſay, ſuch a perſon, in ſuch an election, has both an active voice, and a *paſſive*, i. e. he is both capable of electing, and of being elected.

Some alſo uſe the term *paſſive debt*, for a debt which we owe another, in contradiſtinction to an active debt, which is owing to us.

The chemiſts divide their principles, or elements, into active and *paſſive*. *Paſſive* are ſuch as have no active force inherent in themſelves, and which only act by being joined with ſome of the others.

Such are phlegm and earth; ſome ſay alſo ſalt, and, in effect, all but ſulphur, or fire, which they will have the only principles of action and motion in the univerſe.

PASSIVE *obedience*, a doctrine held by the NONJURORS, or high-churchmen, who maintained, that it was never lawful for the people, under any provocation or pretext whatever, to reſiſt their ſovereign. This doctrine has been warmly oppoſed by many, who think it both lawful and neceſſary, in certain circumſtances, and in caſes of an urgent and momentous nature, to reſiſt the prince for the happineſs of the people. In the preſent advanced ſtate of civil and religious liberty, this doctrine is now almoſt exploded in our country.

PASSIVE *qualities*. See QUALITY.

PASSIVE *underſtanding*. See UNDERSTANDING.

PASSIVE *prayer*, in the *Language of Myſtic Divines*, is a total ſuſpenſion or ligature of the intellectual faculties, in virtue whereof, the ſoul remains, of itſelf, and as to its own power, impotent with regard to the producing of any effects. See PRAYER.

The *paſſive* ſtate, ſays Fenelon, is only *paſſive* in the ſame ſenſe as contemplation is ſo, i. e. it does not exclude peaceable, diſintereſted acts, but only unquiet ones, or ſuch as tend to our own intereſt.

In the *paſſive* ſtate, the ſoul has not properly any activity, any ſenſation of its own: it is a mere infinite flexibility of the ſoul, to which the feebleſt impulſe of grace gives motion. Id.

PASSIVE, in *Grammar*, denotes a ſecond voice or inflexion of verbs, which, of active, become *paſſive*, by aſſuming, in the modern languages, new auxiliary verbs; and, in the ancient, by new terminations. See VERB, VOICE, &c.

The Engliſh verbs become *paſſive*, by taking the auxiliary verb *I am*, in lieu of *I have*, wherewith the active are conjugated; the French, by *Je ſuis*, in lieu of *J'ay*; the Italian, by *Io ſo*, for *Io ho*, &c.

Latin verbs become *paſſive*, by changing their terminations; as *amor* for *amo*, &c. *amari* for *amare*, &c.

Engliſh verbs *paſſive* are nothing elſe, in effect, but the verb *I am* in all its inflexions, joined to the participle *paſſive*; as, *I am praiſed*, in Latin, *laudor*; in French, *Je ſuis loué*; I have been praiſed, *J'ay été loué*, *laudatus fuiſ*, &c.

Mr. Harris, who conſiders all verbs, that are ſtrictly ſo called, as energies, diſtinguiſhes active and *paſſive* verbs in the following manner. Every energy, he ſays, is naturally ſituate between two ſubſtantives, an energizer, which is active, and a ſubject, which is *paſſive*. Hence then, if the energizer lead the ſentence, the energy follows its character, and becomes what we call a verb ACTIVE. Thus we ſay, *Brutus amat*, *Brutus loves*. On the contrary, if the *paſſive* ſubject be principal, it follows the character of this too; and becomes what we call a verb *paſſive*. Thus we ſay, *Portia amatur*, *Portia is loved*.

Neuter PASSIVE is a verb, that has a *paſſive* conjugation, but a neuter ſignification.

Of theſe there are a very ſmall number in Latin, more in French, and fewer in Engliſh: as, *I am entered*, *ingreſſus ſum*, *Je ſuis entré*, &c.

Grammarians are frequently miſtaken here, taking verbs for neuters *paſſives*, which, in effect, are actives, and only differ in that they act on themſelves, by adding the pronoun perſonal; and which, on that footing, ſhould rather be neuters active, than neuters *paſſive*.

Some admit of no genuine *paſſive* verbs in the modern tongues; ſuch, we mean, as anſwer to the notion of *paſſives* in the ancient, where all is done by different terminations. On which footing, there ſhould be none but actives *paſſive*, and neuters *paſſive*.

PASSIVE *vaſſalage*. See VASSALAGE.

PASSO. See PASSAGE.

PASSOVER, πασχα, a ſolemn feaſt, celebrated among the Jews, on the fourteenth day of the moon next after the vernal equinox.

This feaſt was called, by the ancient Latins and Greeks, *paſcha*, not from πασχω, *I ſuffer*, as Chryſoſtom, Irenæus, and Tertullian, weakly imagine, but from the Hebrew פסח *paſahh*, *paſſage*, *leap*; the deſign of the feaſt being to commemorate the deſtroying angel's *paſſing over* the houſes of the Iſraelites, when he entered in, and deſtroyed the firſt-born in thoſe of the Egyptians. Exod. xii. 27.

Many erroneouſly imagine, that it was in memory of their *paſſing* the Red Sea that the *paſſover* was inſtituted; though it is certain the feaſt was held, and had its name, before the Iſraelites took a ſtep of their way out of Egypt, and conſequently ſeveral days before their paſſing the Red Sea.

Beſides the *paſſover* celebrated on the fourteenth of the firſt month, there was a ſecond *paſſover* held on the fourteenth of the ſecond month after the equinox, inſtituted by God in favour of travellers, and ſick perſons, who could not attend at the firſt, nor be at Jeruſalem on the day.

The Greeks, and even ſome of the catholic doctors, from the thirteenth, eighteenth, and nineteenth chapters of St. John, take occaſion to conclude, that Jeſus anticipated the day marked for the *paſſover* in the law; but the authority of three evangeliſts ſeems to evince the contrary. See Whitby's Diſſertation on this ſubject, in an appendix to the fourteenth chapter of St. Mark.

F. Lamy

F. Lamy is of opinion, that he did not attend at the *paſſover* the laſt year of his life; which ſentiment has drawn upon him abundance of oppoſers.

F. Hardouin maintains, that the Galileans celebrated the *paſſover* on one day, and the Jews on another.

PASS-PAROLE, a command given in the head of an army, and thence communicated to the rear, by paſſing it from month to mouth.

PASS-PAR-TOUT, a maſter-key; or key that opens indifferently ſeveral locks belonging to the ſame lodge or apartment.

PASSPORT, a licence or letter from a prince or governor, granting liberty and ſafe-conduct to travel, enter, and go out of, his territories, freely, and without moleſtation.

The *paſſport* is properly given to friends, and the SAFE-CONDUCT to enemies.

For the proviſion by *Magna Charta*, in favour of merchandize, ſee MERCHANT.

The violation of ſafe-conducts, or *paſſports*, expreſly granted by the king or his ambaſſadors to the ſubjects of a foreign power in time of mutual war, or committing acts of hoſtility againſt ſuch as are in amity, league, or truce with us, who are here under a general implied ſafe-conduct, are breaches of the public faith, without which there can be no intercourſe or commerce between one nation and another; and ſuch offences may, according to the writers upon the law of nations, be a juſt ground of a national war. And it is enacted by the ſtatute 31 *Hen. VI. cap.* 4. now in force, that if any of the king's ſubjects attempt, or offend, upon the ſea, or in any port within the king's obeyſance, or againſt any ſtranger in amity, league, or truce, or under ſafe-conduct, and eſpecially by attacking his perſon, or ſpoiling him, or robbing him of his goods; the lord chancellor, with any of the juſtices of either the king's bench or common pleas, may cauſe full reſtitution and amends to be made to the party injured.

Paſquier takes *paſſport* to have been introduced for *paſſe-par-tout*. Balzac mentions a very honourable *paſſport* given by an emperor to a philoſopher in theſe terms: "If there be any one on land, or ſea, hardy enough to "moleſt Potamon, let him conſider whether he be ſtrong "enough to wage war with Cæſar."

PASSPORT is alſo uſed for a licence granted by a prince for the importing or exporting merchandizes, moveables, &c. without paying the duties.

Merchants ſometimes procure ſuch *paſſports* for certain kinds of commodities; and they are always given to ambaſſadors and miniſters, for their baggage, equipage, &c.

PASSPORT is alſo a licence obtained for the importing or exporting of merchandizes deemed contraband, and declared ſuch by tariffs, &c. as gold, ſilver, precious ſtones, ammunition of war, horſes, corn, wool, &c. upon paying duties.

PASSPORT, or PASS, in *Sea-Language*, denotes a permiſſion granted by any ſtate to navigate in ſome particular ſea, without hindrance or moleſtation from it. It contains the name of the veſſel, and that of the maſter, together with her tonnage, and the number of her crew, certifying that ſhe belongs to the ſubjects of a particular ſtate, and requiring all perſons at peace with that ſtate to ſuffer her to proceed on her voyage without interruption.

PASSULATUM, a name given by the ancients to medicine compoſed of the pulp of raiſins paſſed through a ſieve, ſometimes alone, ſometimes with other ingredients.

PASSUM, a name given by the ancients to a kind of wine made of grapes, which had been ſuffered to remain on the vines till much withered and dried up: it is hence uſed alſo by ſome of the moderns to expreſs raiſin wine.

PASS-VOLANT, or PASSE-VOLANT. See FAGGOT.

In France, the *paſſe-volants* are condemned to be marked on the cheek with a fleur-de-lys.

PASTE, in *Cookery*, a ſoft compoſition of flour, wrought up with proper fluids, as water, milk, or the like, to ſerve for cafes or coffins, therein to bake meats, fruits, &c.

Paſte is the baſis or foundation of pyes, tarts, patties, paſties, and other works of paſtry.

PASTE is alſo uſed in *Confectionary*, &c. for a preparation of ſome fruit, made by beating the pulp thereof with ſome fluid, or other admixture, into a ſoft pappy conſiſtence, ſpreading it into a diſh, and drying it with ſugar, till it becomes as pliable as an ordinary *paſte*. See CONFECTS.

It is uſed occaſionally for making the cruſts and bottoms of pyes, &c.

Thus, with proper admixtures, they make almond *paſtes*, apple *paſtes*, apricot *paſtes*, cherry, currant, lemon, plum, peach, and pear *paſtes*.

PASTE is alſo uſed for a preparation of wheaten flour, boiled up, and incorporated with water; uſed by various artificers, as upholſterers, ſaddlers, bookbinders, &c. inſtead of glue or ſize, to faſten or cement their cloths, leathers, papers, &c.

When *paſte* is uſed by bookbinders, or for paper-hangings to rooms, it is uſual to mix a fourth, fifth, or ſixth, of the weight of the flour of powdered reſin; and where it is wanted ſtill more tenacious, gum arabic, or any kind of ſize, may be added. *Paſte* may be preſerved, by diſſolving a little ſublimate, in the proportion of a dram to a quart, in the water employed for making it, which will prevent not only rats and mice, but any other kind of vermin and inſects, from preying upon it.

PASTES, in the *Glaſs Trade*, a ſort of compoſition of the glaſs kind, made from calcined cryſtal, lead, and metallic preparations, to imitate the ſeveral natural gems. Theſe are no way inferior to the native ſtones, when carefully made and well poliſhed, in brightneſs or tranſparence, but want their hardneſs.

The general rules to be obſerved in the making them are theſe: 1. That all the veſſels in which they are made are firmly luted, and the lute left to dry before they are put into the fire. 2. That ſuch veſſels are choſen for the work as will bear the fire well. 3. That the powders be prepared on a porphyry ſtone, not in a metal mortar, which would communicate a tinge to them. 4. That the juſt proportion in the quantities of the ſeveral ingredients be nicely obſerved. 5. That the materials be all well mixed; and if not ſufficiently baked the firſt time, to be committed to the fire again, without breaking the pot; for, if this be not obſerved, they will be full of bliſters and air-bladders. 6. That a ſmall vacuity be always left at the top of the pot, to give room to the ſwelling of the ingredients.

To make a *paſte* of extreme hardneſs, and capable of all the colours of the gems, with great luſtre and beauty, take of prepared cryſtal ten pounds; ſalt of polverine, ſix pounds; ſulphur of lead, two pounds: mix all theſe well together into a fine powder; make the whole, with common water, into a hard *paſte*, and make of this *paſte* ſmall cakes, of about three ounces weight each, with a hole in them made in their middle; dry theſe in the ſun, and afterwards calcine them in the ſtraighteſt part of a potter's furnace; after this powder them, and levigate them to a perfect fineneſs on a porphyry, and ſet this powder in pots in a glaſs-furnace to purify for three days; then caſt the whole into water, and afterwards return it into the furnace, where let it ſtand fifteen days; in which time all foulneſs and bliſters will diſappear, and the *paſte* will greatly reſemble the natural jewels. To give this the colour of the emerald, add to it braſs thrice calcined: for a ſea-green, braſs ſimply calcined to a redneſs; for a ſapphire, add zaffer, with manganeſe; and for a topaz, manganeſe and tartar. All the gems are thus imitated in *paſte*, by the ſame way of working as the making of the coloured glaſſes; and this is ſo hard, that they very much approach to the natural gems.

The colours in all the counterfeit gems made of the ſeveral *paſtes*, may be made deeper or lighter, according to the works for which the ſtones are deſigned; and it is a neceſſary general rule, that ſmall ſtones for rings, &c. require a deeper colour, and large ones a paler. Beſides the colours made from manganeſe, verdigriſe, and zaffer, which are the ingredients commonly uſed, there are other very fine ones, which care and ſkill may prepare: very fine red may be made from gold, and one not much inferior to that from iron; a very fine green from braſs or copper, and a ſky colour from ſilver; and a much finer one from the common ſmall garnets of Bohemia, which are of little value. The gems alſo afford glorious colours like their own.

The fine blue from ſilver is, probably, only from the ſmall quantity of copper uſed in the alloy.

A very ſingular and excellent way of making the *paſte* to imitate the coloured gems, is this: take a quantity of ſaccharum ſaturni, or ſugar of lead, made with vinegar in the common way; ſet it in ſand, in a glaſs body well luted from the neck downwards; leave the mouth of the glaſs open, and continue the fire twenty-four hours; then take out the ſalt, and if it be not red, but yelloviſh, powder it fine, and return it into the veſſel, and keep it in the ſand-heat twenty-four hours more, till it becomes as red as cinnabar. The fire muſt not be made ſo ſtrong as to melt it, for then all the proceſs is ſpoiled. Pour diſtilled vinegar on this calcined ſalt, and ſeparate the ſolution from the dregs; let the decanted liquor ſtand ſix days in an earthen veſſel, to give time for the finer ſediment to ſubſide; filter this liquor, and evaporate it in a glaſs body, and there will remain a moſt pure ſalt of lead; dry this well, then diſſolve it in fair water; let the ſolution ſtand ſix days in a glazed pan; let it ſubſide, then filtre the clear ſolution, and evaporate it to a yet more pure white and ſweet ſalt; repeat this operation

three times; put the now perfectly pure salt into a glass vessel, set it in a sand-heat for several days, and it will be calcined to a fine impalpable powder, of a lively red. This is called the sulphur of lead. Neri's Art of Glass. Take all the ingredients as in the common composition of the *paste* of the several colours, only instead of red lead, use this powder, and the produce will well reward the trouble of the operation, as experience has often proved.

A *paste* proper for receiving colours may be readily made by well pounding and mixing six pounds of white sand, cleansed, three pounds of red lead, two pounds of purified pearl-ashes, and one pound of nitre. A softer *paste* may be made, in the same manner, of six pounds of white sand cleansed; red lead, and purified pearl-ashes, of each three pounds; one pound of nitre, half a pound of borax, and three ounces of arsenic. For common use, a pound of common salt may be substituted for the borax. This glass will be very soft, and will not bear much wear, if employed for rings, buckles, or such imitations of stones, as are exposed to much rubbing; but for ear-rings, ornaments worn on the breast, and those little useful, it may last a considerable time.

In order to give *paste* different colours, the process is as follows.

PASTE *resembling amethyst*. Take ten pounds of either of the compositions described under *colouring of* GLASS; one ounce and a half of manganese, and one dram of zaffer; powder and fuse them together. See AMETHYST.

PASTE *perfectly black*. Take ten pounds of either of the compositions just referred to, one ounce of zaffer, six drams of manganese, and five drams of iron, highly calcined; and proceed as before.

PASTE, *blue*. Take of the same composition ten pounds; of zaffer, six drams; and of manganese, two drams; and proceed as with the foregoing.

PASTE *resembling the chrysolite*. Take of either of the compositions for *paste* above described, prepared without saltpetre, ten pounds, and of calcined iron five drams; and pursue the same process as with the rest. See CHRYSOLITE.

PASTE *resembling the red cornelian*. Take of the compositions mentioned under *colouring of* GLASS, two pounds; of glass of antimony, one pound; of the calcined vitriol, called scarlet oker, two ounces; and of manganese, one dram. Fuse the glass of antimony and manganese with the composition; then powder them, and mix them with the other, by grinding them together, and fuse them with a gentle heat.

PASTE *resembling white cornelian*. Take of the composition just referred to, two pounds; and of yellow oker, well washed, two drams; and of calcined bones, one ounce. Mix them, and fuse them with a gentle heat.

PASTE *resembling the diamond*. Take of the white sand, six pounds; of red lead, four pounds; of pearl-ashes, purified, three pounds; of nitre, two pounds; of arsenic, five ounces; and of manganese, one scruple. Powder and fuse them.

PASTE *resembling the aqua-marine*. Take ten pounds of the composition under GLASS; three ounces of copper, highly calcined with sulphur; and one scruple of zaffer. Proceed as before.

PASTE *like emerald*. Take of the same composition with the last, nine pounds; three ounces of copper, precipitated from aqua fortis, and two drams of precipitated iron. See EMERALD.

PASTE *like garnet*. Take two pounds of the composition under GLASS; two pounds of the glass of antimony, and two drams of manganese. For vinegar garnet, take of the composition for *paste*, described in this article, two pounds; one pound of glass of antimony, and half an ounce of iron, highly calcined; mix the iron with the uncoloured *paste*, and fuse them; then add the glass of antimony, powdered, and continue them in the heat till the whole is incorporated. See GRANATE.

PASTE, *gold*, or *full yellow colour*. Take of the composition for *paste* ten pounds, and one ounce and a half of iron strongly calcined; proceeding as with the others.

PASTE, *deep purple*. Take of either of the compositions for *paste*, ten pounds; of manganese, one ounce; and of zaffer, half an ounce.

PASTE, *resembling ruby*. Take one pound of either of the compositions for *paste*, and two drams of *calx auffi*, or precipitation of gold by tin; powder the *paste*, and grind the calx of gold with it in a glass, flint, or agate mortar, and then fuse them together. A cheaper ruby *paste* may be made with half a pound of either of the above compositions, half a pound of glass of antimony, and one dram and a half of the calx of gold; proceeding as before.

PASTE *resembling sapphire*. Take of the composition for *paste*, ten pounds; of zaffer, three drams and one scruple; and of the *calx auffi* one dram. Powder and fuse them. Or the same may be done, by mixing with the *paste* one-eighth of its weight of smalt. See SAPPHIRE.

PASTE *like topaz*. Take of the compositions under GLASS, ten pounds, omitting the salt-petre; and an equal quantity of the *gold-coloured hard* GLASS. Powder and fuse them. See TOPAZ.

PASTE *like turquoise*. Take of the composition for *blue paste*, already described, ten pounds; of calcined bone, horn, or ivory, half a pound. Powder and fuse them.

PASTE, *opake white*. Take of the composition for *paste*, ten pounds; and one pound of calcined horn, ivory, or bone; and proceed as before.

PASTE, *semi-transparent white, like opal*. See OPAL.

PASTE *for angling*. There are many receipts which particular people are fond of; but the following composition seems one of the best: take equal quantities of fresh butter and sheep's suet, about half as much of good old cheese, and the crumb of an old stale white loaf, as much as will, when they are all beaten in a mortar, make the whole into a *paste*; add a little wool or tow, that it may keep the better on the hook. The place should be baited with blood and grains over night, and in the morning this *paste* will be found an excellent bait. See FISHING.

PASTES *for birds*, a general sort of food made by the people who breed up birds from the nest, and suiting almost all kinds.

It is made in the following manner: grind half a peck of large beans, well dried, to a very fine meal; take of this meal two pounds; of the best sweet almonds blanched, one pound; these must be well beat together in a mortar, till perfectly mixed; then to a quarter of a pound of fresh butter, in a saucepan well tinned, add the *paste*, and mix all well together over a charcoal fire, stirring it as it boils with a wooden spoon; then add the yolks of four eggs, and a little saffron, and finally a small quantity of the finest virgin honey. When these are well incorporated, and are tolerably thin and without lumps, the whole is to be poured into a colander, made with such holes as will let the composition pass through: if any of it is so stiff that it will not go through, it must be beat again in a mortar, and by that means made fit to pass the holes, and mix with the rest. When the whole is done, it is to be put into a pot, and a little clarified honey being melted and poured on it, it will keep very well for six months or longer.

PASTEBOARD, a kind of thick paper, formed of several sheets pasted together.

There is also a coarse kind of *pasteboard*, made of old paper and old *pasteboard*, beaten in a mortar with water, and reduced into a kind of pulp; to which is added a little paste, to give the mass a consistence: after which, it is formed in a mould, and, to finish it, laid in a press, to squeeze out all the water, and reduce it to its proper thickness.

Each kind is distinguished by numeroes, which express the fineness and value: the finest is covered on both sides with a very white, smooth paper; others only on one side; and others on both sides with common paper.

The chief use of *pasteboard* is in the binding of books, and the making of letter-cases, hat-cases, gloves, &c. See BOOK-BINDING.

For the duty on *pasteboard*, see PAPER.

PASTEL. See PASTIL.

PASTERN of a horse, the distance between the fetlock or joint next the foot and the coronet of the hoof.

This part should be short, especially in middle-sized horses; because long *pasterns* are weak, and cannot so well endure travel.

PASTERN *joint* is the joint above the *pastern*.

The *pastern joint*, after travelling, is very apt to be crowned, i. e. to have a swelling round it, beneath the skin, in form of a circle, a third of an inch broad.

PASTIL, or PASTEL, among *Painters*, &c. a sort of paste, made of several colours, ground up with gum-water, either together or separately, in order to make crayons to paint with on paper or parchment. See CRAYON.

PASTIL, *pastillus*, is also used for a dry composition, yielding a fragrant smell when burnt in a perfuming pan, to clear and scent the air of a chamber.

It is composed of odorous resins, mixed with aromatic woods or drugs pulverised, and incorporated with mucilages of gum tragacanth. Some call these compositions ollelets of Cyprus.

There are also *pastils* for the mouth, chewed to procure a sweet breath. These have several names, and consist of several preparations, as musc-dines, conserves, &c.

PASTIL, or PASTEL, is sometimes also used for the plant otherwise called WOAD.

PASTIL, in *Confectionary*, is a preparation of sugar with lemon-water, &c. boiled up with gum-water, strained, beat up, and, by the addition of more dry sugar, worked

into a pliable paſte, and thus formed into round or oblong figures, and dried in a ſtove. See LOZENGE.

PASTINACA, in *Botany*. See PARSNEP.

PASTINACA *marina*, in *Ichthyology*, the name of a fiſh, called in Engliſh the *poiſon fiſh*, *ſea-ſtaire*, or *ſting-ray*. It is one of the flat cartilaginous fiſhes, and ſomething like the common ſkate. It is a ſpecies of the raia, or ray-fiſh, and diſtinguiſhed by Artedi from the other ſpecies, by the name of the ſmooth-bodied ray, with no fins to the tail, but with a long, bony, ſerrated ſpine in it.

This fiſh is the τραγων of Ariſtotle and Oppian, and is called, by the modern Italians, ſtanco.

Its tail, in which all its poiſon is ſaid to be lodged, is long, ſmooth, and round, with a thorn, or dart, of a finger's length, toothed on each ſide like a ſaw, with the teeth ſtanding upwards, or toward the head. This is placed at the diſtance of about one third of the length of the tail; and that from this place grows very ſlender, and ends in a very ſlender point. It grows, ſometimes, to ten pounds weight; and when the tail is cut off is commonly ſold in the markets of Italy, and elſewhere. See *Tab.* III. *of Fiſhes*, N° 35.

Authors give us many remarkable accounts of the poiſon of this fiſh, which it communicates to animals by the ſtroke of its tail. They mention alſo two kinds of it; that is, beſide the ordinary ſpecies, which is ſmooth, another called the *paſtinaca marina aſpera*, which is rough and prickly.

Mr. Pennant obſerves, that there is no credit due to the generally received opinion of its venomous qualities, though even Linnæus has adopted it. The ſpine is the weapon of offence, belonging to the fiſh, which is capable of giving a very bad wound, attended with dangerous ſymptoms, when it happens on a tendinous part, or to a perſon with a bad habit of body. Pennant's Britiſh Zool. vol. iii. p. 95. See TORPEDO.

PASTINATION, a term, ſometimes uſed in *Agriculture*, for the act of opening, looſening, and preparing the earth for planting.

PASTOPHORI, παστοφοροι, among the ancients, prieſts whoſe buſineſs it was, at ſolemn feſtivals, to carry the ſhrine of the deity, when they were to pray to him for rain, fair weather, or the like.

PASTOPHORIA, in *Antiquity*, the apartments, near the temples, where the *paſtophori* were lodged.

Clemens Alexandrinus, deſcribing the temples of the Egyptians, ſays, that, after having paſſed through magnificent courts, you are conducted to a temple, which is at the farther end of theſe courts, and then a *paſtophorus* gravely lifts up the veil, which is at the door, to ſhew you the deity within; which is nothing but a dog or a cat, or ſome other animal. Theſe *paſtophori* alſo ſupported the ſhrine, or niche of theſe ridiculous divinities, when they were carried in proceſſion. Apuleius ſpeaks of the *paſtophori* that carried the Syrian goddeſs.

In the temple of Jeruſalem there were two courts ſurrounded with galleries, and all round about were ſeveral lodging rooms for the prieſts, and to lay up wood, wine, oil, ſalt, meal, ſpices, incenſe, veſtments, valuable veſſels, and proviſions neceſſary for the ſacrifices and lamps, as alſo for the ſupport and maintenance of the prieſts. See 1 Chron. ix. 26, 33. Ezek. xl. 17, 18. 1 Chron. xxvi. 16.

PASTOR, originally, ſignifies one that (*paſcit*) feeds. Hence it was anciently uſed for a *ſhepherd*, or *advocate*; and is now appropriated to a *miniſter*, or one that has the cure of ſouls.

PASTOR *piſcis*, in *Ichthyology*, the name of a fiſh of the mullet kind, caught in the American ſeas and rivers, and eſteemed a very well taſted one.

It is of the uſual ſize of our river trout, and not unlike that fiſh in ſhape; its ſcales are large, and of a ſilvery white, and are ranged in the ſame order with thoſe of the perch, with greyiſh lines between the ſeveral arrangements; it has ſeven fins all very large, eſpecially that on the back, and its tail is remarkably forked; all the fins are white, and the coverings of the gills are ſcaly, not bony, as in moſt other fiſhes; whence it has been ſuppoſed to have no gills.

PASTORAL, ſomething that relates to ſhepherds, *paſtores*. The poets repreſent the innocence of a *paſtoral* life, and *paſtoral* manners, in the moſt agreeable light. We muſt not imagine them ſo beautiful in nature as in their deſcriptions.

PASTORAL, in *Poetry*, denotes a compoſition, the ſubject whereof is ſomething in the *paſtoral*, or at leaſt in rural life, and the perſons ſhepherds, or at leaſt ruſtics.

Moſt authors, except the Engliſh, eſteem *paſtoral* of the dramatic kind; and define it a dramatic piece, wherein the perſons are clad like nymphs and ſhepherds, and act their own amours. The ſcene is always in the fields or the woods; whence Taſſo calls *paſtoral*, favola boſcareccia.

Such are the Paſtor Fido, of Guarini; the Aminta, of Taſſo; the Sylvia, of Mairet, the French poet; and the Comus, of Milton, &c. Taſſo aſſumes to himſelf the honour of having invented *paſtoral*; but the firſt idea of this kind of drama ſeems to be Beccari's, who made the firſt attempt of this kind in 1552. But Taſſo's Aminta, which did not appear till the year 1573, effacing what had been done by Beccari, the firſt author was forgot, and Taſſo was left as the inventor.

It is certain this kind of *paſtoral* fable, compoſed according to the rules of the ſtage, was unknown among the ancients. The Greeks and Latins have indeed introduced ſhepherds in their eclogues; but theſe eclogues had nothing theatrical in them; nor were the ſhepherds ever brought upon the ſtage.

This kind of dramatic *paſtoral* is as yet but little known among us: nor have we, any thing conſiderable under the title of *paſtorals*, but country pieces after the manner of the eclogues or idyllions of the ancients.

Every *paſtoral*, even in this laſt view, ſhould have a little plot or fable, which may deſerve the title of a *paſtoral ſcene*. It muſt be ſimple, and but one; yet, not ſo as to refuſe all digreſſions, provided they be but ſhort. This rule of the plot is every where obſerved by Virgil.

PASTORAL, in the *Italian Muſic*, an air compoſed after a very ſweet, eaſy, gentle manner, in imitation of the airs ſhepherds are ſuppoſed to play.

PASTORAL *column*. See COLUMN.

PASTORAL *ſtaff*. See CROSIER.

PASTRY, that branch of cookery, which teaches the preparation of *paſte* with ſeveral ſavoury ingredients of fleſh, fruits, ſpices, ſugar, butter, &c.

Paſtry is chiefly converſant in the making of pies, paſties, patties, cakes, biſcuits, &c.

PASTURE, *paſtura*, in our law-books, is any place where cattle are occaſionally fed.

By which it differs from *paſcua*, which is a place ſet wholly apart for feeding, and never plowed.

Paſtura *omne genus paſcendi ſignificat, ſive in pratis, ſive in ſtipulis, ſive in agris, ſive in campis: ſed* paſcua *eſt locus principaliter deputatus pecoribus paſcendis, ut puta in montibus, maris, marifciis, & planis non cultis nec arotis.* Linwood.

PASTURE *ground* is properly that which is not cultivated; that is, it is neither meadow, nor arable; but reſerved for the feeding of cattle.

The beſt domains are thoſe conſiſting in *paſture*; they need no tilling. Holland is a country abounding much in *paſture*.

Paſture-land is of ſuch advantage to huſbandry, that many prefer it even to corn-land, becauſe of the ſmall hazard and labour that attend it, and as it lays the foundation for moſt of the profit that is expected from the arable-land; becauſe of the manure the cattle afford which are fed upon it. Where dung is not to be bought, as is often the caſe in places diſtant from large towns, the farmer is forced to proportion his arable to his *paſture*-land, in ſuch manner, that the cattle fed on the latter may be ſufficient for a ſupply of dung, ſo neceſſary for producing the fruits of the former.

Paſture-lands are of three kinds. 1. The up-lands: theſe lie ſo high as not to be overflowed by rivers or land-floods. 2. Thoſe low-lands which lie near rivers and fens. And, 3. thoſe that lie near the ſea. See UP-LAND, MARSH-LAND, MEADOW, and LAND.

Paſture-land requires the refreſhment of dung, as well as the arable or corn-land; but there is to be a difference made in the laying it on and ſpreading it. A harrow performs the office of ſpreading the dung on ploughed lands; but the beſt contrivance for *paſtures* is to lay the dung in ſmall heaps, and draw over it a gate ſtuck full of buſhes. All dung that is laid on *paſture*-land muſt be laid on in winter, that the rains may waſh its ſaltneſs into the ground before the ſun ſcorches it, or evaporates its goodneſs. Fine mould mixed with the dung, and ſpread with it over the land, is very good for *paſtures*; for it is waſhed down to the very roots of the graſs, and gives them a new and fine ſoil juſt in thoſe places where it is moſt wanted.

The beſt manure for *paſture*-land is the rotten bottoms of old hay-ſtacks; for theſe moulder away into a very rich ſoil, and are always full of vaſt quantities of ſeed, fallen at *times* from the hay, which all grow when ſpread on the ground: and thus new nouriſhment, and a new ſet of plants are given at once to the exhauſted ground. But as particularly uſeful as this is for *paſture*-grounds, it is as improper for corn-land, and ſhould by no means ever be ſuffered to mix with the manure of thoſe grounds; as it will then raiſe graſs and other plants, which, though of uſe in *paſture*, are weeds among the corn. Mortimer's Huſbandry.

In order to lay down land that has been in tillage with graſs for *paſture*-ground, the beſt method is to plough

it well, and clean it from weeds, and to ſow the graſs-ſeeds about the middle of September, or a little ſooner in cold lands, and if there be a proſpect of rain. The beſt ſeeds are the upland hay-ſeeds, taken from the cleaneſt *paſtures*, where there are no bad weeds, of which three or four buſhels will ſuffice for an acre. White Dutch clover, or white honey-ſuckle graſs is very proper: and eight pounds of it will be enough for an acre. They ſhould be ſown ſeparately; the graſs ſeed firſt, and then the Dutch clover. After they are ſown, the ground ſhould be lightly harrowed, and in two or three days rolled to break the clods, ſmooth the ground, and fix the ſeeds. When they grow up, they ſhould be carefully weeded, and well rolled, in order to preſs down the graſs, and form a thick bottom and ſward. After the ground has been thus ſown, and brought to a good ſward, the method of preſerving it good is conſtantly to roll the ground with a heavy roller, every ſpring and autumn; to cut up the weeds, at the ſame ſeaſons; to dreſs theſe paſtures, every third year; and to mow one ſeaſon, and feed the next. Miller.

PASTURE, *artificial*. As to the difference of the quantity of *artificial paſture* made by dung without tillage, and that made by tillage without dung, the latter is many times greater, as has been proved by repeated experiments on unplowed land, whereon a dunghill had lain for two or three years, and being then removed was planted with turneps; and at the ſame time a tilled land contiguous thereto, was drilled with turneps, and horſe-hoed. The other being hand-hoed, ſeemed to proſper beſt at the firſt, but in fine it did not amount to a fifth part of the tilled and horſe-hoed land, either in bigneſs or in crops; ſo that the benefit of the dung and hand-hoe was inconſiderable in compariſon of the plough and horſe-hoe. The little quantity of *artificial paſture* raiſed to the other, was only near the ſurface, and did not reach deep enough to maintain the turneps till they arrived at the fifth part of the growth of thoſe which were placed in *an artificial paſture*, that reached to the bottom of the common bed of mould.

Another proof of the ſame kind is, that ſeveral lands of turneps, drilled on the level, and at three feet rows, plowed, and doubly dunged, and alſo horſe-hoed, did not produce nearly ſo good a crop of turneps as ſix feet ridges adjoining horſe-hoed, though no dung had been laid on them for many years.

In this caſe, there was no other difference but that the three feet rows did not admit the hoe-plough to raiſe half the *artificial paſture* as the ſix feet rows did. The dung plowed into the narrow intervals before drilling, could operate no farther with any great effect than the hoe-plough could turn it up and help its pulverization. Upon the whole, dung without tillage can do very little; with ſome tillage, it does ſomething; with much tillage it pulverizes the ſoil in much leſs time than tillage alone can do it in; but tillage alone, in more time, can pulverize it as well. Much of the dung commonly uſed on fields is to be ſaved on this principle; a little more hoeing between the rows of the plants ſupplies the place of it, and is done at much leſs expence than that of ſo much manure, of the hands neceſſary to lay it on, and the carriage. Tull's Horſe-hoeing Huſbandry.

PASTURE *of plants*. See PLANT.

PASTURE, *admeaſurement of*. See ADMEASUREMENT.

PASTURE, *common of*. See COMMON.

PASTUS, the procuration or proviſion, which the king's or lord's tenants are bound to make for them at certain days or ſeaſons, or as often as they make a progreſs to their lands.

This, in many places, has been converted into a pecuniary fee; as in the procurations of the clergy.

PASTY, in *Cookery*, a work of paſtry; being a preparation of ſome proper meat, as beef, veniſon, lamb, or the like, well boned, beaten up to a pulp, and highly ſeaſoned; put up in a paſte, and then baked in an oven. They alſo make veal *paſties*, umbel *paſties*, kidney *paſties*, marrow *paſties*, &c.

PATA, in *Ornithology*, the name by which the Portugueſe in Braſil call a large and very beautiful American duck, known among others by its Braſilian name, IPECATI-*apoa*.

PATÆCI, in *Mythology*, images of certain gods carried by the Phœnicians on the prows of their galies.

Herodotus, lib. iv. calls them πάταικους. The word is Phœnician, and derived from *pathach*, i. e. *tiruit*. See Bochart's Chanaan, lib. ii. cap. 3. But Scaliger does not agree. Morin derives it from πίθηκος, *monkey*, this animal having been an object of worſhip among the Ægyptians, and hence might have been honoured by their neighbours.

Mr. Elſner has lately obſerved, that Herodotus does not call the *pataci* gods; but that they obtained this dignity from the liberality of Heſychius and Suidas, and other ancient lexicographers, who place them at the ſtem of ſhips, whereas Herodotus placed them at the prow. Scaliger, Bochart, and Selden, have taken ſome pains about this ſubject.

Mr. Morin has alſo given us a learned diſſertation on this head, in the Memoires de l'Acad. des Inſcript. & Belles Lettres, tom. i. but Mr. Elſner thinks it defective in point of evidence.

PATAGONULA, in *Botany*, the name of a genus of plants of the *pentandria monogynia* claſs; the characters of which are theſe: the cup is an extremely ſmall perianthium, divided into five ſegments, and remains after the flower is fallen; the flower conſiſts of a ſingle petal, with ſcarce any tube, the margin of which is divided into five acute oval ſegments; the ſtamina are five filaments of the length of the flower; the anthers are ſimple; the germen of the piſtil is oval and pointed; the ſtyle is ſlender, and ſlightly bifid, its ramifications are alſo biſid again; this is of the ſame length with the ſtamina, and remains when the flower is fallen; the ſtigmata are ſimple; the fruit is an oval and pointed capſule, ſtanding on a large cup, made up of five long ſegments emarginated, or rimmed round their edges; the ſeeds of this plant are yet unknown; but the conſtruction of the cup, in which the capſule ſtands, is alone a ſufficient diſtinction for this genus. There is only one ſpecies.

PATANGHI, in *Botany*, a name by which ſome authors have called the tree whoſe wood is the LOGWOOD, uſed in dying and in medicine.

PATARINS. See ALBIGENSES and PAULICIANS.

PATAVINITY, *Patavinitas, among Critics*, a fault objected to Titus Livy, which he derived from his country Padua, by the ancients called Patavium.

Afinius Pollio, as we are informed by Quintilian, taxed Livy with *Patavinity*. But what this *Patavinity* conſiſted in, the critics have been much puzzled to find out.

Morhof believes it to be a certain turn of expreſſion, and ſome phraſes peculiar to the Paduoſe. All we know for certain is, that it was a fault in the language of Livy, not in the ſentiments or manners. In all probability, it is one of thoſe delicacies that are loſt in a dead language.

Dan. Georg. Morhof has an expreſs treatiſe, De *Patavinitate* Liviana, printed at Kiel, in 1685, where he explains, very learnedly, the urbanity and peregrinity of the Latin tongue.

PATE, in *Fortification*, a kind of platform, like what they call a HORSE-SHOE; not always regular, but generally oval, encompaſſed only with a parapet, and having nothing to flank it. It is uſually erected in marſhy grounds, to cover a gate of a town, or the like.

PATEE, or PATTEE, a term, in *Heraldry*, for a croſs, ſmall in the center, and widening towards the extremes. See *Tab.* II. *Herald. fig.* 75. The field, ſable; a croſs *patee*, argent; by the name of Croſs.

This form of a croſs is alſo called *formé*.

It is alſo a term uſed by ſome to expreſs a ſort of irregular line, differing from the indented, ingrailed, and all the other regular and common lines, and called by ſome the dovetail line.

It is ſomewhat like the joint called by our joiners by this laſt name, but it is not in general uſe, and is by ſome reckoned among what the French call the CLATTE.

PATEE, *petty*. See PETTY.

PATELLA, in *Anatomy*, a bone which covers the forepart of the joint of the knee; called alſo *mola*, *rotula*, and popularly the *knee-pan*. See *Tab. Anat. (Oſteol.) fig.* 3. *n.* 21. *fig.* 7. *n.* 25.

It is divided into a baſis, apex, and two ſides, one convex, the other concave. The baſis is the ſuperior and thickeſt part of the bone, and is marked with a very conſiderable muſcular impreſſion, which runs down for a little way on the convex ſide; the apex is obtuſe, and ſerves for the inſertion of a ſtrong ligament, which ties the *patella* to the ſpine of the tibia; the anterior ſide is convex, with ſome ſmall inequalities and furrows upon it; the poſterior ſide is concave, covered with a cartilage, reaching near the apex, and terminating at an unequal cavity or foſſula, which is an impreſſion for the ligament already mentioned. This cartilaginous ſide is parted in two by a ridge which goes between the baſis and apex, and the two parts are exactly ſuited to the pulley of the os femoris, the external part being broader than the internal, which is likewiſe obſervable in the pulley. The *patella* remains long cartilaginous, and in oſſifying it becomes entirely cellular, except the ſurfaces of its two ſides and the impreſſions. It is connected with the tuberoſity of the tibia, by a thick ſhort ligament; and indeed it may be looked upon as belonging

ing in a particular manner to the tibia, or as a moveable olecranum; which again may be looked upon as a fixed *patella*. Winslow.

Over this bone slide the tendons of the muscles, which extend the leg, as on a trochlea or pulley.

But its more immediate use is to hinder the leg from being bent forwards in extension; which would of necessity be the case in this articulation, did not this bone, like a bolster, check its rolling forwards; in the same manner as the olecranum does the swing of the cubitus backwards.

In an erect posture, when one foot is set forwards, the whole weight of the body bears on the *patella*; which, in this situation, hinders the knee from bending backwards, and straining the muscles that inflect it behind. Hence it was, that Galen's wrestler, who had dislocated his *patella*, found so much pain in going down hill.

PATELLA, *fracture of the*. The *patella*, or knee-pan, is much more subject to a transverse fracture than to one in any other direction. The longitudinal fracture of this bone happens more rarely, but when it does, is much more easily cured; because the fragments of the bone, in this case, generally keep in their right places; but when the bone is broken, not only transversely, but into several pieces, the case is yet more difficult and dangerous. The cure of this fracture must be attempted in this manner: in a longitudinal or perpendicular fracture, the patient must be laid upon his back, and, extending the foot, the surgeon must replace the fragments on both sides with the pressure of his hands, binding them up carefully with the uniting bandage; which must be applied, in this case, in the same manner with that used in large wounds in the belly or forehead. But when the *patella* is broken transversely, or into several pieces, the patient, being laid in the same posture, and extending his foot as before, the surgeon is, with great care, to endeavour, with the palms of both hands, assisted by his fingers and thumbs, to bring together and replace the fragments in their natural situation; and when that is done, they must be retained firmly together, by means of a plaster made in form of a half-moon, or properly perforated, and then the foot and leg are to be bound up, and placed so that they cannot be easily moved: but to prevent the bone from being displaced again, the patient must not use his leg till after the ninth or tenth week.—Heister.

PATELLA, *luxated*. The *patella* is most usually luxated either on the internal or external side of the joint, though physicians give accounts of its being sometimes luxated both above and below it. Whenever the knee itself is perfectly luxated, the *patella* can scarce avoid being displaced at the same time, because of its strong connection to the thigh and to the tibia.

The reduction of a luxated *patella* is usually no great difficulty. The patient is to be laid flat on his back upon a table or bed, or upon an even floor, so that his leg may be pulled out strait by an assistant; when this is sufficiently extended, the surgeon must grasp the *patella* with his fingers, and afterwards, by the assistance of his hand, press it strongly into its proper place. This may be also possibly effected while the patient stands upright. When this is done, there remains nothing but carefully to bind up the part, and let the patient rest for some days; sometimes gently bending and extending his leg, in the mean while, that it may not become stiff.—Heister.

PATELLA, in *Natural History*. See LIMPET.

PATELLA, in the *History of Insects*, a name given by Lister, and some others, to a certain little husk or shell, found on the bark of the cherry, plum, and rose-trees, and some others, containing an animal within, and useful in colouring. These *patellæ* are of a globular form, except when they adhere to the tree, and are of a shining chesnut colour in most kinds. The husk itself strikes a very fine crimson colour on paper, and within it is found a white maggot of no value: this, in time, hatches into a very small but beautiful bee. The whole size of this bee is not more than that of half the body of an ant. They have the sting of bees, and the three spots placed in a triangle on the forehead, which are supposed to be eyes. They are black, and have a large round whitish or pale yellow spot upon the back. The upper pair of wings are shaded and spotted, but the under pair are clear.

The shells or husks deserve a trial, to find whether the colour they yield might not be brought to use; it is to be observed, that the deepest coloured husks afford the finest and deepest purple: they must be also used while the creature contained in them is in the maggot form; for when it is changed into the bee state the shell is dry and colourless. Dr. Lister, who first observed these *patellæ*, went so far on comparing them with the common kermes, as to declare that they were of the same nature with that production; but his history of their being the workmanship of a bee, to preserve her young maggot in, is not agreeable to the true history of the kermes; for that is an insect of a very peculiar kind. This author has been too justly censured for his precipitancy of judging of things, and perhaps has fallen into an error by means of it here.

It is very possible that these *patellæ* may be the same sort of animals with the kermes, but then it produces its young within this shell or husk, which is no other than the skin of the body of the mother animal; but as there are many flies, whose worms or maggots are lodged in the bodies of other animals, it may be, that this little bee here described may love to lay its egg in the body of the proper insect here described, and the maggot hatched from that egg may eat up the proper progeny, and, undergoing its own natural changes there, issue out at length in form of the bee. This may have been the case in some few which Dr. Lister examined, and he may have been misled by this to suppose it the natural change of the insect. Phil. Trans. N° 72.

PATELLA *fera*, the *wild limpet*, a name very improperly given by Rondeletius and Aldrovand to the *auris marinæ*, or *auribus Veneris*. This is by no means of the *patella* kind. See EAR-*shell*.

PATENA, in the *Romish Church*, the cover or lid of the chalice, made of the same metal therewith, serving to hold the particles of the host, and give the people to kiss, when they make an offering.

It has its name *patena*, *a patendo*; and this is a general name, in Columella, for any broad flat vessel.

PATENTS, or *Letters* PATENT, in *Law*, the king's letters, sealed with the great seal, serving to convey the title or property of some grant, favour, privilege of a new establishment, or the like. See LETTERS *Patent*.

They have their name from their being delivered open, *ut pateant omnibus*; by way of contradistinction from *letters de cachet*, or *literæ clausæ*, or CLOSE *rolls*, which are sealed.

Grants or *letters patent* must first pass by bill; which is prepared by the attorney or solicitor-general, in consequence of a warrant from the crown; and is then signed, that is, superscribed at the top, with the king's own sign manual, and sealed with his privy signet, which is always in the custody of the principal secretary of state; and then sometimes it immediately passes under the great seal, in which case the *patent* is subscribed in these words, "*per ipsum regem; by the king himself.*" Otherwise the course is to carry an extract of the bill to the keeper of the privy seal, who makes out a writ or warrant thereupon to the chancery; so that the sign manual is the warrant to the privy seal, and the privy seal is the warrant to the great seal: and in this last case the *patent* is subscribed, "*per breve de privato sigillo; by writ of privy seal.*"

It is to be noted, that *patents* differ from writs: a coroner is made by WRIT, not by *patent*.

To this office, enacted 18 Jac. I. belongs a clerk, &c.

PATENT *of peerage*. See PEER.

PATENT *of precedence*. See PRECEDENCE.

PATENT *leaf*, in *Botany*. See LEAF.

PATENTEE, is he to whom the king grants LETTERS *patent*.

PATER *patratus*, among the Romans, the first and principal person of the college of heralds, which formed a kind of board or council, to examine the differences that arose between neighbouring states, and endeavour amicably to accommodate the same.

PATERA, among *Antiquaries*, a goblet, or vessel, used by the Romans in their sacrifices, wherein they received the blood of their victims, offered their consecrated meats to the gods, and wherewith they made libations.

The word is formed from *pateo, I am open, quod pateat*, because it had a great aperture; in contradistinction to bottles, &c.

On medals, the *patera* is seen in the hands of several deities; and frequently in the hands of princes, to mark the sacerdotal authority joined with the imperial, &c.

Hence F. Joubert observes, that besides the *patera*, there is frequently an altar, upon which the *patera* seems to be pouring its contents.

The *patera* was of gold, silver, marble, brass, glass, or earth; and they used to inclose it in urns with the ashes of the deceased, after it had served for the libations of wine and liquors at the funeral.

The *patera* is an ornament in architecture, frequently introduced in friezes, fascias, and imposts, over which are hung festoons of husks or flowers: and they are sometimes used by themselves, as O (*Tab. Archit. fig.* 40.) to ornament a space; and in this case it is common to hang

a ſtring of huſks or drapery over them: ſometimes they are much inriched with foliage, and have a maſk or a head in the center.

PATERERO. See PEDRERO.

PATERNITY, the quality of a FATHER.

PATER-NOSTER, the Lord's prayer, a form ſo called from the two initial words thereof in Latin.

PATER-NOSTER is alſo uſed for a chaplet or ſtring of beads; becauſe ſerving to number the rehearſals of that prayer.

PATER-NOSTERS, in *Architecture*, a ſort of ornaments cut in form of beads, either round, or oval; uſed on baguettes, aſtragals, &c.

PATER-NOSTRE', in *Heraldry*. A croſs *pater-noſtré* is a croſs made of beads; as repreſented in *Tab.* II. *Her. fig.* 76. This croſs is to be ſo ſhadowed in drawing, as that the ſphericity of the beads may appear, to diſtinguiſh them from beſants.

PATETHIS, Æ, a name given by the ancients to grapes, which were ſuffered to remain on the vine till they were greatly dried and withered. They were alſo called *pateæ uvæ*, and were ſuffered to hang thus to make a peculiar wine called *paſſum*.

PATH *of the Vortex*, a term frequently uſed by Mr. Flamſteed, in his doctrine of the ſphere, ſignifying a circle, deſcribed by any point of the earth's ſurface, as the earth turns round its axis.

This point is conſidered as vertical to the earth's center; and is the ſame with what is called the vertex or zenith in the Ptolemaic projection.

The ſemidiameter of this *path* of the vertex is always equal to the compliment of the latitude of the point or place that deſcribes it; that is, to the place's diſtance from the pole of the world.

PATH-*fly*, the name given by us to the fly called in Latin HUMISUGA: it is found in foot-paths, and ſuppoſed to live by ſucking the ground; it is of a grey colour, ſtreaked with duſky white.

PATHETIC, παθητικὸς, from παθὸς, *paſſion, emotion*, ſomething that relates to the paſſions; and particularly that is proper to wake or excite them.

The *pathetic* and ſublime have a near affinity. See STYLE.

PATHETIC, in *Muſic*, ſomething very moving, expreſſive, or paſſionate; capable of exciting pity, compaſſion, anger, or the like. In this ſenſe, we ſay the *pathetic* ſtyle, a *pathetic* figure, *pathetic* ſong, &c.

The chromatic genus, with its greater and leſſer ſemitones, either aſcending or deſcending, is very proper for the *pathetic*; as is alſo an artful management of diſcords; with a variety of motions, now briſk, now languiſhing, now ſwift, now ſlow.

Nieuwentyt tell us of a muſician at Venice, who excelled in the *pathetic* to that degree, that he was able to play any of his auditors into diſtraction; he adds, that the great means he made uſe of was the variety of motions, &c.

PATHETICI, in *Anatomy*, the fourth of the ten pair of nerves, which ariſe from a ſmall medullary chord that is behind the teſtes: they paſs down on the ſides of the medulla oblongata, and proceeding under the dura mater, by the ſides of the cella turcica, they go through the foramen lacerum, and are wholly ſpent on the obliquus major. See *Tab. Anat. (Oſteol.) fig.* 5. *lit. m m.*

The *pathetici* are the ſmalleſt nerves of the brain; and have their name, *pathetici*, from their ſerving to move the eyes in the various paſſions; and they are by ſome alſo called *amatorii*, from the great uſe made thereof by lovers, in ogling, &c.

PATHOGNOMONIC, παθογνωμονικὸς, in *Medicine*, an eſſential ſign or characteriſtic; or a ſymptom peculiar to, and inſeparable from, ſome diſeaſe, and every ſtage thereof.

Thus Blancard, and after him Harris, &c. But the truth is, there is nothing in all medicine that anſwers to the idea of a *pathognomonic* diſeaſe; and ſymptoms are too complicated. And we are to judge of the former not by any one ſign, but by the concurrence of ſeveral.

PATHOLOGY, παθολογία, formed from παθὸς, *paſſion, ſuffering*, and λόγος, *diſcourſe*, that part of medicine which conſiders diſeaſes, both thoſe of the body and thoſe of the mind, their natures, cauſes, ſymptoms, &c. See NOSOLOGY.

PATHOS, παθὸς, *paſſion*, a term frequently uſed in ſpeaking of the movements which the orator excites in his audience.

We ſometimes alſo uſe the word for energy or ſtreſs.

PATIENCE, in *Botany*, the name by which ſome people call the monk's rhubarb; but the French, from whom we have borrowed the word, mean by it all the ſpecies of the *lapathum* or dock kind. See DOCK.

PATIENCE, in *Ethics*, is that virtue which preſerves the mind firm and unbroken, under the evils of life; ſo that the ſpirits are kept from becoming tumultuous, and precipitating the ſufferer into indecent or repining thoughts, words, or actions; and by which he is diſpoſed to pay calm attention to the reaſons of ſacred philoſophy, and to obſerve them.

PATIENT, among *Phyſicians*, a perſon under the direction of a phyſician, or ſurgeon, to be cured of ſome diſeaſe.

Agent and PATIENT. See AGENT.

PATIENTIÆ *muſculus*, in *Anatomy*, a name given by Spigelius to a muſcle of the ſhoulder, which he alſo calls by the more expreſſive name of *ſcapulum attollens*. The French call it the *releveur propre de l' omoplate*, and Albinus, Morgagni, Cowper, and others, LEVATOR *ſcapulæ*.

PATIN *ſhoe*, in the *Manege*, a kind of horſe-ſhoe, under which is ſoldered a ſort of half ball of iron, hollow within. It is uſed for hip-ſhot horſes, and put upon a ſound foot, to the end that the horſe, not being able to ſtand upon that foot without pain, may be conſtrained to ſupport himſelf upon the lame foot, and ſo hinder the ſinews to ſhrink, and the haunch to dry up. *Patin-ſhoes* are likewiſe uſed for horſes that are ſprained in the ſhoulders.

PATIS, in *Ornithology*, the name of a ſmall ſea-bird, deſcribed by Oviedus, and ſeeming to be the ſame with the ſtormfink, deſcribed by Hoier, in his epiſtle to Cluſius. It is a little larger than our ſparrow, and ſkims the ſurface of the water very nimbly, and is ſuppoſed a forerunner of ſtorms.

PATLAHOCA, in *Botany*, the name given by ſome authors to a tree which produces the reſin, commonly called *gum copal*.

PATONCE, in *Heraldry*. A croſs *patonce* is a croſs flory at the ends; from which it only differs in this, that the ends, inſtead of turning down like a fleur de lis, are extended ſomewhat in the patee form. See *Tab.* II. *Herald. fig.* 77. He bears gules; a croſs *patonce*, argent; by the name of Latimer.

PATRES *conſcripti*, in *Antiquity*, a denomination given to the ſenators of Rome.

The firſt hundred ſenators, appointed by Romulus, were called ſimply *patres*, *fathers*; another hundred being added by Romulus and Tatius, upon the union of the two people, theſe latter were called *patres minorum gentium*, and the former *majorum gentium*.

At length Tarquinius Priſcus making up the number three hundred, the two latter claſſes were called *patres conſcripti*, becauſe, *adſcripti*, or written down to the former.

Livy gives a different account of their origin. See CONSCRIPT.

Thoſe afterwards choſen from among the knights were called *patres adlecti*.

PATREZ, a name for a ſort of vermicelli, a paſte made of flour and water, and formed into beads. This and all other kinds of vermicelli are often ſtained with ſaffron.

PATRI, *gloria*. See GLORIA.

PATRIS, *dower ex aſſenſu*. See DOWER.

PATRIARCH, *patriarcha*, formed of πατρία, *family*, and ἀρχὸς, *chief*, one of thoſe firſt fathers who lived towards the beginning of the world; and who became famous by a long line of deſcendants.

Abraham, Iſaac, and Jacob, and his twelve ſons, are the *patriarchs* of the Old Teſtament. Seth, Enoch, &c. were antediluvian *patriarchs*.

Long life and a number of children were the bleſſings of the *patriarchs*.

The *patriarchal* government conſiſted in the fathers of families, and their firſt-born after them, exerciſing all kinds of eccleſiaſtical and civil authority, in their reſpective houſholds: and to this government, which continued till the time of the Iſraelites dwelling in Ægypt, ſome have aſcribed an abſolute and deſpotic power, extending even to the puniſhment by death. In proof of this, they alledge the curſe pronounced by Noah upon Canaan, Gen. ix. 25. but it is replied that in this affair Noah ſeems to have acted rather as a prophet than a *patriarch*. Another inſtance of ſuppoſed deſpotic power is Abraham's turning Hagar and Iſhmael out of his family, Gen. xxi. 9, &c. but this furniſhes no evidence of any ſingular authority veſted in the *patriarchs*, as ſuch, and peculiar to thoſe ages. The third inſtance alledged to the ſame purpoſe is that of Jacob's denouncing a curſe upon Simeon and Levi, Gen. xlix. 7. which is maintained by others to be an inſtance of prophetic inſpiration, more than of *patriarchal* authority. The fourth inſtance is that of Judah with regard to Tamar, Gen. xxxviii. 24. with regard to which it is obſerved that Jacob, the father of Judah, was ſtill living, that Tamar

was not one of his own family, and that she had been guilty of adultery, the punishment of which was death by burning, and that Judah on this occasion might speak only as a prosecutor. Jennings's Jewish Antiq. vol. i. p. 1, &c.

PATRIARCH is also used, in Christendom, for the bishops in possession of some of the grand sees, independent of the papal jurisdiction.

The patriarchate has been always esteemed the supreme dignity in the church: so that, to rise by degrees, the bishop had only under him the territory of the city whereof he was bishop; the metropolitan commanded a province, and had for suffragans the bishops of his province; the primate was the chief of a diocese, and had several metropolitans under him; and the *patriarch* had under him several dioceses, and the primates themselves were under him. But this order was not always observed.

Usher, Pagi, De Marca, and Morinus, attribute the establishment of the grand patriarchates to the apostles. They suppose that the apostles according to the description of the world then given by geographers, pitched on the three principal cities in the three parts of the known world; viz. Rome, in Europe; Antioch, in Asia; and Alexandria, in Africa: and thus formed a trinity of *patriarchs*.

Others, far from attributing this institution to the apostles, maintain that the name *patriarch* was unknown at the time of the council of Nice; and that, for a long time afterwards, *patriarchs* and primates were confounded together; as being all equally chiefs of dioceses, and equally superior to metropolitans, who were only chiefs of provinces. Hence it is that Socrates gives the title *patriarch* to all the chiefs of dioceses, and reckons ten of them. In effect, it does not appear, that the dignity of *patriarch* was appropriated to the five grand sees of Rome, Constantinople, Alexandria, Antioch, and Jerusalem, till after the council of Chalcedon, in 451. For when the council of Nice regulated the limits and prerogatives of the three *patriarchs* of Rome, Antioch, and Alexandria, it did not give them the title of *patriarchs*, though it allowed them the pre-eminence and privileges thereof. Thus, when the council of Constantinople adjudged the second place to the bishop of Constantinople, who, till then, was only a suffragan of Heraclea, it said nothing of the patriarchate.

Nor is the term *patriarch* found in the decree of the council of Chalcedon, whereby the fifth place is assigned to the bishop of Jerusalem; nor did these five *patriarchs* govern all the churches.

There were still many independent chiefs of dioceses, who, far from owning the jurisdiction of the grand *patriarchs*, called themselves *patriarchs*; such as that of Aquileia; nor was Carthage ever subject to the *patriarch* of Alexandria.

Mosheim supposes, that those prelates, who enjoyed a certain degree of pre-eminence over the rest of the episcopal order, were distinguished by the Jewish title of *patriarchs* in the fourth century. Eccl. Hist. vol. i. p. 384.

The authority of the *patriarchs* grew by insensible degrees, till at length we find, that about the close of the fifth century, all affairs of moment, within the compass of their *patriarchate*, came before them; either at first hand, or by appeals from the metropolitans.

They consecrated bishops, assembled yearly in council the clergy of their respective districts; pronounced a decisive judgment in those cases where accusations were brought against bishops; and appointed vicars or deputies, clothed with their authority, for the preservation of order and tranquillity in the remoter provinces.

Nothing, in short, was done without consulting them; and their decrees were executed with the same regularity and respect as those of the princes.

It must, however, be observed, that the authority of the *patriarchs* was not acknowledged through all the provinces without exception. Several districts, both in the eastern and western empires, were exempted from their jurisdiction.

The Latin church was unacquainted with *patriarchs* till the sixth century; and the churches of Gaul, Britain, &c. were never subject to the authority of the *patriarch* of Rome, whose authority only extended to the suburbicary provinces. There was no primacy, no exarchate nor *patriarchate*, owned here; but the bishops, with the metropolitans, governed the church in common.

Indeed, after the name *patriarch* became frequent in the West, it was attributed to the bishops of Bourges, and Lyons; but it was only in the first signification, viz. as heads of dioceses. Du-Cange adds, that there have been some abbots, who have borne the title of *patriarchs*.

PATRIARCH, is also applied to the chief of several churches in the East, who live out of communion with the Roman church: such are the *patriarch* of the Armenians, residing in the monastery of St. Gregory; the *patriarch* of the Abyssinians, called *Abuna*; the *patriarch* of the Cophti, the Jacobites, &c. See ARMENIANS, COPHTI, JACOBITES, &c. See also *Greek* CHURCH.

PATRIARCHAL, in *Heraldry*. A *patriarchal cross*, is that where the shaft is twice crossed: the lower arms or traverse being longer, and the upper shorter. Such a cross is said to belong to *patriarchs*, as the triple cross does to the pope.

PATRICIAN, *patricius*, in ancient Rome, a title given to the descendants of the hundred, or, according to others, of the two hundred first senators chosen by Romulus, and by him called *patres*, *fathers*.

Romulus established this order in imitation of the Athenians, who were divided into two classes, viz. the εὐπατρίδαι, *patricii*, and δημόται, *populares*.

Patricians, therefore, were originally the ancient nobility; in opposition to the plebeians.

They were the only persons whom Romulus allowed to aspire after the magistracy; and they exercised all the functions of the priesthood till the year of Rome 495.

But the cognizance and character of these ancient families being almost lost and extinguished, by a long course of years, and frequent changes in the empire; a new kind of *patricians* were at length set on foot, who had no pretensions from birth, but whose title depended wholly on the emperor's favour.

This new *patriciate*, Zosimus tells us, was erected by Constantine, who conferred the quality on his counsellors, calling them *patrii*, not because descended from the ancient fathers of the senate, but because they were the fathers of the republic, or of the empire.

This dignity, in time, became the highest of the empire. Justinian calls it *summam dignitatem*: in effect, the *patricians* seem to have had the precedence of the *consulares*, and to have taken place before them in the senate: though F. Faber asserts the contrary. What embroils the question is, that the two dignities often met in the same person; because the *patriciate* was only conferred on those who had gone through the first offices of the empire, or had been consuls.

Pope Adrian made Charlemagne take the title of *patrician* before he assumed the quality of emperor; and other popes have given the title to other kings and princes, by reason of its eminence.

PATRICIAN, *patricius*, is also a title of honour frequently conferred on men of the first quality in the time of our Anglo-Saxon kings. See THANE.

PATRICIAN *deities*, *patricii dii*, in *Mythology*, were Janus, Saturn, the Genius, Pluto, Bacchus, the Sun, the Moon, and the Earth.

PATRICIANS, in *Ecclesiastical Writers*, denote ancient sectaries, who disturbed the church in the beginning of the third century: thus called from their founder *Patricius*, preceptor of a Marcionite called Symmachus.

His distinguishing tenet was, that the substance of the flesh is not the work of God, but that of the devil; on which account his adherents bore an implacable hatred to their own flesh; which sometimes carried them so far as to kill themselves.

They were also called TATIANITES; and made a branch of the ENCRATITÆ.

PATRICIDE, *patricidium*, the same with PARRICIDE.

PATRII *dii*. See DII.

PATRIMI *and* MATRINI, among the Romans, children whose father and mother were both living.

It was by a certain number of these that hymns were sung to supplicate the gods.

PATRIMONY, *patrimonium*, a right or estate, which a person inherits from his ancestors.

The name *patrimony* was also anciently given to the effects or revenues, wherewith a church or religious house was endowed. In which sense authors still say the *patrimony* of the church of Rimini, of Milan, &c.

The church of Rome, in the time of the fall of the Roman empire, acquired considerable territories, partly by purchase, and partly by the generosity of princes, &c. not only in Italy, but also in Sicily and other remoter parts of Europe. These were called the *patrimony of St. Peter*, which were afterwards augmented by the benefactions of Pepin, king of France, who added the exarchate of Ravenna: and by Charlemagne, who gave to the pope several towns and provinces, which belong at this time to the estate of the church, over which the pontiff exercises sovereign authority.

To make what belonged to the churches the more respected, they usually give their *patrimonies* the names of the saints they held in the highest veneration.

Thus the church of Ravenna called its inheritance the

patrimony of St. Apollinarius; that of Milan the *patrimony of St. Ambrose*, &c. as is observed by Fra. Paolo.

PATRIOT is a denomination given to a perſon, who, under a free government, loves his country, and exerts all his power for promoting its glory and welfare. Whence *patriotiſm* is uſed to denote the love of one's country. Rome, Athens, and Lacedæmon, owed their exiſtence and glory to *patriotiſm*, founded on noble principles, and ſupported by diſtinguiſhing virtues. But the moſt perfect *patriotiſm* is that which comprehends the rights of mankind in general. The author of the Spirit of Laws ſeems to have been actuated by ſentiments of univerſal *patriotiſm*.

PATRIPASSIANS, PATRIPASSIANI, a name given to the SABELLIANS, becauſe they did not believe it was the Son, but the Father himſelf that ſuffered and was crucified.

The council of Antioch, held by the Euſebians, in 345, ſays, that thoſe whom the Romans call *Patripaſſians*, the eaſtern people called *Sabellians*: it adds the reaſon of the name *Patripaſſians* in their condemnation; viz. that by the incarnation of the Father, they rendered him comprehenſible and paſſible.

The *Patripaſſian* hereſy was firſt broached by Praxeas, who was ſeconded by Victorinus, at the beginning of the third century. They confeſſed Chriſt to be God, and that God ſuffered and died for us; but they confounded the divine perſons, and denied in effect the Trinity; meaning by Father, Son, and Spirit, not three perſons, but one perſon under three names. So that he who ſuffered for us, was, according to them, as much Father as Son. Tertullian wrote expreſly againſt Praxeas.

Hermogenes eſpouſed the error of the *Patripaſſians*, whence they came to be denominated alſo *Hermogenians*. Afterwards Noetius gave into it, which occaſioned them the name of *Noetians*. His diſciple Sabellius the Libyan followed, about the year 250, whence they were called *Sabellians*. Laſtly, becauſe Sabellius was of Pentapolis, and the hereſy ſpread much there, it was called the *Pentapolitan doctrine*.

PATROL, or PATROUILLE, anciently PATOUL, in *War*, a round, or march, made by the guards, or watch, in the night-time, from the beating of the tattoo till the reveille, to obſerve what paſſes in the ſtreets, and to ſecure the peace and tranquillity of a city or camp.

The *patrol* conſiſts generally of a body of ſix or twelve men, detached from a *corps de guard*, and commanded by a ſerjeant.

When the enemy is near at hand, *patrols* conſiſt of an officer and thirty or forty men, as well infantry as cavalry.

PATRON, PATRONUS, a term uſed in various acceptations, though all reducible to the relation of a protector, or guardian.

In the church of Rome, a ſaint, whoſe name a perſon bears, or under whoſe protection he is put, and whom he takes particular care to invoke; or a ſaint in whoſe name a church, or order is founded; or a perſon who firſt eſtabliſhed it, and who is choſen protector of it; are called the *patrons* thereof. Thus St. Peter and St. Paul are the *patrons* of the church of St. Genevieve, St. Dionyſius the *patron* of the city of Paris, St. George of England, St. Benedict the *patron* of the Benedictines, St. Michael of the armourers, St. Ignatius of the Jeſuits, &c.

PATRON, PATRONUS, among the Romans, was an appellation given to a maſter, who had freed his ſlave.

Hence, as the right and relation of maſter expired, that of *patron* commenced.

For the Romans, in giving their ſlaves their freedom, did not deſpoil themſelves of all rights and privileges in them: the law ſtill ſubjected the freed-men to conſiderable ſervices and devoirs toward their *patrons*, the neglect of which was always very ſeverely puniſhed.

The principal right which *patrons* had was that of being the legal heirs of their freed-men, if they died without lawful iſſue, born after their enfranchiſement, and inteſtate.

By the Papian law it was farther provided, that if the eſtate of the freed man were one hundred thouſand ſeſterces, and he had three children, the *patron* ſhould have a child's portion.

PATRON was alſo a name which the people of Rome gave to a perſon of power, under whoſe protection they put themſelves.

The common people uſually choſe ſome perſon of eminence and authority, to whom they paid all kind of honour and reſpect; denominating themſelves his *clients*: and the *patron* on his ſide granted them his credit and protection.

By this reciprocal relation was the *patron* bound to his client, and the client to his *patron*.

Hence the appellation *patroni* was given to thoſe lawyers who defended the cauſe of their clients in matters of law, in contradiſtinction to the PROCURATORES: they were called *advocati*. See ADVOCATE.

PATRON, in the *Canon* and *Common Law*, denotes a perſon who founds or endows a church or benefice, and reſerves to himſelf the right of patronage.

The king is *patron paramount* of all eccleſiaſtical benefices in England.

PATRON, in *Navigation*, is a name given in the Mediterranean to a perſon who commands the veſſel, and ſeamen; ſometimes the perſon who ſteers it; the former, in other places, being called MASTER; the ſecond pilot.

PATRONAGE, *patronatus*, the right of giving or diſpoſing of a church or benefice, properly belonging to the founder or endower thereof. See ADVOWSON.

This right of *patronage* was introduced among Chriſtians towards the cloſe of the fourth century, with no other view than to encourage the opulent to erect a great number of churches, by giving them the privilege of appointing the miniſters that were to officiate in them.

Patronage conſiſts in having the nomination, or preſentation to the benefice by him founded or endowed; in having the honourable rights of the church; in being interred in the chancel, &c.

Of *patronages*, ſome are *lay*, others *eccleſiaſtical*.

PATRONAGE, *lay*, is a right attached to a perſon, either as founder, or as heir of the founder; or as poſſeſſor of a fee to which the *patronage* is annexed.

PATRONAGE, *eccleſiaſtical*, is that which a perſon is intitled to by virtue of ſome benefice which he holds.

If an eccleſiaſtic have a right of *patronage* on his own account, independent of his eccleſiaſtical capacity; this is ſtill *lay patronage*. *Lay patronage*, again is *real* or *perſonal*.

PATRONAGE, *real*, is that attached to the glebe, or to certain lands and hereditaments.

PATRONAGE, *perſonal*, is that belonging immediately to the founder of the church, and tranſmiſſible to his children and family; without being annexed to any fee.

Perſonal *patronage* cannot be alienated or ſold; *real* may, together with the glebe to which it is annexed. There muſt ever be ſome body or matter to fix to it, in order to its being tranſferred to another.

The origin of the right of *patronage*, we find in the tenth canon of the council of Orange: where it is expreſſed, that a founder may preſent to the diocеſan the clerks he thinks proper for his church. And by a law of Juſtinian it is ordained, that the founders of churches may not put clerks in them on their own authority, but only preſent them to the biſhop.

Some canoniſts look on the right of *patronage*, as a kind of eccleſiaſtic ſervitude. The right of *patronage* ſleeps, but is not loſt, while a perſon is out of the communion of the church.

PATRONAGE, *diſturbance of*, is an hindrance or obſtruction of a patron to preſent his clerk to a benefice. Diſturbers of a right of advowſon may be the pſeudo-patron by preſenting to a church to which he has no right, and thereby making it litigious or diſputable; his clerk, by demanding or obtaining inſtitution; and the ordinary, by refuſing to admit the real patron's clerk, or admitting the clerk of the pretender. Theſe diſturbances are vexatious and injurious to him who hath the right; and, therefore, the law (beſides the writ of the right of advowſon, which is a final and concluſive remedy) hath given him two inferior poſſeſſory actions for his relief; an ASSISE of *darrein preſentment*, and a writ of QUARE *impedit*, in which the patron is always the plaintiff, and not the clerk.

PATRONAGE, *arms of*, in *Heraldry*, are thoſe, at the top of which are ſome marks of ſubjection and dependence. Thus the city of Paris bears three flower-de-luces in chief, to ſhew her ſubjection to the king.

The cardinals on the top of their arms bear thoſe of the pope, who gave them the hat, to ſhew that they are his creatures. See ARMS.

PATRONYMIC, Πατρωνυμικὸς, formed from πατὴρ, *father*, and ὄνομα, *name*, among *Grammarians*, is applied to thoſe names which the Greeks gave to the race, or lineage, and which were taken from him who was the founder thereof.

Thus the deſcendants of Æacus were called Æacidæ; and thoſe of Hercules, Heraclidæ.

Theſe *patronymic* names the Romans called *gentilitia*, which amount to much the ſame with our *ſur-names*.

Thus, thoſe of the preſent reigning family in France, we call the Bourbons; thoſe of the late in England, the Stuarts, &c.

PATROON-*galley*. See GALLEY.

PATROUILLE. See PATROL.

PATTALIA, in *Natural Hiſtory*, a word uſed by Ariſtotle and the reſt of the old Greek writers, to expreſs a ſtag or deer of two years old.

PATTES, in *Heraldry*, the paws of a beaſt. See PAW.

PAVAGE,

PAVAGE, *pavagium*, in our *Old Law Books*, money paid towards the paving of ſtreets, or high-ways.

PAVAN, or PAVANE, a grave kind of dance, borrowed from the Spaniards; wherein the performers made a kind of wheel or tail before each other, like that of *pavo, a peacock*: whence the name.

The *pavane* was anciently in great repute; and was danced by gentlemen with cap and ſword; by thoſe of the long robe with their gowns, by princes with their mantles, and by the ladies with their gown-tails trailing on the ground.

It was called the *grand ball*; from the ſolemnity wherewith it was performed. To moderate its gravity, it was uſual to introduce ſeveral flouriſhes, paſſades, capers, &c. by way of epiſodes. Its tablature or ſcore is given at large by Thoinot Arbeau in his Orcheſography.

PAVANA, in *Botany*, the name of the plant which produces the *grana tiglia* of the ſhops. It is a ſpecies of RICINUS.

PAVANA-*wood*, when freſh, operates very violently, both by vomit and ſtool: when dried, it is much more gentle, never vomiting at all; but at preſent it is ſcarce heard of in the ſhops.

PAVEMENT, a layer or ſtratum of ſtone, or other matter, ſerving to cover and ſtrengthen the ground of divers places, for the more commodious walking on, or for the paſſage of carriages.

The word is formed from the Latin *pavimentum*, of *pavire*, to beat down the earth, in order to make it firm and ſtrong.

In England, the *pavements* of the grand ſtreets, &c. are uſually of flint, or rubble-ſtone; courts, ſtables, kitchens, halls, churches, &c. are paved with tiles, bricks, flags, or free-ſtone; ſometimes with a kind of free-ſtone, and rag-ſtone.

In ſome ſtreets, e. gr. of Venice, the ſtreets, &c. are *paved* with brick; churches ſometimes are paved with marble, and ſometimes with moſaic work, as the church of St. Mark at Venice. In France, the public roads, ſtreets, courts, &c. are all paved with gres or grit, a kind of free-ſtone.

In Amſterdam, and the chief cities of Holland, they call their brick *pavement* the *burgher-maſters pavement*, to diſtinguiſh it from the ſtone or flint *pavement*, which uſually takes up the middle of the ſtreet, and which ſerves for carriages; the brick which borders it being deſtined for the paſſage of people on foot.

Pavements of free-ſtone, flint, and flags, in ſtreets, &c. are laid dry, i. e. in a bed of ſand; thoſe of courts, ſtables, ground rooms, &c. are laid in a mortar of lime and ſand; or in lime and cement, eſpecially if there be vaults or cellars underneath. Some maſons, after laying a floor dry, eſpecially of brick, ſpread a thin mortar over it; ſweeping it backwards and forwards to fill up the joints.

The ſeveral kinds of *pavement* are as various as the materials of which they are compoſed, and whence they derive the name by which they are diſtinguiſhed: as, 1. *Pebble-paving*, which is done with ſtones collected from the ſea-beach, moſtly brought from the iſlands of Guernſey and Jerſey; they are very durable, indeed the moſt ſo of any ſtone uſed for this purpoſe. They are uſed of various ſizes, but thoſe which are from ſix to nine inches deep, are eſteemed the moſt ſerviceable. When they are about three inches deep they are denominated bolders, or bowlers; theſe are uſed for paving court-yards, and other places not accuſtomed to receive carriages with heavy weights; when laid in geometrical figures they have a very pleaſing appearance.

2. *Rag paving* was much uſed in London, but is very inferior to the pebbles; it is dug in the vicinity of Maidſtone, in Kent, from which it has the name of Kentiſh ragſtone; there are ſquared ſtones of this material for paving coach-tracks, and footways.

3. *Purbeck pitchons*; ſquare ſtones uſed in footways; they are brought from the iſland of Purbeck, and alſo frequently uſed in court-yards; they are in general from ſix to ten inches ſquare, and about five inches deep.

4. Squared *paving*, for diſtinction by ſome called Scotch *paving*, becauſe the firſt of the kind paved in the manner that has been and continues to be paved, came from Scotland; the firſt was a clear cloſe ſtone, called blue wynn, which is now diſuſed, becauſe it has been found inferior to others ſince introduced in the order they are hereafter placed.

5. *Granite*, a hard material, brought alſo from Scotland, of a reddiſh colour, very ſuperior to the blue wynn quarry.

6. *Guernſey*, which is the beſt, and now almoſt the only ſtone in uſe; it is the ſame ſtone with the pebble before ſpoken of, but broken with iron hammers, and ſquared to any dimenſions required of a priſmoidical figure, ſet with its ſmalleſt baſe downwards. The whole of the foregoing *paving* ſhould be bedded and paved in ſmall gravel.

7. *Purbeck-paving*, for footways, is in general got in large ſurfaces about 2½ inches thick; the blue ſort is the hardeſt and the beſt of this kind of *paving*.

8. *Yorkſhire-paving*, is an exceeding good material for the ſame purpoſe, and is got of almoſt any dimenſions of the ſame thickneſs as the Purbeck; this ſtone will not admit the wet to paſs through it, nor is it affected by the froſt.

9. *Ruegate*, or *free-ſtone paving*, is uſed for hearths, ſtoves, ovens, and ſuch places as are liable to great heat, which does not affect this ſtone if kept dry.

10. *Newcaſtle flags*, are ſtones about two feet ſquare, and 1½ or two inches thick; they anſwer very well for *paving* out-offices; they are ſomewhat like the Yorkſhire.

11. *Portland paving*, with ſtone from the iſland of Portland; this is ſometimes ornamented with black marble dots.

12. *Swordland paving*, is a black ſlate dug in Leiceſterſhire, and looks well for *paving* halls, or in party coloured *paving*.

13. *Marble paving*, is moſtly variegated with different marbles, ſometimes inlaid in moſaic.

14. *Flat brick paving*, done with brick laid in ſand, mortar, or groute, as when liquid lime is poured into the joints.

15. *Brick on edge paving*, done with brick laid edgeways in the ſame manner.

16. Bricks are alſo laid flat or edgeways in herring-bone.

17. Bricks are alſo ſometimes ſet endways in ſand, mortar, or groute.

18. *Paving* is alſo performed with *paving* bricks.

19. With ten inch tiles.

20. With foot tiles.

21. With clinkers for ſtables and outer offices.

22. With the bones of animals, for gardens, &c.

And 23. We have *brick-paving*, with large gravel-ſtones for porticoes, garden-ſeats, &c.

Pavements of churches, &c. frequently conſiſt of ſtones of ſeveral colours; chiefly black and white, and of ſeveral forms, but chiefly ſquares, and lozenges, artfully diſpoſed. Indeed, there needs no great variety of colours to make a ſurpriſing diverſity of figures and arrangements. M. Truchet, in the Memoirs of the French Academy, has ſhewn by the rules of combination, that two ſquare-ſtones, divided diagonally into two colours, may be joined together chequerwiſe ſixty-four different ways: which appears ſurpriſing enough; ſince two letters, or figures can only be combined two ways.

The reaſon is, that letters only change their ſituation with regard to the firſt and ſecond; the top and bottom remaining the ſame: but in the arrangement of theſe ſtones, each admits of four ſeveral ſituations, in each whereof the other ſquare may be changed ſixteen times, which gives ſixty-four combinations.

Indeed, from a farther examination of theſe ſixty-four combinations, he found there were only thirty-two different figures; each figure being repeated twice in the ſame ſituation, though in a different combination; ſo that the two only differed from each other by the tranſpoſition of the dark and light parts.

PAVEMENT *of terrace*, is that which ſerves for covering in manner of a platform; whether it be over a vault, or a wooden floor.

Thoſe over vaults are uſually ſtones ſquared, and bedded in lead. Thoſe on wood, called by the Latins, *pavimento contignato*, are either ſtones with beds for bridges, tiles for cieling of rooms, or lays of mortar made of cement and lime, with flints or bricks laid flat: as is ſtill practiſed by the eaſtern and ſouthern people a-top of their houſes.

All thoſe *pavements* which lie open were called by the Latins *pavimenta ſubdialia*.

PAVEMENT, *moſaic*. See MOSAIC *work*.

PAVEMENT, *teſſellated*. See TESSELLATED.

PAVEMENT, *projection*, or *perſpective of a*. See PERSPECTIVE.

PAVETTA, in *Botany*, a genus of the *tetrandria monogynia* claſs: its characters are, that the corolla is funnel-ſhaped, and has one petal; the ſtigma is crooked, and the fruit is a berry with two ſeeds. There is only one ſpecies.

PAVIA, in *Botany*. See *Scarlet Horſe* CHESTNUT.

PAVICULA, among the Romans, a rammer, or inſtrument for beating down and levelling a ſpot of ground.

It conſiſted of a block of wood one foot long and half a foot thick, with a long handle.

PAVILION, in *Architecture*, ſignifies a kind of turret, or building uſually inſulated, and contained under a ſingle roof; ſometimes ſquare, and ſometimes in form of a dome: thus called from the reſemblance of its roof to a tent.

The word comes from the Italian *padiglione*, *tent*; and that from the Latin *papilio*.

Pavilions are ſometimes alſo projecting-pieces, in the front of a building, marking the middle thereof. Sometimes

times the *pavilion* flanks a corner, in which caſe it is called an *angular pavilion*. The Louvre is flanked with four *pavilions*. The *pavilions* are uſually higher than the reſt of the building.

There are *pavilions* built in gardens, popularly called ſummer-houſes, pleaſure-houſes, &c. Some caſtles or forts conſiſt only of a ſingle *pavilion*.

PAVILION, in *Heraldry*, denotes a covering in form of a tent, which inveſts, or wraps up, the armories of divers kings and ſovereigns depending only on God, and their ſword.

The French heralds hold, that none but ſovereign monarchs may bear the *pavilion* entire, and in all its parts.

The *pavilion* conſiſts of two parts: the top, which is the chapeau, or coronet; and the curtain which makes the mantle. Thoſe who are elective, or have any dependence, ſay the heralds, muſt take off the head, and retain nothing but the curtains.

The uſe of *pavilions* and mantles in armories is derived from the ancient lambrequins, which are ſometimes found ſtretched out in form of coverings; and tucked back on either ſide.

Others will have it derived from the ancient tournaments, wherein were expoſed the arms of the knight, in rich tapeſtry-work, on tents and *pavilions*, which the chiefs of the quadrils planted to ſhelter themſelves in, till the time of entering the liſts.

PAVILION, in *War*, denotes a TENT raiſed on poſts to lodge under in the ſummer time.

PAVILLION is alſo ſometimes applied to ſtags, colours, enſigns, ſtandards, banners, &c. all which authors uſually confound with one another.

The cuſtom of bearing *pointed pavilions*, as at preſent, firſt came from the Mahometan Arabs, at the time when they conquered Spain. Till then, all colours were ſtretched on croſs pieces like church-banners; whence they were called in Latin, *vexilla quaſi velilla*, a diminutive of *vela*, *ſails*.

The pirates all along the coaſts of the Atlantic, and Barbary, bear hexagonal *pavilions*, gules, charged with a little Turk, dreſſed in his turban; though contrary to their law, which prohibits the making any image of a man; from an opinion that thoſe who make the figure here will be obliged to furniſh a ſoul for it at the day of judgment, or, in default thereof, be damned.

But this portrait, it ſeems, is that of Hali Sulficar, Mahomet's ſon-in-law, to whoſe party the Africans adhere: and who appointed his picture to be repreſented on their banners; imagining himſelf ſo terrible to the Chriſtians, that the mere ſight of his image would put them to flight; as we are told by Leunclavius.

PAVILIONS, among *Jewellers*, the under ſides and corners of the brilliants, lying between the GIRDLE and the COLLET.

PAUL's *art*. See ART.

St. PAUL, *hermits of*. See HERMIT.

PAUL, an Italian coin, worth almoſt 6*d.* pence Engliſh.

PAUL, in *Sea Language*, is a ſhort bar of wood, or iron, fixed cloſe to the CAPSTERN or WINDLASS of a ſhip, to prevent thoſe engines from rolling back, or giving way, when they are employed to heave in the cable, or otherwiſe charged with any great effort.

PAULA *gumdo*, in *Natural Hiſtory*, a name given by the people of the Eaſt Indies to a ſpecies of foſſil of the *oſteocolla* kind, found in ſome ſprings, the waters of which are loaded with ſpar. Theſe people uſe it in medicine, giving it in milk for gonorrhœas, and that with good ſucceſs.

PAULADADUM, a name given by ſome authors to the medicinal earth of the iſland of Malta, called *terra Melitenſis*, and *gratia ſancti Pauli*. Some have given this name alſo to a ſpecies of white bole found in ſome parts of Italy, which is made into cakes, and ſealed, and ſerves in the place of this and other white earths.

PAULIANISTS, PAULIANISTÆ, a ſect of heretics, ſo called from their founder Paulus Samoſatenus, a native of Samoſata, elected biſhop of Antioch in 262.

His doctrine ſeems to have amounted to this: that the Son and the Holy Ghoſt exiſt in God in the ſame manner, as the faculties of reaſon and activity do in man; that Chriſt was born a mere man; but that the reaſon or wiſdom of the Father deſcended into him, and by him wrought miracles upon earth, and inſtructed the nations; and finally, that, on account of this union of the divine word with the man Jeſus, Chriſt might, though improperly, be called God. It is alſo ſaid, that he did not baptize in the name of the Father and the Son, &c. For which reaſon the council of Nice ordered thoſe baptized by him to be rebaptized.

Being condemned by Dionyſius Alexandrinus in a council, he abjured his errors, to avoid depoſition; but ſoon after he reſumed them, and was actually depoſed by another council in 269.

PAULICIANS, a branch of the ancient Manichees, ſo called from their chieftain, one Paulus, an Armenian, in the ſeventh century: who with his brother John, both of Samoſatena, formed this ſect; though others are of opinion, that they were thus called from another Paul, an Armenian by birth, who lived under the reign of Juſtinian II. A certain zealot, called Conſtantine, revived, in the ſeventh century, under the government of Conſtans, this drooping faction, which had ſuffered much from the violence of its adverſaries, and was ready to expire under the ſeverity of the imperial edicts, and of thoſe penal laws which were executed againſt its adherents with the utmoſt rigour. However, the *Paulicians*, by their number, and the countenance of the emperor Nicephorus, became formidable to all the Eaſt.

But the cruel rage of perſecution, which had for ſome years been ſuſpended, broke forth with redoubled violence under the reigns of Michael Curopalates, and Leo the Armenian, who inflicted capital puniſhment on ſuch of the *Paulicians* as refuſed to return into the boſom of the church.

The empreſs Theodora, tutoreſs of the emperor Michael, in 845, would oblige them either to be converted, or to quit the empire: upon which, ſeveral of them were put to death, and more retired among the Saracens; but they were not all exterminated.

Upon this, they entered into a league with the Saracens, and, chuſing for their chief an officer of the greateſt reſolution and valour, whoſe name was Carbeas, they declared againſt the Greeks a war which was carried on during this whole century, with the greateſt vehemence and fury. During theſe commotions, ſome *Paulicians*, towards the concluſion of this century, ſpread abroad their doctrines among the Bulgarians: many of them, either from a principle of zeal for the propagation of their opinions, or from a deſire of getting rid of the perſecution and oppreſſion they ſuffered under the Grecian yoke, retired, about the cloſe of the eleventh century, from Bulgaria and Thrace, and formed ſettlements in other countries. Their firſt migration was into Italy, from whence, in proceſs of time, they ſent colonies into almoſt all the other provinces of Europe, and formed gradually a conſiderable number of religious aſſemblies, who adhered to their doctrine, and who were afterwards perſecuted with the utmoſt vehemence by the Roman pontiffs. In Italy they were called Patarini, from a certain place called Pataria, being a part of the city of Milan, where they held their aſſemblies; and CATHARI or Gazari, from Gazaria, or the Leſſer Tartary. In France they were called ALBIGENSES. The firſt religious aſſembly the *Paulicians* had formed in Europe, is ſaid to have been diſcovered at Orleans, in 1017, under the reign of Robert; many of whom were condemned to be burnt alive. The ancient *Paulicians*, according to Photius, expreſſed the utmoſt abhorrence of Manes and his doctrine. The Greek writers comprize their errors under the ſix following particulars. 1. They denied that this inferior and viſible world is the production of the ſupreme Being, and they diſtinguiſh the Creator of this world, and of human bodies from the moſt high God, who dwells in the heavens: and hence ſome have been led to conceive, that they were a branch of the GNOSTICS rather than of the MANICHÆANS. 2. They treated contemptuouſly the virgin Mary, or, according to the uſual manner of ſpeaking, among the Greeks, they refuſed to adore and worſhip her. 3. They refuſed to celebrate the inſtitution of the Lord's Supper. 4. They loaded the croſs of Chriſt with contempt and reproach; by which we are only to underſtand, that they refuſed to follow the abſurd and ſuperſtitious practice of the Greeks, who paid to the pretended wood of the croſs a certain ſort of religious homage. 5. They rejected, after the example of the greateſt part of the Gnoſtics, the books of the Old Teſtament, and looked upon the writers of that ſacred hiſtory, as inſpired by the creator of this world, and not by the ſupreme God. 6. They excluded preſbyters and elders from all part in the adminiſtration of the church. Moſheim's Eccl. Hiſt. vol. ii. p. 178, 8vo.

PAULLINIA, in *Botany*, a genus of the *octandria trigynia* claſs. Its characters are theſe: the flower has a permanent empalement, compoſed of four ſmall oval leaves; it has four oblong oval petals, twice the ſize of the empalement; and eight ſhort ſtamina with a turbinated germen, having three ſhort ſlender ſtyles, crowned by ſpreading ſtigmas; the germen turns to a large three-cornered capſule with three cells, each containing one almoſt oval ſeed. Linnæus reckons ſeven, and Miller nine ſpecies, natives of the Weſt-Indies.

PAUNCH, or PANCH, on *Ship-board*, a ſort of thick and ſtrong mat, formed by interweaving twiſts of rope-yarn as cloſe as poſſible. See MATTS.

PAVO, *peacock*, in *Aſtronomy*, a conſtellation of the ſouthern hemiſphere, unknown to the ancients, and not viſible in

our northern parts of the world, containing fourteen ſtars: the ſituation, longitudes, and latitudes of which are as follow:

Names and ſituations of the ſtars.	Signs.	Longitud.	Latitude. South.	Magnitude.
		° ′	° ′	
The eye of the peacock	♑	20 0	56 11 18	2
In the breaſt		24 41	53 46 56 21	3
In the right wing		28 21	58 45 52 53	3
In the middle		13 32	28 44 29 8	3
In the root of the tail, firſt		3 53	24 41 6 13	5
5.				
ſecond		2 42	11 41 37 9	5
third		3 55	22 39 3 25	4
fourth		5 11	3 17 10 46	6
fifth		9 49	34 18 54 11	5
ſixth	♐	29 39	17 38 3 36	4
10.				
ſeventh		17 22	54 30 0 28	5
laſt		14 7	44 41 28 2	4
In the right foot	♑	1 22	11 38 6 3	4
In the left foot		9 43	7 59 49 7	4

PAVO, in *Ichthyology*. See PEACOCK-*fiſh*.

PAVO, in *Ornithology*. See PEACOCK.

PAVONIUS-*lapis*, the *peacock ſtone*, a name given by Ludovicus Dolcis, and other writers of his time, to a ſtone of which they ſay many idle things, ſuch as its having the virtue of gaining a perſon's love to another, and the like. They have left us no deſcription of it, but probably it was one of the variegated agates.

PAUPER, in *Law*. See FORMA *pauperis*, and POOR.

PAURAEDRASTYLÆ, in *Natural Hiſtory*, the name of a genus of cryſtals. The word is derived from the Greek παυρος, *a few*, εδρα, *a ſide*, or *plane*, the privative particle α, *not*, and κιων, *a column*; and expreſſes a foſſil compoſed of but a few ſides or planes, and having no column.

The bodies of this genus are cryſtals, compoſed of two pyramids joined baſe to baſe, without the intervention of a column; theſe being both hexangular, and conſequently the whole body compoſed only of twelve planes; the others of the ſame ſtructure being compoſed of ſixteen. Of this genus there are only four known ſpecies. See *Tab. of Foſſils, claſs* 3.

PAUSANIA, Παυσανια, in *Antiquity*, a feſtival in which were ſolemn games; wherein freeborn Spartans only contended. It had its name from Pauſanias, the Spartan general, under whoſe conduct the Grecians overcame Mardonius in the famous battle at Platæa, there being always an oration in praiſe of him.

PAUSARY, PAUSARIUS, in ancient Rome, an officer who, in the ſolemn pomps or proceſſions of the goddeſs Iſis, directed the ſtops, or pauſes.

In theſe ceremonies, there were frequent ſtands at places prepared for the purpoſe, wherein the ſtatues of Iſis and Anubis were ſet down; much after the manner of reſting-places in the proceſſion of the holy ſacrament in the Romiſh church.

Theſe reſts were called *manſiones*: the regulation whereof was the office of theſe *pauſarii*.

From an inſcription quoted by Salmaſius it appears, that the Romans had a kind of college or corporation of *pauſarii*.

PAUSARY, *pauſarius*, was alſo a name given to an officer in the Roman galleys, who gave the ſignal to the rowers, and marked the times and pauſes; to the end they might act in concert, and row altogether.

This was always done with a muſical inſtrument: Hyginus ſays, that, in the ſhip Argo, Orpheus did the office with his lyre.

PAUSE, a ſtop or ceſſation of ſpeaking, ſinging, playing, or the like.

The word is formed from the Latin *pauſa*, which we find uſed in Lucretius and Plautus in the ſame ſenſe.

The uſe of pointing in grammar is, to make the proper *pauſes* in certain places.

The uſe of theſe *pauſes* is equally neceſſary to the ſpeaker and to the hearer: to the ſpeaker, that he may take breath, without which he cannot proceed far in his delivery, and that he may relieve the organs of ſpeech by theſe temporary reſts, which otherwiſe would be ſoon tired by continued and uninterrupted action: to the hearer, that the ear alſo may be relieved from the fatigue which it would otherwiſe endure from a continuity of ſound, and that the underſtanding may have ſufficient time to mark the diſtinction of ſentences, and their ſeveral members. *Pauſes* in common diſcourſe, and in moſt compoſitions in proſe, have, beſides the duration, marks of a ſurer kind annexed to them to point out their nature: and theſe are certain notes of the voice, which declare of what kind the *pauſes* are, at the inſtant they are made; and inform the mind what it is to expect from them; whether the ſenſe is ſtill to be continued in the *ſame* ſentence; whether the preceding one is to be the laſt member of the ſentence; or whether the ſentence is cloſed, and a new one is to begin. By means of theſe notes or tones, the ſpeaker may proportion his *pauſes* to the importance of the ſenſe, and not merely to the grammatical ſtructure of words in ſentences. A propoſition or ſentiment of peculiar moment may be preceded or cloſed by a *longer pauſe* than uſual: a *pauſe* may be alſo made before ſome very emphatical word, but this is a liberty that ſhould be uſed with great caution. An ingenious writer on this ſubject obſerves, that *pauſes* in general depend upon EMPHASIS: words are ſufficiently diſtinguiſhed from each other by accent; but to point out their meaning when ranged in ſentences, emphaſis and *pauſes* are neceſſary. Accent, ſays this writer, is the link which connects ſyllables together, and forms them into words: emphaſis is the link which connects words together, and forms them into members of ſentences; but that there may be no miſtake to which emphaſis the words belong, at the end of every ſuch member of a ſentence there ought to be a perceptible *pauſe*. Sheridan's Lectures, p. 75, &c. See COMMA, COLON, POINTS, &c.

There is a *pauſe* in the middle of each verſe: in an hemiſtich it is called the reſt, or repoſe.

Pauſes, or ſilences, are the ſame in poetry, as the odd reſts in muſic, which ſerve to make the odd notes even ten. St. Auſtin inſtructs us how the *pauſes* are to be made according to the laws of muſic.

PAUSE, in *Muſic*, a character of ſilence, and reſt; called alſo, by ſome, a *mute figure*; becauſe it ſhews, that ſome part or perſon is to be ſilent, while the others continue the ſong.

Pauſes are uſed either for the ſake of ſome fugue or imitation, or to give a breathing time, or to give room for another voice, &c. to anſwer what this part ſung; as in dialogues, echoes, &c.

The ancients had two kinds of *pauſes*; the one called by the Italians, *initial pauſes*, becauſe firſt placed at the beginning of the piece, though ſometimes after: and regularly before the circle O, or the ſemicircle C. They had alſo *pauſes* to mark ſilences, after the characters of the meaſure, and in the courſe of the piece.

PAUSE, *general*, denotes a general ceſſation, or ſilence, of all the parts.

PAUSE, *demi*, a ceſſation for the time of half a meaſure.

They alſo ſay, *pauſe of a minim*, *pauſe of a ſemibreve*, *long pauſe*, and *pauſes of a croma* and *ſemi-croma*; which are names given by the Italians to expreſs the different values or durations of *pauſes*.

For the ſigns or characters of *pauſes*, ſee CHARACTER.

PAUSEBASTOS, in *Natural Hiſtory*, the name of a beautiful ſtone dedicated to Venus, and called alſo *panitros*. It ſeems to have been a beautiful agate.

PAUSICAPE, Παυσικαπη, among the Athenians, a kind of puniſhment. A round engine was put about the neck in ſuch a manner, that the ſufferer could not lift his hand to his head.

PAUSIS, a word uſed by the old phyſicians for a remiſſion in acute diſeaſes.

PAUXI, in *Ornithology*, the name of an American bird deſcribed by Nieremberg, and ſeeming to be the ſame with the MITU of the Braſilians, deſcribed by Margrave, and with the *reparcoal* of Nieremberg: the whole difference is, that this, inſtead of a creſt, has a fleſhy protuberance at the baſis of its bill; this is of the ſhape of a pear and as hard as a ſtone, and is of a beautiful turcois colour, or fine pale blue.

PAW PATTE, in *Heraldry*, the fore-foot of a beaſt cut off fliert. If the whole leg be cut off, it is called *gambe*. Lion's *paws* are much uſed in armoury.

PAW, in the *Manage*. A horſe is ſaid to *paw* the ground when his leg being either tired or painful, he does not reſt it upon the ground, and fears to hurt himſelf as he walks.

PAWLE, in a *Ship*. See PAUL.

PAWN, *pignus*, a pledge or gage for ſurety of payment of money lent. It is ſaid to be derived, *a pugno, quia res quæ pignori dantur, pugno vel manu traduntur*. Litt. Dict.

The party that *pawns* goods hath a general property in them; they cannot be forfeited by the party that hath them in *pawn*, for any offence of his, nor be taken in execution for his debt; neither may they otherwiſe be put in execution till the debt for which they are *pawned* is ſatisfied. Litt. Rep. 332.

If the *pawn* is laid up, and the pawnee robbed, he is not anſwerable; though if the pawnee uſe the thing, as a

jewel, watch, &c. that will not be the worse for wearing, which he may do, it is at his peril; and if he is robbed, he is answerable to the owner, as the using occasioned the loss, &c. Ibid.

If the *pawn* is of such a nature that the keeping is a charge to the pawnee, as a cow, or a horse, &c. he may milk the one, and ride the other, and this shall go in recompence for his keeping. Ibid.

Things which will grow the worse by using, as apparel, &c. he may not use.

PAWN, among *Miners*, is a pledge of money put into the bar-master's hand, at the time when the plaintiff causes the bar-master to arrest the mine.

PAWN-*broker*. See BROKER.

PAWNAGE. See PANNAGE.

PAX *dei*. See PEACE *of God*.

PAX *ecclesiæ*. See SANCTUARY.

PAX *regis*. See PEACE *of the king*.

Longo debet esse paxregia a parte sua, ubi residens fuerit, a quatuor partibus bos illius, hoc est quatuor milliaria & ires quarentenæ, & unum aera latitudine, & unum pedes, & unum palmes, & unum grana hordei, &c. Leg. Edv. Confess.

Ad PACEM *redire*, to return to the peace, is to reverse an outlawry; whereby a person is restored to the benefit of the king's peace.

Res potest dare quod jnum est, hoc est, pacem *suam, quam ut-lagatus amisit*. Bracton. lib. iii.

PAY of the *army* and *navy*, is the stipend or salary allowed for each individual serving in the army or navy; for which we refer the reader to the Registers, published annually, and in almost every body's hands.

PAY-*master*, is the person intrusted with the money, and that has the charge of paying it. The payment of the land forces is under the direction of an office, the business of which is conducted by the *pay-master general*, his deputy, cashiers, clerks, &c. The payment of the navy is under the direction of the treasurer of the NAVY, a *pay-master*, and accomptant, clerks, &c. There is also a *pay-master* of the pensions, &c.

To PAY, in *Sea Language*, is to daub or anoint the surface of any body, in order to preserve it from the injuries of the water, weather, &c. Thus the bottom of a ship is *paid* with a composition of tallow, sulphur, resin, &c. The sides of a ship are usually *paid* with tar, turpentine, or resin, or with a composition of tar and oil, to which is sometimes added red ocher, &c. in order to protect the planks from being split by the sun or wind. The lower masts are, for the same reasons, *paid* with materials of the same sort, if we except those along which their respective sails are frequently hoisted and lowered; such are the masts of sloops and schooners, which are always *paid* with tallow for this purpose: for the same reason, all top-masts and top-gallant-masts are also *paid* with hog's-lard, butter, or tallow. Falconer.

PAYING-*off*, in *Sea Language*, denotes the movement by which a ship's head falls to leeward of the point where it was previously affected: particularly, when by neglect of the helmsman, she had inclined to windward of her course, so as to make the head-falls flutter in the wind, and retard her velocity.

PAYING-*off* is likewise used to signify the payment of the ship's officers and crew, and the discharge of the ship from service, in order to be laid up at the moorings.

PAYING-*out*, or PAYING-*away*, is the act of slackening a cable, or other rope, so as to let it run out of the vessel for some particular purpose. See CABLE.

PAYMENT, the discharge of a debt, either by money really told, or by bills of exchange, &c. See DEBT, &c.

PAYMENT, *prompt*, a popular term, in England and Amsterdam. It is when a debtor acquits what he owes, before the expiration of the term granted by the creditor. The ordinary discount for *prompt payment* on most merchandizes, is 1 per cent.

PAYMENTS, *equation of*. See EQUATION *of payments*.

PEA, *pisum*, in *Botany*, a genus of the *diadelphia decandria* class. Its characters are these: the flower hath an empalement cut into five points, the two upper being broadest; it hath four petals, and is of the butterfly kind; the standard is broad, heart-shaped, reflexed, and indented, ending in a point; the two wings are shorter, roundish, and close together; the keel is compressed, half-moon shaped, and shorter than the wings; it hath ten stamina in two bodies, the upper single one is plain and awl-shaped, the other nine are cylindrical below the middle, and awl-shaped above, and cut; these are joined together; it has an oblong compressed germen, with a triangular rising style; the germen afterward becomes a large long taper pod, terminated by a sharp rising point, opening with two valves, having one row of roundish seeds. Miller enumerates six, and Linnæus four species.

We have several sorts of *peas* cultivated for use in the gardens about London and elsewhere; and as many people are desirous of having them very early, it is a common practice to raise them on hot beds. The method of doing this is, to sow the *peas* under warm hedges or walls. In the middle of October, when the plants are come up, their stalks are to be kept earthed up, and thus they are to remain till the end of January, or beginning of February, covering them against the severe frosts with *peas*-haulm, or other light covering. In January or February, there must be made a moderate hot-bed; the dung must be laid about two feet thick, and carefully beat down, and covered about six or eight inches deep with light fresh earth; and when the frames have been set on about four days, the plants must be planted in the earth, at about two feet distance, in rows, and placed in each row at about an inch one from another. They must be watered and shaded till they have taken root, and when they must have as much air as may be; and when they begin to fruit, they should be watered more frequently than before, which will occasion their producing a larger quantity of fruit.

The common dwarf *pea* is the sort always used on this occasion, as all the rest ramble too much in their stalks. The first sort of *pea* to be sown to succeed those on the hot-beds, is the hotspur; of which the gardeners reckon three or four sorts, which differ very little from each other; but those called the golden and Charlton hotspur are usually preferred to the rest. These are to be sown in October, as those intended for the hot-bed, and treated every way in the same manner; but in spring they are subject to be destroyed by slugs and other vermin; the best method of destroying which is, to slake a little lime, and throw over the earth among the plants. For fear of this crop miscarrying by the severity of weather, it is always proper to sow two others after this, at the distance of a fortnight each; and after this there should be no others sowed till the beginning, middle, and end of January. To succeed these, which will supply the table with early *peas*, the Spanish marotto, which is a large *pea*, and a very plentiful bearer, should be sowed about the middle of February, in rows on a clear plat of ground; the rows should be three feet asunder; and the *peas* dropt at an inch from each other: these must be all very carefully covered two inches deep with earth, and the rooks, mice, &c. prevented from getting at them. A fortnight after this another spot should be sowed with this or some other larger *pea*, and this continued every fortnight till the latter end of May: observing to allow the marrow-fats and other large sorts of *peas*, at least 3½ feet, or four feet between row and row; and the rose-*pea* should be allowed at least eight or ten inches from plant to plant in the rows. The dwarf-*peas* need not have more room than two feet, row from row, and an inch distance in the row.

The sickle *pea*, which is the sort mostly cultivated in Holland, is rarely propagated in England: this should be planted in rows about 2½ feet asunder, well guarded from birds, and in other respects managed as the other sorts. There should be continued a succession of the hotspur *peas*, by sowing some every week or ten days; but those, which are sown late in the season, should have a strong moist soil. The best of all the large kinds is the marrow-fat, which, planted on a strong soil, will continue good through the month of August. The grey and other large winter *peas* are seldom cultivated in gardens, but are usually sown in fields in most parts of England: the best time for sowing them is about the beginning of March, when the weather is dry; and they should be allowed at least three feet distance from row to row, and sown thin in the rows.

PEAS, *field*. The common white *pea* succeeds best in a light sandy land, or in a rich loose soil: the time of sowing them is in the latter end of March, or beginning of April, on warm land: but in cold ground they should be sown a fortnight or three weeks later. Three bushels are the common allowance for an acre; and they kill the weeds a land is subject to, better than any other crop. The usual method of sowing these *peas* is with a broad cast, and by harrowing them in: but if they are set in drills, half the quantity of seed will serve for an acre, and the ground may be stirred with a hoe to destroy the weeds, and the *peas* earthed up, which will greatly improve them, and render the cutting of them more easy in autumn, when they are ripe. In Staffordshire they sow the garden rowncivals in fields, and they grow and yield very well, though they are left trailing on the ground without any support of sticks.

The green and purple rowncivals require a stronger soil than the white; and should be sown later in the spring: the rows should be in drills, 3½ or three feet asunder, and the ground between the rows should be stirred two or three times with a hoe. The grey *peas* thrive best on a strong

chafey land, and are commonly ſown under furrow, but they would ſucceed beſt in drills. Theſe may be ſown towards the end of February; by drawing a drill with a hoe, by a line, about two inches deep, and ſcattering the ſeed therein; then the earth ſhould be drawn over them with a rake, ſo that they may be equally covered. In large fields, a ſhallow furrow is commonly made with the plough, the ſeeds are ſcattered in it, and the earth is harrowed over them. If a hoeſe-hoe be drawn between the rows, it will eradicate the weeds, ſtir the ſoil under it mellow, and greatly promote the growth of the plants. Miller. The common quantity of ſeed is two buſhels to an acre. The blue *pea* is the beſt kind for light ſandy land, and is to be early ſown; all *peas* love land manured with lime or with marle. In Suffolk they plough up their lays in the beginning of March, and turning the turf well, they have a croſs-ſtick ſet with iron pegs, which they ſtrike down with their feet: theſe pegs make holes at an even diſtance; into which they have boys and girls following to put the *peas* ſingly, till all the land is ſet. As ſoon as this crop is cut, they plough the land acroſs, and harrowing it well they plough it again, and ſow it about Michaelmas with wheat, and the next year with barley, then with oats; after which the land requires new improvement. Mortimer's Huſbandry.

In order to obtain good ſeed, ſome rows ſhould be left ungathered; and when the *peas* are in flower, all thoſe plants, which are not of the right ſort, ſhould be drawn out. The others muſt remain till their ſeeds begin to ſplit, and then ſhould be gathered up with the haulm, and either laid up in ſtalks till winter, or threſhed as ſoon as they are dry, and the *peas* put up in ſacks for uſe. It is moſt adviſeable to change the ſeed every year, or every two years at leaſt. Miller.

PEA, *chich, cicer*, in *Botany*, a genus of the *diadelphia decandria* claſs. Its characters are theſe: the empalement is cut into five ſegments; the flower is of the butterfly kind; the ſtandard large, roundiſh, and plain; the wings are much ſhorter and obtuſe; the keel is ſhorter than the wings, and is ſharp pointed; it hath ten ſtamina, nine of them being joined, and the tenth ſeparate; it has an oval germen, which becomes a turgid ſwelling pod of a rhomboidal figure, incloſing two roundiſh ſeeds with a protuberance on their ſide. There is but one ſpecies of this plant; though there is indeed a variety of it with a red ſeed, but they differ only in colour. The *chich pea* is much cultivated in Spain, being an ingredient in their dyes, and is there called garavance. It is cultivated in France alſo, but in England it is rarely ſown; and unleſs the ſeaſon proves warm and dry, the plants decay before the ſeeds ripen. Miller.

The ancient Hebrews made uſe of *chich peas* as their common proviſions, when they took the field. They parched them to eat. At this day in Egypt, when people undertake a journey, they lay in a good ſtock of *chich peas*, parched in a frying pan. Bellonius aſſures us, that at Grand Cairo, and Damaſcus, there are abundance of ſhops, where people do nothing elſe but fry *peas*, it being a ſort of proviſions with which they furniſh travellers. In Ethiopia they take barley with them, roaſted in the ſame manner. In Turkey, they lay in a ſtock of rice on theſe occaſions, which they prepare and ſhell. The Hebrew term ץלי, ſignifies properly any thing roaſted in general, and by it is underſtood roaſted *peas*, rice, or barley; ſome will have even coffee to be meant by it. Bellon. lib. ii. cap. 53. Calm. Dict. Bibl.

PEA, *everlaſting*, or *earth-nut* PEA, names ſometimes given to the *lathyrus*. See *Chichling* VETCH.

PEA, *heart*, or *bladder*-PEA, *cardioſpermum*, or *coriolum*, in *Botany*, a genus of the *octandria trigynia* claſs. Its characters are theſe: the flower, which hath a permanent empalement of four concave leaves, has four obtuſe petals, which are alternately larger; and a ſmall four-leaved nectarium encompaſſing the germen; with eight ſtamina, three and three ſtanding oppoſite, the other two on each ſide; the germen is three-cornered, and becomes a roundiſh ſwollen capſule, with three lobes, divided into three cells opening at the top, each having one or two globular ſeeds, marked with a heart. Linnæus reckons two and Miller three ſpecies.

Theſe plants grow naturally in both the Indies, where they climb upon whatever ſhrubs are near them, to the height of eight or ten feet, but will not thrive in the open air in England. They are annual plants.

The *cardiolum* is ſaid to be uſed as an emollient, boiled as food; the ſeeds, which are a ſort of *pea*, are alſo boiled and eaten.

PEA, *Indian*, or *beath*, the name by which a ſpecies of *erebus* is ſometimes called. See *Bitter* VETCH.

PEA, *painted lady*. See *Chichling* VETCH.

PEA, *pigeon*, a name ſometimes given to the *cytiſus*, or *ſhrub* TREFOIL.

PEA, *ſcarlet*, in *Botany*, the Engliſh name of a genus of plants, called by Linnæus *glycine*. See *Liquorice* VETCH.

PEA, *ſweet-ſcented* and *Tangier*. See *Chichling* VETCH.

PEA, *winged*, a name by which ſome call the *lotus*. See *Bird's foot* TREFOIL.

PEA, *wild-winged*, a ſpecies of the *piſum*, or common PEA.

PEA, *wood*. See *Bitter* VETCH.

PEACE, PAX, in its general ſignification, ſtands in oppoſition to *war*.

PEACE, in *Mythology*. See PACALIA.

PEACE, in our *Law Books*, &c. is reſtrained to a quiet and inoffenſive carriage towards the king, and his people. Lamb. Eirenarch.

Where any man ſtands in danger of harm from another, and makes oath thereof before a juſtice of the peace, he muſt be ſecured by good bond, which is called *binding to the peace*.

Any juſtice of the peace may, *ex officio*, bind all thoſe to keep the *peace*, who, in his preſence, make any affray; or threaten to kill or beat another; or contend together with hot and angry words; or go about with unuſual weapons or attendance to the terror of the people; and all ſuch as he knows to be common barretors; and ſuch as are brought before him by the conſtable for a breach of the *peace* in his preſence; and all ſuch perſons, as, having been before bound to the *peace*, have broken it and forfeited their recognizances. Alſo, wherever any private man hath juſt cauſe to fear, that another will burn his houſe, or do him a corporal injury, by killing, impriſoning, or beating him; or that he will procure others ſo to do; he may demand ſurety of the *peace* againſt ſuch perſon; and every juſtice of the peace is bound to grant it, if he who demands it will make oath, that he is actually under fear of death or bodily harm; and will ſhew that he has juſt cauſe to be ſo, by reaſon of the other's menaces, attempts, or having lain in wait for him; and will alſo farther ſwear, that he does not require ſuch ſurety out of malice or mere vexation. This is called *ſwearing the peace* againſt another; and if the party does not find ſureties, as the juſtice in his diſcretion ſhall require, he may immediately be committed till he does. A RECOGNIZANCE for keeping the *peace*, when given, may be forfeited by any actual violence, or even an aſſault, or menace, to the perſon of him who demanded it, if it be a ſpecial recognizance; or, if the recognizance be general, by any unlawful action whatſoever, that either is or tends to a breach of the *peace*. Blackſt. Com. b. iv. p. 251, &c. See GOOD-*abearing*.

PEACE, *time of*, is when the courts of juſtice are open, and the judges and miniſters of the ſame may by law protect men from wrong and violence, and diſtribute juſtice to all. See Coke on Litt.

PEACE *of the king, pax regis*, mentioned in the ſtat. 6 Ric. II. &c. is that ſecurity which the king promiſes his ſubjects, and others taken into his PROTECTION, both for life and goods.

PEACE *of God and the church, pax Dei & eccleſiæ*, mentioned in our *Ancient Law Books*, is that reſt and ceſſation which the king's ſubjects had from trouble and ſuit of law, between the terms.

PEACE *of the plough*, that whereby the plough, plough-tackle, and plough-cattle, are ſecured from diſtreſſes. Thus fairs may be ſaid to have their *peace*, becauſe no man may be troubled in them for any debt contracted elſewhere.

PEACE, *clerk of the*. See CLERK *of the peace*.

PEACE, *commiſſion and juſtice of*. See JUSTICES *of Peace*.

PEACE, *conſervator of the*. See CONSERVATOR.

PEACE, *homage of the*. See HOMAGE.

PEACH-*tree*, *perſica*, or *amygdalus*, in *Botany*, a genus of the *icoſandria monogynia* claſs. Its characters are theſe: the flower has a tubulous empalement of one leaf, cut into five obtuſe ſegments; it hath five oblong obtuſe petals, which are inſerted in the empalement, and about thirty erect ſlender ſtamina, which are ſhorter than the petals, and are alſo inſerted in the empalement; it hath a roundiſh hairy germen, which afterwards becomes a roundiſh, woolly, large, ſucculent fruit, with a longitudinal furrow, incloſing an oval nut, with a netted ſhell, having many punctures. Linnæus enumerates four ſpecies of the *amygdalus*.

The curious in fruits account thirty-one ſorts of *peaches*, but many of them ſeem very trifling diſtinctions. Mr. Miller principally recommends the early purple, the groſſe mignon, the belle chevreuſe, the red magdalen, the chancellor, the bellegarde, the bourdine, the roſſanna, the rambouillet, and nivette.

The fineneſs of this fruit, in general, depends on the firmneſs of the pulp, the delicacy of the flavour, and the thinneſs of the ſkin. A fine *peach* ſhould be of a fine deep red next the ſun, and of a yellowiſh caſt next the wall; and the pulp ſhould be of a yellowiſh caſt, and very

very juicy; and the ſtone ſhould be ſmall, though the fruit in general be large.

The varieties of the *peach* are produced like thoſe of the finer flowers, by ſowing the ſeeds; and though many raiſed this way will be of little value, as is alſo the caſe in flowers, yet probably among a parcel of ſtones, ſaved from the finer kinds of *peaches*, there would be ſome new kinds produced; which, as they were raiſed here, would be eaſily kept up in their perfection; which is not to be expected of thoſe brought from other countries.

The beſt method of ſaving the ſtones is, to let ſome of the fineſt *peaches* of the beſt kinds hang till they drop of themſelves from the tree, and then the ſtones ſhould be immediately planted on a bed of light dry earth, planting them about three inches deep in the earth, and at about four inches aſunder. The beds ſhould be covered, to preſerve them in the winter; and in ſpring, when the plants come up, they muſt be cleared of weeds, and well watered. The next ſpring they ſhould be carefully taken up, and planted in the nurſery, in rows three feet aſunder, and one foot diſtant from each other; laying a little mulch upon the ſurface of the ground about their roots, and in a dry ſpring watering them once in a week; and after one or two years ſtanding here, they may be removed to the places where they are to remain; or they may at that time, when the condition of their fruit is known, be grafted on other ſtocks, which is the common way now uſed to propagate theſe trees.

The common method of propagating the *peach* is by grafting. In order to this, ſome good ſtocks ſhould be provided, which ſhould be of the muſcle, or white pear-plum. When theſe ſtocks are two years old, they will be ſtrong enough to bud; and the common ſeaſon for doing this is about Midſummer. The buds ſhould be choſen from a healthy tree, which produces a great deal of well ratted fruit: they muſt be taken from the trees either in a cloudy day, or elſe in the morning or evening, when the ſun has not much power: they ſhould be then inoculated on the ſtocks as ſoon as poſſible, and the ſtocks treated with the uſual care afterwards. See INOCULATION.

When theſe are to be tranſplanted where they are to remain, the moſt proper ſoil for them is, a light rich paſture-land, ſuch as is called hazel loam, taken up with the turf, and rotted together, before it is to be uſed; and the borders to be made with this cannot be too wide, being never leſs than ſix or eight feet broad, and ought to be raiſed at leaſt a foot, or in very wet land two feet above the level of the ground; but if the ground be dry, ſix or eight inches will be ſufficient, and they ſhould not be more than 2½ feet in depth. They muſt be tranſplanted in autumn, as ſoon as the leaves are fallen off; and ſhould never be ſet at leſs than twelve, and in good ground fourteen feet diſtance from one another. The heads of the trees are then to be raiſed up againſt the walls, to keep the roots from being moved by the wind; and they ſhould be watered at times with a noſe on the watering-pot, and the water ſprinkled all over them. They ſhould alſo be guarded from froſt by mulch, laid on the ſurface of the ground about their roots. In the beginning or middle of March, the heads of the new planted trees muſt be cut off, leaving only four or five eyes above the bud; the earth of the borders ſhould be gently looſened to admit the fibres of the roots; the mulch laid in autumn, if it be rotten, may be dug into the border at ſome diſtance from the roots of the trees; and in dry weather, the ſurface of the border near the roots may be covered with the parings of turf from a paſture ground. In the middle of May, the new ſhoots are to be nailed to the wall, training them horizontally; and the fore-right ſhoots are to be rubbed off: in October the new branches ſhould be pruned, ſhortening them according to the ſtrength of the tree; if ſtrong, they may be left eight inches long; if weak, they ſhould only be left four or five; and the ſame care is to be taken of them for the ſucceeding years.

There are two general rules always to be obſerved in the pruning of *peach* and nectarine trees, which are, 1. Always to have enough bearing wood. And 2. Not to lay in the branches too cloſe to one another. All *peach* trees produce their fruit from the young wood either of the ſame, or at the moſt, of the former years ſhoot; for this reaſon the branches are to be ſo pruned, as to encourage them to throw out new ſhoots in every part of the tree; and this is to be done in May; when by pinching, or ſtopping the ſtrong ſhoots, there may be new wood forced out in any part of the tree.

This is the method of the ſummer pruning; the winter pruning is uſually done in February or March, but is much better done at Michaelmas, as ſoon as their leaves begin to fall; and the wounds will then have time to heal before the ſevere froſts come on.

In pruning of theſe trees it muſt always be obſerved alſo, that it is beſt done under a wood bud, not a bloſſom bud; which may be diſtinguiſhed by the wood bud's being leſs turgid, and longer and narrower than the bloſſom bud; for if the ſhoot have not a leading bud where it is cut, it will commonly die down to the leading bud. In nailing the ſhoots to the wall, they ſhould be placed at as equal diſtances as poſſible; and ſo far apart that the leaves may have room; and they muſt always be trained as horizontally as poſſible, that the lower part of the tree may be well wooded, which it will not be if the branches are ſuffered to run upright.

When the fruit is ſet and grown to the ſize of a ſmall nut, it ſhould be thinned, and left five or ſix inches aſunder: by this management the fruit will be larger and better taſted, and the trees in a condition to bear well the ſucceeding year. The quantity of fruit to be left on large full grown trees ſhould never be greater than five dozen upon each; but on middling trees, three or four dozen will be enough. If the ſeaſon ſhould prove hot and dry, it will be proper to draw up the earth round the ſtem of each tree, to form a hollow baſon of about ſix feet in diameter, and cover the ſurface of the ground in this baſon with mulch; and once in a week or fortnight, according to the drought of the ſeaſon, to pour down eight or ten gallons of water to the root of each tree; or the water may be ſprinkled by an engine over the branches of the trees, which, ſhaking down to the roots, will promote the growth of the fruit and prevent its falling off the trees. This, however, ſhould be continued only while the fruit is growing. Miller.

The *peach-tree*, as well as the roſe-tree, are very ſubject to be over-run with the aphides; which may be eaſily deſtroyed by fumigating the houſe in which the plants are kept with tobacco, by dreſſing the infected plants with ſnuff or tobacco duſt, or by a decoction or infuſion of tobacco. Soap-ſuds effectually deſtroy the different ſpecies of inſects that infeſt fruit trees growing againſt walls, and particularly the *peach*, cherry, and plum. For this purpoſe, a perſon on a ladder ſhould pour them from a watering-pot over both trees and wall, beginning at the top of the wall, and bringing it on in courſes from top to bottom. The ſuds contribute likewiſe to preſerve the wood of the delicate and tender kinds of *peaches*.

PEACH-*colour*, the pale red colour of the bloſſoms of the *peach*-tree.

To give this beautiful colour to glaſs, add at different times, and in ſmall quantities, the powder of prepared manganeſe to the maſs for the making of LATTIMO, or milk-white glaſs, while in fuſion. This alone gives the *peach*-colour; but the metal muſt be immediately worked when of a right tinge, for the colour is very apt to go off.

PEACH-*colour*, in the *Manege*. See BLOSSOM.

PEACH, *wolf's*. See LYCOPERSICON.

PEACH-*flowers*. Theſe are uſed as a purge for children made into a ſyrup, and are by ſome recommended as great deſtroyers of worms; but there is a circumſtance attending them which is little taken notice of, and yet greatly alters their virtue. The cuſtom of gardeners is, to graft the *peach* upon the almond or the plum-tree, and the flowers partake of the nature of the ſtock; thoſe which are produced on *peach*-trees grafted on plum-ſtocks being much more purgative than thoſe from almonds; the reaſon of which ſeems plainly, that the plum is a purgative fruit, the almond not at all ſo. The flowers of the leaſt eſteemed ſorts of *peaches* are alſo uſually found to be the beſt for medicinal uſe.

In examining theſe flowers, they are found to contain more than three-fourths of a ſuperfluous humidity. The buds contain a little leſs than the blown flowers; which is very natural to ſuppoſe, becauſe it is their being afterwards charged with a larger portion of humidity which makes them open. The buttons, or buds of the flowers, are found on experiment, however, to be ſomewhat more purgative than the flowers when open.

If four pounds of theſe flowers are diſtilled in a *balneum Mariæ*, they yield twelve or thirteen ounces of a whitiſh liquor, ſweet to the taſte, and of an agreeable ſmell, reſembling that of bruiſed *peach* kernels; and this is ſo ſtrong in the water, that a few drops of it will very agreeably ſcent a larger quantity of any thing. If the buds are uſed to this purpoſe, inſtead of the open flowers, the ſame ſort of liquor is drawn over; but it is of a ſomewhat coarſer and more earthy ſmell. The reſiduum of theſe diſtillations put into a retort, and diſtilled by a reverberatory fire, gradually raiſed to its ſeveral degrees, yields both acid and alkaline ſubſtances; and, finally, a red ſpirit comes over, full of ſuliginous particles, and containing ſome oil, part of which ſwims at the top of the liquor, and the other part, which is heavier, ſinks to the bottom. This is what a chemical analyſis ſhows in theſe flowers, different from other vegetable matters. Spirits of wine draw a very weak tincture from theſe flowers;

it is indeed much weaker than an infusion of them in common water. An infusion in water of half an ounce of fresh *peach*-flowers, or of a dram of dry ones, (for, as before observed, they contain three-fourths of superfluous moisture) is a very gentle and agreeable purge, and it is said, when sweetened with sugar, to prove an useful purgative and anthelmintic for children.

This method of infusion is much better for these and all other purgative flowers, than the taking of the expressed juice; for in that case there is always a large quantity of purgative matter remaining in the residuum; which water in a warm infusion is able to take out. The infusion of rose or *peach*-flowers keeps also better than their expressed juice.

The juice always turns sour very soon; but the infusion, with the common caution of pouring a little oil on the surface, will keep good even for years.

When oil is used for this purpose, there should always be care taken that it be such as does not freeze easily; for in that case the air gets in between the cake of frozen oil, and the sides of the vessel, and spoils the liquor. Oil of almonds is greatly to be preferred to oil of olives on these occasions; as it freezes with much more difficulty. Another way of preserving the infusions is, the evaporating about half the liquor; and thus they will often keep a long time: infusions keeping better than the juices of plants, seems to shew, that the former contain more of the principles than the latter.

The young leaves of the *peach*, made into an infusion in the same manner as the flowers, are more purgative than they, but less agreeable; they are to be taken in the same manner. Mem. Acad. Par. 1714.

PEACH *gall-insect*, in *Natural History*, a small *gall-insect*, found in great plenty on the *peach*-tree. It is of an oblong figure, flat at the belly, and prominent on the back; pointed, and not unaptly resembling in miniature a small boat turned bottom upwards: their longer diameter is usually extended in the same direction with the length of the branch; sometimes a little obliquely, but scarce ever perpendicular to that direction.

Their colour is usually a faint brown, sometimes it approaches to a coffee-colour, sometimes to a bright chestnut, but more frequently it has something reddish in it. This insect lives but a little while after it has laid its eggs, and its dried body makes an excellent covering and defence for them; and what is very remarkable is, that as this insect is now immoveable, and cannot draw itself over its eggs, they are not thrown out behind its body, as the eggs of other animals; but as they are laid, are drawn under the belly, and evenly arranged there.

The eggs are ten or twelve days before they hatch, and when hatched, the young animals remain quiet under the cover of their mother's carcase for several days.

It is usually about the beginning of June that the young insects get at liberty from under the body of their parent; they may then be found running very nimbly all over the branches of the tree, but are not distinguishable otherwise than by examining the branches with a microscope. The branches, thus covered with these young animals, are in a few days cleared again, and the insects found in form of small scales, covering the leaves, and now large enough to be seen by the naked eye.

Not only the *gall-insects* of the *peach*, but all the other species, after a certain time, become immoveably fixed to the place where they are, and no longer able to use their legs. Their growth is very slow from the time of their hatching, through the months of July, August, September, and October; at the beginning of November they are found somewhat enlarged in breadth, but they are yet no thicker, and at this time they are all become of the same colour, which is somewhat reddish. In the beginning of March they begin to swell and be filled with the growing eggs; their backs become a little convex, and, viewed with a microscope, appear covered with little tubercles; and one may, at this time, perceive seven or eight long threads, which run from several parts of their bodies: these fallen themselves to the branch at a distance from the creature, and fix it immoveably in its place. In the beginning of April they become much more convex, and though they can no longer walk about, they yet have at this time sufficient motion to shew an animal life. At this time, by very slow motions, they change their skin; and it is after this change that they assume so exactly the figure of galls, and grow so very quickly to their full size. Seven or eight days now make such a change in them, that they are not to be known for the same animal; but it is not till the beginning of May, that they arrive at their utmost size. About the 15th of May they are in a condition to lay, and as the eggs are discharged, the belly is pushed closer and closer to the back; and when all are laid, becomes the shell before described, and the young ones are hatched under it, and become full of eggs, and do the same office afterwards to their young.

In the end of April the branches of the *peach* and other trees, covered with these insects, will be found to be greatly frequented by a sort of small flies, beautiful enough to demand attention; their head, breast, body, and legs are all of a deep red; they have only two wings, but those very large, being nearly twice as long as their bodies: these, in the fly's common posture, are crossed on the back, and the upper almost entirely hides the under one; they are less transparent than those of the common flies, and are of a dusky white, bordered with an edge of a fine bright and beautiful red: but what chiefly distinguishes them from all other species is, that they have two long white threads which run from their hinder part, and are of twice the length of their wings; between these there is also a remarkable part, a sort of tail made like a piercer, and of a third or fourth part of the length of these threads. This is, like all other stings, thicker at its base than at its point, and is bent a little downwards. The antennæ of this fly are adorned with long bodies, hairy, and larger at their extremities than at their insertions on the antennæ. It is easy at first sight to conceive, that these are the flies that had been produced of worms fed in the bodies of the *gall-insects* of a former year, and that they were now searching an opportunity to deposit their eggs in the bodies of these little creatures, to be hatched into worms there, and thence to come out in flies, as they themselves before had done.

The flies examined on the branches with a glass will also be found to introduce this seeming piercer always at the same place into the body of the *gall-insect*, and this is that cleft in the hinder part of the body, out of which the young ones, when hatched, afterwards find their way. The flies, which lodge their eggs or young worms in the bodies of other insects, if crushed at that season, will be always found to contain such eggs or small worms; and the microscope never fails to discover them in the matter crushed out of flies even smaller than these, but in these no observation ever shews any such. See *Tab. of Insects*, N° 29. See GALL-*insect fly*.

Notwithstanding that the *peach gall-insect* is the only species in which the male fly has been observed, there is no room to doubt but that the other species all have males of the same kind.

The orange *gall-insect* has been observed not universally fecundated, but that there is only a part of the animals that lays eggs; probably the others are those which hatch into the male flies: and the kermes, the noblest and most valuable of all the *gall-insects*, is known often to produce a white winged fly, very like that of the *peach gall-insect*. And Brennius, who gave some time since a history of the scarlet grain of Poland, the *coccus Polonicus*, a kind of *pea-gall-insect*; though in the first account he gave into the opinion of both sexes being included in each of these animals, and that each was in itself sufficient for the propagation of its species; yet afterwards, to his very great honour, added an account of his having discovered the male of this species, which he describes to be a small fly, with a red body and white wings bordered with red; a fly in all respects like the male of the *peach gall-insect*. Reaumur's Hist. Inf. tom. iv. p. 1. to 44.

PEACH *water*. See WATER.

PEACOCK, *pavo*, in the Linnæan system of *Zoology*, a distinct genus of birds of the order of *gallinæ*; the distinguishing characters of which are, that the head is adorned with an ornament of feathers reversed, in form of a plume; and that the tail-feathers are long and ocellated. Linnæus reckons three species.

Peacocks were first brought from India, where they are still found, in the wild state, in vast flocks, in the islands of Ceylon and Java. From India they were removed to Greece, and being the bird sacred to Juno, were preserved about the temple of this deity at Samos: it is therefore probable, that they were brought here originally for the purposes of superstition, and afterwards cultivated for the uses of luxury.

Peacock's quills were anciently worn among the ornaments of the kings of England.

PEACOCK, in *Astronomy*. See PAVO.

PEACOCK's *tail*. See TAIL.

PEACOCK-*fish*, in *ichthyography*, one of the larger species of the *turdus*, or *wrasse*, but of a middle nature between the long and the flat-bodied kinds; its usual standard, as to size, is about three pounds weight; and its colour on the back a mixture of blackish and a dusky blue: the blue is disposed in three or four longitudinal parallel lines, on a dusky blackish ground; about the head and gills the blue lines are more bright and numerous; its lower jaw is almost wholly blue, and its belly is of a fine saffron colour or reddish yellow; it has thick lips, and very sharp, though not very large teeth; its back-fin is, on

the anterior part, of a fine deep blue, with an edge of purple, and sometimes of yellow; and the rest of the fin is red at the bottom and yellow at the top, and in the middle is finely variegated with blue spots; the foremost nerves of the back fin are rigid and prickly, and have soft and flexile rays accompanying them beyond the limb or edge of the fin, and of more than their own length; its gill-fins are a mixed red and yellow, and its belly-fin behind the anus of a pale flesh colour, with a variegation of blue and yellow; the other belly-fins are of the same colours, and the tail is wholly blue; it is a most remarkably beautiful fish, and from the spots and variegations of its fins has obtained its name. See *Tab.* III. *of Fish*, N° 36.

PEAN, in *Heraldry*, is when the field of a coat of arms is sable, and the powderings or. See *Tab.* II. *Heraldry*, *fig.* 78.

PEANTIDES, the name of a stone to which the ancients attributed great virtues for promoting delivery.

These stones were found in Macedonia and other places; and all the description we have of them is, that they resembled water congealed by frost. Probably the ancients meant by this name the *stalactites*, or stony icicles, which, as they hang from the roofs of caverns, greatly resemble the droppings of water from the eves of houses congealed in frosty weather.

PEAR-*tree*, *pyrus*, in *Botony*, a genus of the *icosandria pentagynia* class. Its characters are these: the flower has a permanent empalement of one leaf, which is divided into five parts at the top; it hath five roundish concave petals, which are inserted in the empalement; and about twenty awl-shaped stamina, shorter than the petals, inserted in the empalement, and terminated by single summits; the germen is situated under the flower, supporting three or four styles, crowned by single summits; it becomes a pyramidal fleshy fruit, indented at the top, but produced at the base, having five membranaceous cells, each containing one smooth oblong seed, pointed at the base. Miller reckons eighty varieties. Linnæus makes five distinct species, joining the apple and quince to this genus. The *pear* and quince may be joined together with more propriety, than the apple with either; for the fruit of the two former are produced at their base, whereas the apple is indented; nor will the apple grow upon either of the other two, or those upon the apple; but the quince or *pear* will grow upon each other; so that there is a natural boundary between these and the apple.

All the sorts of *pears*, propagated in gardens, are produced by budding, or grafting them upon stocks of their own kind; which are commonly called *free stocks*, or else upon the quince or white thorn stocks; but the last are now generally disused, the fruit produced this way being apt to be dry and stony. The quince-stocks are, however, in great esteem for the trees designed for dwarfs or for walls; because they do not let the shoots grow so fast and luxuriant. But there are objections against even these, which are of some consequence, for there are many kinds of *pears* which will not thrive upon them, but will die, or become weak and good for nothing after three or four years; and the hard-breaking *pears* are rendered very unpleasant by being grafted on these stocks, while the buttery or melting ones are meliorated by them. And it is to be added, that no sort of *pear* will thrive upon a quince-stock in a poor or gravelly soil.

Pear-trees planted either against walls, or in espaliers, must not be placed nearer to one another than thirty feet, but the distance of forty feet is better.

As for the ground in which *pear-trees* are planted, if it is a strong stiff land, and subject to wet in the winter, the borders should be raised above the level of the ground as much as possible. And if under the good soil, there is a sufficient quantity of lime, rubbish, or stones laid to prevent the roots of the trees from running downward, it will be of great service to the trees. The borders for these should not be less than eight feet broad, but if they are twelve, it will be still better. If the soil is shallow, and the bottom gravel or chalk, there must be a sufficient depth of good earth laid upon the borders, so as to make them 2½ feet deep.

The manner of preparing these trees for planting, is to cut off all the small fibres from the roots, to shorten some of the longest roots, and cut off all the bruised ones, or such as shoot downright. The best time for planting them, upon a middling or dry soil, is in October or November; laying some mulch upon the surface of the ground, about their roots; and in the beginning of March their heads should be cut off; but in wet ground, the trees may be planted in February or the beginning of March. In the first summer after planting, the branches should be trained horizontally to a wall or espalier; and in the following Michaelmas, some of the shoots should be shortened down to five or six eyes, in order to obtain a sufficient quantity of branches, to furnish the lower part of the wall or espalier. The distance at which the branches should be trained must be proportioned to the size of the fruit. Those, whose fruit is small, may be allowed five or six inches; but the larger sorts must not be less than seven or eight inches asunder.

Pear-trees commonly produce their blossom-buds first, at the extremity of their last year's shoots; the common way of pruning is very prejudicial, therefore, as it takes off the part which should bear the fruit, and occasions new shoots from the same branch, which will over-fill the tree with wood; the trees should always be carefully looked over in summer, and all the foreright shoots taken off; by which means the fruit will not be over-shaded, and the trees will need but little winter-pruning.

The season for pruning these trees is any time after the fruit is gathered, until the beginning of March; but the sooner it is done after the fruit is gathered, the better.

The several sorts of summer *pears* all ripen best in espaliers, but the winter *pears* require a south-east or south-west, or else an east wall: though, in general, most sorts of them will ripen extremely well in all warm situations, when they are planted in espaliers; and the fruit will be better flavoured than that which grows against walls, and will keep much longer good. After the fruit is set and growing, the surface of the borders, in all strong land, should be now and then forked over to loosen the earth: and if the soil at seasons be hot and dry, there should be large hollows made round the stems of the trees to hold water, and into each of these should be poured eight or nine pots of water, which should be repeated once in a week or ten days during the months of June and July. There should be also some mulch laid over the surface of these hollows to prevent the sun and air from drying the ground. Where this is practised, the fruit will be kept constantly growing, and prove large and plump; whereas if this is omitted, it will be often small, grow crooked, crack, and fall off from the trees. It will be necessary also to apply some dressing to the ground near the fruit-trees, which should be laid on in autumn, after the trees are pruned. If the land is warm and dry, this dressing should be very rotten dung, the best of which is neat's or hog's dung, mixed with loam six or eight months before it is laid on: but in cold stiff land, rotten horse dung, mixed with light sandy earth, or sea-coal ashes, will be the most proper. These dressings should be repeated every other year, otherwise the trees will not thrive so well, nor will the fruit be so good. In the gathering of *pears*, care should be taken to preserve the bud which is formed at the bottom of the foot-stalk, for the next year's blossoms. The season for gathering all summer *pears* is just as they ripen, for none of these will remain good above a day or two after they are taken from the tree; nor will many of the autumn *pears* keep good above ten days or a fortnight after they are gathered. But the winter fruit should hang as long upon the trees as the season will permit, so that they may not receive the frost: if the weather continues mild, the end of October will be a proper season; and they should be gathered in dry weather, with care that none be bruised: after they are sorted and laid up in a close heap in a dry place, open for admission of the air, in order to sweat for ten or fourteen days; they should be wiped singly with a woollen cloth, and packed up in close baskets, with wheat straw; between which and the *pears* some soft thick paper may be laid to prevent their imbibing any musty taste from the straw. The baskets should be kept in a close room, where they may be guarded from moisture and frost. Miller.

It is said that crabs and wild *pears*, such as grow in the wildest and most barren clifts, and on hills, may make the richest, strongest, most pleasant, and lasting wines that England yields. See Phil. Trans. N° 477. sect. 4. See PERRY.

PEAR, *avocado*, or *alligator*, a species of *laurus*, or BAY.

PEAR, *batchelor's*, a species of the *solanum* or NIGHTSHADE.

PEAR, *garlic*. See CRATEVA.

PEAR, *Indian*, a name given by several writers to the fruit of a large tree in the East Indies. The bark of this tree is reddish without and white within, and very smooth; the leaves are small, thick, and of a pale green; the flower consists of three long triangular leaves, which, when shut up, form a sort of triangular pyramid; this is of a very disagreeable smell; the fruit is also of a conic figure, its broad part being joined to the pedicle; this is of a woody texture, and of the thickness of one's finger; it divides itself into several filaments, which run through the whole body of the fruit. When the fruit is ripe, its rind or skin is red, very smooth and thin, which is contrary to the common course of nature in the Indian fruits, to which nature has given very thick rinds, in order to make them able to bear the great heats they are exposed to. The infide of this fruit is full of a white, soft, and sweet

ſweet ſubſtance, which is uſually ſcooped out with a ſpoon, and is of a very pleaſant taſte; within this fruit there are ſeveral ſmooth, black kernels, like thoſe of our common *pears*. When this fruit is mellow, the pulpy part of it falls away from the ſtones, and they remain hanging to the pedicle for a long time.

PEAR, *prickly*, or *Indian fig*, *opuntia*, in *Botany*. This in the Linnæan ſyſtem is a ſpecies of *cereus*. See *Addon* THISTLE. Its characters are theſe: the flower is compoſed of ſeveral petals, which are obtuſe, concave, and placed in a circular order, ſitting upon the germen; it has a great number of awl-ſhaped ſtamina, which are inſerted in the germen; the germen, which is ſituated under the flower, ſupports a cylindrical ſtyle, of the length of the ſtamina, crowned by a multifid ſtigma; the germen afterwards turns to a fleſhy umbilicated fruit, with one cell including many roundiſh ſeeds. Miller reckons nine ſpecies.

Theſe plants are all of them natives of America, though the firſt ſort is found growing wild on the ſides of the roads about Naples, in Sicily, and Spain, but it is probable that the plants may have been brought from America thither, at firſt; this has been long in the Engliſh gardens; the joints or branches are oval or roundiſh, compreſſed on their two ſides flat, and have ſmall leaves coming out in knots on their ſurface, as alſo on their upper edges, which fall off in a ſhort time; and at the ſame knots there are three or four ſhort briſtly ſpines, which do not appear unleſs they are cloſely viewed, but on being handled they enter the fleſh, and ſeparate from the plant, and thus are troubleſome and often very difficult to get out.

PEARCH, or PERCH, in the Linnæan ſyſtem of *Zoology*, the name of a genus of fiſh of the order of thoracici. The characters of theſe are, that the membrane of the gills has ſeven bones, and the back has one or two fins: the firſt ſpiny, the ſecond ſoft; the body is covered with rough ſcales, and the edges of the gill-covers are ſcaly and ſerrated. Linnæus enumerates thirty-ſix ſpecies.

The name *perca* is of Greek origin, and is derived from the word *περκος*, which ſignifies variegated with black or duſky ſpots; a character common to moſt of the ſpecies of this fiſh.

The common *pearch*, or *perca fluviatilis* of Linnæus, is much admired as a firm and delicate fiſh; and the Dutch are particularly fond of it when made into a diſh called water-ſouchy.

Mr. Pennant mentions a ſingular variety of the *pearch*, the back of which is quite hunched, and the lower part of the back bone, near the tail, ſtrangely diſtorted: in colour and other reſpects it reſembles the common kind. It is found in a lake called *Llyn Raithlyn*, in Merionethſhire, and alſo in the Thames near Marlow.

The common *pearch* affords good ſport for the angler. The beſt time for their biting is, when the ſpring is over, and before the heats of ſummer come on. At this time they are very greedy, and the angler, with good management, may take at one ſtanding all that are in the hole, be they ever ſo many.

The *pearch* will bite all day long, if the weather be cloudy; but the beſt time is from eight to ten in the morning, and from three till ſix in the afternoon. The *pearch* is very abſtemious in winter, and will ſeldom bite in this ſeaſon of the year; if he does at all, it is in the middle of the day: at which time indeed all fiſh bite beſt at that ſeaſon. See FISHING.

PEARCH, *gilded*, in *Ichthyology*. See RUFFE.

PEARCH, *ſea*, *perca marina* of Linnæus, in *Ichthyology*, the name of a ſea fiſh, much reſembling the common freſh water *pearch* in ſhape, ſize, and colours, but ſomething thinner in proportion to its length, and more variegated; its back is variegated with ſix or ſeven blackiſh tranſverſe lines, like thoſe of the *pearch*, and the intermediate ſpace is of a ſomewhat reddiſh hue, eſpecially toward the head; its whole head, and part of its belly, are very elegantly variegated with red and blue ſtreaks; its back-fin is of pale yellow, with ſeveral reddiſh yellow ſpots, is very long, and furniſhed with fifteen ſtrong ſpiny rays, and fourteen ſoft; its mouth is extremely wide, and almoſt always gapes open; its teeth are ſharp, and its eyes very large; it is very common in the Mediterranean, and is a well-taſted fiſh.

PEARL, PERLA, or MARGARITA, in *Natural Hiſtory*, a hard, white, ſmooth, ſhining body, uſually roundiſh, found in a teſtaceous fiſh, reſembling an oyſter; and is ranked in the number of gems.

The fiſh, wherein the *pearls* are found, is three or four times the ſize of the common oyſters; and is called, by naturaliſts, *the concha margaritifera*.

This fiſh is common on the coaſt of Perſia, near Ormus, about Cape Comorin, and on the coaſt of the iſland of Ceylon.

The ancients called theſe *pearls* uniones, apprehending that there never was but one in an oyſter; but there have been ſometimes found ſeven in a ſhell; and an author, who treats well of their production, pretends to have ſeen a hundred and fifty in the ſame fiſh, but thoſe in different degrees of perfection. The moſt perfect drop out firſt; the reſt remaining longer at the bottom of the ſhell.

The formation of *pearls* has puzzled both ancient and modern naturaliſts, and given occaſion to a great number of hypotheſes, many of them wild and extravagant enough. Pliny, and from him Solinus, &c. will have them to be formed of the *dew*: the fiſh, ſay they, riſes every morning to the ſurface of the water, and there opens its ſhell, to imbibe the dew of heaven; which, like a liquid *pearl*, inſinuating into the body of the *pearl*-oyſter, fixes by its ſalts, and there aſſumes the colour, hardneſs, and form of *pearl*; as ſome other liquors are converted into cryſtals in the earth, or the juice of flowers into honey and wax in the body of the bee; but the *pearl*-oyſters grow faſt to the rocks, and nobody ever yet ſaw any of them appear on the ſurface of the water.

Others will have *pearls* to be the eggs of the fiſhes they are found in; but neither does this conſiſt with the phenomena: for *pearls* are found throughout the whole ſubſtance of the oyſter; in the head, the coat that covers it, the circular muſcles that terminate it in the ſtomach, and, in general, all the fleſhy and muſculous parts; ſo that there is no appearance that *pearls* ſhould be in the oyſters, what the eggs and ſpawn are in fowls and fiſhes. For beſide that there is no particular place deſtined for their formation, anatomiſts have not been able to find any thing about them that bears any relation to what paſſes in this reſpect in other animals.

Others, with M. Geoffroy the younger, rank *pearls* among the *bezoars*; as comprehending, under that claſs, all ſtones formed in layers or ſtrata in the bodies of animals. See BEZOAR.

M. Reaumur has a very curious piece on the ſubject of the formation both of the ſhells and *pearls*, in the Memoirs of the French Academy, anno 1717. He obſerves, that *pearls* are formed like other ſtones in the animals; as thoſe, e. gr. in the bladder, kidneys, &c. and that they are apparently the effects of a diſeaſe of the fiſh. In effect, they are all formed of a juice extravaſated out of ſome broken veſſels, and detained, and fixed, among the membranes.

To evince the poſſibility of this, he ſhews that the ſhells of ſea-fiſh, as well as thoſe of ſnails, &c. are wholly formed of a glutinous ſtony matter, oozing out of the body of the animal. Now it is no wonder that an animal, which has veſſels wherein circulates a ſufficient quantity of ſtony juice to build, thicken, and extend a ſhell, ſhould have enough to form ſtones alſo, in caſe the juice, deſtined for the growth of the ſhell, ſhall chance to overflow, and burſt forth in any cavity of the body, or among the membranes.

To confirm this ſyſtem, he obſerves, that the inner ſurface of the common *pearl* muſcle, found on the coaſts of Provence, is of a *pearl*, or mother of *pearl* colour, from one part of its extent, which he determines, to another; after which it becomes reddiſh: now there are *pearls* of two colours found in the ſhell; and the colours of the *pearls* are preciſely the ſame with thoſe of the ſhell; nay, more, each kind of coloured *pearl* is found in the correſponding coloured part of the ſhell; which ſhews, that, in the ſame place wherein the tranſpiration of a certain juice had formed, and would have continued to form, a coat or layer of ſhell of a certain colour; the veſſels which conveyed that juice being broken, there is formed a little maſs or collection of the juice, which, hardening, becomes a *pearl* of the ſame colour with the part of the ſhell to which it correſponds.

Add to this, that the ſilver or *pearl*-coloured part of the ſhell is formed of ſtrata, or layers, over one another, like an onion; and the reddiſh part of little cylindrical ſhort fibres applied againſt one another. The *pearls* of the two colours have alſo this difference of texture; not but they are both compoſed of concentric couches; but thoſe of the reddiſh *pearls* are much leſs ſenſible; and, beſides, they have threads, which, like radii, proceed from their centre to their circumference. Theſe circumſtances ſeem effectually to determine the formation of *pearls*, and to eſtabliſh the new ſyſtem beyond contradiction.

As to the formation of the *pearl-fiſh*, though it is the moſt natural opinion, that this fiſh, like all others, produces eggs or ſpawn, whoſe exterior ſurface at firſt is ſoft and viſcous, but changes, and hardens, by degrees, into a ſhell; yet we muſt not leave unmentioned the popular, though erroneous hypotheſis of the Paravas, viz. that in rainy weather, the brooks of the neighbouring lands that empty themſelves all along the coaſts, run near two leagues on the ſurface of the ſea without mixing therewith.

with. For a while the ſuſpended water, they ſay, retains its natural colour and ſweetneſs: but, at length, the heat of the ſun, condenſing it, forms it into a kind of light tranſparent froth; this done, it preſently divides into an infinity of parts, each whereof appears as if animated; moving this way and that like little inſects. The fiſhes ſometimes catch at them as they paſs by; but they ſoon abandon them. By degrees their ſkin thickening, and hardening, they at length become heavy enough to ſink to the bottom, and aſſume the figure of *pearl* oyſters.

The perfection of *pearls*, whether round, in form of pears or olives, or irregular, conſiſts chiefly in the luſtre and clearneſs of the colour, which jewellers call the *water*. There are ſome whole waters is white, which are thoſe moſt eſteemed in Europe; the water of others border on the yellow, which ſome Indians and Arabs prefer to the white; others are of a lead colour; others border on black; and others are quite black. They are all liable to change with wearing: in eighty or a hundred years they uſually become of little value, eſpecially the white ones, which often turn yellow, and ſpoil in forty or fifty years time.

The difference of colours, doubtleſs, ariſes from the different parts of the oyſter wherein they are formed. When the ſeed happens to be thrown into the melentery or liver, or the parts correſponding thereto, it is no wonder if the impurities of the blood change the natural white.

The oriental *pearls* are the fineſt, on account of their largeneſs, colour, and beauty, being of a ſilver white; whereas the occidental *pearls* ſeldom exceed the colour of milk.

In Europe, *pearls* are ſold by the carat-weight, the carat containing four grains. In Aſia, the weights uſed for *pearls* are different, in different ſtates.

The value of *pearls* increaſes as the ſquare of their weight: thus, the price of a *pearl* of one carat being ſettled at 8*l.* to find the price of a *pearl* weighing ſix carats; firſt find the ſquare of 6, viz. 36; which multiplied by 8 gives 288 thillings, or 14*l.* 8*s.* the price required.

The term *pearl* is only properly applied to what grows independent of the ſhell. The ſhell itſelf is rather called *mother of pearl*: thoſe pieces which have grown thereto, and have been ſince ſeparated by the addreſs of the workman, are called *mere of pearls*; which are, in effect, nothing but roundiſh excreſcences, or pieces of the ſhell, though frequently uſed for real *pearls*.

Pearls, *V. Boulbouts* obſerves, have this advantage over precious ſtones dug out of rocks, &c. that the latter owe their luſtre to the induſtry of men; nature only, as it were, hews them out, and leaves the finiſhing of them to art: but the former are born with that beautiful water which gives them their value. They are found perfectly poliſhed in the abyſſes of the ſea; and nature has put the laſt hand to them before they are ſeparated from their mother.

Pearls of unuſual figures, i. e. neither round, nor in the pear form, are called *baragous*, and ours *Scotch pearls*: thoſe of unuſual ſizes are called *parangons*; ſuch as were that of Cleopatra, valued by Pliny at centies HS. or 800000*l.* ſterling, that brought in 1574 to Philip II. of the ſize of a pigeon's egg, valued at 14400 ducats; that of the emperor Rudolph, mentioned by Boetius, called *la peregrina, or the incomparable*, of the ſhape of a muſcadel pear, and weighing thirty carats; and that mentioned by Tavernier, in the hands of the emperor of Perſia, in 1634, bought of an Arab for 32000 tomans, which, at 3*l.* 9*s.* the toman, amounts to 110400*l.* ſterling.

Pearls are of ſome uſe in medicine; but they are only the ſmalleſt ſort, called *ſeeds of pearls*, that are uſed. The quality required in, that they be white, clear, and tranſparent; and truly oriental. They ſerve to make cordial potions, formerly much valued, but now fallen from their ancient reputation; and ſcarce ordered by any but charlatans.

The ladies alſo uſe certain preparations of *pearls*, as they are made to believe, for their complexions: ſuch as the whites of *pearls*; flowers, eſſences, ſpirits, tinctures, &c. of *pearl*; but they are all apparently deceits.

PEARLS, *ounce*. See OUNCE.

PEARL-*fiſheries*. *Pearls* are caught in the ſeas of the Eaſt Indies, in thoſe of America, and in ſome parts of Europe.

PEARL-*fiſheries of the Eaſt are*, 1. the iſland of Bahren, or Baharem, in the Perſian gulf; this the Portugueze were maſters of while they held Ormus and Maſcati; but it has been returned to the ſophi of Perſia, ſince the time that prince, with the aſſiſtance of the Engliſh, took from them Ormus, and the Arabs Maſcati.

2. The fiſhery of Catifa, on the coaſt of Arabia Felix, over againſt Bahren.

3. That of Manar, a ſea-port in the iſle of Ceylon. The *pearls* here fiſhed are the fineſt in all the Eaſt for their water and roundneſs; but they ſeldom exceed two carats.

Laſtly, there are *pearls* fiſhed on the coaſt of Japan, but they are coarſe and irregular, and little valued.

The *pearls* of Bahren and Catifa are thoſe commonly ſold in the Indies: they border a little on the yellow, but the Eaſtern people do not value them the leſs for it: they eſteem it the ſign of their being ripe, and mature; and are perſuaded, that thoſe which have this yellowiſh tincture naturally never change their colour; and that, on the contrary, thoſe of the white water do not hold above thirty years before the *pearl* turns to a blihy yellow colour, by reaſon of the heat of the climate, and the ſweat of the perſons who wear them.

PEARL, *American, fiſheries* are all in the great gulf of Mexico, along the coaſt of the Terra Firma. There are five of them.

1. The fiſhery of Cubagua, an iſland five leagues from New Andaluſia, in 10½ deg. north lat.

2. That of the iſland Margueritea, or *Pearl iſland*.

3. That of Comogote near the Terra Firma.

4. That of the river De la Hach, called *La Rancheria*.

5. That of St. Martha, ſixty leagues from the river De la Hach.

The *pearls* of theſe three laſt fiſheries are uſually of a good weight, but ill formed, and of a livid water. Thoſe of Cubagua ſeldom exceed five carats, but are found in abundance. But the greateſt quantity, and the fineſt, both with regard to weight and water, are thoſe of the iſland Margueritea.

PEARL *fiſhery*, in Chineſe Tartary, is near the city Nipehon, ſituate on a lake of the ſame name: the *pearls* here are leſs beautiful than thoſe of Baharem, and the fiſhery leſs plentiful. It was this fiſhery that occaſioned the war between the Chineſe and Muſcovites, terminated towards the end of the laſt century, by the Jeſuits Pereira and Gerbillon; when the lake, which is of great extent, was divided between the two nations, each whereof had pretended to the whole.

There are ſome *pearl fiſheries* alſo in the South-Sea, but they are very inconſiderable.

PEARL *fiſheries* of Europe are in ſome places on the coaſts of Scotland, and in a river of Bavaria, but the *pearls* found here are no ways comparable to thoſe of the Eaſt Indies, or of America; though they ſerve for necklaces, which are ſold ſometimes for a thouſand crowns, and upwards. See an account of *pearl* fiſhing, in the north of Ireland, Philoſ. Trani. N° 198.

PEARLS, *manner of fiſhing for, in the Eaſt Indies*. There are two ſeaſons of *pearl* fiſhing in the year: the firſt in March and April, the ſecond in Auguſt and September. The more rain there falls in the year, the more plentiful are the fiſheries. In the opening of the ſeaſon, there appear ſometimes two hundred and fifty barks on the banks: in the larger barks are two divers; in the ſmaller, one. Each bark puts off from ſhore before *ſun-riſe*, by a land breeze, which never fails; and returns again by a ſea breeze, which ſucceeds it about noon.

As ſoon as the barks are arrived at the place where the fiſh lie, and have caſt anchor, each diver binds a ſtone, ſix inches thick, and a foot long, under his body; which is to ſerve him as ballaſt, and prevent his being driven away by the motion of the water, and to enable him to walk more ſteady among the waves.

Beſides this, they tie another very heavy ſtone to one foot, whereby they are ſoon ſunk to the bottom of the ſea: and as the oyſters are uſually ſtrongly faſtened to the rocks, they arm their fingers with leathern mittens, to prevent their being wounded in ſeparating them violently off; and ſome even carry an iron rake, for the purpoſe.

Laſtly, each diver carries down with him a large net, in manner of a ſack, tied to his neck by a long cord, the other end whereof is faſtened to the ſide of the bark. The ſack is intended for the reception of the oyſters gathered from the rock, and the cord is to pull up the diver, when his bag is full, or when he wants air.

In this equipage he precipitates himſelf, ſometimes above ſixty feet under water. As he has no time to loſe there, he is no ſooner arrived at the bottom than he begins to run from ſide to ſide, ſometimes on land, ſometimes on a clayey earth, and ſometimes among the points of rocks; tearing off the oyſters he meets with, and cramming them into his budget.

At whatever depth the divers be, the light is ſo great, that they eaſily ſee whatever paſſes in the ſea, with the ſame clearneſs as on land. And, to their conſternation, they ſometimes ſee monſtrous fiſhes, from which all

their address in muddling the water, &c. will not always save them; but they become their prey: and of all the perils of fishery, this is one of the greatest and most usual.

The best divers will keep under water near half an hour; the rest do not stay less than a quarter. During which time, they hold their breath without the use of oils, or any other liquors; only acquiring the habit by long practice.

When they find themselves straightened, they pull the rope to which the bag is fastened, and hold fast by it with both hands; when the people in the bark, taking the signal, heave them up into the air, and unload them of their fish, which is sometimes five hundred oysters, sometimes not above fifty.

Some of the divers need a moment's respite to recover breath; others jump in again instantly, continuing this violent exercise, without intermission, for many hours.

On the shore they unload their barks, and lay their oysters in an infinite number of little pits, dug four or five feet square, in the sand; raising heaps of sand over them to the height of a man, which, at a distance, look like an army ranged in battle.

In this condition they are left, till the rain, wind, and sun have obliged them to open, which soon kills them. Upon this the flesh rots and dries, and the *pearls*, thus disengaged, tumble into the pit upon taking the oysters out.

The flesh of the fish is excellent: and if what some naturalists maintain be true, viz. that the *pearls* are stones, formed there by the ill constitution of the body, as sometimes happen in men, this disease does not alter the humours: at least, the Paravas, who eat them, do not find any difference between those that have *pearls*, and those that have none.

After cleaning the pits of the grosser filth, they sift the sand several times, to separate the *pearls*. But what care soever they take herein, they always lose a great many. After cleaning and drying the *pearls*, they are passed through a kind of sieve, according to their sizes. The smallest are sold as seed *pearls*; the rest are put up by auction, and sold to the highest bidder.

PEARL, *manner of fishing for, in the West-Indies*. The season for fishing there is usually from October to March. In this time there set out from Carthagena ten or twelve barks, under the convoy of a man of war called l'Armadilla. Each bark has two or three slaves for divers.

Among the barks there is one called Capitana; to which all the rest are obliged to bring at night what they have caught in the day, to prevent frauds. The divers never live long, by reason of the great hardships they sustain; continuing sometimes under water above a quarter of an hour. The method is the same as in the East India fisheries.

The Indians esteemed *pearls* before the discovery of America; and when the Spaniards arrived there, they found great quantities stored up, which the Americans set great value on. But they were almost all imperfect, and their water yellow and smoky, because they used fire in opening the fishes.

As to *pearls* in form of pears, though equally perfect, and of equal weight with the round ones, their value is much inferior: however, when two are found that match well, their value is less but by one third.

PEARLS, *to blanch and cleanse*. First soak and cleanse them in bran-water, then in milk-warm water, and last of all steep them in mercurial water, then string and hang them in a glass, close it well and set them in the sun to dry.

The bran-water is made thus: boil two good handfuls of wheaten bran, in a quart of water, till all the strength of the bran is drawn out, which use thus: take a new glazed earthen pan, in which put your *pearls* on a string, and pour the third part of the bran-water upon it; when they have soaked, and the water is just warm, rub your *pearls* gently with your hands, to clean them the better, and continue this till the water is cold; throw off that, and pour on another third part of the bran-water, that is boiling, proceed with this as you did before, and when cold throw it away, and pour on the remainder of the water, still proceeding as before. After this heat fair water, and pour it on your *pearls*, to refresh them, and to wash away the remains of the bran, by shifting them and pouring on fresh warm water: this do thrice, without handling your *pearls*; then lay them on a sheet of clean white paper, and dry them in a shade, after which dip them into mercurial water, to bring them to perfection. Postl. Dict. Com.

Other methods in blanching of *pearls*. Pound alabaster to an impalpable powder, rub the *pearls* therewith, very gently: this will not only cleanse them, but if you let them remain in this powder, twenty-four hours afterwards, they will still be the better for it. White coral has the same effect, used in the like manner. White tartar calcined and divested of all its moisture is very good for the same purpose.

Salt dissolved, filtred, coagulated, well dried, and ground, is as effectual as any of the former things, for cleansing of *pearls*, by rubbing them therewith; and if afterward you lay them up in some coarse ground millet, it will contribute to their brightness.

PEARLS, *false*, are counterfeit or factitious *pearls*, resembling the true ones in water or colour; popularly called BEADS.

These anciently were only made of glass; with a kind of coating of quicksilver within side; afterwards they used wax, covered over with a fine brilliant fish-glue.

There has since been invented in France another manner of making them, so near the natural ones in lustre and water, that they deceive a good eye. These are what the ladies now generally wear in respect of true *pearls*; small necklaces whereof they despise, and the large ones are generally too dear.

PEARLS, *false, method of making*. Take of thrice distilled vinegar two pounds, Venice turpentine, one pound; mix them together into a mass, and put them in a cucurbit; fit a head and receiver to it, and after you have luted the joints, set it, when dry, on a sand furnace, to distil the vinegar from it; do not give it too much heat, lest the stuff swell up: after this put the vinegar into another glass cucurbit, in which there is a quantity of seed *pearl*, wrapped in a piece of thin silk, but so as not to touch the vinegar; put a cover or head upon the cucurbit, lute it well, and put it in *bal Marine*, where you may let it remain a fortnight. The heat of the *balneum* will raise the fumes of the vinegar, and they will soften the *pearls* in the silk, and bring them to the consistence of a paste, which being done, take them out, and mould them to what bigness, form, and shape you please. Your mould must be of fine silver, the inside gilt; you must also refrain from touching the paste with your fingers, but use silver gilt utensils, with which fill your moulds. When they are moulded, bore them through with a hog's bristle, or gold wire, and let them dry a little; then thread them again on gold wire, and put them into a glass, close it up and set them in the sun to dry: after they are thoroughly dry, put them in a glass matrass into a stream of running water, and leave them there twenty days; by that time they will contract the natural hardness and solidity of *pearls*: then take them out of the matrass and hang them in mercurial water, where they will moisten, swell, and assume their oriental beauty; after which thrist them into a matrass hermetically closed up, to prevent any water coming to them, and let it down into a well, to continue there about eight days: then draw the matrass up, and in opening it, you will find *pearls* exactly resembling oriental ones.

The mercurial water is thus prepared: take plate-tin of Cornwall, calcine it, and let the calx be pure and fine; then, with some ounce of the calx and two ounces of prepared mercury, make an amalgama; wash it with fair water, till the water remains insipid and clear; then dry the amalgama thoroughly, put it into a matrass over the furnace, giving it such a heat as is requisite for sublimation. When the matter is well sublimated, take off the matrass, and let it cool. Take out that sublimate, add one ounce of Venice sublimate to it, and grind them together on a marble; put this into another matrass, close it well, and set it upside down in a pail of water, and the whole mass will dissolve itself, in a little time, into mercurial water: this done, filter it into a glass receiver, fix it on a gentle ash fire to coagulate, and it will turn into a crystalline substance: beat this in a glass mortar, with a glass pestle, to a fine powder; strain it through a fine sieve, and put it into a matrass, stop it close up, and place it in *balneo Mariæ*: there let it remain till it resolves again into water, which will be fit for the above mentioned use. Postl. Dict. Com.

The sieur Janin having observed, that the scales of a little fish called the *blade*, found plentifully in the river Marne, had not only all the lustre of the real *pearl*, but that, after beating them to powder in water, they returned to their former brilliance upon drying; he bethought himself of setting a piece, or little mass thereof in the cavity of a bead, or grain of *pearl*, which is a kind of counterfeit opal made of glass, and bordering much on the colour of *pearls*. The difficulty was, to get it in there, and when in to spread it equally throughout the bead.

A little glass tube, six or seven inches long, and a line and half in diameter, but very sharp at one end, and a little crooked, served for the introducing of the matter, by blowing it with the mouth, after having taken up a drop of this mixture with the pointed extremity of the

tube; and to spread it throughout the inner circumference, be contented himself to shake it gently a long time, in a little oher basket lined with paper.

The pulverized scales, fastened by this motion in the inside of the bead, resume their lustre as they dry. To increase this lustre, in winter, they lay the beads in a hair sieve, or a bolting-cloth, which they suspend to the ceiling, and under it, at six feet distance, they lay heaps of hot ashes. In summer they suspend them in the same manner, but without any fire.

The *pearls*, thus well dried, become very brilliant; and nothing remains but to stop up the aperture, which is done by melted wax, conveyed into it with a tube like that used in introducing the powdered scales.

After clearing off the superfluous wax, they perforate the *pearls* with a needle, and string them; and thus they form a necklace.

PEARL, *mother of*, is the shell not of the *pearl* oyster, but of another sea-fish of the oyster kind.

The shell within side is very smooth and polished, and of the whiteness and water of *pearl* itself; and it has the same lustre without side, after the first famine or leaves, which make the outer coat of this rich shell-fish, have been cleared off, with aqua fortis, and the lapidary's mill. It is used in inlaid works, and in several toys, as snuff-boxes, &c.

PEARL, *stone of*, are certain excrescences, or prominent places, in form of half-pearls; sometimes found in the bottoms of *pearl* shells.

The lapidaries have the address to saw off these protuberances, to join them together, and to use them in several works of jewelry, as if they were really *pearls*.

PEARL, in *Heraldry*, is used by such as blazon with precious stones instead of colour and metals, for argent, or white.

PEARL, in *Ichthyology*, a name given by us in the parts about London, to that fish which is called in Cornwall, and other parts of the west of England, LUG-*a-leaf*; it is the *rhombus laevis* of the generality of authors; and, according to the new system of Artedi, it is a species of the *flounnelles*, distinguished by the author by the name of the *smooth-bodied pleuronelles*, with the eyes on the left side; and the *pleuronelles rhombus* of Linnæus. This fish is often found in the London markets; but is inferior to the turbot in goodness as well as size.

PEARL-*ashes* is a kind of fixed alkaline salts, prepared chiefly in Germany, Russia, and Poland, by melting the salts out of the ashes of burnt wood; and, having reduced them again to dryness, evaporating away the moisture, and calcining them for a considerable time in a furnace moderately heated. See POT-*ashes*.

The goodness of *pearl-ashes* must be distinguished by the uniform and white appearance of them: they are subject, however, to a common adulteration, not easily distinguishable by the appearance, which is done by the addition of common salt. In order to discover this fraud, take a small quantity of the suspected salt, and after it has been softened by lying in the air, put it over the fire in a shovel: if it contains any common salt, a crackling and kind of slight explosion will take place, as the salt grows hot.

The *pearl-ashes* are much used in the manufacture of glass, and require no preparation: except where very great transparency is required, as in the case of looking-glass, and the best window-glass. For this purpose dissolve them in four times their weight of boiling water: when they are dissolved, let the solution be put into a clean tub, and suffered to remain there twenty-four hours, or longer. Let the clear part of the fluid be then decanted off from the sediment, and put back into the iron pot, in which the solution was made; in this let the water be evaporated away till the salts be left perfectly dry again. Keep those that are not designed for immediate use in stone jars, well secured from moisture and air.

PEARL-*barley*. See BARLEY. This affords, to a microscopic observer, a peculiar kind of mite worthy attention, and very different from the common species. The bodies of these have some brown marks upon them, and have not such long hairs as the common mites have; the hinder part of the body also is of a different make. They have eight legs; and before the head there stand two weapons twice as thick as the legs, and of about half their length: these are divided toward the ends with joints like fingers, and those have at their ends a sort of nails formed with sharp and crooked claws; and one of the longest joints is serrated at the edge like a saw. These weapons serve not only as arms and hands to seize hold of things, but they also serve as a defence; for as soon as any danger threatens the creature's head, it erects them both, and makes them meet, and fold into one another over the head, as we can join our hands and fingers together in the same erect posture.—Philos. Trans. N° 227.

PEARL *colour*, in glass. This beautiful colour is given to glass in the following manner: put tartar calcined to a whiteness into purified crystal, while in fusion, at several times, in small quantities, mixing it well every time, till the glass is become of the desired colour; and when it is, work it as quick as can be, for it is a colour that is quickly gone. See GLASS.

PEARL *shell* or *paper*. See MYA.

PEARL, *pin*, or *web*, in *Medicine*, an unnatural speck, or thick film over the eye. See PANNUS.

PEARL, *white*, is the powder of *pearls*, or the finer parts of oyster-shells, much used in miniature paintings. The method of preparing it is to take the oysters as they are are found on the sea-coast, calcined by the sun, or otherwise to dry fresh ones by the fire, till they may be easily powdered; to scrape off from these shells all the external or other parts that are not of the most perfect whiteness; and to levigate them well with water on the stone, and wash the powder over till it is thoroughly fine.

PEARLED *crowns*. See CROWN.

PEASE, in *Botany*. See PEA.

PEASE-*blossom-damp*, in *Natural History*. See DAMP.

PEAT. See MORASS.

PEAUCIER, in *Anatomy*, a name given by Winslow, in his Treatise on the Head, and by other of the French writers, to the muscle, called by Albinus *latissimus colli*; and by others *detrahens quadratus*, and *quadratus genæ*. Santorini has called the part of this which arises from the cheek, *musculus risorius novus*; and some call the whole *platisma myoides*.

PEBBLES, *calculi*, in *Natural History*, the name of a genus of fossils, distinguished from the flints and homochroa, by their having a variety of colours. These are defined to be stones, composed of a crystalline matter, debased by earths of various kinds in the same species, and then subject to veins, clouds, and other variegations; usually formed by incrustation round a central nucleus, but sometimes the effect of a simple concretion, and veined like the agates, by the disposition which, the motion of the fluid they were formed in gave their differently coloured substances.

The variety of *pebbles*, of England alone, is so great, that a hasty describer would be apt to make almost as many species as he saw specimens. A careful examination will teach us, however, to distinguish them into a certain number of essentially different species, to which all the rest may be referred, as accidental variations. When we find the same substances and the same colours, or those resulting from a mixture of the same, such as nature frequently makes in a number of stones, we shall easily be able to determine that these are all of the same species, though in different appearances; and that, whether the matter be disposed in one or two, or in twenty crusts laid regularly round a central nucleus, or thrown without a nucleus into irregular lines, or finally blended into a sort of uniform mass.

These are the three states in which we are liable to find every species of *pebble*; for if it hath been most naturally and regularly formed by incrustation round a central nucleus, we find that ever the same in the same species, and the crusts not less regular and certain. If the whole has been more hastily formed, and has been the result only of one simple concretion, if that has happened while its different substances were all moist and thin, they have blended together and made a mixed mass of the joint colour of them all; but if they have been something harder when this has happened, and too far concreted to diffuse wholly among one another, they are found thrown together into irregular veins. These are the natural differences of all the *pebbles*; and having regard to these in the several variegations, all the known *pebbles* may be reduced to thirty-four species. Hill's Hist. of Foss. p. 512, seq.

In all the strata of *pebbles* there are constantly found some which are broken, and whose pieces lie very near one another; but as bodies of such hardness could not be broken without some considerable violence, their present situation seems to imply, that they have suffered that great violence in or near the places where they now lie. Beside these, there are others also found which have as plainly had pieces broken off from them, though those pieces are no where to be found; whence it seems equally plain, that whatever has been the cause of their fracture, they have been brought broken, as we find them, from some other place, or else that the pieces broken from them must at some time or other have been carried from this place to some other distant one.

Several of these broken *pebbles* have their edges and corners so sharp and even, that it seems evident they never can have been tossed about or removed since the breaking;

breaking; and others have their sides and corners so rounded, planted, and worn away, that they seem to have been roughly moved and rolled about among other hard bodies, and that too either with great violence, or for a very long continuance; since such hard bodies could not have been reduced to the condition we now see them in without long friction.

It may be supposed by some, that these stones never were broken, but have been naturally formed of this shape; but it will be easily seen, by any one who accurately surveys their veins or coats, which surround the nucleus, like the annular circles of a tree, that they must have been originally entire; and this will be the more plain if they are compared with a stone broken by art. Such *pebbles* as are found in strata, that lie near the surface of the earth, are much more brittle than those which lie in deeper strata.

The more clear and transparent the sand is, which is found among *pebbles*, the more beautiful the *pebbles* are generally observed to be.

The use of these stones, and their disposition in the earth, is a subject of great admiration; and may serve as one of the numerous proofs of an over-ruling Providence in the disposition of all natural bodies. The surface of the earth is composed of vegetable mould, made up of different earth mixed with the putrid remains of animal and vegetable bodies; and is of the proper texture and compages for conducting the moisture to the roots of trees and plants: and under this are laid the sands and *pebbles* which serve as a sort of drain to carry off the redundant moisture deeper into the earth, where it may be ready to supply the place of what is constantly going in exhalations; and lest the strata of sand should be too thick, it is common to find thin ones of clay between, which serve to put a stop to the descent of the moisture, and keep it from passing off too soon; and lest these thin strata of clay should yield and give way, and by their softness, when wetted, give leave to the particles of sand to blend themselves with, and even force their way through them, there are found in many places thin coats of a poor iron ore, placed regularly above and below the clay; and by that means not only strengthening and supporting the clay, but effectually keeping the sand from making its way into it. Phil. Trans. N° 483.

PEBBLES, *ridged*. It is not uncommon to meet with *pebbles*, in our gravel-pits, which have one or more ridges, or white lines, standing above the surface of the rest of the stone, in form of a rib or zone, laid on the stone after its formation. This, however, is not the case; but the line or zone always goes through the whole body of the *pebble*: the matter forming this ridge is always harder than the rest of the stone; and it seems probable, that at first it was not elevated, but level with the rest of the surface; but being not so easily worn away by accidents, and when the whole *pebble* came in the way of rubbing among harder bodies, this would be less rubbed away, and consequently would be left more elevated than the rest. We daily see on the seashores numbers of stones rounded by the continual rolling and tolling among the waves, and in these the softer parts have given way first and been worn into holes, while the harder have been left prominent. It seems probable to have been the case with these *pebbles* also; but they are not found on the shores; but in our gravel-pits, at a great distance from the sea: and it is evident, that these have had their surfaces thus ground and worn down between the time of their being formed by concretion, and their being deposited where we now find them.

The smoothness of the surfaces of some *pebbles* and flints, which we find with their natural coats or crusts worn off, is another proof of the same thing. These *pebbles*, in this unnaturally naked state, as well as the ribbed and lineated ones, are found in our pits, under the strata of earth; and yet they are in exactly the same condition with those which have been rolled about and rounded on the sea shores.

PEBBLES, *swallowing of*. There are many people of opinion, that the swallowing of *pebbles* is very beneficial to health, in helping the stomach to digest its food, and a *pebble*-potlet is an old woman's medicine in the colic, in many parts of England. They usually order the small white stones to be picked out of gravel walks for this purpose, and eat them in large quantities in some sort of spoon meat, of which milk is an ingredient.

The thing that has given occasion to this practice seems to have been, that people observe the birds to pick up the gravel, and that they are never well unless they have frequent recourse to this to help their digestion: but this is no similar case at all, for the gizzard or stomach of a bird is made very strong, because the creature hath no teeth to chew its food; and this gizzard is lined with a rough coat, by the help of which and these stones, the food they swallow whole is so ground, as to yield its juices to the nourishment of the animal. But the stomach of man is formed so very differently, that it can never require those assistances to the comminution of food. Many people have, however, accustomed themselves to swallow not only these small white stones, but large *pebbles*, even to the size of a walnut each; and these will often pass safely, and people, who have long accustomed themselves to swallow them, boast of receiving no injury from them: we can never know, however, that the death of such persons is not owing to them at last; and as they can do no good, it is best always to avoid them. There is one instance on record, of much mischief done by them, in our Philosophical Transactions, N° 253, p. 190.

PECARY, in *Zoology*. See TAJACU.

PECCANT, in *Medicine*, an epithet given to the humours of the body, when they offend either in quantity or quality, i. e. when they are either morbid, or in too great abundance.

Most diseases arise from *peccant* humours, which are either to be corrected by alteratives and specifics, or else to be evacuated.

PECHEM, in the *Materia Medica*, a name given by the modern Greek writers to the root called *behem* by Avicenna and Serapion. Many have been at a loss to know what this root *pechem* was; but the virtues ascribed to it are the same with those of the *behem* of the Arabians; its description the same, and the division of it into white and red, is also the same as that of the *behem*. Nay, the word *pechem* is only formed of *behem*, by changing the *b* into a *p*, which is very common, and the aspirate into *χ*, or *ch*, which is as common. Myrepsus, who treats of this root, says the same thing, that the Arabian Avicenna says of *behem*, namely, that it was the fragments of a woody root, much corrugated and wrinkled on the surface, which was owing to its being to moist whilst fresh, that it always shrunk greatly in the drying.

PECHYAGRA, a name given by authors to the gout affecting the elbow.

PECHYS, a name used by some anatomical writers for the elbow.

PECHYTYRBE, an epithet used by some medical writers for the scurvy.

PECK, a measure, or vessel used in measuring grain, pulse, and the like dry substances.

The standard, or Winchester *peck*, contains two gallons; each gallon of corn weighing about eight pound troy.

Four *pecks* make a bushel; four bushels a comb, or carnock.

Besides the general, or Winchester *pecks*, there are local *pecks*, containing some more, some less; as the Lancaster *peck*, containing six gallons, &c.

PECORA, in the Linnæan system of *Zoology*, a classical term, comprehending a whole order of quadrupeds. The characters of this order are, that the creatures have *dentes incisores*, or *cutting teeth*, in their under-jaw, but none in the upper: they have no *canini*, or *dog-teeth*, and have five molares each way. The paps of this order of animals are situated in the groin, and their feet have hoofs. Of this order Linnæus enumerates six genera; viz. the CAMEL, MOSCHUS, OX, or BOS, the CAPRA or GOAT, the OVIS or SHEEP, and BOS or OX; and thirty-five species.

PECQUET's *duct*, in *Anatomy*, the THORACIC *duct*; thus called from its discoverer *Pecquet*.

PECTE, in *Botany*, a name given by some of the old Greek writers to the *great comfry*, called also *symphytum*, from its agglutinating broken bones.

PECTEN *arboris*, in *Botany*, is the grain of the wood of any tree.

PECTEN, in *Anatomy*, is used by some authors for the PUBES, or lower part of the hypogastrium; usually covered with hair.

PECTEN, in *Natural History*, the name of a genus of shell-fish, the characters of which are these: it is a bivalve shell, shutting close in all parts, of a flatted shape, striated in the manner of a comb, and often auriculated, sometimes only semiauriculated, and in some species not auriculated at all. There are also some few species which are oval, not flat as the others.

This genus of shells has had its name, *pecten*, from the longitudinal strize with which its surface is covered, which resemble the teeth of a comb. According to the general character of this shell, it will be easy to perceive that it is meant to include the cockles as well as the scallops; these being the *pectens* without ears, and with less flat or elated shells. These are called by all authors by a name which is only a diminutive of *pec-*

ten, pollunculus. And though the having ears is the common mark of diſtinction between the *pectens* and the *cockles*, which laſt uſually have none; yet the genera are not diſtinct as ſome have ſuppoſed; for there are ſhells allowed to be *pectens* or ſcallops, which have yet no ears, and others univerſally allowed to be *pollunculi*, or cockles, which have ears. Hence appears the error of Liſter, who made theſe two diſtinct genera, and gave the ears and the equal convexity of both ſhells as the great characters of them: theſe, though good marks to diſtinguiſh the ſpecies by, are by no means unalterable enough to found different genera upon.

The genus of *pectunculus*, or cockles, has been made by all authors a very extenſive one, but the reader will find all the ſuppoſed ſpecies of it very aptly received into the genus of the *cordiformis*, or heart-ſhell, and the *pectens*.

According to this eſtabliſhment of the genus of the *pecten*, the ſpecies are to be enumerated under ſeveral diſtinct heads. Thus, ſome *pectens* are auriculated on both ſides: of theſe we have ſeventeen ſpecies.

Of thoſe *pectens* which are ſemiauriculated, we have ſix ſpecies.

Of thoſe *pectens* which have no ears at all, we have ſeven ſpecies.

This ſhell-fiſh is one of the ſpinners of the ſea, having power of ſpinning or forming threads like the muſcle; but they are much ſhorter and coarſer even than thoſe of that fiſh: ſo that they can never be wrought into any ſort of work, in the manner of the longer and finer threads of the *pinna marina*. The uſe of theſe threads, which the *pecten* or ſcallop ſpins, is to fix the creature to any other body that is near, whether it be a ſtone, a piece of coral, or another ſhell. All theſe threads proceed as in the muſcle, from one common trunk; they make their way out of the ſhell in thoſe *pectens* which have only one ear, a little below that ear; in the others probably they iſſue out on both ſides. It is an evident proof, that the fiſh has a power of fixing itſelf at pleaſure to any ſolid body by means of theſe threads, that after ſtorms the ſcallops are often found toſſed upon rocks, where there were none the day before; and yet theſe are fixed by their threads, as well as thoſe which had remained ever ſo long in their place. They form their threads in the very ſame manner with the muſcle, only their organ which ſerves for ſpinning is ſhorter, and has a wider hollow, whence the threads are neceſſarily thicker and ſhorter. See MUSCLE.

PECTINATION, *combing of the head.* Frequent *pectination* is recommended by many phyſicians to women, and men who wear their hair, as an exerciſe; and, at the ſame time, a kind of friction.

PECTINEUS, or PECTINÆUS, in *Anatomy*, the third of the fifteen muſcles of the thigh; ſo called, becauſe it has its origin in the fore-part of the os pectinis. See *Tab. anat. (Alyol.) fig.* 2. *n.* 35.

Its inſertion is in the thigh, under the left trochanter. The *pectineus*, with the pſoas and iliacus, draw the thigh forwards, and, of conſequence, bend it.

PECTINIS *os*, in *Anatomy*, the ſame with *os* PUBIS.

PECTIS, in *Botany*, a genus of the *ſyngeneſia polygamia ſuperflua* claſs. Its characters are, that the receptacle is naked; the down bearded; the empalement cylindric and compoſed of five leaves; and that it has five floſculous radii. There are four ſpecies.

PECTORAL, ſomething relating to the BREAST, *pectus*. In the Romiſh church, biſhops, and regular abbots, wear a *pectoral* croſs, i. e. a little croſs of gold, hanging from the neck down to the breaſt.

PECTORAL *medicines*, or ſimply PECTORALS, are remedies proper to ſtrengthen and relieve the breaſt: or medicines intended againſt diſeaſes of the breaſt, and lungs. Their ordinary intention is either to attenuate, or to thicken the humours of thoſe parts, which cauſe coughing, &c. and render them fit to be expectorated, or ſpit out.

PECTORAL *wine*. See WINE.

PECTORALE, or PECTORAL, in the *Jewiſh Law*. See RATIONALE.

PECTORALIS *internus*, in *Anatomy*, a name given by Riolan and others to a muſcle of the breaſt, now generally known by the name of the TRIANGULARIS *ſterni*; called by the older writers *ſextus thoracis*. See PECTORALIS *minor*.

PECTORALIS *major*, in *Anatomy*, a large, thick, and fleſhy muſcle, covering the breaſt from the ſtomach, where it is very broad, to the axilla, where it contracts in its paſſage to the arm, and ſerved for moving the arm forwards. It is naturally divided into two portions, one ſuperior and ſmall, and the other inferior and large; the firſt may properly be called the *clavicular portion*, the other the *thoracic*.

The *clavicular portion* is fixed by a fleſhy inſertion in almoſt half the clavicle next the ſternum, ending under the inſertion of the ſterno-maſtoideus; from thence it runs obliquely down towards the axilla, contracting by ſmall degrees, and finally ending in a flat tendon or tendinous band. The *thoracic* portion is broad, and in ſome meaſure radiated. It is fixed by its anterior circumference in the lateral part of the outſide of the ſternum, in the outſide of the cartilages, and in a ſmall part of the bones of all the true ribs, and of the firſt and ſometimes the ſecond falſe rib; all theſe inſertions are like ſo many digitations. The inſertions in the ſternum end by a great number of very ſhort tendons, which run towards the middle of the bone, meeting and decuſſating thoſe from the ſame muſcle on the other ſide.

This muſcle, together with the deltoides, ſends off an aponeurоſis, which, joining that of the biceps, is ſpread over the muſcles of the arm: it partly covers the pectoralis minor, and ſerratus major; and by its broad tendon covers tranſverſely the brachial channel, and the tendon of the biceps lodged there. Laſtly, it forms the anterior border of the hollow of the axilla, as the poſterior is formed by the latiſſimus dorſi. Winſlow.

Naturaliſts obſerve a ſpecial mark of Providence in the ſize and ſtrength of the *pectoral* muſcle in different animals. It is by the action of this muſcle, that the flying of birds is chiefly performed: accordingly it is much larger and ſtronger in birds than in any animals not made for flight.

Borelli obſerves, that in men the *pectoral* muſcles are ſmall; ſcarce the fiftieth or ſeventieth part of all the other muſcles: but in birds they are vaſtly large, equaling, nay exceeding, in bulk and weight, all the other muſcles of the bird together.

PECTORALIS *minor*, a muſcle called alſo TRIANGULARIS. It is ſmall and fleſhy, ſomething of a triangular ſhape, and is ſituated at the ſuperior, lateral, and anterior part of the thorax. By its baſis it is inſerted into the external labium of the upper edge of the ſecond, third, fourth, and fifth true ribs, near their union with the cartilages, by the ſame number of digitations, or ſeparate fleſhy portions, between the intervals of the ribs; and for that reaſon it has been called the *ſerratus minor anticus*. From hence theſe portions run up more or leſs obliquely toward the ſhoulder, and form a fleſhy belly, which contracts as it paſſes before the two firſt ribs; and then becoming a ſhort, flat, and broad tendon, is inſerted in the upper part of the apophyſis coracoides of the ſcapula, reaching all the way to the point of that proceſs. This muſcle is covered by the *pectoralis major*, and adheres very cloſely to the external intercoſtal muſcles. The digitations, commonly taken notice of, cover and hide ſeveral others, by which the number of fibres and thickneſs of this muſcle is increaſed. Its tendon unites a little at the apex of the coracoide apophyſis, with the inſertion of the coraco-brachialis, and with that of one portion of the biceps.

PECTOREL, in our old writers, armour for the breaſt, a breaſt-plate or *petral* for a horſe. It is mentioned ſtat. 14. Car. II. cap. 3.

PECTORIS *os*, the ſame as STERNUM.

PECTORIS *hydrops*. See DROPSY *of the breaſt*.

PECTORIS *oſſa*, in fiſh. The bones of the breaſt and belly are beſt ſought after in the cetaceous and ſpinoſe kinds. In the ſpinoſe kinds they are theſe: the clavicles, the ſternum, the ſcapulæ, or bones to which the *pinnæ pectorales* are affixed at their baſis, the bones at the roots of the *pinnæ ventrales*.

The number, ſituation, and figure of theſe differ greatly in the ſeveral kinds of fiſh, and make very eſſential characters.

PECTORIS *triangularis*. See TRIANGULARIS and PECTORALIS *minor*.

PECUARII, among the Romans, thoſe who farmed the public paſtures, in order to let them again to advantage.

PECULATE, *peculatus*, in the *Civil Law*, the crime of embezzling the public money, by a perſon who has the management, receipt, or cuſtody thereof: ſo called, *quaſi pecuniæ ablatio*.

Civil lawyers uſe *peculate* for any theft of a thing, either ſacred, religious, public, or fiſcal. *Peculate* in the caſe of public money is proſecuted even on the criminal's heir.

The Julian law, among the Romans, puniſhed this crime with death, in a magiſtrate; and with deportation, or baniſhment, in a private perſon. With us it is not a capital crime, but ſubjects the committer of it to a diſcretionary fine and impriſonment.

PECULIAR, in the *Canon Law*, a particular parish, or church, which hath jurisdiction within itself, for probate of wills, &c. exempt from the ordinary of the diocese, and the bishops courts.

There are royal *peculiars*, and archbishops *peculiars*.

The king's chapel is a royal *peculiar*, exempt from all spiritual jurisdiction, and reserved to the visitation and immediate government of the king himself, who is supreme ordinary.

Peculiars of the archbishops are exclusive of the bishops and archdeacons.

It is an ancient privilege of the see of Canterbury, that wheresoever any manors or advowsons do belong to it, they forthwith become exempt from the ordinary, and are reputed *peculiars*. In the province of Canterbury there are more than a hundred such *peculiars*. In these *peculiars* jurisdiction is administered by several commissaries, the chief of whom is the dean of the ARCHES for the thirteen *peculiars* within the city of London.

There are also *peculiars* of bishops, exclusive of the jurisdiction of the bishop of the diocese in which they are situated: of these the bishop of London hath four parishes within the diocese of Lincoln; and every bishop, who hath a house in the diocese of another bishop, may therein exercise episcopal jurisdiction.

There are also *peculiars* of bishops in their own diocese, exclusive of archidiaconal jurisdiction.

The *peculiars* of deans, deans and chapters prebendaries, &c. are places wherein, by ancient compositions, the bishops have parted with their jurisdiction, as ordinaries to those societies. See COURT *of peculiars*.

PECULIARS, *court of*, is a court where the affairs of *peculiars* are transacted. See COURT.

PECULIUM, the flock which a person in the power or property of another, as a slave, minor, or the like, may acquire by his own industry, without any advance or assistance from his father or master; but merely by their permission.

The word is usually derived *a pecunia & pecoribus*; because the whole estate anciently consisted in money and cattle.

PECULIUM is also used, among the Romanists, for what each monk or religious reserves, and possesses to himself.

Some say, that the *peculium* of a religious, when preferred to a cure, does not cease to belong to the monastery; and that the property thereof never absolutely resides in the religious himself.

PECUNIA, *money*. See MONEY.

PECUNIA, in our old law-books, is sometimes used for cattle, and sometimes for other goods, as well as money.

In the emendation of the laws of Edward the Confessor, by William the First, it is ordered, that no *vicus pecuniæ, selling money*, i. e. cattle, be bought or sold, except within cities, and that before three sufficient witnesses.

So in Domesday Book, *pecunia* is frequently used, *pro pecude*; as pasture *ad pecuniam vestitam*.

PECUSIA *ecclesiæ*, was anciently used for the estate of the church.

PECUNIA *sepulchralis* was money formerly paid to the priest at the opening of the grave, for the good and behoof of the deceased's soul; and which our Saxon ancestors called *saul-sceat*, and *animæ symbolum*.

PEDAGE, *pedagium*, *toll*, or a local due exacted on persons, goods, and carriages, passing through certain places.

Pedage is usually levied for the repairing of roads, bridges, and causeways, the paving of streets, &c.—Anciently, those who had the right of *pedage*, were to keep the roads secure, and answer for all robberies committed on the passengers between inn and inn; which is still observed in some parts of England and in Italy, where there were guards, called *stationarii*, established for the security of merchants, particularly at Terracina, on the road between Rome and Naples.

PEDAGOGUE, or PEDAGOGUE, παιδαγωγὸς, formed from παιδὸς ἀγωγὸς, *puerorum ductor, leader of boys*, a tutor or master, to whom is committed the discipline and direction of a scholar, to be instructed in grammar, and other arts.

M. Fleury observes, that the Greeks gave the name *pedagogues* to slaves appointed to tend their children, lead them, and teach them to walk, &c. The Romans also gave the same denomination to the slaves who were entrusted with the care and instruction of their children.

PEDALES. See ARBOR.

PEDALIUM, in *Botany*, a genus of the *didynamia angiospermia* class. Its characters are, that the empalement is divided into five segments; that the flower is a little gaping, and terminated by a limb, which is cut into five segments. The fruit is a four-cornered nut, with two cells, containing two seeds. There is only one species.

PEDALS, the large pipes of an ORGAN, so called, because played and stopped with the foot.

The *pedals* are the largest pipes in the machine; they are made square, and of wood; they are usually thirteen in number. They are of modern invention, and serve to carry the sounds an octave deeper than the rest.

PEDANEUS, in the *Civil Law*, a petty judge, who has no formal seat of justice, but hears causes standing, and without any tribunal.

The word seems formed from *planx in pedibus*: and is used among the ancients by way of opposition to those magistrates, who were seated in the curule chair, *in sella curuli*, or had a tribunal or bench raised on high.

The Roman *pedanei*, therefore, were such as had no tribunal, not pretorium; but rendered justice *de plano*, or *plano pede*.

From the eighty-second Novel, it appears, that the emperor Zeno established these *pedanei*, in the see of every province; and that Justinian erected seven of them at Constantinople, in manner of an office; granting them power to judge in any sum as high as three hundred crowns.

PEDANT, a schoolmaster, or pedagogue, who professes to instruct and govern youth, and teach them the humanities and the arts.

PEDANT is also used for a rough unpolished man of letters, who makes an impertinent use of the sciences, and abounds in unseasonable criticisms and observations.

Dacier defines a *pedant*, a person who has more reading than good sense.

Pedants are people ever armed with quibbles and syllogisms; they breathe nothing but disputation and chicanery, and pursue a proposition to the last limits of logic.

Malebranche describes a *pedant* as a man full of false erudition, who makes a parade of his knowledge, and is ever quoting some Greek or Latin author, or hunting back to a remote etymology.

St. Evremont says, that to paint the folly of a *pedant*, we must represent him as turning all conversation to some one science or subject which he is best acquainted with.

There are *pedants* of all conditions, and of all roles. Wicquefort says, an ambassador, always attentive to formalities and decorums, is nothing else but a political *pedant*.

PEDANTRY, or PEDANTISM, the quality or manner of a PEDANT.

To swell up little and low things, to make a vain shew of science, to heap up Greek and Latin without judgment, to tear those to pieces who differ from us about a passage in Suetonius, or the etymology of a word, to stir up all the world against a man for not admiring Cicero enough, to be interested for the reputation of an ancient as if he were our next of kin, form what we properly call *pedantry*.

PEDARIAN, in *Antiquity*, those senators who signified their votes by their feet, not their tongues; that is, such as walked over to the side of those whose opinion they approved of, in divisions of the senate.

The origin of the word Dr. Middleton thinks owing to this, that though the magistrates of Rome had a right to a place, and vote in the senate, as well during their office as after it, and before they were put upon the roll by the censors, yet they had not probably a right to speak or debate there on any question, at least in the earlier times of the republic. For this seems to have been the original distinction between them and the ancient senators, as it is plainly intimated in the formula of the consular edict, sent abroad to summon the senate, which was addressed to all senators, and those who had a right to vote in the senate. From which distinction, these last, who had only a right to vote, were called, by way of ridicule, *pedarii*; because they signified their votes by their feet, not their tongues, and, upon every division of the senate, went over to the side of those whose opinion they approved. It was in allusion to this old custom, which seems, however, to have been wholly dropt in the later ages of the republic, that the mute part of the senate continued still to be called by the name of *pedarians*, as we learn from Cicero, who in giving an account to Atticus, of a certain debate and decree of the senate upon it, says, that it was made with the eager and general concurrence of the *pedarians*, though against the authority of all the consulars. Vide Festus in Voc. Senatores, A. Gell. lib. iii. 18. Fest. in

Pedarius.

Pedarius. Cicero ad Attic. 1. 19. Middlet. of Rom. Sen. p. 86. feq.

PEDATURA, in *Roman Antiquity*, was uſed for a ſpace or proportion of a certain number of feet ſet out.

The word occurs frequently in writers about military affairs: thus in Hyginus de Caſtrametatione we meet with *meminerimus itaque ad computationem cohortis equitatæ militariæ* pedaturam *ad milliteremens ſexaginta duri debere*; which is to be thus explained: the *pedatura*, or ſpace allowed for a COHORS *equitata* or provincial cohort, conſiſting of both horſe and foot, could not be the ſame as the *pedatura* of an uniform body of infantry, of the ſame number, but muſt exceed it by 360 feet: for the proportion of the room of one horſeman to one foot ſoldier he aſſigns as two and a half to one. Vide Phil. Tranſ. N° 482 ſect. 3.

PEDESTAL, formed from *pes*, *pedis*, *foot*, and τυπος, *column*, in *Architecture*, the loweſt part of an order of columns; being that which ſuſtains the column, and ſerves it as a foot to ſtand on. See *Tab. Architecture*, *fig.* 40. T.

The *pedeſtal*, called by the Greeks *ſtylobates*, and *ſtereobates*, conſiſts of three principal parts; viz. a ſquare trunk, or dye, which makes the body; a cornice, the head; and a baſe, the foot of the *pedeſtal*.

The *pedeſtal* is properly an appendage to a column; not an eſſential part thereof; though M. le Clere thinks it is eſſential to a complete order.

The proportions and ornaments of the *pedeſtal* are different in the different orders: Vignola, indeed, and moſt of the moderns, make the *pedeſtal*, and its ornaments, in all the orders, one third of the height of the column, including the baſe and capital: but ſome deviate from this rule.

M. Perrault makes the proportions of the three conſtituent parts of *pedeſtals*, the ſame in all the orders; viz. the baſe one fourth of the *pedeſtal*; the cornice an eighth part; and the ſocle, or plinth, of the baſe, two thirds of the baſe itſelf. The height of the dye is, what remains of the whole height of the *pedeſtal*.

PEDESTAL, *Tuſcan*, is the ſimpleſt and the loweſt of all. Palladio and Scamozzi make it three modules high; Vignola five. Its members, in Vignola, are only a plinth, for a baſe; the dye; and a talon crowned, for a cornice. This has rarely any baſe.

PEDESTAL, *Doric*, Palladio makes four modules, five minutes high; and Vignola five modules, four minutes. In the antique, we not only do not meet with any *pedeſtals*; but even not with any baſe, in the Doric order. The members in Vignola's Doric *pedeſtal* are the ſame with thoſe in the Tuſcan, with the addition of a mouchette in its cornice.

PEDESTAL, *Ionic*, in Vignola and Serlio, is ſix modules high; in Scamozzi five; in the temple of Fortuna Virilis it is ſeven modules, twelve minutes. Its members and ornaments are moſtly the ſame with thoſe of the Doric, only a little richer. The *pedeſtal* now uſually followed is that of Vitruvius, though we do not find it in any work of the antique. Some, in lieu hereof, uſe the Attic baſe, in imitation of the ancient.

PEDESTAL, *Corinthian*, is the richeſt and moſt delicate of all. In Vignola it is ſeven modules high; in Palladio, five modules one minute; in Serlio, ſix modules fifteen minutes; in the Coliſeum, four modules two minutes.

Its members, in Vignola, are as follow; in the baſe are a plinth, for a ſocle; over that a tore carved; then a regle; a gula inverted and enriched, and an aſtragal. In the dye are a regle, with a conge over it; and near the cornice a regle, with a conge underneath. In the cornice is an aſtragal, a frize, fillet, aſtragal, gorge, and a talon. See each under its proper article.

PEDESTAL, *Compoſite*, in Vignola, is of the ſame height with the Corinthian, viz. ſeven modules; in Scamozzi, ſix modules two minutes; in Palladio, ſix modules ſeven minutes; in the Goldſmith's arch ſeven modules eight minutes.

Its members, in Vignola, are the ſame with thoſe of the Corinthian; with this difference, that, whereas thoſe are moſt of them enriched with carvings in the Corinthian, they are all plain in the Compoſite. Nor muſt it be omitted, that there is a difference in the profiles of the baſe and cornice, in the two orders.

The generality of architects, Daviler obſerves, uſe tables or panels, either in relievo, or creux, in the dyes of *pedeſtals*, without any regard to the character of the order. Thoſe in relievo, he obſerves, only fit the Tuſcan and Doric; the three others muſt be indented: but this, he adds, is a thing the ancients never practiſed, as being contrary to the rules of ſolidity and ſtrength.

PEDESTAL, *ſquare*, is that whoſe height and width are equal; as that of the arch of the lions at Verona, of the Corinthian order; and ſuch ſome followers of Vitruvius, as Serlio, Philander, &c. have given to their Tuſcan orders.

PEDESTAL, *double*, is that which ſupports two columns, and is larger in width than height.

PEDESTAL, *continued*, is that which ſupports a row of columns without any break or interruption; ſuch is that which ſuſtains the fluted Ionic columns of the palace of the Tuilleries on the ſide of the garden.

PEDESTALS *of ſtatues* are thoſe ſerving to ſupport figures or ſtatues.

Vignola obſerves, there is no part of architecture more arbitrary, and wherein more liberty may be taken, than in the *pedeſtals* of ſtatues; there being no laws preſcribed for them by antiquity; nor any even ſettled by the moderns.

There is no ſettled proportion for theſe *pedeſtals*; but the height depends on the ſituation, and the figure they ſuſtain. Yet, when on the ground, the *pedeſtal* is uſually two thirds, or two fifths, of that of the ſtatue; but always the more maſſive the ſtatue, the ſtronger muſt be the *pedeſtal*.

Their form, character, &c. are to be extraordinary and ingenious, far from the regularity and ſimplicity of the *pedeſtals* of columns. The ſame author gives us a great variety of forms, oval, triangular, multangular, &c.

PEDESTRIAN *ſtatue*. See STATUE.

PEDETICHE, in *Natural Hiſtory*, a name given by ſome of the Greek writers to the CHAMOIS goat, the creature whoſe ſkin affords us the chamois or SHAMMY leather.

PEDIÆAN, πεδιαῖος, in *Antiquity*. The city of Athens was anciently divided into three different quarters; one on the deſcent of an hill; another on the ſea-ſhore; and a third in a plain between the other two.

The inhabitants of the middle region were called Πεδιεῖς, *Pediæans*, formed from πεδίον, *plain*, or *flat*: or, according to Ariſtotle, *Pedienſi*: thoſe of the hill, Diacrians; and thoſe of the ſhore, Paralians.

Theſe quarters uſually compoſed ſo many different factions. Piſiſtratus made uſe of the *Pediæans* againſt the Diacrians.

In the time of Solon, when a form of government was to be choſen, the Diacrians would have it democratic; the *Pediæans* demanded an ariſtocracy; and the Paralians a mixed government.

PEDIÆUS, in *Anatomy*, is the ſecond of the extenſor muſcles of the foot, *pes*; whence its name.

It has its origin in the lower part of the perone, and annular ligament; and is divided into four tendons, which are inſerted into the external part of the firſt articulation of the four toes. Its uſe is to extend the foot, together with the firſt of the extenſors, called *extenſor communis*.

PEDICLE, *pedicellus*, a diminutive of *pes*, *foot*, in *Botany*, *foot-ſtalk*; that little ſtalk whereby the leaf, fruit, or flower, is ſuſtained, and connected to its branch or ſtem. Flowers will keep freſh a long time after gathering, by immerging their *pedicles* in water. The great ſecret of preſerving fruits for the winter is to ſeal up their *pedicles* with wax. Cherries with the ſhorteſt *pedicle* are eſteemed the beſt. The PISTIL of the flower ſometimes becomes the *pedicle* of the fruit.

PEDICULARIS, in *Botany*. See LOUSEWORT.

PEDICULARIS *morbus*, from *pediculus*, *louſe*, in *Medicine*, the ſoulſy diſtemper, a diſeaſe ariſing from ſome uncommon corruption in the body, which generates infinite quantities of lice on the ſkin.

Herod is ſaid to have died of the *pedicular* diſeaſe. See PHTHIRIASIS and LOUSE.

PEDICULUS, in *Zoology*. See LOUSE.

PEDIGREE, a DESCENT, or GENEALOGY.

PEDILUVIUM. *See Bathing of the* FEET, art. FOOT.

PEDIMENT, in *Architecture*, a kind of low pinnacle; ſerving to crown porticos, or finiſh a frontiſpiece; and placed as an ornament over gates, doors, windows, niches, altars, &c. See *Tab. Architect. fig.* 24.

The pinnacles of the ancient houſes, Vitruvius obſerves, gave architects the firſt idea of this noble part; which ſtill retains the appearance of its original.

The parts of the *pediment* are, the tympanum and its cornice. The firſt is the pannel naked, or area of the *pediment*, repreſented by A, in *Tab. Architect. fig.* 40. incloſed between the cornice, which crowns it, and the entablature, which ſerves it as a baſe, or ſocle.

Architects have taken a great deal of liberty in the form of this member; nor do they vary leſs as to the proportion of the *pediment*. The moſt beautiful, according to Daviler, is that where its height is about one-fifth of the length of its baſe.

It is deſcribed thus: divide the line *ab* (*Tab. Archit. fig.* 40.) which is the length of the baſe, into two equal parts,

parts, in the point *c*, by means of the perpendicular *fd*; in this perpendicular take the part *e d* equal to *o c*; and from the point *d*, as a centre, describe the arch *a e b*. The point of the perpendicular, cut in *e*, will be the top of the pediment *a e b*; and the cornice, and the triangular space included therein, the tympanum.

The *pediment* is usually triangular, and sometimes an equilateral triangle; this is also called a *pointed pediment*. Sometimes it is circular; though Felibien observes, that we have no instance of round *pediments* in the antique, beside those in the chapels of the Rotundo. Sometimes its upper cornice is divided into three or four sides, or right lines; sometimes the cornice is cut, or open a-top, which is an abuse introduced by the moderns, particularly by Michael Angelo. For the design of this part, at least over doors, windows, &c. being chiefly to shelter those underneath from the rain, to leave it open in the middle is to frustrate its end.

Sometimes the *pediment* is formed of a couple of scrolls, or wreaths, like two consoles joined together. See CONSOLE.

Sometimes, again, the *pediment* is without base, or its lower cornice is cut out, all but what is bestowed on two columns, or pilasters, and on these an arch, or sweep, raised, in lieu of an entablature: of which Serlio gives an instance in the antique, in a Corinthian gate at Foligny, in Umbria; and Daviler a more modern one, in the church of St. Peter, at Rome.

Under this kind of *pediments* do also come those little arched cornices which form *pediments* over doors and windows, supported by two consoles, in lieu either of entablature or columns.

Sometimes the *pediment* is made double, i. e. a less *pediment* is made in the tympanum of a larger, on account of some projecture in the middle; as in the frontispiece of the church of the Great Jesus at Rome: but this repetition is an abuse in architecture, though authorized by some very good buildings; as the large pavilion of the Louvre, where the caryatides support three *pediments*, one in another.

Sometimes the tympanum of the *pediment* is cut out, or left open, to let in light; as we see under the portico of the Capitol at Rome. Lastly, this open *pediment* is sometimes triangular, and enriched with sculpture, as roses, leaves, &c. as we find in most of the Gothic churches.

M. le Clerc observes, that the modillions in the cornice of the *pediment* should always answer exactly over those of the entablature. Indeed Vitruvius says, the ancients did not allow any modillions at all in *pediments*.

The same M. le Clerc observes, that the cornice which serves the *pediment* as a base should have no cymatium; by reason the cymatium of the rest of the entablature, when it meets the *pediment*, passes over it.

This change of determination occasions a considerable difficulty; the cymatium, in this case, appearing too broad in the turn of the angle: to remedy which, the architects have recourse to several expedients.

A *pointed pediment* may crown three arches; but a *circular pediment* can only crown one agreeably.

One would never use above two *pediments* over each other in the same frontispiece; and even where there are two, it would be proper to have the lower circular, and the upper pointed.

PEDIS *abscisio, cutting off a foot*, a punishment anciently inflicted among us: as appears by the laws of William the Conqueror. *Interdicimus ne quis occidatur, vel suspendatur, pro aliqua culpa, sed erruantur oculi*, abscindantur pedes, *vel testiculi, vel manus*, &c. Leg. Will. cap. 1.

So Ingulphus, *sub pœna perditionis dextri sui pedis*, &c.

PEDIS *minimi digiti abductor*. See ABDUCTOR.

PEDIS, *adductor pollicis*. See ADDUCTOR.

PEDIS, *dorsum*. See DORSUM.

PEDIS, *flexor pollicis*. FLEXOR.

PEDIS *interossei, perforans, perforatus*, and *transversalis*. See the respective articles.

Transcriptio PEDIS *finis*. See TRANSCRIPTIO.

PEDITUM *arraiatio*. See ARRAIATIO.

PEDLAR. See HAWKER.

PEDO, in *Natural History*, a name given by some writers to the *tipula*, or father-long-legs; called also by others *tryno*, or the crane-fly.

PEDOMETER, or PODOMETER, formed from πους, *pes, foot*, and μετρον, *metrum*, way-wiser; a mechanical instrument, in form of a watch; consisting of various wheels, with teeth, catching in one another, all disposed in the same plane; which, by means of a chain, or string, fastened to a man's foot, or to the wheel of a chariot, advance a notch each step, or each revolution of the wheel; so that the number being marked on the edge of each wheel, one may number the paces, or measure exactly the distance from one place to another.

PEDOMETER is sometimes also used for the common surveying wheel, an instrument chiefly used in measuring roads; popularly called the *soy-wiser*. See PERAMBULATOR.

PEDRERO, PETERERO, or PATERERO, a small piece of ORDNANCE, used on board ships, for the discharging of nails, broken iron, or partridge shot, on an enemy attempting to board.

They are generally open at the breech, and their chamber made to take out to be loaded that way, instead of at the muzzle.

PEDRO *de porco*. See *Hog* BEZOAR.

PEDUNCLE, among *Botanists*, expresses that little stalk which grows from the trunk or branches of a plant, and supports the parts of fructification, the flower and the fruit, or either: when this is produced from the stalk, it is called *calliculus*; when from the side of the leaves, *alaris*; when it terminates the plant or its branches, *terminalis*.

PEDUNCULARIA, in *Botany*, a name by which some authors have called the *staphisagria*, or stavesacre: a plant whose seeds are used to kill vermin.

PEDUNCULI *cerebelli*, in *Anatomy*, two medullary processes of the CEREBELLUM, whereby that part is joined to the medulla oblongata.

Willis, who first gave them the name, observed in them three distinct processes on either side; the two first whereof go to the testes; the second directly from the cerebellum to the medulla oblongata, decussating the former, and fastening the processus annularis; the third, springing from the hinder process of the cerebellum, is inserted into the medulla oblongata, looking like an additional chord to it.

PEE, in *Mining*, is used for the place where two veins meet and cross one another, thus +.

PEEK, in the *Sea-Language*, a term used in various senses; e. g. an anchor is said to be *a-peek*, when the ship, being about to weigh, comes over her anchor, so that the cable hangs perpendicularly between the hause and the anchor; the bringing of a ship into which position they call *hoaving a-peek*.

A ship is said to ride *a-peek*, when, lying with her main and fore yards hoised up, one end of her yards is brought down to the shrouds, and the other raised up on end; which is chiefly done when she lies at rest in rivers, lest other ships, falling foul of her, should break her yards.

PEEK, *to ride a broad*, denotes much the same, excepting that the yards here are only raised to half the height.

To PEEK *the mizzen* is to put the mizzen-yard perpendicular by the mast.

PEEK is a name given to the upper corner of all those sails which are extended by a gaff or by a yard which crosses the mast obliquely, as the mizzen-yard of a ship, the main-yard of a bilander, &c. The upper extremity of those yards and gaffs is also called the *peek* or peak.

PEEK is also used for the room in the hold, from the bitts forward to the stem: in this place men of war keep their powder, and merchantmen their victuals.

PEEK-*halliards* are the ropes or tackles by which the outer end of the gaff is hoisted, as opposed to the throat-halliards, which are applied to the inner end.

PEER, *par*, primarily denotes an equal, or one of the same rank and condition. Hence, in some councils, or assemblies, we find, "With the consent of our peers, bishops, abbots, &c."

PEER, afterwards, was applied to the vassals, or tenants, of the same lord, who were obliged to serve and attend him in his courts.

They were called *peers, pares*, because equal in *function*; and *peers in fiefs*, or *fees*, because holding fees of the lord; or because their business in court was to sit and judge, under their lord, of disputes arising concerning fees.

The number of *peers* required to sit in a court was at least four; and when there happened to be too many *peers* in the same jurisdiction, the lord usually chose out twelve, who had the titles of *peers*, by way of distinction and eminence.

There are also instances of women who have assisted at judgments, on account of their tenements, not of their being wives of *peers*. The origin of these *peers* of fees is as ancient as that of the fees they were appointed to judge of: from these we derive our common juries, and our *peers* of the realm.

PEER *of the realm*, denotes a noble lord, or person who has a seat and vote in the upper house of parliament; which is hence called the *house of peers*. See NOBILITY.

The right of peerage seems to have been originally territorial; that is, annexed to lands, honours, castles, manors, and the like; the proprietors and possessors of which were

were (in right of those estates) allowed to be *peers* of the realm, and were summoned to parliament to do suit and service to the king: and when the land was alienated, the dignity passed with it as appendant.

Thus the BISHOPS sit in the house of lords, in right of succession to certain ancient baronies annexed, or supposed to be annexed, to their episcopal lands: and though they are lords of parliament, they are not properly of the degree of nobility, their blood is not ennobled, nor their peerage hereditary: and, therefore, they are tried not by *peers*, but by a common jury: and when one of the nobility is tried by his *peers* in parliament, the spiritual lords must withdraw, and make their proxies.

But afterwards, when alienations became frequent, the dignity of peerage was confined to the lineage of the PARTY ennobled, and instead of territorial became personal.

Peers are now created by writ or patent. The creation by writ, or the king's letter, is a summons to attend the house of *peers*, by the style or title of that barony which the king is pleased to confer; that by patent is a royal grant to a subject of any dignity or degree of peerage. The creation by writ is the more ancient, but a man is not ennobled thereby, unless he takes his seat in the house of lords; and, therefore, the most usual, because the surest way, is to grant the dignity by patent, which entures to a man and his heirs, according to the limitations thereof, though he never makes use of it. Creation by writ, however, has one advantage over that by patent; for a person created by writ holds the dignity to him and his heirs, without any words to that purport in the writ; but in letters patent there must be words to direct the inheritance; or else the dignity endures only to the grantee for life.

A *peer* cannot lose his nobility but by death or attainder; and though some have said, that if a baron wastes his estate, so that he is not able to support the degree, the king may degrade him; yet it is expressly held by later authorities, that a *peer* cannot be degraded but by act of parliament.

Peers of the realm are by their birth hereditary counsellors of the crown, and may be called together by the king, to impart their advice, in all matters of importance to the realm, either in time of parliament, or when there is no parliament in being: and it is usually considered as the right of each particular *peer* of the realm to demand an audience of the king, and to lay before him, with decency and respect, such matters as he shall judge of importance to the public weal. The claims of peerage may be hereafter easily settled, since by a standing order of the house of lords, May, 1767, the heralds are directed to take exact accounts, and preserve regular entries of all *peers* and peeresses of England, and their respective descendants: and it is required, that an exact pedigree of each *peer*, and his family, shall, on the day of his first admission, be delivered to the house, by Garter, the principal king at arms.

As to the privileges of *peers*, see NOBILITY and PARLIAMENT.

The house of lords have a right to take cognizance originally of all public accounts, and to enquire into any misapplication, or default, in the distribution of public monies; or of any other mismanagement whatsoever.

Towards the latter end of the reign of king Charles the First, the house of lords asserted their jurisdiction of hearing appeals from the chancery, which they do upon a paper petition, without any writ directed from the king; and for this their foundation is, that they are the great court of the king and that therefore the chancery is derived out of it, and by consequence that a petition will bring the cause and record before them. This was much controverted by the commons, in the reign of Charles the Second, but is now pretty well submitted to, because it has been thought too much, that the chancellor should bind the property of the whole kingdom without appeal.

PEERS, *pares, of France*, are the twelve grand lords of that kingdom. The institution of these *peers* is very uncertain; some refer it to Hugh Capet, at the time when the dukes and counts changed the offices they then held of the king into perpetual fiefs: but this is impossible; Champagne, one of the titles, not being then erected into a county. Indeed, Paſquier observes, that it is an old tradition, that there have been twelve *peers* in all ages. Of these *peers*, six are dukes, and six counts, *comites*; of these, again, six are ecclesiastics, and six laymen.

The archbishops of Rheims, and the bishops of Laon, and Langres, are dukes and *peers*; and the bishops of Noyons, Chalon on the Marn, and Beauvais, are counts and *peers*.

The dukes of Burgundy, Normandy, and Aquitaine, are lay *peers* and dukes; and the counts of Flanders, Champagne, and Thoulouse, lay *peers* and counts.

These lay *peers* still assist at the coronation of the kings in ceremony, and by way of representatives, where each performs the functions attached to his respective dignity: though their peerships be, in reality, all, except that of Flanders, reunited to the crown. Six lords of the first quality are chosen to represent them. The ecclesiastic *peers* usually assist in person. At present the title *peer*, in France, is bestowed, as in England, on every lord, or person, whose fee is erected into a lordship, or peership.

The word *peer*, according to Paſquier, is derived from *patricius*, the first dignity in the eastern empire; on the model whereof he supposes these *peers* to have been instituted. But others, with more probability, derive the title from the *pares curiæ*, or *peers of fees*, because of their being equal to each other.

These *pares curiæ*, on whose model they suppose the *peers* of realms to have been erected, were a kind of vassals, depending all on the same lord, whom they were obliged to attend and assist in court.

All feudal matters, or disputes, among vassals, relating to their fees or dependencies, were terminated by the superior lord of the two contending parties, and by their *peers* in fee.

If the process were between the lord and the vassal, the lord took no cognizance of it, and the *peers* alone judged it.

Hence all lords or nobles, being *pares nobilitatis*, i. e. all equally intitled to the privileges of nobility, are denominated *pares regni*, *peers of the realm*.

Some authors attribute the first institution of *peers* of the realm to Charlemagne, but with little probability; since most of the fiefs, which bear the names of duchies, &c. or give titles to the *peers*, were not erected into duchies, &c. till long after; the dukes, &c. in those days, being no more than simple governors of provinces, without any other title or privileges.

The more probable opinion is, that *peers* were first instituted by Philip the Young, of France, about the year 1176, and that they first acted in capacity of *peers* at the coronation of his son.

PEER, in *Building*. See PIER.

PEERAGE, the dignity of a PEER attached to a duchy, earldom, barony, or the like.

The kings of England and France confer *peerage* at pleasure. King George the First offered his parliament to resign that branch of his prerogative, and to have the number of *peers* limited.

The reason, insisted on, was the inconvenience accruing to the state from an arbitrary and immoderate use thereof; the prince having it hereby in his power to throw what number of his creatures he pleases into the upper house of parliament.

The twelve *peers*, created at once in a late reign, was a main argument in behalf of the *peerage* bill. It is recorded as a saying of king Charles, that if his friends could but secure him a house of commons, he would put his whole troop of guards into the upper-house, but he would have the *peers*.

PEERAGE, *to hold land in*, in the *Ancient Customs*, was a tenure which obliged the person to assist the lord's bailiff in his judgments; as all the ancient vassals, called *peers*, did.

PEERESS. As we have noblemen of several ranks, so we may have noblewomen, and these may be by creation, descent, or marriage; and first, king Hen. VIII. made Anne Bullen, marchioness of Pembroke; king James I. created the lady Compton, wife to sir Thomas Compton, countess of Buckingham, in the life time of her husband, without any addition of honour to him; and also the same king made the lady Finch, vis countess of Maidstone, and afterwards countess of Winchelsea, to her and the heirs of her body: and king George I. made the lady Schulenberg, duchess of Kendal.

A woman noble by creation or descent, marrying one under the degree of nobility, still remaineth noble, but if she be noble by marriage only, she loseth her dignity if she marry afterwards a commoner; though not if the second husband is noble, and inferior in dignity to the first husband; and by the courtesy of England, women noble by marriage always retain their nobility. 1 Inst. 16. 1 Inst. 30. 6 Rep. 53.

A countess or baroness may not be arrested for debt or trespass; for though in respect of their sex, they cannot sit in parliament, they are nevertheless peers of the realm, and shall be tried by their peers, &c.

PEEVIT, in *Ornithology*, a bird of the larus kind, with a black head, and a grey coloured body. See GULL.

PEGANELAEON, a word used by the ancients to express oil, in which the leaves and flowers of rue had been infused and insolated.

PEGANERON, a name given by some old authors to a

plaſter in which rue was a principal ingredient, from *Peganon*, the Greek name of rue.

PEGANON, or PEGANUM, a name uſed by ſome authors for the *ruta ſylveſtris*, or wild rue; called *harmala*, or *harmel*, in the ſhops. See *Wild Aſſyrian* RUE.

PEGASUS, in *Ichthyology*, is a genus of the *amphibia nantes*; the characters of which are, that the mouth is furniſhed with a retractile probocſis, the upper jaw is denticulated, and the ſnout is linear and ſword-ſhaped; the opening of the gills is before the pectoral fins, the body is articulated by bony joints, and the ventral fins are abdominal. There are three ſpecies, inhabitants of the Indian ſeas.

PEGASUS, among the *Poets*, a horſe imagined to have wings, being that whereon Bellerophon was fabled to be mounted when he engaged the Chimera.

The opening of the fountain Hippocrene, on mount Helicon, is aſcribed to a blow of *Pegaſus*'s hoof. It is feigned to have flown away to heaven; where it became a conſtellation. Hence,

PEGASUS, in *Aſtronomy*, the name of a conſtellation of the northern hemiſphere, figured in form of a flying horſe. The ſtars in this conſtellation, in Ptolemy's Catalogue, are twenty, in Tycho's nineteen, in Hevelius's thirty-eight, in the Britannic Catalogue eighty-nine. Their longitudes, latitudes, magnitudes, &c. are as follow:

Names and ſituations of the ſtars.	Sigus.	Bayer's Cha.	Longitud.			Latitude North.			Magnitudes.
			°	′	″	°	′	″	
Preced. } In the triangle over	♈		25	58	39	13	18	39	4
Nos. } Pegaſus's mouth	♈		29	49	57	30	09	30	4-5
			24	43	42	19	38	12	6
			24	36	55	18	46	05	6
			29	49	32	31	28	35	6-7
5.									
			23	57	56	15	21	40	6
			25	21	11	18	21	56	6
Pegaſus's mouth		ε	27	33	32	22	07	16	3
Poller. and ſouth. in the triangle	♓	ζ	0	41	04	20	02	49	4-5
In the heel of the preced. foot		α	4	37	10	30	39	05	4
10.									
			25	39	21	15	06	59	6
			3	34	17	34	05	10	6
			2	04	04	28	28	58	6
			8	25	13	40	15	40	6
			8	19	10	38	46	07	6
15.									
			6	54	27	36	07	07	6
			1	35	20	23	01	46	6
			0	16	21	17	46	20	5
			2	06	39	19	06	36	6
			3	01	42	23	37	20	6
20.									
			2	51	41	21	47	57	5
South of two in the head		ρ	0	58	06	15	42	01	5
			11	39	57	37	40	34	6
In the preced. knee.		η	10	04	09	34	16	48	4
25.			8	31	30	30	51	42	6-7
North in the head		θ	2	28	46	16	21	48	4
			15	04	15	41	03	45	5
In the heel of the hind foot			8	48	51	29	57	44	6-7
Small one againſt the ear		ψ	15	15	13	40	19	52	4-5
			4	46	30	15	01	47	6
30.									
North in the ear, or rather inform			7	37	52	20	51	42	4-5
			15	10	56	35	34	03	6
In the top of the main preced. }			11	55	46	28	35	31	6-7
of three Δ }									
North of the triangle			5	42	45	13	09	56	6
35.			6	08	55	13	21	09	6
Poller. and ſouth. in the ſame			8	11	57	17	18	51	6-7
			6	33	16	12	53	28	6
			19	41	51	38	29	28	6
			13	48	43	17	09	30	6-7
			15	0	29	25	54	02	6
40.									
Prec. of the con. ſtars in the neck		ξ	15	17	33	25	56	59	6-7
South in the hind knee			11	49	16	17	42	03	3
North in the ſame knee			20	35	43	34	25	43	5
			21	24	12	35	07	01	3
			16	29	36	25	05	48	6-7
45.									
Laſt of the contig. in the neck.		ξ	13	37	19	18	27	38	5
Preced. of two in the breaſt		λ	18	43	48	28	48	42	4
Schedir.			20	03	20	29	33	32	2
North of two in the mane			13	57	01	15	43	54	6
South of the ſame			14	14	56	14	30	06	6
50.									
			19	56	37	25	11	47	6
			16	21	5	16	46	18	6
In the riſe of the hind leg Scheat.		β	25	02	13	31	28	06	2

Names and ſituations of the ſtars.	Sigus.	Bayer's Cha.	Longitud.			Latitude North.			Magnitudes.
			°	′	″	°	′	″	
In the ſhould. of the wing Markab		α	19	09	13	19	24	37	2
Preced. of the north in the ſmall }		ι	17	24	16	13	53	52	5
□ of the neck }									
55.									
That under Scheat.			24	28	48	28	28	39	5-6
Preced. of ſouth in □ of neck		π	17	31	19	12	58	10	6
Laſt of north		ε	18	06	35	13	57	58	6
Laſt of ſouth		ρ	18	03	32	12	47	28	6-5
			26	16	4	29	23	48	6
60.									
			27	53	40	30	05	17	6
North of two under the wing in }		ν	26	44	08	25	33	57	6
the body }			♈	0	10	38	31	31	39	6
Preced. of five in the belly			1	21	12	32	39	01	6
			♓	25	50	08	22	44	22	6
65.									
Preced. of two behind Markab.			22	10	23	14	57	25	6
Second and north in the belly			♈	02	15	33	35	1	29	6-7
South of two under the wing		ν	♓	27	38	15	24	47	52	6
			29	01	51	16	09	20	6
That behind Markab.		ε	23	45	06	14	45	25	5-6
70.									
That in the right line with the }		γ	29	04	02	23	10	09	6
60th and 65th }									
Third and middle in the belly			♈	03	35	42	31	01	57	6
			4	56	31	32	53	00	6
			♓	27	25	39	17	32	36	7
Preced. in the middle of the wing		ι	28	12	34	19	00	48	6
75.									
			28	23	55	16	40	02	6
			26	00	19	11	07	40	6
Fourth in the belly			♈	4	16	00	28	18	05	5-6
South of five in the belly			5	45	24	27	16	20	6
			♓	27	24	45	9	24	26	6
80.									
Middl. in the mid. wing		φ	♈	1	49	59	18	13	41	6
			♓	28	22	33	10	45	09	6
North in the mid. wing		ι	♈	3	03	01	20	35	00	6
North in the extreme of the wing		ψ	5	45	50	23	09	16	6
			7	37	33	24	34	42	6
85.									
			2	22	00	11	42	38	5-6
		α	5	09	17	15	36	15	6
Tip of the wing, Algenib		γ	4	49	50	12	35	12	2
South in the extrem. of the wing		♓	♓	7	15	42	17	01	40	6

PEGEMUS, one of the many names by which the chemiſts have called mercury.

PEGMA, among the Romans, a wooden machine, uſed in theatrical entertainments, which was raiſed and let down by ſecret engines, whence it was ſaid to grow. See PEGMATES.

PEGMATES, or rather PEGMARES, in *Antiquity*, a name given to certain gladiators, as well as artificers among the Romans.

The ancients ſometimes exhibited ſhews of a ſort of moving machines, called *pegmata*: theſe were ſcaffolds varioufly adorned, ſomewhat after the manner of thoſe now raiſed for fire-works.

Theſe ſcaffolds, being made to play, and riſe aloft, either threw up into the air the matters wherewith they were charged; and, among the reſt, men, who were thus ſacrificed to afford the people diverſion; or elſe they precipitated them into holes dug in the ground, where they lighted their funeral piles; or finally into the dens of wild beaſts.

Both the miſerable people thus ſacrificed, and the workmen that made and played the machines, were called *pegmates*, or *pegmares*.

According to Caſaubon, fire was ſet to the ſcaffold; and the *pegmates* were to ſave themſelves through the flames, and the wreck of the machine.

Lipſius only ſays, that the *pegmates* were ſuch gladiators as fought on ſcaffolds erected for that purpoſe. They were alſo called *petauriſtæ*, q. d. *fliers in the air*.

PEGOMANTIA, Πηγομαντεια, in *Antiquity*, a ſpecies of divination, which was performed with fountain water. See HYDROMANCY.

PEGORELLA, in *Ichthyography*, a name by which ſome have called a *fiſh* of the truttaceous kind, caught in the Mediterranean, and more uſually called CASTAGNOLA.

PELADA, a kind of ALOPECIA, or diſtempered ſtate of the body, occaſioning the ſhedding of the hair, ariſing from a venereal cauſe.

PELÆAS, Πελειας, in *Ornithology*, the name by which the ancients called that ſpecies of pigeon now known by the name of the LIVIA, and *ſaſſarella*; a grey pigeon, of a very ſmall ſize, and with ſome variegations of purple and green.

PELA-

PELAGIÆ, formed of πελαγος *marine*, or belonging to the sea, in *Natural History*, a term used to express such sea-shells and fishes, as never, or very rarely, are found near the shores; but always reside in the deep, or in those parts of the bottom of the sea which are most remote from land.

PELAGIA, in *Natural History*, a name by which Pliny, and other of the ancient naturalists, have usually called the PURPURA.

PELAGIANS, *Pelagiani*, in *Ecclesiastical History*, the denomination of a sect, well known in the church by the writings of St. Augustine.

The author of this sect, *Pelagius*, properly called *Morgan*, was a monk of Bangor; but the learned are at a loss whether it was of the monastery of Bangor in Wales, or that of the same name and order in Ireland. But he was a contemporary with St. Jerom, and St. Augustine; and quitted his country to go and live in the East, according to the custom of the monks of those days, who were not attached to particular houses like those of our own time.

Cœlestius, as some say a native of Ireland, according to others, of Scotland, and again as others say, of Campania, in Italy, was the colleague of *Pelagius*, in forming this sect. The both lived at Rome in great reputation, and were universally esteemed on account of their extraordinary piety and virtue. About the year 410, they published their doctrine, first in Sicily, and afterwards in Africa. From Africa *Pelagius* passed into Palestine, and Cœlestius remained at Carthage, whence, his errors being condemned in a council, A. D. 412, he went into the East. The former, under the protection of John, bishop of Jerusalem, made a public profession of his opinions, and formed disciples in several places. Soon after the controversy was brought to Rome, and referred by *Pelagius* and Cœlestius to the decision of Zozimus, who was raised to the pontificate A. D. 417; and he pronounced in their favour: however he was prevailed upon by the remonstrance of the Africans to change his mind, and he severely condemned those two persons, whom he had honoured with his approbation, and covered with his protection. They were also condemned by the council of Ephesus, A.D. 431; and, in short, the Gauls, Britons, and Africans, by their councils, and emperors, by their edicts and penal laws, demolished this sect in its infancy.

Pelagius absolutely denied all original sin, which he held to be the mere invention of St. Augustine; and taught that men are entire masters of their actions, and perfectly free creatures; in opposition to all predestination, reprobation, election, &c.

He owned, indeed, that the natural power of man needed to be assisted by the grace of God, to enable him to work out his own salvation; but, by this grace, he only meant outward assistance, viz. the doctrines of the law, and of the gospel.

Though, when pressed by those words of St. Paul, *Deus est enim, qui operatur in nobis*, &c. he owned that it is God, in effect, that makes us will what is good, when he warns and excites us by the greatness of the glory we are to obtain, and by the promises of rewards; when he makes us love him by revealing his wisdom, &c.

These are *Pelagius*'s own words, as cited by St. Augustine; who confutes him, and shews, that, besides these exterior graces, there are required other real and interior ones.

He owned, that the will of man is indeed aided by a real grace; but he added, that this grace is not absolutely necessary in order to live well; but that it only helps us to do well with the more ease.

Julian, one of his adherents, went farther yet; and owned that the assistance of grace was absolutely necessary to enable us to do perfect works.

In effect, the grand doctrine of the *Pelagians* was, that a man might accomplish all the commands of God by the mere power of nature; and that the gifts of grace were only necessary to enable him to act well more easily, and more perfectly.

PELAGIANS, *semi*. See SEMI-PELAGIANS.

PELAMYS, in *Ichthyology*, a name by which the ancients expressed the young brood of the *thynnus*, or tunny fish, at a certain age and size; but later writers have appropriated the word for the name of a distinct species of fish, of the same genus, called by others *sarda*; and by some by the two names joined into one, *pelamys-sarda*.

It is a sea-fish, of the shape of the tunny; but of a smooth skin, and free from scales every where, except about the gill-fins; its teeth are large, long, and crooked. These are the only external marks by which it is to be known from the young brood of the tunny; but when brought to the table, it is easily distinguished by the hardness of its flesh.

PELAMYS *vera*, a name given by Rondeletius, and some other authors, to the fish more distinctly known by the name of AMIA.

PELANI, Πελανοι, among the Athenians, a kind of cakes used in their libations.

PELATÆ, Πελαται, in *Antiquity*, a particular kind of servants among the Athenians.

The *pelatæ* were free-born citizens, who, by reason of their indigence, were forced to serve for wages. They had no suffrage in public affairs, as not being masters of an estate proper to qualify them for giving their votes; but this restriction was not perpetual. They were otherwise called *thetes*, and continued in the condition of servants only during their own pleasure and necessities; for they had power either to change their masters, or (if they became able to subsist themselves) wholly to release themselves from servitude.

PELECAN, in *Ornithology*. See PELICAN.

PELECANUS, a name given by some authors to the *platea*, or spoon-bill; a bird very different from the pelican, being of the stork or heron kind.

PELECINUS, in *Botany*, the name given by Tournefort to the BISERRULA.

PELECOID *angle*. See ANGLE.

PELECOIDES, from πελεκυς, *hatchet*, and ειδος, *form*, in *Geometry*, a figure in form of a hatchet.

Such is the figure BCDA, *Tab.* III. *Geometry, fig.* 67, contained under the two inversed quadrantal arcs A B and A D, and the semicircle B C D.

The area of the *pelecoides* is demonstrated to be equal to the square A C; and that, again, to the rectangle E B. It is equal to the square A C, because it wants of the square on the left hand, the two segments A B and A D, which are equal to the two segments B C and C D, by which it exceeds on the right hand.

PELICAN, in the Linnæan system of *Zoology*, makes a distinct genus of birds of the order of the *anseres*; the characteristic of which is to have a strait beak, with a hooked point, and furnished with a large bag or purse beneath. There are eight species.

The common *pelican*, called *onocrotalus*, is of the size of a goose, or larger, and is of a greyish white all over, except that the neck looks a little yellowish, and the middles of the back feathers are blackish; the bill is remarkably long and hooked at the end, and has under it a lax membrane extended also to the throat, which makes a bag or sack capable of holding a very large quantity; its feet are webbed, as in the duck and goose, all the toes being joined by the membrane. There is one very singular thing in this bird, which is, that its bones are solid, containing no marrow, and are all pellucid.

PELLA, in *Ornithology*, a name by which many have called the common grey HERON.

PELLACK, the name of a young spout-whale, often found in Zetland; where they run into creeks, and so entangle themselves among the rocks, that they are cast on shore, or easily taken. Phil. Trans. N° 473, sect. 8.

PELLAGE, in our *Old Writers*, a custom or duty paid for skins or leather.

PELLETS, in *Heraldry*, a name given those roundlets which are black: called also *agresses* and *gun-stones*.

PELLICAN, or PELECAN, among the *Chemists*, a kind of double vessel, ordinarily of glass; used in working on liquors, by circulation.

It has a tubulated capital, from which two opposite and crooked beaks pass out, and enter again at the belly of the cucurbit. Two matrasses, the mouth of one of which is inserted into the mouth of the other, answer the same purpose with this vessel.

PELLICAN also denotes an instrument used by surgeons, &c. to draw teeth.

PELLICAN, again, is the name of an ancient piece of ordnance, carrying a ball of six pounds; by the French made eight feet and a half, and by the Dutch nine feet long. See CANNON.

PELLICLE, *pellicula*, a diminutive of *pellis*, *skin*, a thin film or fragment of a membrane or skin.

The epidermis, or cuticula, is a little *pellicle*, covering the derma, cutis, or skin. See CUTICULA.

The valves of the veins and arteries are insensible *pellicles*, which open and shut to promote the circulation.

When any chemical solution is evaporated in a gentle heat, till a thin skin or film arises a-top, it is called an evaporation to a *pellicle*: in this case there is but just liquor enough left to keep salts in fusion.

PELLITORY *of Spain*, in *Botany*; for the characters see CHAMOMILE.

This is a perennial plant with a long taper root, like a carrot, and grows naturally in Spain and Portugal, from whence its roots are brought to England. The branches trail upon the ground, and spread a foot or more on every side, having five winged leaves like those of the common chamomile; at the extremity of each branch is

produced

produced one large single flower, like *chamomile*, but much larger; the rays of which are of a pure white within, but purple on their outside; it flowers in June and July, and the seeds are ripe in September; but unless the season is warm and dry, they will not ripen in England.

The dogstil sell us indiscriminately two kinds; the one the root of a corymbiferous plant, called by authors *pyrethrum foliis bipinnatis*, or the daisy-flowered *pellitory* of Spain; the other, the *pyrethrum umbelliferum*, or *umbelliferous pellitory*: and it is a dispute among the learned, which of the two is the genuine and proper kind. The description left us of it by Dioscorides, as it is differently written, serving as well to prove the one so as the other.

They are both used in the toothach, and are prescribed by some in diseases of the head and nerves, and are found to be diuretic and violently sudorific, but they are very seldom given.

PELLITORY, *double*, in *Botany*. See ACHILLEA, and YARROW.

PELLITORY *of the wall*, *parietaria*, in *Botany*, a genus of the *polygamia monoecia* class. Its characters are these: it hath hermaphrodite and female flowers upon the same plant; there are two hermaphrodite flowers contained in a four-leaved involucrum; they have no petals, but four permanent awl-shaped stamina, with an oval germen, supporting a slender coloured style, crowned by a pencil-shaped stigma; the germen afterwards turns to an oval seed, wrapped up in the empalement; the female flowers have no stamina, but in other respects are the same as the hermaphrodite. Linnæus enumerates six, and Miller two species.

The *pellitory* of the shops is a plant of a long time famous in medicine. It is cooling and abstergent; decoctions, and the expressed juice of the leaves are prescribed in strangurics, and in cases of gravel or small stones in the kidneys; and are an ingredient in many of the shop-compositions, intended for those purposes; they are sometimes made an ingredient in decoctions for clysters, to be given in nephritic cases, and externally are much recommended in the erysipelas, and for the softening of hard tumors.

PELLS, *clerk of the* PELLS. See CLERK *of the Pells*.

PELLS, *comptroller of the*. See COMPTROLLER.

PELLUCID, *formed of pellucere*, or *perlucere*, *I shine through*, a term of the same import with diaphanous, or transparent.

Pellucid stands opposed to opake.

PELLUCIDITY, diaphaneity, or TRANSPARENCY, &c.

PELOPIA, πελοπεια, in *Antiquity*, a festival celebrated by the Eleans, in honour of Pelops, for whom that nation had more veneration than for any other hero.

PELORIA, πελωρια, in *Antiquity*, a festival not unlike the Roman Saturnalia, celebrated by the Thessalonians.

PELORIDES, in *Natural History*, a name given by some to a peculiar species of chama. Bellonius, who first used the word, never gives it alone as the name of the shell, but only uses it as an epithet derived from *pelorus*, the name of the place where a particular species of chama was very frequent.

PELT-*wool*, wool stripped off the skin or *pelt* of a dead sheep.

PELTA, πελτη, in *Antiquity*, a kind of buckler, used among the ancients.

The *pelta* was small, light, and more manageable than the parma.

It appears from Virgil, and other authors, that the *pelta* was the buckler used by the Amazons: and Xenophon observes, that the *pelta* of the Amazons was shaped like a leaf of ivy. Pliny, speaking of the Indian fig-tree, says its leaves are of the width of the Amazonian *pelta*. Servius on the Æneid says, the *pelta* resembled the moon in her first quarter.

PELTÆ, in *Botany*, are the fructification of the LICHEN, and are really the petals of the flower; they are flat, and for the most part fallen to the edges of the leaves.

PELTARIA, in *Botany*, a genus of the *tetradynamia siliculosa* class: its characters are, that the fruit is an entire, almost orbicular, compressed pod. There is only one species.

PELTASTES, πελταστης, among the *Ancients*, one who used the buckler called PELTA.

PELTATED-*leaf*, PELTATUM *folium*, among *Botanists*. See LEAF.

PELVIS, in *Anatomy*, the lower part of the cavity of the abdomen; thus called from its resemblance to a bason, or ewer, called in Latin *pelvis*.

The *pelvis* is always much larger in women than in men, to give room for the growth, &c. of the fœtus.

It is well fortified with bones, to screen the contents from external injuries. The ossa ilia, coxendicis, pubis, and the sacrum, comprehend or environ the *pelvis*.

The pelvis is the third and lowest part of the trunk, consisting chiefly of two large pieces, called *ossa innominata*; (see Os), which being united anteriorly by a cartilaginous symphysis, and posteriorly to the two sides of the os sacrum, represent a kind of bason. When considered separately, they are of no determinate figure; being of different breadths in different parts, and unequally convex on the outside, and unequally concave within.

Each bone is but one piece in adults, but in children each consists of three pieces, joined together by a cartilage; which afterwards perfectly ossifies, leaving commonly no vestige of the first division. Anatomists consider it, however, even in adults, as made up of three portions; and distinguish them by different names, as if they were three different bones. Of these three bones the largest is superior and posterior, and is called *os ilium*. The second inferior called *os ischium*; and the third and smallest anterior called *os pubis*. Without entering on the particular description of these, (which, see under their proper heads,) it is to be observed, that these are in the entire bone several common parts, or parts which belong to more portions of it than one, viz. a deep cartilaginous cotyloide cavity, called in Latin *acetabulum*: this is formed by all the three portions: a large opening, called the *foramen ovale*, formed by the *os ischium* and *os pubis*: a large posterior notch or sinus, called the *ischiatic* notch, and formed by the *os ischium* and *os ilium*: an oblique eminence, or protuberance, above the *acetabulum*, toward the *foramen ovale*, made by the *os ilium* and *os pubis*: and to these may be added, a ridge on the inside of the *pelvis*, which divides the wide upper part from the bottom, to which alone the ancients gave the name *pelvis*. Winslow.

PELVIS *of the kidneys* is a large membranous sinus, or cell, in the concave part of the kidneys. See *Tab. Anat. (Splanch.) fig. 4. lit. e dd.* &c.

From the twelve papillæ of the kidneys there arise twelve canals, called *fistulæ membranaceæ*. These, at length, are collected into three large branches, which, being at last united into one, form the *pelvis*; and this again, contracting itself, terminates in a membranaceous pipe, called the *ureter*.

The urine, then separated from the blood by the urinary pipes, conveyed to them by the papillæ, and taken up by the fistulæ membranaceæ, is brought into the *pelvis*; and thence is discharged into the ureter; thence into the bladder, &c. See URINE.

PELUS *armena*, in the *Materia Medica*, a name given by some of the old writers to the drug that we at present call BOLE *armoniac*. This was the original name, and the term *bolus armena* is not to be found, but in the later writers.

PEMPHINGOIDES, an epithet bestowed by Hippocrates on fevers by flatulencies and inflations, in which the patient feels a kind of wind passing along under the skin, and the physician may perceive it in the same places rising against the pressure of his finger, called by some an inflative fever.

PEMPTÆUS, a word used by medical writers, as the name of an ague, the fits of which return always on the fifth day.

PEN, according to Camden, originally signifies a high mountain, which was thus called among the ancient Britons, and even the Gauls. And hence, that tall range which parts Italy and France, is called *Apennine*.

PEN, is also a little instrument, usually formed of a quill, and serving to write withal.

PENS, *Dutch*, are those made of quills which have been passed through hot ashes, to take off the grosser fat and moisture thereof.

PEN, *fountain*. See FOUNTAIN *pen*.

PEN, *sea*, *pennatula*, in *Natural History*, a genus of ZOOPHYTE, which though it swims about freely in the sea, approaches near to the GORGONIA. This genus hath a bone along the middle of the inside, which is its chief support; and this bone receives the supply of its osseous matter by the same POLYPE mouths, that furnish it with nourishment. Linnæus reckons seven species.

PEN *flock*, a sort of sluice or flood gate placed in the water of a mill-pond, or the like, to retain or let it go at pleasure.

PENÆA, in *Botany*, a genus of the *tetrandria monogynia* class: its characters are, that the empalement consists of two leaves; that the flower is bell-shaped; the style is quadrangular; and the fruit is a four-cornered capsule, containing four cells and eight seeds. There are three species.

PENAL *Action*. See ACTION.

PENALTIES *negative*. See NEGATIVE.

PENANCE, *pœnitentia*, is properly the exercise of *penitence*; and may be defined a punishment, either voluntary, or imposed by legal authority, for the faults a person has committed.

The Romanists define *penitence*, a sacrament wherein a

perſon, who has the requiſite diſpoſitions, receives abſolution at the hands of the prieſt, of all ſins committed ſince baptiſm.

To a legitimate *penance* they require three things, contrition, abſtinence, and ſatisfaction.

Their prieſts receive a power of adminiſtering the ſacrament of *penance*, when they receive the prieſthood; but to exerciſe this power, it is required they have the juriſdiction of an ordinary, i. e. that they have a benefice, either original or delegated; with the approbation of the biſhop to hear confeſſions. See POPERY.

PENANCE, is particularly uſed in the Romiſh church, for the penalty which a confeſſor impoſes, for the ſatisfaction of the ſins whereof a perſon is abſolved.

The ancient diſcipline, Du-Pin obſerves, was very ſevere on the head of *penance*: for great crimes people were excluded the communion of the church, expelled the aſſemblies of the faithful, obliged to faſt, and to mortify themſelves publicly, even at the church-door, cut their hair, go always on foot, &c.

He adds, that thoſe who had done public *penance* were never admitted into the clergy; and that public *penance* was never granted more than once. Thoſe, who fell a ſecond time, were never to be reconciled to the church, and were to look for pardon only at the hands of God.

PENANCE, in our *Canon Law*, is an eccleſiaſtical puniſhment, chiefly adjudged to the ſin of fornication.

The puniſhment is thus deſcribed by the canons: the delinquent is to ſtand in the church-porch on ſome Sunday, bare-head and bare-foot, in a white ſheet, with a white wand in his hand; here bewailing himſelf, and begging every one to pray for him; then to enter the church, falling down, and kiſſing the ground; and, at laſt, to be placed on an eminence in the middle of the church, againſt the miniſter, to declare the fouleſs of his crime, odious to God, and ſcandalous to the congregation.

If the crime be not notorious, the canons allow the puniſhment to be commuted at the parties requeſt, for a pecuniary muleſt, for the benefit of the poor, &c.

PENATES, in the *Ancient Mythology*, a term applied to all the domeſtic gods, whom the ancients adored in their houſes: whence they are ordinarily confounded with the LARES.

Authors are not all agreed about the origin of the *dii penates*, who were properly the tutelary gods of the Troians, and were only adopted by the Romans, who gave them the title of *penates*.

De Mezeriac, in his notes on Dido's Epiſtle to Æneas, relates at large what he has met withal in the ancient writers on this ſubject: Dionyſius Halicarnaſſeus tells us, that Æneas firſt lodged theſe gods in the city Lavinium; and that his ſon Aſcanius, afterwards, upon building the city Alba, tranſlated them thither; but that they returned twice miraculouſly to Lavinium. The ſame author adds, that in Rome there is ſtill ſeen a dark temple, ſhaded by the adjacent buildings, wherein are the images of the Trojan gods, with the inſcription Denas, which ſignifies *penates*.

Theſe images repreſent two young men ſitting, each of which holds a lance. I have ſeen, adds Dionyſius, ſeveral other ſtatues of the ſame gods in ancient temples; who all appear like young men dreſſed in habits of war.

Varro fetches theſe *penates* from Samothrace to Phrygia, to be afterwards tranſported by Æneas into Italy. Macrobius, who relates this from Varro, adds alſo, that they were called *penates*, from the Latin words *per quos penitus ſpiramus*, which ſeems a mere ſubtilty. But the real etymology muſt be ſought in the Phrygian, not the Latin tongue.

Cicero, in Aulus Gellius, derives the name hence, *quod penes nos nati ſunt*. Yet in his book de Nat. Deor. he ſays, it is formed from *penus, proviſion*; or, perhaps, adds he, *quod penitus inſident*; others ſay, *quia coluntur in penetralibus*.

Rofinus diſtinguiſhes among the *penates*: he makes an order of *penates* of the heavens, ſuch as Pallas in the ethereal region, Jupiter in the middle region, and Juno in the loweſt; beſides *penates* of cities, *penates* of private families, &c. On which footing the *dii penates* were the guardian or tutelary gods of every thing.

It is a popular queſtion among the learned, who were the *penates* of Rome? Some ſay, Veſta; others, Neptune and Apollo; Vives ſays, Caſtor and Pollux; with whom agrees Voſſius, who adds, that the reaſon of their chooſing Caſtor and Pollux in quality of *penates*, might be the important ſervice they did the Romans in the war againſt the Latins.

Nor are authors more unanimous on the ſubject of the *penates*, which Æneas brought into Italy. Some ſay they were Neptune and Apollo, who built the walls of Troy; others Jupiter, Juno, and Minerva; and others Cœlus and Terra.

Dionyſius Halicarnaſſeus, lib. i. ſpeaking of the *dii penates* tells us, that the hiſtorian Timæus has wrote, that the figure, ſtatue, or effigy of the *penates*, or *penates*, was nothing but a crooked iron, or copper rod, and a Trojan veſſel of potters ware: and that this was all Æneas brought from Troy. But, for himſelf, he aſſures us, he had ſeen a temple at Rome, near the forum, where thoſe gods were repreſented ſitting, under the form of two young men, having each of them a dart in his hand: he adds, that the inſcription was DENATES, for that the ancients, before the invention of the letter P, uſed a D inſtead thereof: but Dionyſius might be miſtaken: for the bottom of the P is frequently ſo very ſmall on medals, that there is no ſenſible difference between a P and a D; which might be the caſe in the inſcription that author mentions; for that the ancient inhabitants of Italy had no P, is a miſtake ſufficiently refuted by many proper names ſtill remaining of the moſt early ages, e. g. Capys, Capetus, Picus, Pallas. Nor were the Trojans without the ſame, witneſs Palinurus, Paris, Priamus, &c.

PENCE, *Peter-Pence*. See PETER-*pence*.

PENCE, *pitching*. See PITCHING-*pence*.

PENCIL, from *penicultus*, *penicillus*, or *penicillum*, which ſignify the ſame, formed by diminution of *penis*, an inſtrument uſed by painters, for the application of their colours.

There are *pencils* of various kinds, and made of various matters: the moſt uſual are of badgers and ſquirrels hair, thoſe of ſwans down, and thoſe of boars briſtles; which laſt are bound to a ſtick bigger, or leſs, according to the uſes they are deſtined for; and when large, are called *brufhes*. The others are inclofed in the barrel of a quill.

The ancients, M. Felibien obſerves, had *pencils* made of little pieces of ſponge; whence, doubtleſs, the ſtory of the painter, who not able to expreſs the foam of a horſe, ſucceeded by throwing the ſponge at the picture.

PENCIL, *black lead*. See *Black* LEAD.

PENCIL *caſe*. See PORT-*crayon*.

PENCIL, in *Electricity*. See BRUSH, and *Experiments, &c. in* ELECTRICITY, *Exp.* 10.

PENCIL *of rays*, in *Optics*, is a double cone, or pyramid of rays, joined together at the baſe; one of which hath its vertex in ſome point of the object, and has the cryſtalline humour, or the glaſs GLS (*Tab.* V. *Optics*, *fig.* 88.) for its baſe; and the other has its baſe on the ſame glaſs, or cryſtalline, but its vertex in the point of convergence; as at C.

Thus BGSC is a *pencil* of rays; and the line BLC is called the AXIS *of that pencil*.

PENDANT, *ear-ring*, an ornament, of gold or ſome precious ſtone, worn by the ladies; hung by a hole made for that purpoſe through the ear; and frequently enriched with diamonds, pearls, and other precious ſtones.

The *pendants* of the European ladies are nothing in compariſon of thoſe worn by the Eaſt Indians, both men and women; among whom it is the faſhion to lengthen out the ears, and to enlarge the hole, by putting in *pendants* of the ſize of faucers, ſet with ſtones.

In the Weſt Indies, Columbus named a certain coaſt Oreja, becauſe he found people with holes in their ears big enough to paſs an egg through.

They make holes too in their lips and noſtrils, and hang *pendants* at them: which is alſo practiſed by the Mexicans, and other nations.

PENDANT, in *Heraldry*, a term applied to the parts hanging down from the label, to the number of three, four, five, or ſix at moſt. Theſe muſt be ſpecified in blazoning, when there are more than three. They reſemble the drops at the bottom of the triglyphs in the Doric frieze.

PENDANT *barometer*. See BAROMETER.

PENDANT *feathers*, in *Falconry*, are thoſe feathers which grow behind the thighs of a hawk.

PENDANT *gardens*, in *Antiquity*. See PENSILES *Horti*.

PENDANTS, among *Florifts*, a kind of globules growing on ſtamina, or chives. Such are thoſe in the middle of tulips, lilies, &c. See APICES, and STAMINA.

PENDANTS *of a ſhip*, are thoſe long colours, or ſtreamers, cut pointing towards the end, and there divided into two parts; hung out at the head of maſts or at the yard-arm ends.

The *pendants* are chiefly uſed for ſhew, though ſometimes for diſtinction of ſquadrons, and for ſignals. See *Tab. of Flags and Ship*, *fig.* I. *n.* 80.

PENDANT, or PENNANT, is alſo uſed for a ſhort rope, which at one end is faſtened to the head of the maſt, or to the yard, or the clue of the ſail; and at the other end, hath a block and thiver, to reeve ſome running rope into.

The *pendant* of the tackles is made faſt to the head of the maſt; and the *pendants* of the back-ſtays are faſtened to, and hang down on, the inſide of the ſhrouds. All the yard-arms, except the miſen, have of theſe *pendants*, into which the braces are reeved.

PENDENTIVE, in *Architecture*, the whole body of a vault, ſuſpended out of the perpendicular of the walls, and bearing againſt the arc boutants.

Daviler defines it, a portion of a vault between the arches of a dome, uſually enriched with ſculpture: Felibien the plane of the vault contained between the double arches, the forming arches, and the ogives.

The *pendentives* are uſually of brick, or ſoft ſtone; but care muſt be taken, that the joints of the maſonry be always laid level, and in right lines proceeding from the ſweep whence the riſe is taken.

The joints too muſt be made as ſmall as poſſible, to ſave the neceſſity of filling them up with ſlips of wood, or of uſing much mortar.

PENDULOUS, *hanging down*; a name which botaniſts give to thoſe heads of flowers which hang downwards; the ſtalk not being able to ſuſtain them upright.

PENDULOUS ROOTS, among *Botaniſts*, ſuch as are fixed to the ends of fibres, whence they ſeem to hang.

PENDULUM, in *Mechanics*, any heavy body, ſo ſuſpended as that it may ſwing backwards and forwards, about ſome fixed point, by the force of gravity.

Theſe alternate aſcents and deſcents of the *pendulum*, are called its vibrations, or its OSCILLATIONS.

The point round which the *pendulum* vibrates is called its *CENTER of motion*, or *point of ſuſpenſion*; and a ſtraight line drawn through the center of motion, parallel to the horizon, and at right angles with the plane in which the *pendulum* moves, is called the AXIS *of oſcillation*.

There is one certain point within every *pendulum*, into which, if all the matter that compoſes the *pendulum* was condenſed, the lines in which the vibrations would be performed, would not be altered by ſuch condenſation; this point is called the *CENTER of oſcillation*: and the length of the *pendulum* is always eſtimated by the diſtance of this point from the center of motion.

The length of a *pendulum* that will vibrate ſeconds in the latitude of London, has been generally ſet at three feet three inches, and two tenths of an inch; but by ſome very ingenious and accurate experiments, the late celebrated Mr. George Graham found the true length to be three feet three inches, and one hundred and twenty-eight thouſand parts of an inch.

The length of a *pendulum* vibrating ſeconds at Paris, was found by Varin, Des Hays, de Glos, and Godin, to be 440½ lines; by M. Picard, to be 440⅝ lines; and by M. Mairan in 1735, to be 440⅞ lines.

Galileo was the firſt who made uſe of a heavy body annexed to a thread, and ſuſpended by it for meaſuring time, in his experiments and obſervations: according to Stumius, the firſt perſon who obſerved the iſochroniſm of *pendulums*, and made uſe of them in meaſuring time, was Ricciolus; after him, Tycho, Langrenus, Wendeline, Merſenne, Kircher, and others, obſerved the ſame thing; though without any intimation of what Ricciolus had done. But Mr. Huygens was the firſt who demonſtrated the properties of the *pendulum*, and probably the firſt who applied them to clocks. He demonſtrated, that if the point to which a *pendulum* is ſuſpended was perfectly fixed or immoveable, and all manner of friction and reſiſtance removed, that a *pendulum*, once ſet in motion, would for ever continue to vibrate without diminution of motion, and that all its vibrations, (ſubject to theſe conditions) would be perfectly iſochronal. Hence the *pendulum* has univerſally been conſidered as the beſt chronometer: and as all *pendulums* of the ſame length perform their vibrations in the ſame time, without regard to their different weight, it has been ſuggeſted, by means of them, to eſtabliſh an univerſal ſtandard meaſure for all countries. On this principle, M. Mouton, canon of Lyons, has a treatiſe, De Menſura poſteris tranſmittenda. See *Univerſal* MEASURE.

Mr. Polени ſeems to think, that if a long *pendulum* were made to ſwing in the plane of the meridian, and another of equal length in a plane perpendicular to the meridian, ſome difference might be found in their vibrations from the centrifugal force ariſing from the earth's rotation about its axis. See Phil. Tranſ. N° 468. ſect. 1.

The *pendulum* is either *ſimple* or *compound*.

PENDULUM, *a ſimple*, in *Theory*, conſiſts of a ſingle weight, as A, conſidered as a point, and an inflexible right line AC, ſuſpended from, and moveable round a fixed point or centre C, and ſuppoſed void of gravity. *Tab.* V. *Mechanics*, *fig.* 85.

PENDULUM, *compound*, in *Theory*, is a *pendulum* conſiſting of ſeveral balls or weights moveable round one common centre of motion, and retaining the ſame diſtance both from one another, and from the centre about which they vibrate. However, among artiſts, theſe terms are differently underſtood, as will appear in the ſequel of this article.

PENDULUMS, *doctrine and laws of*. 1. A *pendulum* raiſed to B, through the arc of the circle BA, will fall, and again riſe, through an equal arc, to a point equally high, D; and thence will fall to A, and again riſe to B; and thus continue riſing and falling perpetually.

For ſuppoſe H I a horizontal line, and B D parallel to it; if the ball A, which we here conſider as a point, be raiſed to B; the line of direction B H, being perpendicular from the centre of gravity B to the horizontal line A I, falls withoutſide the point C. The ball therefore cannot reſt, but muſt deſcend.

But being retained by the thread BC, from falling perpendicularly through B H; it will fall through the arc B A. Conſequently, when the centre of gravity arrives at the bottom, A has the ſame force, it would have acquired in falling from K; and will therefore be able to riſe equally high as if it had fallen from B, i. e. in deſcending through the firſt half of its vibration, it acquires a velocity by the continual acceleration of its fall; and as this velocity is always proportionable to the height whence it falls, as being in ſome meaſure the effect thereof; it is ſtill able to make it return to the ſame height, ſuppoſing, according to the ſyſtem of Galileo, that the velocities are always the ſquare roots of the heights.

Since then the thread prevents the *pendulum* going off in the tangent A I, it muſt aſcend through the arc A D, equal to that of A B.

All the force therefore which it had acquired by falling, being exhauſted; it will return by the force of gravity through the ſame arc A D, and again will riſe from A to B; and thus continually.

Experience confirms this theorem, in any finite number of oſcillations; but if they be ſuppoſed infinitely continued, there will ariſe a difference. For the reſiſtance of the air, and the friction about the centre C, will take off part of the force acquired in falling; whence it will not riſe preciſely to the ſame point as hence it fell.

Thus the aſcent continually diminiſhing, the oſcillation will be at laſt ſtopped, and the *pendulum* will hang at reſt in its natural direction, which is perpendicular to the horizon.

2. Let ATC (*Tab.* III. *Mechanics*, *fig.* 33.) be a ſemicycloid, having its baſe EC parallel to the horizon, and its vertex A downwards: ſuppoſe a ſtring, with a *pendulum*, of the length of the ſemicycloid, ſuſpended at C, and applied to the ſemicycloid C T A, the body P, by its gravity, will gradually ſeparate the ſtring from the ſemi-cycloid C T A, and will deſcribe an equal ſemicycloid A P V, having its vertex in V, and its axis perpendicular to the horizon. On the axis A E deſcribe the generating ſemicircle A G E, draw A B cutting the vertical line C V in D, and on D V, taken equal to A E, deſcribe the ſemicircle D H V. Then, ſince the ſemicycloid C T A is equal to 2 A E or C V, (ſee CYCLOID), the body P will come to V, when the ſtring C T P comes to a vertical ſituation. Through T and P draw T G and P H parallel to A D, meeting the ſemicircles in G and H; and ſince the ſtraight part of the ſtring T P is equal to the curve T A to which it was applied, therefore T P = 2 A G = 2 T K (ſee CYCLOID), and conſequently T K and K P are equal, and the points G and H muſt be equally diſtant from the line A D; and therefore, the arc A G will be equal to D H, and conſequently the angle G A D = A D H, and the chords G A and D H are parallel. But T P, being a tangent to the cycloid in T, is parallel to G A, (ſee CYCLOID); therefore D K P H is a parallelogram, and D K = P H. But the arc A G is equal to G T, (ſee CYCLOID), and, therefore, the arc A G = A K; and ſince A D = A E, it follows that D K or P H = G E or H V: and if P H be produced till it meet the axis in R, then ſhall the ordinate P R be equal to the ſum of the arc H V, and its right line H R; and, therefore, the point P (ſee CYCLOID), muſt be in a ſemicycloid, whoſe generating circle is D H V, its axis D V, and vertex V. If another ſemicycloid equal to C T A, as C' B, be placed in a contrary ſituation, it is plain, that by means of theſe ſemicycloids, a *pendulum* may be made to deſcribe the cycloid A V B in its oſcillations.

Farther, let V L, perpendicular to D V, be equal to any arc of the cycloid V M L; deſcribe with the radius V L the ſemicircle L Z I; and ſuppoſing the *pendulum* to begin an oſcillation from L, the velocity acquired at M, in the cycloid, will be as M X the ordinate of the circle at the correſponding point M in the ſtraight line V L: and the force by which the motion of the *pendulum* is accelerated in M, is as the arc of the cycloid V M that remains to be deſcribed. Let L R, M S, be perpendicular to the axis D V, meeting the generating circle in O and Q, and draw the chords V O, V Q: then, the velocity of the *pendulum* at M will be the ſame as would

have

have been acquired by a body directly falling from R to S, and the velocity acquired at V will be the same as would have been acquired by a body falling directly from R to V (see *Inclined* PLANE); but these velocities are to one another as $\sqrt{RS}$ to $\sqrt{RV}$, (see ACCELERATION); and since RV : SV :: VO² : VQ², and RV : RV − SV (= RS) :: VO² : VO² − VQ² :: VL² : VL² − VM², because VL = ½ VO and VM = ½ VQ (see CYCLOID), it follows that the velocity of the *pendulum* acquired in M is to the velocity acquired in V, as $\sqrt{VL^2 - VM^2}$ to $\sqrt{VL^2}$, or as MX to VZ. For the demonstration of the second part of this proposition, see CYCLOID.

Again; suppose that the circle L Z *l* is described by the body X with an uniform motion, by the velocity acquired by the *pendulum* in V; and any arc of the cycloid, as M N, will be described by the *pendulum*, in the same time as the arc of the circle X Y by that uniform motion; taking V N on the straight line V L, equal to V N in the cycloid, and drawing N Y parallel to V Z, meeting the circle in Y. Let *x m* be an ordinate very near to X M, and draw X*r* paralel to the diameter L *l*, meeting *x m* in *r*: then since the triangles X *r x* and V X M are similar, it follows that X *r* : M *m* (= X*r*) :: V X : M X, that is, as the velocity of the body X to that of the body M: and consequently the spaces X *x* and M *m* will be described in the same time by these bodies, the times being always equal when the spaces are taken in the same ratio as the velocities. After the same manner, the other corresponding parts of the lines M N and X Y will be described in the same time; and, therefore, the whole space M N will be described in the same time as the arc X Y. Hence it appears, that the *pendulum* will oscillate from L to V in the same time as the body X will describe the quadrant L Z.

Lastly; the time of a complete oscillation in the cycloid is to the time in which a body would fall through the axis of the cycloid D V, as the circumference of a circle to its diameter. The time in which the semi-circumference L Z *l* is described by the body X, is to the time in which the radius L V could be described with the same velocity, as the circumference of a circle to its diameter. But the same time, in which the semi-circumference L Z *l* is described by the body X, is equal to the time of the complete oscillation L V P in the cycloid. The time in which a body falls from O to V, along the chord O V, is equal to the time in which L V (= ½ O V) could be described by the velocity acquired at the point V (see ACCELERATION, and *Inclined* PLANE); and the time of the fall through the chord O V is equal to the time of the fall through the diameter D V (see *Inclined* PLANE): consequently the time in which L V could be described by a velocity equal to that of the body X, is equal to the time of a fall through the diameter D V. It follows, therefore that the time of the entire oscillation L V P is to the time of a fall through the diameter D V as the circumference of a circle to its diameter.

Hence it appears, that the oscillations in the cycloid are all performed in equal times; for they are all in the same ratio to the time in which a body falls through the diameter D V. If, therefore, a *pendulum* oscillates in a cycloid, the time of the oscillation in any arc is equal to the time of the oscillation in the greatest arc B V A, and the time in the least arc is equal to the time in the greatest. Moreover, as the cycloid may be considered as coinciding, in V, with any small arc of a circle described from the center C, passing through V; and the time in a small arc of such a circle will be equal to the time in the cycloid; the times in very little arcs are equal, because these little arcs may be considered as portions of the cycloid as well as of the circle. Farther, the time of a complete oscillation in any little arc of a circle being to the time in which a body would fall through half the radius, as the circumference of a circle to its diameter; and since the latter time is half the time in which a body would fall through the whole diameter, or any chord; it follows, that the time of an oscillation in any little arc is to the time in which a body would fall through its chord, as the semicircle to the diameter. Suppose N V a small arc of the circle described from the center C; then the time in the arc N V is so far from being equal to the time in the chord N V, even when they are supposed to be evanescent, that the last ratio of these times is that of the circumference of a circle to four times the diameter. See Maclaurin's View, &c. book ii. chap. 3.

Hence, also, the longer the *pendulums* are, that oscillate in arcs of a circle, the more oscillations are isochronal; which agrees with experiment: for in two *pendulums* of equal lengths, but oscillating in unequal arcs, provided neither arc be very great, you will scarce discern any inequality in a hundred oscillations.

Hence, also, we have a method of determining the space which a heavy body, falling perpendicularly, passes over in a given time. For the ratio which the time of one oscillation has to the time of the fall through half the length of the *pendulum*, being thus had; and the time wherein the several vibrations of any given *pendulum* being found; we have the time of the fall through half the length of the *pendulum*; and hence may collect the space it will pass over in any other time.

Thus Mr. Huygens demonstrates, that falling bodies, by their gravity only, describe fifteen Paris feet and one inch, in a second of time.

The whole doctrine of *pendulums* oscillating between two semicycloids, both theory and practice, we owe to the great Huygens; who first published the same in his Horologium Oscillatorium, five Demonstrationes de Motu *Pendulorum*, &c.

Every thing that regards the motion of *pendulums* has been demonstrated in different ways, since the time of Huygens; and the celebrated Sir Isaac Newton has given us, in his Principia, an admirable theory on this subject, in which he has extended to epicycloids the properties which Huygens had demonstrated in relation to the cycloid.

3. The action of gravity is less in those parts of the earth where the oscillations of the same *pendulum* are slower, and greater where they are swifter.

For the time of oscillation in the cycloid is to the time of perpendicular descent through the diameter of the generating circle, as the periphery of the circle to the diameter.

If then the oscillations of the same *pendulum* be slower, the perpendicular descent of heavy bodies is likewise slower, i. e. the motion is less accelerated, or the force of gravity is less, and conversely.

Hence, as it is found by experiment, that the oscillations of the same *pendulum* are slower near the equator, than in places less remote from the pole; the force of gravity must also be less towards the equator than towards the poles. And consequently, the *figure of the* EARTH is not a just sphere, but a spheroid.

This M. Richer found by an experiment made in the island Cayenna, about four degrees from the equator; where a *pendulum* three feet, eight lines ½ long, which at Paris vibrates seconds, was to be shortened a line and a quarter to reduce its vibrations to seconds.

M. des Hayes, in a voyage to America, confirms the observation of Richer; but adds, that the diminution established by that author appears too little.

M. Couplet the younger, upon his return from a voyage to Brasil and Portugal, falls in with M. des Hayes, as to the necessity of shortening the *pendulum* towards the equator more than Richer has done. He observed, that even at Lisbon the *pendulum* which swings seconds must be two lines ½ shorter than that of Paris; which is shorter than that of Cayenna, as fixed by Richer: though Cayenna be in twenty-four degrees less latitude than Lisbon.

But these observations of M. Couplet did not appear to Sir Isaac Newton to be sufficiently exact. Principia, prop. 20. lib. iii.

The truth is, this diminution does not proceed regularly: Messr. Picart and de la Hire found the length of the *pendulum* which beats seconds exactly the same at Bayonne, at Paris, and at Uranibourg, in Denmark, though the first be in 43½° of latitude, and the last in the latitude 55° 3′.

Hence M. de la Hire takes occasion to suspect, that the diminution is only apparent; and that, e. gr. the iron rod, wherewith M. Richer measured his *pendulum*, might be lengthened by the great heats of the isle of Cayenna: not the *pendulum* shortened by the approach towards the line.

To confirm this, he tells us he found, by very careful experiments, that an iron bar, which exposed to the frost was six feet long, was lengthened two-thirds of a line by the summer's sun.

To this it might be replied, that, according to the table which Sir Isaac Newton has given of the length of the *pendulum* in different latitudes, the difference of the length at 43½° and 55° is so small, that it cannot be easily perceived; because this difference is not above ¼ of a line; and, therefore, the difference at Bayonne and Paris must be still more insensible. With respect to the contraction of *pendulums* by cold, and their dilatation by heat, Newton replies, that in the experiment related by M. de la Hire, the heat of the rod was greater than that of the human body, whereas that of the rod of the *pendulum*, which is not always exposed to the sun, could not be so great; whence he concludes, that the rod of the *pendulum* about three feet long, might be, in reality, a little

longer

longer in ſummer than in winter, and at the equator than in our climates, if we regard merely the heat; but that its dilatation could not be ſo conſiderable as to produce the whole difference obſerved in the length of the *pendulum*. In comparing the different obſervations of the French aſtronomers, Newton apprehends that two lines may be taken for the length by which a ſecond *pendulum* ought to be increaſed at the equator.

From ſome obſervations made by Mr. Campbell, in 1731, at Black-river, in Jamaica, 18° nort. lat. it is collected, that if the length of a ſingle *pendulum* that ſwings ſeconds in London, be 39.126 Engliſh inches, the length of one at the equator, would be 39.00, at the poles 39.206. Phil. Tranſ. Abr. vol. viii. part i. p. 238. or N° 432.

A TABLE, ſhewing how much a *pendulum* that ſwings ſeconds at the equator would gain every twenty-four hours in different latitudes; and how much the *pendulum* would need to be lengthened in theſe latitudes, in order to make it ſwing ſeconds therein.

Latitude of the Place.	Time gained in one Day.		Lengthening of the *Pendulum* to ſwing ſeconds.		Latitude of the Place.	Time gained in one Day.		Lengthening of the *Pendulum* to ſwing ſeconds.	
Deg.	Seconds.		Inch.	Parts.	Deg.	Seconds.		Inch.	Parts.
5	1	.7	0	.0016	50	1'14	.0	0	.1118
10	6	.9	0	.0062	55	1'53	.2	0	.1586
15	2	.3	0	.0138	60	1'71	.2	0	.1549
20	26	.7	0	.0236	65	1'18	.1	0	.1696
25	40	.8	0	.0369	70	2'01	.6	0	.1 24
30	57	.1	0	.0516	75	2'13	.0	0	.1027
35	1'1	.1	0	.0679	80	2'21	.4	0	.1003
40	1'24	.3	0	.0853	85	2'26	.1	0	.1000
45	1'14	.1	0	.1033	90	2'24	.5	0	.1061

4. If two *pendulums* vibrate in ſimilar arcs, the times of the oſcillations are in the ſubduplicate ratio of their lengths.

For the time of the oſcillation in the arc LVP *(fig. 33.)* is in a given ratio to the time of the fall through D V, which time is in the ſubduplicate ratio of the ſpace, D V, or of its double C V. the length of the *pendulum*.

Hence the lengths of *pendulums* vibrating in ſimilar arcs are in a duplicate ratio of the times wherein the oſcillations are performed.

5. The numbers of iſochronal oſcillations performed in the ſame time by two *pendulums*, are reciprocally as the times wherein the ſeveral oſcillations are performed.

Hence the lengths of *pendulums* vibrating in ſimilar and ſmall arcs are in the duplicate ratio of the numbers of oſcillations performed in the ſame time, but reciprocally taken.

6. The lengths of *pendulums* ſuſpended between cycloids, are in a duplicate ratio of the times wherein the ſeveral oſcillations are performed.

And hence they are in a duplicate ratio of the numbers of oſcillations performed in the ſame time, but reciprocally taken: and the times of oſcillations in different cycloids are in a ſubduplicate ratio of the lengths of the *pendulums*.

7. If the bodies that oſcillate be acted upon by unequal accelerating forces, then the oſcillations will be performed in times that are to one another in the ratio compounded of the direct ſubduplicate ratio of the lengths of the *pendulums*, and inverſe ſubduplicate ratio of the accelerating forces: becauſe the time of the fall through D V is in the ſubduplicate ratio of the ſpace D V directly, and of the force of gravity inverſely; and the time of the oſcillations is in a given ratio to that time. Hence it appears, that if oſcillations of unequal *pendulums* are performed in the ſame time, the accelerating gravities of theſe *pendulums* muſt be as their lengths: and thus we conclude, that the force of gravity decreaſes as you go towards the equator; ſince the lengths of *pendulums* that vibrate ſeconds are always leſs at a leſs diſtance from the equator.

8. To find the length of a *pendulum*, which ſhall make any aſſigned number of vibrations in any given time.

Let the number of vibrations required be 50 in a minute, and the length of the ſtring, counted from the point of ſuſpenſion, to the centre of oſcillation, be required: it is a fixed rule, that the lengths of *pendulums* are to each other, as the ſquares of their vibrations, and contrariwiſe: now it is agreed, that a *pendulum* vibrating ſeconds (or 60 times in a minute) is 39.128 inches: ſay therefore, as the ſquare of 50 (which is 2500) to the ſquare of 60 (which is 3600); ſo is 39.128 to the length of the *pendulum* required: which will be found 36.34 inches.

Note, in practice, ſince the product of the mean terms will always be 140800.8 (that is, the product of the ſquare of 60, multiplied by 39.128) that is, 3600 × 39.128, you need only divide that number by the ſquare of the number of vibrations aſſigned; and the quotient will give the length of a *pendulum*, which ſhall vibrate juſt ſo many times in a minute.

9. The length of a *pendulum* being known, to find the number of vibrations it will make in a given time.

This being the reverſe of the former; ſay, as the length given, ſuppoſe 36.34, is to the length of the ſtandard *pendulum* ſwinging ſeconds, viz. 39.1285 ſo is the ſquare of the vibrations of the ſtandard *pendulum* in the given time, v. gr. a minute, to the ſquare of the vibrations ſought: that is, as 36.34 : 39.128 :: 3600 : 2500. And the ſquare root of 2500 will be 50, the number of vibrations ſought. But for uſe, here (as in the former problem) you need only divide 140800.8 by the length; and it gives the ſquare of the vibrations, as there you divided by the ſquare of the vibrations to find the length.

On theſe principles, Dr. Derham has conſtructed a table of the vibrations of *pendulums* of different lengths in the ſpace of a minute.

Pend. length in inches.	Vibrat. in a minute.	*Pend.* length in inches.	Vibrat. in a minute.
1	375.7	30	68.6
2	265.6		
3	216.9	39.2	60.0
4	187.8		
5	168.0	40	59.5
6	153.3	50	53.1
7	142.0	60	48.5
8	132.8	70	44.9
9	125.2	80	42.0
10	118.8	90	39.6
20	84.0	100	37.5

Mr. Ferguſon has calculated the following TABLE, ſhewing what the length of a *pendulum* muſt be, to make any given number of vibrations in a minute, from 1 to 300, in the latitude of London.

Vibrations	Length. Yards.	Feet.	Inches.	Vibrations	Length. Feet.	Inches.	Vibrations	Length. Inches.	Vibrations	Length. Inches.	Vibrations	Length. Inches.
1	1014	2	4·2	51	3	8·83	101	9·65	151	4·31	201	2·41
2	380	1	1·05	52	3	6·32	102	9·49	152	4·28	202	2·41
3	225	2	7·3	53	3	3·85	103	9·33	153	4·22	203	2·39
4	145	0	4·25	54	3	1·84	104	9·18	154	4·17	204	2·37
5	56	2	3·05	55	2	9·4	105	9·03	155	4·13	205	2·35
6	108	2	0·76	56	2	7·4	106	8·89	156	4·08	206	2·33
7	80	0	1·12	57	2	5·4	107	8·75	157	4·04	207	2·31
8	61	0	0·56	58	2	3·4	108	8·62	158	3·99	208	2·29
9	48	1	3·46	59	2	1·48	109	8·49	159	3·95	209	2·27
10	39	0	1·0	60	2	0·0	110	8·36	160	3·91	210	2·25
11	32	1	2·8	61	1	10·08	111	8·23	161	3·87	211	2·23
12	27	0	0·56	62	1	8·16	112	8·10	162	3·83	212	2·21
13	23	0	2·89	63	1	6·25	113	7·97	163	3·79	213	2·19
14	20	0	0·51	64	1	4·34	114	7·84	164	3·75	214	2·18
15	17	0	2·45	65	1	2·46	115	7·72	165	3·71	215	2·17
16	15	0	0·56	66	1	0·59	116	7·60	166	3·67	216	2·15
17	13	1	0·83	67	0	11·03	117	7·48	167	3·63	217	2·13
18	12	0	1·25	68	0	11·87	118	7·36	168	3·59	218	2·12
19	10	2	0·83	69	0	10·03	119	7·25	169	3·56	219	2·10
20	9	2	0·05	70	0	10·07	120	7·10	170	3·53	220	2·09
21	8	2	1·23	71	0	9·33	121	7·10	171	3·49	221	2·07
22	8	0	3·76	72	0	9·00	122	7·00	172	3·46	222	2·05
23	7	1	2·69	73	0	8·20	123	6·90	173	3·43	223	2·03
24	6	2	1·67	74	0	7·61	124	6·80	174	3·39	224	2·02
25	6	0	0·67	75	0	7·55	125	6·71	175	3·36	225	2·01
26	5	2	1·68	76	0	7·40	126	6·62	176	3·33	226	1·99
27	5	1	1·73	77	0	6·80	127	6·53	177	3·30	227	1·97
28	5	0	0·13	78	0	6·27	128	6·44	178	3·27	228	1·96
29	4	2	11·23	79	0	5·83	129	6·35	179	3·23	229	1·95
30	4	1	0·91	80	0	5·43	130	6·27	180	3·20	230	1·94
31	4	0	2·91	81	0	5·05	131	6·19	181	3·17	231	1·92
32	3	2	1·93	82	0	4·69	132	6·11	182	3·14	232	1·90
33	3	1	0·98	83	0	4·33	133	6·03	183	3·11	233	1·89
34	3	0	0·07	84	0	3·98	134	5·95	184	3·08	234	1·88
35	2	2	1·19	85	0	3·64	135	5·87	185	3·05	235	1·87
36	2	1	0·34	86	0	3·32	136	5·80	186	3·02	236	1·85
37	2	0	1·53	87	0	3·01	137	5·73	187	2·99	237	1·84
38	2	0	0·73	88	0	2·72	138	5·66	188	2·96	238	1·83
39	1	2	1·95	89	0	2·43	139	5·59	189	2·94	239	1·82
40	1	2	1·24	90	0	2·16	140	5·52	190	2·91	240	1·80
41	1	2	0·61	91	0	2·01	141	5·45	191	2·89	241	1·78
42	1	2	0·00	92	0	1·77	142	5·38	192	2·86	242	1·77
43	1	1	11·41	93	0	1·53	143	5·32	193	2·84	243	1·76
44	1	1	10·84	94	0	1·31	144	5·26	194	2·81	244	1·75
45	1	1	10·29	95	0	1·09	145	5·20	195	2·79	245	1·74
46	1	1	9·76	96	0	0·89	146	5·14	196	2·77	246	1·72
47	1	1	9·25	97	0	0·70	147	5·08	197	2·74	247	1·71
48	1	1	8·76	98	0	0·52	148	5·02	198	2·72	248	1·70
49	1	1	8·29	99	0	0·35	149	4·96	199	2·70	249	1·69
50	1	1	7·84	100	0	0·19	150	4·91	200	2·67	250	1·68

Vibrations	Length. Yards.	Feet.	Inches.	Vibrations	Length. Feet.	Inches.	Vibrations	Length. Inches.	Vibrations	Length. Inches.	Vibrations	Length. Inches.
251	1	1	7·41	276	1	0·03	301	3·98	326	3·46	351	3·05
252	1	1	7·00	277	0	11·87	302	3·96	327	3·45	352	3·04
253	1	1	6·59	278	0	11·72	303	3·93	328	3·43	353	3·03
254	1	1	6·20	279	0	11·57	304	3·91	329	3·41	354	3·02
255	1	1	5·82	280	0	11·43	305	3·89	330	3·40	355	3·01
256	1	1	5·45	281	0	11·29	306	3·87	331	3·38	356	3·00
257	1	1	5·09	282	0	11·15	307	3·85	332	3·37	357	2·99
258	1	1	4·74	283	0	11·01	308	3·83	333	3·35	358	2·98
259	1	1	4·39	284	0	10·87	309	3·81	334	3·34	359	2·97
260	1	1	4·06	285	0	10·74	310	3·79	335	3·32	360	2·96
261	1	1	3·73	286	0	10·61	311	3·77	336	3·31	361	2·95
262	1	1	3·41	287	0	10·48	312	3·75	337	3·29	362	2·94
263	1	1	3·09	288	0	10·35	313	3·73	338	3·28	363	2·93
264	1	1	2·78	289	0	10·22	314	3·71	339	3·26	364	2·92
265	1	1	2·48	290	0	10·10	315	3·69	340	3·25	365	2·91
266	1	1	2·18	291	0	9·98	316	3·67	341	3·23	366	2·90
267	1	1	1·89	292	0	9·86	317	3·65	342	3·22	367	2·89
268	1	1	1·60	293	0	9·74	318	3·63	343	3·20	368	2·88
269	1	1	1·32	294	0	9·62	319	3·61	344	3·19	369	2·87
270	1	1	1·04	295	0	9·50	320	3·59	345	3·17	370	2·86
271	1	1	0·77	296	0	9·39	321	3·57	346	3·16	371	2·85
272	1	1	0·50	297	0	9·28	322	3·55	347	3·14	372	2·84
273	1	1	0·24	298	0	9·17	323	3·53	348	3·13	373	2·83
274	1	0	11·98	299	0	9·06	324	3·52	349	3·11	374	2·82
275	1	0	11·73	300	0	8·95	325	3·50	350	3·10	375	2·81

Note, These laws, &c. of the motion of *pendulums* can scarce hold strictly; unless the thread that sustains the ball be void of weight, and the gravity of the whole weight be collected in a point.

In practice, therefore, a very fine thread, and a small ball, but of a very heavy matter, are to be used. A thick thread, and a bulky ball, disturb the motion strangely; for in that case, the simple *pendulum* becomes compound; it being much the same as if several weights were applied to the same inflexible rod in several places.

The use of *pendulums* in measuring time in astronomical observations, and on other occasions where a great degree of precision is required, is too obvious to need a description. Either the length of the *pendulum* may be adjusted before its application, and made to vibrate the desired time, v. gr. seconds, half-seconds, &c. by article VI. or it may be taken at random, and the times of the vibrations afterwards determined from article IX.

For the use of the *pendulum* in measuring remote inaccessible distances, &c. by means of sound, &c. see Sound.

Pendulum, *simple*, in *Mechanics*, an expression commonly used among artists to distinguish such *pendulums* as have no provision for correcting the effects of heat and cold from those that have. *Simple pendulum*, or *detached pendulum*, are terms sometimes applied to such *pendulums* as are unconnected with clocks.

Pendulum, *compound*, in *Mechanics*, a *pendulum*, whose rod is composed of two or more wires or bars of metal, that undergo different degrees of expansion and contraction, when exposed to the same heat or cold, and whose *different degrees of expansion* is made to act in such manner as to preserve constantly the same distance between the *point of suspension*, and *centre of oscillation*, although exposed to very different and various degrees of heat or cold. Great are the diversity of contrivances for answering this purpose, but all reducible to the *gridiron*, the *mercurial*, and the *lever pendulum*.

We shall here only observe, that the vulgar method of remedying the inconvenience arising from the extension and contraction of the metalline rods of *pendulums*, is by applying the ball with a screw, by which means the *pendulum* is at any time made longer or shorter, as the ball is screwed downwards or upwards, and thus the time of its vibration is continually the same.

The *gridiron pendulum* was the invention of Mr. John Harrison, a very ingenious artist, and famous for his invention of the clock for finding the difference of Longitude at sea, about the year 1735. It consists of five rods of steel, and four of brass, placed in an alternate order, the middle rod being of steel, and suspending the *pendulum* ball; these rods of brass and steel, thus placed in alternate order, and so connected with each other at their ends, that while the expansion of the steel rods has a tendency to lengthen the *pendulum*, the expansion of the brass rods acting upwards tends to shorten it; and thus when the lengths of the brass and steel rods are duly proportioned, their expansions and contractions will exactly balance and correct each other, and preserve the pendulum invariably of the same length; the simplicity of this ingenious contrivance is much in its favour, and the difficulty of adjustment seems the only objection to it.

Mr. Harrison, in his first machine for measuring time at sea, applied this combination of wires of brass and steel, to prevent any alterations by heat or cold; and in the machines or clocks he has made for this purpose, a like method is used for guarding against the irregularities arising from this cause.

The *mercurial pendulum* was the invention of Mr. Graham, in consequence of several experiments relating to the materials of which *pendulums* might be formed, in 1715. Its rod is made of brass, and branched towards its lower end, so as to embrace a cylindric glass vessel thirteen or fourteen inches long, and about two inches diameter, which being filled about twelve inches deep with mercury, forms the weight, or ball, of the *pendulum*. If upon trial the expansion of the rod be found too great for that of the mercury, more mercury must be poured into the vessel; if the expansion of the mercury exceeds that of the rod, so as to occasion the clock to go fast with heat, some mercury must be taken out of the vessel, so as to shorten the column; and thus may the expansion and contraction of the quicksilver in the glass be made exactly to balance the expansion and contraction of the *pendulum* rod, so as to preserve the distance of the centre of oscillation from the point of suspension invariably the same. Thus, if a glass or metalline tube, uniform throughout, filled with quicksilver, and 58.8 inches long, were applied to a clock, it would vibrate seconds; because it would vibrate in the same time with a simple *pendulum*, whose length is $\frac{1}{4}$ of 58.8 = 39.2 (see

Centre *of oscillation*); and such a *pendulum*, it is evident, admits of a twofold expansion and contraction, viz. one of the metal, and the other of the mercury, which at the same time will be contrary, and correct each other. For the metal expanding with heat, the *pendulum* must vibrate slower on that account; the mercury also expanding with heat, and the length of its column increasing, the centre of oscillation will be raised, and its distance from the point of suspension diminished; and on this account, the *pendulum* will vibrate quicker. Therefore, if the circumstances of the tube and mercury are skilfully adjusted, the time of the clock might, by these means, for a long course of time, continue the same, without any sensible loss or gain. Mr. Graham, who made a clock of this sort, compared it with one of the best of the common sort for three years together, and found the errors of the former about one-eighth part of the latter. Phil. Trans. N° 392.

The *lever pendulum*. From all that we can collect respecting this construction of a *pendulum*, we are inclined to believe, that the idea of making the difference of the expansion of different metals operate by means of a lever, originated with Mr. Graham, who, in the year 1737, constructed a *pendulum*, whose rod was composed of one bar of steel between two of brass, and acting upon the short end of a lever, to the other end of which, the ball or weight of the *pendulum* was suspended: this *pendulum* was, upon trial, found to move by jerks, and laid aside by Mr. Graham, to make way for the mercurial *pendulum*.

Mr. Short (Phil. Trans. vol. xlvii. art. 88.) informs us, that Mr. Frotheringham, a quaker in Lincolnshire, caused a *pendulum* of this kind to be made, consisting of two bars, one of brass, and the other of steel, fastened together by screws, with levers to raise or let down the bob; and that these levers were placed above the bob. M. Cassini, in the History of the Royal Academy of Sciences at Paris, for 1741, also describes two sorts of *pendulums* for clocks, compounded of bars of brass and steel, and in which he applies a lever to raise or let down the bob of the *pendulum*, by the expansion or contraction of the bar of brass.

Mr. John Ellicott, in the year 1738, constructed a *pendulum* on the same principle, but differing from Mr. Graham's in many particulars: the rod of Mr. Ellicott's *pendulum* was composed of two bars only, the one of brass, the other of steel; it had two levers, each sustaining its half of the weight or ball, and a spring under the lower part of the ball, to relieve the levers from a considerable part of its weight, so as to render their motion more smooth, and safer: the one lever in Mr. Graham's construction was above the ball; both the levers in Mr. Ellicott's were within the ball, and each lever was furnished with an adjusting screw, in order to lengthen or shorten the lever, so as to render the adjustment the more perfect. Phil. Trans. vol. xlvii. p. 479, &c. where Mr. Ellicott's methods of construction are described and illustrated by figures.

Great ingenuity has been displayed by these very eminent artists on this construction; but we must further observe, in the history of improvements of this nature, that Mr. Cumming, another eminent artist, has given, in his Essays on the Principles of Clock and Watch-work, London, 1766, an ample description, with plates, of a *construction of a pendulum with levers*, in which he seems to have united the properties of Mr. Graham's and Mr. Ellicott's, without any of the defects of either. The rod of his *pendulum* is composed of one flat bar of brass, and two of steel, steadily supporting each other, but in such manner, that each bar has its whole surface exposed to the air, so as to feel each change in its temperature at the same instant. He uses *three levers* within the ball of the *pendulum*, with a transparent glass before, and a silvered glass behind the levers, by which they are secured from dust, &c. and the back pivots, and other back parts of the lever, are constantly exposed to view, as well as the front side, one of the levers serving to render the pressure of the ball on each of the other two perfectly equal, notwithstanding any imperfections of execution, or inequalities that may take place in the length of those levers, if the one adjusting screw should happen to be more turned than the other: by means of this third lever the ball of the pendulum is always enabled to accommodate itself to the sides of the rod on which it moves, so as to slip freely thereon, without the possibility of jamming, or moving by jerks; the adjusting screws are so constructed, that no bad effect can arise from any bending of the screw, or from irregularity in its threads; nor can they be moved by any accident, after they have been properly adjusted. In this construction also, the spring, which relieves the levers from the pressure of the ball, is upwards of twenty inches long, in a spiral form,

and contained in a cylindric cavity within the ball, when it can, after all the parts of the *pendulum* are put together, and applied to the clock, be brought to such a degree of tension as to sustain any desired part of the weight of the ball, and render the motion of the lever perfectly free; the levers also are so disposed of, as to admit of their being much longer than in Mr. Ellicott's construction, by which means their angular motion and friction on the pivots are proportionably diminished; and for the more accurate adjusting of this *pendulum* to mean time, it is provided with a small ball and screw below the principal ball or weight, one entire revolution of which on its screw will only alter the rate of the clock's going one second per day; and its circumference divided into 30, one of which divisions will alter its rate of going one second in a month.

PENDULUM *clock*, a clock which has its motion regulated by the vibration of a *pendulum*.

It is controverted between Galileo and Huygens, which of the two first applied the *pendulum* to a clock. For the pretensions of each, see CLOCK.

After Huygens had discovered, that the vibrations made in arcs of a cycloid, however unequal they were in extent, were all equal in time; he soon perceived, that a *pendulum* applied to a clock, to as to make it describe arcs of a cycloid, would rectify the otherwise unavoidable irregularities of the motion of the clock; since, though the several causes of those irregularities should occasion the *pendulum* to make greater or less vibrations, yet, in virtue of the cycloid, it would still make them perfectly equal; and the motion of the clock governed thereby, would therefore be preferved perfectly equable.

But the difficulty was to make the *pendulum* describe arcs of a cycloid; for, naturally, the *pendulum* being tied to a fixed point, can only describe arcs of circles about the same.

Here M. Huygens contrived to fix the iron rod or wire, which bears the bob or bottom, at the top to a silken thread, placed between two cycloidal cheeks, or two little arcs of a cycloid, made of metal. Hence the motion of vibration, applying incessantly from one to the other of those arcs, the thread, which is extremely flexible, eaſily aſſumes the figure thereof; and by means hereof it is demonſtrated, that the weight ſuſpended at the other end of the rod will deſcribe a juſt arc of a cycloid.

This is doubtleſs one of the moſt uſeful and ingenious inventions many ages have produced: by means whereof, we have clocks which will not err a ſingle ſecond in ſeveral days.

It is true, the *pendulum* is ſtill liable to its irregularities, how minute ſoever they may be; and M. de la Hire thinks there is ſtill room to improve it.

The ſilk thread by which it is ſuſpended, he obſerves, ſhortens in moiſt weather, and lengthens in dry; by which means the length of the whole *pendulum*, and conſequently the times of the vibrations, are ſomewhat varied.

To obviate this inconvenience, M. de la Hire, inſtead of a ſilk thread, uſed a little fine ſpring; which was not indeed ſubject to ſhorten and lengthen, but which he found grew ſtiffer in cold weather, and then made its vibrations falter than in warm.

He had therefore recourſe to a ſtiff wire or rod, firm from one end to the other. In fact, by this means he renounced the advantages of the cycloid; but he found, as he ſays, by experience, that the vibrations in arcs of circles are performed in times as equal, provided they be not of too great extent, as thoſe in cycloids. But the experiments of Sir J. Moor, and others, have demonſtrated the contrary.

The ordinary cauſes of the irregularities of *pendulums*, Dr. Derham aſcribes to the alterations in the gravity and temperature of the air, which increaſe and diminiſh the weight of the ball, and by that means make the vibrations greater and leſs; an acceſſion of weight in the ball being found by experiment to accelerate the motion of the *pendulum*.

A weight of ſix pound added to the ball, Dr. Derham found, made his clock gain 15 ſeconds every day.

A general remedy againſt the inconveniencies of *pendulums* is to make them long, the bob heavy, and to vibrate but a little way; this is the uſual means in England; the cycloidal cheeks being generally overlooked. See the preceding article.

Pendulum clocks reſting againſt the ſame wall have been found to influence each other's motions. See the Phil. Tranſ. N° 453, ſect 5 and 6, where Mr. Ellicot has given a very curious and exact account of this phenomenon.

PENDULUM *clocks, to correct the motion of.* The uſual method is to ſcrew and ſet down the ball; but a very ſmall alteration here having a very great effect, Dr. Derham prefers Huygens's method, which is to have a ſmall weight or bob to ſlide up and down the rod above the ball, which is to be immoveable; though he improves on the method, and recommends having the ball to ſcrew up and down, to bring the *pendulum* near its gage; and the little bob to ſerve for the nicer corrections, as the alteration of a ſecond, &c.

Mr. Huygens orders the weight of this little corrector to be equal to that of the wire, or $\frac{1}{50}$ of that of the great ball; he adds a table of the alterations the ſeveral ſtiffnings thereof will occaſion in the motion of the *pendulum*; wherein it is obſervable, that a ſmall alteration towards the lower end of the *pendulum*, makes as great an alteration in time, as a greater riſing or failing does when higher.

PENDULUM *royal*, a name given among us to a clock, whoſe *pendulum* ſwings ſeconds, and goes eight days; ſhewing the hour, minute, and ſecond.

The numbers of ſuch a piece are thus calculated: firſt caſt up the ſeconds in twelve hours, which are the beats in one turn of the great wheel; and you will find them to be $43200 = 12 \times 60 \times 60$. The ſwing-wheel muſt be 30 to ſwing 60 ſeconds in one of its revolutions; now let $\frac{1}{2}$ of $43200 = 21600$ be divided by 30, and you will have 720 in the quotient, which muſt be broken into quotients; the firſt of them muſt be 12 for the great wheel, which moves round once in twelve hours. 720 divided by 12, gives 60, which may alſo be conveniently broken into two quotients, as 10 and 6, or 5 and 12, or 8 and 7½; which laſt is moſt convenient; and if you take all your pinions 8, the work will ſtand thus:

$$\left.\begin{matrix} 8) & 96 & (12 \\ 8) & 60 & (8 \\ 8) & 30 & (7\frac{1}{2} \end{matrix}\right\} 1$$

30

According to this computation, the great wheel will go about once in twelve hours, to ſhew the hour; the ſecond wheel once in an hour, to ſhew the minutes; and the ſwing-wheel once in a minute, to ſhew the ſeconds. See CLOCK-WORK.

PENDULUM *level*. See LEVEL.

PENDULUM *watch*. See WATCH.

PENETRABILITY. See IMPENETRABILITY.

PENETRALE, among the Romans, properly denoted the chapel conſecrated to the PENATES, or houſhold gods.

PENETRATION, *penetratio*, the act whereby one thing enters another, or takes up the place already poſſeſſed by another.

The Schoolmen define *penetration* the co-exiſtence of two or more bodies, ſo that one is preſent, or has its extenſion in the ſame place as the other.

Philoſophers hold the *penetration* of bodies abſurd, i. e. that two bodies ſhould be at the ſame time in the ſame place; and accordingly, impenetrability is laid down as one of the eſſential properties of MATTER.

What we popularly call *penetration* only amounts to the matter of one body's being admitted into the vacuity of another. Such is the *penetration* of water through the ſubſtance of WOOD.

PENGUIN, in *Ornithology*, a name given by ſailors of different nations to two different ſpecies of water-fowl, both web-footed, and both wanting the hinder toe.

The *penguin* of the Engliſh is the bird more commonly known by the name of the *gare-fugel*, or the *alca impennis* of Linnæus.

It grows to the ſize of a common tame gooſe, and is black on its back, or upper part, and white on the belly; its wings are very ſmall, and by no means fit for flying; its beak is ſomewhat broad and long, compreſſed on the ſides and back, and has toward the extremity ſeveral furrows, ſeven or eight on the upper ſide, and about ten on the under; and the long cheap ſwells into a protuberance downward; its head has two white lines reaching from the beak to the eyes; its tail is very ſhort, and it has no hinder toe.

This bird is obſerved by ſeamen never to wander beyond ſoundings; and according to its appearance they direct their meaſures, being then aſſured that land is not very remote. This bird breeds in the iſle of St. Kilda, appearing there in the beginning of May, and retiring in the middle of June. It lays one egg, about ſix inches long, of a white colour. See *Tab.* IV. *Birds*, N° 46.

The *penguin* of the Dutch is the *anſer Magellanicus* of Clufius. See PINGUIN.

PENGUIN, or *wild* ANANAS, *karatas*, in *Botany*. Its characters are theſe: it hath a tubulous bell-ſhaped flower, divided into three parts at the mouth, from whoſe calyx ariſes the pointal, fixed like a nail in the hinder part of the flower, which afterward becomes a fleſhy, almoſt conical fruit, divided by membranes into three cells, which

are full of oblong seeds. Linnæus has joined the *karota* and *mamma* to the *bromelia*.

This plant is very common in the West Indies, where the juice of its fruit is often put into punch, being of a sharp acid flavour. There is also a wine made of the juice of this fruit, which is very strong, but it will not keep good long, so is only for present use. This wine is very intoxicating, and heats the blood, therefore should be drank very sparingly. In England this plant is preserved as a curiosity; for the fruit seldom arrives to any degree of perfection for use in this country, though it often produces fruit in England, which has ripened pretty well; but if it were to ripen as thoroughly here as in its native country, it will be little valued, on account of its great austerity, which will often take the skin off from the mouths and throats of those people who eat it incautiously. Miller.

PENICILLA, thus called from *penicillus*, a *pencil*, which it is supposed to resemble in shape, in *Pharmacy*, a LOZENGE; or form of medicine made round by rolling.

PENICILLI *marini*, in *Natural History*, a sort of marine tubuli, or cases of sea-worms, making a distinct genus of those shells. They are defined to be shelly tubes, very slender, and terminating in the shape of a painter's pencil; many of them in their native shape adhering to stones, &c. on the sea-shores, by means of a soft and lax substance. Some of these are white and pellucid, others yellowish or brown; and the more common sort are about a finger's length, and about the thickness of a wheaten straw; and some are of a sort of funnel-like shape, and have their mouths surrounded by a sort of hairs, or filaments. These are called by some *proboscipsellum*, others are called *cauli*, and others *retalia*.

PENICILLUS, among *Surgeons*, is used for a TENT, to be put in wounds, or ulcers.

PENIDIUM, in *Pharmacy*, *loaf-sugar*.

Dr. Quincy uses the word *penidium*, for a kind of clarified sugar, with a mixture of starch, made up into little lumps.

PENINSULA, in *Geography*, a portion or extent of land, joining to the continent by a narrow neck or isthmus; the rest being encompassed with water.

The word is compounded of the Latin *pene* and *insula*, q. d. *almost island*, which the French pertinently enough render *presque-isle*.

Such is Peloponnesus, or the Morea; such also are Africa, Jutland, &c.

Peninsula is the same with what is otherwise called CHERSONESUS.

PENIS, in *Anatomy*, a part of the body, called, by way of eminence, the *member*, or *virile member*, as being one of the principal organs of generation in the male kind. See *Tab. Anat. (Splanch.) fig.* 1. *lit.* 2. *fig.* 8. *lit.* e b, &c. *fig.* 10. *lit.* d. *fig.* 13. *lits* c e, n n. *(Angeiol.) fig.* 1. *n.* 67.

It is fastened to the lower part of the os pubis, and the upper part of the scrotum; its body consists of the two corpora cavernosa, the corpus cavernosum urethræ, and the urethra itself.

The *corpora* CAVERNOSA *of the penis*, called also *corpora nervosa & spongiosa*, &c. have two distinct origins in the os pubis; whence they proceed, growing both in bulk and thickness, till they meet the *corpus* CAVERNOSUM of the urethra, where they join; leaving an interstice or channel for its passage along them; and thus they continue their progress, connected together by a membranous body called the *septum*, and terminating at length in the glans.

The *cavernous body of the urethra* includes the urethra or urinary passage. Its form, contrary to that of the other cavernous bodies, is largest at the two extremes, and smallest in the middle. That part included between the two origins of the cavernous bodies of the *penis*, Mr. Cowper calls the *bulb of the urethra*; its other extremity, being dilated, forms the body called the *glans*.

The *penis* receives arteries from the internal iliac branches, and umbilical arteries; and these at length subdividing into innumerable branches, from the capillary extremities thereof arise so many veins, in whose channels are apertures corresponding to so many cells, which, communicating with each other, empty themselves into larger [illegible] ducts, running on the superior surface of the *penis*; from whereof join the veins of the prepuce; others make one large trunk, called *vena penis*, which, reaching on the dorsum *penis* to the prostate, there divides, and enters the internal iliac on either side.

The *penis* has nerves from a trunk compoied of a coalescence of the third of the os sacrum, and a branch of the great crural: these, ascending the cavernous bodies, expand themselves over the upper surface thereof, and are thence distributed to all parts of the *penis*.

It has lymphaducts very numerous on its surface under the skin, which discharge themselves into the glandulæ inguinales.

The *penis* has two pair of muscles, and an odd one; the odd muscle is called ACCELERATOR *urinæ*.

The first pair of muscles are called the *erectores penis*. By their action the *penis* is sustained, and drawn towards the pubes; and, by the assistance of the suspensory ligament of the *penis*, the *vena penis* is applied to the transverse ligament of the ossa pubis, and the refluent blood hindered from passing that way, whereby the corpora cavernosa become distended.

The last pair of muscles are the *transversales penis*, which vary in various subjects, and are sometimes wanting: their use is to dilate that part of the cavernous body of the urethra, to which they are fastened.

The *penis* has also three glands, first discovered by Mr. Cowper; these all empty themselves into the urethra, and, from the tenacity of the liquor they separate, are called the MUCOUS *glands*. See also *Observations* GLANDS.

The whole compages of the *penis* is invested with a cellulose membrane, of admirable texture; which again is covered with a firm nervous coat, and that with a cuticula and cutis; the duplicature of the cutis on the glans makes the prepuce.

It is tied to the lower part of the glans by a ligament called the FRENUM. By another ligament, called *suspensorium*, the *penis* is held up to the ossa pubis.

The use of the *penis* is for evacuating the seed and urine. Indeed, Dr. Drake, from a view of its structure, thinks it originally intended for the former only; and that the conveyance of the urine was not considered by nature in the mechanism of this part.

He adds another use, viz. the incitement to venery, and the propagation of the species. In effect, without such an instrument, the seed of the most perfect animals could not be conveyed to the place of prolification: add to this, that an alternation of erection and flaccidity is absolutely necessary; the first for the performance of its office, the second for the security of the part. See ERECTION.

The cavernous body of the urethra is erected by the musculi accelatores, embracing the veins of its bulb.

Bleeding in the vena dorsalis of the *penis* is usually found to surpass all remedies whatever in abating inflammatory disorders of this member. This large vein, which runs along the back or upper side of the *penis*, being generally pretty much distended and conspicuous in an inflammation of this part, may be opened about the middle, and kept bleeding till the member becomes flaccid, and a sufficient quantity of blood be discharged proportionably to the urgency of the case; which done, a compress must be applied, and kept on by bandage. There must, however, be great caution in this operation not to injure the arteries or nerves which enter the *penis* near this vein, as also not to make the bandage too strict, by which the inflammation and symptoms may become worse than before. Heister's Surgery, p. 284.

PENIS *primus musculus*, in *Anatomy*, a name given by Vesalius and others, to a muscle of the *penis*, now generally known by the name of ACCELERATOR.

PENITENCE, *pœnitentia*, is sometimes used for a state of repentance, and sometimes for the act of repenting. See REPENTANCE, and IMPENITENCE.

PENITANCE is also used for a discipline, or punishment attending repentance; more usually called PENANCE.

PENITENCE also gives the title to several religious orders, consisting either of converted debauchees, and reformed prostitutes; or of persons who devote themselves to the office of reclaiming them. Of this latter kind is the *Order of* PENITENCE *of St. Magdalen*, established about the year 1272, by one Bernard, a citizen of Marseilles, who devoted himself to the work of converting the courtezans of that city.

Bernard was seconded by several others; who, forming a kind of society, were at length erected into a religious order by pope Nicholas III. under the rule of St. Augustine.

F. Gesnay adds, that they also made a religious order of the *penitents*, or women they converted, giving them the same rules and observances which they themselves kept.

Congregation of PENITENCE *of St. Magdalen at Paris*, owed its rise to the preaching of F. Tiseran, a Franciscan, who converted a great number of courtezans about the year 1492. Louis, duke of Orleans, gave them his house for a monastery; or rather, as appears by their constitutions, Charles VIII. gave them the hotel, called Bochaigne, whence they were removed to St. George's chapel, in 1572. By virtue of a brief of pope Alexander, Simon, bishop of Paris, in 1497, drew them up a body of statutes, and gave them the rule of St. Augustine.

To qualify a woman for admission, it was required, that the

she had committed the sin of the flesh. None were admitted who were above thirty-five years of age.

Till the beginning of the last century, none but *penitents* were admitted; but since its reformation by Mary Alexquio, in 1618, none have been admitted but maids, who, however, still retain the ancient name *penitents*.

PENITENTS, an appellation given to certain fraternities, or societies of persons who assemble together for prayers, make processions bare-footed, their faces covered with linen, and give themselves discipline, &c.

There are *White Penitents* in Italy, at Avignon, and at Lyons. There are also *Blue Penitents*, and *Black Penitents*, which last assist criminals at their death, and give them burial.

PENITENTS, or *Converts of the name of Jesus*, a congregation of religious at Seville, consisting of women, who had led a licentious life, founded in 1550.

This monastery is divided into three quarters: one for professed religious; another for novices; a third for those under correction.

When these last give signs of a real repentance, they are removed into the quarter of the novices, where, if they do not behave themselves well, they are remanded to their correction. They observe the rule of St. Augustine.

PENITENTS *of Orviete*, are an order of nuns, instituted by Antony Simonetti, a gentleman of Orviete. The monastery he built was at first destined for the reception of poor girls, abandoned by their parents, and in danger of losing their virtue.

In 1662 it was erected into a monastery, for the reception of such as, having abandoned themselves to impurity, were willing to take up, and consecrate themselves to God by solemn vows. Their rule is that of the Carmelites.

These religious have this in peculiar, that they undergo no noviciate. All required is, that they continue a few months in the monastery in a secular habit; after which they are admitted to the vows.

PENITENTIAL, *Pœnitentiale*, an ecclesiastical book, retained among the Romanists; wherein is prescribed what relates to the imposition of penance, and the reconciliation of *penitents*.

To the Capitulars of Charlemagne, the priests are enjoined to study well their *Penitentials*. There are various *Penitentials*, the Roman *Penitential*, that of Venerable Bede, that of pope Gregory III, &c.

PENITENTIARY, *pœnitentiarius*, an office, or tribunal, in the court of Rome, wherein are examined, and delivered out, the secret bulls, graces, or dispensations, relating to conscience, confession, &c.

The expeditions of the *penitentiary* are sealed up with red wax, and sent close; directed to the confessors.

PENITENTIARY is also an officer, or dignitary, in some cathedrals, vested with power from the bishop to absolve in cases reserved to him; on which account he is also called the *bishop's ear*.

In some places there is a *grand penitentiary*, and a *subpenitentiary*. Anastasius says, that pope Simplicius chose some among the Roman priests to preside over penitences. At present the pope has his *grand penitentiary*, who is a cardinal, and the chief of the other *penitentiary priests* established in the patriarchal churches of Rome, who consult him in all difficult cases.

He presides in the *penitentiary*, dispatches dispensations, absolutions, &c. and has under him a regent, and twenty-four proctors, or advocates of the facted *penitentiary*.

PENITENTS, in the church of Rome. See POENITENTES.

PENNANT, or PENDANT, in a *Ship*. See PENDANT.

PENNATA *folia*, winged leaves, among *Botanists*, are such leaves of plants as grow directly one against another, on the same rib or stalk: as those of ash, walnut-tree, &c. See LEAF.

PENNATULA, in *Natural History*. See SEA-PEN.

PENNEVISCH, in *Ichthyology*, a name given by some to the most common species of the fish called BAGRE, caught in the East and West Indies.

PENNON, or PENON, a standard with a long tail, anciently belonging to a simple gentleman; properly used as a guidon, to place over a tent.

It is opposed to the *banner*, which was square; and hence, when any one was to be made a banneret, the ceremony consisted in cutting off the tail of his *pennon*, and thus converting it into a banner.

PENNY, or PANY, in *Commerce*, an ancient English coin, which had formerly considerable course; but is now dwindled into an imaginary money, or money of account.

It is derived by Camden from *pecunia*; but others suppose that the word is formed from *pende, to weigh*, and it was sometimes written according to this origin, *pending*.

The ancient English *penny*, *penig*, or *pening*, was the first silver coin struck in England: nay, and the only one current among our Saxon ancestors; as is agreed by Camden, Spelman, Dr. Hickes, &c.

With them it was always the 240th part of their pound, and the true weight should have been about 22½ Troy grains. Some writers affirm, that the Saxons had likewise a half-penny and farthing, both of them probably of silver. Clarke on Coins, p. 248.

The *penny*, which in Ethelred's time was the 20th part of the Troy ounce, was equal in weight to our three-pence; five of them made one shilling, or sculling Saxon; and thirty a mark or mancuse, equal to our 7s. 6d. It was the largest silver coin in England, and retained this value till the reign of Edward III.

Till the time of king Edward I. the *penny* was struck with a cross so deeply indented in it, that it might be easily broke, and parted, on occasion, into two parts; thence called *half-pennies*; or into four, thence called *fourthings*, or *farthings*. But that prince coined it without indenture; in lieu of which he first struck round *half-pence* and farthings.

Stow, in his Annals, p. 290, observes, that *half-pennies* were first coined round, A. D. 1270, in the reign of Edward I. But historians have since discovered, that *half-pennies* of this kind were coined by Henry I. and that though the usual way in the reign of the two first Williams was to cut the *penny* into two for making of *half-pennies*, &c. yet it has been supposed that some few *half-pennies* might even then be coined round. Some few pieces of this kind are preserved in the cabinets of the curious. See Mr. Pegge's remarks on this subject in Gent. Mag. vol. xxvii. p. 104, &c.

Edward I. also reduced the weight of the *penny* to a standard; ordering that it should weigh thirty-two grains of wheat, taken out of the middle of the ear. Stat. 25 Edw. I. This *penny* was called the *penny sterling*. Twenty of these pence were to weigh an ounce, whence the *penny* became a weight, as well as a coin.

By 9 Edw. III. it was diminished to the twenty-fifth part of the Troy ounce; by 2 Hen. VI. it was the thirty-second part; by 5 Edw. IV. it became the fortieth, and also by 30 Hen. VIII. and afterwards the forty-fifth; but by 2 Eliz. sixty *pence* were coined out of the ounce, and during her reign fifty-two, which proportion is observed in our times.

The *penny sterling* is now disused as a coin, and hence subsists, but as a money of account, containing the twelfth part of a shilling, or the two hundred and fortieth part of a pound.

The course of exchange between England and France is settled on the foot of so many pence sterling, for a French crown of three livres.

The French *penny*, or denier, is of two kinds; the Paris *penny*, called *denier Parisis*; and the *penny* of Tours, *denier Tournois*. See DENIER.

The Dutch *penny*, called *penninck*, or *pening*, is a real money, worth about one fifth more than the French *penny Tournois*. The *penninc* is also used as a money of account, in keeping books by pounds, florins, and patards; twelve *penincs* make the patard; and twenty patards the florin.

At Hamburgh, Nuremberg, &c. the *pend* or *pfennig* of account is equal to the French *penny Tournois*. Eight of them make the kreutz; and forty the florin of those cities; and ninety the French crown, or 4s. 6d. sterling. See COIN.

PENNY, in *Ancient Statutes*, &c. is used for all silver money.

And hence the *two-penny*, *three-penny*, *hundred-penny*, *tithing-penny*, and *brithwal-penny*. See PENCE, &c.

PENNY-*earth*, in *Agriculture*, a term used by the farmers for a hard, loamy, or sandy earth, with a very large quantity of sea-shells intermixed in it; some of which being round and flat, and in some measure resembling pieces of money, have occasioned the earth's being called by this name. It is an earth not easily dug; but is usually undermined with pick-axes, and then falls in large lumps; which, with the shells, break to pieces, and leave the shells loose. It is prepared by breaking and mixing well with water, and then makes very desirable floors. The Jersey coursers comb-pots are also made of it, and the sides and tops of ovens are plastered with it; and being slightly managed, it combines into a coat almost as strong as plaister of Paris.

PENNY *bird*, *half*. See BIRD *half-penny*.

PENNY, *half*. See HALF-*penny*.

PENNY, *rere*. See RERE-*penny*.

PENNY, *shan*. See SCHAN-*penny*.

PENNY, *ward*. See WARD-*penny*.

PENNY *post*. See POST.

PENNY-*royal*, *pulegium*, in *Botany*. Its characters are these: the empalement of the flower is permanent, cut into

five parts; the flower is of the lip-kind; it hath one petal, with a short tube, divided at the brim into four parts; the helmet, or upper lip of the flower, is entire; the lower is cut into three equal segments; it hath four stamina, two being longer than the other, terminated by roundish summits, and a four-pointed germen, supporting an erect style, crowned by a bifid stigma; the germen afterward becomes four small seeds, sitting in the empalement of the flower. Miller enumerates three species.

Tournefort and Linnæus make the *penny-royal* a species of *menthæ*, or MINT.

The several sorts of *penny-royal* all propagate themselves very fast by their trailing branches, which take root at every joint; so that no more is required in their culture and propagation than to cut off and plant out these rooted branches: they should be planted at a foot distance every way, that they may have room to grow. The best season for this is in September, that the plants may be rooted before winter. They love a moist soil, and generally grow very fast.

Penny-royal is among the first plants in esteem in the present practice, as well as in former ages, as an attenuant and uterine. It promotes the menses, and forwards delivery. It is good in flatulencies and suppressions of urine, and by many is greatly recommended in dropsies, jaundices, and other chronic distempers. It communicates its virtues very readily to water in infusion; and its simple water, drawn by the alembic, has, perhaps, more virtue than any other kept in the shops. Its essential oil is sometimes, though rarely, used in the same intentions with the water.

The oil, and a simple and spirituous water strongly impregnated with it, by drawing off a gallon of water, or proof spirit, from a pound and a half of the dry leaves, are kept in the shops.

PENNY-*royal, Virginian*, a species of *satureia*. See SAVORY.

PENNY-*weight*, a Troy WEIGHT, containing twenty-four grains; each grain weighing a grain of wheat gathered out of the middle of the ear, well dried.

The name took its rise hence, that this was actually the weight of one of our ancient silver *pennies*.

Twenty of these *penny-weights* make an ounce Troy. A *penny-weight* of gold bullion standard, is worth four shillings; and of silver bullion, threepence. See GOLD and SILVER.

PENNY-*wort*. See NAVEL-*wort*.

PENNY-*wort, marsh* and *water*, *hydrocotyle*, in *Botany*, the name of a genus of plants of the *pentandria digynia* class; the characters of which are these: the flowers are disposed into small umbels, and are of the rosaceous kind, being composed of several petals, arranged in a circular order upon a cup, which afterwards becomes a fruit composed of two plain and semi-orbicular seeds.

The species of *hydrocotyle*, enumerated by Linnæus, are five.

PENON. See PENNON.

PENSA *libra*, in our *Ancient Customs*, a pound of money paid by weight, not by tale.

PENSILES *horti*, in *Antiquity*, gardens raised on arches by Nebuchadnezzar, king of Babylon, in order to gratify his wife Amytis, daughter of Astyages, king of Media. Q. Curtius makes them equal in height to the walls of the city, viz. fifty feet. They contained a square of four hundred feet on every side, and were carried up into the air in several terrasses, laid above one another, and the ascent from terrass to terrass was by stairs ten feet wide. The arches sustaining the whole pile were raised above one another, and it was strengthened by a wall, surrounding it on every side, of twenty-two feet in thickness. The floors of each of the terrasses were laid in the following manner: on the top of the arches were first laid large flat stones sixteen feet long, and four broad, and over them was a layer of reed, mixed with a great quantity of bitumen, over which were two tows of bricks closely cemented together by plaister, and over all were laid thick sheets of lead; and, lastly, upon the lead was laid the mould of the garden. The mould, or earth, was of such a depth, as to admit the largest trees to take root and grow; and it was covered with various kinds of trees, plants, and flowers. In the upper terrass there was an aqueduct or engine, whereby water was drawn up out of the river, for watering the whole garden. Diod. Sic. lib. ii. Strab. lib. xvi. Q. Curtius, lib. v. cap. 1, or, Prid. Conn. vol. i. p. 144.

PENSION, *pensio*, a yearly appointment, or sum of money paid any one for services or considerations already past.

That which in the two Temples is called a *parliament*, and in Lincoln's Inn a *council*, is in Gray's Inn termed a *pension*; viz. an assembly of the members of the society, to consult of the affairs of the house.

PENSIONS also denote certain annual payments of each member to the house, for certain occasions.

When a *pension writ* is issued, none sued thereby in the inns of court shall be discharged, or permitted to come into commons, till all duties be paid.

Hence a *pension order*, in the same inn, is a peremptory order against such of the society as are in arrear for *pensions*, and other duties.

PENSIONARY, or PENSIONER, a person who has a *pension*, appointment, or yearly sum, payable during life, by way of acknowlegement; charged on the estate of a prince, company, particular person, or the like.

In the Romish countries it is frequent to have *pensions* on benefices: these were anciently granted with a great deal of ease, under pretence of infirmities, poverty, &c. But since the twelfth century, these pretences were carried so far, that the incumbents, or titularies of benefices, were little more than farmers.

This obliged the spiritual powers to fix the causes, and the quantities, of *pensions*. *Pensions* are now only creatable by the pope, and are never to exceed one third of the revenue; two-thirds being still to remain to the incumbent.

PENSIONARY is also the appellation of the first minister of the states of the province of Holland.

The *pensionary* is chairman in assemblies of the states of that province; he proposes the matters to be consulted on, collects the votes, forms and pronounces the resolutions of the states; he also opens letters, confers with foreign ministers, &c.

He is charged with inspecting the finances, preserving the rights of the province, maintaining the authority of the states, and seeing to the observation of the laws, &c. for the good of the state. He assists in the college of deputy-counsellors of the province, who represent the sovereignty in the absence of the states; and he is perpetual deputy of the states-general of the United Provinces. His commission is only given for five years; after which it is deliberated whether or no it shall be renewed. Indeed there is no instance of its having been revoked. Death only puts a period to the functions of this important minister. Formerly he was called the *advocate of the province*: the title *pensionary* was only given at the time Barnevelt had the office. Grotius calls him in Latin *adjutor jurisperitus*; Meruis, *advocatus generalis*; and Matthæus, professor at Leyden, *consiliarius pensionarius*, which is the quality the states give him in their instruments.

PENSIONARY is also the first minister of the regency of each city, in the province of Holland.

His office is, to give his advice in matters relating to the government, either of the city in particular, or of the state in general; and in assemblies of the states of the province he is speaker in behalf of his city.

Yet the function of these *pensionaries* is not alike everywhere: in some cities they only give their advice; and are never found in assemblies of the magistrates, except when expressly called thither: in others they attend constantly; and in others they even make the propositions on the part of the burgher-masters, draw up their conclusions, &c. They are called *pensionaries*, because they receive an appointment or *pension*.

PENSIONERS, *gentlemen*, a band of gentlemen, whose business it is to guard the king's person in his own house; and who for that end wait in the presence-chamber.

They were first set on foot by king Henry VII. the number is forty; and each is obliged to keep three double horses, and a servant, who is to be armed; so that they properly make a troop of guards, and have accordingly been mustered by their own officers; but this part of duty, to which they are sworn, the king usually dispenses with.

Their officers are a captain, whose salary is 1000*l.* a year, lieutenant, with 500*l.* a year, standard-bearer, with 312*l.* a year, and clerk of the cheque, whose annual appointment is 120*l.* Their ordinary arms are gilt pole-axes, with which they attend the king to and from the chapel-royal; receiving him in the presence-chamber, or coming out of his private lodging; as also at all great solemnities. Their *pension* 100*l. per annum*.

To this band belong also a pay-master, harbinger, are-keeper, and messenger.

PENSIONS *of churches*, are certain sums of money paid to clergymen in lieu of tithes; and some churches have settled on them annuities, *pensions*, &c. payable by other churches: which *pensions* are due by virtue of some decree made by an ecclesiastical judge upon a controversy for tithes, by which the tithes have been decreed to be enjoyed by one, and a *pension* instead thereof to be paid to another; or they have arisen by virtue of a deed made by the consent of the parson, patron, and ordinary; and if such *pension* hath been usually paid for twenty years,

then it may be claimed by prescription, and be recovered in the spiritual courts; or a parson may prosecute his suit for a *penſion* by prescription, either in that court, or at common law, by a writ of annuity; but if he takes his remedy at law, he ſhall never afterwards ſue in the ſpiritual court. If the preſcription be denied, that muſt be tried by the common law. F. N. B. 51. Hard. 230. Ventr. 120.

PENSTOCK. See PEN.

PENTACEROS, in *Natural Hiſtory*, a name given by Linnæus, and ſome other authors, to a kind of *ſtella marina*, or *ſea ſtar-fiſh*, compoſed of five principal rays, with ſeveral tranſverſe hairy or downy proceſſes.

PENTACHORD, compounded of πεντε, *five*, and χορδη, *ſtring*, an ancient muſical inſtrument with five ſtrings.

The invention of the *penta-chord* is referred to the Scythians; the ſtrings were of bullocks leather, and they were ſtruck with a plectrum made of goats horn.

PENTACROSTIC, a ſet or ſeries of verſes ſo diſpoſed, as that there are always found five ACROSTICS of the ſame name, in five diviſions of each verſe.

PENTACTINODOS, in *Natural Hiſtory*, a name given by ſome authors to thoſe ſpecies of ſtar-fiſh which are compoſed of a body divided into five rays.

PENTADACTYLON, *five fingers*, in *Botany*, a name given by ſome authors to the *ricinus*, or *palma Chriſti*, from the figure of its leaf.

PENTADACTYLOS *piſcis*, the *five-fingered fiſh*, in *Ichthyology*, the name of a fiſh common in all the ſeas about the Eaſt Indies, and called by the Dutch there *vyf vinger viſch*.

It has this name from five black ſtreaks which it has on each ſide, reſembling the prints of five fingers. It grows to about a foot and a half long; its head ſmall in proportion to its body; its mouth is long, and its fins large, and reaching almoſt to its tail; its general colour is very bright and elegant, a yellow with an admixture of purple, and of a ſilvery gloſs; it has no ſcales, and is a dry but not ill-taſted fiſh.

PENTADACTYLOS-ASTER, in *Natural Hiſtory*, a name given by Linnæus, and ſome other authors, to a ſpecies of *ſtar-fiſh*, compoſed of a ſmall body, and five principal rays, which have each ſeveral proceſſes coming from them, covered with down.

PENTAEDROSTYLIA, in *Natural Hiſtory*, the name of a genus of ſpars.

The word is derived from the Greek πεντε, *five*, εδρα, *ſides*, and στυλος, a *column*.

The bodies of this genus are ſpars, in form of pentangular columns, terminated by pentangular pyramids at one end, and irregularly affixed at the other to ſome ſolid body.

Of this genus there are three known ſpecies.

PENTAGON, from πεντε, *quinque*, *five*, and γωνια, *angle*, in *Geometry*, a figure of five ſides, and five angles.

If the five ſides are equal, the angles are ſo too; and the figure is called a *regular pentagon*, as *fig.* 69. *Tab.* III. *Geometry*. Moſt citadels are regular *pentagons*.

The moſt conſiderable property of a *pentagon* is, that one of its ſides, e. g. DE, is equal in power to the ſides of a hexagon and a decagon inſcribed in the ſame circle ABCDE; that is, the ſquare of the ſide DE is equal to the ſum of the ſquares of the ſides D*d* and D*b*.

Pappus has alſo demonſtrated, that twelve regular *pentagons* contain more than twenty triangles inſcribed in the ſame circle, lib. v. prob. 45.

The dodecahedron, which is the fourth regular body, conſiſts of twelve *pentagons*.

PENTAGON, *projection, or perſpective of a*. See PERSPECTIVE.

PENTAGON-ASTER, in *Natural Hiſtory*, a name given by Linnæus, and other authors, to a kind of *ſtella marina*, or *ſtar-fiſh*, compoſed of five rays, with a number of tranſverſe proceſſes riſing from them, covered with a hairyneſs.

It is one of the general claſſes of the *ſtellæ crinitæ*, ſo called from this hairyneſs.

PENTAGONOTHECA, in *Botany*, the name given by Vaillant to the plant called by Linnæus, Plumier, Houſton, and others, PIPEWORT.

PENTAGRAPH, an inſtrument whereby deſigns, prints, &c. of any kind, may be copied in any proportion, without a perſon's being ſkilled in drawing.

The inſtrument is otherwiſe called a *parallelogram*.

The common *pentagraph* (repreſented *Tab.* II. *Miſcel. fig.* 27.) conſiſts of four braſs or wooden rulers, two of them from fifteen to eighteen inches long, the other two half that length. At the ends, and in the middle, of the longer rulers, as alſo at the ends of the ſhorter, are holes, upon the exact fixing whereof the perfection of the inſtrument chiefly depends. Thoſe in the middle of the long rulers are to be at the ſame diſtance from thoſe at the end of the long ones, and thoſe of the ſhort ones; ſo that, when put together, they may always make a parallelogram.

The inſtrument is fitted together for uſe, by ſeveral little pieces, particularly a little pillar, N° 1. having at one end a ſcrew and nut, whereby the two long rulers are joined; and at the other a little knot for the inſtrument to ſlide on. The piece, N° 2. is a rivet with a ſcrew and nut, whereby each ſhort ruler is faſtened to the middle of each long one. The piece, N° 3. is a pillar, one end whereof, being hollowed into a ſcrew, has a nut fitted to it. At the other end is a worm to ſcrew into the table; when the inſtrument is to be uſed, it joins the ends of the two ſhort rulers. The piece, N° 4. is a pen, portcrayon, or pencil, ſcrewed into a little pillar. Laſtly, the piece, N° 5. is a braſs point, moderately blunt, ſcrewed likewiſe into a little pillar.

Uſe of the PENTAGRAPH, or *parallelogram*. 1. To copy a deſign in the ſame ſcale or bigneſs as the original: ſcrew the worm, N° 3. into the table; lay a paper under the pencil, N° 4. and the deſign under the point, N° 5. This done, conducting the point over the ſeveral lines and parts of the deſign, the pencil will draw or repeat the ſame on the paper.

2. If the deſign be to be reduced—e. gr. into half the ſpace, the worm muſt be placed at the end of the long ruler, N° 4. and the paper and pencil in the middle. In this ſituation conduct the braſs point over the ſeveral lines of the deſign, as before; and the pencil at the ſame time will draw the copy in the proportion required; the pencil here only moving half the length that the point moves.

Hence, on the contrary, if the deſign be to be enlarged by one half, the braſs point, with the deſign, muſt be placed in the middle, at N° 5. the pencil and paper at the end of the long rules, and the worm at the other.

3. To enlarge or reduce in other proportions, there are holes drilled at equal diſtances on each ruler; viz. all along the ſhort ones, and half way of the long ones, in order for placing the braſs point, pencil, and worm, in a right line thereto. If the piece carrying the point be put in the third hole, the two other pieces muſt be put in its third hole.

If then, the point and deſign be placed at any hole of the great rulers, and the pencil with the paper at any hole of the ſhort ruler, which forms the ſame theorem, the copy will be leſs than half the original. On the contrary, if it be placed at one of the holes of that long ruler, which is parallel to the long ruler, the copy will be greater than half the original.

The conſtruction of this inſtrument requires a degree of accuracy, which moſt of our inſtrument-makers are ſtrangers to; for which reaſon there are very few of the inſtruments that ſucceed. Few will do any thing tolerably but ſtreight lines; and many of them not even thoſe. In order to prove that the figure deſcribed by a *pentagraph* is ſimilar to the given figure; let C, *fig.* 28. be the fixed centre of motion; P the pencil for tracing the given figure PP, and *p* the pencil which traces the other figure *p p*; *p*, &c. muſt be ſo adjuſted, that *p*, C and B, may lie in one ſtreight line; then, ſince B *p* : A *p* :: BP : AC, whatever be the ſituation of the *pentagraph*, the angles PCP and *p*C*p*, are vertical, and, therefore, PC*p* will in every poſition of the inſtrument be a right line; but PC : *p*C :: BA : A*p*, in each of the two poſitions in the figure, and conſequently the triangles PCP, *p*C*p*, are ſimilar; and PP : *p p* :: PC : *p*C :: BA : A*p*, or in a given ratio. Hence it appears, that by moving the pencil *p*, A*p* may be equal to BA, or leſs in any proportion; and conſequently *p p* may be equal to PP, or leſs, in the ſame proportion.

PENTAMETER, derived from πεντε, and μετρον, *meaſure*, in *Poetry*, a kind of verſe conſiſting of five feet or metres.

The two firſt feet of a *pentameter* may be either dactyls or ſpondees; the third muſt be always a ſpondee; and the two laſt anapeſts.

It is uſually joined to hexameters, in elegies, epiſtles, epigrams, and other little pieces. There is no work of conſtant *pentameters* alone.

PENTANDRIA, formed of πεντε, *five*, and ανηρ, *male*, in *Botany*, the fifth claſs of plants, which have hermaphrodite flowers, with five ſtamina or male parts in each. See *Tab.* I. of *Botany*, *Claſſ.* 5. and *Tab.* III. *Claſſ.* 5.

Of this claſs of plants, which comprehend ſix orders, diſtinguiſhed by the number of ſtyles, are the primroſe, willow herb, honeyſuckle, &c.

PENTANGLE, in *Geometry*, a figure with five angles.

PENTAPETALOUS *plants*, are ſuch whoſe flowers conſiſt of five leaves.

PENTAPETES, in *Botany*, a genus of the *monadelphia decandria* claſs. Its characters are theſe: the flower has a double ſupplement, the outer being ſmall, and compoſed

posed of three leaves; the inner cut into five parts, which are reflexed; it has five oblong petals, which spread open, and fifteen narrow stamina joined in a tube at their base, with long coloured summits that are erect and barren; between each of these are three stamina, terminated by oblong, erect summits; it has a roundish germen, with a cylindrical style the length of the stamina, crowned by a thick stigma; the germen becomes an oval, ligneous capsule, with five cells, filled with oblong seeds. Miller mentions one species, a native of India. Linnæus enumerates three species.

PENTAPHARMACUM, a medicine consisting of five ingredients: it has also been used in the same sense to all menses. Adrian the emperor was, as we are informed, particularly fond of a dish of five ingredients, called by this name. The ingredients were the udder of a sow, ham, peacock, brawn, and a fore of paste.

PENTAPHYLLOIDES, in *Botany*. See CINQUEFOIL.

PENTAPLEURUM, a name given by some botanical writers to the common small plantain, usually called *ribwort* and *sheatage quinquenervia*, from its leaves always having just five ribs running along them.

PENTAPOLIS, *Πεντάπολις*, in *Geography*, &c. a country wherein are five cities.

The most celebrated was the *Pentapolis Cyrenaica*, or *Pentapolis* of Egypt, whose five cities were Berenice, Arsinoe, Ptolemais, Cyrene, and Apollonia.

Among the ancient geographers and historians, we likewise read of the *Pentapolis* of Libya, now called *Mesurata*; the *Pentapolis* of Italy; and the *Pentapolis* of Asia Minor.

PENTAPTEROPHYLLUM, in *Botany*, a name by which Dillenius has called the MYRIOPHYLLUM of other authors, characterised under that name in the Genera Plantarum of Linnæus, p. 459.

PENTAPTOTON, in *Grammar*, a noun which has only five cases.

PENTASTICH, *pentastichon*, in *Poetry*, a stanza, or division of a poem, consisting of five verses.

PENTASTYLE, in *Architecture*, a work wherein are five rows of columns.

Such was the portico begun by the emperor Gallienus, and which was to have been continued from the Flaminian gate to the bridge Milvius, i. e. from the Porto del Popolo, to the Porte Mole.

PENTATEUCH, in the *Sacred Learning*, the five books of Moses at the head of the Old Testament; viz. Genesis, Exodus, Leviticus, Numbers, and Deuteronomy. The word is formed from *πέντε*, which signifies the same; compounded of *πεντ*, *five*, and *τεύχος*, *volume*.

Pere Simon, in his Hist. Crit. du V. Test. produces a great number of passages to prove, that Moses was not wholly the author of the *Pentateuch*, as we now have it. Indeed, those apparent interpolations at the end are sufficient to determine that point; it being absurd to suppose Moses the author of the account of his own death and burial, and of the comparison between him and the succeeding prophets in Israel.

These interpolated passages are usually attributed to Esdras; who, on his return from the Babylonish captivity, is supposed to have published the Old Testament, or at least a part of it, corrected and enlarged.

There are two famous *Pentateuchs*, or editions of the *Pentateuch*, which have a long time disputed the preference, both as to antiquity, and as to character; viz. that of the Jews, called the *Jewish* or *Hebrew Pentateuch*, written in the Chaldean or Assyrian character; and that of the Samaritans, written in the Samaritan or Phœnician character. Each is maintained to be the ancient Hebrew; though the generality of the critics give it in behalf of the latter.

Indeed, as to the point of matter, they are generally pretty conformable to each other; each has all the interpolated passages above mentioned, though the Samaritan has one or two more, which are not in the Hebrew: the first a passage in Deut. xxvii. 4. where an altar is enjoined to be built, and sacrifices to be offered, on mount Ebal, or rather mount Gerizim; which passage was doubtless foisted in to countenance the Samaritan worship, and represent it of equal antiquity with that of the temple of Jerusalem. See SAMARITANS.

But the grand difference is in the letter or character: the Jewish being in the Chaldean or Assyrian character, and the Samaritan in the Phœnician, i. e. the Canaanitish character; this latter seems to have an advantage over the vulgar Jewish *Pentateuch*. Yet Prideaux is of opinion, that the latter is only a transcript from the former out of the Chaldean into the old Hebrew character. One great reason he gives, is, that there are many variations in the Samaritan, manifestly occasioned by mistaking the similar letters in the Hebrew alphabet; which letters having no similitude in the Samaritan character, it is evident the variations must have arisen in transcribing from the vulgar Hebrew into the Samaritan; and not the contrary way.

Add to this, that Simon, Allix, and many other learned men, take the Chaldean or Assyrian character to have been the character always in use among the Jews; and the Samaritan or Canaanitish, or, as it is also called, the *old Hebrew* character, to have never been used by the Jews before the captivity, in any manner, either on books, or on medals.

Hence the *Pentateuch* must have been transcribed into that character; and that, probably, to render it legible to the inhabitants of Samaria, who, upon their introduction of the *Pentateuch*, might probably be versed in no other character.

Usher takes the Samaritan *Pentateuch* to have been compiled by Dositheus, a Samaritan, mentioned by Origen to have adulterated the *Pentateuch*. Dupin supposes it the work of some modern Samaritan, whom he imagines to have compiled it chiefly out of the different copies of the Palestinian and Babylonian Jews, and the Septuagint; because it sometimes agrees with one, and sometimes with another.

The Jews read the whole *Pentateuch* every year; and for this purpose they divide it into paragraphs or sections, which they distinguish into great and small. The great are those which they read in a week, of which there are fifty-four (see PARASCHE); and the small regard particular matters. Each greater section, which is denominated by the word with which it begins, is divided into seven parts, because they are read by so many different persons: the priest begins, afterwards a Levite; and in the choice of the other readers, respect is paid to the rank of the people. After the text of Moses, they read a paragraph of the PARAPHRASE of Onkelos. The books of the prophets are also divided in the same manner.

PENTATHLON, *πενταθλον*, in *Antiquity*, the five exercises performed at the Grecian games, and for which prizes were proposed.

These exercises were wrestling, darting, leaping, running, and quoit-playing. He who bore away the prize in them all, was called *pentathlos*; by the Latins, *quinquertio*; as the five exercises themselves were by those latter people called *quinquertium*.

PENTATONON, in the *Ancient Music*, a concord, by us called the redundant sixth.

It consists of four tones, and a major and minor semitone; whence the name, *pentatonon*, q. d. *five tones*.

PENTAUREA, a name given by some fabulous authors to a stone said to have been first found by Apollonius Tyaneus, and to possess the virtues of all the other stones, and to attract them all to it, as the magnet does iron.

PENTECONTARCHA, among the *Ancients*, the captain or commander of a galley, called PENTECONTEROS.

PENTECONTEROS, *πεντηκόντορος*, a vessel with fifty oars.

PENTECOST, *Πεντηκοστή*, Whitsuntide; a solemn feast of the church, held in commemoration of the descent of the Holy Ghost on the apostles; as described in the Acts. See WHITSUNTIDE.

It has its name from the Greek *πεντηκοστος*, q. d. *quinquagesimus*, *fiftieth*, because held on the fiftieth day after EASTER.

In the ancient church, *Pentecost* finished the Paschal time, or Easter season; wherein, as Tertullian, St. Jerom, &c. observe, Hallelujah was sung every where, the office celebrated standing, no fasting allowed, &c.

The Jews likewise had a feast they called *Pentecost*, or *Quinquagesimus*, solemnized in memory of the Law's being given to Moses, fifty days after their departure out of Egypt.

This was the second of the three grand festivals in the ecclesiastical year, at which all the males were to appear before the Lord at the national altar. It is called by several names in the Old Testament; as the Feast of Weeks, because it was celebrated seven weeks, or a week of weeks, after the Passover, or rather, after the first day of the feast of unleavened bread; the Feast of Harvest, according to Mede and Bochart, because, as the harvest began at the Passover, it ended at *Pentecost*; or, according to others, because at this feast the first fruits of their wheat harvest were brought and offered to God; and the Feast of First Fruits.

PENTECOSTALS, *Pentecostalia*, anciently, were pious oblations made at the feast of *Pentecost*, by the parishioners to their parish-priests; and sometimes by inferior churches or parishes, to the principal or mother-church.

These parish *Pentecostals* were also called *Whitsun-farthings*; and their sum was divided into four parts, of which one went to the priest, one to the poor, one towards the repair of the church, and one to the bishop of the diocese.

These

These are still paid in some few dioceses; being now only a charge upon particular churches, where by custom they have been paid.

PENTELASMIS, in the *History of Shell-fish*, the name of the *concha* ANATIFERA of some writers.

The *pentelasmis* is a genus of animals, composed of a shelly body, affixed to a fleshy and soft pedicle; the body is composed of five valves, and the pedicle is sometimes short, and sometimes long. The animal itself belongs to the TRITONS.

PENTELICUM *marmor*, in the *Works of the Ancients*, a name given to a very beautiful and goodly species of white marble, of which many of the columns and statues of larger size of the ancients were made: the Parian marble, from certain cracks and fissures in the strata, seldom affording blocks of more than five feet in length.

PENTESYRINGUS, in *Antiquity*, a sort of pillory, with five holes; wherein were fastened the legs, arms, and heads, of criminals, to prevent their stirring.

PENTEXOCHE, a name given by authors to a species of echinites, resembling the ripe fruit of a medlar, and thence called also *mespilum lapis*.

PENTHEMIMERIS, πενθημιμερὴς, compounded of πέντε, *five*, μέρος, *half*, and μέρος, *part*, in the Greek and Latin *Poetry*, part of a verse, consisting of two feet, and one long syllable.

PENTHORUM, in *Botany*, a genus of plants of the *decandria pentagynia* class, the characters of which are these: the cup is very small and permanent; it is composed of one leaf divided into five segments at the edges; there is no flower; the stamina are ten setaceous filaments of double the length of the cup; these are permanent; the antheræ are roundish, and fall off very quickly; the germen of the pistil is divided into five parts, and terminates in five styles, which are conic, erect, and of the length of the stamina; the stigmata are obtuse; the fruit is a capsule divided into five parts, and containing five cells; the seeds are numerous, small, and compressed. There is only one species.

PENTODRYON, in *Botany*, a name given first by the Greek writers, and after that by the Romans, to a kind of *hyoscyamus* or *nightshade*, which caused madness in those who eat of it. This was called by others *maniacum hyoscyamus*, and by some simply *manicum*.

PENTOPHTHALMOS, in *Ichthyology*, the name of an East Indian fish, approaching to the European *sparus*, or *bream-fish*, but larger, and called by the Dutch there *ogt-spys*. It has these names from five round spots in the tail-fin, resembling five eyes; it is of a yellowish colour, and is covered with a smooth skin, having no scales; its body is thick, its head small, its beak long; it has two red fins, and its tail is bluish; it is an inhabitant of the fresh waters, and is a very well-tasted fish.

PENULA. See PENULA.

PENULTIMA, or PENULTIMATE, formed from *pene*, and *ultimus*, *almost last*, in *Grammar*, denotes the syllable, or foot, immediately before the last.

Hence *antepenultimate* is that before the *penultimate*, or the last but two.

PENULTIMATE, in *Music*. M. Brossard will have it the same with what the Greeks called *paranete*; though others will not allow the *paranete* to be the *penultimate* chord, but the next to it.

PENULTIMATE *of the separate*, *paranete diezeugmenon*, is a name the ancients gave to one of the chords of their lyre or system, corresponding to the *d*, *la*, *re*, of the third octave of the modern system.

PENULTIMATE *of the acute*, *paranete hyperbolon*, a chord of the ancient system, answering to the *g*, *re*, *sol*, of the third octave of the modern system.

PENUMBRA, in *Astronomy*, a faint or partial shade, observed between the perfect shadow and the full light in an eclipse.

The *penumbra* arises from the magnitude of the sun's body: were he only a luminous point, the shadow would be all perfect; but by reason of the diameter of the sun it happens that a place which is not illuminated by the whole body of the sun, does yet receive rays from a part thereof.

Thus suppose S the sun (*Tab. Astron. fig.* 43.) and T the moon, and the shadow of the latter to be projected on a plane, as G H. The true proper shadow of T, viz. G H, will be encompassed with an imperfect shadow, or *penumbra*, H L and G E, each portion whereof is illuminated by an entire hemisphere of the sun.

The degree of light or shadow of the *penumbra* will be different in different parts, as those parts lie open to the rays of a greater or lesser part of the sun's body; thus from L to H, and from E to G, the light continually diminishes; and in the confines of G and H, the *penumbra* becomes loft and confounded with the total shade; as near E and L, it is confounded with the total light.

A *penumbra* muft be found in all eclipfes, whether of the fun, the moon, or the other planets, primary or fecondary; but it is moft conſiderable with us in eclipſes of the fun; as is the caſe here referred to.

In eclipſes of the moon, the earth is encompaſſed indeed with a *penumbra*; but it is only ſenſible to us on the earth near the total ſhadow: an obſerver placed on a plane, whereon the ſhadow falls, might obſerve the whole *penumbra*, as in eclipſes of the ſun. Thus an eye placed at I or F, would only ſee the ſemidiameter of the ſun; the reſt being hid behind the moon. Going from I towards H, more and more of the ſun is hid, till it be loſt in the ſhadow itſelf, &c.

Hence we have eclipſes of the ſun when the ſhadow never touches the earth, provided the *penumbra* do but reach it; and hence there is a difference obſerved in eclipſes of the ſun, as the ſhadow itſelf, or a greater or leſs degree of the *penumbra*, paſſes over a place. But eclipſes of the moon appear the ſame in all places where they are viſible.

When the ſhadow itſelf falls on the earth, the eclipſe is ſaid to be total or central; when only the *penumbra* falls on it, the eclipſe is ſaid to be partial.

The *penumbra* extends infinitely in length, inaſmuch as to each point of the diameter of the ſun, there anſwers a ſpace infinite in length, into which no rays enter from that point, though there do from others. Two rays drawn from the two extremities of the earth's diameter, and which proceed ſtill diverging, form the two edges of the *penumbra*; which, of conſequence, is continually growing in width, and is infinite alſo in this ſenſe. All that infinite ſpace is the *penumbra*; except the triangle of the ſhadow included in it.

The figure of this ſpace comprehending the ſhadow, is a trapezium, one of whoſe ſides is the diameter of the earth; the oppoſite ſide parallel thereto is an infinite line, i. e. the width of the *penumbra* projected to infinity; and the two other ſides are two rays drawn from the two extremities of the diameter of the ſun, through thoſe of the diameter of the earth, and which, prolonged back beyond the ſun, will interſect in a certain point, making an angle equal to the apparent diameter of the ſun; which angle may be called the *angle of the penumbra*.

Now the *penumbra* will be the greater, as this angle, or which is the ſame thing, as the ſtar is greater, the planet remaining the ſame; and if the diameter of the planet be increaſed, the ſtar remaining the ſame, it will be the ſame as if the diameter ſtill receded from the angle of the *penumbra*.

In order to determine how much of the ſurface of the earth can be involved in the *penumbra*, let us ſuppoſe the apparent ſemidiameter of the ſun to be the greateſt, or about 16′ 32″, which is when the earth is in her perihelion. Let A B D (*Tab. Aſtronom. fig.* 44.) be the earth, I, the moon, and A M B half the angle of the cone, which is equal to 16′ 32″; whence we ſhall find its height I M = 584 ſemidiameters of the earth (ſee SHADOW). Let the moon be in her apogee, and therefore, at her greateſt diſtance from the earth, which is 64 ſemidiameters of the earth, and T M = T I + I M = 122½ ſemidiameters. But T B : T M :: ſine of T M B : ſine of M B N or M B T: and T B : T M :: 1 : 122½, and the angle T M B = 16′ 23″, therefore the angle M B N = 35° 42′ = T M B + M T B. Conſequently M B N — T M B = (35° 42′ — 16′ 23″ =) M T B = 35° 25′, which is the meaſure of the arc A D; whoſe double 70° 51′ is equal to the arc C A D, or about 4900 Engliſh miles. See ECLIPSE.

M. de la Hire examines the different degrees of the *penumbra*, and repreſents them geometrically by the ordinates of a curve, which ſhall be among themſelves, as the ſeveral parts of the ſun's diſc, wherewith a body placed in the *penumbra* is enlightened.

PENY. See PENNY.

PEONY, in *Botany*. See PIONY.

PEP and PEPIA. See PIP.

PEPASMUS, πέπασμος, in *Medicine*, the digeſting and ripening of morbid humours.

PEPASTIC, or PEPTIC, πεπαστικὸς, or πεπτικὸς, formed from πέπτειν, *to digeſt or ripen*, in *Medicine*, a kind of medicament of the conſiſtence of a plaiſter, proper to bring vitious and corrupt humours to a head, and diſpoſe them for ſuppuration.

Butter, roots of mallows, of fleurs-de-lis, onions, and leaves of oxylapathum, are eſteemed good *pepaſtica*, or maturatives.

The word is alſo uſed for ſuch medicines as promote the digeſtion of food in the ſtomach.

PEPITA, in the *Materia Medica*, a name given by ſome authors to the *nux ſancti Ignatii*, or *St. Ignatius's nut*.

PEPLION, or PEPLOS, names given by the antients to medicines which they uſed as brisk cathartics to purge off the bile and other humours.

PEPLIS, in *Botany*. See *Water* PURSLANE.

PEPLIUM, in *Botany*, a name given by the ancient Greek writers to a ſhrub which had pinnated leaves and papilionaceous flowers. It is tranſlated by many *ſena*; but this does not appear certainly to be right; the ſeveral ſpecies of *colutea* agree as well with this deſcription as the *ſena*, and they have indeed been called *ſena* by many; probably it was one of theſe.

PEPLUS, πεπλος, among the ancients, a kind of garment worn by women.

The *peplus* was a long robe that reached to the feet, without any ſleeves, and ſo exceeding fine, that the ſhape of the body could eaſily be diſcovered through it.

The *peplus* of Minerva is very famous among ancient mythologiſts. The Athenians uſed a great deal of ceremony in making the *peplus*, and dreſſing the ſtatue of this goddeſs with it.

PEPLUS, in *Botany*, a name given by ſome authors to the ſmaller round-leaved ſpecies of *tithymal*, or SPURGE, as they call the narrow-leaved ones *eſula*.

PEPO, in *Botany*. See PUMPKIN.

PEPPER, or *Lenard's Tail*, in *Botany*, *piper*, a genus of the *diandria trigynia* claſs. Its characters are, that the flowers are cloſely faſtened to a ſingle ſtalk, and have no complete cheath; theſe have no petals nor ſtamina, but have two ſummits oppoſite to the robe of the germen, which are roundiſh; they have a large oval germen, but no ſtyle, crowned by a prickly triple ſtigma; the germen afterwards becomes a roundiſh berry, with one cell, containing one globular ſeed. Miller enumerates fourteen, Linnæus twenty ſpecies. From a ſpecies of this genus is obtained the black *pepper*, which is an aromatic fruit of a hot dry quality, chiefly uſed in the ſeaſoning of meats.

It is the product of a ſhrub, growing in ſeveral parts of the Eaſt Indies, chiefly Java, Sumatra, Malacca, and the coaſts of Malabar. The plant is very weak, and of the reptile kind; and for that reaſon uſually planted at the foot of the larger trees, as the areca, cocoa, &c.

Pepper grows in bunches or cluſters, at firſt green; as the grains ripen, they grow reddiſh; and, at laſt, after being expoſed a while to the ſun, and, probably, gathered before perfect maturity, they become black, in the condition we ſee them.

The fruit is gathered in November. It muſt be choſen large, full, not wrinkled, without duſt, with a good many white grains in it; and care muſt be taken the largeſt borries have not been picked out, as is often done, to make white *pepper*.

PEPPER, *white*, *piper album*, is the fruit of the ſame plant with the black, and is prepared from it by moiſtening it with the ſea-water, and then expoſing it in the ſun, and caſting away the outer bark, which, abandoning the grains, leaves them white.

Indeed M. Deſlon, a late traveller, ſays, they ſtrip off the ſkin, by beating it before it be quite dry; or by ſoaking it in water after it has dried, and then beating it.

Many authors, and among the reſt Pomet, will have the *white pepper* to be natural, and the fruit of a different plant from the black; but M. Deſlon, who expreſly declares the contrary from his own long experience, ſeems to put the matter paſt doubt.

White pepper muſt be choſen after the ſame manner as black; with this further care that it hath not been dyed white.

Pepper that is ſold ground, is very apt to be ſophiſticated; the black with burnt cruſt of bread, &c. the white with beaten rice.

Of theſe pungent ſpices the black ſort is the hotteſt and ſtrongeſt, and moſt commonly uſed for medicinal, as well as culinary purpoſes. *Pepper*, infuſed in water, impregnates the menſtruum pretty ſtrongly with its flavour, but weakly with its taſte: the eſſential oil, which riſes to the ſurface of the water in boiling it, is thin, light, and limpid; in ſmell, ſtrong and agreeable; and in taſte, mild. The quantity of extracts from both kinds of *pepper* is nearly the ſame; that by rectified ſpirit amounting to about one-eighth, and the watery to near one half their weight. But thoſe of the white are weaker than the other ſort.

PEPPER, *long*, *piper longum*, is thus denominated from its form, which is cylindrical and about an inch and a half in length; it conſiſts of an aſſemblage of grains, or ſeeds, joined cloſe to one another, of a browniſh colour, bordering without on red, and within on black; and grows by a long pedicle to a plant, like that of the black *pepper*, and of the ſame genus, but lower, and its leaves ſmaller and greener. Its taſte reſembles that of the former, but it is hotter and more pungent; and its ſpirituous extract is proportionably more fiery: in its pharmaceutic properties, it entirely agrees with the former.

There are three kinds of this *pepper*, that of the Eaſt Indies, that of America, and that of Ethiopia, called alſo grain of Zelim; though the firſt alone is the proper *long pepper*, the reſt reſembling it but little.

It muſt be choſen new, large, heavy, well filled, hard to break, and without duſt or mixture: it chief uſe is in medicine, where it enters ſeveral Galenical compoſitions; among the reſt Venice treacle.

PEPPER, *Barbary*, *bell*, *bird*, and *bonnet*. See CAPSICUM.

PEPPER, *Guinea*, *piper Indicum*, obtained from a ſpecies of the CAPSICUM, is a reddiſh pod, of a coral colour, much eſteemed by the Americans, from among whom it is brought, and by them called *chile*, and by the French, *garden coral*.

It is a native of the Eaſt and Weſt Indies, and raiſed in ſome of our gardens.

It is now cultivated pretty commonly in France, eſpecially in Languedoc, where it is uſed in making vinegar, and is likewiſe comfited with ſugar. It muſt be choſen new, in large pods, dry, entire, and red.

In taſte it is extremely pungent and acrimonious; it gives out its pungency to rectified ſpirit, together with a pale yelloviſh red tincture. It is ſometimes given, in ſmall quantities, as one of the higheſt ſtimulants in cold phlegmatic temperaments, in ſome paralytic caſes, to relaxations and inſenſibility of the ſtomach, and for promoting the efficacy of aloetic medicines, and the deobſtruent gums in uterine diſorders.

It is uſed principally at table: a ſpecies of it, called in the Weſt Indies *bird-pepper*, is the baſis of the powder brought from thence under the name of *Cayenne pepper*. See CAPSICUM.

There are four kinds of this; the firſt called by the Americans *cilliehotes*; the ſecond, very ſmall, *chilterpin*; both of a very pungent taſte; the third, *tonalchiles*, moderately hot, and eaten by the natives like other fruit with bread; the fourth, *chilpelagua*, moderately pungent, ſometimes uſed by the Spaniards in the preparation of chocolate; there is alſo a fifth kind, called *agy*, growing in Peru.

PEPPER, *Jamaica*, called by the Dutch *amomi*, by the Spaniards *pimienta de Jamaica*, is the fruit of a tree, the *myrtus foliis alternis* of Linnæus, growing plentifully in Jamaica, and other American iſlands.

It is a real aromatic, and may ſupply the defect of cloves, nutmeg, and cinnamon; whence it is called alſo by the Engliſh, *all-ſpice*. The French call it the *round clove*, from its round ſhape, and its taſte reſembling that ſpice. See PIMENTO.

PEPPER, *Ciapa*, *pimienta de Ciapa*, a name given by the Spaniards to a ſort of ſpice which they diſcovered in Ciapa, a province of Guatimala, in New Spain, and of which they were at firſt very fond, both in food and medicine.

In medicine it is a very good cephalic and ſtomachic. It is recommended very ſtrongly alſo by ſome of the Spaniſh writers, as a cure for the epilepſy and gutta ſerena; but thoſe who tried it in theſe caſes do not confirm ſuch accounts.

The deſcriptions we have of it are, that it has the taſte of cloves, *pepper*, cinnamon, and ginger, all blended together; and Redi is of opinion, that it is no other than our PIMENTO, or Jamaica *pepper*.

PEPPER, *Indian*. See *Guinea* PEPPER and CAPSICUM.

PEPPER, *poor-man's*, a name ſometimes given to the *lepidium*. See DITTANDER.

PEPPER, *wall*, a name ſometime given to a ſpecies of SEDUM, or *leſſer houſe-leek*.

PEPPER, *water*, a ſpecies of *polygonum*, or KNOT-*graſs*, in the Linnæan ſyſtem. Miller and others make it a ſpecies of the *perſicaria*, or ARSMART.

PEPPER-*graſs*. See PILULARIA.

PEPPER-*mint*, the name of a ſpecies of MINT.

PEPPER-*wort*, a name by which ſome call the *lepidium*, or DITTANDER.

PEPPER-*bird*, the Engliſh name of the *rhamphaſtos*, with a yellow rump, otherwiſe called TOUCAN.

PEPPER-*muſhroom*, in *Botany*, a name given by Dr. Liſter to a new ſpecies of fungus, diſcovered by him in the woods of Yorkſhire, whoſe juice is acrid and hot as *pepper*. This is ſomewhat larger than the common eſculent muſhroom, but of the ſame ſhape with that, having a round head and open gills underneath. The head is very fleſhy, and the pedicle alſo is ſolid, not hollow, as in moſt other of the large funguſes: any part of this muſhroom being cut or broken, it bleeds very freely a white milky juice, like that of the tithymals. This juice taſtes like *pepper*, only that it is much *hotter*. It is not viſcous or clammy to the touch, and the air does not much diſcolour it; nor does it render the blade of the knife, with which it is cut, black, as moſt other vegetable juices do. When let out of the plant it very ſoon con-

concretes into a firm and dry mass, making a sort of cake; and when thus dried into a solid substance, it retains its white colour and pungent taste. It is very remarkable, that this mushroom, though so hot to our tongues as not to be endured, yet is so well suited to the palates and nature of certain insects, that they can not only feed on it, but live comfortably in the midst of it. The yellow naked fusil feeds greedily on the plant while growing, and the stalks of it at such times as the juice is sharpest of all, that is, while it is growing to the full size, are full of the maggots and worms hatched from the eggs of flies, deposited there for a nidus and food for them in that state. The juice has a great affinity with euphorbium, and may be brought into medicinal use, perhaps, to very good purpose.

John Bauhine describes a mushroom much resembling this, but smaller and less fleshy; and the Prussians and Polanders have a sort of great mushroom, which they call GROGRISHYE, which agrees with this in many particulars; but it is larger and thicker. Phil. Trans. N° 69.

PEPPER-*water*, a liquor prepared by the curious for examination by the *microscope*, as always affording a great number of small animals.

The method of preparing it is this: put common black *pepper*, grossly powdered, into an open vessel, so as to cover the bottom of it half an inch thick, and put to it rain or river water, till it covers it an inch, shake or stir the whole well together, at first mixing, but never stirring it afterwards: let the vessel be exposed to the air, uncovered; and in a few days there will be seen a pellicle or thin skin swimming on the surface of the liquor, appearing of several colours.

This is a congeries of multitudes of small animals; and being examined by the microscope, will be seen all in motion: the animals, at first sight, are so small as not to be distinguishable, unless to the greatest magnifiers; but they grow daily till they arrive at their full size. Their numbers are also continually increasing, till the whole surface of the liquor is full of them, to a considerable depth. When disturbed they will sometimes all dart down to the bottom, but they soon after come up to the surface again. The skin appears soonest in warm weather, and the animals grow the quickest; but in the severest cold it will succeed, unless the water freezes.—Baker's Microscope, p. 71.

About the quantity of a pin's head of this scum, taken up on the nib of a new pen, or the tip of a hair-pencil, is to be laid on a plate of clear glass; and if applied first to the third magnifier, then to a second, and finally to the first, will shew the different animalcules it contains, of several kinds and shapes as well as sizes. Phil. Trans. N° 284.

The animalcules discoverable in this liquor, are principally of six kinds. 1. The largest kind of all is in length about the diameter of a hair, and of scarce a fourth part of that measure in breadth; they are very thin and transparent, but their back is darker than their belly; they turn about very frequently and nimbly in the water; their sides are fringed with a great number of minute feet, which are seen principally at the two ends; and at one end there are also some bristles longer than the feet, which make a sort of tail. They are very nimble, and walk as well as swim, and will climb up a hair, if put in among them.

2. There is a smaller sort, whose length is about a third of a hair's breadth; but their tail is five or six times as long as their body. This they either carry strait, or in a spiral form; and at the other end they thrust out a sort of bearded tongue: these make a constant current of water toward them.

3. There is a smaller sort than these, which are sometimes seen of an oval figure, and sometimes long and flat like a flounder: these also have feet, which are plainly seen when the water is evaporating.

A fourth kind appear like slender worms, fifty times as long as broad: their thickness is not above the hundredth part of a hair's breadth; and they move with equal ease either forward or backward. There are a fifth sort extremely minute and round; and a sixth kind which are longer than these, but not larger; and probably there may be yet many kinds not discovered. These small animals are easily destroyed; a little dissolved salt or sugar, or spirit of vitriol, or even spittle, will kill them; and in the drying away of the waters many of them burst. Phil. Trans. N° 303.

PEPSIS, πεψις, which signifies *boiling*, in *Medicine*, the COCTION or DIGESTION of foods or humours in the body.

PEPTIC, in *Medicine*. See PEPASTIC.

PEPUZIANS, a sect of ancient heretics, otherwise called PHRYGIANS, or CATAPHRYGIANS.

They had their name *Pepuzians*, from a pretence that Jesus Christ appeared to one of their prophetesses in the city of Pepuza in Phrygia, which was their holy city.—See QUINTILIANS.

PER *accidens*. See ACCIDENS.

PER ACUTUM *mensuram*. See MENSURUM.

PER ÆQUATORES, among the Romans, officers appointed to regulate the *census* according to every man's circumstances, by easing those that were overcharged, and raising the taxation if too low.

PERAMBULATION *of the forest*, the surveying, or walking about a forest, or the limits of it, by justices or other officers thereto appointed, to set down the meres and bounds thereof, and what is within the forest, and what without.

PERAMBULATION *of parishes* is annually performed in order to preserve those bounds of parishes which have been long settled by custom; and because these *perambulations* were performed in the rogation week, the rogation days were anciently called *gang-days*, from the Saxon *gan*, or *gangen*, *to go*.

In the *perambulation* of a parish, no refreshments can be claimed by the parishioners, as due of right from any houses or lands in virtue of custom.

These *perambulations* were, in the times of popery, accompanied with great abuses, viz. with feastings and superstition; being performed in the nature of processions, with banners, hand-bells, lights, staying at crosses, and the like; and, therefore, when processions were forbidden, in the reign of queen Elizabeth, it was required, that, for the retaining of the *perambulation* of the circuits of parishes, the people should, once in the year, at the usual time, with the curate and the substantial men of the parish, walk about the parishes, and at their return to church make their common prayers, &c.

PERAMBULATIONE *faciendâ* is a writ commanding the sheriff to make *perambulation*, and set down the bounds of two or more manors, whose limits are not so well known.

The writ *de perambulatione faciendâ* is only issued where the lords of both manors agree to have such perambulation. If one of them refuse, the other must seek his remedy by a writ *de* RATIONABILIBUS *divisis*.

PERAMBULATOR, in *Surveying*, an instrument for the measuring of distances; called also PEDOMETER, *way-wiser*, and *surveying wheel*.

Its advantages are its handiness and expedition: its contrivance is such, that it may be fitted to the wheel of a coach; in which state it performs its office, and measures the road without any trouble at all.

There is some difference in its make: that now most usual, and most convenient, is as follows.

PERAMBULATOR *or way-wiser, construction of the*. The *perambulator* (represented *Tab.* II. *Survey. fig.* 33.) consists of a wheel two feet seven inches and a half in diameter; consequently half a pole, or eight feet and three inches in circumference. On one end of the axis is a nut, three quarters of an inch in diameter, divided into eight teeth, which, upon moving the wheel round, fall into the eight teeth of another nut *c*, fixed on one end of an iron rod Q, and thus turn the rod once round, in the time the wheel makes one revolution. This rod, lying along a groove, in the side of a carriage of the instrument, has at its other end a square hole, into which fits the end *b* of the little cylinder P. This cylinder is disposed under the dial-plate of a movement, at the end of the carriage B, in such manner as to be moveable about its axis. Its end *a* is cut into a perpetual screw; which falling into the thirty-two teeth of a wheel perpendicular thereto, upon driving the instrument forward, that wheel makes a revolution, each fifteen poles. On the axis of this wheel is a pinion with six teeth, which, falling into the teeth of another wheel of sixty teeth, carries it round every hundred and sixtieth pole, or half a mile.

This last wheel then carrying a hand or index round with it, over the divisions of the dial-plate, whose outer limb is divided into one hundred and sixty parts, correspondling to the one hundred and sixty poles, points out the number of poles passed over. Again, on the axis of this last wheel is a pinion containing twenty teeth, which, falling into the teeth of a third wheel that has forty teeth, drives it once round in three hundred and twenty poles, or a mile. On the axis of this wheel is a pinion of twelve teeth, which, falling into the teeth of a fourth wheel, that has seventy-two teeth, drives it once round in twelve miles.

This fourth wheel carrying another index over the inner limb of the dial-plate, divided into twelve, for miles, and each mile subdivided into halves, quarters, and furlongs, serves to register the revolutions of the other hand, and to keep account of the half-miles and miles passed over, as far as twelve miles.

PERAM-

PERAMBULATOR, or *surveiser*, *ufe of the*. The application of this inftrument is obvious from its conftruction. Its proper office is in the furveying of roads, and large diftances, where a great deal of expedition, and not much accuracy, is required. It is evident, that driving it along, and obferving the hands, has the fame effect as dragging the chain, and taking account of the chains and links. See CHAIN.

PERANEMA, in *Ichthyology*, the name of a Braſilian fiſh, of the ſize of the pearch, being ten or eleven fingers in length, and about three fingers broad in the broadeſt part.

Its mouth is large and round, and has no teeth, but ſeveral very rough and ſharp prominences; its eyes are large, and it has one long fin running down the back, which is ſupported by rigid and prickly rays; its tail is not forked; its whole body is a ſilvery white, with a faint bluſh of red; its ſcales are extremely ſmall, and of a triangular figure, and its belly is very white: it is a ſea-fiſh, and is wholeſome and well-taſted.

PERANTES, the name of a ſtone mentioned with many idle ſtories of its origin, by the writers of the middle ages.

It ſeems originally to have been only a corruption of the word *peantides*, a name by which the ancients ſeem to have called our *ſtalactites* or *dropſtone*.

PER ARSIN, and *theſin*, in *Muſic*. *Per* is a Latin prepoſition, ſignifying *by*, *during*; *arſis* and *theſis* are Greek words, the firſt whereof ſignifies elevation or riſing; the ſecond poſition, or ſetting down.

Per theſin, then, ſignifies in falling, or during the latter time of the meaſure; *per arſin*, in riſing, or in the firſt time of the meaſure. A ſong, counter-point, fugue, &c. are ſaid to be *per theſin*, when the notes deſcend from acute to grave: on the contrary, they are *per arſin*, when the notes aſcend from grave to acute. See ARSIS.

Fugue per ARSIN and *theſin*. See FUGUE.

PERCA, in *Ichthyology*. See PEARCH.

PERCA *Ambimenſis*, in *Ichthyology*, the name of a freſh water fiſh, ſomewhat reſembling our pearch, but differing in that it is of a brown colour, and has ſeveral blue lines under its ſnout, and ſome blueneſs in the adjoining fins, but its back and belly fins are green. It is caught in the lakes and rivers of freſh-water, at Amboyna, and is a very delicately taſted fiſh.

PERCEPTION, *perceptio*, in *Logic*, the act of *perceiving*, or apprehending a thing, without making any affirmation, or negation. See APPREHENSION and CONCEPTION.

Some writers have confounded IDEA and *perception*, whereas theſe are clearly diſtinguiſhable as the cauſe and effect; the one is an operation of the mind, and the other the reſult of that operation.

The faculty or power of *perception*, conſtitutes what we call the UNDERSTANDING.

The faculty of *perception* ſeems to be that which conſtitutes the diſtinction between the animate and inanimate parts of the creation. Vegetables, ſome of them, have ſome degree of motion, and upon different applications of other bodies, alter their figures and motions; ſo as hence to obtain the name of *ſenſitive* plants; which, however, is the reſult of mere mechaniſm, and no otherwiſe produced than the ſhortening of a rope by the eſſuſion of water. But *perception* is a metaphyſical principle, and is found in ſome degree in all animals; and in them alone.

PERCH, *pole*, or *rod*, a long meaſure, much uſed in furveying and meaſuring of land.

Among the old Romans, and ſtill among geometricians, the *pertica*, *perch*, is ten feet; and they otherwiſe call it the *decem*, *funis*, and *decempeda*.

In England, the ſtatute *perch* contains ſixteen feet and a half; and for coppice-woods, &c. eighteen feet. Forty ſquare *perches* make a rod, and one hundred and ſixty an acre.

The cuſtomary *perch* is various in various counties: in Staffordſhire it is twenty-four feet; in the foreſt of Sherwood twenty-one, the foot there being eighteen inches, the meaſure whereof is marked in the chancel wall of Edwynſtow, and in the church of St. Mary in Nottingham.

In Herefordſhire, a *perch* of walling is ſixteen feet and a half; a *perch* of ditching twenty-one feet, &c. In France, the *perch* is from eighteen to twenty-three, and even twenty-ſeven, of their feet.

PERCH, or POLE, of a wheel carriage, is faſtened to the middle of the hind axle-tree, and paſſes between the fore axle-tree and its bolſter, being ſecured by the pole-pin, ſo as to move about it, and connecting the fore and hind carriages together. Thus, AB (*Tab.* II. *Miſcellany*, *fig.* 29) repreſents the *perch* paſſing under the body of a coach, and faſtened to the hinder axle at C. DE repreſents the fore axle, and W, W, the ſections of the wheels. It is plain, that in turning a carriage of this conſtruction, the larger the wheel, the ſooner it will ſtrike againſt the *perch*; and in the caſe repreſented in the figure, the wheel ſtrikes againſt the *perch* when the axle makes the angle deſcribed by the dotted lines D, D. On this account, the fore-wheels are uſually made ſmaller than the hind ones; and notwithſtanding this diminution of ſize, the turning of ſuch carriages is attended with great inconvenience. In order to remedy this, many expedients have been adopted, particularly in coaches, chariots, and other light vehicles, to which the crane-necked *perch* could be conveniently applied. But as this could not be adapted to the heavier kinds of carriages, and is, beſides, attended with a very conſiderable expence, Mr. Jacob has contrived a more ſimple and leſs expenſive method of attaining the propoſed end. For this purpoſe, inſtead of fixing the pin, paſſing through the *perch* at P, in the centre of the axle, he brings a projection backwards from it, as in *fig.* 30 and makes the axle with the wheels turn round the pin paſſing through that projection at P; in which caſe the angle which the wheel makes with the *perch*, becomes conſiderably leſs, before the wheel ſtrikes againſt it. So that a larger wheel, in a carriage of this conſtruction, will not touch the *perch* ſo ſoon as a ſmaller wheel in a carriage of the ordinary conſtruction; and whatever be the ſize of the wheels, the carriage will turn ſhorter than if it were conſtructed in the former method, with the centre-pin in the centre of the axle. This conſtruction is attended with no additional expence, is applicable to all kinds of carriages, and is ſtronger than the uſual mode of conſtruction. Jacob's Obſ. on the Structure and Draught of Wheel Carriages, 4to. 1773. p. 59.

PERCHANT, among *Fowlers*, a DECOY-*bird*, which the fowler has faſtened by the foot, and which flutters about the place where it is tied, to draw other birds to it, and give the fowler an occaſion of catching them.

PERCOLATION. See FILTRATION.

Many have attempted the condenſing of wines by *percolation*, or ſeparating from them that ſuperfluous moiſture or water, which dilutes them below the true ſtandard of vinous liquors, in order to make them richer, and fitter for keeping; but it does not appear that ſuch attempts have as yet ſucceeded.

PERCUNOS, the name of an ancient Pruſſian idol. See POTRIMPOS.

PERCUSSION, in *Phyſics*, the impreſſion a body makes in falling or ſtriking upon another; or the ſhock or colliſion of two moving bodies; which meeting, alter each other's motion. See MOTION.

Percuſſion is either *direct* or *oblique*. See DIRECTLY and OBLIQUE.

In bodies either perfectly hard, or perfectly ſoft, and ſo void of all elaſticity, the laws of *percuſſion* are eaſily determined; but ſince even the hardeſt bodies have their ſhare of elaſticity, and in elaſtic bodies the laws are very different, and much more intricate, having been firſt aſcertained in the Philoſophical Tranſactions, by Sir Chr. Wren, Dr. Wallis, and Mr. Huygens, we ſhall lay down each apart.

PERCUSSION, *laws of, in bodies not elaſtic*. 1. If a body in motion, as A (*Tab.* V. *Mechanics*, *fig.* 38.) ſtrike directly againſt another at reſt, B, the firſt will loſe juſt as much of its motion as it communicates to the ſecond; ſo that the two will proceed thence with an equal velocity, as if collected into one maſs.

If A therefore be triple of B, A will loſe one fourth of its motion; ſo that if before it moved through a line of twenty-four feet in a minute, it will now only move eighteen.

2. If a moving body A ſtrike againſt another already in motion, B; the firſt will increaſe the velocity of the latter, but will loſe leſs of its own motion than if the latter had been at reſt; ſince all here required is, that ſome degrees of motion be added to thoſe the latter already had, to make them both proceed with an equal velocity.

Suppoſe, e.gr. the body A, with twelve degrees of motion, to ſtrike againſt the other B, leſs by half, and at reſt, the firſt will tranſfer four degrees of its motion to the latter, and retain eight to itſelf: but if it ſtrike with twelve degrees of motion on the other already moving with three degrees, it will only communicate two degrees; for A being double of B, this needs only half the motion to make it proceed with the ſame velocity.

3. If a moving body A, ſtrike on another B, either at reſt, or moving more ſlowly, and either in the ſame direction or in a contrary one; the ſum of the momenta, if the bodies move in the ſame direction, or their difference, if they move in a contrary one, will be the ſame after the *percuſſion* as before.

4. If

4. If two equal bodies, A and B, meet each other with equal velocities; after the congreſs, they will both remain at reſt.

5. If a body A ſtrike directly on another at reſt B; its celerity after the ſtroke is to its celerity before it, as the weight of A is to the ſum of the weights of A and B: if, therefore, the weights were equal, the celerity after the ſhock will be half of what it was before it.

Thus if $A=Q$, and its velocity before the ſtroke be denominated C, and $B=q$, then QC will expreſs the whole quantity of motion before and after the ſtroke, and $\frac{QC}{Q+q}$, or, the quantity of motion divided by the weights or quantities of matter, will be equal to V the common velocity: hence we ſhall have $QC=V\times Q+q$; and, therefore $C:V::Q+q:Q$. If $Q=q$, it will be $C:V::2Q:Q::2:1$.

6. If a body in motion A ſtrike directly on another moving more ſlowly, but in the ſame direction; the velocity, after the ſtock, will be equal to the ſum of the momenta, divided by the ſum of the weights.

For the ſum of the momenta both before and after the ſtroke is $QC+qc$, c being the velocity of q or B; therefore $V=\frac{QC+qc}{Q+q}$. Hence if $Q=q$, $V=\frac{Q\times C+c}{Q\times 2}=\frac{C+c}{2}$, or half the ſum of the former velocities.

7. If two equal bodies, moving with different velocities, ſtrike directly againſt each other; after the conflict, they will proceed with the ſemi-difference of the velocities wherewith they were moved before it.

For the quantity of motion is $QC-qc$, and, therefore, $V=\frac{QC-qc}{Q+q}$: and if $Q=q$, $V=\frac{QC-Qc}{2Q}=\frac{C-c}{2}$. And if C alſo $=c$, $V=o$, and, therefore, the quantity of motion is not always the ſame, as the Cartesians maintain.

8. If two bodies, A and B, meet directly with velocities that are reciprocally as their weights; after the conflict, they will both remain at reſt: i. e. if $Q:q::c:C$, $QC=qc$, and $V=\frac{Qc-qc}{Q+q}=o$.

9. If two bodies, A and B, meet directly with the ſame velocity; the celerity, after the impulſe, will be to that before it, as the difference of the weights to their ſum. For $QC-qC=V\times Q+q$; therefore $V:C::Q-q:Q+q$.

10. If two bodies meet directly, with any velocity whatever; the celerity after the ſtroke will be equal to the difference of the momenta, divided by the ſum of the weights. For $V=\frac{QC-qc}{Q+q}$.

To determine the momentum loſt by the conflict: multiply the celerity which the body had before the conflict, into its maſs; thus you have the momentum before the conflict. In like manner, multiply the celerity after the conflict into the maſs; thus have you the momentum after the conflict. The latter momentum therefore, being ſubtracted from the former, leaves the loſs. And hence may the magnitudes of the ſtrokes be eſtimated.

Thus in the three caſes already recited, the momentum before the conflict is QC, $QC+qc$, and $QC-qc$; and V, or the celerity after the conflict, will be reſpectively $\frac{QC}{Q+q}$, $\frac{QC+qc}{Q+q}$, and $\frac{QC-qc}{Q+q}$, and the momenta of Q in the ſeveral caſes $\frac{Q^2C}{Q+q}$, $\frac{Q^2C+Qqc}{Q+q}$, and $\frac{Q^2C-Qqc}{Q+q}$: therefore the quantities of motion loſt by Q will be reſpectively $QC-\frac{Q^2C}{Q+q}=\frac{QqC}{Q+q}$, $QC-\frac{Q^2C+Qqc}{Q+q}=\frac{QCq-Qcq}{Q+q}$; and $QC-\frac{Q^2C-Qqc}{Q+q}=\frac{QqC+Qqc}{Q+q}$.

Hence it appears in the firſt caſe, that the magnitude of the ſtroke, which is as the motion loſt, will be as the celerity of the ſtriking body; for if its celerity were C, the motion loſt would be $\frac{QCq}{Q+q}$; but if it were c, the motion loſt would be $\frac{Qcq}{Q+q}$; and $\frac{QCq}{Q+q}:\frac{Qcq}{Q+q}::C:c$.

In the ſecond caſe, the magnitude of the ſtroke will be the ſame as if q had been at reſt, and Q had ſtruck it with the difference of their celerities; for the motion loſt is $\frac{QCq-Qcq}{Q+q}$; but in the caſe now ſuppoſed, the motion loſt would be $\frac{Q\times C-c}{Q+q}=\frac{QCq-Qcq}{Q+q}$.

In the third caſe, the magnitude of the ſtroke will be the ſame as if either body as q had been at reſt, and the other, as Q, had ſtruck it with the ſum of their celerities: for the motion loſt is $\frac{QqC+Qqc}{Q+q}$, and in the caſe now ſuppoſed it would be $\frac{Qq\times C+c}{Q+q}$ equal to the former. Hence it appears, that the magnitude of the ſtroke between two given bodies is always proportional to their relative, and not to their abſolute celerities.

11. A direct or perpendicular ſtroke is to an oblique one as the whole ſine is to the ſine of the angle of incidence. For let BC (*Tab.* V. *Mechanics. fig.* 87.) be the body ſtruck, A the ſtriking body, AC the oblique ſtroke, aC the perpendicular ſtroke; and the magnitude of the perpendicular ſtroke aC will be to that of the oblique ſtroke in the direction AC as aC to AB, or as AC: AB. For reſolving the force in AC into AB perpendicular to BC and AD parallel to it; and it is evident that the force in the direction AB is the only part of AC that ſtrikes BC, the other part A D being parallel to it. But the magnitude of a perpendicular ſtroke of the ſame body moving with the ſame force is to be meaſured by the line aC=AC; and therefore it is to the magnitude of the oblique ſtroke as aC to AB, i. e. as AC to AB, or as radius to the ſine of the angle of incidence.

Percussion, *laws of, in elaſtic bodies*. In bodies perfectly elaſtic, the force of elaſticity is equal to the force wherewith they are compreſſed; that is, the colliſion of two ſuch bodies on each other is equivalent to the motion which either of them would acquire, or loſe, by mere ſimple impulſe. This force exerting itſelf contrary ways, a motion equivalent thereto muſt be ſubtracted from the motion in the impelling body, and added to that in the body impelled by mere impulſe, to find their velocities after *percuſſion*. See Elasticity.

12. If a body ſtrike directly on an immoveable obſtacle, either one or both of them being elaſtic; the body will be reflected with the ſame velocity wherewith it ſtruck, and in the ſame line. For if the elaſticity were away, the whole force of the ſtriking body would be ſpent in overcoming the reſiſtance of the obſtacle; and conſequently all the motion would ceaſe: it follows, that the whole force is employed in compreſſing the elaſtic body; by which means it acquires an elaſtic force equal thereto: ſince then the elaſticity, when the compreſſing force is ſpent, reduces the body into its former ſtate, it repels the other with the ſame force wherewith it ſtruck; conſequently, it will rebound with the ſame velocity. And becauſe an elaſtic body reſtores itſelf in the ſame direction wherein it was compreſſed (there being no reaſon why it ſhould change its direction) the body will rebound in the ſame right line.

13. If an elaſtic body ſtrike obliquely on an immoveable obſtacle, it will rebound in ſuch manner as to make the angle of reflexion equal to the angle of incidence. See this demonſtrated with regard to light, by a method which applies to all impinging elaſtic bodies, under Reflection.

14. If an elaſtic body A ſtrike directly againſt another at reſt B equal to it; after *percuſſion* A will remain at reſt, and B will proceed with the ſame velocity which A had before the ſhock, and in the ſame direction.

For if the bodies were not elaſtic, each would proceed, after the ſtroke, in the ſame direction, and with half the velocity; but ſince the elaſtic force acts in the ſame direction wherein the compreſſion is made, and is equal to the compreſſing force; it repels A with half its velocity, and therefore ſtops its motion: but it drives B farther with half its velocity, and therefore acceleratas its motion. It is therefore carried after the ſhock, with the whole celerity wherewith A was carried before it, and A remains at reſt. The quantity of motion before the ſtroke is QC, and the motion loſt by *percuſſion*, being the double of that loſt between non-elaſtic bodies is $\frac{2CQq}{Q+q}$; therefore the momentum after the ſtroke will be $QC-\frac{2CQq}{Q+q}=\frac{Q^2C-QCq}{Q+q}$: and $V=\frac{QC-Cq}{Q+q}$; and the velocity of q, whoſe motion is equal to that loſt by Q, is equal to $\frac{2Qq}{Q+q}\div q=\frac{2Q}{Q+q}$. If $Q=q$, $V=\frac{QC-CQ}{Q+q}=o$; and $v=C$.

Hence, ſince *ib. Tab.* V. *Mechan. fig.* 88.) transfers all its force to B; B in like manner will transfer it to C, C again to D, and D to E. Wherefore if there be ſeveral equal elaſtic bodies, mutually touching each other, and A be ſtruck againſt B, all the intermediate ones remaining at reſt, the laſt alone, E, will be moved, and that with the velocity wherewith A ſtruck againſt B.

15. If an elaſtic body, A, ſtrike directly on another at reſt, B; its velocity, after *percuſſion*, will be to its velocity before it, as the difference of weights is to their ſum: but

but the velocity it communicates to B, is to the ſame, as double the weight of A to the ſum of the weights.

After *percuſſion*, therefore, the velocity of A is to the velocity of B, as the difference of weights to the double of A.

Thus, $V=\frac{QC-Cq}{Q+q}=\frac{Q-q\times C}{Q+q}$; therefore, $V\times\overline{Q+q}=\overline{Q-q}\times C$, conſequently, $V:C::Q-q:Q+q$. And becauſe $v=\frac{2QC}{Q+q}$, $v:C::2Q:Q+q$. Conſequently $V:v::Q-q:2Q$.

16. If a greater body ſtrike a leſs body at reſt, the velocity given to it will be leſs than the double of its own velocity. If $Q\overline{>}q$, let $Q=mq$, then $v=\frac{2QC}{Q+q}$ will be equal to $\frac{2mqC}{mq+q}=\frac{2C}{1+\frac{1}{m}}\angle 2C$.

17. The velocity which a greater body gives to a leſs body at reſt, is to that which the leſs body moved with the ſame velocity would communicate to the greater body at reſt, as the magnitude of the greater to the magnitude of the leſs body. If $Q\overline{>}q$ ſuppoſed to be at reſt, then $v=\frac{2QC}{Q+q}$; but if Q be at reſt, and q ſtrike it with the celerity C, the velocity of Q after the ſtroke would be $\frac{2qC}{q+Q}$; therefore the velocity given by the greater body is to that given by the leſs as $\frac{2QC}{Q+q}:\frac{2qC}{q+Q}::Q:q$.

18. If a greater body ſtrikes againſt a leſs, the greater body will not come to reſt, but move more ſlowly; for ſince $Q\overline{>}q$, $Q-q$ will be poſitive, and therefore, in the proportion $Q+q:Q-q::C:V$, V will be poſitive; but leſs than C, becauſe $Q-q\angle Q+q$.

19. Again, if an elaſtic body ſtrike a larger elaſtic body at reſt, the ſmaller body will always rebound, and move in a contrary direction to what it did at firſt, and alſo give the larger body a greater quantity of motion than what was originally in the ſmaller body. For as $q\overline{>}Q$, $Q-q$ will be a negative quantity, and therefore, V will be negative, or Q will move backwards. And this quantity of motion communicated, may be greater than the original motion in any ratio leſs than that of 2 to 1. For ſuppoſing the ſmall body and its velocity, to be denoted by unity, and the larger body at reſt by x, the velocity of x after the ſhock will be $\frac{2}{1+x}$, and its quantity of motion will be $\frac{2x}{1+x}$. But though the proportion of $2x$ to $1+x$ increaſes when x increaſes, yet its limit will be the proportion of 2 to 1; which is the limit to which the motion of x may approach indefinitely near.

Hence it follows, that if the force of moving bodies be meaſured by their quantity of motion, a body may, by *percuſſion*, immediately communicate a greater force than itſelf has to another, and this in any proportion leſs than double.

But if other elaſtic bodies be interpoſed, a body may mediately communicate a greater force than its own to another larger body x, in any proportion leſs than that of $x\sqrt{x}$ to 1. Thus if $x=1000000$, the body 1 with the velocity 1, may, by the means of intermediate bodies, give it the force 999000000; and the ſum of the abſolute forces of all theſe bodies taken together, ariſing from the *percuſſion*, may exceed the force of the firſt or unity, in any ratio leſs than $2x\sqrt{x}$ to 1, or 2000000000 to 1, although the relative force in all caſes remains as at firſt $=1$.

Theſe are paradoxes which cannot be urged againſt thoſe who maintain the forces of bodies to be meaſured by their maſſes and the ſquares of their velocities.

It is alſo to be obſerved, that thoſe who meaſure force by the quantity of motion, muſt deny that there is any force loſt by the impreſſions, made on ſoft bodies, or by the bending of elaſtic bodies; for if any were loſt from ſuch cauſes, the ſum of the quantities of motion of bodies moving the ſame way, could not remain the ſame before, during, and after the ſhock, which is an univerſal rule admitted by the Newtonians. But they admit that a ſpring bent between two bodies may, by unbending itſelf, generate motion in theſe bodies. Hence it follows that, according to this doctrine, though a ſpring may give motion to bodies, it cannot, by a contrary action, take it away; which ſeems no ſmall paradox. See FORCE.

20. If a body A moves towards the body C, at reſt, and an intermediate body B of a mean magnitude be placed at reſt between them, ſo that A firſt impels B, and then B impels C, a greater motion will be given to C than if A had ſtruck it directly. And if B be a mean proportional between A and C, the velocity communicated to C will be the greateſt that can be. Huygens, de Mot. Corp. ex Percuſſ. prop. 12.

In the preceding ſeries of proportional magnitudes, $B+\frac{AC}{B}\angle A+C$. For $A:B::B:C$, therefore $A-B:B::B-C:C$, and $A-B:B-C::B:C$; but $C\angle B$, therefore $B-C\angle A-B$; and therefore $B\angle A-B+C$, and $2B\angle A+C$: but $B=\frac{AC}{B}$; therefore $B+\frac{AC}{B}\angle A+C$. The ſame propoſition might be demonſtrated, if C were the greateſt body and A the leaſt.

Now it is plain, that the velocity of the body C ſtruck only by A would be $\frac{2Aa}{A+C}=\frac{4Aa}{2A+2C}$, a denoting the velocity of A: the velocity of B, ſtruck immediately by A, would be $\frac{2Aa}{A+B}=b$, b denoting the velocity of B: and, therefore, the velocity of C ſtruck by B moved with the velocity b would be $\frac{2Bb}{B+C}=\frac{2B\times 2Aa}{\overline{B+C}\times\overline{A+B}}=\frac{4BAa}{BA+BB+CA+CB}=\frac{4Aa}{A+B+\frac{CA}{B}+C}$. But $\frac{4Aa}{A+B+\frac{CA}{B}+C}:\frac{4Aa}{2A+2C}::2A+2C:A+B+\frac{CA}{B}+C$. And the ſecond antecedent is evidently greater than the ſecond conſequent; therefore the firſt antecedent is greater than the firſt conſequent. But if B were a mean proportional between A and C, $B+\frac{AC}{B}$ would be leſs than in any other caſe. For if $B=m$ the mean proportional, $B+\frac{AC}{B}=m+\frac{m^2}{m}=2m$; but if $B=m\pm D$, then $B+\frac{AC}{B}=m\pm D+\frac{AC}{m\pm D}$; i. e. $m^2\pm 2mD+D^2+AC\,(=m^2)\overline{>}2m^2\pm 2mD$.

If more bodies be interpoſed between A and C, the motion of C will be greater; and it will be the greateſt when the bodies interpoſed conſtitute a ſeries of mean propotionals between A and C. Ibid. Prop. 13.

21. If there be a ſeries of a hundred bodies in the proportion of 1, 2, 4, 8, 16, &c. and the motion begins by the greateſt body, the velocity communicated to the ſmalleſt will be to that with which the greateſt moved nearly as 2,338,500,000,000,000 to 1. And, if the motion begins by the leaſt body, the quantity of motion will be increaſed on the whole nearly as 1 to 4,677,000,000,000. But it is to be obſerved, that there is a miſtake in the impreſſion of Huygens's book, as to the firſt number, which is there printed 147600,000,000, inſtead of 2,338, &c. ſo that the velocity thus given to the ſmalleſt body is 150 times greater than what the printed copy of Huygens aſſigns. Bernoulli, Diſc. ſur. le Mouv. Oper. tom. iii. p. 34. and s'Graveſande, Præf. ad Huygen. Oper. Poſt. tom ii. Amſt. 1728.

This ſtupendous augmentation of the quantity of motion is a remarkable inſtance of the fallity of the Carteſian principle, that the ſame quantity of motion is always preſerved in the world.

Some have thought this augmentation no ſmall difficulty againſt thoſe who maintain the moving force or power of action in bodies, to be proportional to their quantities of motion. This difficulty does not preſs the Leibnitians; for it is to be obſerved, that notwithſtanding the prodigious increaſe of motion here aſſigned, yet there is no increment of the *vis viva* of this ſyſtem of bodies. See FORCE and VIS viva.

A learned author has urged, that if the force of bodies were in proportion to their quantities of motion, the increaſe in the motion here mentioned might be employed to reſtore the motion of the firſt body, and hence make a perpetual motion. But it is anſwered, that as the motion of the laſt is increaſed in the ſame direction with the firſt, the motion of all the reſt will be in the contrary direction, and equal to that of the laſt diminiſhed by unity: hence the ſum of the motions in the ſame direction remains as it did, equal to that of the firſt and ſmalleſt body, which we ſuppoſe unity. See Maclaurin's Demonſtrat. de Loix du choc des Corps, p. 21. Paris, 1724, and s'Graveſand. Rem. ſur la Poſſibilité du Mouvement perpetuel, in Journ. Liter.

It is to be obſerved, that there is a limit which the velocity communicated to the laſt body never amounts to (ſuppoſing the firſt and laſt bodies, and the velocity of the firſt before the ſtroke, to be given) but to which it approaches continually, while the number of ſuch bodies

dies interposed between the first and last is always increased. And this limit is to the velocity of the first body before the ſtroke, in the ſubduplicate ratio of the firſt body to the laſt.

Mr. Huygens has not mentioned this limit, but the curious may ſee the determination of it in Mr. Maclaurin's Fluxions, art. 514.

22. If two equal elaſtic bodies, A and B, meet directly, and with equal velocity; each will rebound with the ſame velocity wherewith it ſtruck, and alſo in the ſame direction.

For ſetting aſide the elaſticity, both would remain at reſt: their whole force therefore is ſpent in the compreſſion; but their elaſtic force whereby they rebound in the former direction is equal thereto: this force therefore acting equally on each body A and B, will produce the ſame celerity in each; and that equal to the former. So that they will rebound with the celerity wherewith they ſtruck.

23. If two equal elaſtic bodies, A and B, ſtrike directly againſt each other with unequal velocities: after the ſhock they will rebound with interchanged velocities.

For ſuppoſe the bodies to concur with the velocies $C+c$ and C: if they meet with the ſame velocity C, after the ſhock, they would both move with the ſame velocity C. If B were at reſt, and A ſhould ſtrike upon it with the celerity c after the ſhock, A would remain at reſt, and B be moved with the celerity c. Therefore the exceſs of the celerity c, wherewith A is carried, is tranſferred wholly by the conflict to B: A therefore is moved with the celerity C, and B with the celerity $C+c$.

Hence, after *percuſſion*, they recede from each other with the ſame velocity as before they concurred.

The two propoſitions in theſe two laſt articles may be proved otherwiſe thus: the momentum of Q before the ſtroke is QC; the motion loſt by it is $\frac{2QCq+2Qcq}{Q+q}$; therefore, its quantity of motion after the ſtroke will be $QC-\frac{2QCq+2Qcq}{Q+q}=\frac{Q^2C-QCq-2Qcq}{Q+q}$. Conſequently $V=\frac{QC-Cq-2qc}{Q+q}$.

The quantity of motion in q before the ſtroke is $=qc$, and that loſt by Q and acquired by q is $\frac{2QCq+2Qcq}{Q+q}$; and, therefore, its momentum after the ſtroke will be $-qc+\frac{2QCq+2Qcq}{Q+q}=\frac{2QCq-q^2c+Qcq}{Q+q}$: and $v=\frac{2QC-qc+Qc}{Q+q}$. But when $Q=q$, $V=\frac{2QC-QC-2Qc}{2Q}=-c$, and $v=\frac{2QC-Qc+Qc}{2Q}=C$.

24. If two elaſtic bodies, A and B, ſtrike directly on each other with velocities that are reciprocally proportional to their weights; after colliſion they will rebound with the ſame velocity wherewith they met.

For $Q:q::c:C$, therefore $CQ=cq$; and $V=\frac{QC-2QC-Cq}{Q+q}=-\frac{QC+Cq}{Q+q}=\frac{Q+q\times-C}{Q+q}=-C$; and $v=\frac{2qc-qc+Qc}{Q+q}=\frac{qc+Qc}{Q+q}=+c$.

25. If an elaſtic body A ſtrike on another equal one, indued with a leſs degree of motion B; after *percuſſion*, both will proceed in the ſame, *viz.* in the former direction, and with interchanged velocities.

For ſuppoſe A to ſtrike with the velocity $C+c$, upon B moving with the velocity C. Since by reaſon of the equal velocities C and C, there ariſes no impulſe; it is the ſame thing as if A ſtruck on B, with the ſole celerity c, on B at reſt. But in that caſe A would remain at reſt, and B would move with the velocity c: therefore, after *percuſſion*, A will move with the ſole celerity C, and B with the celerity $C+c$, both according to the former direction, there being nothing to change that direction.

For in this caſe, the quantity of motion in Q before the ſtroke is QC, the motion loſt by it is $\frac{2QCq-2Qcq}{Q+q}$, and the quantity of motion after the ſtroke will be $QC-\frac{2QCq-2Qcq}{Q+q}=\frac{Q^2C+2Qcq-QCq}{Q+q}$: and therefore $V=\frac{QC+2cq-Cq}{Q+q}$.

The momentum of q before the ſtroke is qc, that loſt by Q and acquired by q is $\frac{2QCq-2Qqc}{Q+q}$; therefore the momentum of q after the ſtroke will be $qc+\frac{2QCq-2Qqc}{Q+q}=\frac{q^2c+2QCq-Qqc}{Q+q}$; and $v=\frac{2QC+qc-Qc}{Q+q}$.

In the caſe here ſuppoſed $Q=q$, therefore $V=\frac{QC+2Qc-CQ}{2Q}=c$, and $v=\frac{2QC+Qc-Qc}{2Q}=C$.

26. If a moving body A ſtrike on another B; the ſtroke will be the ſame as would be made by the body A ſtriking on B at reſt, with the difference of their velocities.

Hence, ſince the elaſtic force is equal to the *percuſſion*; it acts on the bodies A and B with the difference of the velocities they had before the congreſs.

27. *To determine the velocities of any two elaſtic bodies*, A *and* B, *after ſtriking directly on each other with any velocities.* If the elaſtic body A ſtrike on B, either at reſt, or moving ſafter than A; the velocity, *v. gr.* of A after *percuſſion*, is found thus: as the ſum of the weights is to double of either of them, ſuppoſe, in this caſe, of B, ſo is the difference of the velocities before the congreſs, to a velocity, which ſubtracted from the velocity of A before the impulſe (in the other caſe added to it) leaves the velocity of A after the congreſs.

If the two elaſtic bodies, A and B, meet each other; the velocity of A, after the impulſe, is found thus: as the ſum of the weights is to the double of either of them, ſuppoſe of B, ſo is the ſum of the velocities before colliſion, to a velocity which ſubtracted from the velocity of A before colliſion, leaves its celerity after colliſion.

28. In the direct colliſion of bodies the ſame reſpective velocity is preſerved, i. e. in a direct concurrence, the difference of velocities is the ſame before and after the ſhock; and in a direct mutual encounter, the difference of velocities after the ſhock is the ſame with their ſum before it.

Hence they retire from each other, after the impulſe, with the ſame velocity wherewith they met.

Thus $v-V=C\mp c$. For $v=\frac{2QC\pm qc\mp Qc}{Q+q}$, and $V=\frac{QC\pm 2qc-Cq}{Q+q}$; therefore $v-V=\frac{2QC\pm qc\mp Qc-QC\mp 2qC+Cq}{Q+q}=\frac{QC\mp qc\mp QC+Cq}{Q+q}=\frac{Q+q\times C\mp c}{Q+q}=C\mp c$.

29. In the colliſion of elaſtic bodies there is not always preſerved the ſame momentum, or, as the Carteſians expreſs it, the ſame quantity of motion; but this is ſometimes increaſed, and ſometimes diminiſhed.

It is a miſtake, therefore, of Des Cartes, and his followers, that the ſame quantity of motion is ſtill preſerved in the world.

Thus, let q at reſt be greater than the impinging body Q; and the quantity of motion will be increaſed by colliſion: let $q=Q+x$, and C the velocity of Q: the velocity of the body q after the ſtroke will be $\frac{2QC}{Q+q}=\frac{2QC}{2Q+x}=C-\frac{xC}{2Q+x}$; but the velocity of the body Q will be $\frac{QC-Cq}{Q+q}=\frac{-xC}{2Q+x}$; therefore the abſolute momentum of q after the ſtroke will be $=q\times C-\frac{xC}{2Q+x}=\overline{Q+x}\times C-\frac{xC}{2Q+x}$.

But the momentum of the body Q is $=QC-\frac{xC}{2Q+x}$; and the quantity of motion in both bodies will be $=\frac{2Q^2C+2QxC+QxC}{2Q+x}=\frac{2Q^2C+3QxC}{2Q+x}=QC+xC-\frac{xxC}{2Q+x}$; but the quantity of motion before the ſtroke was QC, which is leſs than the former quantity, becauſe $\frac{xxC}{2Q+x}\angle xC$; for $\frac{xxC}{x}=xC$. If the bodies return to a ſecond ſtroke with the velocities acquired by the firſt, they will recover their firſt velocities, in which caſe the quantity of motion will be diminiſhed.

30. If two elaſtic bodies, A and B, meet or overtake each other directly; the ſum of the factums of the maſſes into the ſquares of the velocities remains the ſame, before and after the congreſs: hence the ſame quantity of force is likewiſe preſerved in the congreſs.

31. *To determine the motion of two bodies*, A *and* B *(fig.* 47.*) ſtriking obliquely againſt each other, whether they be elaſtic, or not elaſtic.* The motion of the body A along AC is reſoluble into two others, in the directions AE and AD; and

and the motion of B along BC into two others according to BF and BG: and the velocities through AD and BF are to the velocities through AC and BC as the right lines AD, BF, AC, BC: now since the right lines AE and BG are parallel, the forces acting according to theſe directions are not mutually oppoſite, and muſt therefore be conſidered in the congreſs.

But ſince the lines AD and BF, or, which is the ſame, EC and GC, conſtitute the ſame right line perpendicular to DC; it is the ſame as if the bodies A and B ſhould meet directly with velocities that are as EC and GC. Find, therefore, the velocity of A and B according to the rules above laid down.

Suppoſe, e. gr. the velocity of the rebounding body A to be as CH; ſince the motion along AE is not changed by the congreſs, make CK=AE, and complete the parallelogram HCKI; the diagonal CI will repreſent the motion of A after the congreſs: for, after *percuſſion*, the body will move according to the direction CI, and with a velocity as CI. In the ſame manner it will be found, that the rebounding body B will move along the diagonal of the parallelogram CM; in which LM= BG. The velocities, therefore, after *percuſſion*, are as CI to CM.

PERCUSSION, *centre of*. See CENTER *of Percuſſion*.

PER *deliquium*. See DELIQUIUM.

PER *deſcenſum*, by deſcent, in *Chemiſtry*, a particular manner of DISTILLATION.

PERDICIUM, in *Botany*, a genus of the *ſyngeneſia polygamia ſuperflua* claſs: its characters are, that it has a naked receptacle; the down is ſimple; and the corollulæ bilabiate. There are three ſpecies.

PERDIX, in *Ornithology*. See PARTRIDGE.

PERDIX, in *Conchyliology*, a name given by authors to a genus of ſhells, ſuppoſed to reſemble the partridge in the ſhades and diſpoſition of the colours.

The partridge-ſhell is of the OLIVUM, or *concha globoſa* claſs, and is ſtriated and ſpotted in a peculiarly elegant and regular manner.

PERDONATIO *ad agendas*, in *Law*, a pardon for one who is outlawed.

PERDONIUM, a term, invented by Paracelſus, to expreſs wine medicated with herbs.

PERDUE, a ſoldier placed in a dangerous, and almoſt deſperate poſt. Thus we ſay, *enfans perdues*, for the forlorn hope of an army.

The word is French, and literally ſignifies *loſt*.

To lie *perdue*, is to lie flat on the belly, or to lie cloſely in wait.

PEREGRINARY, *peregrinarius*, in the *Ancient Monaſteries*, a monk to whom was committed the care of receiving and entertaining ſtrangers, or viſitors.

PEREGRINATORES, in *Botany*, a name for ſuch ſtudents in that ſcience as have taken long journeys, and viſited the remoteſt regions, in ſearch of plants.

PEREGRINE, *peregrinus*, a term applied among *Aſtrologers*, to a planet, when found in a ſign where it has none of its five eſſential dignities.

PEREMPTORY, in *Law*, an epithet applied to an action, exception, &c. ſignifying them to be abſolute, final, and determinate; and not to be altered, renewed, or reſtrained.

Thus in our law books we find, *peremptory action*, *peremptory nonſuit*, *peremptory exemption*, &c.

PERENNIAL, in *Botany*, is applied to thoſe plants whoſe roots will endure many years.

Perennials are of two kinds: the one retain their leaves all the winter, called *evergreens*.

The other caſt the leaves in winter, called *deciduous*, or *perdeſoils*.

PERENNIAL *winds*. See WIND.

PERESKIA, in *Botany*. See *Melon* THISTLE.

PERETERION, a name given by chirurgical writers to the perforating part of the trepan.

PERFECT, ſomething to which nothing is wanting; or that has all the requiſites of its nature and kind.

PERFECT *number*, in *Arithmetic*. See NUMBER.

PERFECT, *perfecti*, in *Church Hiſtory*, a deſignation which the followers of Valentinus aſſumed to themſelves.

PERFECT, in *Grammar*. Preter or preterit-*perfect* tenſe, is an inflection, marking a time perfectly paſt; as *I have heard*: pluſquam-*perfect*, is an inflection, expreſſing the time more than perfectly paſt; as *I had heard*, &c. See TENSE.

PERFECT, in *Muſic*, denotes ſomething that fills and ſatisfies the mind, and the ear. In which ſenſe we ſay, *perfect* cadence, *perfect* concord, &c.

The ancients had two kinds of modes, the major and minor; and each of theſe, again, was either *perfect* or *imperfect*.

The word *perfect*, when joined with the words *mode*, and *time*, uſually expreſſes triple time, or meaſure; in oppoſition to double time, which they call *imperfect*. See TIME.

PERFECT, in *Phyſiology*. A *perfect* animal is uſed, by ſome writers, for that which is born by univocal generation; in oppoſition to inſects, which they pretend to be produced by equivocal GENERATION.

PERFECT *flowers* are ſuch as have petals, piſtil, ſtamina, and apices. See FLOWER.

PERFECT *mixts*. See MIXTS.

PERFECT *plants*. See PLANTS.

PERFECTION, the ſtate or quality of a thing PERFECT.

This is of divers kinds: *phyſical*, *moral*, and *metaphyſical*.

PERFECTION, *phyſical*, or *natural*, is that whereby a thing has all its powers, or faculties, and thoſe too in their full vigour; and all its parts both principal and ſecondary, and thoſe in their due proportion, conſtitution, &c. In which ſenſe a man is ſaid to be *perfect*, when he has a ſound mind in a ſound body.

This *perfection* is by the ſchoolmen frequently called ἐντελέχεια, becauſe a thing is hereby enabled to perform all its operations.

PERFECTION, *moral*, is an eminent degree of virtue, or moral goodneſs; to which men arrive by often repeated acts of piety, beneficence, &c.

This ſome ſubdivide into abſolute or *inherent*, which is actually in him to whom we attribute it; and *imputative*, which exiſts in ſome other, and not in him it is attributed to.

PERFECTION, *metaphyſical*, or *tranſcendental*, or *eſſential*, is the poſſeſſion of all the eſſential attributes, or of all the parts neceſſary to the integrity of a ſubſtance: or it is that whereby a thing has, or is provided of, every thing belonging to its nature.

This is either *abſolute*, where all imperfection is excluded; ſuch is the *perfection* of God: or *ſecundum quid*, and in its kind.

PERFECTISSIMATE, *perfectiſſimatus*, a quality, or dignity, whereof we find mention made in the code. *Perfectiſſimi* were thoſe to whom the emperors truſted the preſidentſhip of any province. Alciat imagined the name had been only given to the governors of Hiſpania Tarraconenſis, and Noricum; but Calvin has ſhewn the contrary, in his Lexicon Juridicum.

The *perfectiſſimi* were inferior to the *clariſſimi*, though the former word imply moſt perfect.

PERFIDIA, in *Muſic*, a term borrowed from the Italians, ſignifying an affectation of doing always the ſame thing, of purſuing the ſame deſign, continuing the ſame motion, the ſame ſong, the ſame paſſage, and the ſame figures, of notes.

Such are the ſtiff or conſtrained baſſes; as thoſe of chaconnes, and many others, becauſe depending wholly on the caprice of the compoſer.

PERFOLIATA, the ſame with bupleurum, or HARE'S *ear*.

PERFOLIATE-*leaf*, among *Botaniſts*. See LEAF.

PERFORANS *manus*, in *Anatomy*, a muſcle of the hand; called alſo, from its action, *flexor tertii internodii digitorum manus*. See *Tab. Anat. (Myol.) fig.* 2. *n.* 18.

It ariſes fleſhy from the fore and upper part of the ulna, and the ligament which joins that and the radius; and, after forming a pretty thick fleſhy body, it is ſplit into four round tendons; which paſſing under the annular ligament, and through the ſlits in the tendons of the former, are inſerted into the third bone of each FINGER.

PERFORANS *pedis*, in *Anatomy*, a muſcle of the foot, called alſo *profundus*; and, from its action, *flexor tertii internodii digitorum pedis*, & *flexor magnus*.

It ariſes from the upper and back part of the tibia, and, paſſing under the inner ankle, and ligament that ties the tibia and os calcis together, it divides into four tendons, which, paſſing the holes of the perforatus, are inſerted into the third phalanx of the leſſer toes.

There is a maſſa carnea, or fleſhy ſubſtance, that ariſes from the os calcis, and which joins the tendons of this muſcle where the lumbricales begin.

PERFORATA, in *Botany*, a name given by ſome authors to the *hyperieum*, or *St. John's wort*, from the ſmall holes ſeen all over its leaves, if held up to the light.

PERFORATIVE. See TREPANUM.

PERFORATUS *brachii*, in *Anatomy*, a name given by Placentini to a muſcle of the arm, now generally known by the name of the CORACO-*brachialis*. It has been by many diſputed not to be a diſtinct muſcle. Veſalius calls it only *pars interior ſi principii cubiti flectentium primi carnoſa*, eſteeming it only a part of that muſcle. Many of the writers who followed Veſalius have given it alſo the name of *pars* and *portio*, not eſteeming it a diſtinct muſcle: and Caſſerius, who wrote after Placentini, calls it only *portio carnoſa*, and cenſures that author for thinking it a diſtinct muſcle, and calling it *perforatus*.

PERFORATUS *manus*, in *Anatomy*, a muſcle of the fingers, thus called from the *perforations* of its tendons by thoſe

of the perforans: it is alſo called, ſometimes, *flexor ſecundi internodii*, from its action: and ſometimes *ſublimis*, from its ſituation. See *Tab. Anat. (Myol.) fig.* 2. *n.* 17.

It ariſes tendinous from the internal protuberance of the humerus, and the upper part of the radius before; and, being parted into four, paſſes under the annular ligament; whence it ſends ſeveral tendons into the upper part of the phalanx of each finger: every tendon having, at the firſt internode, a ſlit or perforation for the admiſſion of the tendons of the perforans.

PERFORATUS *pedis*, in *Anatomy*, a muſcle of the foot; called alſo *flexor pedis & ſublimis*.

It ariſes from the inner and lower part of the calcaneum, and ſends a tendon to every bone of the ſecond phalanx of each of the four leſs toes. In this, as alſo in the *perforatus* of the hand, there is a ſlit in each tendon about the firſt joint, which lets through the tendon of the perforans.

PERFUME, an agreeable artificial odour, ſtriking the ſenſe, or organ of ſmelling.

The generality of *perfumes* are made or compoſed of muſk, ambergriſe, civet, roſe and cedar-woods, orange-flowers, jaſmin, jonquils, tuberoſes, and other odoriferous flowers.

Therein alſo enter ſtorax, frankincenſe, benzoin, cloves, mace, and other like drugs, commonly called *aromatics*.

Some *perfumes* are alſo compoſed with aromatic herbs, or leaves, as lavender, marjoram, ſage, thyme, hyſſop, &c.

Perfumes were anciently much in uſe, particularly thoſe wherein muſk, ambergriſe, and civet enter; but they are now generally diſuſed, ſince people have become ſenſible of the harm they do the head. In Spain and Italy, however, they are ſtill very common.

PERFUMES, *ſuffitus*, in *Pharmacy*, &c. are topical or external medicines, compoſed of certain powders and gums, which, being mixed together, and thrown on the coals, produce a vapour or ſmoke, ſalutary in ſeveral diſeaſes. See SUFFITUS.

Fits of the mother are cured by the ſume of partridge-feathers, old leather, &c. Burnt mercury is ſometimes applied by way of *ſuffitus*, called fomes of cinnabar.

There are dry *perfumes*, made up in troches, pills, &c. of oilibanum, maſtic, aloes, &c. and moiſt viſcous ones mixed with the juices of herbs, &c.

PERGULARIA, in *Botany*, a genus of the *pentandria digynia* claſs: its characters are, that it is contorted; that the nectarium is formed of five parts like the points of arrows; and that the flower is monopetalous, and ſhaped like a cup or ſalver. There are two ſpecies.

PERIAGOGE, περιαγωγη, in *Rhetoric*, the ſame with PERIBOLE.

PERIAGUA, in *Sea-Language*, a ſort of large CANOE, uſed in the Leeward Iſlands, South America, and the Gulf of Mexico.

This is compoſed of the trunks of two trees hollowed and united together; and thus differs from the CANOE, which is formed of one tree.

PERIAMMA, a word uſed by ſome medical writers to expreſs an amulet.

PERIANTHIUM, or PERIANTHEUM, formed from περι, *about*, and ανθος, *flower*, in *Botany*, the little green leaves which compoſe the bottom of a flower, called, by Dr. Grew, the *empalement*, and by others the *calyx*.

The uſe of the *perianthium* is to be a ſupport, ſecurity, and as it were bands, to the other parts of the flower. Mr. Ray obſerves, that flowers, whoſe leaves or petals are ſtrong, as tulips, have no *perianthium*, as needing none. Carnations, &c. whoſe petals are long and ſlender, have their *perianthium* of one piece; others, as the knap-weed, &c. have it of ſeveral pieces, and found in divers rounds, and all with a counterchangeable reſpect to each other, for the greater ſtrength and ſecurity of themſelves, and the petals, which they include.

If it includes the ſtamina and not the germen, it is the *perianthium* of the flower; if the germen, but not the ſtamina, it is the *perianthium* of the fruit; but if it includes both, it is the *perianthium* of the fructification.

PERIAPTON, περιαπτον, a kind of medicine, otherwiſe called *periamma*, or *amulet*; which, being tied about the neck, is ſuppoſed to prevent, or cure diſeaſes.

PERIBOLE, a word uſed very frequently by Hippocrates, and, in different places, in very different ſenſes. Sometimes it ſignifies a tranſlation of the humours from one part to another; ſometimes only the dreſs or garments of a patient. In the firſt of theſe ſenſes, the word is frequently uſed to expreſs a tranſlation of the morbific matter from the centre to the ſurface, in the termination of a diſeaſe, by the breaking out of puſtules all over the body.

PERIBOLE, περιβολη, in *Rhetoric*, is uſed where many things are accumulated into one period; which might have been divided into ſeveral. We have an inſtance in Cicero's defence of Flaccus: *Quod ſi eſſet aliquando futurum ut aliquis de L. Flacci pernicie cogitaret; nunquam tamen exiſtimavit, judices, Decium Lælium, optimi viri filium, optimâ ipſum ſpe prædilum, ſummæ dignitatis, cum ſuſceptarum accuſationum, quæ ſceleratorum potius civium odia, & furori, quam ipſius virtuti, atque inſtitutæ adoleſcentiæ, conveniret.*

Now this long period might very well have been divided into the three following: 1. *Quod ſi eſſet aliquando futurum, ut aliquis de L. Flacci pernicie cogitaret; nunquam tamen exiſtimavit, judices, Decium Lælium, cum ſuſceperum accuſationem.* 2. *Eſt enim is optimi viri filius, optimâ ipſe ſpe prædilus, ſummæ dignitatis.* 3. *Accuſatio vero hæc ſceleratorum potius odia et furori, quam ipſius virtuti atque inſtitutæ adoleſcentiæ, conveniret.* See PUNCTUATION.

PERICALAMITES, in the *Materia Medica of the Ancients*, a name given by ſome to the *adarce*.

We find the word *pericalamites* in a preſcription recorded in Galen, and it has generally been underſtood to mean *ſyrus*, that being called *calamita*: but the ADARCE is the thing ſignified by the name, which expreſſes its manner of formation, it being always found concreted about the ſtalks of reeds that grow on the edges of waters.

PERICARDIARY, an epithet given to worms generated in the pericardium, or capſula of the heart.

M. Andry makes theſe one of the twelve kinds of worms engendered in the human body: they ſometimes occaſion convulſions, the paroxyſms whereof laſt but a little while, but return inceſſantly.

Theſe worms are accompanied with a frightful paleneſs of the face, a low pulſe, and violent pains of the ſtomach and breaſt.

They ſometimes occaſion a palpitation of the heart. M. Andry adds, that they have been known to occaſion ſudden death.

PERICARDIUM, περικαρδιον, formed from περι, *about*, and καρδια, *heart*, in *Anatomy*, a membranous capſule, or pouch, which includes the heart.

The *pericardium* conſiſts of three laminæ; the inner ariſing from the coats of the veſſels of the heart; the outer from the mediaſtinum; and the middle, which is the chief, is compoſed of very fine tendinous filaments, cloſely interwoven and croſſing each other in different directions. Its figure reſembles that of the heart, being conoidal; and it embraces the heart laxly, allowing room for its pulſation.

It is connected either immediately, or by veſiculæ emitted from it, to the ſternum, back, and jugulum, and in human bodies to that part of the diaphragm which anſwers to the flat or lower ſide of the heart; whereas in brutes it is looſe.

The adhering portion is in ſome meaſure of a triangular ſhape, anſwering to that of the lower ſide of the heart, but the reſt of the bag lies upon the diaphragm, without any adheſion.

Its uſe is ſuppoſed to be to defend the heart; as likewiſe to contain a loſt ſerous humour, which tranſudes through an infinite number of very ſmall holes, by which the internal lamina is perforated, and ſerves to lubricate and moiſten the heart, and to prevent any inflammation that might probably ariſe from the dry friction of the heart and its capſula.

But this latter uſe is controverted; for ſome take the humour found in it to be unnatural; and will have it forcibly ſeparated by the convulſive agonies ſupervening in the article of death.

In effect, anatomiſts are puzzled to find whence it ſhould come, or from what veſſels it is ſecreted.

Dr. Keil, in his Treatiſe of Animal Secretion, ſhews, that the liquor in the *pericardium* muſt be the moſt fluid of any ſeparated from the blood, becauſe its particles unite firſt, and are ſecreted firſt. For thoſe particles which unite firſt will have the greateſt attractive force; conſequently their particles muſt be the moſt ſpherical, and moſt ſolid; and therefore their contact will be the leaſt of any, and they the moſt fluid.

In the Memoirs of the French Academy, M. de Mortal gives an inſtance of a *pericardium*, which being opened, the liquor contained therein was found congealed into a conſiſtence fit to be cut with a knife, and lay two fingers thick about the heart.

We read of a *pericardium* of a monſtrous ſize, out of which above three pounds of congulated blood and ſerum were taken. See Medic. Eſſ. Edinb. vol. v. art. 5vi.

The *pericardium* is ſubject to inflammation, the ſymptoms and cure of which are much the ſame with thoſe of the PLEURISY.

PERICARPIA, περικαρπια, compounded of περι, *about*, and καρπος, *the wriſt*, a name ſometimes given to medicines that are applied to the wriſt: otherwiſe called EPICARPIA.

PERI-

PERICARPUS, or PERICARPIUM, formed of περὶ *about*, and καρπὸς, *fruit*, in *Botany*, a pellicle, membrane, or other ſubſtance encompaſſing the FRUIT or SEED of a plant.

It is the germen of the piſtil enlarged; or, as Linnæus defines it, it is an entrail of the plant big with ſeed, which it diſcharges when ripe. There are no leſs than nine ſpecies of *pericarpia*. 1. A capſule. 2. A conceptaculum. 3. A pod. 4. A legume. 5. A nut. 6. A drupe. 7. An apple or pomum. 8. A berry. 9. A ſtrobilus. See CAPSULE, CONCEPTACULUM, &c.

PERICHAREIA, a word uſed by the ancients to expreſs a ſudden ſurprize of joy, ſuch as has been frequently known to occaſion death.

PERICHORESIS. See CIRCUMINCESSION.

PERICHORUS, formed from περὶ, and χώρα, *country*, in *Antiquity*, a name given by the Greeks, to their profane games and combats, i. e. to ſuch as were not conſecrated to any of the gods. See GAMES.

Perichorus, in the original, ſignifies *near*, or *neighbouring*; apparently, becauſe none of the people of the neighbourhood attended at theſe obſcure exerciſes. The champions here did not fight in honour of any god, or hero, as in the others; but only for the prize-ſake.

PERICHRISIS, a word uſed by the ancients for a liniment, principally of the oleaginous or ſpirituous kinds, and as thin and fluid as oil.

PERICLASIS, a word uſed by the ancients for a fracture of a limb, attended with a large wound, by which the broken ends of the bone, or part of it, are laid bare.

PERICLYMENUM, in *Botany*. See HONEY-*ſuckle*.

PERICNEMIA, a word uſed by ſome medical writers for the parts about the calf of the leg.

PERICRANIUM, Περικράνιον, formed from περὶ, *about*, and κρανὸν, *head*, or *ſkull*, in *Anatomy*, a thick, ſolid coat or membrane, covering the outſide of the cranium, or ſkull. Some call it by the general name of *perioſteum*, becauſe of its adhering to the bone: others divide it into two membranes; the under whereof, immediately inveſting the ſkull, they call *pericraneum*, and the upper the *pericranium*. In effect, it is one double membrane, conſiſting, as moſt others do, of two coats.

It is ſuppoſed to have its origin from the dura mater; which, paſſing through the ſutures of the ſkull, by means of ſeveral filaments forms this thick membrane: at leaſt, it is found connected to the dura mater by fibres tranſmitted from it to the membrane through the futures.

About the origin of the temporal muſcles the two coats of the *pericranium* part; the outer paſſing over thoſe muſcles, and the inner ſtill adhering cloſe to the cranium.

PERIDONIUS *lapis*, in *Natural Hiſtory*, a name given by ſome of the writers of the middle ages to the *pyrites*, which they call alſo *peritbe*.

PERIDROME, *peridromus*, in the *Ancient Architecture*, the ſpace or an iſle in a PERIPTERE, between the columns and the wall.

Salmaſius obſerves, that the *peridromes* ſerved for walks among the Greeks.

PERIDROMIDES, Περιδρομίδες, in *Antiquity*. See XYSTI.

PERIDROMOS, a word uſed by the old Greek writers to expreſs the extreme edge of the hairs of the head, when hanging down in their natural form.

PERIEGETES, Περιηγητὴς, a Greek term, ſignifying a perſon who leads or conducts another about a thing, to ſhew it him, &c.

It is applied in antiquity to geographers; eſpecially to thoſe who deſcribed the ſea-coaſts: thus Dionyſius is ſtyled *periegetes*, for publiſhing a geography in hexameter verſes, which Euſtathius has commented on, both in Greek.

The name *periegetes* was alſo given to thoſe who conducted ſtrangers about in cities, to ſhew them the antiquities, monuments, curioſities, &c. thereof. Theſe were the ſame with what they now call the antiquaries in Italy.

PERIESTECOS, in *Medicine*, an epithet for diſeaſes, ſigns, and ſymptoms, which are ſalutary, and prognoſticate the future better health of the patient.

PERIGÆUM, PERIGEE, formed of περὶ and γῆ, *earth*, in *Aſtronomy*, that point of the ſun's or moon's orbit, wherein they are at their leaſt diſtance from the earth.

In which ſenſe *perigee* ſtands oppoſed to APOGEE.

PERIGEE, in the *Ancient Aſtronomy*, denotes a point in a planet's orb, wherein the center of its epicycle is at the leaſt diſtance from the earth.

PERIGRAPHE, a word uſually underſtood to expreſs a careleſs or inaccurate deſcription of any thing: but in Veſalius it is uſed to expreſs the white lines or impreſſions that appear in the muſculus rectus of the abdomen.

PERIHELIUM, formed from περὶ, and ἥλιος, *ſun*, in *Aſtronomy*, that point of the orbit of a planet, or comet, wherein it is at its leaſt diſtance from the ſun.

Perihelium ſtands oppoſed to APHELIUM. The ancient aſtronomers, inſtead of this term, uſed *perigæum*; becauſe they placed the earth in the centre.

PERILEUCOS, in the *Natural Hiſtory of the Ancients*, a name given to an agate; but not of a diſtinct ſpecies, but only a particular appearance of the lead-coloured agate, more uſually known among them by the name of PHASSACHATES.

PERILLA, in *Botany*, a genus of the *didynamia gymnoſpermia* claſs: its characters are, that the upper ſegments of the empalement are the ſhorteſt; the ſtamina are diſtant, and the ſtyles are two and connected. There is only one ſpecies.

PERIMETER, formed from περὶ, and μέτρον, *menſure*, in *Geometry*, the ambit or extent that bounds a FIGURE, or body.

The *perimeters* of ſurfaces, or figures, are lines; thoſe of bodies are ſurfaces.

In circular figures, &c. inſtead of *perimeter*, we ſay circumference or periphery.

PERINÆUM, or PERINEUM, περίναιον, or περίνεον, formed of περὶ, and νάειν, *to inhabit*, in *Anatomy*, the ſpace between the pudendum and the fundament; properly, the ligamentous ſeam which connects thoſe two parts, called by the Latins, *interfæmineum*.

This part is ſubject to laceration in a difficult birth: and in this part an operation is performed, called the puncture of the *perineum*. But the principal diſorders to which this part is ſubject, are abſceſſes and fiſtulas. See FISTULA.

PERINDE *valere*, in the *Canon Law*, a diſpenſation granted a clerk, who being legally incapable of a benefice, or other eccleſiaſtical function, is *de facto* admitted to it.

The *perinde valere* is a kind of writ, thus called from two words therein ſignifying the diſpenſation to be equivalent or tantamount to a legal capacity.

PERINEUCOS, an epithet given to a peculiar ſort of irregular pulſe common in hectic patients, in which the artery beats more ſtrongly in ſome parts than in others. See EPINEUCOS.

PERIOCHA, Περιοχὴ, an argument, indicating the ſum of a diſcourſe.

PERIOD, Περίοδος, in *Aſtronomy*, the time taken up by a ſtar or planet in making a revolution; or the duration of its courſe, till it return to the ſame point of the heavens.

The ſun's, or properly the earth's *period*, is three hundred and ſixty-five days, five hours, forty-nine minutes. That of the moon is twenty-ſeven days, ſeven hours, forty-three minutes, &c. The *periods* of the comets are now many of them pretty well aſcertained. See COMET.

There is a wonderful harmony between the diſtances of the planets from the ſun, and their *periods* found him; the great law whereof is, that the ſquares of the periodic times are ever proportional to the cubes of their mean diſtances from the ſun.

The ſeveral *periods* and mean diſtances of the ſeveral planets are as follow:

	Days	h.	′	″	mean Diſt.
Saturn	10579	6	36	26	953800
Jupiter	4332	12	20	35	520110
Mars	686	23	27	30	152369
Earth	365	6	9	30	100000
Venus	224	16	49	24	72333
Mercury	87	23	15	53	38710

See PLANETS.

PERIOD, in *Chronology*, denotes an epocha, or interval of time, by which the years are accounted; or a ſeries of years, whereby, in different nations, and on different occaſions, time is meaſured.

Such are the *Calippic*, and *Metonic periods*, two different corrections of the Greek calendar; the *Julian period*, invented by Joſeph Scaliger; the *Victorian period*, &c.

PERIOD, *Calippic*. See CALIPPIC *period*.

PERIOD, *Conſtantinopolitan*. See *Julian* PERIOD.

PERIOD, *Dionyſian*. See *Victorian* PERIOD.

PERIOD, *Hipparchus's*, is a ſeries of three hundred and four ſolar years, returning in a conſtant round, and reſtoring the new and full moons to the ſame day of the ſolar year; according to the ſentiment of Hipparchus.

This *period* ariſes by multiplying the *Calippic period* by four. Hipparchus aſſumed the quantity of the ſolar year to be 365 days, 5 hours, 55′ 12″; and hence concluded, that in one hundred and four years Calippus's *period* would err a whole day. He therefore multiplied the *period* by four, and from the product caſt away an entire day. But even this does not reſtore the new and full moons to the ſame day throughout the whole *period*: but they are ſometimes anticipated 1 day, 8 hours, 23′ 29″ 20‴.

PERIOD, *Julian*, ſo called as being adapted to the *Julian* YEAR, a ſeries of ſeven thouſand nine hundred and eighty Julian years; ariſing by the multiplication of the

cycles of the moon, the sun, and indiction, viz. 28, 19, 15, into one another; commencing from the first day of January in the Julian year.

The *Julian period* is also produced by multiplying the *Victorian period* by fifteen. Since every year in the *Julian period* has its particular cycles of the moon, sun, and indiction: e. gr. only the first has the moon's cycle one, the sun's cycle one, and cycle of indiction one; all the years of this *period* are accurately distinguished from each other.

This *period* was invented by Scaliger, as a common receptacle of epochas, to facilitate the reduction of years of a given epocha to those of another epocha likewise given. It agrees with the Constantinopolitan epocha, or *period*, used by the Greeks, except in this, that the cycles of the sun, moon, and indiction, are reckoned differently: and in that the first year of the Constantinopolitan *period* differs from that of the *Julian period*.

To find the year answering to any given year of the *Julian period*, and *vice versâ*. See EPOCHA.

PERIOD, *menstrual*, or *cycle*. See CYCLE of the *Moon*.

PERIOD, *Victorian*, an interval of five hundred and thirty-two Julian years; which elapsed, the new and full moons return on the same day of the Julian year, according to the sentiment of the inventor Victorinus, or Victorius, who lived in the time of pope Hilary.

Some ascribe this *period* to Dionysius Exiguus, and hence call it the *Dionysian period*: others call it the *great paschal cycle*; because it was invented for computing the time of Easter.

The *Victorian period* is produced by multiplying the lunar cycle nineteen, by the solar circle eighteen; the product of which is five hundred thirty-two. But neither does this restore the new and full moons to the same day throughout its whole duration, by 1 day, 16 hours, 58′ 59″ 40‴.

PERIOD, *Chaldaic*. See SAROS.

PERIOD, in *Grammar* and *Rhetoric*, denotes a little compass of discourse, containing a perfect sense; distinguished at the end by a point or full stop (.); and its members or divisions marked by commas, colons, &c.

De Colonia defines *period*, a short, but perfect sentence, consisting of certain parts or members, depending one on another, and connected together by some common vinculum.

The celebrated definition of Aristotle is, a *period* is a discourse which has a beginning, a middle, and an end, all visible at one view.

Rhetoricians consider *period*, which treats of the structure of sentences, as one of the four parts of COMPOSITION. The *periods* allowed in oratory are three: a *period* of two members, called by the Greeks *dicolos*, and the Latins *binembris*; a *period* of three members, *tricolos*, *trimembris*; and a *period* of four, *quadrimembris*, *tetracolos*.

A strict oratorial *period* does not allow of either more or fewer than these: it is possible indeed to introduce a *period* of one member, called by Aristotle *monocolos*, or simple *period*; but it will be reputed a flaw, and is a thing never practised by the masters.

The period may be likewise prolonged to five or six members; but then it changes its name, and, instead of *period*, commences what they call a *periodical discourse*.

A *period* of two members Cicero supplies us with: *Ego & mihi mea fortissimæ uxori conjunctissimo, C. Cæsar, interclusam eripuisti: & his omnibus ad bene de republica sperandum quasi signum aliquod justissimi.*

A *period* of three members the same Cicero gives us in the exordium of his *Manilian oration*: *Nam cum antea per ætatem hujus auctoritatem loci contingere non auderem; statuerumque nihil hac nisi perfectum ingenio, elaboratum industria, afferri oportere; omne meum tempus omnesque temporibus transmittendum putavi.*

A *period* of four members he gives us in that admirable description of the punishment of parricides: *Ita vivunt, ut ducere animum de cœlo non queant: ita moriuntur, ut eorum ossa terra non tangant: ita jactantur fluctibus, ut nunquam adhæreant: ita posterorum ejiciuntur, ut ne ad sacra quidem mortui conquiescant.*

The laws and measures of *periods* are pretty strictly regarded by orators, at least they are so by the ancient ones: in ordinary discourse, and in the modern tongues, authors are much less severe. In oratory, the members of *periods* are to be equal, or nearly equal; that the pauses or rests of the voice at the close of each member may be nearly equal; but in writing not intended for rehearsal, this is disregarded.

Common discourse allows of *periods* both longer and shorter than oratory; which admits of none less than two members, nor greater than four. Short mutilated *periods* break the stream, and check the course of the sublime; and long ones embarrass and keep the mind too long in suspence; and even strain the voice, which is never to stop but at the ends of *periods*. Philareus, Hermogenes, Terence, &c. confine the just *period*, called by the Latins, *ambitus* and *circuitus*, to four members: agreeable to the distich:

Quatuor è membris plenum formare videbis
Dictorum circuitum, sine ambitu ille vocetur.

Of which sentiment is Cicero, who in his Orator says, *Cingitur ille ambitus & plena comprehensio è quatuor fere partibus, quæ membra dicuntur, ut & aures impleat, & ne brevior sit quam satis sit neque longior.* An instance of a periodical discourse the same author gives us in the opening of his oration for Archias the poet: *Si quid in me ex ingenio, judices, quod sentio quam sit exiguum; aut si quis exercitatio dicendi, in qua me non infitior mediocriter esse versatum; aut si hujusce rei ratio aliqua ab optimarum artium studiis & disciplina profecta, a qua ego confiteor nullum aetatis meæ tempus abhorruisse; earum rerum omnium vel ex primis hic A. Licinius fructum a me repetere prope jure debet.*

In the formation of these *periods* two things are chiefly to be regarded, their length and cadence. As the length ought to be suited to the breath of the speaker, the ancient rhetoricians scarce admit of more than four colons. As to the cadence, what Cicero has observed is found true by experience, that the ears judge what is full, and what is deficient; and direct us to fill up our *periods*, that nothing be wanting of what they expect. When the voice is raised at the beginning of a sentence, they are in suspence till it be finished; and are pleased with a full and just cadence, but are sensible of any defect, and are displeased with redundancy. Care must, therefore, be taken, that *periods* be neither deficient, and as it were maimed, that is, that they do not drop before their time, and defraud the ears of what seemed to be promised to them; nor, on the other hand, offend them by too long and immoderate excursions. This rise and cadence of the voice in pronunciation depend on the nature and situation of the members. In a *period* of two members, the turn of the voice begins with the latter member. If a sentence consist of three members, the inflexion is best made at the end of the second member. But a *period* of four members is reckoned the most complete and perfect, where the inflection begins at the middle, that is, with the third member. An equality of the members should likewise be attended to in the composition of a *period*, the better to adjust their rise and cadence. And for this reason in sentences of three members, where the cadence begins with the third; or in those of four members where it begins at the fourth, it promotes the harmony to make the last member the longest. Ward's Or. vol. i. sect. 22.

Periods are said to be either *rotunde*, *round*, or *quadrati*, *square*, according to their different economy and cadences.

PERIOD, *square*, is that consisting of three or four equal members, formally distinguished from each other: as that of Cicero on the punishment of parricides.

PERIOD, *round*, is that whose members or parts are so connected, and fitted into each other, as that the junctures or commissures are scarce seen; but the whole slides equally round, without any notable stops or inequalities. Such are the dicolos and tricolos of Cicero above mentioned.

PERIOD is also used for the character (.) wherewith the *periods* of discourse are terminated and expressed; this is popularly called a *full stop*, or *point*. See PUNCTUATION.

Father Buffier observes two difficulties in the use of the *period*, or point: 1. e. in distinguishing it from the colon, or double point; and in determining justly the end of a *period*, or perfect sentence.

It is observed, that the supernumerary numbers of a *period*, separated from the rest by colons and semicolons, usually commence with a conjunction. Yet it is certain these same conjunctions sometimes rather begin new *periods*, than supernumerary members of old ones. It is the sense of things, and the author's own discretion, that must make the proper distinction which of the two in effect it is. No rules will here be of any service, unless this be admitted as one, that when what follows the conjunction is of as much extent as what precedes it, it is usually a new *period*; otherwise not.

The second difficulty arises hence, that the sense appears perfect in several short detached phrases, wherein it does not seem there should be *periods*: a thing frequent in free discourse; as, *We are all in suspence: make your proposals immediately: you will be to blame for detaining us longer.* Where it is evident, that simple phrases have perfect senses like *periods*, and ought to be marked accordingly; but that the shortness of the discourse making them easily comprehended, the pointing is neglected.

PERIOD, *semi*. See SEMI-*period*.

PERIOD, in *Numbers*, is a diſtinction made by a point or comma, after every ſixth place, or figure; and is uſed in numeration, for the readier diſtinguiſhing and naming the ſeveral figures or places, which ſee under NUMERATION.

PERIOD, in *Medicine*, is applied to certain diſeaſes which have intervals, and returns, to denote an entire courſe or circle, of ſuch diſeaſe; or its progreſs from any ſtate through all the reſt till it return to the ſame again.

Galen deſcribes *period* as a time compoſed of an intenſion and remiſſion; whence it is uſually divided into two parts, the paroxyſm or exacerbation, and remiſſion.

In intermitting fevers the *periods* are uſually ſtated and regular; in other diſeaſes, as the epilepſy, gout, &c. they are vague or irregular.

PERIOD is alſo uſed, by ſome writers, for the ſtate of a diſtemper, or diſeaſe.

PERIOD *of the blood*, *periodus ſanguinis*, the circle of the blood, or the tour it makes round the body, for the ſupport of life. See CIRCULATION.

PERIODEUTA, Περιοδευτὰι, a church officer among the Greeks; eſtabliſhed by the council of Laodicea, in towns, &c. where there were no biſhops.

The *periodeutæ* were a kind of rural deans; ſo called, according to Zonaras, becauſe always on the road, going from one quarter to another, to keep the people in their duty.

Hence Gregory of Theſſalonica calls them *ambulantes*, *walkers*. Balſamon calls them *exorchæ*; by which name they are known among the Greeks at this day.

PERIODIC, PERIODICAL, ſomething that terminates and comprehends a period.

PERIODICAL *month*. See MONTH.

PERIODICAL *diſeaſes* are ſuch as decline and riſe again with ſimilar ſymptoms, alternately.

In the Philoſophical Tranſactions, Dr. Muſgrave gives us an inſtance of *periodic* palſy; and Dr. Cole an inſtance of a *periodical* convulſion.

PERIODIC, in *Grammar*, is applied to a ſtyle, or diſcourſe, that has numbers, or which conſiſts of juſt and artful PERIODS.

PERIODICAL *winds*. See WIND.

PERIŒCI, Περίοικοι, formed from περὶ, *about us*, and οἶκος, *I inhabit*, in *Geography*, ſuch inhabitants of the globe as have the ſame latitudes, but oppoſite longitudes; or live under the ſame parallel, and the ſame meridian, but in different ſemicircles of that meridian, or oppoſite points of the parallel.

Theſe have the ſame common ſeaſons throughout the year, and the ſame phænomena of the heavenly bodies; but their hours, or times of the day, are oppoſite to each other. When, *v. gr.* with the one it is mid-day, with the other it is midnight.

PERIOPHTHALMIUM, compounded of περὶ, about, and ὀφθαλμὸς, *eye*, in *Natural Hiſtory*, a thin ſkin, which birds can draw over their eyes to defend them, without ſhutting their eye-lids; otherwiſe called the NICTITATING *membrane*.

PERIOSTEUM, or PERIOSTIUM, Περιοστεον, formed of περὶ, *about*, and ὀστεον, *bone*, in *Anatomy*, a membrane pretty tough, and extremely ſenſible, covering the whole exterior ſurface of all the bones of the body; the teeth only excepted. See *Tab. Anat. (Splanch.) fig.* 13. *lit. gg.* See BONE.

The *perioſteum* is derived from the dura mater, and conſiſts principally of fibres detached thence; beſides which it receives other fibres from the membrana communis of the muſcles; or, as Dr. Havers imagines, from the fleſhy fibres of the belly of the muſcles, which interſect the former. That part of it which covers the cranium, or ſkull, is by a peculiar name called the PERICRANIUM.

This membrane is extended over the cartilages and ligaments alſo, as well as the bones; but when it covers the cartilages, it is called *perichondrium*, when the ligaments, *perideſmium*.

The *perioſteum* in general is a fine ſtrong membrane, or membranous expanſion, not equally thick in all its parts, more or leſs tranſparent, of a very cloſe texture, not eaſily yielding, extremely ſenſible, and compoſed of ſeveral plains of fibres differently diſpoſed, and mixed with a great number of fine veſſels and nervous filaments.

This membrane does not immediately ſurround thoſe portions of bones which are covered by cartilages, nor thoſe in which ligaments or tendons are inſerted; neither does it cover thoſe portions of cartilages which are expoſed to friction, as in the moveable articulations, channels, &c. and, laſtly, it does not cover thoſe portions of the teeth which lie out of the ſockets and gums. The innermoſt plane of the fibrous texture of the *perioſteum*, or that which immediately adheres to the ſurface of the bones, is fixed thereto by an infinite number of ſmall fibrous extremities, brought from all the planes, and which enter the pores of the bones. Theſe extremities are accompanied by capillary veſſels and nervous filaments, which having run for ſome ſpace between the different planes of the *periſtium*, perforate the innermoſt at the orifices of the pores of the bones. The *periſteum* is of different thickneſſes, but this difference of thickneſs does not appear near ſo much on the outer ſurface, as on the inner; which is marked in many places with impreſſions, owing to the ſulci, depreſſions, lines, and inequalities on the ſurface of the bones.

Some anatomiſts have been of opinion, that this membrane was not only united to, but cloſely braced round, the bones; and that therefore it might ſet bounds to their growth. It is probable they had only examined a few bones on this occaſion, for, had they conſidered thoſe which have concave ſurfaces, depreſſions, and inequalities, they would there have found only a ſimple adheſion of the *periſteum*, without any tenſion.

In places where it is only fixed to the bone by the filaments of its innermoſt plane, it is eaſily pulled off from the bones; but where the fibres of the other planes likewiſe penetrate the bones, eſpecially when theſe planes are very numerous, and where the inſertions of tendons and ligaments mingle with theſe fibres, the ſeparation is much more difficult.

The *periſteum* in general ſerves to ſupport that admirable texture of an infinity of capillary veſſels, by which the bones and all the parts belonging to them are nouriſhed: it likewiſe ſupports a vaſt number of nervous filaments, by which ſenſation is communicated not only to this and to the internal membrane of the bones, but even, in ſome degree, to ſome portions of the bones themſelves. Winſlow.

Indeed this laſt uſe is controverted; ſome of the lateſt anatomiſts maintaining, that the *periſteum* is wholly inſenſible.

The *periſteum* is liable to inflammation from a variety of cauſes, and particularly the venereal diſeaſe and the ſcurvy; this generally terminates in an abſceſs or gangrene; if not ſpeedily removed, the bone will be injured. The cure is, in general, the ſame as in other inflammations; but the particular intention will be to carry the peccant matter outwards by fomentations and inciſions. Caſes of this kind generally terminate in amputation.

PERIPATETIC *philoſophy*, the ſyſtem of philoſophy taught and eſtabliſhed by Ariſtotle, and maintained by his followers, the *Peripatetics*.

A ſpecimen of the *Peripatetic* philoſophy, ſee under ARISTOTELIAN.

PERIPATETICS, Περιπατητικοὶ, a ſect of philoſophers, the followers of Ariſtotle, or the maintainers of the *Peripatetic* philoſophy: called alſo ARISTOTELIANS.

Cicero tells us, that Plato left two excellent diſciples, Xenocrates and Ariſtotle, who founded two ſects, which only differed in name; the former taking the appellation of ACADEMICS, who were thoſe that continued to hold their conferences in the Academy, as Plato had done before: the others, who followed Ariſtotle, were called *Peripatetics*; from περιπατέω, *I walk*; becauſe they diſputed walking in the Lyceum.

Ammonius fetches the name *Peripatetic* from Plato himſelf, who only taught walking; and adds, that the diſciples of Ariſtotle, and thoſe of Xenocrates, were equally called *Peripatetics*; the one *Peripatetics* of the Academy, the other *Peripatetics* of the Lyceum: but that, at length, the former quitted the title *Peripatetic*, for that of Academic, on occaſion of the place where they aſſembled: and the latter retained ſimply that of *Peripatetic*.

The greateſt and beſt part of Ariſtotle's philoſophy, he borrowed from his maſter Plato: Serranus affirms confidently, and ſays he is able to demonſtrate it, that there is nothing exquiſite in any part of Ariſtotle's philoſophy, dialectics, ethics, politics, phyſics, or metaphyſics, but is found in Plato. And of this opinion are many of the ancient authors, Clemens Alexandrinus, &c.

Gale endeavours to ſhew, that Ariſtotle borrowed a good deal of his philoſophy, both phyſical, about the firſt matter, and metaphyſical about the firſt being, his affections, truth, unity, goodneſs, &c. from the ſacred books; and adds, from Clearchus, one of his (Ariſtotle's) ſcholars, that he made uſe of a certain Jew, who aſſiſted him therein.

Ariſtotle's philoſophy preſerved itſelf *in puris naturalibus* for a long time: in the earlier ages of Chriſtianity, the Platonic philoſophy was more generally preferred; but this did not prevent the doctrine of Ariſtotle from forcing its way into the Chriſtian church. Towards the cloſe of the fifth century, it roſe into conſiderable credit: the Platonics, interpreting, in their ſchools, ſome of the writings of Ariſtotle, particularly his dialectics, and recommending them to young perſons. This ſeems to have been the firſt ſtep to that univerſal dominion, which

Ariſtotle

Ariſtotle afterwards obtained in the republic of letters; which was alſo very much promoted by the controverſies which Origen had occaſioned: he was zealouſly attached to the Platonic ſyſtem; and, therefore, after his condemnation, many, to avoid the imputation of his errors, and to prevent their being counted among the number of his followers, openly adopted the philoſophy of Ariſtotle. Nor was any philoſophy ſo proper for furniſhing thoſe weapons of ſubtle diſtinctions and captious ſophiſms, which were uſed in the Neſtorian, Arian, and Eutychian controverſies. About the cloſe of the ſixth century, the Ariſtotelian philoſophy, as well as ſcience in general, was almoſt univerſally decried; and it was chiefly owing to Boethius, who explained and recommended it, that it obtained a higher degree of credit among the Latins than it had hitherto enjoyed. Towards the end of the ſeventh century, the Greeks, abandoning Plato to the monks, gave themſelves up entirely to the direction of Ariſtotle, and in the ſucceeding century, the *Peripatetic* philoſophy was taught every where in their public ſchools, and propagated in all places with conſiderable ſucceſs. John Damaſcenus very much contributed to its credit and influence, by compoſing a conciſe, plain, and comprehenſive view of the doctrines of the Stagirite, for the inſtruction of the more ignorant, and in a manner adapted to common capacities. Under the patronage of Photius, and the protection of Baraas, the ſtudy of philoſophy, having for ſome time declined, revived again about the end of the ninth century. About the year 1050, a revolution in philoſophy commenced in France; when ſeveral eminent logicians, who followed Ariſtotle as their guide, took neverthleſs the liberty of illuſtrating and modelling anew his philoſophy, and extending it far beyond its ancient limits. In the twelfth century, three methods of teaching philoſophy were practiſed by different doctors; the firſt was the ancient and plain method, which confined its reſearches to the philoſophical notions of Porphyry, and the dialectic ſyſtem, commonly attributed to St. Auguſtine, and in which were laid down this general rule, that philoſophical inquiries were to be limited to a ſmall number of ſubjects, leſt, by their becoming too extenſive, religion might ſuffer by a profane mixture of human ſubtilty with its divine wiſdom. The ſecond method was called the Ariſtotelian, becauſe it conſiſted in explications of the works of that philoſopher, ſeveral of whoſe books, being tranſlated into Latin, were almoſt every where in the hands of the learned. The third was termed the free method, employed by ſuch as were bold enough to ſearch after truth, in the manner the moſt adapted to render their inquiries ſucceſsful, without rejecting the ſuccours of Ariſtotle and Plato.

A reformed ſyſtem of *Peripateticiſm* was firſt introduced into the ſchools, in the univerſity of Paris, from whence it ſoon ſpread throughout Europe; and has ſubſiſted in the univerſities to this day, under the name of *ſchool philoſophy*.

The foundation hereof is Ariſtotle's doctrine, frequently miſunderſtood, and oftener miſapplied: whence the retainers thereto may be denominated *Reformed Peripatetics*.

Out of theſe have ſprung, at ſeveral times, ſeveral branches; the chief are, the THOMISTS, SCOTISTS, and NOMINALISTS.

The *Peripatetic* ſyſtem, after having prevailed with very great and very extenſive dominion for many centuries, began rapidly to decline towards the cloſe of the ſeventeenth century, when the diſciples of Ramus attacked it on the one hand, and it had ſtill more formidable adverſaries to encounter in Des Cartes, Gaſſendi, and Newton. See ARISTOTELIAN.

PERIPETIA, Περιπετια, in the *Drama*, that part of a tragedy wherein the action is turned, the plot unravelled, and the whole concludes.

The word is formed from the Greek περιπιπτω, ſomething falling into a different ſtate; formed of περι, *about*, and πιπτω, πεσω, *I fall*.

The *peripetia* is properly the change of condition, whether happy or unhappy, which the principal perſon or perſons undergo; ariſing from ſome diſcovery, or incident, which gives a new turn to the action.

The *peripetia*, therefore, concludes with the cataſtrophe, or unravelling; unleſs we make the *peripetia* to depend on the cataſtrophe, &c. as an effect on its cauſe.

The *peripetia* is ſometimes induced by remembrance, or diſcovery; as in the Œdipus, where the meſſenger ſent from Corinth to invite Œdipus to the crown, informs him, that Polybus and Merope were not his father and mother; which begins a diſcovery, that Laius, whom he had killed, and Jocaſta, whom he had then to wife, were his father and mother, and throws him into the deepeſt diſtreſs. This inſtance Ariſtotle calls a *double peripetia*.

The qualities of the *peripetia* are, that it be probable and neceſſary; in order to which it muſt be the natural reſult, at leaſt the effect, of the foregoing action, or of the ſubject itſelf; and muſt not ſtart out from any foreign, or collateral cauſe.

Sometimes the *peripetia* is occaſioned without any diſcovery; as in the Antigone of Sophocles, where the change in Creon's fortune is produced by the effect of his own obſtinacy; and ſometimes, by a mere change of the will, which, though the leaſt artful, yet, Mr. Dryden obſerves, may be ſo managed, as to become exceedingly beautiful.

Theſe two caſes Ariſtotle calls *ſimple peripetias*; in theſe the change only conſiſts in a paſſage out of trouble and action into tranquillity and reſt. See FABLE, ACTION, &c.

PERIPHALLIA, Περιφαλλια, in *Antiquity*, the ſame with *phallagogia*. See PHALLAGOGIA and DIONYSIA.

PERIPHERY, formed from περιφερω, *I turn round*, of περι, *about*, and φερω, *I bear*, or *carry*, in *Geometry*, the circumference, or bounding-line, of a circle, ellipſis, parabola, or other regular curvilineal figure.

The *periphery* of every circle is ſuppoſed to be divided into three hundred and ſixty degrees; which are again ſubdivided, each into ſixty minutes, the minutes into ſeconds, &c.

The diviſions of degrees, therefore, are fractions, whoſe denominators proceed in a ſexagecuple ratio; as, the minute, $\frac{1}{60}$, ſecond $\frac{1}{3600}$, third $\frac{1}{216000}$. See SEXAGESIMAL.

But theſe denominators being troubleſome, in their ſtead are uſed the indices of their logarithms; hence the degree, being the integer, or unit, is marked by 0, the minute by ′, ſecond by ″, &c. See CIRCLE, and CIRCUMFERENCE.

PERIPHERY, *angle at the*. See ANGLE.

PERIPHRASIS, Περιφρασις, *circumlocution*, formed of περι, *about*, and φραζω, *I ſpeak*, in *Rhetoric*, a circuit, or tour, of words, much affected by orators, to avoid common and trite manners of expreſſion.

The *periphraſis* is of good uſe on many occaſions; and we are frequently forced to have recourſe to it, to make things be conceived which are not proper to name.

It is often a piece of politeneſs to ſuppreſs the names, and only intimate, or deſign them. Theſe turns of expreſſion are alſo particularly ſerviceable in oratory; for, the ſublime admitting of no direct citations, there muſt be a compaſs taken to inſinuate the authors whoſe authority is borrowed. A *periphraſis*, by turning round a proper name to make it underſtood, amplifies and raiſes the diſcourſe; but care muſt be taken it be not too much ſwelled, nor extended *ultra modum*; in which caſe it becomes flat and languid. See CIRCUMLOCUTION.

PERIPLOCA, in *Botany*. See *Virginian* SILK.

PERIPLUS, Περιπλους, a voyage, or navigation, round a certain ſea, or ſea-coaſt.

Arrian has deſcribed all the coaſts of the Black Sea, after having inſpected them in quality of general of the emperor Adrian; to whom he dedicates the deſcription, under the title *Periplus of the Euxine ſea*.

PERIPLYSIS, a name given by ſome authors to a diarrhœa, in which the ſtools are extremely thin and watery, and very frequent, and large in quantity.

PERIPNEUMONY, Περιπνευμονια, formed from περι, *about*, and πνευμων, *lungs*, in *Medicine*, an inflammation of ſome part of the thorax, properly of the lungs; attended with an acute fever, and a difficulty of breathing.

This diſeaſe is very frequently confounded with the PLEURISY, and then one is miſtaken for the other, ſometimes even by phyſicians. As this, however, is a diſorder of the lungs, and the other of the pleura, there are ſymptoms attending them by which they may be certainly diſtinguiſhed.

In the *peripneumony*, the pulſe is more ſoft and the pain leſs acute; but the difficulty of breathing, and oppreſſion of the breaſt are greater. The pleurify and *peripneumony* are often complicated, in which caſe the diſeaſe is called a *pleuro-peripneumony*.

The *peripneumony* is diſtinguiſhed into *vera*, or *true*; and *notha*, or *ſpurious*.

The *true* PERIPNEUMONY is a real inflammation of the ſubſtance of the lungs, attended with a ſymptomatical fever, and a cough; by the former of which it is diſtinguiſhed from an aſthma, and by the latter from a pleuriſy.

Its uſual cauſes are, want of exerciſe, hard ſtudy, ſuppreſſion of natural evacuations, a moiſt air, or the like. And the perſons moſt ſubject to it are thoſe who abound with thick blood, whoſe fibres are tenſe and rigid, who feed upon groſs aliment, and drink ſtrong viſcid liquors. It is generally fatal to thoſe who have a flat breaſt, or narrow cheſt, and to ſuch as are afflicted with an aſthma, eſpecially in the decline of life. Sometimes the inflam-

mation

mation reaches to one lobe of the lungs only; at other times the whole of this organ is afflicted; in which case, the diſeaſe can hardly fail to prove fatal. It is often occaſioned by an obſtructed perſpiration, from cold, wet clothes, &c. or by an increaſed circulation of the blood by violent exerciſe, the uſe of ſpiceries, ardent ſpirits, &c. When it ariſes from a phlegmon, the patient ſpits pure blood: when it is eryſipelatous, the ſputum is yellow, and not much tinged with red: in this laſt the breaſt is not ſo much contracted, but the fever is more violent.

The *peripneumonia* is more dangerous, though leſs painful, than the pleuriſy: its uſual way of going off is by expectoration of well concocted, reddiſh, yellow, or white matter. The flowing of the menſes, or any hæmorrhage, or diarrhœa, abſciſſes about the ears, or other parts, are alſo good prognoſtics. The medicines preſcribed are mollify the ſame that obtain in aſthmatic and pleuritic caſes. See PLEURISY.

PERIPNEUMONY, *ſperinon*, or *noſtoſpir*, is a diſeaſe of the lungs, ariſing from a heavy pituitous matter, generated throughout the whole maſs of blood, and diſcharged upon the lungs.

It is known by the viſcidity, palenеſs, and flowneſs of the blood, copiouſneſs of the ſaliva, paleneſs, and want of ſcent of the urine, ſwellings, and obſtructions in the minuter veſſels, ſhort breath, oppreſſion in the thorax, &c. Worſt of, phlegmatic, cold, phthiſical, cacarthous conſtitutions, are moſt liable to it. It begins with a feebleneſs, indolence, wearineſs, difficulty of breathing, oppreſſion of the breaſt, and feveriſhneſs; and goes on without any great appearance of danger, to death itſelf, without any certain prognoſtic thereof in the urine, pulſe, &c. It is cured by blood-letting, clyſters, thin diet, diluters, abſtergents, and aperients.

When an inflammation of the breaſt does not yield to bleeding, bliſtering, and other evacuations, it commonly ends in a ſuppuration; when this happens in the pleura, it ſometimes breaks outwardly, and the matter is diſcharged by the wound. When it happens within the ſubſtance of the lungs, the matter may be diſcharged by expectoration; but if it floats in the cavity of the breaſt, between the pleura and the lungs, it can only be diſcharged by an inciſion made betwixt the ribs. If the patient's ſtrength does not return after the inflammation is apparently removed; if his pulſe continues quick though ſoft, his breathing difficult and oppreſſed, if he has cold ſhiverings at times, his cheeks ſuſhed, his ſpeech dry, and if he complains of thirſt and want of appetite, there is reaſon to fear a ſuppuration, and that a phthiſis, or CONSUMPTION of the lungs will enſue. Buchan.

PERIPTERE, Περίπτερε, formed of περὶ, *about*, and πτέρον, *wing*; q.d. winged on every ſide, in the *Ancient Architecture*, a building encompaſſed on the outſide with a ſeries of inſulate columns, forming a kind of iſle, or portico, all around.

Such were the baſilica of Antonine, the ſeptizon of Severus, the portico of Pompey, &c.

Peripteres were properly temples which had columns on all the four ſides; by which they were diſtinguiſhed from *proſtyles*, and *amphiproſtyles*, the one of which had no columns before, and the other none on the ſides.

M. Perrault obſerves, that *peripteres*, in its general ſenſe, includes all the ſpecies of temples which have porticoes of columns all around, whether the columns be diptere, or pſeudo-diptere, or ſimple *peripteres*; which is a ſpecies that bears the name of the genus, and which has its columns diſtant from the wall by the breadth of an intercolumniation. For the difference between *peripteres* and peniſtyle, ſee PERISTYLE.

PERIPYEMA, a word uſed by chirurgical writers to expreſs a collection of matter wholly ſurrounding any part.

PERIRRHANTERION, περιῤῥαντήριον, in *Antiquity*, a veſſel, uſually of ſtone or braſs, filled with holy water, with which all thoſe that were admitted to the ſacrifices were ſprinkled; and beyond which it was unlawful for any one that was βέβηλος, or *profane*, to paſs. Some ſay it was placed in the ἄδυτα, or inmoſt recеſs of the temple, into which none entered but the prieſt; but Caſaubon will have it to be placed at the door of the temple, which opinion ſeems moſt probable, becauſe all perſons who were ἀκάθαρτοι, or *unpolluted*, were permitted to paſs beyond it.

PERISCII, περίσκιοι, q.d. *circumumbræ*, of περὶ, *about*, and σκιὰ, *ſhadow*, in *Geography*, thoſe inhabitants of the earth, whoſe ſhadows do, in one and the ſame day, ſucceſſively turn to all the points of the horizon.

Such are the inhabitants of the frozen zones, or thoſe who live within the compaſs of the arctic and antarctic circles; for, as the ſun never goes down to them after he is once up, but moves always round about, ſo do their ſhadows; inſomuch that, in the ſame day, they have their ſhadows on all ſides.

PERISCYLACISMUS, περισκυλακισμὸς, a method of purification in frequent uſe among the Greeks. It was done by drawing a whelp round the perſon to be purified.

The word comes from σκύλαξ, a *whelp*.

PERISKYTISM, *periſkyſtiſm*, formed from περὶ, and σκυτὸν, *to ſhut*, or *cut the ſkin*, in *Surgery*, an operation performed by the ancients on the CRANIUM.

The *periſkyſtiſm* is an inciſion which they made under the coronal future, reaching from one temple ſtole to the other, and penetrating to the bone of the cranium: its intention was to ſeparate the pericranium from the ſkull.

PERISSACHOREGIA, a term found in the Code, about the meaning whereof authors are much divided.

Alciat, and ſome others, will have it to be the name of an office; viz. that of curator of the annona, or proviſions; from περισσὸν, *ſuperfluous*, and χορηγεῖν, *to lead*, or *bring*. Others take it to be the office of a magiſtrate who was to look to the augmentation of the annona, and the diſtribution of the ſame. Dom. Macri will have it to ſignify a donative, or diſtribution made to the ſoldiers, over and above their pay. See DONATIVE.

PERISSON, in *Botany*, a name given by the ancient Greeks, and afterwards by the Romans, to the time of Pliny, to a kind of night-ſhade, which made thoſe people who took it internally run mad. It was alſo called *pentacoccon* and *ambrakon*, and by ſome *manicum* STRYCHNUM, or ſimply *manicon*.

PERISSOSIS, a word uſed by Hippocrates to expreſs a redundance of humours.

PERISSOLOGY, περισσολογία, in *Rhetoric*, a quality of ſtyle directly oppoſite to *brachylogy*, and is otherwiſe called *macrology*. See MACROLOGY, BRACHYLOGY, and DICTION.

PERISTALTIC, περισταλτικὸς, formed from περιστέλλω, and literally implying ſomething driven, or preſſed all around, in *Medicine*, a motion proper to the INTESTINES, wherein their ſeveral parts are ſucceſſively contracted from above downwards, or from the pylorus to the anus; in a manner ſomewhat reſembling the creeping of a worm; whence it is alſo called the *vermicular motion*.

The *periſtaltic* motion is performed by the contraction of the circular and longitudinal fibres, whereof the fleſhy coat of the inteſtines is compoſed. It is by means hereof that the chyle is driven into the orifices of the lacteal veins, and the excrements are preſſed downwards, and at laſt expelled.

When this motion comes to be depraved, and its direction changed, ſo as to proceed from below upwards, it produces what we call the ILIAC *paſſion*.

M. Perault, in an expreſs treatiſe on the *periſtaltic motion*, obſerves, that though it is ordinarily only attributed to the inteſtines, yet it is really an action common to all thoſe parts of the body which alter, prepare, concoct the ſeveral humours and ſpirits, which are the matter and inſtruments of animal action. In effect, he gives the name to all the motions whereby the cavities of the body are preſſed, or compreſſed.

PERISTAPHYLINUS, in *Anatomy*, a name which ſome give to a muſcle of the UVULA, more properly denominated PTERYGOSTAPHYLINUS.

PERISTERION, in *Botany*, a name given by ſome authors to the *ſcabiola minor*, or ſmall ſcabious.

PERISTERITES, the *pigeon-ſtone*, in *Natural Hiſtory*, a name given by ſome whimſical people to an odd conformation of a pebble, which they ſuppoſe to repreſent very exactly a pigeon without its wings. It ſeems to have been a *mere luſus naturæ*, in the formation of a common pebble. The variations of figure in the common pebbles are ſo infinite, that a perſon of a fertile imagination might find reſemblances to all the parts of the creation in the ſtones of a ſingle gravel-pit. The giving names to ſuch accidental things is not only unneceſſary, but miſchievous, as it cauſes great confuſion in natural hiſtory.

PERISTERNA, in *Anatomy*, is uſed for the lateral parts of the thorax.

PERISTIARCHUS, περισταρχὸς, in *Antiquity*, a name given to the perſon that officiated in a ſuffration.

The word comes from περισταρ, another name for καθαρματα.

PERISTOMA, in *Anatomy*, a word uſed by authors to expreſs the villous coat of the inteſtines.

PERISTYLE, περιστύλιον, formed from περὶ, *about*, and στύλος, *column*, in the *Ancient Architecture*, a place, or building, encompaſſed with a row of columns on the inſide; by which it is diſtinguiſhed from the peripтere, where the columns are diſpoſed without-ſides.

Such was the hypæthre temple of Vitruvius; and ſuch are now ſome baſilicas in Rome, ſeveral places in Italy, and moſt cloiſters of religious.

PERISTYLE *is alſo uſed*, by modern writers, for a range of columns, either within or without a building.

Thus we say, the Corinthian *peristyle* of the portal of the Louvre, &c.

PERISTYLION, *περιστυλιον*, among the Athenians, a large square place, though sometimes oblong, in the middle of the *gymnasium*, designed for walking, and the performance of those exercises which were not to be performed in the *palæstra*.

PERISYSTOLE, *περισυστολη*, in *Medicine*, the pause or interval between the two motions of the heart, or pulse; viz. that of the systole, or contraction; and that of the diastole, or dilatation.

PERITEXIS, a word used by the old medical writers to express a colliquation.

PERITHE, a name by which some of the writers of the middle ages have called the *pritis*; they say it has great virtues against the gout; some of them also have called it the *lapis perdonius*.

PERITONÆUM, or PERITONEUM, *περιτοναιον*, or *περιτονιον*, derived from the verb *περιτεινω*, *I stretch all around*, in *Anatomy*, a thin soft membrane, adhering to the inner surface of the musculi transversi, covering and containing all the viscera of the lower belly. See *Tab. Anat. Splanch. I. fig. 2. lit. n n. fig. 3. lit. b b.*

The figure and size of the *peritonæum* answer to those of the lower belly, which it lines throughout; its internal surface is smooth, and lined with an unctuous humour, serving to prevent its wounding the intestines, and other parts it touches, as well as to lubricate and facilitate their motion. When the glands which furnish it are obstructed, the *peritonæum* grows thick; as is frequently found in dropsies.

The external surface is fibrous and unequal, that it may adhere more firmly to the muscles of the abdomen, linea alba, ossa pubis, ischium, ilium sacrum, and the vertebræ lumbares, to which it is fastened; and from the last whereof many suppose it to have its origin.

The *peritonæum*, in general, is a membrane of a pretty close texture, and yet capable of a very great extension; after which it can recover itself, and be contracted to its ordinary size, as we see in pregnancy, dropsies, corpulency, and repletion.

It is also connected to the inferior, or convex surface of the liver, which it suspends; and the part employed in this action is called the *ligamentum suspensorium hepatis*.

The *peritonæum* is double every where, but most apparently so from the navel to the os pubis, and near the lumbar vertebræ, as appears, not only from its extraordinary thickness in both, but from its spontaneous parting in the latter, to receive the kidneys. But though it seems to be made up of two portions, one internal, the other external, which many anatomists have considered as a duplicature of two distinct membranous laminæ, yet, properly speaking, the internal portion alone deserves the name of a membranous lamina, as being the main body of the *peritonæum*. The external portion is no more than a kind of fibrous or follicular apophysis of the internal, and may properly enough be called the cellular substance of the *peritonæum*. It is perforated in the upper part to give passage to the œsophagus, aorta, and cava; in the under, for the fundament, the neck of the matrix, and the vessels that go to the thighs; and in the fore-part to give passage to the umbilical vessels.

Its cellular substance has two processes, which, in men, fall down into the scrotum, wrap up the spermatic vessels, and, dilating, make the tunica vaginalis of the testicles; in women, they form a cover for the round ligament of the womb.

There are other two elongations, which past under the ligamentum Fallopii, with the crural vessels, which they involve, and are gradually lost in their course downward. To these we may add a fifth, which is spread on the neck of the bladder, and, perhaps, a sixth, which accompanies the intestinum rectum. The great blood-vessels, that is, the aorta and vena cava, are likewise involved in this cellular substance of the *peritonæum*. The true lamina, or membranous portion of the *peritonæum*, is connected, by the intervention of the cellular substance, with the inner surface of the cavity of the abdomen; and has productions peculiar to itself, and very different from those of the cellular substance. Some of these are simply folded, like a duplicature; such as the membranous ligaments of the liver, colon, &c.; some are expanded like inverted bags, to contain some viscus, as the external membrane of the liver; some begin by a simple duplicature, and are afterwards expanded into a cavity, which contains some organ, as in the mesentery; some are alternately extended in the form of simple duplicatures and of cavities, as in the mesocolon; and some form only a small eminence on the inner surface of the great cavity of the *peritonæum*, as the kidneys and ureters.

The *peritonæum* receives veins and arteries from the mammariæ, diaphragmaticæ, epigastricæ, sacræ, and lumbares: nerves from the os sacrum and loins. Of Rudbeckius pretends to have likewise discovered lymphatics; but these, being scarce visible, except in hydropic cases, are not much taken notice of.

In morbid cases, great quantities of serum have been found between the duplicatures of this membrane, when there was none in the cavity of the abdomen: this constitutes the true tympany.

The use of the *peritonæum* is to contain, and keep in their place, the viscera of the abdomen, and to supply them with particular coats, &c. This is so manifest, that, whenever this membrane happens to be broken, or extraordinarily dilated, some of the parts are apt to fall down, and to form those tumors called *hernia* or *ruptures*. See HERNIA.

In the fish kind, the *peritonæum*, or membrane surrounding the abdomen, is very variously coloured. In some it is of a shining silvery whiteness, as in the cyprini, pearch, sciœnæ, &c. In others it is of a fine pale flesh-colour, as in the salmon; and in some it is wholly black, or else variegated with very numerous black spots, as in the clupeæ, gadi, couti, and spari.

PERITROCHIUM, in *Mechanics*, a wheel or circle, concentric with the base of a cylinder, and moveable together with it, about an axis. Such is the wheel AB, *Tab.* III. *Mechanics, fig.* 44. moveable on the axis EF. The axis, with the wheel, and levers fixed therein to move it, make that mechanical power, called *axis in peritrochio*.

Axis in PERITROCHIO, in *Mechanics*, one of the six mechanical powers, or simple machines, contrived for the raising of weights. See its structure, doctrine, applications, &c. under AXIS *in peritrochio*. See also MECHANICAL *powers*.

PERJURY, *perjurium*, in *Law*, the crime of swearing wilfully, absolutely, and falsly, in a lawful oath, administered in some judicial proceeding, by one who has authority, in any matter relating to an issue, or cause in question; whether it be of the person's own accord, or by subornation of another. If a man calls me *perjured*, I have my action upon the case. If he calls me *forsworn*, no action lies, because the forswearing may be extrajudicial.

Perjury is usually excepted out of general acts of grace. At common law, the punishment of *perjury*, and subornation of *perjury*, was anciently death; afterwards banishment, or cutting out the tongue; then forfeiture of goods; and now it is fine and imprisonment; and the offender is ever afterwards incapable to be a witness. 3 Inst. 163. By statute, persons committing wilful and corrupt *perjury*, in any cause depending concerning lands or goods, &c. in any of the courts of record, shall forfeit 20*l.* and be imprisoned six months, and their oaths shall not be received in any court of record, until the judgment is reversed; and if the offenders have not goods or chattels to the value of 20*l.* they shall be set on the pillory in some market-place, and have both their ears nailed to it; and unlawful and corrupt procuring and suborning a witness to give false testimony in any court of record, &c. or corruptly procuring any witness to testify *in perpetuam rei memoriam*, incurs a forfeiture of 40*l.* And if the offender be not worth 20*l.* he shall suffer six months imprisonment, and stand on the pillory in some open market, near the place where the offence was committed; and shall not be received as a witness till such judgment be reversed, the party grieved shall recover damages against the prosecutor by action on the case, &c. 5 Eliz. cap. 9. and not only in a court of record, but in any other lawful court, as a court baron, &c. *perjury* may be committed.

The statute 2 Geo. II. cap. 25. superadds a power, for the court to order the offender to be sent to the house of correction for seven years, or to be transported for the same period; and makes it felony, without benefit of clergy, to return or escape within the time. Our ancient law inflicted the punishment of deliberate murder on wilful *perjury*, when it was the cause of the death of an innocent person; and by the laws of France it is universally capital.

PERIWINKLE, in *Natural History*, the English name of a species of shells, being the *turbo littoreus* of Linnæus. It has five spires; the first ventricose; in younger subjects striated spirally; in the old smooth, and of a dusky colour. This abounds on most rocks, far above low-water mark, and is eaten in great plenty by the poor. The Swedish peasants believe, that when these shells creep high up the rocks, they indicate a storm from the south.

PERIWINKLE, *pervinca*, or *vinca*, in *Botany*, a genus of the *pentandria monogynia* class. Its characters are these: the empalement of the flower is permanent, and cut into five

five parts at the top; the flower has one falver-shaped petal, whose tube is longer than the empalement; the brim is broad, spreading open, and tightly cut into five obtuse segments; it has five very short inflexed ſtamina, terminated by erect, obtuſe ſummits; and two roundiſh germina, which have two roundiſh corpuſcles on their ſide, ſupporting one common ſtyle, the length of the ſtamina, crowned by two ſtigmas; the germen afterward turns to fruit, compoſed of two taper acute-pointed huſks, opening lengthways, with one valve, and filled with oblong cylindrical ſeeds. Miller reckons three, and Linnæus four ſpecies.

This plant deſerves a place in the ſtove, as much as any of the exotic plants we have in England; becauſe the flowers are very beautiful, and there is a conſtant ſucceſſion of them all the ſummer. Miller.

The *periwinkle* are eaſily known, even when not in flower or ſeed, by their branches being long and trailing, and their leaves ſmooth and gloſſy, and approaching to the ſhape of bay-leaves. Theſe plants ſeldom ripen their fruit; and the way to make them do it is, to plant them in a ſmall pot, and cut off all the trailing branches; by which means the nouriſhment will be carried up to the ripening of the fruit.

PERMANENT *air*, and *quantity*. See the ſubſtantives.

PERMEABLE denotes a body conſidered as its pores are capable of letting ſomewhat paſs through them. See PORE.

PER MINIMA, in *Medicine*, denotes a perfect mixture of the ſmalleſt particles of ſeveral bodies, or ingredients.

PER MINIMA, in *Pharmacy*, denotes an intimate and perfect mixture of natural bodies; wherein their very *minima*, i. e. their atoms, or firſt component particles, are ſuppoſed to be accurately blended together.

If ſilver and lead be melted together, they will thus mingle *per minima*.

PERMISSION, *permiſſio*, in *Rhetoric*, a figure which differs in nothing from CONCESSION, except that the latter relates only to argument and pleading, but the former to action: E. gr. *Quamvis, omnibus rebus exceptis, ſolum mihi ſupereſſet animus et corpus: hæc ipſa, quæ de multis relicta ſunt, vobis et veſtris caudum poteſtatis. Vos me quo patte vobis videtur, utamini, atque abutamini; licebit impune. In me quicquid libet ſtatuite*, &c.

PERMISSIVE *waſte*. See WASTE.

PERMIT, a certificate granted by exciſe officers, and ſigned by them, expreſſing the quantity of liquor, the name of buyer and ſeller, and that the duty hath been paid, or that it hath been condemned as forfeited.

PERMITTIT—*quare non* PERMITTIT. See QUARE.

PERMUTATION, the truck, or exchange, of one thing for another. See EXCHANGE.

PERMUTATION, in the *Canon Law*, a real and actual exchange of two benefices.

Permutation is a means of bringing benefices into commerce without ſimony.

The conditions required to a canonical *permutation*, are, 1. That there be benefices *permuted* on either ſide, though the revenues be unequal; and, in caſe of inequality, no compenſation is to be made in money, but only a penſion is to be charged on the greater. 2. That each of the *permutants* quit their benefices, and make a procuratiop *ad reſignandum*. 3. That the *permutation* be followed by a collation of the ordinary. 4. That the ordinary be informed of the cauſe of the *permutation*. 5. That thoſe, to whom the preſentation or election to the benefices belongs, give their conſent; or, in caſe of their refuſal, that the conſent of the dioceſan be had.

The chief rules of *permutation* are, that if one of the *compermutants* cannot enjoy, he re-enters, with full right, into the benefice he has quitted; and that, if he die before he have accompliſhed the *permutation*, on his part, by the taking of poſſeſſion, the *compermutant*, who has accompliſhed, retains both benefices, unleſs they fall into the regale.

PERMUTATIONS *of quantities*, in *Algebra*, the CHANGES, ALTERNATIONS, or different COMBINATIONS, of any number of quantities.

PERMUTATIONE *archidiaconatus, & rectoriæ eidem annexæ, cum rectoria & prebenda*, is a writ iſſued to an ordinary, commanding him to admit a clerk to a benefice upon exchange made with another. *Reg. of writs.*

PER MY *& per tout*—A joint-tenant is ſaid to be ſeiſed of the land he holds jointly, *per my & per tout*, i. e. he is ſeiſed by every parcel, and by the whole, *totum tenet, & nihil tenet; ſeu totum conjunctim, & nihil ſeparatim.* Brad.

PERNANCY, from the French *prendre, to take*, in *Law*, the taking, or receiving any thing.

Tithes, in *pernancy*, are tithes taken, or which may be taken, in kind.

PERNIO, in *Medicine*, a diſeaſe afflicting the hands and feet in the winter-time, popularly called a *kibe* or CHILBLAIN.

PERNOR *of profits*, he who takes or receives the profits of any thing. From the French *prenour, taker.*

PERONE, in *Anatomy*, a bone of the leg, more uſually called FIBULA.

PERONES, in *Roman Antiquity*, a kind of high ſhoes formed rudely of raw hides, and reaching up to the middle of the leg; though in the more ancient times of the commonwealth, the ſenators uſed them, yet in later ages they were only uſed by the ploughmen and labourers. Hence *Peronatus Avator*. Perſius, Sat. v. ver. 102. and Juvenal, Sat. 14. ver. 186.

PERONÆUS *anticus, longus, or primus*, a muſcle of the leg, ariſing fleſhy and tendinous from the head to the middle of the perone; whence, running as in a pulley, through the channel on the hind part of the outer ankle-bone, it is inſerted into the upper end of the bone of the metatarſus, which joins the great toe. The office of this muſcle is, to draw the foot upwards. See *Tab. Anat. (Myol.) fig.* 1. *n.* 65. *fig.* 2. *n.* 40. *fig.* 6. *n.* 43 *fig.* 7. *n.* 28.

PERONÆUS *maximus*, a muſcle of the leg, commonly called PERONÆUS *poſticus*.

PERONÆUS *medius*. This is commonly called *peronæus anticus*. See PERONÆUS *anticus*.

PERONÆUS *minimus*, a ſmall muſcle, vulgarly thought be a portion of the extenſor digitorum longus, though it is eaſily ſeparable from it.

It is fixed by fleſhy fibres in the lower half of the inſide of the fibula, between two oblique bony lines, on one ſide of the lower part of the extenſor digitorum longus, to which muſcle it is ſimply contiguous; from thence it runs down, contracting in breadth, and paſſes, with the extenſor longus, through the common annular ligament, forming a flat tendon, which ſoon ſeparates from thoſe of the extenſor, and is inſerted near the baſis of the fifth metatarſal bone. It is diſtinguiſhed from the other two *peronæi* by a ſeptum, or production of the ligamentary aponeuroſis of the tibia. Winſlow.

PERONÆUS *poſticus, brevis* or *ſecundus*, a muſcle ſometimes alſo called *ſemifibularis*, and *peronæus maximus*, ariſing fleſhy and ſharp on the back-part of the perone; whence continuing down the outer ſide of the bone till below the middle, it forms a ſmooth, ſtrong, flat tendon, which runs through the ſame channel at the bottom of the malleolus externus, with the longus, to the outſide of the os metatarſi of the little toe. Its office is, to pull the foot upwards. See *Tab. Anat. (Myol.) fig.* 1. *n.* 76. *fig.* 6. *n.* 44 *fig.* 7. *n.* 28.

PEROQUETTE, in *Ornithology*, the name of a ſmall ſpecies of the *pſittacus* or parrot-kind, with a long tail. See PARROT.

There are ſeveral kinds of this bird. 1. The common, which is green, red, and yellowiſh, and was the firſt ſpecies of parrot brought into Europe, and well known among the ancients. 2. The *perequito*, which is green all over, without any variegation. 3. The pale, green, and red kind. 4. The red and green-creſted kind. 5. The red kind, with wings variegated with black and green.

Beſide theſe, Margrave has deſcribed ſeven other Braſilian kinds, called the *tuiupetijuba, tuitiricica, jendaya, tuiete, tuipara, anaco*, and *quiquabatu*, and two others, to which no particular name has been given; one of the ſize of a ſwallow, all over green, with a black beak, and a very long tail; and the other of the ſize of a ſtarling, of a deep green on the back, and paler green on the belly, and with a ſhorter tail. Ray.

PERORATION, *peroratio*, in *Rhetoric*, the epilogue, or laſt part, of an oration; wherein, what the orator had inſiſted on through his whole diſcourſe, is urged afreſh, with greater vehemence and paſſion.

The *peroration* conſiſts of two parts: 1. RECAPITULATION, wherein the ſubſtance of what was diffuſed throughout the whole ſpeech, is collected briefly and curſorily, and ſummed up with new force and weight.

2. The moving the paſſions; which is ſo peculiar to the *peroration*, that the maſters of the art call this part *ſedes affectuum*.

The PASSIONS, to be raiſed in the *peroration*, are various, according to the various kinds of orations: in a panegyric, love, admiration, emulation, joy, &c. In an invective, hatred, contempt, &c. In a deliberation, hope, confidence, or fear.

The qualities required in the *peroration* are, that it be vehement and paſſionate; and that it be ſhort; becauſe, as Cicero obſerves, tears ſoon dry up.

The *peroration* was Cicero's maſter-piece: here that great orator not only ſet his judges and auditors on fire, but even ſeemed to burn himſelf; eſpecially when he was to raiſe pity and commiſeration towards the accuſed; where,

as he himself tells us, he frequently filled the forum with weeping and lamentation. He adds, that where there were several orators to speak for the same person, the *peroration* was always referred to him; and subjoins, that if he excelled herein, it was not owing to genius, but the grief himself shewed. This is abundantly evident in his Milonian *peroration*, where he says, *Sed jam sic: meum enim pro eo quod jam loqui possum, & vis & necessitas defendi vetat*—and in that for Rabirius Postumus: *Sed jam, quoniam, ut spero, fidem quam potui, vobis præstiti, Postumo, reddam etiam lachrymas quas debeo—jam indicat tot hominum lacrymæ, quam sit earum tuis, & meo dolori destitutus, includitur oratio.*

PERPENDICULAR, in *Geometry*, a line falling directly on another line, so as to make equal angles on each side; called also a *normal* line.

Thus the line IG (*Tab.* III. *Geometry, fig.* 70.) is *perpendicular* to the line KH; i. e. makes right and equal angles therewith.

From the very notion of a *perpendicular*, it follows, 1. That the *perpendicularity* is mutual; i. e. if a line, as IG, be *perpendicular* to another, KH; that other is also *perpendicular* to the first.

2. That only one *perpendicular* can be drawn from one point in the same place.

3. That if a *perpendicular* be continued through the line it was drawn *perpendicularly* to; the continuation will also be *perpendicular* to the same.

4. That if there be two points of a right line, each of which is at an equal distance from two points of another right line; that line is *perpendicular* to the other.

5. That a line, which is *perpendicular* to another, is also *perpendicular* to all the parallels of the other.

6. That a *perpendicular* line is the shortest of all those which can be drawn from the same point to the same right line.

Hence the distance of a point from a line, is a right line, drawn from the point *perpendicular* to the line or plane; and hence the altitude of a figure is a *perpendicular* let fall from the vertex to the base.

To erect a PERPENDICULAR GI on any given point G, in a right line ML: one foot of the compasses being in G, with any interval at pleasure, cut off equal parts on each side GH and GK; from the points K and H, with an interval greater than the half of KH, strike two arcs intersecting in I; the right line GI is *perpendicular* to ML.

Perpendiculars are best described in practice by means of a square; one of whose legs is applied along that line, to or from which the *perpendicular* is to be let fall or raised.

To erect a PERPENDICULAR on the end of a given line, suppose at P; open your compasses to any convenient distance, and, setting one foot in C, describe the arc RPS; lay a ruler from S through C, it will find the point R in the arc, whence draw PR, which is *perpendicular* to PM.

To let fall a PERPENDICULAR on a given line, MP, from a given point L; (*fig.* 72.) set one foot of the compasses in L, and with the other cross the given line in the points M and G. Then, setting the compasses in G and M, strike two arcs intersecting each other in *a*: then lay a ruler from L to *a*, and the line KL, described thereby, is the *perpendicular* required.

A line is said to be *perpendicular* to a plane, when it is *perpendicular* to more than two lines drawn in that plane.

A plane is said to be *perpendicular* to another plane, when a line in one plane is *perpendicular* to the other plane.

PERPENDICULAR to a curve, is a right line cutting the curve in the point in which any other right line touches it, and is also itself *perpendicular* to that tangent.

PERPENDICULAR, in *Fortification*. See FORTIFICATION, *according to Mr. Vauban's method*, and *according to ancient Pagan's method*.

PERPENDICULAR, in *Gunnery*, is a small instrument used for finding the centre line of a piece in the operation of pointing it to a given object. See *Pointing of a* GUN.

PERPENDICULARITY *of plants* is a curious phenomenon in natural history, first observed by M. Dodart, and published in an essay on the affectation of *perpendicularity* observed in the stems or stalks of all plants, in the roots of many, and even in their branches, as much as possible.

The matter of fact is, that, though almost all plants rise a little crooked, yet the stems shoot up *perpendicularly*, and the roots sink down *perpendicularly*: even such as, by the declivity of the soil, come out inclined, or such as are diverted out of the *perpendicular* by any violent means, again redress and straiten themselves, and recover their *perpendicularity*, by making a second and contrary bend or elbow, without rectifying the first. A common eye looks upon this affectation without any surprize; but a man that knows what a plant is, and how formed, finds it a subject of astonishment.

In effect, each seed contains in it a little plant, already formed, and needing nothing but to be unfolded: the little plant has its little roots and the pulp, which is usually separated into two lobes, is the foundation of the first food the plantule draws, by its root, when it begins to germinate.

Now if a seed in the earth be so disposed, as that the root of the little plant be turned downwards, and the stem upwards, and even *perpendicularly* upwards, it is easy to conceive, that the little plant coming to unfold itself, its stalk and root need only follow the direction they have, to grow *perpendicularly*. But it is known, the seeds of plants, whether sown of themselves, or by the help of man, fall in the ground at random; and among an infinite number of situations with regard to the stalk of their plant, the *perpendicular* one upwards is but one.

In all the rest, therefore, it is necessary the stalk redress or rectify itself, in order to get out of the ground: but what force is it, that effects this change, which is certainly a violent action? Is it, that the stalk, finding a less kind of earth above it, goes naturally that way where it finds the least obstacle? Were this so, the little root, when it happens to be uppermost, must, for the same reason, follow the same direction, and mount on high.

M. Dodart, therefore, to account for two such different actions, has recourse to another system: he supposes that the fibres of the stalks are of such a nature, as that they contract and shorten by the heat of the sun, and lengthen out by the moisture of the earth; and, on the contrary, that the fibres of the roots contract by the moisture of the earth, and lengthen by the heat of the sun.

When, then, the plantule is inverted, and the root is at the top, the fibres, which compose one of the branches of the root, are not equally exposed to the moisture of the earth; the lower part is more exposed than the upper. The lower therefore must contract the most; which contraction is again promoted by the lengthening of the upper, wherein the sun acts with the greatest force. Of consequence, therefore, this branch of the root must recoil towards the earth, and, insinuating through the pores thereof, must get underneath the bulb, &c. By inverting this reasoning, it is easy to shew how the stalk comes to get uppermost.

In a word, we may imagine, that the earth attracts the root to itself, and that the sun contributes to its descent; and, on the contrary, that the sun attracts the stem, and the earth, in some measure, sends it towards the same.

As to the second straitening, viz. that of the stalk in the open air, it takes it to arise from the impression of external causes, particularly the sun and rain. For the upper part of a stalk, that is bent, is more exposed to the rain, dew, and even the sun, &c. than the under. Now both these causes, in a certain structure of the fibres, tend equally to straiten the part most exposed, by the shortening they successively occasion in it; for moisture shortens by swelling, and heat by distending. Indeed, what that structure is, which gives the fibres such different qualities, or whereon it depends, is still a mystery.

M. de la Hire accounts for the *perpendicularity* of the stems or stalks of plants, thus: he imagines that, in plants, the root draws a coarser and heavier juice; and the stem and its branches a finer and more volatile one. And, in effect, most naturalists conceive the root as the stomach of the plant, where the juices of the earth are subtilized, so as to become able to rise through the stem to the extremity of the branches. This difference of juices supposes larger pores in the roots than the stalk, &c. and, in a word, a different contexture; which difference must be found even in the little invisible plant included in the seed: in this plantule, therefore, we may conceive a point of separation; such as that all on one side, e. gr. the root, shall be unfolded by the grosser juices, and all on the other side, by the more subtile juices.

Suppose, now, the plantule, when its parts begin to unfold, to be entirely inverted; the root atop, and the stalk below: the juices which enter the root will fill be constrained, and when they have opened and enlarged the pores, so as to admit juices of a determinate weight, those juices, thus pressing the root more and more, will drive it downwards; and this the more, as the root is more extended or enlarged; for the point of separation being conceived as the fixed point of a lever, they will act by the longer arm. At the same time, the volatile juices, having penetrated the stalk, will tend to give it a direction from below upwards; and, by reason of the lever, will give it more and more every day. Thus it the little plant turned on its fixed point of separation, till it be perfectly erect.

The plant thus erected, the stalk, we know, should continue to rise *perpendicularly*, to give it the more firm

bibing, and enable it to withſtand the effort of wind and weather.

The manner wherein this is effected, M. Parent lays down thus: the nutritious juice being arrived at the extremity of a riſing ſtalk, if it evaporate, the weight of the air, which encompaſſes it on all ſides, will make it aſcend vertically; and, if it do not evaporate, but congeal, and remain fixed to that extremity whence it was ready to go off, the weight of the air will give it the ſame direction; ſo that the ſtalk will have acquired a very little new part, vertically laid over it: juſt as in a candle held in any way obliquely to the horizon, the flame ſtill continues vertical, by the preſſure of the atmoſphere. The new drops of juice that ſucceed will follow the ſame direction; and, as all together form the ſtalk, that muſt of courſe be vertical, unleſs ſome particular circumſtance intervene.

As to the branches, which are at firſt ſuppoſed to proceed laterally out of the ſtalk in the firſt embryo of the plant; though they ſhould even come out in an horizontal direction, yet muſt they raiſe themſelves upwards by the conſtant direction of the nutritious juice, which at firſt ſcarce meets any reſiſtance in a tender ſupple branch; and even afterwards, though the branch grow more firm, yet will it act with the more advantage; ſince the branch, being become longer, furniſhes it with a longer arm or lever. The ſlender action of a little drop becomes very conſiderable, by its continuity, and by the aſſiſtance of ſuch favourable circumſtances. Hence may be accounted for that regular ſituation and direction of the branches, which all, and always nearly, make the ſame conſtant angle of 45° with the ſtem, and with one another.

M. Aſtruc accounts for the *perpendicularity* of the ſtems, and their redreſſing themſelves, on theſe two principles: 1. That the nutritious juice ariſes from the circumference of the plant, and terminates in the pith. 2. That fluids, contained in tubes either parallel or oblique to the horizon, gravitate on the lower part of the tubes, and not at all on the upper.

From hence it eaſily follows, that, in a plant poſited either obliquely or parallel to the horizon, the nutritious juice will act more on the lower part of the canals than the upper; and, by this means, inſinuate more into the canals communicating therewith, and be collected more copiouſly therein: thus the parts on the lower ſide will receive more accretion, and be more nouriſhed, than thoſe on the upper; the conſequence whereof muſt be, that the extremity of the plant will be obliged to bend upwards.

The ſame principle brings the ſeed into its due ſituation at firſt: in a bean, planted upſide down, the plume and radicle are eaſily perceived with the naked eye, to ſhoot, at firſt, directly, for about an inch; but thenceforth they begin to bend, the one downward, and the other upward. The like is ſeen in a heap of barley to be made into malt, or in a quantity of acorns laid to ſprout in a moiſt place, &c. each grain of barley, in the firſt caſe, and each acorn, in the ſecond, has a different ſituation; and yet all the ſprouts tend directly upward, and the roots downward, and the curvity or bend they make, is greater or leſs, as their ſituation approaches more or leſs to the direction wherein no curvature at all would be neceſſary. Now, two ſuch oppoſite motions cannot ariſe without ſuppoſing ſome conſiderable difference between the two parts: the only one we know of is, that the plume is fed by a juice, imported to it by tubes parallel to its ſides; whereas the radical imbibes its nouriſhment at all the pores in its ſurface. As oft, therefore, as the plume is either parallel or inclined to the horizon, the nutritious juice, feeding the lower parts more than the upper, will determine its extremes to turn upward, for the reaſons already aſſigned. On the contrary, when the radicle is in the like ſituation, the nutricious juice penetrating more copiouſly through the upper part than the under, there will be a greater accretion of the former than the latter; and, conſequently, the radicle will be bent downwards; and this mutual curvity of the plume and radicle muſt continue, till ſuch time as their ſides are nouriſhed alike, which cannot be till they are perpendicular. Memoires de l'Acad. Royale des Scienc. an. 1708.

PERPENDICULAR *roots*. See FIBROUS *roots*.

PERPETUAL, ſomething that endures always, or that laſts for ever.

PERPETUAL is ſometimes alſo uſed for a thing that laſts, or holds, during a perſon's life.

Thus offices, &c. held *durante vitâ*, are ſometimes called *perpetual* offices. In this ſenſe, M. Fontenelle was ſaid to be *perpetual* ſecretary of the Royal Academy of Sciences. Hence the French call him abſolutely, *M. le Perpetuel*.

PERPETUAL *action*. See ACTION.

PERPETUAL *curate*. See CURATE.

PERPETUAL *glands*, in *Anatomy*, are thoſe which are natural; thus diſtinguiſhed from the adventitious ones. See GLANDS.

PERPETUAL *lamp*. See LAMP.

PERPETUAL *motion*, in *Mechanics*. See MOTION.

Circle of PERPETUAL *acculation* and *apparition*. See CIRCLE.

PERPETUAL *pills*, *pilulæ* PERPETUÆ, among *Phyſicians*, are pills made of regulus of antimony; which, being ſwallowed and voided fifty times, will purge every time with undiminiſhed force.

PERPETUAL, or *endleſs ſcrew*. See SCREW.

PERPETUAL *virginity*. See VIRGIN.

PERPETUITY, in *Annuities*, is always the quotient of unity divided by the intereſt of 1*l.* for a year, or 100*l.* divided by the rate of intereſt. Thus, the *perpetuity* is 33-33, 28-57, 25, 20, or 16-666, according as intereſt is reckoned at 3, 3½, 4, 5, or 6 *per cent.* See ANNUITIES and ASSURANCES.

PERPETUITY, *perpetuitas*, in the *Common Law*, the quality of a benefice that is irrevocable, or whoſe incumbent cannot be deprived, except in certain caſes determined by law. It is aſſerted, with reaſon, that the *perpetuity* of benefices is eſtabliſhed by the antient canons; and that prieſts are inſeparably attached to their churches, as by a ſpiritual marriage. It is true, by the corruption of the times, the ſecular prieſts being fallen into great diſorder, and even contempt, the biſhops anciently called the religious to their aſſiſtance, and committed to them the cure of ſouls, and the adminiſtration of parihes; ſtill reſtoring them back again to their cloiſters, when they thought fit, and again revoking them *ad nutum*.

But this vague and uncertain adminiſtration only laſted to the twelfth century, when benefices returned to their eſſential *perpetuity*.

PER QUÆ *ſervitia* is a writ judicial, iſſuing on the note of a fine; and lies for the cognize of a manor, eſtignory, chief rent, or other ſervices, to compel the tenant of the land, at the time of the fine levied, to attourn to him.

PERQUISITE, *perquiſitum*, any thing gotten by a man's own induſtry, or purchaſed with his own money—In contradiſtinction to that which deſcends to him from his father, or his anceſtors.

PERQUISITES *of courts* are thoſe profits which ariſe to a lord of a manor, by virtue of his court-baron, over and above the certain yearly profits of his lands: as fines of copyholds, heriots, amerciaments, waifes, ſtrays, &c.

PER QUOD *conſortium amiſit*; or PER QUOD *ſervitium amiſit*, are words neceſſary in declarations for treſpaſs, &c. where a man's wife or ſervant is beaten or taken from him, and he loſes their ſervice, &c. 2 Lill. Abr. 595, 596.

PERRIWIG. See PERUKE.

PERRIWINKLE. See PERIWINKLE.

PERRON, in *Architecture*, a ſtaircaſe lying open, or without-ſide the building: properly, the ſteps before the front of the building, which lead into the firſt ſtory when raiſed a little above the level of the ground.

Perrons are made of different forms and ſizes, with regard to the ſpace and height they are to lead to. Sometimes the ſteps are round, or oval; more uſually they are ſquare.

PERRUKE, or PERRIWIG, was anciently uſed for a long head of natural hair; ſuch, particularly, as there was care taken in the adjuſting and trimming of.

Menage derives the word, by a long detour, from the Latin *pilus*, hair. The ſeveral ſtages of its paſſage, according to the critic, are, *pilus*, *pelus*, *pelutus*, *pelutinus*, *pelutica*, *perrutica*, *perica*, *perruque*.

The Latins called it *cæſaries*, whence part of Gaul took the denomination of *Gallia Comata*, from the long hair which the natives wore as a ſign of freedom. An antient author ſays, that Abſalom's *perruke* weighed two hundred ſhekels.

PERRUKE is now uſed for a ſet of falſe or borrowed hair, curled, buckled, and ſewed together on a frame, or cawl; anciently called *capillamentum*, or *falſe perruke*.

It is doubted, whether or no the uſe of *perrukes* was known among the ancients. It is true, they uſed falſe hair: Martial and Juvenal make merry with the women of their time, for making themſelves look young with their borrowed hair; with the men who changed their colours according to the ſeaſons; and with the dotards, who hoped to deceive the Deſtinies by their white hair. But theſe ſeem to have ſcarce had any thing in common with our *perrukes*; and were, at beſt, only compoſed of hair painted, and glued together. Nothing can be more ridiculous than the deſcription Lampridius gives of the emperor Commodus's *perruke*: it was powdered with ſcrapings of gold, and oiled (if we may uſe the expreſſion) with glutinous perfumes for the powder to hang by. In effect, the uſe of *perrukes*, at leaſt in their preſent

mode, is little more than a hundred and fifty years old; the year 1629 is reckoned the epocha of long *perukes*; at which time they began to appear in Paris; whence they spread, by degrees, throughout the east of Europe. At first it was reputed a scandal for young people to wear them, because the loss of their hair at that age was attributed to a disease, the very name whereof is a reproach; but at length the mode prevailed over the scruple, and persons of all ages and conditions have worn them; foregoing, without any necessity, the conveniences of their natural hair.

However, it was some time before the ecclesiastics came into the fashion: the first who assumed the *perruke* were some of the French clergy, in the year 1663; for it is the practice yet well authorized. The cardinal Grimaldi, in 1684, and the bishop of Lavaur, in 1688, prohibited the use of the *perruke* to all priests, without a dispensation, or necessity. M. Thiers has a treatise expressly, to prove the *perruke* indecent in an ecclesiastic, and directly contrary to the decrees and canons of councils. A priest's head, embellished with an artificial hair curiously adjusted, he esteems a monster in the church; nor can he conceive any thing so scandalous as an abbot with a florid countenance, brightened with a well-curled *perruke*.

PERRY, a drink made of pears, after the like manner as cyder is made from apples.

The best fruit, for this use, are such as are least fit for eating; e. gr. the bosbury-pear, horse-pear, barelandpear, and squab-pear. The bosbury and squab-kind, so called in Gloucestershire, have been frequently known to yield in one season, from one to four hogsheads of perry. The bosbury-pear is thought to yield the most lasting and vinous liquor; the jolly, the harpary, the drake, the mary, and the hallum-pear, and several others of the harshest kinds, are esteemed the best for *perry*; and always the redder they are, the better.

The method of preparing *perry* is perfectly the same with that of cyder. Only note, that the fruit must be perfectly ripe. Some mix crabs with them, to mend the liquor. For the duty on *perry*, see CYDER.

PER SE, in the *Schools*, is sometimes opposed to *per accidens*. In which sense, a thing is said to agree with another *per se*, when the agreement is not owing to any accidental event, but is found in the intrinsic principles of things themselves.

PER SE, is sometimes also opposed to *per aliud*. In which sense, God alone is said to have a being *per se*, as not deriving it from any other, but having it necessarily, and of himself.

PER SE, again, sometimes signifies as much as, of its own nature, or in virtue of its own entity. Thus the sun is said to give light *per se*; and thus quantity is extended *per se*.

PER SE, among *Logicians*. A thing is said to be known *per se*, *per se notum*, when we immediately perceive it upon the first proposing of the terms. As, that the whole is greater than its parts.

Philosophers go so far as to consider the mode of a thing existing *per se*, or that which constitutes its existence such; which they call *per se esse*, *per se stare*.

Object PER SE. See OBJECT.

PER SE, in *Chemistry*. When a body is distilled singly, and without the usual addition of any other matter to raise it, it is said to be distilled *per se*.

The tenuine spirits of hartshorn are those raised *per se*, in opposition to those distilled with the addition of lime.

PERSEA, in *Botany*. See BAY.

PERSECUTION, *persecutio*, literally imports any pain, affliction, or inconvenience, which a person designedly inflicts on another.

PERSECUTION more particularly denotes that tyranny which the sovereign power of any country exercises, or permits to be exercised, against those who adopt different opinions from its own in matters of religion. This kind of *persecution* is no less contrary to reason and sound policy than to the forbearing, comprehensive spirit of Christianity, and the laws of humanity. See HERESY.

PERSECUTION, as a term, is restrained to the sufferings of Christians, in behalf of their religion; particularly to those of the primitive Christians, under the heathen emperors, Nero, &c. See MARTYR.

We usually reckon ten of these persecutions: Nero set on foot the first, A. D. 65; the second happened under Domitian, A. D. 90; the third began under Trajan, A. D. 100; the fourth under Adrian, A. D. 126, which was continued under Antoninus Pius, A. D. 140; the fifth under Marcus Aurelius, A. D. 162; the sixth under Severus, A. D. 203; the seventh under Maximinus, A. D. 236; the eighth under Decius, A. D. 251; the ninth under Valerian, A. D. 258; and the tenth under Diocletian, A. D. 303.

Lactantius has written the history of the deaths of *persecutors*, though some question whether that work be really his, or not; but bishop Burnet, who has translated it into English, makes no great doubt of it.

PERSEES. See GABRES, MAGI, and ZEND.

PERSEVERANCE, in *Theology*, a Christian virtue, whereby we are enabled to persist in the way of salvation to the end.

The final *perseverance* of the saints is an article much controverted between the ARMINIANS and CALVINISTS; the latter of whom maintain it impossible for grace to be lost; and therefore make *perseverance* to the end, a necessary consequence thereof, which the former deny; esteeming the most confirmed believers never to be out of a possibility of falling.

PERSEUS, in *Astronomy*, a constellation of the northern hemisphere; whose stars, in Ptolemy's Catalogue, are 29; in Tycho's, as many; in Hevelius's 46; and in the Britannic Catalogue, 59; the longitudes, latitudes, magnitudes, &c. whereof, are as follow:

Names and situations of the stars.	Mag.	Longitud.	Latitude. North.	Magnitudes.
		° ′ ″	° ′ ″	
	♈	14 19 13	42 53 16	6
In the middle of the sword	♉	11 52 1	36 18 37	6
		12 09 56	34 36 16	6-7
		15 39 10	38 57 30	6
		19 1 2	41 12 23	6
5				
	♌	15 44 32	35 9 45	6
South. in hilt of sword against the hand	♌	19 56 48	30 42 21	4-6
North		20 22 33	31 41 3	5
Small one under the hand	♍	19 44 43	38 57 41	6
		20 39 20	36 29 28	5-7
10				
		22 47 40	37 6 22	7
North of inform. before Medusa's head	♎	16 32 53	23 13 6	6
In the preced. fhould.	♎	20 09 23	21 36 7	4
		18 25 57	16 27 27	6
In upper arm		21 52 1	31 46 11	6
15				
South of inform. before Medusa's head	♐	27 23 1	10 55 34	4
Prec. of inform under Medusa's head	♐	26 36 35	17 46 8	4-5
In Perseus's head	♐	23 35 56	22 20 12	5
		23 52 40	26 14 52	6
Subsid. and left. before Medusa's head	♐	28 8 12	20 41 45	6
20				
		26 51 6	14 23 27	5-6
Prec. in Medusa's head	♑	29 34 32	21 44 25	4-5
In the hind fhould.	♑	25 42 7	7 28 39	5
	♑	29 22 16	15 5 51	6
South. in Medusa's head	♑	20 34 30	20 33 33	4
25				
Bright one in Medusa's head	♒	21 39 42	22 25 47	2-3
In lower part of the arm	♒	27 21 12	26 8 21	4
Next the bright one	♒	22 1 40	20 55 30	4-5
		26 52 44	30 44 12	6-7
		24 38 48	24 49 51	6
30				
		26 54 41	20 55 42	6
Against preced. and fouth. fide	♓	27 3 30	23 38 4	5-6
A lucid one against hind. part	♓	27 16 44	25 5 25	4
		28 32 30	25 15 0	6
Prec. the lucida of hind. part	♓	28 17 48	28 00 25	5
35				
	♈	28 3 1	26 5 48	6
Middl. of three in the fide	♈	29 25 56	25 55 18	5
	♈	25 6 14	29 21 33	6
Another foll. thofe againft the hip	♉	0 23 6	27 15 23	3
Over heel of inner foot	♉	26 48 56	33 32 0	6
40				
In lower thigh	♈	29 30 20	22 7 3	4
In heel of fame foot	♈	28 7 41	29 53 18	6
In upper thigh	♉	3 46 12	29 32 51	5
In extrem. of fouth. foot	♉	28 17 40	27 17 55	5
In fouth. knee	♉	1 21 25	29 4 53	3
45				
In fouth. leg	♉	0 19 15	24 54 5	5
Prec. againft north. knee	♉	5 20 22	28 59 5	5
Prec. in upper leg	♉	5 10 51	30 17 7	5-6
		5 18 49	26 26 20	6
		3 3 44	30 44 22	7
50				
Subfeq. in upper leg	♉	6 23 6	26 30 9	5
Thin foll. fouth. knee	♉	4 49 3	31 38 20	5
In exil upper leg	♉	7 17 43	29 50 37	5
		5 51 21	34 51 40	5-6
		3 37 6	32 17 4	7
55				
In heel of upper foot	♉	8 38 40	31 7 41	5
In fole of fame foot	♉	8 55 46	29 49 12	6
	♉	9 36 20	28 58 00	5
		10 48 5	42 33 3	6

PERSIAN *monarchy*. See MONARCHY.

PERSIAN, or PERSIAN *tongue*, one of the living oriental languages; spoken in the empire of Persia.

The *Persian* has two particularities not found in any of the other eastern tongues: the one, that it has an auxiliary verb, answering to the *verb substantive* of the Greeks; the other that it has no *dual*. Both these it borrowed from the Macedonians, after the conquest of Alexander.

PERSIAN *wheel*, in *Agriculture*, is a machine for raising a quantity of water sufficient to overflow lands bordering on the banks of rivers, &c. where the stream is too low to do it alone.

Such a wheel is represented in *Tab.* V. *Hydraulics* and *Hydrostatics*, *fig.* 52. with which water may be raised by means of a stream AB turning a wheel CDE, according to the order of the letters, with buckets *a*, *a*, *a*, *a*, &c. hung upon the wheel by strong pins *b*, *b*, *b*, *b*, &c. fixed in the side of the rim: but the wheel must be made as high as the water is intended to be raised above the level of that part of the stream in which the wheel is placed. As the wheel turns the buckets on the right hand go down into the water, and are thereby filled, and go up full on the left hand, until they come to the top at K; where they strike against the end *n* of the fixed trough M, and are thereby overset, and empty the water into the trough; from which it may be conveyed in pipes to the place which it is designed for: and as each bucket gets over the trough, it falls into a perpendicular position again, and goes down empty, until it comes to the water at A, where it is filled as before. On each bucket is a spring *r*, which going over the top or crown of the bar *n* (fixed to the trough M) raises the bottom of the bucket above the level of its mouth, and so causes it to empty all its water into the trough.

Sometimes this wheel is made to raise water no higher than its axis; and then instead of buckets hung upon it, its spokes C, *d*, *e*, *f*, *g*, *b*, are made of a bent form, and hollow within; these hollows opening into the holes C, D, E, F, in the outside of the wheel, and also into those at O in the box N upon the axis. So that, as the holes C, D, &c. dip into the water, it runs into them; and as the wheel turns, the water rises in the hollow spokes, *e*, *d*, &c. and runs out in a stream P from the holes at O, and falls into the trough Q, from whence it is conveyed by pipes. And this is a very easy way of raising water, because the engine requires neither men nor horses to turn it. See OVERFLOWING *of land*.

PERSIAN, or PERSIC, in *Architecture*, a name common to all statues of men; serving, instead of columns, to support entablatures. See *Tab. Archit. fig.* 37.

They only differ from CARYATIDES, in that those represent statues of women.

The *Persian* is a kind of order of columns, first practised among the Athenians, on occasion of a victory their general Pausanias obtained over the *Persians*. As a trophy of this victory, the figures of men dressed in the *Persian* mode, with their hands bound before them, and other characters of slavery, were charged with the weight of Doric entablatures, and made to do the office of Doric columns.

Persian columns, M. Le Clerc observes, are not always made with the marks of slavery; but are frequently used as symbols of virtues, vices, joy, strength, valour, &c. as when made in the figures of Hercules, to represent strength; and of Mars, Mercury, fauns, satyrs, &c. on other occasions.

PERSIAN *æra*, and *year*. See EPOCHA and YEAR.

PERSIAN *bodies* and *joints*. See the substantives.

PERSICA, in *Botany*. See PEACH-*tree*.

PERSICA *concha*, in *Natural History*, a name given to a very remarkable and beautiful sea-shell, which authors have long been at a loss to reduce to any genus.

Aldrovand has thrown it to the end of his work, and says, it would be of the turbinated kind, if it did not want the turba. It is truly of the genus of the *concha globosa*, or DOLIUM.

PERSICA *terra*, in *Natural History*, an earth of the ochre kind, known in the colour-shops of London by the name of *Indian red*.

It is a very fine purple ochre, of a considerably compact texture, and great weight; while in the earth it is of a pure blood colour, and is not to be cut with the spade, but is dug with iron crows, and falls in irregular masses.

It is of a rough dusky surface, and full of considerably large, bright, glittering particles: these are white and of a fine lustre. It adheres firmly to the tongue, is rough and harsh to the touch, stains the hands very deeply, and is of a rough astringent taste, and makes a very violent effervescence with acid menstruums.

It is dug in the island of Ormus, in the Persian gulf, and in some parts of the East Indies.

PERSICARIA, in *Botany*. See ARSMART.

PERSIMON, in *Botany*. See JOA's *zizara*.

PERSOLATA, in *Botany*, a word used by Pliny, as the name of a kind of burdock, different from the *personata*. He has, in the beginning of the chapter, spoken of the arctium of the Greeks, which he says the Latins sometimes called *personata*, and afterwards adds this *persolata*; which, he says, was a plant vulgarly known, and called by the Greeks *arctium*.

He seems to allow, that the Greeks called both these plants by the same name; but he distinguishes the *persolata* from *personata*, by saying that the former has leaves like those of the great gourd, but larger and more hairy. It is probable, therefore, that he distinguishes, under these two names, the two different species of the great burdock common with us, the one with simple, the other with woolly heads.

PERSON, *persona*, an individual substance, of a rational or intelligent nature.

The father and son are reputed, in law, as the same *person*; an ambassador represents the *person* of his prince.

The word *person*, *persona*, is said to be borrowed *a personando*, from personating or counterfeiting; and is supposed to have first signified a mask: by reason, says Boethius, *in larva canorus sonus volvitur*; and hence the actors who appeared masked on the stage were sometimes called *larvati*, and sometimes *personati*.

The same author adds, that as the several actors represented each their simple individual *person*, viz. Œdipus, or Chremes, or Hecuba, or Medea; for this reason, other people, who were also distinguished by something in their form, character, &c. whereby they might be known, came also to be called, by the Latins, *personæ*; and, by the Greeks, πρόσωπα.

Again, as these actors rarely represented any but great and illustrious characters, the word came, at length, to import the mind, as being a thing of the greatest regard and dignity among human matters. And thus men, angels, and even God himself, were called *persons*. Things merely corporeal, as a stone, a plant, or a horse, were called, by them, *hypostases*, or *suppositi*, but never *persons*.

Hence also the learned imagine, the same name *person* came to be used to signify some dignity, whereby a *person* is distinguished from another; as a father, husband, judge, magistrate, &c.

In which sense we are to understand that of Cicero: Cæsar never speaks of Pompey, but in terms of honour and respect; but he does many hard and injurious things against his *person*.

This for the name *person*. As for the thing, we have already defined *person*, an individual substance of a reasonable nature; which is the same as Boethius's definition.

Now a thing may be individual two ways. 1. Logically, as it cannot be predicated of any other; as Cicero, Plato, &c. 2. Physically; in which sense a drop of water, separated from the ocean, may be called an individual. *Person* is an individual nature in each of these senses: logically, says Boethius, since *person* is not spoken of universals, but only of singulars and individuals; we do not say the *person* of an animal, or a man, but of Cicero and Plato: and physically, since Socrates's hand or foot are never considered as *persons*.

This last kind of individual is denominated two ways: positively, as when the *person* is said to be the whole principle of acting; for whatever thing action is attributed to, that do the philosophers call a *person*: and negatively, as when we say, with the Thomists, &c. that a *person* consists in this, that it does not exist in another as a more perfect being.

Thus, a man, though consisting of two very different things, viz. body and spirit, is not two *persons*; since neither part alone is a whole principle of action, but one *person*, since the manner of his consisting of body and spirit is such as constitutes one whole principle of action; nor does he exist in any other as a more perfect being; as, e. g. Socrates's foot does in Socrates, or a drop of water in the ocean.

PERSON, in *Grammar*, is a term applied to verbs and pronouns, which being conjugated, are applicable to three different *persons*.

I love, is a verb used in the first *person*; *thou lovest*, designs the second *person*; *he loveth*, marks the third: and thus in the plural number.

I, *thou*, *he*, are pronouns of the first, second, and third *person*.

Verbs agree with their nouns, in number and *person*.

PERSON, *persona*, in *Dramatic Poetry*, the name and part of an actor; or of him presented by the comedian.

At the head of dramatic pieces come the *dramatis personæ*, the list of actors, and characters that are to appear on the stage.

The ancient tragedy was only a simple chorus: Thespis

was

was the firſt who introduced a *perſon* to relieve the chorus; and Æſchylus added a ſecond.

F. Boſſu obſerves, that, in the epic and dramatic poem, the ſame *perſon* muſt reign throughout; i. e. muſt ſuſtain the chief part throughout the whole piece, and the characters of all the other *perſons* muſt be ſubordinate to him.

Quod PERSONA *nec prehendarii*, &c. See QUOD.

PERSON, *perſona*, in *Law*. See PARSON.

PERSONABLE, *perſonabilis*, in *Law*, implies the being able to hold or maintain a plea in court.

That is, as the civilians would expreſs it, *habere perſonam ſtandi in judicio*.

Thus they ſay the defendant was judged *perſonable* to maintain this action. Old Nat. Brev. 142.

The tenant pleaded, that the demandant was an alien, born in Portugal, without the ligeance of the king; and judgement was aſked, Whether he ſhould be anſwered? The plaintiff ſaid, he was made *perſonable* by parliament. Kitch. fol. 124.

PERSONABLE is alſo uſed to ſignify a capacity to take any thing granted or given.

PERSONAL, ſomething that concerns, or is reſtrained to, the *perſon*.

In diſputes among the learned, there is ever ſomething *perſonal* intermixed; in ethics, it is a maxim, that all faults are *perſonal*; i. e. they do not paſs to our deſcendants.

PERSONAL *action*, in *Law*. See ACTION.

PERSONAL *goods*, or *eſtate*, is that conſiſting of money, moveables, &c. which every perſon has in his own diſpoſal (ſee CHATTELS), in oppoſition to lands and tenements, which are called *real* ESTATE.

PERSONAL *chattels*, *covenant*, *diſtreſs*, *hiſtory*, *liberty*, *patronage*, *preſidency*, *ſervice*, and *tithes*. See the ſubſtantives.

PERSONAL, *pronoun*, or *verb* PERSONAL, in *Grammar*, a verb or pronoun conjugated in all the three perſons.

They are thus called, in oppoſition to *imperſonals*, which have only the third perſon.

PERSONALITY, *perſonalitas*, in the ſchools, the quality of a perſon; or that which conſtitutes an individual in the quality of a perſon.

The philoſophers, being uſed to conſider matter and form in every other thing, do the ſame in perſon. The matter of perſon, according to them, is a ſingular ſubſtance, endued with reaſon: for ſubſtance may, at the pleaſure of God, either be, or not be, a perſon; inaſmuch as the human nature in Chriſt is not a perſon. The form of perſon, which they call *ſubſiſtency*, *ſuppoſitality*, and *perſonality*, is that by which the foreſaid ſubſtance becomes individual.

The ſchool-divines are divided about what it is that diſtinguiſhes the ſeveral *perſonalities* in the Trinity.—Some will have it to be only the different relations: others, as Ferraventius, contend for ſome incommunicable ſubſtance: St. Bonaventure, and St. Thomas, take it to be different origins that diſtinguiſh the *perſonalities*; which opinion is the moſt followed.

PERSONALITY, or PERSONALTY, in *Law*. An action is ſaid to be in *perſonality*, when it is brought againſt the right perſon.

PERSONATA, in *Botany*. See BURDOCK.

PERSONATI, among *Botaniſts*, denote ſuch flowers as expreſs the gaping mouths of certain living creatures.

PERSONIFYING, or PERSONALIZING, the feigning a perſon; or attributing a perſon to an inanimate being; or giving it the figure, ſentiments, and language of a perſon. See PROSOPOPOEIA.

The poets have *perſonified* all the paſſions; and even made divinities of them, which were worſhipped by the heathens; as the goddeſs Perſuaſion, the god Sleep, the Furies, Envy, and Diſcord, and Fame, Fortune, Victory, &c.

Perſonifying is eſſential to poetry, eſpecially to the epopœia.

PERSPECTIVE, the art of delineating viſible objects on a plain ſurface, ſuch as they appear at a given diſtance, or height, upon a tranſparent plane, placed perpendicular to the horizon, between the eye and the object. This we particularly call

PERSPECTIVE, *linear*, as regarding the poſition, magnitude, form, &c. of the ſeveral lines, or coutours of objects, and expreſſing their diminution.

This is a branch of mathematics: ſome make it a part of optics; others a ſcience and art derived therefrom: its operations are all geometrical.

PERSPECTIVE, *hiſtory of*. The art of *perſpective* owes its birth to painting, and particularly to that branch of it which was employed in the decoration of the theatre, where landſcapes were principally introduced, and which would have looked unnatural and horrid, if the ſize of the objects had not been pretty nearly proportioned to their diſtance from the eye. The ancients muſt, therefore, have had conſiderable knowledge of this art; though the only ancient author from whom we can obtain any information, relative to its antiquity, is Vitruvius; who, in the preface to his ſeventh book, informs us, that Agatharchus, at Athens, was the firſt who wrote on this ſubject, on occaſion of a play exhibited by Æſchylus, for which he prepared a tragic ſcene; and that afterwards the principles of the art were more diſtinctly taught in the writings of Democritus and Anaxagoras, the diſciples of Agatharchus, which are no longer extant.

The *perſpective* of Euclid and of Heliodorus Larriſſæus contains only ſome general elements of optics, that are by no means adapted to any particular practice, though they furniſh ſome materials that might be of ſervice even in the linear *perſpective* of painters.

Geminus, of Rhodes, who was a celebrated mathematician, in the time of Cicero, hath likewiſe written on this ſubject.

We may alſo infer, that the Roman artiſts were acquainted with the rules of *perſpective*, from the account which Pliny, Nat. Hiſt. lib. xxxv. cap. 4. gives of the repreſentations on the ſcene of thoſe plays given by Claudius Pulcher; by whoſe appearance, he ſays, the crows were ſo deceived, that they endeavoured to ſettle on the fictitious roofs. However, of the theory of this art among the ancients we know nothing; as none of their writings have eſcaped the general wreck of ancient literature in the dark ages of Europe. *Perſpective* muſt, without doubt, have been loſt, when painting and ſculpture no longer exiſted. Nevertheleſs we have reaſon to believe, that it was practiſed much later in the Eaſtern empire.

John Tzetzes, who lived in the twelfth century, ſpeaks of it as if he was well acquainted with its importance in painting and ſtatuary: and the Greek painters, who were employed by the Venetians and Florentines, in the thirteenth century, ſeem to have brought ſome optical knowledge with them into Italy: for the diſciples of Giotto are commended for obſerving *perſpective* more regularly than any of their predeceſſors in the art had done; and they lived in the beginning of the fourteenth century.

The Arabians were not ignorant of this art; as we may preſume from the optical writings of Alhazen, who lived about the year 1100, cited by Roger Bacon, when treating on this ſubject.

Vitellus, a Polander, about the year 1270, wrote largely and learnedly on optics.

Our own friar Bacon, as well as John Peckham, archbiſhop of Canterbury, treated this ſubject with ſurpriſing accuracy, conſidering the times in which they lived.

The moſt ancient authors, who profeſſedly laid down rules of *perſpective*, were Bartolomeo Suzzaniſto, of Milan, whoſe book, intitled Regole di *Perſpettiva*, e Miſure delle Antichita di Lombardia, is dated 1440? and Pietro del Borgo, likewiſe an Italian, who was the moſt ancient author met with by Ignatius Danti, and who is ſuppoſed to have died in 1543. This laſt writer ſuppoſed objects to be placed beyond a tranſparent tablet, and endeavoured to trace the images, which rays of light emitted from them, would make upon it. But his work is not now extant. However, Albert Durer conſtructed a machine upon the principles of Borgo, by which he could trace the *perſpective* appearance of objects.

Leon Battiſta Alberti, in 1450, wrote his treatiſe De Pictura, in which he treats principally of *perſpective*.

Balthazar Peruzzi, of Siena, who died in 1536, had diligently ſtudied the writings of Borgo; and his method of *perſpective* was publiſhed by Serlio, in 1540. To him, it is ſaid, we owe the diſcovery of points of diſtance, to which all lines that make an angle of 45° with the ground line are drawn.

Guido Ubaldi, another Italian, ſoon after diſcovered, that all the lines that are parallel to one another, if they be inclined to the ground line, converge to ſome point in the horizontal line; and that through this point, alſo, a line, drawn from the eye, parallel to them, will paſs.

His *perſpective* was printed at Peſaro in 1600, and contained the firſt principles of the method afterwards diſcovered by Dr. B. Taylor.

In 1583, there was publiſhed a book, written by Giacomo Barozzi, of Vignola, commonly called Vignola, intitled The two Rules of *Perſpective*, with a learned Comment, by Ignatius Danti. In 1615, the work of Marolois was printed, in Latin, at the Hague, and engraved and publiſhed by Hondius. And in 1625, Sirigatti publiſhed a treatiſe of *perſpective*, which is little more than an abſtract of Vignola's.

The art of *perspective* has been gradually improved by subsequent gemmetricians, particularly by professor 'Gravesande, and, in a much greater degree, by Dr. Brook Taylor, whose principles are in a considerable measure new, and far more general than those of any of his predecessors. He did not confine his rules, as his predecessors had done, to the horizontal plane only, but made them general, so as to affect every species of planes and lines, whether they were parallel to the horizon or not; and thus his principles were made universal. Farther, from the simplicity of his rules, the whole tedious progress of drawing out plans and elevations for any object is rendered entirely useless, and therefore avoided; for by this method, not only the fewest lines imaginable are required to produce any *perspective* representation, but every figure, thus drawn, will bear the nicest mathematical examination. Moreover, his system is the only one calculated for answering every end of those, who are practitioners in the art of design; because from hence they may be enabled to produce the whole, or only so much of an object as is wanted, and by fixing it in its proper place, may determine its apparent magnitude in an instant. It explains also the *perspective* of shadows, the reflections of objects from polished planes, and the inverse practice of *perspective*.

His Linear *Perspective* was first published in 1715; and his New Principles of Linear *Perspective* in 1719, which he intended as an explanation of his first treatise. In 1738, Mr. Hamilton published his Stereography, in 2 vols. fol. after the manner of Dr. Taylor. But the most complete system of *perspective*, both as to theory and practice, on the same principles, is that of Mr. Kirby, the third edition of which was published in 1768, fol. We have also treatises on this subject, by the Jesuit, originally written in French, at Paris, translated by Mr. Chambers, and printed at London, in 1726, Highmore, Ware, Cowley, Priestley, Ferguson, &c.

The instruments necessary for drawing according to the rules of *perspective* are a DOUBLE SQUARE, a PARALLEL *ruler*, a drawing board (which is only a smooth board made exactly square), a SECTOR, a REFRACTOR; to which may be added a drawing pen, and a black-lead pencil.

But to return to the doctrine of linear *perspective*. Suppose a glass-plane H I, (*Tab. Perspect. fig. 3.*) raised perpendicularly on a horizontal plane: and the spectator S, directing his eye O, to the triangle A B C: if now we conceive the rays A O, O B, O C, &c. in their passage through the plane, to leave their traces or vestigia in *a*, *b*, *c*, &c. on the plane; there will appear the triangle *a b c*, which as it strikes the eye by the same rays *a* O, *b* O, *c* O, by which the reflected particles of light from the triangle A B C are transmitted to the same; it will exhibit the true appearance of the triangle A B C, though the object should be removed, the same distance and height of the eye being preserved.

The business of *perspective*, then, is to shew by what certain rules the points *a*, *b*, *c*, &c. may be found geometrically: and hence, also, we have a mechanical method of delineating any object very accurately.

Hence it appears, that *a b c* is the section of the plane of the picture with the rays, which proceed from the original object to the eye: and, therefore, when this is parallel to the picture, its representation will not only be parallel to the original, but similar to it, though smaller in proportion, as the original object is farther from the picture. If the original is brought to coincide with the picture, the representation will be equal to the original; but as the original is removed farther and farther from the picture, the image of it will become smaller and smaller, and also rise higher and higher in the picture, till at last, when the original is supposed to be at an infinite distance, its image, or representation, will vanish into an imaginary point, exactly as high above the bottom of the picture as the eye is above the ground or original plane, upon which the spectator, the picture, and the original object are supposed to stand. This may be familiarly illustrated in the following manner: Suppose a person at a window looks through an upright pane of glass at any object beyond it; and, keeping his head steady, draws the figure of the object upon the glass, with a black-lead pencil, as if the point of the pencil touched the object itself; he would then have a true representation of the object in *perspective*, as it appears to his eye. In order to this, it is necessary, first, that the glass be laid over with strong gum-water, which, when dry, will be fit for drawing upon, and will retain the traces of the pencil; and, secondly, that he looks through a small hole in a thin plate of metal, fixed about a foot from the glass, between it and his eye, and that he keeps his eye close to the hole, otherwise he might shift the position of his head, and consequently make a false delineation of the object. Having traced out the figure of the object, he may go over it again, with pen and ink; and, when that is dry, put a sheet of paper upon it, and trace it in this with a pencil; then, taking away the paper, and laying it on a table, he may finish the picture, by giving it the colours, lights, and shades, as he sees them in the object itself; and thus he will have a true resemblance of the object. See DESCENDING.

Perspective is either employed in representing the *scenographies* and ground-plots of objects, as projected on *perspective* planes; or in *scenographies* and representations of the bodies themselves.

From this general view of *perspective*, the necessity of it in the art of painting is obvious. Accordingly Leonardo da Vinci observes, that the practice of painting ought always to be built upon a rational theory, of which *perspective* is the guide and gate; and without which it is impossible to succeed, either in designing or in any of the arts depending upon it.

In order to understand the practice of *perspective*, it will be necessary to premise some definitions, and general principles, upon which its various operations depend. Several of these occur in the course of this work, but it may be convenient and useful to give, in this place, a brief and connected view of them.

The *point of sight*, in *perspective*, is that point E (*fig. 4.*) where the spectator's eye should be placed to view the picture. The *point of sight*, in the picture, is the same with the centre of the picture, or the point directly opposite to the eye, and the nearest to it; called also the principal point.

If from the point of sight E, a line E C, be drawn perpendicular to the picture O *b* I; the point C, where the line intersects the picture, is called the *centre of the picture*; and E C the principal ray.

The *distance of the picture* is the length of the line E C, which is the common section of the vertical and horizontal planes; and if this distance be transferred to the horizontal line on each side of the point C, as is sometimes the case, the extremes are called the *points* of distance: for the points of distance are set off from the point of sight, sometimes on the horizontal line, and sometimes on the perpendicular E C.

As the beauty of *perspective* depends on the point of distance, the eye ought never to be placed too near the object, nor too far from it. It should never be nearer to the object than half of its largest dimension, for in this situation the visual angle will be 90°; and this is the largest angle which the eye can well discover at one cast. If it be made less than 45°, the object will be too much contracted, and the visual angle so small, that the returns in buildings would not be distinguished, and the whole would appear confused. And, therefore, when the visual angle is about 60°, or when the distance of the eye from the extremities of the object is nearly equal to its longest dimension, the object will be seen with the greatest advantage. However, in some cases, such as in painting deceptions, or for pictures with curvilineal objects, the distance should be taken as great as possible: and in drawing agreeable *perspective* views of small objects, the observer should be considered as viewing them under an angle not exceeding 30° at most.

The real object, whose representation is sought, whether it be a line, point, or plane figure, is the *original object*; and the *original plane*, called also the *geometrical plane*, is that plane upon which the real object is situated: thus the ground or bottom plane K I, is the original plane, and A B G D is the original object. The line O I, in which the ground plane cuts the bottom of the picture, is called the section of the original plane, *ground* LINE, *line of the base*, or *fundamental line*.

If an original line A B be continued, so as to intersect the picture, the point of intersection R is called the intersection of that original line, or its *intersecting point*.

The *horizontal plane* is the plane *a b d*, which passes through the eye, parallel to the horizon, and cuts the *perspective* plane or picture at right angles; and the *horizontal* line *b g* is the common intersection of the horizontal plane with the picture.

The *vertical plane* is that which passes through the eye at right angles to the ground plane, and perpendicular to the picture, as E C S N; and the *vertical line* is the common section of the vertical plane and the picture, as C N.

The *line of station* S N is the common section of the vertical plane with the ground plane, and perpendicular to the ground line O I.

The *line of the height of the eye* is a perpendicular, as E S, let fall from the eye on the ground plane. This height, which determines that of the horizontal line from the bottom of the picture, should never be so great as the distance of the eye. In EASEL-*pieces*, or moveable pictures, the height of the eye is left entirely to the direction of the artist; but it is observed in general, that

low horizons have a much better effect than high ones; for which reason the height of the horizontal line should never exceed one half of the height of the picture; and perhaps the most proper height would be one third part. However, if the picture be a fixed one, then the height of the horizontal line must be exactly level with the spectator's eye. The size of the picture is to be regulated by the distance and height of the eye.

The *vanishing line* of the original plane is that line where a plane passing through the eye, parallel to that original plane, cuts the picture: thus H *g*, *fig.* 5. is the vanishing line of A B G D. It is plain that no point in the original plane can have its image in the picture above the line H *g*, as long as the position of the picture and eye remain the same: and that if the original plane A B G D were infinitely extended beyond the picture, yet its *perspective* appearance, in this case, would be a finite space, bounded by the vanishing line H *g*. It is also plain, from this definition, that if two or more planes, A B G D and T, are parallel to each other, they will have the same vanishing line H *g*.

The *vanishing point* of the original line is that point where a line drawn from the eye, parallel to that original line, intersects the picture: thus C and *g* are the vanishing points of the lines A B, K I. Hence it follows, that the vanishing points C and *g* of the lines A B, K I, in any original plane A B G D, are in the vanishing line of that plane.

If from the point of sight a line be drawn perpendicular to any vanishing line, the point where that line intersects the vanishing line, is called the centre of that vanishing line: and the *distance of a vanishing line* is the length of the line which is drawn from the eye, perpendicular to the said line.

Measuring points are points from which any lines in the *perspective* plane are measured, by laying a ruler from them to the divisions laid down upon the ground line. The *measuring point* of all lines parallel to the ground line is either of the points of distance on the horizontal line, or point of sight. The *measuring point* of any line, perpendicular to the ground line, is in the point of distance on the horizontal line; and the *measuring point* of a line oblique to the ground line is found by extending the compasses from the vanishing point of that line to the point of distance on the perpendicular, and setting it off on the horizontal line.

Having explained the principal terms that occur in *perspective*, we shall farther premise some general propositions, from which the practical operations result:

I. *The representation a b, fig.* 6. *of a line* A B *is part of a line* S C, *which passes through the intersecting point* S, *and the vanishing point* C, *of the original line* A B. For the plane B D E N, passing through the eye E and the original line A B, will pass through the intersecting point S, and the vanishing point C, and cut the picture in the line S C. And since the visual rays A E, B E, drawn from the extremities of the line to the eye, are in the plane B D E N, and consequently their sections *a*, *b*, with the picture, are in the section S C of that plane with the picture, *a*, *b* must be the projections of A, B. But B E A is a plane of rays which form the projection *a b* of the whole line A B, and as B E A is in the plane B D E N, the section *a b* must be a part of the section S C, which passes through S and C. Hence it follows, that, whatever be the situation of any original line, its representation upon the picture will always be in that line which is drawn through its intersection and vanishing point. For let the oblique line A D, *fig.* 7. be in the plane G F E O M, whose section with the picture is V O. Continue D A to cut the picture in V, and draw its parallel E O to cut the picture in O, which will be the vanishing point of A D. From the extremes of the line A D produce the rays A E, D E, to the eye E, and *a d*, the image of A D, in part of the line V O, which passes through the intersecting point V, and the vanishing point O.

II. *If the original plane is parallel to the picture, it can have no vanishing line upon it; consequently the representation will be parallel*; because a parallel plane, that passes through the eye, can never cut the picture, and consequently can produce no vanishing line upon it. Nor can lines parallel to the picture have any vanishing points upon it; but their images will be parallel to the originals. If the original is perpendicular to the ground line, as A B, *fig.* 6. then its vanishing point will be in C, the centre of the picture, or point of sight; because E C is perpendicular to the picture, and, therefore, parallel to A B. All lines, which are parallel to each other, but not parallel to the picture, will have the same vanishing point; because a line which passes through the eye, being parallel to one of them, is parallel to all the rest; and, therefore, they can have but one vanishing point, whatever be their number.

III. *The image of a line bears a certain proportion to its original.* In this proposition there are three cases; for the original line may be perpendicular, parallel, or oblique to the plane of the picture. In the first case, let A B, *fig.* 8. be the original line, consisting of three equal parts, of which E C contains two; then E C + A B = B S = five parts. Divide A C into five equal parts, and the ray B E will pass through *b*; and A *b* : A C :: B A : B A + C E (= B S), i. e. the image is to the distance between the vanishing point C and the intersecting point A, as the original object is to its own length added to the distance of the eye from the picture. See Simpson's Geometry, th. 12 book vii. Hence it follows, that A C − A *b* = C *b* : A B + C E − A B = C E :: A C : A B + C E, or C *b* : A C :: C E : A B + C E, i. e. the distance between the vanishing point of a line and any point *b* in its image is to the distance between the vanishing point and the intersecting point as the distance E C is to A B + C E. From a view of the figure it is also evident, that A *b* : E S :: A B : B S, i. e. the height of the point *b* in the picture is to the height of the eye as the distance of the objective point from the picture is to the sum of the same distance and that of the eye from the picture.

In the second case, when the original line is parallel to the plane of the picture, the image *a b* of a line A B, *fig.* 9. parallel to the picture is to its original A B as the distance E C of the image is to the distance E D of the original line. Suppose the figure constructed, and it is plain, that the triangles E B D, E C *b*, and E C *a*, E D *a*, are respectively equiangular, because *a b* is parallel to A B: and, therefore, C *b* : D B :: E C : D E, and C *a* : D A :: E C : D E; consequently *a b* : A B :: E C : E D. In the third case, when the original line is oblique to the picture, the image A *b* of the oblique line A B, *fig.* 10. is to the distance A V between its vanishing point V, and intersecting point A, as the length of the line A B is to the sum of A B and E V, the distance of the vanishing point V from the eye. The lines A B and E V are parallel by construction; therefore the triangles E V *b* and A B *b* are equiangular; therefore, V E : A *b* :: E V : A B, i. e. the distance between the vanishing point of an oblique line and any point of its image is to the remaining part of A V as the distance of the vanishing point is to the original line: and A *b* : A *b* + *b* V = A V : A B : A B + E V.

IV. *The image of a line may be determined by transferring the length or distance of the given line to the intersecting line; and the distance of the vanishing point to the horizontal line*; i. e. *by bringing both into the plane of the picture.* Let A B be the original line, whose vanishing point is V, and produce the ground line F A, and the vanishing line H V, and draw A V. From the intersecting point A transfer the line A B to D, and from V transfer E V to *b*, then draw the lines B E and D *b*, which will both pass through the same point *b*, and give A *b* for the image of A B. See Simpson's Geom. book vii. th. 12. cor.

Having premised the general principles of *perspective*, we shall now subjoin some examples of the practice of *lineographic perspective* in the following problems.

I. *To find the representation of an objective point* A.—From A, *fig.* 11. draw any line at pleasure, as A 1, intersecting the bottom of the picture in 1; and from the eye E draw E H parallel to A 1, intersecting the horizontal line in H; which will be the vanishing point of A 1; draw H 1, and from A a line to E, intersecting H 1 in *a*; and *a* will be the representation of the original point A. Otherwise, draw A 1, A 2, *fig.* 12, N° 1, at pleasure, intersecting the bottom of the picture in 1 and 2; and from the eye E draw E H, parallel to A 1, and E L parallel to A 2; then draw H 1 and L 2, which will intersect each other in *a*, the representation of A.

There is also another method of resolving this problem, or of exhibiting the *perspective* appearance *b*, of an objective point H *fig.* 13.) From the given point draw H I perpendicular to the fundamental line D E. From the fundamental line D E cut off I K = I H; through the point of sight F draw a horizontal line F P; and make F P equal to the distance of the eye S L: lastly, from the point I to the point of sight F, draw F I; and from K to the point of distance P, the line P K. The intersection *b* is the appearance of the objective point. For O F is parallel to H I, therefore F is the vanishing point of H I; and since the representation of H I is in the line I F, and consequently the image of the point I is in the same line; and since O P is parallel to H K, because the triangles O F P and H I K are isosceles and right angled, and consequently equiangular; and O F being parallel to H I, F O H = O H I, therefore P O H = O H K;

=OHK; P will be the vanishing point of HK, and the image of the point H will be found somewhere in the line KP; consequently it muſt be exhibited in *b*, the common interſection of LF and KP.

Hence, 1. ſince the appearance of the extreme points of a right line being given, the appearance of the whole line is given; the *ichnographic* projection of any rectilinear figure may be had by this method. And, 2. ſince any number of points of a curve line may by this means be projected on the *perſpective* plane; the projection of curve lines may likewiſe be effected after the ſame manner. And, 3. therefore, this method will ſuffice for mixtilineal figures; and is conſequently univerſal.

II. *To find the repreſentation of a line* A B (*fig.* 14.) *which is perpendicular to the ground line of the picture.* The point C, where E C interſects the horizontal line, is the vaniſhing point of A B; and, therefore, if A C be drawn, and from B be drawn B E, interſecting A C in *b*; A *b* will be the image of A B.

Otherwiſe; from B, *fig.* 15. draw B 1 at pleaſure, interſecting the ground line in 1; and from the eye E draw E H parallel to B 1, interſecting the horizontal line in H; then H is the vaniſhing point of B 1; and, therefore, drawing A C and 1 H, the point *b* of their interſection will determine the required image A *b*.

III. *To determine the image of a line* A B *parallel to the ground line.* Draw A 1, B 2 (*fig.* 16.) perpendicular to the ground line, and C will be the vaniſhing point of thoſe lines; draw 1 C, 2 C, and B E interſecting 2 C in *b*; then draw *a b* parallel to H L, and it will be the image of A B.

Otherwiſe, by two vaniſhing points: draw A 2 (*fig.* 17.) at pleaſure, interſecting the ground line in 2, and draw E H parallel to A 2, then H is the vaniſhing point of A 2: draw 2 H interſecting 1 C in *a*; and the parallel line *a b* will be the image required.

IV. *To exhibit the image of a line* A B *oblique to the picture.* Produce A B (*fig.* 18.) to the picture, and draw E H parallel to it; from 1 draw 1 H, and from the extremities A and B draw lines to E, which will interſect 1 H in *a* and *b*; and *a b* is the image of A B.

Otherwiſe; from A, B (*Tab.* II. *Perſpect. fig.* 22.) draw A 1, B 1, parallel to each other: and from E draw E L parallel to A 1, B 1; then draw 1 L, 1 L interſecting 2 H in *a* and *b*, and *a b* is the repreſentation of A B.

The problems now laid down will ſerve for determining the ſituation of all objects that are ſuppoſed to lie upon the ground.

V. *To find the* perſpective *appearances of a triangle*, A B C, (*fig.* 23.) *whoſe baſe* A B *is parallel to the fundamental line* D E. To the fundamental line D E draw a parallel at an interval equal to the altitude of the eye. Aſſume a fundamental point V, oppoſite to this either directly or obliquely, as the caſe requires. Tranſfer the diſtance of the eye from V to K. From the ſeveral angles of the triangles A C B, let fall perpendiculars, A 1, C 2, B 3: ſet off theſe perpendiculars upon the fundamental line D E oppoſite to the point of diſtance K. From 1, 2, 3, draw right lines to the fundamental or principal point V 1, V 2, V 3. From the points A, B, and C, of the fundamental line D E draw other right lines A K, B K, C K, to the point of diſtance K.

Since *a*, *b* and *c* are the appearances of the points A, B and C; the right lines *c a*, *a b*, *b c*, being drawn, *a c b* will be the appearance of the triangle A C B.

After the ſame manner is a triangle projected on a plane, where the vertex C is oppoſed to the eye: all here required is, that its ſituation on the geometrical plane be changed, and the vertex C be turned towards the fundamental line D E.

Otherwiſe; produce D A and D B (*fig.* 24.) to the ground line, and draw E L parallel to A D, and E H parallel to B D; then draw 1 L and 2 H interſecting each other in *d*; and if we be repreſentation of the angular point D. From B draw B 1 parallel to A 1, and L will be its vaniſhing point: therefore, draw 1 L interſecting 2 H in the point *b*, and *b* will be the repreſentation of the angular point B; and ſince A B is parallel to the bottom of the picture, from the point *b* draw *b a* parallel to the ground line, and the image of the triangle will be completed: or, it may be done by drawing A 3 perpendicular to the bottom of the picture, and then 3 C cutting 1 L in the point *a*, &c. If this triangle be equilateral, it may be eaſily divided into two equal parts, by deſcribing from E, with any radius, one arc O P, biſecting it in X, and drawing E C; from C draw a line through *d*, interſecting *a b* in *e*. This is evident, becauſe C is the vaniſhing point of D F.

The triangle may be alſo projected by having only one ſide *a d* (*fig.* 25.) given: let this be produced to its vaniſhing point L, and draw L E; then at L, with the diſtance L E, deſcribe the arc H E, interſecting the horizontal line in H, and H is the vaniſhing point of the other ſide *b d*; and by drawing *a b* parallel to the horizontal line, the repreſentation will be completed.

This method furniſhes a very uſeful rule for ſhortening the operations in *perſpective*. For ſuppoſe *a* L to be a line given in *perſpective* (that is, to be drawn upon the picture) to any vaniſhing point L; and let it be required to cut off a part *a d*, of the line *a* L, to repreſent a given length. From the end *a* of the line *a d*, draw *a b* parallel to the horizontal line H L, and call *a b* the repreſentation of a parallel line upon the picture; then from L the vaniſhing point of *a d* tranſfer the diſtance L E to H: from H draw a line to *b*, interſecting *a* L in *d*, then will *a d* repreſent the length of the line *a b*. Or, if *a d* be a line given in *perſpective*, and it be required to find the length of the parallel line *a b*, the ſame proceſs will ſerve: for a line, drawn from H through *d*, will cut off *a b* to repreſent a length (in *perſpective*) equal to *a d*; becauſe, the whole figure *a b d*, being the repreſentation of an equilateral triangle, its ſides are all equal in the original figure; conſequently, in either of the above caſes, *a b* and *a d* muſt repreſent lines which are equal to each other.

VI. *To exhibit the* perſpective *appearance of a ſquare* A B D C (*fig.* 26.) *ſeen obliquely, and having one of its ſides* A B *in the fundamental line.* The ſquare being viewed obliquely, aſſume the principal point V in the horizontal line H K, in ſuch manner as that a perpendicular to the fundamental line may fall without the ſide of the ſquare A B; at leaſt may not biſect it: and make V K the diſtance of the eye. Tranſfer the perpendiculars A C and B D to the fundamental line D E; and draw the right lines K B, K D, as alſo A V, V C. Then will A and B be their own appearances; and *c* and *d* the appearances of the points C and D. Conſequently A *c d* B is the appearance of the ſquare A B D C. If the ſquare A C B D ſhould be at a diſtance from the fundamental line D E; which yet rarely happens in practice; the diſtances of the angles A and B muſt likewiſe be tranſferred to the fundamental line: as is evident from the preceding problem. And ſince, even the oblique view is not very common; in what follows, we ſhall always ſuppoſe the figure to be poſited directly oppoſite to the eye: unleſs where the contrary is expreſly mentioned. Thus: let the original ſquare be A B F D. (*fig.* 27.) Draw A C, B C to the vaniſhing point C of the perpendicular ſides A D, B F; from the eye E draw E H and E L parallel to the diagonals B D and A F: then from A and B draw lines to L and H, interſecting A C in *d*, and B C in *f*; then *d f*, being drawn, completes the repreſentation.

Having found the image of one ſquare, that of any other, *i k m n*, may be eaſily found, by ſuppoſing *i k* to be one ſide of the image, and drawing, from *i* and *k*, *i* C and *k* C; then from *i* draw *i* H, and from *k* draw *k* L, which will give the depth of the ſquare.

Or, one diagonal only will be ſufficient. Thus: A L interſects B C in *f*; therefore, draw *f d* parallel to the horizontal line.

With reſpect to ſquares thus ſituated we may obſerve, that the vaniſhing points H and L of their diagonal, are exactly as far from the centre of the picture, or point of ſight, as from the eye. For H C and L C are each equal to the diſtance C E; and, therefore, by ſetting off C H or C L equal to C E, the lines E H and E L may be omitted.

There are other methods of reſolving this problem: thus (in *fig.* 28.) if only the height A B of the ſquare be given; ſet off A D and A 1 equal to A B; from A and D draw lines to C, and make C L = C E; draw 1 L, interſecting A C in *b*; then will A *b* be equal to A 1; draw *b d* parallel to the horizontal line, and the repreſentation will be completed. Or, if one ſide G I be given, draw lines from G and I to C; make C H = C E; from H draw H G, interſecting I C in *r*; and draw the parallel *r s*. Or, if the middle diameter *n p* be given, biſect *n p* in *e*; from C draw lines through the extremes *n*, *p*; from H produce a line through *e*, interſecting I C in *r*, and G C in G; laſtly, from *r* and G draw the parallels G I, *r s*, which complete the figure.

VII. *To exhibit the appearance of a ſquare* A B C D (*fig.* 29.) *whoſe diagonal* A C *is perpendicular to the fundamental line.* Continue the ſides D C and C B till they meet the fundamental line in 1 and 2. From the principal point V ſet off the diſtance of the eye to K and L. From K to A and 1 draw right lines K A and K 1; and from L to A and 2, the right lines L A, L 2. The interſections of theſe lines will exhibit the appearance of the ſquare A B C D viewed angle-wiſe.

VIII. *To exhibit the appearance of a ſquare* A B C D (*fig.* 30.) wherein another, I M G H, is inſcribed; the ſide of the greater, A B, being in the fundamental line; and

the diagonal of the leſs, perpendicular to the fundamental. From the principal point V, ſet off, each way, on the horizontal line HB, the diſtances VI. and VK; draw VA and VB; and KA and LB; then will *AedB* be the appearance of the ſquare ACDB. Produce the ſide of the inſcribed ſquare IH, till it meets the fundamental line in *i*; and draw the right lines K 1, and KM; then will *ibg*M be the repreſentation of the inſcribed ſquare IHGM. Hence, is eaſily conceived the projection of any figures inſcribed in others.

IX. *To exhibit the* PERSPECTIVE *of a pavement, conſiſting of ſquare ſtones, viewed directly.* Divide the ſide AB *fig.* 31, tranſverſed to the fundamental line DE into as many equal parts as there are ſquare ſtones in one row. From the ſeveral points of diviſion, draw right lines to the principal point V; and from A to the point of diſtance K, draw a right line AK; and from B to the other point of diſtance L, draw another LB. Through the points of the interſections of the correſponding lines draw right lines on each ſide, to be produced to the right lines AV and BV. Then will A *fg* B be the appearance of the pavement AFGB.

X. *To determine the repreſentation of a regular hexagon* ABDFGI, *(fig.* 32.) *when one of its ſides is parallel to the ground line.* Produce the ſeveral oblique ſides to interſect the ground line, and parallel to theſe draw EH and EL; then H will be the vaniſhing point of AI and DF, and L will be the vaniſhing point of of BD and IG. Through the angular points A, F, B, and G, draw F 1, G 2, which, being parallel to the ſides BD and AI, will have L and H for their vaniſhing points: from 1 draw 1 L, and from 2, draw 2 H, interſecting each other in *i*, then *i* will be the repreſentation of the corner I. From 1 draw 1 L, interſecting 2 H in *a*; and *a* will be the repreſentation of the corner A, and *a i* that of the ſide AI; then draw 1 L and 2 H, and *b* will be the repreſentation of B, and *a b*, being drawn, will be the image of AB, &c. In the ſame manner the image of an octagon may be determined. This method will likewiſe ſerve for the repreſentation of a circle; for having found eight points in the circumference, they will be ſufficient guides for drawing the figure. This problem may be reſolved by only having one ſide *b d (fig.* 33) in the repreſentation given. Through the corner *b* draw a line *a n* parallel to to the horizontal line; and produce *b d* to its vaniſhing point H; from H draw HE, and make HL=HE; then from L, draw a line through *d*, interſecting *a n* in *n*; then *b n* repreſents a line equal to the original of *b d*; make *ab*=*bn*; and *a b* is the repreſentation of one parallel ſide; from *d* draw *d* L, and from *a* draw *a* H, cutting *d* L in *f*; then *f* is another corner; and *d f* repreſents another ſide. Again, from *d* draw *di* parallel to the horizontal line, and *a* L cutting it in *i*; and *i* is another corner, and *a i* another ſide: laſtly, draw H*i* and the parallel *f g*, and the repreſentation is completed.

XI. *To exhibit the* PERSPECTIVE *of a circle.* If the circle be ſmall, circumſcribe a ſquare about it. Draw diagonals and diameters *ba* and *de (fig.* 34.) interſecting each other at right angles; and draw the right lines *f g* and *h c* parallel to the diameter *de* through *b* and *f*; as alſo through *a* and *g* draw right lines meeting the fundamental line DE in the points 3 and 4. To the principal point V draw right lines V 1, V 3, V 4, V 2; and to the points of diſtance L and K, draw the right lines L 2 and K 1. Laſtly, connect the points of interſection, *a*, *b*, *d*, *f*, *h*, *g*, *c*, *e*, with arcs *a b*, *b d*, *d f*, &c. Thus will *ab d f hgeca*, be the appearance of the circle.

If the circle be large, on the middle of the fundamental AB *(fig.* 35.) deſcribe a ſemicircle; and from the ſeveral points of the periphery, C, F, G, H, I, &c. to the fundamental line, let fall perpendiculars C 1, F 2, G 3, H 4, I 5, &c. From the points A, 1, 2, 3, 4, 5, &c. draw right lines to the principal point V, as alſo a right line from B to the point of diſtance L; and another from A to the point of diſtance K. Through the common interſections draw right lines as in the preceding problem; thus ſhall we have the points *c*, *f*, *g*, *h*, *i*, which are the repreſentations of C, F, G, H, I; and theſe, being connected as before, give the projection of the circle.

The eaſieſt and beſt method for putting a circle into *perſpective* ſeems to be the following; which admits alſo of univerſal application. Let *a b (fig.* 36.) repreſent the diameter of the given circle: biſect it in *c* for the centre; make CH, CL, each equal to UW the breadth of the picture; divide CH, CL, each into five equal parts; and make C*k*, C*i* each equal to two parts and one fourteenth. From H produce a line at pleaſure through the centre *c*; from *b*, draw two lines through the extremities *a*, *b*, interſecting H *i* in the points 3 and 4; do the ſame by the line L *k* with the point *k*; then draw a line from C through the centre *c*; from H draw lines through 3 and *b*, interſecting C 1 in 1 and 2; and having thus obtained eight points in the image of the circumference of a circle, the outline may be very accurately drawn through theſe points.

Hence appears, not only how any curvilinear figure may be projected on a plane; but alſo how any pavement, conſiſting of any kind of ſtones, may be delineated in *perſpective*.

Hence alſo appears what uſe the ſquare is of, in *perſpective*; for even in the ſecond caſe we uſe a ſquare divided into certain areolæ, and circumſcribed about the circle; though it be not delineated on the geometrical plane in the diagram.

XII. *To exhibit the* PERSPECTIVE *of a regular pentagon, having a broad limb, terminated by lines parallel thereto.* 1. From the ſeveral angles of the exterior pentagon A, B, C, D, E, *(fig.* 37.) to the fundamental line TS, let fall perpendiculars A 0, B 1, C 2, D 3, E 4; which, as in the former, tranſfer to the fundamental line. Connect the points 1, 2, 3, 4, to the principal point V; and the points 1, 2, 3, 4, to the point of diſtance K. Thus will the common interſections repreſent the appearance of the exterior pentagon. 2. If now, from the inner angles G, H, K, L, I, the perpendiculars G 0, H 5, K 6, L 7, I 8, be in the like manner let fall; and the reſt be done as in the former; we ſhall have the repreſentation of the inner pentagon. The pentagon ABCDE, therefore, with its limb, is repreſented in *perſpective*.

This problem is added for the ſake of an inſtance of the projection of a figure that has a broad limb, or edge.

It muſt be here obſerved, that if the magnitudes of the ſeveral parts of an object be given in numbers, together with the height and diſtance of the eye; its figure is to be firſt conſtructed by a geometrical ſcale; and the fundamental point, with the point of diſtance, to be determined by the ſame.

Nor is it always neceſſary, that the object be delineated under the fundamental line: in the projection of ſquares and pavements it is beſt let alone. But where it is neceſſary, and ſpace is wanting, draw it apart; find the diviſions in it, and tranſfer them to the fundamental line in the plane.

Threads being hung in the principal point, and the point of diſtance, and thence ſtretched to the points of the diviſions of the fundamental line; the common interſection of the threads will give the projection of the ſeveral points without confuſion; a thing much to be feared from the multiplicity of lines to be drawn.

XIII. *Having given the centre C of the picture, (fig.* 38.) *the vaniſhing line* H L, *and two vaniſhing points* H, L, *of a ſquare b d b f; to find the diſtance of the picture.* Biſect HL in A; from A with the radius AH (or AL) deſcribe the arc L E H; from C draw the perpendicular CE to touch the arch LEH, and EC will be the diſtance of the picture. For, drawing LE and HE, which will make a right angle at E, and EH, EL, are parallel to the originals of *b d*, *b f*, and conſequently CE is the true diſtance of the eye, &c.

XIV. *Having given the repreſentation of two lines* B *a*, D *f*, *(Tab.* III. *Perſpect. fig.* 39.) *to find their originals* BA, DF. From the interſecting point B, draw B A parallel to CL; from E draw a line through *a* interſecting AB in A; then BAis the original of B *a*. Again, from the vaniſhing point H, draw EH; and from the interſecting point D, draw DF parallel to EH; then from E, draw EF through the point *f*, which gives DF for the original of D *f*.

N. B. Theſe two laſt articles comprehend a part of what Dr. Taylor calls the *inverſe* practice of PERSPECTIVE.

Having in the preceding problems illuſtrated the principles and practice of *perſpective*, as it relates to objects ſituated upon the ground plane, we ſhall now give a brief account of the method of repreſenting objects, that are perpendicular and oblique to it; obſerving, in general, that thoſe which are parallel to the ground plane may be drawn by the help of thoſe that are perpendicular to it; and that lines perpendicular to the ground plane muſt be repreſented by lines perpendicular to the ground line, wherever they are ſituated. In order to determine the vaniſhing lines and vaniſhing points of planes which are perpendicular to the ground, we may ſuppoſe theſe planes to be either perpendicular to the picture, or oblique to it. Let the ſquare plane BKIF *(fig.* 40.) be perpendicular to the picture, ſo that the top and bottom of it vaniſh into C, its centre. Draw the line EV through C, and perpendicular to HL, and EV will be the vaniſhing line of the plane BKIF. And ſince CH is perpendicular to the vaniſhing line EV, C is the centre of that vaniſhing line; and as CH is equal to the diſtance of the eye, H will be the tranſpoſed place of the eye, and HC the diſtance of the vaniſhing line EV. But if the plane *a b e d (fig.* 41.) is oblique to the picture, then the top and bottom of it will not vaniſh into its centre C, but into the point L, on one ſide of the centre.

Draw

Draw a line through the vanishing point L, perpendicular to the horizontal line; then VU is the vanishing line of the plane *abcd*. And because CL is perpendicular to the vanishing line VU, L will be the centre of that vanishing line. Again, draw EL, and this will be the distance of the eye E from the vanishing line VL; and this distance transferred to H, will give H for the transposed place of the eye, and HL for the transposed distance of the vanishing line VU.

XV. *To find the representations of planes, whose bases are perpendicular to the ground line of the picture.* E. g. Let one corner A of the plane ABFD (*fig.* 42.) be at the bottom of the picture; and let it be required to draw the representation of a plane ten feet high, and four feet wide. From A, upon the ground line, make a scale of equal parts, representing feet at pleasure: from A draw AD perpendicular to this line, and produce it at pleasure: upon AD set ten feet from A upwards, and draw DC to the centre C, and from A draw AC; make CH=CE, and draw H4 intersecting AC in B; then AB=4 feet: therefore, from B draw BF parallel to AD, and ABFD will be the representation required. Let the plane, whose representation *efgh* is required, be four feet wide, and five feet high, and its nearest corner *e* be one foot from the bottom of the picture. Draw CN at pleasure; make CL=CE; and set off one foot from N to 9, and draw L9 intersecting CN in *e*; and *e* will be one foot from the bottom. Take 4 feet more, as 9 5, and draw 5L intersecting CN in *f*, and *ef* is equal to 4 feet; draw NO perpendicular to the bottom of the picture, and make it equal to 5 feet; draw *eg*, *fh*, parallel to NO, and draw OC, which will complete the proposed representation. Otherwise: from *e* draw *ew* parallel to NA, intersecting L 5 in *w*; then *ew* will be 4 feet; make *eg* to *ew* as 5 is to 4, and draw gC. In the same manner we may determine the image *abcd* of a plane, 4 feet square, removed 5 feet into the picture, and whose lower edge is in the line AC. From *a*, where CA intersects the ground line, set off 5 feet for its distance, as A 5, and 4 feet for its breadth, as 5 9; draw H 5 and H 9, intersecting AC in *a* and *b*; then *ab* is the representation of its depth; draw *ad*, *bc*, parallel to AD, and make AQ four feet; then draw QC, which completes the figure.

Ex. 2. Having B given as one angular point of a square plane, and BM for its height and breadth upon the picture; there to determine the representation of the whole plane BFIK (*fig.* 40.) From the corner B, draw the perpendicular BF, make BF=BM, and draw MI, intersecting AC in K; draw KI parallel to BF; then FC completes the figure. If the representation be determined, and it be required to find the length and breadth of the original. Produce CB to A; at A erect a perpendicular AD; from I, produce lines through B and K, intersecting the bottom of the picture in N and 2. The space 2N comprehends eight feet, and, therefore, BK represents eight feet. For the height BF, produce CF to D, and the space AD contains eight feet. N. B. The vanishing lines of planes perpendicular to the ground are perpendicular to the horizontal line, and always pass through the vanishing point of those planes: thus, the vanishing line EV passes through C; and EV is the vanishing line of the plane BFIK, as is evident by turning the figure, and considering EV as the horizontal line, H as the eye, HE as its distance, and BFIK as the representation of a square lying upon the ground; so that in this example we have the vanishing line HL of planes parallel to the ground, and also the vanishing line EV of planes perpendicular to the ground, connected together.

XVI. *To determine the representations of planes that are parallel to the picture.* E. gr. Let the plane *abcd* (*fig.* 43.) five feet wide, and eight feet high, be removed two feet from the bottom of the picture. From A and 5, draw AC and 5C; make CH=CE, and draw 7H, intersecting 5C in *b*; then 5*b* represents a length equal to 5 or 2 feet; draw *ab* parallel to the ground line, cutting AC in *a*, which will give the length of the lower side: erect the perpendiculars *ac*, *bd*; make *bd* equal to 8 feet, and draw the parallel *dc*. If the plane *ghkk* be 9 feet high, and 3 feet wide, and 6 feet from the bottom of the picture; draw a line at pleasure from C, as C 9; take 3 feet, and draw another line from B to C; from L draw L 9, intersecting BC in *e*; then *e*B represents three feet; from *e* draw the parallel *ef*, and from L produce L*f*, intersecting *e*C in g, which gives *eg* for a *perspective* length representing *ef*. Now *gf* and *f*B are the representations of two squares, whose sides are all equal in the original figures; and therefore all the sides *ef*, *eg*, &c. represent equal lines, and, consequently, *gb* represents the depth of 6 feet, and *hg* the parallel width of 3 feet. Draw the perpendiculars *hk*, *gi*; and make *gi* three times the length of *gh*; and draw *ik* parallel to *gh*.

XVII. *To find the representations of planes, that are oblique to the ground line or bottom of the picture.* Let *abdc* (*fig.* 42.) be eight feet high, eight feet wide, and two feet from the bottom of the picture; let L be its vanishing point, and AL the line in which the plane is to stand. Draw AB perpendicular to the bottom of the picture; set 8 feet upon it, and draw B1, transferring LE to H; take A 1=2 feet, and from 1 produce 2 H, intersecting AL in *a*; then A*a* represents a line equal to A 2=2 feet. Again, from 2 feet set off 8 feet, and draw DH intersecting AL in *b*; then *ab* represents the length of 8 feet; draw *ac* and *bd* parallel to AB. When the representation is not to be of any particular dimension, the operation is exceeding simple. Let AB (*fig.* 42.) be one side given, and AD its height; from *a* and B draw AD, BF, perpendicular to the bottom of the picture; and from C draw CE. N. B. The vanishing point C of the line *AB* is the vanishing point of every line Q*q*, *mk*, &c. parallel to AB. For the application of these operations in determining the *perspective* of solid figures, see SCENOGRAPHY.

As to objects that are inclined to the ground, such as pediments, roofs of houses, &c. it is proper to observe, that this part of *perspective* was little, if at all, understood by any authors before Dr. Taylor; who has shewn, that inclined objects have their proper vanishing lines and points, as well as those which lie flat upon the ground, or are perpendicular to it; and that the method for determining the appearance of objects in either case is exactly the same. For the illustration of this method, let *adgf* (*fig.* 44.) represent the body of a house; the side *cigf* being parallel, the other side *adei* both its vanishing line VU, which passes through the centre of the picture, and is perpendicular to the horizontal line; and it is evident, that the roof is formed by two inclined planes, one leaning towards the eye, the other from it. These inclined planes have their proper vanishing lines and vanishing points upon the picture, as well as those which are either parallel or perpendicular to the ground. It has been already shewn (see *fig.* 40.) that VE, continued, is the vanishing line of all the lines, which can be drawn within the plane *adei*: however, let us here turn the figure, and call C the centre of the picture, CE the distance of the eye, and VU the horizontal line; *adei* the representation of a parallelogram, and *abi* a triangle joined to the end of it. Let us next suppose the line *fr* to be the bottom of the square *fihr*, whose vanishing point is V, and the vanishing points of its diagonals are D and F; and let *cifg* represent a parallelogram even with the eye, which will complete the representation of a solid body, like the model of a house, laid upon that side, which by workmen is called the gable end. If this be a true representation, that is, if VU be the vanishing line of *abicd*, and DF the vanishing line of *fihr*, then turning the figure in any position cannot make any alteration in the *perspective*, because VU and DF will be invariably the vanishing lines of *abicd*, *hifr*, &c. The planes *abi*, *hrfi*, are joined by the line *ib*, the vanishing point of which is V; and because the original of *fr* is parallel to the original of *ib*, both *ib* and *fr* will vanish into the same point V; or into that point where the vanishing lines VU and DF cross each other; for the vanishing point V must be in the line VU, which is the vanishing line of the plane *adeib*, and it must be also in the vanishing line DF of the inclined plane *hfi*; for the line *ib* is the common section of both planes; therefore its vanishing point must be the intersection of the vanishing line of those planes.

XVIII. *To find the vanishing line of the inclined plane hifr; and also the centre and distance of it.* Let EL be the horizontal line; C the centre of the picture, CE its distance, *adgf* the body of a house, and UV the vanishing line of its side *adei*. Upon the horizontal line, or parallel to it, draw *vs*, then the figure *vsomn* will be a small module of the perpendicular plane *adeib*; or, in other words, let *om* be the inclination of the inclined plane with *mn*, supposed to be 45°. From the eye E draw EV parallel to *ms*, intersecting the vanishing line VU in V; through V draw DF parallel to the horizontal line EL; then is DF the vanishing line required, V its centre, and EV its distance. In order to find the representation of the plane *hifr*, supposing it to be a perfect square, &c. let *ib* be the representation of one side of the square, whose vanishing point is V. Produce the perpendicular CV at pleasure; make VD, VK, VF, each equal to the distance EV of the vanishing line DF; then is VK the distance EV, transposed to K; and because VD, VF, are each equal to VK; therefore D and F are the vanishing points of the

diagonals *ir* and *fb*. From the points *i* and *b* draw *if*, *br*, parallel to the vanishing line DF; from D draw *Dr* cutting *br* in *r*; then *rb* is cut off to represent another side of the square; from V draw a line through *r*, interfecting *if* in *f*, which completes the *perspective* of a square in this position. This may alſo be done by merely giving the inclination of the plane: ſuppoſe it 45° as at the eye E make an angle with the line EC of 45°, and draw EV interſecting UV in V; make VF, VD, each equal to VE; then V is the vaniſhing point of the ſides *ib*, *fr*; and D, F, the vaniſhing points of the diagonals; from whence the figure may be completed as before. The vaniſhing line, its centre, and the diſtance of the oppoſite inclined plane, are determined in the ſame manner

XIX. *To find the vaniſhing line of a roof ibrf, &c. (fig. 45.) when the gable end abi is parallel to the picture, and to determine the whole repreſentation.* Having drawn the body of the building *ag*, and alſo the gable end *abi*; obſerving that the interior part, *if*, of the roof vaniſhes into C, the centre of the picture, and conſequently the upper part *br* will vaniſh into the ſame point, both being ſuppoſed parallel in the original figure; draw *bC*, and from *f* the line *fr* parallel to *ib*, which completes the ſide of the roof *ibrf*, without the vaniſhing line propoſed. But ſince the roof *ibrf* has an inclination with reſpect to the picture, in order to determine its proper vaniſhing line, through the vaniſhing point C draw FD parallel to *ib* or *rf*; then FD is the vaniſhing line of the inclined plane *ibrf*. From C, the centre of the vaniſhing line FD, produce CK perpendicular to FD; make CK = CE, the diſtance of the eye; and CK is the diſtance of the vaniſhing line FD, and K the tranſpoſed place of the eye. E. gr. Having given *ib* for one ſide of a ſquare roof, and found its vaniſhing line FD, and its diſtance CK, to complete the repreſentation of the roof. Make CF, CD, each equal to the diſtance of the eye CK; then F and D are the vaniſhing points of the diagonals of a ſquare. From *i* and *b* produce lines to C; and from the ſame points draw lines to F and D, interſecting *b*C, *i*C, in *r* and *f*; draw *rf*, which will be parallel to *ib*, and complete the repreſentation required.

XX. *Having given the vaniſhing line of any inclined plane, and one vaniſhing point of that plane, together with the centre and diſtance of the picture, to determine the vaniſhing line of another plane, making a given angle with the plane, whoſe vaniſhing line is* VL. Let VL, (*fig.* 46.) be the vaniſhing line of any inclined plane, V one vaniſhing point, C the center, CE the diſtance of the picture, and *abi* the angle of inclination of the two original planes; if this be a right angle, from V draw a line through C, as VD; make CI perpendicular to VD, and CI = CE; draw VI, and at I make VI*r* = *abi*, the given angle, and draw I*s* interſecting VD in *s*; through *s* draw LU parallel to IC, interſecting VI in L, and UL is the vaniſhing line required. If the plane, whoſe vaniſhing line is VU, were inclined at an angle of 60°, and it were required to find its vaniſhing line; through the centre of the picture draw VD, and find the vaniſhing line LU of a plane perpendicular to that plane whoſe vaniſhing line is VU; produce CD, and make *c*D = IC, the diſtance of LU; draw DU, which makes an angle at D of 60°, and draw DP; laſtly, draw PV, which is the vaniſhing line required. In order to find the centre and diſtance of the vaniſhing line UL; from C draw CD perpendicular to UL, and CI perpendicular to CD, and make CI = CE, and CI is the diſtance of UL; make *c*D = *c*I, which is the diſtance to be uſed for determining the repreſentations of any planes that vaniſh into the line UL. Suppoſe L the vaniſhing-point of one ſide of a ſquare, draw DU at right angles with DL, and U will be the other vaniſhing point of the ſaid ſquare. For the farther illuſtration and application of theſe rules, we muſt refer to Mr. Kirby's comprehenſive work, entitled, Dr. Brook Taylor's Method of *Perſpective* made eaſy, &c. 3d edit. 1768.

XXI. *To fix points in* perſpective *lines, or to divide theſe lines ſo as to intercept any lengths that may be required in them.* Lines parallel to the ground line may be divided, by diſtiding the ground line, and either laying a ruler from theſe diviſions to the point of diſtance in the horizon, or drawing lines to them from the point of ſight D. Lines perpendicular to the ground line are diviſible, by ſetting off diviſions from the place where they meet the ground line, and drawing other lines from them to the point of diſtance. Lines oblique to the ground line may be divided, by ſetting off on the ground line any number of diviſions from the point where the line to be divided interſects it; as from C to *k* (*fig.* 47.); taking the diſtance from the vaniſhing point *v* of the line to the point of diſtance E in the perpendicular DE, and ſetting it off along the horizontal line to *y*; and from the point thus determined, drawing a line *yb* to the point in the ground line bounding the number of diviſions: this line will interſect C*i*, the repreſentation of the given oblique line in *b*, the point required. See articles XV. XVI. XVII. above.

If a ſingle point in a given ſituation upon the ground plane be required, its place in the *perſpective* plane may be found by ſuppoſing it to be the interſection of two lines, the ſituation of which is given: as by ſuppoſing one of them to be drawn through it perpendicular to the ground line, and the other to be a line drawn from the point of diſtance, and interſecting it at a given diſtance from the ground line: or, it might be found by drawing lines making any given angle with the perpendicular, and interſecting them at proper diſtances from the ground line. To divide lines, not lying in the ground plane, but perpendicular to it, let *ac* (*fig.* 48.) be the image of a line perpendicular to the ground plane, and let a number of diviſions, e. gr. five, be cut off from the point *a*. Take at pleaſure (generally beyond the bounds of the picture) any point *e* in the horizontal line; from thence draw a line *ed* to any point *d* in the ground line; ſet off five diviſions from *e* to *f* in the perpendicular *eh*, and draw the line *fa*; draw a line from the foot *a* of the object, parallel to the ground line, interſecting *de* in *g*; and raiſing a perpendicular from *i* to *df*, find *h*, and the line *ih* contains the five meaſures required, which are to be ſet off from *a* to *b* in the given line *ac*; and thus *ab* will be equal to *fe*. The lines *de* and *eh* will ſerve to meaſure any other lines perpendicular to the ground plane, always drawing a line parallel to the ground line from the foot of the object to be meaſured to the line *ac*, and proceeding as above. It is evident, that any row of objects of the ſame height, ſtanding upon the ground plane, on a line perpendicular, or oblique to the ground line, muſt appear to diminiſh, till they vaniſh in the horizontal line; conſequently, the triangle *dfe* will contain in it perpendicular lines equal to the apparent heights of all objects that are of the height of *fe*; and this will be the caſe wherever the point *d* is taken in the horizontal line; for it will be invariably *ih* : *ef* (:: *dh* : *de* :: *dm* : *dl*) :: H*a* : H*l*.

To meaſure a line oblique to the ground plane: let the line be C*g* (*fig.* 47.) and let eight diviſions be cut off from C. For this purpoſe draw CN parallel to *gy*, and CN being conſidered as a new ground line, ſet off the given number of diviſions from C to *n*; join *a* and *y* with a line interſecting the given line in *x*; and C*x* will be the part required: or, from the vaniſhing point *g* of the given line C*g*, take *gy* parallel to the ground line AB, and equal to *gy* on the ground line ſet off the given length from C to *a*, and a line joining *a* and *y* will cut off the required part C*x*. In the firſt method, the triangles *kgy*, *k*C*a*, are ſimilar; whence *gk* : *k*C :: *gy* : C*a*; but *gy* is equal to *ga*, the diſtance of the eye from the vaniſhing point *g*, and C*a* is equal to the given oblique line by conſtruction: therefore the extreme point of it will be repreſented by *k*. See Propoſition III. above. In the ſecond method, ſince *gy* is drawn parallel to C*a*, we have *gk* : *k*C :: *gy* : C*a*; but *gy* and C*a* are equal to *gy* and C*a*, and conſequently equal to *ga*, and the given oblique line reſpectively. If the line C*g* does not ſtand upon the ground line, but is an indefinite line ſtanding on the ground plane at C (*fig.* 49.) and it is propoſed to cut off a part of it from C, equal, e. gr. to ten diviſions; find the point *y* as above; from C, parallel to the ground line, draw C*b*, from which cut off (art. 21.) a part C*a*, equal to ten diviſions, and a line joining *y* and *a* will cut the given line C*g* in *k*, the point ſought. If ſeveral other diviſions in C*g* be required, make C*b* equal to the abſolute length of ten diviſions, and through *k* draw *bk* cutting *gy* produced in *d*; and *d* will be a meaſuring point for the line C*g*; ſo that the diviſions themſelves may be ſet upon C*b* at once, and lines drawn from thence to *d* will cut the given line C*g* in the deſired points. The point *d* may be found at once, by taking *gd* to *gy* as the height of the eye is to the perpendicular CL.

In the foregoing explication of the theory and practice of *perſpective*, regard has been merely had to the appearance of objects upon an upright picture, which is generally choſen for *perſpective* repreſentations; but there are ſome caſes in which the ſituation of the picture is parallel or inclined to the ground, ſuch as ceilings, inclined walls, &c. The repreſentation of objects upon ſuch kind of ſurfaces is deducible from the ſame principles, and determined after the ſame manner. The rules for drawing the appearance of objects upon the parallel picture are exactly the ſame as thoſe for drawing the appearance of objects upon the perpendicular picture; obſerving, that

that those objects, which in the parallel picture are to be represented as erect, must be determined as those which lie flat upon the ground in the perpendicular picture; those which are parallel in one picture as those which are parallel in the other; and those which are oblique, after the same manner: or more generally, however original planes are situated, the vanishing lines of those planes must always be determined by imagining a plane to pass through the eye parallel to those planes, &c. for by this means all their representations may be projected. The inclined picture is seldom used; but those who wish to acquaint themselves with this kind of *perspective*, may find ample information in Mr. Kirby's elaborate work, already cited, and much used in the compilation of this article.

PERSPECTIVE *of building*, &c. In the practice hereof, great regard is had to the height of the horizontal line; all above the horizontal being seen in the upper part, and all below it in the under part; whence *perspective* becomes divided into the *high* and *low sight*; both which may be illustrated by what follows.

To represent a building (v. gr. palace, college, &c.) *in* PERSPECTIVE.

1. Take the ichnography, or ground-plat of the building; its lengths, breadths, and depths, by actual measuring; and take its altitude with a quadrant.

2. Make a scale divided into two or three hundred equal parts; either actually, or so as that each division signify ten parts: by this scale lay down the ground-plat; as in *fig.* 30.

This done, having a long rule, and a square, which by sliding on the rule helps you to draw your perpendiculars either, reduce it into *perspective*, in its iconographic appearance.

Then having drawn a line towards the bottom of the paper for the front or base line, as F (*fig.* 31.) divide it into as many equal parts as you find the building has in the ichnography, or more, if you please: this will serve for a scale to determine the several heights, &c. and to those divisions, with a black lead pencil, draw lines from the centre, when you have chosen it; which choice requires judgment on two accounts.

3. For if the centre be too nigh the front-line, then the depth of the whole building will be fore-shortened too much; and if too far off, it will not be fore-shortened enough. This may be illustrated thus: set an open tankard, or the like, on a stand, so as that it be a little lower than your eye; if you be at a great distance from it, you can see very little or nothing into it; if you come nigher to it by degrees, you will perceive the farther edge seem to be raised a little higher than that next you, so that you may see a little way into it; if you come very nigh it, you see too deep into it, or more than can be well expressed in picture. We shall therefore find some one place, which we must conclude the most convenient for the draught, and which may be in general determined to be as far off the front-line as the front-line is long: this rule, though it has just grounds, yet we sometimes dispense with *pro re nata*, that we may express things with the better appearance.

4. Consider how to place this centre with such advantage as that you may express those things most, which are chiefly designed; for as to the bottom and top lines of the sides of the building that run from us in or nigh the direct line to the centre, though you see the upper part very well, yet the sides that fall between the ground-line and top fall so very near one another, that it would be very difficult to express particulars in them; so that the centre must be well chosen in reference to this.

Those buildings, therefore, which you would see most of, must be placed as far off as you think convenient from the direct line that runs to the centre; and the farther they are, the plainer they will be.

Place then those things you would see least of, nighest the direct line; and see whether the others fall according to your mind; but this must be done after you have drawn your diagonal, which is the next thing.

5. Having pitched on your centre, and having from it drawn lines to every division of the front-line, you are to determine your diagonal, AR, thus: having, with a pair of compasses, measured the length of the front-line, take your compasses, and putting one foot in the centre, see where the other will reach in the horizon (on both sides, if you please); where it rests, from that point draw a thwart line to the left division of the front; and this will be truly drawn, or pretty nigh to the truth. That it is so, you may consider how it falls in respect of the two last centre-lines; for if where the next line from the last is intersected by the diagonal, you draw a parallel to the front between them, as at A 10, you will have a rhombus; if then all the sides be pretty equal, you may be sure you are nigh the right; but if the sides that run towards the centre be too long, then things will not be fore-shortened enough; and if the sides be not long enough, they will be fore-shortened too much.

6. After the front-line is thus divided, the centre fixed, and the diagonal placed, take the breadth of the chapel AB, which in the ichnography is shewn to be twenty parts; because this line is perpendicular, it must run toward the centre: therefore reckon twenty in the diagonal, and the rule laid parallel to the front in that point will give you a point in the centre-line, which will give the breadth of the chapel; and consequently a line drawn from A to B puts it into the ichnographic *perspective*. The length of the chapel being seventy divisions in the front-line, reckon seventy from I, parallel to the front-line, and there you will have a point at C.

The depth of the building from the chapel northward being one hundred and fifteen from the chapel, I reckon from D (where it cuts the diagonal at ten) onwards in the diagonal; and at one hundred and fifteen in the diagonal, with my rule, as before, parallel in this place in the front, I have the point Z in the central line. Its breadth being thirty, I reckon three divisions, and there is the just breadth there; and so on in every particular part.

Having placed the ichnography in *perspective*, you may then give every thing its proper height thus:

7. The height of the chapel being thirty, I reckon thirty on the front-line; and with this length, by a square applied to the front-line, I drop a perpendicular to that height; and so where the other side of the chapel is placed, having reckoned the height upon a supposed parallel, there I draw another line in that height; then joining these several heights by several lines, you have the profiles of each building.

To diversify these several lines, that they confound you not, make the ichnography, when you lay it into *perspective*, in discontinued crooked lines, the heights in pricked lines, and the tops of each building in continued lines, as the centre-lines are in the table. You will likewise find the centre, though it is not here expressed, as likewise the point of distance, by continuing the diagonal up to the supposed horizon, where it and the eye are placed.

Having done thus, your art must be employed for the particular expressions of things, by drawing and shadowing, which is the life of this half-formed figure, which we leave to the painter. It remains that we speak of the low-sight; and here, we suppose the horizontal line just the height of the eye, about five feet from the base; though it is generally placed higher, even to a third part of the height of the building, that the side building may be expressed the more gracefully.

The diagonal is best determined by dividing the last division of the base-line into five parts at G, taking four of these, sometimes the whole five, because we determined before, that the length of the front-line was the distance of the eye in the horizon from the point of distance; but here we take four, and then make this the distance in the horizon between the eye and the point of distance. You may then either graduate the plan at the several intersections of the diagonal with the centre-lines, or else suppose it so; and then raise the buildings as you will find by *perspective* enough of this sort every where to be met with.

PERSPECTIVE is also used for a kind of picture or painting, frequently seen in gardens, and at the ends of galleries; designed expressly to deceive the sight by representing the continuation of an alley, a building, landskape, or the like.

PERSPECTIVE, *aerial*, is sometimes used as a general denomination for that which more restrictedly is called AERIAL *perspective*, or the art of giving a due diminution or degradation to the strength of light, shade, and colours of objects, according to their different distances, the quantity of light which falls upon them, and the medium through which they are seen; the *chiaro scuro*, or CLAIR *obscure*, which consists in expressing the different degrees of light, shade, and colour of bodies, arising from their own shape, and the position of their parts with respect to the eye and neighbouring objects, whereby their light or colours are affected; and KEEPING, which is the observance of a due proportion in the general light and colouring of the whole picture; so that no light or colour in one part may be too bright or strong for another. A painter, who would succeed in *aerial perspective*, ought carefully to study the effects which distance, or different degrees or colours of light have on each particular original colour; to know how its hue or strength is changed in the several circumstances that occur, and to represent it accordingly. As all objects in a picture take their measures in proportion to those placed in the front, so, in *aerial perspective*, the strength of light, and the brightness of the colours of objects close to the picture, must serve as a measure, with

respect to which all the same colours at several distances must have a proportional degradation in like circumstances.

PERSPECTIVE, *alley in.* See ALLEY.

PERSPECTIVE, *architecture in.* See ARCHITECTURE.

PERSPECTIVE, *bird's eye view in*, is that which supposes the eye to be placed above any building, &c. as in the air at a considerable distance from it: this is applied in drawing the representations of fortifications, when it is necessary not only to exhibit one view as seen from the ground, but so much of the several buildings as the eye can possibly take in at one time from any situation. In order to this, we must suppose the eye to be removed a considerable height above the ground, and to be placed as it were in the air, so as to look down into the building like a bird that is flying. In representations of this kind, the higher the horizontal line is placed, the more of the fortification will be seen, and *vice versâ*.

PERSPECTIVE, *diagonal.* See OPERA *glass*.

PERSPECTIVE, *graphical.* See GRAPHICAL.

PERSPECTIVE *machine*, is a machine by which any person may delineate the true *perspective* figures of objects, without the help of the rules of this art. Mr. Ferguson has described a machine of this kind, the invention of which he ascribes to Dr. Bevis. The plane of this instrument is exhibited in *fig.* 52, and *fig.* 53. is a representation of it when made use of in drawing distant objects in *perspective*. *a b c f* fig. 52. is an oblong square board, represented by A B E F in *fig.* 53; *x* and *y* (X and Y) are two hinges on which the part *c d* (C L D) is moveable. This part consists of two arches or portions of circles *c m f* (C M L) and *d n l* (D N L) joined together at the top *f* (L) and at bottom to the cross bar *c d* (D C) to which one part of each hinge is fixed, and the other part to a flat board, half the length of the board *a b c f* (A B E F) and glued to its uppermost side. The centre of the arch *c m f* is at *g*, and the centre of the arch *d n l* is at *o*.

On the outer side of the arch *d n l* is a sliding piece *s* (much like the nut of the quadrant of altitude belonging to a common globe) which may be moved to any part of the arch between *d* and *l*: and there is such another slider *r* on the arch *c m f*, which may be set to any part between *c* and *f*. A thread *c p n* (C P N) is stretched tight from the centre *c* (C) to the slider *n* (N), and such another thread is stretched from the centre *d* (D) to the slider *s* (O); the ends of the threads being fastened to those centres and sliders.

Now it is plain, that by moving these sliders on their respective arches, the intersection *p* (P) of the threads may be brought to any point of the open space within the arches. In the groove *b* (K) is a straight sliding bar *t* (I) which may be drawn farther out, or pushed farther in at pleasure.

To the outer end of this bar I *figs.* 53.) is fixed the upright piece H Z, in which is a groove for receiving the sliding piece Q. In this slider is a small hole *r* for the eye to look through, in using the machine: and there is a long slit in H Z, to let the hole *r* be seen through when the eye is placed behind it, at any height of the hole above the level of the bar I.

In delineating a *perspective* representation, e. g. of the house, *g r s*, a great way off, place the machine on a steady table, with the end EF of the horizontal board A B E F toward the house, so that, when the Gothic-like arch D I. C is set upright, the middle part of the open space (about P) within it may be even with the house when you place your eye at Z, and look at the house through the small hole *r*. Then fix the corners of a square piece of paper with four wafers on the surface of that half of the horizontal board which is nearest the house; and all is ready for drawing.

Set the arch upright, as in the figure; which it will be when it comes to the perpendicular fide *t* of the upright piece *t t* fixed to the horizontal board behind D. Then place your eye at Z, and look through the hole *r* at any point of the house, as *g*, and move the sliders N and O till you bring the intersection of the threads at P directly between your eye and the point *g*: then put down the arch flat upon the paper on the board, as at S T, and the intersection of the threads will be at W. Mark the point W on the paper with the dot of a black lead pencil, and set the arch upright again, as before: then look through the hole *r*, and move the sliders N and O till the intersection of the threads comes between your eye and any other point of the house, as *p*: then put down the arch again to the paper, and make a pencil-mark thereon at the intersection of the threads, and draw a line from that mark to the former one at W; which line will be a true *perspective* representation of the corner *p g* of the house.

Proceed in the same manner, by bringing the intersection of the threads successively between your eye and other points of the outlines of the house, as *r*, *s*, &c. and put down the arch to mark the like points on the paper, at the intersection of the threads: then connect these points by straight lines, which will be the *perspective* outlines of the house. In like manner find points for the corners of the door and windows, top of the house, chimnies, &c. and draw the finishing lines from point to point: then shade the whole, making the lights and shades at you see them on the house itself, and you will have a true perspective figure of it. Great care must be taken, during the whole time, that the position of the machine be not thifted on the table; and to prevent such an inconvenience, the table should be very strong and steady; and the machine fixed to it, either by screws or clamps.

In the same way, a landscape, or any number of objects within the field of view through the arch, may be delineated, by finding a sufficient number of *perspective* points on the paper, and connecting them by straight or curved lines as they appear to the eye.

The arch ought to be at least a foot wide at bottom, that the eye at Z may have a large field of view through it; and the eye should then be, at least, 10½ inches from the intersection of the threads at P when the arch is set upright. For if it be nearer, the boundaries of view at the sides near the foot of the arch will subtend an angle at Z of more than sixty degrees, which will not only strain the eye, but will also cause the outermost parts of the drawing to have a disagreeable appearance. To avoid this, it will be proper to draw back the sliding bar I, till Z be 144 inches distant from P; and then the whole field of view, through the foot-wide arch, will not subtend an angle to the eye at Z of more than forty-five degrees; which will give a more easy and pleasant view, not only of all the objects themselves, but also of their representations on the paper whereon they are delineated. So that, whatever the width of the arch be, the distance of the eye from it should be in this proportion: as 12 is to the width of the arch, so is 144 to the distance of the eye (at Z) from it.

If a pane of glass, laid over with gum water, be fixed into the arch, and set upright when dry, a person who looks through the hole *r* may delineate the objects upon the glass which he sees at a distance through and beyond it, and then transfer the delineation to a paper put upon the glass. Ferguson's Perspective, chap. 3.

Mr. Kirby has also contrived and described an instrument, that will be useful in taking extensive views, &c. The ruler A B (*fig.* 54.) is nineteen inches long, and is graduated into nineteen equal parts; it has a dove-tail groove on its upper edge to receive the perpendicular ruler C, which has one end fitted to it, so as to slide very easily: this ruler is fourteen inches long, and is divided into fourteen equal parts, and upon the back side of it F is a fine drawn exactly in the middle, to which is fixed a silken line with a small plummet at the end. The ruler A B is fixed by two screws *a*, *c* to two pieces of thin brass; and these pieces of brass are fixed at the other ends by two screws *d*, *e*, to a stronger piece of brass *d e*, which goes close to the ruler A B, and has a joint at X turning upon a screw: below this joint is a piece of round brass about six inches long, which goes into a hole made in the top of the staff, and may be raised higher or lower, by means of a screw S: C D E represents part of this staff, the whole length of which is about three feet, and at the bottom is a rank screw made of iron and fixed to the staff. H I is a wire twenty-two inches long, with a screw at *b* to go into the hole *b*; the piece of brass wire, bent into the form *i k*, is fixed to the wire H I by the screw *i*; and the part *i* goes into the hole *f* in the brass-piece *b e*. The small wire K L is about twelve inches long, and fitted at K, at which place is a little hole above one-eighth of an inch in diameter; this wire K L is fitted to the holes *l*, *m*, *n*, *o*, which are made in the larger wire H I, and it may be placed higher or lower by means of a small screw. This instrument is used in the following manner: fix a paper upon a drawing board, as in *fig.* 55, and divide the paper lengthways into nineteen equal parts, and perpendicularly into fourteen equal parts; making these divisions greater or smaller according to your design. Then take the staff, and fix it strongly in the ground, by means of the screw at bottom, and at a convenient distance from the prospect which you intend to take. After this, put the instrument together as in *fig.* 56. and fix the ruler A B exactly horizontal by means of the plummet on the perpendicular ruler and the brass joint X; then fix the wire K L, so as to have the eye-hole exactly level with the horizon or equal to the height of the eye, and take care to have the greatest distance of the eye-hole from the ruler equal to the whole length of the longest ruler A B, and never less than the distance *b l*. Having thus fixed the instrument, proceed to make the drawing; look through the eye-hole, and then

then move the perpendicular ruler in the groove, till you get one edge exactly against some principal object; then will the parts upon the ruler shew how high the object is from the bottom of the ruler, i. e. from the bottom of the picture, and you will also know its apparent height; therefore transfer this to the paper in those squares which correspond with the divisions upon the rulers. For the breadth of objects, move the perpendicular ruler so as to be even with the sides of an object, and the divisions upon the lower ruler will shew their apparent breadths. After the same manner, get the places and apparent sizes of as many principal objects as are necessary for assisting you in completing the whole drawing, which may be done by this method with great exactness. When the drawing is finished, the instrument may be taken to pieces and put into a box, which may serve as a drawing board; the top M may be screwed into the staff, which will serve as a walking stick, and the stool to fit on may be made very portable; so that every part of this apparatus may be carried by one person without any inconvenience. Kirby, ubi supra, b. ii. p. 65, &c.

PERSPECTIVE, *military*, is that wherein the eye is supposed to be very remote from the table or plane. See *Bird's Eye View*, in PERSPECTIVE.

PERSPECTIVE, *plain, plane*, is a glass, or other transparent surface supposed to be placed between the eye and the object, perpendicular to the horizon, unless the contrary be expressly mentioned.

Such is the plane HI *fig.* 3., between the eye O, and the object, as B C, cutting the optic rays in *a*, *b*, *c*.

This, some call the *section*, some the *table*, others the *picture*, and others the *ghost*.

PERSPECTIVE, *scenographies*. See SCENOGRAPHY.

PERSPECTIVE *of shadows*. See SHADOW.

PERSPECTIVE, *specular*, is that which represents the objects in conical, spherical, or other mirrors, erect and clear, whereas on other planes they appear confused and irregular. See MIRROR and ANAMORPHOSIS.

PERSPICUITY, *perspicuitas*, in *Rhetoric*, is a principal excellence of style, to which all the ornaments and beauties of speech ought to give way; as it is necessary to render a discourse intelligible, and forms one of the constituent parts of ELEGANCE. *Prima est eloquentiæ virtus perspicuitas*, says Quintilian, lib. viii. cap. 2. There are three different ways in which *perspicuity* in a composition may be violated; viz. by obscurity, ambiguity, and unintelligible expression. The common sources of obscurity are some defect in the expression, arising from ellipses in language, the affectation of conciseness, or rapidity of thought in writers, or a bad choice of words; a bad arrangement of the words, so that the construction is not sufficiently clear; the use of the same word in different senses in the same sentence; an uncertain reference in pronouns and relatives; too complicated or artificial a structure of the sentence, so that the sense is too long suspended by parentheses; the injudicious introduction of technical words and phrases; and, lastly, very long sentences. Ambiguity may be occasioned either by using some expression which is equivocal, or by ranging the words in such an order that the construction is rendered equivocal. The last fault proceeds either from great confusion of thought, which is commonly accompanied with intricacy of expression, or from affectation of excellence in the diction, evidenced by the injudicious use of figures, or from a total want of meaning. In these several ways, a speaker may express himself obscurely, and so convey his meaning imperfectly to the mind of the hearer; or express himself ambiguously, and so along with his own, convey a meaning entirely different; or express himself unintelligibly, and so convey no meaning at all. Dr. Campbell in his Philosophy of Rhetoric, vol. ii. book 2. chap. 6. has well exemplified and exposed these offences against *perspicuity*. It is justly observed by Quintilian, ubi supra, that by *perspicuity*, care is taken, not that the hearer *may* understand, if he will; but that he *must* understand, whether he will or not.

PERSPIRATION, *perspiratio*, in *Medicine*, the action of evacuating the superfluous juices of the body through the pores of the skin.

When this evacuation is copious enough to be perceived by the senses, as in sweat, the *perspiration* is said to be *sensible*; where it escapes the notice of the senses, as is the case in the ordinary state of the body, the *perspiration* is said to be *insensible*.

The word *perspiration*, used simply, and without any adjective, is to be understood of insensible *perspiration*.

This evacuation was indeed known to the ancients, Hippocrates, Galen, &c. but it was Sanctorius, the famous Paduan physician, who first brought it under any stated rules. To him we owe both the invention and perfection of the doctrine of *insensible perspiration*.

The vessels through which the *perspiration* is performed, lie obliquely open under the squamæ or scales of the cuticle or scarf-skin. They are inconceivably small: from a calculation of Leewenhoeck it appears, that the mouths of one hundred and twenty-five thousand of them may be covered with a common grain of sand.

The most considerable of these pores are the orifices of the ducts arising from the miliary glands.

Through these vessels there is continually transfusing a subtle humour, from every point of the body, and throughout the whole expanse of the cuticle.

The matter evacuated this way is found by certain experience to be more than equal to that evacuated all the other ways, i. e. by stool, urine, &c. Sanctorius found in Italy, under the circumstances of a moderate diet, middle age, and easy life, that the matter insensibly perspired was $\frac{5}{8}$ of that taken in for food: so that there only remained $\frac{3}{8}$ for nutrition, and for the excrements of the nose, ears, intestines, bladder, &c.

The same author shews, that as much is evacuated by insensible *perspiration* in one day, as by stool in fourteen days; particularly, that in the space of a night's time, about fifteen ounces are ordinarily discharged by urine, four ounces by stool; and above forty ounces by *insensible perspiration*.

He also observes, that if a man eat and drink eight pounds in a day, five pounds of it are spent in *insensible perspiration*; and adds, as to the times, that within five hours after eating, there is perspired about one pound; from the fifth to the twelfth hour about three pounds; and from the twelfth to the fifteenth scarce half a pound.

M. Dodart, from a number of experiments made for thirty-three years successively, assures us, that we perspire much more in youth than in age. In some persons the *perspiration* is so copious, that they void very little of the coarser excrements, though they eat very heartily.

The benefits of *insensible perspiration* are so great, that without it, Borelli says, animal life could not be preserved. The general cause of *perspiration* is the circulation and heat of the blood.

The great subtilty, equability, and plenty of the matter, thus perspired, its increase after sleep, &c. constitute the grand symptoms of a perfect state of health; and the chief means of preserving the same. On the contrary, the departing from these is the first sure sign, and, perhaps, the original cause, of diseases.

Perspiration is performed, preserved, and increased, by the viscera, vessels, and fibres; by motion or exercise as far as the first appearance of sweat; by moderate use of venery; by sleep of seven or eight hours, the body well covered, yet not loaded with bed-clothes; cheerfulness; light, fermented, yet solid food, not fat; pure, not heavy air, &c. The contraries of all these, as also the increase of the other excretions, diminish, prevent, and deprave it.

Hence we see the cause, effect, &c. of this perspirable matter, its use in preserving the parts soft and flexible, and in supplying what is lost, but chiefly in preserving the nervous papillæ moist, fresh, lively, and fit to be affected by objects, and to transmit their impressions.

Perspiration is also absolutely necessary, in the animal œconomy, for purifying the mass of blood, and discharging it of a number of useless heterogeneous particles, which might corrupt it. Hence it is, that upon a stoppage of the usual *perspiration* there arise so many indispositions, particularly fevers, agues, rheums, &c.

Too much *perspiration* occasions weakness, swoonings, sudden death; too little, or none at all, occasions the capillary vessels to dry, wither, and perish. Hence also the larger emunctories come to be obstructed; hence the circulation is disturbed, sharp humours retained; and hence putridity, crudity, fevers, inflammations, and imposthumes.

Cold prevents *perspiration*, by constringing the pores of the skin and thickening the liquors circulating in the cutaneous glands; heat, on the contrary, augments it, both by opening the excretory ducts of the glands, and by increasing the fluidity and velocity of the humours.

To determine the state and conditions of the *perspiration*, so necessary for judging of those of the body, Sanctorius invented a weighing chair, whereby he examined the quantity, degree, &c. of *perspiration* in several circumstances of the body, under several temperatures of the air, and in the several intervals of eating, drinking, sleeping, &c.

Some of the more extraordinary phenomena observed herewith, are, that for some time after eating the *perspiration* is least of all: that between the fifth and twelfth hour after meals *perspiration* is greatest: that riding either on horseback, in a coach or ship, &c. brisk motion on the ice, &c. but, above all, a brisk friction of the skin, promote *perspiration* surprisingly: and that *perspiration* is naturally always much less in women than in men.

Perſpiration is influenced by the paſſions of the mind. Thus anger and joy increaſe, and fear and ſadneſs leſſen, both *perſpiration* and urine. Anger cauſes a ſtrong motion in the membranes of the heart, and quickens its contraction and dilatation, and thereby quickens the contraction and dilatation of the blood-veſſels and ſecerning ducts, and of conſequence increaſes the diſcharges of *perſpiration* and urine; and that more or leſs, in proportion to the ſtrength and continuance of the paſſion.

Joy affects theſe diſcharges in like manner as anger. In the paſſions of fear and ſorrow, *perſpiration* and urine are leſſened, by the depreſſion of the activity of the ſoul under theſe paſſions. Dr. Bryan Robinſon of the Food and Diſcharges of Hum. Bodies, p. 77, ſeq.

The proportion of *perſpiration* to urine is increaſed by all thoſe exerciſes which increaſe the motion of the blood, and warm the ſkin.

We have an account of a perſon, who by paſſing many nights in aſtronomical ſpeculations, had his *perſpiration* ſo obſtructed by the cold and damp of the air in Holland, that a ſhirt he had worn for five or ſix weeks was as clean as if it had been worn but one day. The conſequence of this was, that he gathered ſubcutaneous waters, but was cured in time. Phil. Tranſ. N° 8. p. 138.

We have ſeveral obſervations, experiments, and tables, relating to the quantity of *perſpiration*, urine, and ſtool, in South Caroſina, by Dr. John Laning. See Philoſ. Tranſ. N° 470 and 475.

Some have ſuppoſed that the *perſpiration* of animal bodies, in a healthy ſtate, has the ſame effect upon air that breathing itſelf, viz. phlogiſticating and making it noxious; this is an opinion which Dr. Ingenhouſz has deduced from ſome experiments; and Dr. Macbride, Eſſays, p. 257, informs us, that having collected about two drams of ſweat, and mixed it with ſix drams of lime-water, he found that the mixture immediately became turbid, and in a ſhort time depoſited a light ſediment, like that afforded in ſimilar circumſtances by urine, and which effervesced as violently when ſpirit of vitriol was added. Whence he concludes, that air is thrown off from the fluids by *perſpiration* as well as by urine. But Dr. Prieſtley obſerving, that there is nothing we know of in the human frame which would lead any perſon to ſuſpect that air ever iſſues from the ſkin, from various experiments maintains, that perſpirable matter has no ſuch effect upon the air, leaving it as wholeſome or as fit for reſpiration as ever, as he concludes from the teſt of nitrous air. Hence he infers that it is only RESPIRATION, and not the *perſpiration* of the body, that injures common air. Exper. and Obſ. vol. v. ſect. 10.

PERSPIRATION *of plants*. See PLANTS.

PERTICA, a ſort of cornet, being the ſame with VERU.

PERTICA, among the Romans, a long rod for beating the fruit from trees. It was likewiſe uſed for a long meaſure. See PERCH.

PERTICATA, or PARTICATA *terræ*, in our *Old Law-Books*, is the fourth part of an acre, or a piece of ground containing one perch in breadth, and forty in length. See ROOD, and PERCH.

Continet in integra ſuperficie 40 *perticas*.

PERTICULAS, poor ſcholars of the iſle of Man. The king granted to *L. Macguin de inſula de Man, ſcholari, quandam elemoſinam vocatam* Perticulas, *ad ſuſtentationem cujuſdam pauperis ſcholaris, de inſula prædicta ad exercend. ſcholas, per progenitores noſtros quondam reges Angliæ datum & conceſſam*. Pat. Hen. 4.

PERU, *baſſam of*. See BALSAM.

PERVIGILIA, in *Antiquity*, an appellation given to nocturnal feſtivals, celebrated in honour of ſeveral deities, as Ceres, Venus, Fortune, &c. They were ſo called becauſe the nights were ſpent in waking.

PERVIGILIUM, in *Medicine*, exceſſive waking, or WATCHING.

PERVINCA, in *Botany*. See PERIWINKLE.

PERVISE, or PARVISE, a term in our *Old Law-Books*, ſignifying, according to Selden in his notes on Forteſcue, an afternoon's exerciſe, or moot, which the pleaders held for the inſtruction of the younger ſtudents; bearing originally the ſame name with the parriſæ in Oxford. See MOOT.

Mr. Sommer ſays, that PERVISE ſignifies *palatii atrium, vel area illa a fronte aulæ Weſtmonaſterienſis, hodie*, the *Palace-yard*: and Spelman thinks that the lawyers turned thither to meet their clients, not to hold moots.

PERUVIAN *bark*. See CORTEX *Peruvianus*.

PERUVIAN *emerald*. See EMERALD.

PERYGUA, in *Botany*, a name given by ſome authors to a plant of the caſſine kind, called the *caſſaberry* buſh, and by ſome the *Paraguay tea*.

PERYSIAS, a word uſed by authors to expreſs wine of the laſt year's vintage.

PERYSTAPHYLO *pharyngei*, in *Anatomy*, are two ſmall muſcles inſerted between the uvula and lower extremity of the internal ala of the apophyſis pterygoides; and running obliquely backwards on the ſides of the pharynx.

PES, a long meaſure, in Engliſh called FOOT.

PES *forceſtæ*. See FOOT *of the Foreſt*.

PES *leonis*, in *Botany*, a name by which ſome authors expreſs the *alchymilla*, or ladies-mantle.

PES *monetæ*, in *Ancient Records*, ſignifies a true and reaſonable adjuſtment of the real value of all current coin.

PESA, an old law-term for a WEIGH, or certain weight of cheeſe, wool, &c.

PESADE, or PESATE, in the *Manage*, that action taught a horſe, wherein he riſes with his fore feet, and bends them up to his body, without ſtirring the hind feet.

The *peſade* takes its name from the motion of the horſe, which, in this action, leans and lays all the weight of his body upon his haunches. To be perfect, the hinder feet, which ſupport the whole, ought to be fixed and immoveable, and the fore-part of the horſe more or leſs raiſed according as the creature will allow; but the fore-legs, from the knee to the feet, muſt always be extremely bent and brought under him.

The *peſade* is the firſt leſſon taught a horſe, in order to bring him to curvets, &c. unleſs he performs this well, he will never go well in any air: yet he is not to be taught it at the firſt riding.

This is the foundation of all the AIRS, and is neceſſary to diſpoſe and prepare the horſe for all ſorts of manages: however, great caution ſhould be uſed not to teach a horſe to riſe up, or ſtand upon his haunches, unleſs he is quite exact and obedient to the hand and heel: for in this caſe he would be thrown into diſorder, his mouth would be ſpoiled, the appuy falſified, and he would become reſtive. When he is fit for this exerciſe, work him upon the walk, the trot, and the gallop; ſtop him in the hand, keep him firm and moderately together; aid with the tongue, the ſwitch, and your legs; and when he begins to comprehend what you would have him do, encourage and careſs him; working him gently and by degrees. Sluggiſh and heavy horſes require, in the beginning, ſtronger and ſharper aids. There are other horſes, which are apt to riſe of themſelves; this ſhould be prevented by driving them forward. Berenger's Art of Horſemanſhip, vol. ii. chap. 16.

PESAGE, *peſagium*, a cuſtom or duty paid in certain markets, &c. for weighing of merchandizes, or wares.

PESATE. See PESADE.

PESCE *vacca*, the *cow-fiſh*, a name given by Auguſtino Scilla to a kind of dog-fiſh, not deſcribed by any author before his time, but accurately drawn by him in his book on petrifactions, on occaſion of its teeth: many ſpecies of the *glaſſopetræ* of the iſland of Malta, and other places, being plainly the ſame with the teeth in the jaws of this fiſh.

PESSARY, or PESSUS, formed from *πεσσος*, or *πεσσω*, which ſignifies the ſame, in *Medicine*, a ſolid medicament of the length and thickneſs of the finger, but of a pyramidal form; conveyed into the natural parts of a woman, to provoke, or to put a ſtop to the menſes, to prevent a deſcent of the matrix, or on other occaſions in diſorders of theſe parts.

The *peſſary* conſiſts of a piece of cork, or light wood, or of a little linen-bag full of powders, incorporated with wax, oil, and cotton, crammed cloſe together, to make it ſolid enough for intromiſſion.

At one end it is faſtened to a little ribband, by which it may be drawn out at pleaſure.

PESSOMANTIA, *Πεσσομαντια*, in *Antiquity*, the ſame with CLEROMANCY.

PESTERABLE, in our *Old Writers*, an epithet for ſuch wares as *peſter*, or take up much room in a ſhip. Stat. 32 Hen. VIII. cap. 14.

PESTILENCE, formed from *peſtis*, which ſignifies the ſame, in *Medicine*, an epidemical, malignant, and contagious diſeaſe, uſually mortal; popularly known under the name of PLAGUE.

PEST-*houſe*, a lazaretto, or infirmary, where goods, perſons, &c. infected, or ſuſpected to be infected, with ſome contagious diſeaſe, are diſpoſed, and provided for.

PESTILENCE-*wort*, in *Botany*. See BUTTER-*bur*.

PESTILENTIAL *carbuncle*. See CARBUNCLE.

PESTILENTIAL *diſeaſes*. See DISEASE.

PESTILENTIAL *fevers*, among *Phyſicians*, are ſuch as do not only afflict the patient with a vehement heat, but alſo with ſome malignant and venomous quality, and in ſome approach to the nature of the plague.

PESTIS. See PLAGUE.

PETALA, *petali*, in *Botany*, the leaves of a flower; ſo called to diſtinguiſh them from the folia, or leaves of the plant.

The word is formed from the Greek *πεταλον*, a *leaf*; which, in

in that language ſerves indifferently for the leaves of the plant, and thoſe of the flower.

By flower is properly meant, that aſſemblage of parts, called *petala*, *ſtamina*, *apices*, and *piſtil*, which ſerve for the propagation of the kind.

The coloured leaves, called *petala*, which encompaſs the other parts, are in reality no more than caſes or covers, to ſecure and ſereen the generative organs; unleſs, as Mr. Bradley conjectures, they may alſo ſerve to ſecrete ſome fine juice for the nouriſhment of the ſeed.

The *petal* is that part of the flower which conſtitutes the corolla; it generally diſtinguiſhes itſelf by its ſingular colour.

The *petal* is defined by Linnæus to be a corollaceous covering to the flower, meaning that it incloſes and defends it in the manner of a corolla, or wreath.

When the COROLLA conſiſts only of one *petal*, its lower tubular part is called the *tube*; its upper expanded part, the *limb*: when ſeveral *petals* go to make up the flower, the narrow part where they are inſerted is called *unguis*; their broader part towards the end, *bractea* or *lamina*.

The moſt eaſy diviſion of flowers, in regard to the matter of generation, is into ſimple ones; i. e. thoſe formed of ſtamina and piſtil only; and compound flowers, whoſe ſtamina and piſtil are encompaſſed with *petals*, called by Dr. Grew the *foliation*, and by Mr. Ray *folia*.

Compound flowers again, are either encompaſſed with a ſingle *petalum*, or piece; or with ſeveral pieces; the firſt of which are called *monopetalous*, the ſecond *polypetalous* flowers.

Again, from the regular or irregular configuration of the *petals*, Mr. Juſſieu makes another diviſion of flowers into claſſes; as regular and irregular *monopetalous*; regular and irregular *polypetalous*, &c.

That great botaniſt, the late Mr. Pitton Tournefort, fixed upon the moſt ſtriking and ſhewy parts of vegetables, as the foundation of his method and general diviſion of the vegetable world; which he has accordingly ranged into twenty-two claſſes.

The firſt is of the plants with a *monopetalous* or one-leaved flower, formed like a bell; and the flowers of this claſs he afterwards ſubdivides into four kinds; firſt, the *bell-faſhioned* flowers properly ſo called, as being very nearly of the regular ſhape of a bell; ſecondly, the *tubulate bell-faſhioned* flowers which are narrow and oblong; thirdly, the *expanded*, which open in form of a wide baſon; and, fourthly, the *globoſe*, the mouth of which is narrower than the body. In this claſs he comprehends the *mandrake*, *lily of the valley*, &c.

The ſecond claſs is of the plants with *monopetalous funnel-faſhioned*, and *rotated*, or wheel-like flowers. The flowers of this claſs he divides into two kinds only; the one repreſenting at its mouth, the bottom of an inverted cone, the other a ſalver or faucer; and theſe he diſtinguiſhes by the names of *funnel-faſhioned* and *ſalver-like* flowers: of this claſs are the *tobacco*, *henbane*, &c.

The third claſs is of what he calls the plants with *anomalous*, *monopetalous* flowers; of theſe he makes the variouſly-ſhaped *monopetalous* flowers of *birth-wort*, *fox-glove*, *fig-wort*, and ſome others; ſome of which repreſent a face, and others the ſnout of an animal: to diſtinguiſh the plants of this claſs the author however is obliged fairly to confeſs the imperfection of the method of claſſing by the *petals* alone, and call in the aſſiſtance of the different ſtructure of the ſeed-veſſels. In this claſs he comprehends the *toad-flax*, *butter-wort*, &c.

The fourth claſs is of the plants, which have a *monopetalous*, *labiated*, or lipped flower; which he defines to be ſuch a one as is narrow, like a pipe within, and expanded; and in form of lips at the mouth. In this claſs are comprehended the *ſage*, *clary*, *deadnettle*, *mint*, *balm*, &c.

The fifth claſs is of the plants with a *polypetalous*, *cruciform* flower; that is, ſuch a one as is compoſed of a number of leaves, diſpoſed in form of a croſs; and theſe he afterwards more nicely defines to be ſuch as are always compoſed of four *petals*, or leaves only, and thoſe ever diſpoſed in form of a croſs. Of this claſs are the *creſſes*, *muſtard*, *ſauce-alone*, &c.

The ſixth claſs is of the plants which have a *roſaceous*, or roſe-like flower. This he defines to be ſuch a one as is compoſed of many leaves or *petals*, diſpoſed like thoſe of the roſe into a round figure: the number of *petals*, he adds, is uncertain and indeterminate in this claſs; and that they are frequently five, and more rarely four than two. Of this claſs are the *chickweed*, *orpine*, *ſaxifrage*, *yew*, &c.

The ſeventh claſs is of the plants with *umbelliferous* flowers. Theſe he defines to be *polypetalous*, *roſaceous* flowers, whoſe cup goes off into a fruit compoſed of two ſeeds, cohering firmly together while green, but naturally ſeparating when ripe; and obſerves, that in this claſs the flowers are generally diſpoſed in great numbers together, and in the form of what the ladies call an *umbrella*, uſed to be carried over them to keep off the ſun; but he does not make this a neceſſary character of the claſs. The plants comprehended under this are *carrot*, *paſtnip*, *earth-nuts*, *elder-vel*, *fennel*, &c.

The eighth claſs is of the plants with a *caryophyllous*, or pink-like flower, which he defines to be ſuch a one as is compoſed of many *petals*, diſpoſed in an orbicular form, and ariſing each from the bottom of the cup, as from a tube, in the ſame manner as they do in the common pink. Of this claſs are the *catchfly*, *ſea-lavender*, *flax*, &c.

The ninth claſs is of the plants which have a *liliaceous*, or lily-like flower, which he defines to be ſuch a one as is compoſed of ſix *petals*, ſometimes indeed but three, but always divided however into ſix at the end. Here the author alſo again acknowledges the imperfection of claſſing by the *petals*, ſince here he takes in the aſſiſtance of the figure and diviſion of the ſeed-veſſel, which he ſays muſt always in this claſs be tricapſular, or divided into three cells; and plants which have this ſeed-veſſel, though their flowers are not ſtrictly of the lily-ſhape, are allowed to be truly of the claſs. Of this are the *aſphodel*, *ſaffron*, *flower-de-luce*, *tulip*, *crown-imperial*, &c.

The tenth claſs is of the plants with a *papilionaceous*, *papilionaceous* flower, or one that is compoſed of many *petals*, and in form reſembling a butterfly. Theſe flowers the author defines to be compoſed of four diſſimilar *petals*, which iſſue from a one-leaved cup, which is hollow, and like the conic paper-caſes people twiſt up to put ſpices, &c. in; and divided into many ſegments at the rim; and from this cup ariſes alſo the *piſtil* of the flower. The upper leaf in theſe flowers, which in ſome ſort repreſents the colours carried by ſoldiers in battle, he calls the *vexillum* or *enſign*; the lower, which is hollowed, and in form of a boat, the *keel*; and the two ſide ones the *wings*. The plants comprehended under this claſs are the *liquorice*, *pea*, *fenugreek*, &c.

The eleventh claſs is of plants with an *anomalous* or irregular *polypetalous* flower. Among theſe he comprehends ſuch of the *polypetalous* flowers as are of various ſhape, and compoſed of diſſimilar or irregular *petals*, and could not well be comprehended under any one expreſſive or determinate character. Of this claſs are the *violet*, *fumitory*, *dyer's-weed*, *wolfsbane*, &c.

The twelfth claſs is of the plants with a *floſculous* flower. This he defines to be one compoſed of a number of ſmall flowers, crowded cloſe together, and comprehended in the ſame general *calyx*, or cup; theſe flowers, which together compoſe this complex one, he obſerves are generally compoſed of only one *petal*, which is wider at the mouth than at the other end, and generally notched or divided there into many ſegments. He alſo has recourſe to the other parts of the flower for further deſcriptions; and comprehends under it the *thiſtles*, *knapweed*, *bluebottle*, &c. The thirteenth claſs is of the plants with a *ſemifloſculous* flower. Theſe he defines to be compoſed of a multitude of half flowers, each compoſed of one *petal*, hollow in its lower part, but in its middle and upper part flat and plain; and diſpoſed into a ſingle or manifold circle. He here alſo deſcribes the fructification of the plants of this claſs, and comprehends in it the *lettuce*, *dandelion*, *hawkweed*, &c.

The fourteenth claſs is of the plants with a *radiated* flower. Theſe flowers the author deſcribes to have two parts, a middle or *diſk*, compoſed of ſmall *ſtellate* flowers, and a *rim*, or *edge*, called the corona, which is made up of half flowers; and ſometimes, though ſeldom, of plain flat *petals*. Under this claſs are comprehended the *ſtar-wort*, *ragwort*, *golden-rod*, *ſunflower*, &c.

The fifteenth claſs is of the plants which have flowers compoſed of *ſtamina* or *threads*, ſuſtaining the *apices* or *capſules* of the fecundating farina. The author diſtinguiſhes theſe alſo by their *piſtil* changing into a ſingle ſeed enveloped in a huſk, and of this claſs makes the *ſorrel*, *orſmart*, *orrach*, the *graſſes*, *horſetails*, &c.

The ſixteenth claſs is of thoſe plants which the author ſuppoſes to have no flower at all; and yet to produce ſeeds. Of this claſs he determines the *fern*, *liver-wort*, and *adder's-tongue*, to be.

The ſeventeenth claſs is of thoſe plants whoſe flowers and fruit he ſays are both ordinarily wanting. Theſe he afterwards divides into the earth and water plants; among the firſt he reckons the *moſſes*, *muſhrooms*, &c. And among the others the *fucuſes*, *algæ*, *coralines*, &c. the flowers and ſeeds of which he obſerves we are as yet at leaſt ignorant of.

The eighteenth claſs is of the trees and ſhrubs, which have *apetalous* flowers, or flowers without *petals* or leaves at all. Of this claſs are the *aſh*, *box*, &c.

The nineteenth claſs is of the trees and ſhrubs which have *catkins* or *juli* for their flowers. Theſe the author ſays conſiſt either of *ſtamina* and *apices* alone, that is, of

the threads or capsules of the farina; or they are composed of these with some little leaves affixed to a long slender axis: these *catkins* he observes are always in a different place from the fruit; and that, sometimes on the same, sometimes on different trees. Of this class are the *walnut, oak, beech*, &c.

The twentieth class is of trees and shrubs, which have a *rosaceous* flower; and of this are the *elm, lotus, storax, olive*, &c.

The twenty-first class is of the trees and shrubs which have a *papilionaceous* flower; among which are reckoned the *broom, bean, trefoil, judas-tree*, &c. See BOTANY, and FLOWER; and *Tables* VIII. IX. and X. *of Botany*.

It is very easily seen, that this is far from a strictly accurate method; the author has indeed assisted it with figures, which are very useful and instructive; and, as the judicious Linnæus observes, more is in reality to be learned from them, than from all the author has said. Linnæus has well observed, that this method is neither perfect nor sufficiently distinctive; the glory of instructing the botanist with truth and certainty was indeed reserved for that author alone, who, when he had shewn the imperfection and uncertainty of all the before established methods, planned out an absolutely new one, founded on the unalterable parts of plants, their organs of FRUCTIFICATION.

Nature exhibits peculiar art in the folding up of the *petala* in the perianthium, before they begin to blow or expand: of these foldings Dr. Grew notes the following varieties; viz. the close couch, as in roses; the concave couch, as in blattaria flore albo; the single plait, as in peas-blossoms; the double plait, as in blue-bottles; the couch and plait together, as in marigolds, &c. the rowl, as in ladies-bower; the spire, as in mallows; and lastly, the plait and spire together, as in convolvulus doronici folio.

The calyx, or perianthium, sometimes serves plants in lieu of *petala*.

PETALISM, *petalismus*, πεταλισμος, in *Antiquity*, a kind of EXILE or BANISHMENT, for the term of five years.

The *petalism* at Syracuse was nearly the same thing as the *ostracism* at Athens, except that the latter was for ten years, and the former only for five.

The *petalism* was performed by the people's writing the name of the person condemned, on a leaf; whence the term from πεταλον, *leaf*.

PETALODES, πεταλωδης, a name given to urine, when it seems to have little leaves, flakes, or scales, in it.

PETAMINARIUS, in *Antiquity*, a name given to certain persons who performed extraordinary feats of activity; took perilous leaps, vaults, &c.

The word is formed from the Greek, πεταννυμι, πεταω, *I fly*. Some authors write it *petisminarius*; and derive it from *petimen*, which, according to Festus, signifies the hunch of a camel; alluding to the manner wherein these operators bend the body in exhibiting postures, &c.

PETARD, in *War*, a kind of engine of metal, somewhat in shape of a high-crowned hat, or truncated cone; serving to break down gates, barricades, draw-bridges, or the like works which are intended to be surprised.

The *petard* may be considered as a piece of ordnance, very short, narrow at the breech, and wide at the muzzle; made of copper mixed with a little brass; or of lead with tin; usually about 8.5 inches within at the bottom; the diameter at the beginning of the round part is six, and distant from the lower base nine inches: the circular part is described from the point where the perpendicular to the sides meets the middle line or axis; the thickness of metal is 1.6 inches: there is a brim at the bottom that projects the metal by two inches, and is one inch thick, in which are six holes of half an inch diameter, which serve for screws to fasten the *petard* on a board in a firm manner; there is a cavity within at the bottom, half an inch deep, and as much in height to fix a board, in order to keep the charge in the *petard* before it is fixed to the beard or plank. There are likewise two handles of about three inches from the flat ring, five inches long, ¾ thick, and 3.8 from the outside to the metal. Lastly, a hole of an inch diameter is made either at the top, or on the side, to screw in an iron fuse by which the powder is fired, which fuse is filled with a slow composition, in order that when it is lighted, the petardier may have time to retire out of danger. See the section of a *petard* in *Tab.* II. *Gunnery, fig.* 13.

Petards are made of various dimensions; but the biggest should not weigh above seventy pounds when loaded and fixed to its plank, and the least not less than forty-five or fifty. The common and best way of loading the *petard* is to fill it gradually with powder, and between every layer of two or three inches thick, to put a wooden mould into the *petard*, which should be beat upon with a mallet, so as to press the powder as close together as possible, without bruising the grains; and when it is quite full, the board is put upon the powder, and over this a cloth with rosin, and bound round the brim with packthread, to keep the charge and board together till the *petard* is screwed on the plank or board; then the part that exceeds the brim is cut off, and the other being pressed by the brim prevents any air from coming to the powder. The board to which the *petard* is fixed has two iron bands on the back, placed cross-ways, and a hook to hang it up against the gate or door, by means of a screw, when it is to be used. Some moisten the powder with spirits of wine, and dry it in the sun, in order to make it stronger, and then sprinkle every layer of powder of two inches thickness with mercury, upon which they lay powder again, and press it down, sprinkling it with mercury, till the petard is filled.

Its use is in a clandestine attack, to break down gates, bridges, barriers, &c. to which it is hung, which it does by means of the wooden plank. It has been also used in countermines, to break through the enemies galleries, and give vent to their mines: but in later years the use of *petards* has been discontinued.

Petards are sometimes also made of wood, bound round with iron hoops.

The invention of *petards* is ascribed to the French Huguenots in the year 1579. Their most signal exploit was the taking the city Cahors by means hereof, as we are told by d'Aubigne.

PETARDIER, in the *Military Art*, is he who loads, fixes, and fires the *petard*.

PETASITES, *butter-burr*, in *Botany*. See BUTTER *Bur*.

PETASUS among the *Romans*, a covering for the head, not unlike our hats; it had a broad brim, and was used in journeys to save the face from being sun-burnt.

The PILEUS differed from the *petasus*, as having no brim. The *petasus* is observed upon the head of ancient figures of Mercury; who wore it in the quality of the god of travellers and merchants.

PETECHIÆ, spots in the skin, like flea-bites, which come out in some fevers, which are hence called *petechial* or *spotted fevers*. See FEVER.

PETECHIAL, an appellation given to a malignant, epidemical kind of fever; wherein the skin breaks out in *petechiæ*, or purple spots.

The *petechial* FEVER is also called *febris lenticularis*, and *pulicosis*.

PETELMA, in the *Turkish Military Orders*, is the procurator general of the effects of the Janizaries. When any one dies under the protection of this body, he seals up their houses, to secure the tenth part of their effects; which are due to the Janizaries.

PETERERO. See PETRERO.

PETER-*penny*, an ancient levy, or tax, of a penny on each house throughout England, paid to the pope.

It was called *Peter-penny*, because collected on the day of St. *Peter ad Vincula*; by the Saxons it was called *Rome fesh*, i. e. the fee of Rome, and also *Romescot*, and *Romepenny*, because collected and sent to Rome; and lastly, it was called *hearth-penny*, because every dwelling-house was liable to it, provided there were thirty pence over *peculiar* belonging to it; nay, and every religious house; the abbey of St. Albans alone excepted.

This *Peter-penny* was at first given as a pension or alms, by Ina, king of the West Saxons, in the year 727, being then in pilgrimage at Rome: and the like was done by Offa, king of the Mercians, throughout his dominions, in 794: and afterwards by Ethelwulph, through the whole kingdom, in the year 855.

It was not intended as a tribute to the pope, but chiefly for the support of the English school or college at Rome: the popes, however, shared it with the college: and at length found means to appropriate it to themselves.

At first it was only an occasional contribution; but it became at last a standing tax; being established by the laws of king Canute, Edward the Confessor, the Conqueror, &c.

The bishops who are charged with the collecting it, employed the rural deans and archdeacons therein.

Edward the Third first forbad the payment, but it soon after returned, and continued till the time of king Henry VIII. when Polydore Virgil resided here as the pope's receiver-general.

It was abolished under that prince, and restored again under Philip and Mary; but it was finally prohibited under queen Elizabeth.

St. PETER'S *wort*, *ascyrum*, in *Botany*, a genus of the *polyadelphia polyandria* class. Its characters are these: the empalement of the flower is four-leaved; and the flower has four oval petals, the two outer are large, and placed opposite, the two inner small; in the centre is situated

an oblong germen, attended by a great number of briſtly ſtamina, which are reduced at their baſe to four bodies; the germen becomes an oblong pointed-ſeed veſſel, filled with ſmall round ſeeds. Miller enumerates four, and Linnæus three ſpecies.

PETESIA, in *Botany*, a genus of the *tetrandria monogynia* claſs: its characters are, that the corolla has a ſingle petal, and is funnel-ſhaped; the ſtigma is bifid, and the fruit a polyſpermous berry. There are two ſpecies.

PETIA, a word uſed by medical writers in different ſenſes. It is commonly underſtood to mean a piece of rag, uſed to the medicinal ingredients in, to be uſed by infuſion in liquors; but *petia oculi* ſignifies an hæmorrhage of the eye.

PETICULÆ, the ſame as *petechiæ*, purple ſpots appearing on the ſkin in malignant fevers.

PETIGO, a word uſed by ſome authors for IMPETIGO.

PETILUS *flos*, a name uſed by ſome botanical authors for the African marygold.

PETIMBUABA, in *Ichthyography*, the name of a fiſh caught in the American ſeas, and called by ſome, in Engliſh, *the tobacco-pipe fiſh*; a name more commonly uſed for the AGUS *ſiringatus*.

It grows to the length of three or four feet; its body is like that of an eel, long and ſlender; and its mouth without teeth; the length of the noſe is conſiderable, and the upper jaw is ſhorter than the lower; its eyes are remarkably large, not ſmaller than a hazel nut, and ſomething of the ſame figure; its ſkin is ſmooth, like that of the eel, and of a liver-colour on the back and ſides, with ſeveral rows of blue ſpots diſpoſed in three rows on the back, two on the head, and one on each ſide; there are alſo ſome green ſpots every where interſperſed among the blue ones. The belly is white, but has ſomething of a brownith red caſt, and is flat. It is a well-taſted fiſh.

PETIOLATE *leaf*, among *Botaniſts*. See LEAF.

PETIOLE *petiolum*, among *Botaniſts*, expreſſes that ſtalk which ſupports the leaves of a plant, as the peduncle does the fructification.

Some uſe the word *petiolum* to denote the whole middle rib of a leaf of any plant, which is the ſtrongeſt part of it, and runs from the ſtalk, by which the leaf adheres to the tree or plant, to its extremity, and from which the lateral fibres or nerves, as they are uſually called, commonly ariſe.

The authors, who have written on the ſubject of the anatomy of leaves, have had occaſion to be accurate about the diſtinctions of the ſeveral parts; and they have called this main or middle rib, the *petiolus*. The ſide branches going off from this, they call *rami*; and the ſubdiviſions of theſe into more minute fibres *furculi*: theſe generally are interwoven into a reticular plexus one with another, and make up the ſubſtance of the leaf, with the bladders of a liquid matter, which are contained in their interſtices. All theſe ſolid parts of leaves, the *furculi* and *rami*, as well as the *petiolus*, are congeries of oblong fibres extended evenly together, and collected into one body; and the fibres in all parts of plants are divided into two kinds; the one containing juices, and called *ſucciferæ*; the other giving paſſage only to air, and therefore called *tracheæ*.

Leewenhoek has diſtinguiſhed the ſucciferous veſſels into two kinds, which he calls veins and arteries: the latter, he obſerves, receive the ſap from the root, where it is firſt collected, and carry it up to the reſt of the plant, and the others bring it back again from thence, in the manner of veins.

Perrault has joined a great number of experiments to Leewenhoek's, in order to prove this ſyſtem of the juice-veſſels, but Fontenelle, and ſome others, have doubted either the exiſtence, or at leaſt the uſe, of the TRACHEÆ or air-veſſels, ſuppoſing them either imaginary veſſels, or deſtined for other purpoſes. The vine branches, however, examined either by a microſcope, or by a good eye in a good light, will ſhew evidently that ſuch veſſels exiſt, and that in very great numbers; and the veſſels in the *petiole* and *furculi* of leaves, when ſtrictly examined, are found to be of both theſe kinds. Act. Eruditi. 1722.

PETIOLUS, a word uſed by botanical writers to expreſs the ſtalk of a fruit.

PETIT *ſage, jury, larceny, ſerjeanty, ſeſſion, treaſon.* See the ſubſtantives.

PETIT *guet*, Fr. in *Military Language*, is carried on by a ſlight party, commanded by an expert partiſan, conſiſting of between one and two thouſand men, ſeparated from the main army, in order to ſecure the camp on a march, to reconnoitre the enemy or the country, to ſeize their poſts, convoys, or eſcorts, to plant ambuſcades, and to practiſe every ſtratagem for ſurpriſing or diſturbing the enemy.

PETITA *terra*. See SUMMONS.

PETITIO *principii*, in *Logic*, a begging the queſtion, or precarious ſuppoſing a thing to be true, or taking it for granted, when it really remains either dubious, or elſe I expreſly denied.

PETITION, *petitio*, a ſupplication in form, made by an inferior to his ſuperior; eſpecially to one having ſome juriſdiction.

To ſubſcribe a *petition* to the king to frighten him into change of his meaſures, inſinuating, that if he denied, many thouſands of his ſubjects will be diſcontented, &c. is included among the contempts againſt the king's perſon and government, tending to weaken the ſame, and is puniſhable by fine and impriſonment. 1 Hawk. P. C. 80. The right of *petitioning* is, however, unqueſtionable; proviſion can be taken, that under the pretence of petitioning, the ſubject be not guilty of any riot or tumult: for preventing which, it is provided by the ſtat. 13 Car. II. ſtat. 1. cap. 5. that no *petition* to the king, or either houſe of parliament, for any alterations in church or ſtate, ſhall be ſigned by above twenty perſons, unleſs the matter thereof be approved by three juſtices of the peace, or the major part of the grand jury, in the county; and in London by the lord mayor, aldermen, and common council: nor ſhall any *petition* be preſented by more than ten perſons at a time, on pain in either caſe, of incurring a penalty not exceeding 100*l.* and three months impriſonment. But, under theſe regulations, it is declared by the ſtatute 1 W. and M. ſtat. 2. cap. 2. that the ſubject hath a right to *petition*; and that all commitments and proſecutions for ſuch petitioning are illegal.

PETITION *of appeal* to the houſe of lords is the dernier reſort of any ſubject who thinks himſelf aggrieved by any interlocutory order or final determination in the court of chancery. This juriſdiction of the houſe of peers is ſaid to have begun in 18 Jac. I. and the firſt *petition*, which appears in the records of parliament, was preferred in that year; and the firſt that was heard and determined was preferred in a few months after; both levelled againſt the lord keeper Bacon, for corruption and other miſbehaviour. It was afterwards warmly controverted by the houſe of commons, in the reign of Charles II. But the diſpute has long ſince terminated. We may obſerve that no new evidence is admitted in the houſe of lords, upon any account, for this is a diſtinct juriſdiction.

PETITION *of bankruptcy*, is a *petition* preſented to the lord chancellor by one creditor, to the amount of 150*l.* or by three or more to the amount of 200*l.* upon which he grants a COMMISSION to certain perſons, who are then ſtyled commiſſioners of bankrupts. The petitioners muſt be bound in a ſecurity of 200*l.* to make the party amends, in caſe they do not prove him a BANKRUPT. And if they receive any money or effects from the bankrupt, as a recompence for ſuing out the commiſſion, ſo as to receive more than their rateable dividends of his eſtate, they forfeit not only what they have ſo received, but their whole debt.

In conſequence of this *petition*, and when the commiſſion is awarded and iſſued, the commiſſioners are to meet, at their own expence, and to take an oath for the due execution of their commiſſion, and to be allowed a ſum not exceeding 20*s.* per diem each, at every ſitting. When the commiſſioners have received proof of a perſon's being a trader, and of his having committed an act of bankruptcy, they declare him a bankrupt, giving notice thereof in the Gazette, and appointing three meetings. At one of theſe meetings ASSIGNEES ſhall be choſen; and at the third meeting, at fartheſt, which muſt be on the forty-ſecond day after the adverſement in the Gazette, the bankrupt, upon notice ſerved upon him or left at his uſual place of abode, muſt ſurrender himſelf perſonally to the commiſſioners, and conform to the ſtatutes of bankruptcy; or, in default thereof, be guilty of felony, and ſhall ſuffer death, and his goods and eſtate ſhall be diſtributed among his creditors. The bankrupt is to be examined by the commiſſioners, who may alſo ſummon and examine his wife or any other perſon; and if he refuſe to anſwer fully to any lawful queſtion, or to ſubſcribe his examination, they may commit him to priſon without bail, till he makes and ſigns a full anſwer. The bankrupt is alſo to make a full diſcovery of all his eſtate and effects, and in caſe he conceals or embezzles any to the amount of 20*l.* or with-holds any books or writings, with intent to defraud his creditors, he ſhall be guilty of felony without benefit of clergy. After the time allowed to the bankrupt for ſuch diſcovery is expired, any other perſon voluntarily diſcovering any part of his eſtate, before unknown to the aſſignees, ſhall be intitled to five per cent. out of the effects ſo diſcovered, and ſuch reward as the commiſſioners and aſſignees ſhall think proper: but any truſtee wilfully concealing the eſtate of any bankrupt, after the expiration of the forty-two days, ſhall forfeit 100*l.* and double the value of the eſtate concealed, to the

creditors. For the farther proceſs in a caſe of BANKRUPTCY, ſee CERTIFICATE.

We ſhall only here obſerve farther, that by ſtatute 19 Geo. II. cap. 32. no money paid by a bankrupt to a *bona fide* or real creditor, in a courſe of trade, even after an act of bankruptcy done, is liable to be refunded: nor by 1 Jac. I. c. 15. ſhall any debtor of a bankrupt, that pays him his debt, without knowing of his bankruptcy, be liable to account for it again.

PETITION *of right*, was a parliamentary declaration of the liberties of the people, aſſented to by king Charles I. in the beginning of his reign: in which it is enacted, that none ſhould be compelled to make or yield any gift, loan, benevolence, tax, and ſuch like charge, without conſent by act of parliament; nor, upon refuſal ſo to do, be called to make anſwer, take any oath not warranted by law, give attendance, or be confined, or otherwiſe moleſted concerning the ſame, &c. And that the ſubject ſhould not be burthened by the quartering of ſoldiers or mariners; and all commiſſions for proceeding by martial law to be annulled, and none of like nature iſſued thereafter, leſt the ſubject (by colour thereof) be deſtroyed or put to death, contrary to the laws of the land, &c. See ſtat. 3. Car. I. cap. 1.

PETIVERIA, *in Botany*. See *Guinea* HENWEED.

PETOLA, in *Zoology*, a ſpecies of coluber, the ſcuta of whoſe abdomen are two hundred and nine; and the ſquamæ of the tail ninety. See COLUBER.

PETOLIN, in *Natural Hiſtory*, the French name for a ſhrub of the piſtachia kind, famous for affording bladders or tubercles on its leaves and tender branches, in the manner of the common turpentine-tree; which are found full of inſects. Theſe inſects are always found to be of the puceron kind, and ſome of them are winged, others not, as is known to be the caſe in that genus of animals. Theſe bladders, and thoſe of the turpentine-tree, called its *horns*, have been by ſome ſuppoſed to be the natural production of the trees, but they are in reality only a peculiar ſpecies of bladder-galls, formed by theſe animals, one female of which making her way into the leaf, while the young raiſes its covering membrane into a bladder, in which ſhe produces her young ones; which by ſucking its ſides, derive the juices to it, and occaſion its increaſe. See PUCERON.

PETRARIA, *in Ancient Writers*, is ſometimes taken for a quarry of ſtone.

In other places *petraria* is uſed for a ſort of engine of war, wherewith ſtones were caſt on the enemy; chiefly uſed in ſieges, &c.

PETRE *oil*, ſtone, the ſame as petroleum. *See* PETROL.

PETREA, in *Botany*, a genus of the *didynamia angioſpermia* claſs. Its characters are theſe: the flower hath an empalement of one leaf, cut into five acute ſegments; it has one petal, with a ſhort tube, cut above into five almoſt equal ſegments, which are expanded; it has four ſhort ſtamina ſituated in the tube, two of which are a little longer than the other, terminated by ſingle ſummits; and four germina ſupporting a ſhort ſtyle, crowned by an obtuſe ſtigma; the germina become four ſeeds, wrapped in a fringed cover. There is but one ſpecies, a native of La Vera Cruz, in New Spain.

PETREL, the name of a very remarkable bird, called *procellaria*, by authors. See FULMAR, SHEAR-*water*, and STORM-*finch*.

PETRIDIA, in *Natural Hiſtory*, the name of a genus of foſſils of the SCRUPI kind, of a plain uniform ſtructure, of no great variety of colours, and emulating the external form of pebbles.

Of this genus there are twelve known ſpecies. Hill.

PETRIFACTION, or PETRIFICATION, formed from πετρα, *ſtone*, and *fio* or *facio*, *to become*, or *to make*, in *Phyſiology*, the act of converting fluids, woods, and other matters, into ſtone.

The faculty of *petrifying* wood is aſcribed to ſeveral ſprings, lakes, &c. and the ancient naturaliſts mention a river whoſe waters turned bodies into marble, by mere contact; nay, which, being drunk, *petrified* the viſcera of the drinker.

Flumen habent Cirenes, quod potum ſanos reddit
Viſcera, quod tactis inducit marmora rebus.

Seneca relates, that the mud of this river was of ſuch a nature as to harden and glue together the parts of bodies. At, ſays he, the duſt of Puzzuoli, by barely touching water, becomes ſtone; ſo this water, by touching any ſolid, penetrates and grows to it; whence things caſt into it are immediately taken out ſtones. Pliny obſerves very well, that wood caſt into this river is preſently found covered with a ſtony bark or rind; and ſubjoins the names of ſeveral other rivers which do the ſame: particularly the river Silarus, near Tarentum, whoſe waters are nevertheleſs found very wholeſome. To Pliny's liſt we might add many more among ourſelves; particularly the Loch Lohmond, in Scotland, Loch Neagh, in Ireland, &c. But, in effect, there does not ſeem any real tranſmutation of the woody nature into the nature of ſtone, in any of theſe caſes: all that is done is this; the ſtony particles, which before floated in the liquor, are now lodged on the ſurface, or depoſited in the pores of theſe ſubſtances, in ſuch manner, and in ſuch plenty, as to leave little elſe but the appearance of a ſtone.

Petrifactions are moſt frequently nothing elſe but incruſtations of ſtony particles, which ſurround the bodies immerged, and, as falts, ſhoot upon and adhere to them.

Varenius has a conjecture, that waters only petrify woods by means of certain minute, ſharp, and pointed particles lodged therein, which cut the longitudinal fibres of the wood in an infinite number of points, and thus deſtroy the form by which they were diſtinguiſhed from ſtone.

The knowledge of this part of natural hiſtory is but of very late years arrived at any degree of perfection. Dr. Hooke, Steno, Boerhaave, and Auguſtino Scilla, have been among the firſt who treated judiciouſly of theſe things; but great honour is to be done to Fabius Columna, who, before the time of any of them, publiſhed two admirable diſcoveries upon the parts of aquatic and terreſtrial animals, and of plants buried in the earth, and which he had himſelf ſeen dug up in the mountains of Andria, Apulia, and other places. He boldly declares, that theſe could be depoſited there by no other means but by the general deluge in the days of Noah; and enters into the reaſons why, in ſome places, theſe remains of animal and vegetable bodies are found perfect and entire, and in others corrupted or altered; and obſerves, that they anſwer ſo exactly in every lineament to the recent bodies of the ſame kind, that there can be no doubt of their having once been alſo ſuch.

It is a very remarkable obſervation, in regard to the really and certainly determining the origin of *petrified* ſhells, that they are not all alike altered by lying in the earth, but that they differ according to the matter among which they have lain to *petrify*. Thus the ſame ſpecies of ſhell *petrified* in a looſe ſand-ſtone is never nearly ſo hard as when *petrified* in a ſolid quarry, or in a hard lime-ſtone; ſo that it is evident they were brought into the places where they now lie, in the ſtate of ſhells, and that the ſtone in which they are depoſited, having imparted to them its own nature, they are harder or ſofter, in proportion to its hardneſs. We find in pits where the ſhells are depoſited in looſe earth, that they are often not *petrified* at all, but rendered more ſoft and friable than before.

In places where the incruſtations of moſſes and other vegetables happen, ivy is one which very frequently undergoes the ſame fate. The beauty and elegance of the *petrified ivy* of Derbyſhire with us has been long famous. In the mountains near Matlock-baths, in that county, there are many grottos which afford great quantities of this *petrified ivy*, as it is called, and of other incruſtations of the ſame kind. The beauty of theſe caverns is ſcarce to be conceived; their roofs are hung with ſtalactitæ and ſtalagmitæ, in form of cluſters of grapes, and the incruſted plants are many of them ſo delicate and tender that they fall to pieces under the touch. It is very common in theſe places to ſee ivy creeping along the rock; in ſome parts the ſame branch will be found only incruſted in the common way; in other parts the ſtony matter will ſo penetrate its pores, that the wood and leaves ſhall appear wholly petrified, and in others the ſame branch ſhall be yet freſh and vegetating.

Hazel trees often make a part of theſe incruſtated matters, and appear in this ſtate very beautiful, their roots and branches being in ſome parts only thinly incruſted, in others more thickly and firmly petrified. Among theſe alſo, as in the ivy, there are continually ſhooting up a number of young branches, which after a time will all ſhare the ſame fate. Philoſ. Tranſ. N° 436. p. 353.

Nothing can give a more lively and beautiful idea of the whole buſineſs of *petrifaction*, than this appearance of the ſeveral ſtates or ſtages of it in the ivy, and other vegetables in theſe places. It is evident, that in theſe places not only the water diſtilling out of the rocks is able to depoſit ſtony matter on the vegetables, &c. in form of incruſtations, but even the ſteams and exhalations, being highly ſated with theſe ſtony particles, are capable of working the ſame effect. This is evidently the caſe in regard to ſeveral pieces of the incruſtated ivy, which have never been in the way of water, and yet are as completely covered with ſtone as the reſt; and this is the only method in which the ſtony matter is conveyed into the internal parts of the plants that are really petrified in theſe places. For experience ſhews in regard to theſe, that they are not petrified firſt, and afterwards incruſted, but

but it is plain, that the incruſtation is made firſt, and that afterwards, when in a long ſpace of time the vegetable matter within is petrified and waſted away, the cavity that it leaves by this means is filled up afterwards with the ſame ſtony matter. It is evident that this inner part of the *petrifaction* was not formed while the vegetable yet exiſted by the inſinuation of ſtony matter into its pores, but that it is a mere maſs of ſtone added afterwards, ſince it has never any the leaſt trace of the inner ſtructure of the vegetable: and this ſtony matter, though uſually much more firm and ſolid than the outer cruſt, muſt in many caſes have been formed merely by vapours, as it is in places where water is never found to come on any occaſion.

The water of ſome ſprings may be ſo loaded with ſtony matter, as perhaps by penetrating the pores of wood, and other lax bodies, to increaſe greatly their ſpecific gravities, yet ſurely it is contrary to the laws of matter to ſay, that there are any hidden properties in that water capable of changing the bodies put into it, into other bodies ſpecifically different. A piece of wood put into one of theſe ſprings may in time loſe its texture and coherency, by the admittance of heterogeneous particles of different attractions; but the cauſe of coherency in the parts of the original body muſt ceaſe and be diſſolved, before it can be ſaid to become a part of any other body whatever. Afterwards, indeed, the ſpace that was poſſeſſed by the parts of the original body may be ſupplied by thoſe of the new one, ſo as to make in time an uniform ſtone in the ſhape of the original plant; but if this petrified plant be ſtill kept in the place, where the ſame petrifying quality continues to act upon it, it will loſe even that ſhape, and become a part of that body which is contiguous to it, and ſo a great number of theſe plants thus petrified, arranged near to one another, will compoſe large maſſes, and perhaps whole ſtrata of ſtone. This is clearly the caſe in regard to many of the lime-ſtone rocks about the places where the *petrified ivy* is found; and perhaps it might be carried ſo far as to ſtrengthen our conception about the general formation of the ſtrata of lime-ſtone and marble; that appearing to be every where (notwithſtanding that Dr. Woodward diſputes them much more expeditiously) but eſpecially in the Peak of Derbyſhire, ſuch a *petrifaction* as has been deſcribed, only perfectly finiſhed. Philoſ. Tranſ. N° 456. p. 356.

The echini marini, and other ſuch hollow and open-mouthed ſhells, are very often found filled up with earth or ſtone, the ſame with that in which they lie; and refuſe matter is ſometimes found among this, ſuch as the fragments of other ſhells, and the ſpines of ſome other echini. All theſe ſerve to prove that the ſhell, in its recent ſtate, was ſuſpended in water among ſuch ſubſtances as theſe. And it is not to be ſuppoſed, with ſome authors, that they are found originally as foſſils within the ſhell; ſince, in this caſe, they would be ſometimes doubtleſs found of ſuch a ſize as could not have got in at the mouth of the living animal; but this is never the caſe. And upon the whole it appears very plain, that after the membranes, which covered the mouths of theſe ſhells in their recent ſtate, were decayed or waſhed away, theſe extraneous bodies found entrance at them along with the marle, chalk, ſtone, or whatever other ſubſtance they were among, which was evidently all ſoft and fluid at that time.

The *petrified* vertebræ of fiſhes cannot be ſuppoſed real foſſile productions, but are plainly remains of animals; and when examined ever ſo accurately, they are found to agree with the ſame bones in the recent animal in every lineament.

Seilla mentions a foſſile lobſter's claw preſerved in his muſeum, and found in the hills near Meſſina, in which a piece of a ſcallop-ſhell was found clenched juſt in the manner in which that animal ſeizes its prey. Thoſe who ſuppoſe theſe foſſils to be really produced in the earth ſurely cannot ſuppoſe that there could be any ſeminal principle only for the claw of an animal. In Poland there is a kind of ſtone called *nice kamni*, which they bring from a place called by the ſame name. This ſtone has very much the appearance of the grain of wood, and is probably wood *petrified*. Rzaczinſki, in his hiſtory of Poland, mentions the place, and tells us, that there are many roots and parts of the trunks of trees *petrified* there. He tells us alſo of an old beech-tree in Podolia, whoſe lower part is not only *petrified*, but that into the hardeſt and pureſt of the common ſtones; it being converted wholly into flint, and ſerving the country people thereabout for their common uſes as ſuch.

The author tells us, indeed, that the lower parts of trees become *petrified* there as they ſtand, and while the upper parts continue growing; but this ſeems ſcarce credible.

We have indeed ſome other accounts of the ſame nature, but not from authors of ſufficient authority to build our faith on, in ſo ſeemingly unnatural a caſe. This author in particular, ſeems too credulous in many inſtances; among other things, giving us an account of ſome earthen veſſels found at conſiderable depths in the earth, which he ſuppoſes to have been formed there by nature. We have other accounts beſide this of foſſile urns, but the authors of them all have either miſtaken the cruſtated ferruginous bodies for urns, or elſe they have ſuppoſed things natural which are certainly artificial. Rzaczinſki's Hiſt. Polon.

Mr. Boyle mentions a kind of ſandy earth found in England, which turns wood into ſtone, though there be no *petrifying* ſpring near the place: and this, he ſays, is done in a better manner than by any water he ever ſaw. See Works Abr. vol. i. p. 161.

PETREFACTIONS, *animal*, a term uſed to expreſs ſuch *petrifactions* as are found in the ſeveral parts of the bodies of living creatures.

Of theſe the human body affords many, which are the occaſions of very terrible and generally incurable diſeaſes. The Philoſophical Tranſactions afford us two very ſingular inſtances of this ſort of *petrifactions*; the one in a woman, whoſe whole left kidney was entirely *petrified*, not being filled up in its cavity with a ſtony concretion, as frequently happens in nephritic caſes, but its whole ſubſtance converted into abſolute ſtone, only covered with a thin ſkin.

The other inſtance is in the caſe of a conſumptive perſon, whoſe lungs were found, on diſſection, full of ulcers, and thoſe having almoſt all of them, more or leſs gravel in them; but this was not all, for ſeveral large pieces of the lungs were found, as the kidney in the other inſtance, wholly concreted into ſtone, only covered with a thin ſkin. Phil. Tranſ. N° 71. See *Foſſil* BONES, *Foſſil* SHELLS, MARINE *remains*, and *Foſſil* IVORY. See alſo FOSSILS.

PETRIFYING *waters*. Alonſo Barba gives an account of ſome *petrifying waters* of Peru, which greatly exceed all thoſe we have in Europe in the quantity of ſtony matter they contain. He tells us, that they ſoon choak up their own paſſage by the ſtony matter they depoſit there; and that all the cattle that drink of them die. He adds another ſtory, which he probably took a little too haſtily upon credit, which is, that they have moulds of the ſhape of our bricks, which they fill with this water, and that on being expoſed to the ſun a few days, the water is wholly converted into a ſtone of the ſame ſhape; and that they build their houſes and other buildings with theſe ſtones.

PETROBRUSSIANS, a religious ſect, which aroſe in France, and the Netherlands, about the year 1110; ſo called from their leader, *Peter Bruys*, a Provencal, who made the moſt laudable attempt to reform the abuſes and remove the ſuperſtitions that diſgraced the beautiful ſimplicity of the goſpel: and after having engaged in his cauſe a great number of followers, during a laborious miniſtry of twenty years continuance, was burnt in the year 1130, by an enraged populace, ſet on by the clergy.

The chief of Bruys's adherents was a monk, one Henry; from whom the *Petrobruſſians* were alſo called HENRICIANS.

Peter the Venerable, abbot of Clugny, has an expreſs treatiſe againſt the *Petrobruſſians*; in the preface to which, he reduces their opinions to five heads.

1. They denied that children before the age of reaſon can be juſtified by baptiſm; in regard it is our own faith that ſaves by baptiſm. 2. They held, that no churches ſhould be built, but that thoſe that already are ſhould be pulled down; an inn being as proper for prayers as a temple, and a ſtable as an altar. 3. That the croſs ought to be pulled down, and burned, becauſe we ought to abhor the inſtruments of our Saviour's paſſion. 4. That the real body and blood of Chriſt are not exhibited in the euchariſt, but merely repreſented by their figures and ſymbols. 5. That ſacrifices, alms, prayers, &c. do not avail the dead.

P. Langlois objects Manicheiſm to the *Petrobruſſians*; and ſays, they maintained two gods, the one good, the other evil: but this we rather eſteem an effect of his zeal for the catholic cauſe, which determined him to blacken the adverſaries thereof, than any real ſentiment of the *Petrobruſſians*.

PETROCOSSYPIUS, in *Ornithology*, a name given by ſome authors to the bird more uſually called from its colour the CÆRULEUS.

It lives among the rocks, in woody mountains, and ſings very ſweetly.

PETROJOANNITES, the followers of Peter John, or Peter Joannis, i. e. Peter the ſon of John, who lived in the twelfth century; whoſe doctrine was not known till after his death; when his body was taken out of his grave, and burnt. His opinions were, that he alone had the knowleſge of the true ſenſe wherein the apoſtles preached the goſpel; that the conſecrated bread was not the form of man; that there is no grace inſuſed by baptiſm; and that Jeſus Chriſt was pierced with a lance on the croſs before he expired

PETROL, *petroleum*, q. d. *petræ oleum*, oil of petre, or rock oil, an oleaginous juice, issuing out of the clefts of rocks; and found floating on the waters of certain springs. Beside artificial and vegetable oils, i. e. those drawn from plants, &c. by expression, there are also natural and mineral oils issuing of themselves from the entrails of the earth, called by a common name *petrols*, or *petrolea*.

The more fluid *petrolea*, says Dr. Lewis, have been distinguished by the name of NAPHTHA; and the thicker by those of PISSASPHALTHUM and PISSELEUM.

These, according to all appearance, must be the work of subterraneous fires, which raise or sublime the more subtile parts of certain bituminous matters that lie in their way.

These parts, being condensed into a liquor by the cold of the vaults of rocks, are there collected, and ooze thence through clefts and apertures, with which the disposition of the ground furnishes them.

Petrol then, is a liquid bitumen, only differing by its fluidity from other bitumens, as asphaltum, jet, amber, and the like subfiances.

The naphtha, which is either a liquid, or at least a very soft bitumen, is nearly allied to *petrol*.

Hitherto there has been little *petrol* found, except in hot countries. Olearius says, he saw above thirty springs of it near Scamachia, in Persia: there are also *petrols* in the southern provinces of France; but the best are those in the duchy of Modena, first discovered by Ariosto, a physician, in 1640, in a very barren valley, twelve leagues from the city of Modena.

Three canals are there dug with great expence in the rock; by which three different kinds of *petrol* are discharged into little basons or reservoirs: the first, as white, clear, and fluid as water, of a brisk penetrating smell, and not disagreeable; the second of a bright yellow, less fluid, and of a less brisk smell than the white; the third of a blackish red, of thicker consistence, and a smell more approaching that of bitumen.

There are many varieties of these oils in regard to colour, fluidity, subtility, and the pungency of their smell and taste; the most fluid are, in general, the most subtile and pungent. With us they are commonly sophisticated.

Mr. Boulduc made several experiments with the *petroleum* of Modena, an account of which he gave to the Paris Academy.

It easily took fire on being brought near a candle, and that without immediately touching the flame; and when heated in any vessel, it will attract the flame of a candle, though placed at a great height above the vessel, and the vapour it sends up taking fire, the flame will be communicated to the vessel of heated liquor, and the whole will be consumed. It burns in the water, and when mixed with any liquor swims on the surface of it, even of the highest rectified spirit of wine, which is $\frac{1}{3}$ heavier than pure *petroleum*. It readily mixes with all the essential oils of vegetables, as oil of lavender, turpentine, and the rest, and seems very much of their nature: nor is this very strange, since the alliance between these bodies is probably nearer than is imagined, as the essential oils of vegetables may have been originally mineral ones, and drawn up out of the earth into the vessels of the plant. Mem. Acad. Par. 1715.

Petroleum, when shaken, yields a few bubbles; but they sooner subside than in almost any other liquor, and the liquor resumes its clear state again almost immediately. This seems owing to the air in this fluid being very equally distributed to all its parts, and the liquor being composed of particles very evenly and nicely arranged.

The extensibility of this oil is also amazing. A drop of it will spread over several feet of water, and in this condition it gives a great variety of colours, that is, the several parts of which this thin film is composed act as so many prisms.

The most severe frost never congeals *petroleum* into ice, and paper wetted with it becomes transparent, as when wetted with oil; but it does not continue so, the paper becoming opake again in a few minutes, as the oil dries away.

Spirit of wine, which is the great dissolvent of sulphur, has no effect upon *petroleum*, not even with ever so long a digestion. It will not take fire with the dephlegmated acid spirits, as oil of cloves, and other of the vegetable essential oils do; and in distillation, either by balneum Mariæ, or in sand, it will neither yield phlegm nor acid spirit; but the whole rises in its own form, leaving in the retort only a little matter, thick as honey, and of a brownish colour. Whoever, therefore, would use this oil in medicine, must take it as nature has prepared it, as having no power to make any alteration in it. Mem. Acad. Paris, 1725.

Alonso Barba, in his Book of Metals, gives a very melancholy instance of the power of *petroleum* of taking fire at a distance: he tells us, that a certain well, yielding *petroleum* on the surface of its water, being to be repaired, the workman took down into the well with him a lantern and a candle in it; there were some holes in the lantern, through which the *petroleum*, at a considerable distance, drew out the flame of the candle, and, taking fire, burst up with the noise of a cannon, and tore the man to pieces.

The people of Mount Claro, in Italy, have some years since found out a much easier way of finding *petroleum*, than they formerly had been used to.

This mountain abounds with a sort of greyish slate, which lies in large horizontal beds, mingled with strata of clay, and large quantities of a spar of that kind called by the Germans *selenites*; which is the common sort, that ferments with acids, and readily dissolves in them, and calcines in a small fire. They pierce these slates in a perpendicular direction till they find water, and the *petroleum*, which had been dispersed among the cracks of those slates, is then washed out by the water, and brought from all the neighbouring places to the hole or well which they have dug, on the surface of the water on which it swims after eight or ten days. When there is enough of it got together, they bale it from the top of the water with brass basons, and it is then easily separated from what little water is taken up with it. It is remarkable, that all the *petroleum* got by this means is white, whereas that of Modena is yellow, and that of Parma brown. These wells or holes continue to furnish the oil in different quantities for a considerable time, and, when they will yield no more, they pierce the slates in some other place. Mem. Acad. Scien. Par. 1736. See NAPHTHA.

Petroleum is never used among us; but the French give it internally in hysteric complaints, and to their children for worms: some also give it from ten to fifteen drops in wine, for suppressions of the menses. This, however, is rather the practice of the common people than of the faculty.

It has also been sometimes recommended to be taken internally in nervous complaints, and as a diuretic; but it is chiefly used as an external stimulant, against rheumatic pains, palsies, chilblains, &c. See *British* OIL.

PETROLEUM *Barbadense*. See BARBADOES *tar*.

PETROMARULA, in *Botany*, a name given by several authors to the pyramidal RAPUNCULUS of the island of Crete, called, by Mr. Tournefort, *rapunculus Creticus seu pyramidalis alter*.

PETROMYZON, the *stone-sucker*, in the Linnæan system of *Zoology*, the name of a genus of AMPHIBIA *nantes*, comprehending the LAMPREY, &c.

The name is originally Greek, and is derived from the words πετρος, *a stone*, and μυζω, *to suck*; this fish being usually found in rivers, adhering to the stones by sucking, and so keeping its place.

The characters of this genus, according to Artedi, are these: the foramina, or apertures of the branchiæ, or lungs, are seven on each side; they are placed longitudinally, and beside these, there is one single aperture in the head, placed immediately between the eyes; the body is long, and nearly of a cylindric figure; it is smooth, and has only two fins, and those are both placed on the back. The species of this genus, enumerated by Artedi and Linnæus, are three.

PETRONEL, a sort of HAND-GUN or hand-gun.

PETRONELLUS, in *Ornithology*, a name under which some have described the BUNTING.

PETRONIA *marina*, in *Ornithology*, the name of a small bird of the ortanline kind, or nearly allied to that genus. Its beak is strong and sharp, like that of the chaffinch; its head is a brownish grey, but has usually a long whitish streak running along it; its neck is ash-coloured, and at the bottom is variegated with black; the rump is of a brownish green; the long wing-feathers are blackish, with edges and tips of green, and are white underneath; the breast is of a dusky white, and the tail brownish, variegated with yellow. It is however, distinguished from all other birds by a fine large yellow spot, which is has on the middle of its throat.

PETRO-*pharyngei*, in *Anatomy*, are muscles of the PHARYNX, inserted in the lower part of the extremity of the apophysis petrosa. These serve, with the cerato-pharyngei and pterygo-pharyngei to draw the middle portion or great cavity of the pharynx upward.

PETROSA *ossa*, in *Anatomy*, a denomination given to the fifth and sixth bones of the head, called also *ossa temporum*, because they shew the age of man; the hairs hereon turning grey before any of the rest.

The upper part of each is squamous, or scaly; the lower is *petrosa*, i. e. hard or stony: and hence they come here to be more particularly denominated *petrosa*.

The *ossa petrosa* are the smallest proper bones of the cranium: their upper part is semicircular, and their lower

is of a firm ſtructure. They are ſituated in the lateral and lower parts of the head; bounded at top by the ſquamous future, which joins them to the parietalia; and behind by the lambdoides, which joins them to the occipital, and connects them to the os ſphenoides. Each has two ſinuſes, before and behind the ſphenoides: the exterior lined with a cartilage, receiving the proceſs of the lower jaw; the interior receives the lower part of the ſinus lateralis of the dura mater.

Each, again, has four proceſſes; three external, and one internal: of the external, the firſt is called *zygomaticus*, or *os jugale*; the ſecond *maſtoides* or *mammillaris*; the third *ſtyloides*: each whereof ſee under its proper article. The internal proceſs is properly called the *os petroſum*: this is pretty long and large, containing the whole meatus auditorius, and cavity of the tympanum.

The chief uſes of theſe bones are to complete the globe of the ſkull, to ſerve for the articulation of the lower jaw, and for the inſertion of many muſcles, and laſtly, to contain the organ of hearing.

PETROSELINI *radix, parſley-root*. See PARSLEY.

PETROSELINUM *Macedonicum*, in the *Materia Medica*, the name of a ſeed uſed in medicine. The plant which produces it is a native of the warm countries; and the ſeed ſhould be choſen for uſe, clean, well fed, longiſh, and of a brownith green colour, and well taſted, and aromatic; in quality it reſembles the common PARSLEY, but is weaker and leſs grateful; it is aperitive, provokes urine and the menſes, and expels wind; and, in form of a cataplaſm, is ſaid extremely to help the gout: it is an ingredient alſo in the Venice treacle. See BUGLOS.

PETROSUM *ſal*, in *Natural Hiſtory*, a name given by ſome of the old writers to the nitre of Egypt, uſed in the ancient times; and by others to the common nitre, which we uſe at preſent, and call by a ſimilar name, *ſal petræ*.

PETTIA, *Πεττεια*, in the *Ancient Muſic*, a Greek term to which we have no correſponding one in our language.

The melopœia, i. e. the art of arranging ſounds in melodious, ſo as to make melody, is divided into three parts, which the Greeks call *legis, mixis*, and *chreſis*; the Latins *ſumptio, mixtio*, and *uſus*; and the Italians *preſa, meſcolamento*, and *uſo*. The laſt of theſe is called by the Greeks, *ſtaſeis, pettiæ*, and by the Italians *pettia*.

Pettia, or *petteia*, then, is the art of making a juſt diſcernment of all the manners of ranging or combining ſounds among themſelves, ſo as they may produce their effect, i. e. may expreſs the ſeveral paſſions intended to be raiſed, thus: e. gr. it ſhews what ſounds are to be uſed, and what not; how often any of them are to be repeated; with which to begin, and with which to end; whether with a grave ſound to riſe, or an acute one to fall, &c.

It is the *petteia* that conſtitutes the manners of the muſic; it being this that chooſes out this or that paſſion, this or that motion of the ſoul, to be awakened; and whether it be proper to excite it on this or that occaſion. The *petteia* therefore is in muſic much what the manners are in poetry.

We do not ſee whence the denomination ſhould have been taken by the Greeks, unleſs from *πεττεια*, their game of chels; the muſical *petteia* being a ſort of combination and arrangement of ſounds, as chels is of pieces called *πεττοι*, calculi, or chels-men.

PETTY *bag*, an office in chancery; the three clerks whereof record the return of all inquiſitions out of every ſhire, and make all patents of cuſtomers, gaugers, comptrollers, &c. See CLERK.

PETTY-*chaps*, in *Ornithology*, the MOTACILLA *hippolais*, in the Linnæan ſyſtem; the inſide of the mouth is red; the head, neck, back, and wings, are of an olivaceous aſh-colour; the quill-feathers darker, edged with olive; the inner coverts of the wings yellow; the breaſt white, tinged with yellow; the belly of a ſilvery white; the tail duſky; and the legs bluiſh. This bird is called in Yorkſhire the *beam-bird*, from its neſting under beams in out-buildings, &c. Pennant.

PETTY *conſtable*. See CONSTABLE.

PETTY-*fogger*, formed from the French, *petit*, little, and the Saxon, *fogere, fotier*, or *cuvier*, a little ſhifting ſolicitor or jobber in law-diſputes, without either ſkill or conſcience.

PETTY, or PETIT *larceny*, in *Law*. See LARCENY.

PETTY *warrs*. See ORDERS.

PETTY *pokes*, among *Confectioners*, a ſort of ſmall pies, made of a rich cruſt, and filled with ſweet-meats.

PETTY-*ſingles*, among *Falconers*, are the toes of a hawk.

PETTY *ſuits*, in the *Sea Language*, a competent allowance of victuals, according to the number of the ſhip's company.

PETTY, or PETIT *treaſon*, in *Law*. See TREASON.

PETTY-*whin*. See FURZE, and REST-*harrow*.

PETULANTIUM *feſtum*, in *Antiquity*, a feſtival celebrated by the Athenians and Lacedæmonians in honour of the moon, under the name of Venus: at which the men aſſiſted, dreſſed in women's cloaths; and the women in the habits of men.

PETUNTSE, or, as it is uſually called *petunſe*, one of the two earths or foſſile ſubſtances of which the porcelain ware of China is made. The other is named KAOLIN.

The *petunſe* is ſprinkled all over with bright glittering particles; it is beaten to powder, and afterwards made up into a ſort of bricks, and in that form it is ſent to the places where it is to be wrought; it is of a hard texture, and of a ſomewhat greeniſh colour. Mr. Reaumur, of the Academy of Sciences of Paris, who was extremely induſtrious in ſearching into the nature of porcelain, obtained ſome ſpecimens of the *petunſe*, both in its native ſtate, and in form of the brick, which is given it after it is powdered and reduced to a paſte.

Mr. Reaumur found that the *petunſe* was ſo far from being an earth, as uſually ſuppoſed, that it was truly of the nature of the European flint or pebble, as he eſtabliſhes the character of that body: but to underſtand this rightly, it is to be obſerved, that this author makes the flints and pebbles a very large claſs of bodies, ſome of which are more, ſome leſs tranſparent; and that this *petunſe* is of the nature of the coarſer, or leſs tranſparent kind, the ſurface of which, when broken, is not ſo ſmooth and poliſhed as that of the ordinary flint. This ſubſtance is probably a ſpecies of GYPSUM rather than of flint or talc. By ſome experiments of Mr. Scheffer, in the Sweediſh Tranſactions, for the year 1753, it appears to be a glittering, flaky, ſemi-tranſparent maſs, like the *lapis ſpecularis*, of a light greeniſh-grey colour, and remarkably heavy. It was not acted upon by acids, and in the fire it burſt and fell in pieces, and calcined into a white powder, interſperſed with a red ferruginous matter. Calcined in contact with the fuel, it emitted ſtrong ſulphureous vapours, like the other gypſa, and became quite white, conſiderably firm, and coherent, and ſemi-tranſparent.

The great character of theſe ſtones for the porcelain manufactures is, however, that they are very eaſily vitrified, without the aſſiſtance of any ſalt, and without the immediate contact of the fire, the operation ſucceeding in a crucible, which is not at all the caſe in regard to the European flints, they very differently melting alone in a crucible, and then only into a whitiſh opake glaſs.

It being certain from hence, that one of the two ingredients of the china-ware is eaſily vitrifiable, it follows, from the experiment of the whole mixture, or china-ware not being reducible into a glaſs in large fire, that it is a compoſition of a vitrifiable, and a not vitrifiable (or at leaſt not eaſily vitrifiable) ſubſtance; and conſequently, that the kaolin is a ſcarce vitrifiable body, and that the reſult of the action of fire on a mixture of theſe two is a ſemivitrification; which is what we call the China-ware.

If we, therefore, could, in Europe, provide the materials of China, or ſuch as were like them, we might reaſonably hope to ſucceed; and this appears far from improbable. The *petunſe* is eaſily ſupplied by many of our own earths, ſtones, and ſands, as nothing is required in it more than a property of running eaſily into a white glaſs. The kaolin ſeems moſt to be reſembled by our European rales. Mem. Acad. Par. 1727.

PEUCEDANUM, *hog-fennel*, in *Botany*. See *Hog's* FENNEL.

PEVET. See PIVOT.

PEVETS, in a *Watch*, the ends of the ſpindle of a wheel in a WATCH. The holes into which they run, are called *pevet-holes*.

PEWIT, in *Ornithology*, the Engliſh name of a common bird of the *larus*, or ſea-gull kind, called by ſome authors *larus cinereus*, and by other *cepphus*, and in ſome of the counties of England the *black-cap*, and *ſea-crow*. This is the *larus ridibundus* of Linnæus.

It is about the ſize of a pigeon; its beak and legs are red; its head and throat of a greyiſh black, and its neck, tail, breaſt, and belly white; the middle of its back grey; it has its Engliſh name from its note, which ſeems to expreſs the word *pewit*, and is a kind of hoarſe laugh. It is affirmed by many, that the head of this bird is only black at a certain ſeaſon of the year.

Pewits are birds of paſſage, reſorting to pools and ſens in ſome of the inland counties, particularly Staffordſhire, in the ſpring, and after the breeding-ſeaſon diſperſing to the ſea-coaſts. The young were formerly much eſteemed and fattened for the table. Plot relates, that at the death of the lord of the ſoil, they ſhift their quarters for a certain time. There was a piece of ground near Portſmouth, which formerly produced 40*l.* a year to the owner, by the ſale of *pewits*. Ray and Pennant.

PEWIT is alſo a name given to the baſtard plover or LAPWING.

PEWTER, a factitious metal, uſed in domeſtic utenſils: its baſis is tin, and it conſiſts of three different ſtandards: viz. that which is called plate-metal, of which plates and diſhes are made, which is formed of tin and regulus of antimony, in the proportion of one hundred and twelve pounds of the former to ſix or ſeven pounds of the latter: the next metal inferior to this is called trifling metal, and is lowered one half-penny per pound in worth, by alloying it with lead; of this metal ale-houſe pots are made: the lower ſort of metal is ſtill farther alloyed by lead, ſo as to reduce the value two pence in a pound lower than plate-metal; of this, which is called lay-metal, wine-pots are made.

Pewter has occaſionally ſerved for money. In the Philoſophical Tranſactions, M. Patland informs us that king James II. turned all the *pewter* veſſels, &c. of the proteſtants in Ireland he could *ſeize*, into money; half-crowns were ſomewhat bigger than half-pence, and other pieces in proportion.

He ordered it to be current in all payments: whence, our author obſerves, people abſconded for fear of being paid their debts: he alſo mentions crown-pieces of this metal, with this legend on the rim, *melioris ſubſtra fati*.

PEZIZA, *cup-muſhroom*, in *Botany*, a genus of the claſs of *cryptogamia*, and order of *fungi*. This *muſhroom* is bell-ſhaped and ſeſſile. Linnæus enumerates eight ſpecies.

PHACA, in *Botany*. See *Baſtard Milk* VETCH.

PHACOIDES, a word uſed by the ancient phyſicians to expreſs any thing that in ſize and ſhape approached to a lentil. Thus the cryſtalline humour of the eye was ſo called.

PHACOPTISANA, a medicine often mentioned by the ancient writers as a nouriſhing and ſtrengthening thing: it was a peliſan with lentils.

PHACOSIS, a word uſed by the ancients to expreſs a diſorder of the eye, appearing in form of a black ſpot, of the ſize and round figure of the lentil.

PHÆCASIA, in *Antiquity*, a kind of ſhoes.

PHÆNICOPTERUS. See FLAMINGO.

PHÆNOMENON, or PHENOMENON, φαινομενον, formed from φαινω, *I appear*, ſtrictly an appearance in phyſics, an extraordinary appearance in the heavens, or on earth; either diſcovered by obſervation of the celeſtial bodies, or by phyſical experiments; and whoſe cauſe is not obvious. Such are meteors, comets, uncommon appearance of ſtars and planets, earthquakes, &c. Such alſo are the effects of the magnet, phoſphorus, &c.

The *phænomena* of comets are inconſiſtent not only with the ſolidity of the heavens, ſuppoſed in the Ptolemaic hypotheſis, but equally with the plenitude of the heavens, aſſerted by the Carteſians.

That hypotheſis is beſt which ſolves moſt *phænomena*. Sir Iſaac Newton ſhews, that all the *phænomena* of the heavenly bodies follow from the attraction of gravity, which intercedes thoſe bodies; and almoſt all the *phænomena* of the leſſer bodies from the attraction and repulſion between their particles; ſo ſimple is nature.

PHENOMENOS, *parallax of a*. See PARALLAX.

PHAETON, in *Ornithology*, a genus of the *anſeres*, in the Linnæan ſyſtem. Its characters are, that the bill is ſharp, ſtrait, and pointed; the noſtrils oblong; and the hinder toe turned forward. There are two ſpecies, viz. the FLAMINGO, and TROPIC *bird*.

PHAGEDÆNA, φαγεδαινα, formed of φαω, *to eat*, in *Surgery*, &c. a deep, bloated ulcer, which eats and corrodes the neighbouring parts.

PHAGEDÆNIC *medicines*, ſuch as are uſed to eat off fungous or proud fleſh.

PHAGEDÆNIC *ulcer*. See PHAGEDÆNA, and ULCER.

The Ephemerides of the academy of the Curioſi Naturæ relate, that *phagedænic* ulcers have been frequently cured only with ſheeps dung.

PHAGEDÆNIC *water*, in *Chemiſtry*, denotes a water made from quick-lime and ſublimate; ſo called from its efficacy in the cure of *phagedænic* ulcers.

To prepare this water, they put two pounds of freſh quick-lime in a large earthen pan, and pour upon it about ten pounds of rain-water; theſe they let ſtand together two days, ſtirring them frequently: at laſt leaving the lime to ſettle well, they pour off the water by inclination, filtrate it, and put it up in a glaſs bottle, adding to it an ounce of corroſive ſublimate in powder; which, of white, becomes yellow, and ſinks to the bottom of the veſſel. The water, being ſettled, is fit for uſe, in the cleanſing of wounds and ulcers, and to eat off ſuperfluous fleſh, and eſpecially in gangrenes; in which caſe may be added to it a third or fourth part of ſpirit of wine.

PHAGESIA, φαγησια, in *Antiquity*, a feſtival in honour of Bacchus, celebrated during the DIONYSIA.

It was otherwiſe called *phagiſpoſio*, φαγισποσια; which names come from φαγω, *to eat*, and πωω, *to drink*; becauſe it was a time of good cheer.

PHAGON, φαγων, in *Antiquity*, a feſtival of the ſame nature with that called PHAGESIA.

PHAGRUS, the *ſea-bream*. The Arteſian ſyſtem of ichthyology does not allow this fiſh a peculiar generical name, but makes it a ſpecies of the large genus of the *ſpari*: the author diſtinguiſhes this from the others by the name of the *reddiſh* SPARUS, with the ſkin hollowed into a ſinus at the roots of the back-fins.

PHAGUS, in *Botany*, a name given by many authors to the eſculus, or ſweet and eſculent oak, found in Greece and Dalmatia.

PHALACRA, a word uſed by Hippocrates to expreſs all the blunt inſtruments uſed in ſurgery; ſuch as probes and others, with buttons at the ends.

PHALACROCEPHALUS *indicus*, in *Ichthyology*, the name of an anadromous fiſh of the Eaſt Indies. Its neck and head appear naked and bald, as it were; it is all over of a greyiſh white in colour, and is variegated with red ſpots about the mouth; the eyes are large and very prominent, and their irides yellow; its uſual ſize is about a foot and a half in length, and it lives part of its time in the ſea, and part in rivers; it is an extremely delicate taſted fiſh, and eſteemed one of the fineſt of that part of the world. It is called by the Dutch *kuckop*.

PHALÆNA, in *Zoology*, a genus of the *lepidoptera* order of inſects; the characters of which are, that the antennæ are ſetaceous, ſenſibly attenuated from the baſe to the apex; the wings are moſt commonly declined. Linnæus enumerates four hundred and ſixty ſpecies, under the ſeveral titles of *phalæna*, *atlacus*, *bombyx*, *noctua*, *geometra*, *tortrix*, *pyralis*, *tinea*, and *alucita*. See PAPILIO.

PHALAIA, a word invented by Baſil Valentine, and uſed as the name of a *panacæa*, or univerſal medicine; but Roſlink has ſince uſed it to expreſs a tincture of ſalap.

PHALANGER. See OPOSSUM.

PHALANGIUM, in the *Hiſtory of Inſects*, the name of a peculiar genus of *ſpiders*, the characters of which are theſe: they do not move regularly and evenly as other *ſpiders*, but hop in the manner of fleas. This was a character recorded of them by Pliny and the ancients, and is found at this time in all ſpecies. They have a ſquare forehead; and in this are placed eight eyes of different ſizes, and diſpoſed in form of a part of a circle; they have alſo the fore-legs greatly longer and ſtronger than any of the others. Of theſe there are four principal kinds. See OPILIO.

PHALANGIUM *Apulum*, the *Apulian phalangium*, a name given by authors to that large and poiſonous ſpecies of ſpider, called by the vulgar the TARANTULA, from the name of a city of Calabria, Tarantum; near which it is very common.

PHALANGIUM, in *Botany*. See SPIDER-*wort*.

PHALANGOSIS, in *Surgery*, the name of a tumor and relaxation of the eye-lids, which is often ſo great as to deform the eye, and very much impede viſion. Sometimes the relaxed eye-lid ſubſides or ſinks down, occaſioned either by a palſy of the muſcle which ſuſtains and elevates the eye-lid, or elſe from a relaxation of the cutis above, from various cauſes. Sometimes alſo an œdematous or aqueous tumor is formed on the eye-lids, ſo as almoſt entirely to exclude viſion; but this laſt caſe ſhould be well diſtinguiſhed from the other, and may be remedied without much difficulty, by the uſe of internal and topical medicines; ſuch as purges and diuretics given inwardly, and a compreſs dipped in warm ſpirit of wine and lime-water.

But in the paralytic or relaxed caſe, the uſe of cordial and nervous medicines muſt be propoſed internally, and outwardly, baſtam of Peru and Hungary water are to be employed. If all theſe fail, the remaining method is to extirpate a ſufficient quantity of the relaxed cutis; and then, after healing up the wound, the remainder will be ſufficiently ſhortened. Heiſter.

PHALANX, φαλαγξ, in *Antiquity*, a huge, ſquare compact battalion, formed of infantry, ſet cloſe to one another, with their ſhields joined, and pikes turned croſs-ways; inſomuch that it was almoſt impoſſible to break them.

It conſiſted of eight thouſand men: Livy ſays, that this ſort of battalion was invented by the Macedonians, and that it was peculiar to them; whence, among writers, it is ſometimes called the *Macedonian phalanx*.

St. Evremont obſerves, that the Macedonian *phalanx* had the advantage in valour and ſtrength over the Roman legion.

PHALANX, *phalanges*, is alſo applied, by anatomiſts, to the three rows of ſmall bones which form the FINGERS.

PHALANX, in *Natural Hiſtory*, a term uſed by Dr. Woodward, and ſome other writers of foſſils, to expreſs an arrangement of the columns of that ſort of foſſile coralloide body found frequently in Wales, and called *lithoxylon*.

In the great variety of ſpecimens which are found of this, ſome

some have the whole *phalanx* of columns cracked through, and others only a few of the external ones; but these cracks never remain empty, but are found filled up with a white spar, as the smaller cracks of stone usually are. This is not wonderful, as there is much spar in the composition of this fossil; and it is easily washed out of the general mass to fill up these cracks, and is then always found pure, and therefore of its natural colour, white.

The *lithostrotion*, or general congeries of these phalanges of columns, is commonly found immersed in a grey stone, and found on the tops of the rocky cliffs about Milford in Wales. It is usually erect, though somewhat inclining in some specimens, but never lies horizontal. It seems to have been all white at first, but to have been since gradually tinctured with the matter of the stone in which it lies. The single columns, which form each *phalanx*, are usually round or cylindric, though sometimes flatted and bent; some of them are also naturally of an angular figure; these, however, are not regular in the number of their angles, some consisting of three sides, some of five, and some of seven; some are hexangular also, but these are scarce. They are from five or six to fifteen inches in length; and the largest are near half an inch over, the least about a quarter of an inch; the greater number are very equal to one another in size; but the sides of the columns being unequal, the same column measures of a different thickness when measured different ways; the phalanges or congeries of these are sometimes of a foot or more in diameter.

The columns are often burst, as if they had been affected by external injuries; and it is evident, that they were not formed before several other of the extraneous fossils; for there are found sometimes shells of sea-shells and entrochi immersed and bedded in the bodies of the columns. It appears plainly from hence, that when these bodies were washed out of the sea, and tossed about in the waters which then covered the tops of these cliffs, this elegant fossil, together with the stony bed in which it is contained, were so soft, that these other bodies found entrance into their very substance, and they were formed, as it were, upon them. This fossil takes an elegant polish, and makes in that state a very beautiful appearance, being of the hardness of the common white marble, and carrying the elegant structure visible in the smallest lineaments. Woodward's Coll. of Foss. p. 13.

PHALARIS, *Canary grass*, in the Linnæan *System of Botany*, the name of a peculiar kind of grass called *phalaroides* by Scheuhzer and others; and with this author making a distinct genus of plants of the *triandria digynia* class; the characters of which are, that the cup is a glume, containing only one flower; this glume is large, bivalve, obtuse, and compressed, each of the valves being of a boat-like shape, flatted, obtuse above, with strait edges meeting one another in parallel lines; the flower is also bivalve, and is smaller than the cup, the exterior valve of it being oblong, pointed, and folded, the interior much smaller; the stamina are three capillary filaments, shorter than the cup; the antheræ are oblong; the germen of the pistil is roundish; the styli are two in number, and are capillary ones; the stigmata are hairy; the flower serves for a close covering to the seed, not at all gaping from it; the seed is single, smooth, and roundish, but pointed at both ends. There are nine species.

PHALARIS's *Bull*, in *Ancient History*, was a brazen bull for tormenting criminals, constructed by Perillus the Athenian, in order to flatter the cruelty of *Phalaris*, tyrant of Agrigentum. The artist, demanding too great a reward for his contrivance, was the first who suffered in it. Some have treated this fragment of ancient history as a fable; but we learn from Diodorus Siculus, lib. xiii. cap. 13. that Scipio Africanus, when he razed Carthage, about two hundred and sixty years after the destruction of Agrigentum, found among other things this bull, and restored it to the inhabitants of Agrigentum, where it was to be seen when Diodorus wrote his history, viz. in the reign of Augustus.

PHALAROPE, in *Ornithology*, is a species of the TRINGA in the Linnæan system. Mr. Pennant gives the following general characters of this species: the bill is strait and tender; the nostrils minute; the body and legs like those of the sand-piper, and the toes furnished with scalloped membranes. He also more particularly describes the grey *phalarope*, or *tringa lobata* of Linnæus, and the red or *tringa hyperborea* of the same author.

PHALERA, the name of a bandage for the nose, described by Galen in his Treatise on Bandages.

PHALERÆ, among the *Ancients*, *horse-trappings*.

PHALUCUS, or PHALAECUS, in *Poetry*, a kind of verse, in use among the Greeks and Latins; consisting, like the Sapphic, of five feet; the first a spondee, the second a dactyl, and the three last trochees.

The *phalæcian* is very proper for epigrams. Catullus excelled in it. Its original author is not known; though some have said it derives its name from its inventor.

PHALLICA, φαλλικα, in *Antiquity*, feasts or sacrifices celebrated at Athens, in honour of Bacchus.

The *Phallica* were instituted on the following occasion: one Pegasus, a citizen of Eleutheris, having carried some statues of Bacchus to Athens, drew on himself the laughter and contempt of the Athenians. Soon after this, the people were seized with an epidemic disease; and, upon consulting the oracle how to get free of it, were answered, that there was no way but to receive Bacchus in pomp: they did it, and thus instituted the *Phallica*; wherein, besides the statues and trophies of the god, they bore figures of the parts affected, tied to thyrsi.

PHALLOPHORI, φαλλοφοροι, in *Antiquity*, a name given at Sicyon to certain mimes, who ran about the streets smutted with black, and clothed in sheep skins, bearing baskets full of various herbs, as chervil, branca ursina, violet, ivy, &c.

The word is formed from φαλλος, a *pole*, at the end of which was fastened the figure of a human penis made of leather; and φερω, *I bear*.

They danced in cadence, and were crowned with ivy, in honour of Bacchus; carrying the *phallus* before them as the ensign of their office.

PHALLUS, *stink-horns*, in *Botany*, a genus of the *cryptogamia* class, and *fungi* order; the fungus of which is reticulated on the upper side, and smooth on the lower. There are two species.

PHALLUS *marinus*, a name given by some authors to a species of *cancelli* or *tubuli marini*, found about Amboyna, and called by the French writers *priape* and *arrosoir*. It is an oblong shell, with a large head, which is pierced full of holes; so that it at once resembles the *glans penis*, and the nose of a watering-pot used by gardeners.

PHANATIC, *phanaticus*, commonly written *fanatic*, a visionary; one who fancies or thinks he sees spectres, spirits, apparitions, or other imaginary objects, even when awake; and takes them to be real.

Such are phrenetics, necromancers, hypochondriac persons, lycanthropi, &c. See PHRENSY, HYPOCHONDRIAC, LYCANTHROPY, &c.

Hence the word is also applied to enthusiasts, pretenders to revelation, new lights, prophecies, &c. See FANATIC.

PHANTASM, φαντασμα, *phantasm*, a species of an object perceived by an external sense, and thence retained in the phantasy.

PHANTASTIC, in *Music*. *Phantastic style* is a free, easy manner of composition; proper for instruments. See STYLE.

PHANTASTICAL *colours*, is a denomination given by the Peripatetics to those colours exhibited by the rainbow, or a prism; they erroneously supposing them not to be real colours, but only phantoms, or deceptions of the sight. But many experiments of the moderns, and particularly those of Sir Isaac Newton, demonstrate the contrary, and prove them as real as any other colours in nature. See EMPHATICAL.

PHANTASY, or FANCY, the *imagination*; the second of the powers or faculties of the sensitive or rational soul; by which the species of objects received by the common sense, are retained, recalled, farther examined, and either compounded, or divided.

Others define the *phantasy* to be that internal sense or power, whereby the ideas of absent things are formed, and presented to the mind, as if they were present.

The seat or organ of this sense is vulgarly supposed to be the middle part of the brain; and its objects, all the species communicated to it by the common sense, by the comparing of which it frames infinite others to itself.

In melancholic and mad men this faculty is very strong, representing many extravagant and monstrous things, and framing its images as lively as those of sensation; whence naturally arise the visions and fables with more strength, consistency, and beauty.

In men it is supposed to be subject to reason, but in brutes it has no superior; this being the *ratio brutorum*, or what we call reason in brutes.

The *phantasy* is free from the ligature, or suspension of sleep; witness our dreams, &c.

Some philosophers use the word *phantasy* in a more general signification, viz. for what we usually call *sensus communis*, the *common* SENSE. See IMAGINATION.

PHARAON, the denomination of a game of chance. The

principal rules of this game are, that the banker holds a pack of fifty-two cards; that he draws all the cards one after the other, and lays them down at his right and left hand alternately; that the ponte may at his choice set one or more ſtakes upon one or more cards, either before the banker has begun to draw the cards, or after he has drawn any number of couples; that the banker wins the ſtake of the ponte, when the card of the ponte comes out in an odd place on his right hand, but loſes as much to the ponte when it comes out in an even place on his left hand; that the banker wins half the ponte's ſtake, when it happens to be twice in one couple; that when the card of the ponte being but once in the ſtock, happens to be the laſt, the ponte neither wins nor loſes; and that the card of the ponte being but twice in the ſtock, and the laſt couple containing his card twice, he then loſes his whole ſtake. Mr. De Moivre has ſhewn how to find the gain of the banker in any circumſtance of cards remaining in the ſtock, and of the number of times that the ponte's cards is contained in it. Of this problem he enumerates four caſes; i. e. when the ponte's card is once, twice, three, or four times, in the ſtock.

In the firſt caſe, the gain of the banker is $\frac{1}{n}$, n being the number of cards in the ſtock. In the ſecond caſe, his gain is $\frac{n-2\times y}{n\times n-1}+\frac{2}{n\times n-1}$, or $\frac{y\,n+1}{n\times n-1}$, ſuppoſing $y=\frac{1}{2}$. In the third caſe, his gain is $\frac{3y}{2\times n-1}$, or $\frac{3}{4\times n-1}$, ſuppoſing $y=\frac{1}{2}$. In the fourth caſe, the gain of the banker, or the loſs of the ponte, is $\frac{2n-5}{n-1\times n-3}$, or $\frac{2n-5}{2\times n-1\times n-3}$, ſuppoſing $y=\frac{1}{2}$. Mr. De Moivre has calculated a table, exhibiting this gain or loſs, for any particular circumſtance of the play; and he obſerves, that at this play, the leaſt diſadvantage of the ponte, under the ſame circumſtances of cards remaining in the ſtock, is when the card of the ponte is but twice in it, the next greater when three times, the next when once, and the greateſt when four times. He has alſo demonſtrated, that the whole gain *per cent.* of the banker, upon all the money that is adventured at this game, is 2*l.* 19*s.* 10*d.* De Moivre's Doctrine of Chances, p. 77, &c. p. 105, &c. See BASSETTE.

PHARI, among the *Ancients*, a kind of candleſtick. See BRANCH.

PHARICUM, the name of a famous poiſon among the ancients: it was ſaid to be compoſed of many ingredients, but we know nothing of it at this time.

PHARISEES, a celebrated ſect among the ancient Jews; ſo called, ſay ſome, becauſe ſeparated from the reſt by the auſterity of their life, and by their profeſſing a greater degree of holineſs, and a more religious obſervation of the law.

This is the import of the word פרושים, in the Hebrew, or rather Chaldee tongue; whence is formed the Greek Φαρισαιος, and the Latin *Phariſæus*. St. Jerom, and ſeveral of the rabbins, maintain this etymology; which is very agreeable to the ſtate and character of the *Phariſees*; who were not only diſtinguiſhed from the reſt by their manner of life, but by their habit. However, others, with leſs probability, have derived the name from פרש, *expoſuit*, becauſe the *Phariſees* were in the higheſt reputation for expounding the law.

It is very difficult to fix the preciſe origin of the *Phariſees*. The Jeſuit Serrarius places their firſt riſe about the time of *Eſdras*; becauſe it was then that the Jews firſt began to have interpreters of their traditions. Maldonat, on the other hand, will not have this ſect to have ariſen among the Jews, till a little before the time of Chriſt. Others, perhaps with more probability, refer the origin of the *Phariſees* to the time of the Maccabees.

Dr. Lightfoot thinks, that *Phariſaiſm* roſe up gradually, from a period which he does not aſſign, to the maturity of a ſect. It is certain, from the account given by Joſephus, that in the time of John Hyrcanus, the high prieſt and prince of the Aſmonean line, about a hundred and eight years before Chriſt, the ſect was not only formed, but made a conſiderable figure; and that it had advanced to a high degree of popularity and power about eighty years before Chriſt. Joſ. Ant. lib. xiii. cap. 10 § 5, 6. cap. 15. § 5. & cap. 16. § 1. According to Baſnage, Hiſt. of the Jews, book ii. cap. 9. § 2. one Ariſtobulus, an Alexandrian Jew, and a Peripatetic philoſopher, who flouriſhed about a hundred and twenty-five years before Chriſt, and wrote ſome allegorical commentaries on the Scripture, was the author of thoſe traditions, by an adherence to which the *Phariſees* were principally diſtinguiſhed from other ſects.

Be this as it will, *Phariſaiſm* is ſtill the prevailing doctrine in the Jewiſh religion; that vaſt number of traditions in the Talmud, which bear ſo great a ſway among the Jews, coming all from the *Phariſees*, which they aſcribed to God, and received as of equal authority with the ſacred writings. See MISCHNA.

Joſephus, who deſcribes their dogmata, ſays, that they attributed all to deſtiny, and to God; ſo, however, as not to deprive man of his free agency; which Sixtus of Sienna thus explains: the *Phariſees* believed, that all things were done by deſtiny, i. e. with God's foreknowledge, and in conſequence of his immutable decree; the will of man ſtill remaining free and unaffected: *Fatis, hoc eſt, Dei præſcientiæ, & immobili decreto, omnia geri; manente tamen libero humanæ libertatis aſſenſu.*

They owned the immortality of the ſoul, a reſurrection, and a future ſtate; but they admitted, at the ſame time, as ſome have ſuppoſed, a kind of metempſychoſis, or tranſmigration of ſouls. They alſo held the doctrine of angels, and ſeparate human ſpirits.

The *Phariſees* were great ſticklers for the allegorical or myſtical ſenſe of the Scriptures; whence moſt of the converts made to Chriſtianity among the Jews were of the number of the *Phariſees*.

In effect, the *Phariſees* were in every thing directly oppoſite to the Sadducees.

PHARMACEUTICA, Φαρμακευτικη, that part of phyſic which directs the preparation and application of medicines. See PHARMACY.

PHARMACI, Φαρμακοι, among the Greeks, an appellation uſed for two perſons who were employed in the LUSTRATION or purification of cities.

Theſe were two men, according to ſome; but others ſuppoſe them to have been a man and woman, to repreſent the male and female ſex; for each of which they offered a ſacrifice. It was uſual for the man to carry about his mock figs, called συκαζες, of a blackiſh colour; and the woman ſuch as were white. Pott. Archæol. Græc. tom. i. p. 400, ſeq.

PHARMACIA, Φαρμακια, in *Antiquity*, denotes the art of effecting ſtrange and wonderful things, by means of medicated and enchanted compoſitions of herbs, minerals, &c. Theſe things themſelves were called *pharmaca*, ſome of which, being taken inwardly, were ſaid to cauſe blindneſs, madneſs, love, &c. Such were the medicaments by which Circe transformed Ulyſſes' ſoldiers; others infected by touch; ſuch was the garment Medea ſent to Creuſa; others ſpread their venom afar off, and operated upon perſons at a great diſtance.

There were alſo *pharmaca ſalutaria*, Φαρμακα σωτηρια, which were amulets againſt the former; ſuch was the herb moly, which preſerved Ulyſſes from Circe's enchantments; the laurel, the ſallow-tree, the rhamnus or Chriſt-thorn, ſlea-bane, the jaſper-ſtone, and many others mentioned by Albertus Magnus, and Orpheus, in his book De Lapillis. Pott. Archæol. Græc. lib. ii. cap. 18. tom. i. p. 353. See AMULET.

PHARMACITIS *terra*, in the *Materia Medica*, a name which ſome authors have given to the common ANTHELITES, or canal-coal.

PHARMACOCHEMIA, a term uſed to expreſs that part of the chemical art which treats of the preparation of medicines.

It is thus called by way of diſtinction from that chemiſtry, which is wholly employed about the tranſmutation of metals by means of the philoſopher's ſtone; this being called *ſpagirica-chemia*.

PHARMACOLOGY, a treatiſe of medicines, or the art of preparing them, judging of them, &c.

PHARMACOPŒIA, formed from φαρμακον, *remedy*, and ποιεω, *to make*, a diſpenſatory, or a treatiſe deſcribing the preparations of the ſeveral kinds of medicines, with their uſes, manner of application, &c.

We have various *pharmacopœiæ*; as thoſe of Bauderon, Quercetan, Zwelfer, Charas, Bates, Salmon, Lemery, &c. The laſteſt, and moſt in eſteem, are the Edinburgh and London diſpenſatories; but the moſt univerſal is Quincy's *Pharmacopœia*.

PHARMACOPOLA, or PHARMACOPOLIST, an *apothecary*; or a perſon who prepares and ſells medicines. See APOTHECARY.

The word is ſeldom uſed but by way of ridicule. It is formed from φαρμακον, and πωλεω, *to ſell*. See Horace, Satire 2. lib. i. verſ. 1.

PHARMACUM, Φαρμακον, a medicament, or medicine; whether of a ſalutary, or poiſonous quality.

PHARMACY, Φαρμακια, derived from φαρμακον, *remedy*, that branch of medicine, which teaches the choice, preparation, and mixture of medicines.

Moſt of the natural bodies being ſome way or other employed as ſubjects of *pharmacy*, the materia medica is extremely large, and its operations various. Its materials in the earlieſt ages, indeed, were very few, and the

ways of managing them very simple: subjects afterwards multiplied, operations increased, and at present we seem abundantly stocked with both simple and compound medicines.

Diseases must have been very early, if the first inhabitants of the earth experienced the same changes of seasons, breathed the same kind of air, and used a like kind of diet and regimen of life with ourselves; but soon after the disease attacks, the patient seeks a remedy; and this appears to have been the foundation of *pharmacy* in different parts of the world.

Experiments being thus multiplied, and the preparations of simples better made, *pharmacy* became at length an art. Hippocrates, however, when he came to compile a kind of system of physic from the observations of antiquity, described but few, and those generally simple.

Succeeding physicians then enlarged the MATERIA *medica*; Galen considerable swelled the catalogue, and the Arabians much more; and when learning began to revive in Europe, the materia medica was again enlarged, and great changes wrought upon it by chemistry.

The art of *pharmacy* must be considered under the management of physicians, apothecaries, trading chemists, and druggists. To the physician it belongs to direct the medicines, and to give the rules of extracting and managing the simples. To the apothecary belongs the reduction of the materia medica into certain forms of medicines, according to the direction of the physician. And the design of trading chemists, and druggists, is to furnish medicinal matters to the apothecary, who cannot always detect an artificial counterfeit, or a dexterous sophistication; and perhaps many remedies, well designed by the physician, have failed, or had mischievous effects on this account. Shaw's Lecture, p. 105

Pharmacy is divided into Galenical and chemical.

PHARMACY, *Galenical*, called also simply *pharmacy*, is that derived to us from the ancients; consisting in the knowledge and management of the several parts of the materia medica, now in the hands of the apothecaries. See GALENIC.

PHARMACY, *chemical*, called also *spagirical* and *hermetical*, is that introduced by Paracelsus, who calls it *ars dissolutoria*, consisting in the resolving of mixed bodies into their component parts, in order to separate the useless and ill, and collect and exalt the good. See CHYMISTRY.

One of the chief obstacles in the way of the improvement of physic, is the physicians neglecting of *pharmacy*; simples, vulgar, familiar, easily prepared, and readily procured, Pliny well observes, were the only remedies intended by nature: when fraud was got into the world, and men began to live by their wits, shops were soon set up, and life offered every man to sale. Soon after this, innumerable compositions, and endless, inexplicable mixtures, were cried up; the products of Arabia and India were crouded into a draught; and a plaster for a little ulcer fetched from the Red Sea; whereas the proper remedies are those the poor every day meet with. Hist. Nat. lib. xxix. cap. 1.

PHARMACY, *counsellors in*. See CHARACTER.

PHARMUTHI, in the *Egyptian Chronology*, one of the months of their year, which answered to the month of April among the Romans.

PHARNACEUM, in *Botany*, a genus of the *pentandria trigynia* class. Its characters are, that the empalement is compofed of five leaves; it has no corolla; and the fruit is a three-celled, polyfpermous capfule. There are four fpecies.

PHAROS, *pharus*, a *light-house*, a pile raised near a port, where a fire is kept burning in the night, to guide and direct veffels near at hand.

The *pharos* of Alexandria, built in a fmall iſland at the mouth of the Nile, was anciently very famous, inſomuch as to communicate its name to all the reſt. It was fo magnificent a ſtructure, being built by the famed architect Soſtratus, a native of Cnidos, or, as ſome ſay, by Deiphanes, the father of Soſtratus, that it coſt Ptolemy Philadelphus eight hundred talents. It had ſeveral ſtories raiſed one over another, adorned with columns, balluſtrades, galleries of the fineſt marble and workmanſhip, to which, ſome add, that the architect had contrived to faſten ſome looking-glaſſes, ſo artificially againſt the higheſt galleries, that one could ſee in them all the ſhips that ſailed on the ſea for a great way; inſtead of which noble ſtructure, one ſees now only a kind of irregular caſtle, without ditches or outworks of any ſtrength, the whole being accommodated to the inequality of the ground on which it ſtands, and which it ſeems is no higher than that which it ſhould command. Out of the midſt of this clumſey building riſes a tower, which ſerves for a light-houſe, but which hath nothing of the beauty and grandeur of the old one. The COLOSSUS of Rhodes alſo ſerved as a *pharos*.

Ozanam ſays, *pharos* anciently ſignified a ſtreight; as the *pharos* or *pharo* of Meſſina. See LIGHT-*houſe*.

PHARSANG, or PARASANG. See PARASANG.

PHARUS, in *Botany*, a genus of the *monoecia hexandria* claſs. Its characters are, that it has male and female flowers; the empalement of the male is a glume, with two valves, and a ſingle flower, and the corolla is a bivalve glume; the empalement of the female flower is the ſame with that of the other; the corolla is a ſingle valved, long glume; it has one ſeed. There is only one ſpecies.

PHARYNGÆUM *ſal*, a name given by authors to an artificial ſalt, of uſe in the quinſey, and caſes of the like kind, when the *pharynx*, or fauces, are incommoded by a diſcharge of ſerous or other humours.

It is prepared of cream of tartar and nitre, each an ounce, with half an ounce of burnt alum; all theſe are to be diſſolved in vinegar, and coagulated according to art. This ſalt mixed with honey, and diſſolved in plantain water, makes an excellent gargle.

PHARYNX, Φαρυγξ, in *Anatomy*, the upper opening of the œſophagus or gullet, ſituate at the bottom of the mouth; and called alſo the *fauces*.

The *pharynx* is that part more particularly called the *gula*, or gullet; in which the action of deglutition commences, and where it is chiefly performed.

The *pharynx* is a muſcular and glandular bag, the outer ſurface of which is cloſely joined to the inner ſurface of all that ſpace which is at the bottom of the mouth, behind the poſterior nares, uvula, and larynx, and which reaches from the anterior apophyſis of the os occipitis to the œſophagus, which is the continuation of the *pharynx*. It may be divided into three parts; one ſuperior, which is the arch of the *pharynx*; one middle, which is the body or great cavity; and one inferior, which is the bottom, narrow portion, or ſphincter. There are in it likewiſe three openings, that of the arch, towards the nares, that of the body, towards the mouth, and that of the bottom towards the œſophagus.

It is aſſiſted by three pair of muſcles, which principally compoſe the *pharynx*. The firſt, called the *ſtylopharyngæus*, ſerves to draw up and dilate the *pharynx*; the ſecond, the *pterygopharyngæus*, ſerves to conſtringe it; the third, which is called the *œſophagæus*, ſerves to cloſe it. See each under its proper article.

The muſcles of the *pharynx* are reduced by Mr. Whiſlow to three general claſſes, with regard to their inſertions: the firſt claſs comprehends thoſe which are inſerted in the baſe of the cranium; and they are the CEPHALO-*pharyngæi*, the PETRO-*pharyngæi*, the SPHENO-*pharyngæi*, the PTERYGO-*pharyngæi*, and STYLO-*pharyngæi*. The ſecond claſs includes thoſe which are inſerted towards the mouth; viz. the PERYSTAPHILO-*pharyngæi*, the GLOSSO-*pharyngæi*, the HYPERO-*pharyngæi*, which is a general denomination for thoſe on each ſide that are inſerted in the os hyoides, and may be reckoned three pairs, the *baſio-pharyngæi*, *kerato-pharyngæi minores*, and the *majores*; and the GENIO-*pharyngæi*. The third claſs comprehends thoſe inſerted in the lateral parts of the larynx, viz. the SYNDESMO-*pharyngæi*, the THYRO-*pharyngæi*, the CRICO-*pharyngæi*, the OESOPHAGÆUS, and the ADENO-*pharyngæus*.

The particular uſes of all theſe muſcles are very difficultly determined. It is certain, that thoſe of the middle and lower portions of the *pharynx* ſerve chiefly for deglutition; thoſe of the upper portion, and ſome of thoſe of the middle portion, may, among other functions, be uſeful in modifying the voice, according to the opinion of M. Sauvorini. Whiſlow.

PHASCUM, in *Botany*, a genus of the claſs of *cryptogamia*, and order of *muſci*, or moſſes. Its characters are, that the anthera is covered, and guarded at the margin by parallel briſtles, and that the calyptra, or veil, is ſmall. There are four ſpecies.

PHASEOLUS, in *Botany*. See *Kidney*-BEAN.

PHASES, Φασεις, formed from Φαινω, *I appear*, in *Aſtronomy*, the ſeveral appearances, or quantities of illumination of the moon, Venus, Mercury, and the other planets; or the ſeveral manners wherein they appear illuminated by the ſun.

The variety of *phaſes* in the moon is very remarkable: ſometimes ſhe increaſes, ſometimes wanes, ſometimes is bent into horns, and again appears like a ſemicircle; at other times ſhe is gibbous, and preſently again reſumes a full circular face. For the theory of the *ſame phaſes*, ſee MOON.

As to the *phaſes* of Venus, the naked eye does not diſcover any diverſity in them; but the teleſcope does: Copernicus anciently propheſied, that after-ages would find, that Venus underwent all the changes of the moon; which prophecy was firſt fulfilled by Galileo, who, di-

feeling his telescope to Venus, observed her *phases* to emulate those of the moon; being sometimes full, sometimes horned, and sometimes gibbous.

Mercury also does the same; all the difference between these and those of the moon, is, that when these are full, the sun is between them and us; whereas, when the moon is full, we are between her and the sun.

Saturn puzzled the astronomers a long time with his strange variety of *phases*; Hevelius and others found him, 1. Monospherical. 2. Trispherical. 3. Spherico-ansated. 4. Elliptico-ansated. 5. Spherico-cuspidated. But Huygens shews, that these monstrous *phases* were principally owing to the imperfection of their telescopes. That great author, assisted by the best telescopes, noted three principal *phases*; viz. Jan. 16, 1656, he was round; Octob. 13, brachiated; and Decem. 17, 1657, ansated. See SATURN.

PHASES *of comets*. See COMET.

To determine the PHASES *of an eclipse for any given time.*—Find the moon's place in her visible way for that moment; and thence, as a centre, with the interval of the moon's semidiameter, describe a circle. Find in like manner the sun's place in the ecliptic, and thence, with the semidiameter of the sun, describe another circle; the intersection of the two circles shews the *phases* of the eclipse, the quantity of obscuration, and the position of the cusps or horns.

PHASIANUS, in *Ornithology*. See PHEASANT.

PHASMATA, in *Physiology*, certain appearances arising from the various tinctures of the clouds by the rays of the heavenly luminaries, especially the sun and moon.

These are infinitely diversified by the different figures and situations of the clouds, and the appulses of the rays of light; and, together with the occasional flashings and shootings of different meteors, they have, no doubt, occasioned those prodigies of armies fighting in the air, &c. of which we have such frequent accounts in most sorts of writers. Vide 2 Maccab. xi. 8. Melancth. Meteor. 2 Shel. de Comet. ann. 1618.

Kircher, and his imitator Schottus, have erroneously endeavoured to explain the phenomenon from the reflection of terrestrial objects made on opake and congealed clouds in the middle region of the air, which, according to them, have the effect of a mirror. So that, according to these authors, the armies pretended by several historians to have been seen in the skies were no other than the reflection of the like armies placed on some part of the earth. Vide Hist. Acad. Roy. Scienc. ann. 1726. p. 405, & seq.

PHASSACHATES, in the *Natural History of the Ancients*, the name of a species of *agate*, which, in its different appearances, they sometimes called also LEUCACHATES and PERILEUCOS. It is found in the East Indies, and in Bohemia, and some other parts of Europe.

PHAUSINGES, a name given by the ancients to red circles on the legs, occasioned by fire: it is by some also extended to several other spots and blemishes on the skin.

PHEANITIDES, in *Natural History*, a name given by some to the stone called *empnumites*; it was of the nature of our spurry incrustations on the roofs of subterraneous caverns. It was supposed to have great virtues in promoting delivery, and was given to women when they fell in labour.

PHEASANT, *phasianus*, in *Ornithology*, a genus of birds of the gallinæ order.

The distinguishing characteristic of this genus of birds, is, that the area or space about the eyes is naked, and that they have no wattles.

The species are these: 1. The common *pheasant*, with a blackish purple-coloured breast. 2. The red, or scarlet-breasted *pheasant*: this is nearly of the size of the common *pheasant*, and its breast is of a high scarlet, and the belly red, but not so bright. 3. The East India *pheasant*: this is an extremely beautiful bird, the whole body of which is variegated with a profusion of the brightest colours, yellow, red, bluish green, and almost every other tinge.

Linnæus enumerates three other species; viz. the motmot, or brown *pheasant* of Guinea; the nythemerus, or white *pheasant* of China; and the argus, or yellow *pheasant*, spotted with black, of Chinese Tartary, besides several varieties of the common sort. *Pheasants* were first brought into Europe from the banks of the Phasis, a river of Colchis. Martial, lib. xiii. ep. 72.

The *pheasant* is so nearly allied to our common poultry, that it would naturally appear a very easy thing to breed them up from young; but the proper food of them is not sufficiently enquired into. Though they eat corn when full grown and in health, yet they have recourse, in their young state, and when sick, to another sort of food, preying on several insects, and that in a very voracious manner.

The young *pheasants* and partridges prey upon ants; and they will never succeed with us, if they have not a proper quantity of ants to have recourse to, as soon as they leave their roost in a morning. When musty corn, or want of due care in cleaning their houses, has made them sick, a repast of ants will often recover them. When that fails, they may be offered millepedes or earwigs, or both together, which will always do much better than either singly. To this medicine must be added a proper care that their common food of corn be very sweet, their habitation be kept nicely clean, and their water shifted twice a day. They must not be let out of the house in a morning till the dew is off the ground; and after sunset they must be immediately taken in again: in the heat of the day they must be allowed to bask in the sun in a dry sandy place. With these regulations, the birds of this kind will succeed much better than they usually do. The *pheasant* is a bird of a sullen disposition; and when the coupling time is over, these are seldom found more than one in a place. Phil. Transf. N° 23.

The way of taking *pheasants* is, first, to be acquainted with their haunts and breeding-places; which are usually young, thick, and well-grown coppices, free from the disturbances of cattle, and having no path-way through them; for the *pheasant* is an extremely timorous bird. When the haunts are discovered, the next thing to be attempted is, to find where the eye or brood is. In order to this, it is to be considered, that the *pheasants* comes out of the wood three times a day to feed in green corn, fresh pastures, or the like places. The times of coming out are in the morning soon after sun-rise, at noon, and at sun-set. The sides of the wood where they are supposed to come out are to be carefully watched on this occasion, and the young ones will be seen following the female just as a flock of chickens follow the hen. The wood may be also well watched in the evenings, and the noise of the cock and hen calling the young ones together will soon be heard; and the sportsman is on this occasion to get as near as he can to the place, and being very still and silent be may observe their numbers and disposition, and learn how to spread his nets so as to take the whole brood with great ease; but if his least motion when near them discover him, they will all take to their legs, and run to a great distance; they seldom rise on the wing, except very close frighted indeed. Practice will make some people so expert at imitating the voice of the old *pheasant*, that he will be able to call the young ones together to any place that he pleases, when the haunts are once found out, and by this means they are easily led into the nets.

The best time for using the call is in the morning or evening; and the note imitated should be that by which the old ones call them out to feed; but by learning to imitate the other notes they will be brought together at any time of the day. The sportsman who can make this call must shelter himself in some close place, and begin by very softly making the note; then, if none are near enough to be within hearing, he is to raise it to more and more loudness, and at length he will be answered as loud, if any are within hearing, though at a considerable distance; whereas, if he should set up the call too loud at first, and any of the birds should happen to be very near, they would be frighted away.

As soon as a *pheasant* answers, the sportsman is to creep nearer and nearer, still calling, though not so loud; he will still be answered, till at length he will be led by the bird's voice within sight of it. As soon as this is the case, he is to spread his net, and then begin to call again, keeping in some close and well sheltered place behind the net; in this place he is to call till the bird approaches; and when he has drawn it under the net, he is to appear suddenly, and the bird, rising up, will be caught in the net.

Another method of taking *pheasants* much quicker than by this means is, the having a live cock *pheasant* to use as a stale: this bird is to be fixed under the net, and by his crowing he will soon entice others in. The sportsman must be concealed; and as soon as another *pheasant* comes in, he is to draw the net over him. Many people have a method of taking *pheasants* in springes or horse-hair snares: the succeeding in this depends on the carefully searching out their haunts, and the places by which they go out of the woods into the fields. When these are found, a peg is to be fixed in the ground at each, and at each peg two springes are to be laid open; the one to take in the legs, the other the head. As soon as the springes are set, the sportsman is to go into the woods, and getting behind the birds, he is to fright them with some little noise, such as shall not be enough to raise them to the wing, but only to set them a-running. They will naturally make their way out of the wood, through their accustomed passes, and be then caught in the springes.

There is another method of taking these birds in the winter, provided that there is no snow. This is to be done

done with a net made like a casting net, but with the meshes much wider; they may be five inches wide. Some peas or wheat are to be taken out; and the path of the *pheasants* being discovered, which may easily be done by their dung, a part or thereabout of corn is to be thrown down in the path in a place marked, so that the sportsman can come to it again. This is to be done for several days, till at length the *pheasants* are expecting it every day regularly; and all the birds of this kind that frequent the place are brought together to feed there, and then the net is to be fixed over the place; its top being tied up to some bough of a tree, and its bottom fixed down all around, except in one place, where the walk of the *pheasants* lies. In this place it is to be raised in form of an arch, and the entrance is to be lined with several rods of hazel; the thick ends of which are to be tied to the net, and the thin ones let into the space covered by it; and thus the *pheasants* will easily get in by parting the small ends of the sticks, as fish into a wheel, but they will not easily get out again. The nets are to be dyed of a russet colour, by laying them in a tan-pit; and they must, when planted for this purpose, be covered with boughs, so that the birds do not discover them, and then they will easily run into them, and be all taken at once.

PHEASANT'S *eye, flos Adonis*, in *Botany*, a genus of the *polyandria polygynia* class. Its characters are these: the flower has a five-leaved empalement, and five, twelve, or fourteen petals, without any nectaria, which expand in form of a rose; in the centre there are many germina collected in a head, attended by a great number of short stamina, crowned by oblong, inflexed summits; after the flower is past, the germina become so many naked seeds, closely adhering to the pedicle, and forming an obtuse spike. Miller enumerates three, and Linnæus four species.

The common Adonis grows naturally on the sides of the river Medway in Kent; and for some years past great quantities have been sold in London under the name of red Morocco.

PHEASANT'S *eye pink*. See PINK.

PHEASANT, *sea*. See *Pintail* DUCK.

PHECOS, in *Botany*, a name used by some authors for the *stapitaria*, or *water-arrow-head*.

PHELLANDRIUM, in *Botany*, a genus of the *pentandria digynia* class. Its characters are, that the flosculi of the disc are small, and that the fruit is ovated, smooth, and crowned with a perianthium and pistil. There are two species.

PHELLOS, in *Botany*, a name used by some authors for the cork-tree.

PHELLOS, Φελλος, in *Antiquity*, a festival in honour of Bacchus, being a preparative to the DIONYSIA.

PHENGITES, in the *Natural History of the Ancients*, the name of a very beautiful species of alabaster. It is a very rude and irregular mass, very shattery and friable, yet of a brightness superior to that of most of the other marbles, and excelling them all in transparence; it is in colour of an agreeable pale, yellowish, white, or honey colour; the yellowish is more intense in some places than in others, and sometimes makes an obscure resemblance of veins. It is very weak and brittle in the mass, and when reduced to small pieces, is easily crumbled between the fingers into loose, but considerably large angular pieces, some perfect, others complex, irregular, or mutilated, and all approaching to a flat shape.

The ancients were very fond of this species in their public buildings; and the Temple of Fortune, built wholly of it, has long been famous. Its great beauty is its transparence, from which alone this temple was perfectly light when the doors were shut, though it was built without a window, and had no other light but what was transmitted through the stone its walls were built with. It was anciently found in Cappadocia, and is still plentiful there: we have it also in Germany and France, and in our own kingdom in Derbyshire, and some other counties. It takes an excellent polish, and is very fit for ornamental works, where there is no great strength required. Hill's Hist. of Foss. p. 490. See GLASS.

PHEONS, in *Heraldry*, the barbed heads of darts, arrows, or other weapons.

Pheons are represented as in *Tab.* II. *Herald. fig.* 79.—Sable, a fesse ermine between three *pheons*, by the name of Egerton.

PHEOS, in *Botany*, a name given by Theophrastus, Dioscorides, and others, to a plant used by the fullers in dressing their cloths, and of which there were two kinds, a smaller, called simply *pheos*, and a larger, called *hippopheos*.

The name of this plant is sometimes written *phleos*; and it is by that confounded with a kind of marsh cudweed, or *gnaphalium*, called also by that name; but it may be always found which of the two plants an author means, by observing the sense in which the word is used, and the use to which the plant was put. The *phleos*, properly so called, that is, the cudweed, was used to stuff beds and other such things, and to pack up with earthen vessels to prevent their breaking; but the *pheos*, improperly called *phleos*, only about cloths; this was, however, also called *flæbe* and *exophon*.

PHEREPHATTIA, Φερεφαττια, in *Antiquity*, a festival at Cyzicum, wherein a black heifer was sacrificed to Pherephatta or Proserpine.

PHIAL, *phiala*, formed of φιαλη, which signifies the same, a small thin glass bottle, popularly called a *vial*.

PHIAL, *Leyden*. See LEYDEN.

PHIDITIA, or PHILITIA, in *Antiquity*, feasts instituted by Lycurgus, and celebrated with great frugality at Lacedæmon.

The *Phiditia* were held in the public places, and in the open air: rich and poor assisted at them alike, and on the same footing; their design being to keep up peace, friendship, and a good understanding and equality among all the citizens, great and small. Bernegger says, they who attended at this feast brought each a bushel of flour, eight measures of wine, called chorus, and five minæ of cheese, and as much figs.

The *Phiditia* of the Greeks were much the same with the CHARITIA at Rome.

PHILA, in *Mythology*, one of the attributes of Venus, which distinguishes her as the mother of love, from φιλεω, *to love*.

PHILADELPHIA, in *Antiquity*, were games instituted at Sardis, to celebrate the union of Caracalla and Geta, the sons of Septimius Severus.

PHILADELPHIA *stones*, a name given by some authors to what are called by others *Christian's bones*, found in the walls of that city. It is a common error, that these walls are built of bones, and the tradition of the country is, that when the Turks took the place they fortified it for themselves, and built their walls of the bones of the Christians whom they killed there. Dr. Smyth, in one of his epistles, mentions this wall as an instance of the Turkish barbarity; but this is an idle opinion, what passes for bone being only a loose and porous stone of the spurry kind, found in an old aqueduct, which is filled in the wall. Sir Paul Rycaut brought home pieces of these stones, which he also supposed to have been bones, but on examination they proved to be no other than various bodies, chiefly vegetable, incrusted over and preserved in a spar of the nature of that which forms incrustations in Knaresborough spring, and other places with us. These bodies are often cemented together in great numbers by this matter, and their true shape lost in the congeries, till a diligent and judicious eye traces them regularly.

PHILADELPHIAN *Society*, in *Ecclesiastical History*, an obscure and inconsiderable society of mystics, formed towards the close of the last century by an English female fanatic, named Jane Leadley, who seduced by her visions, predictions, and doctrines, several disciples, among whom were some persons of learning. This woman apprehended, that all dissensions among Christians would cease, and the kingdom of the Redeemer become a scene of charity and felicity, if Christians, without regarding the forms of doctrine or discipline that distinguish particular communions, would all join in committing their souls to the care of the internal guide, to be instructed, governed, and formed, by his divine impulse and suggestions. Nay, the pretended a divine commission to proclaim the approach of this glorious communion of saints; and imagined that the society established by herself was the true kingdom of Christ. One of her leading doctrines was, that of the final restoration of all intelligent beings to perfection and happiness.

PHILADELPHUS, φιλαδελφος, in *Antiquity*, a title or surname, borne by several ancient kings; formed from the Greek φιλος, *friend, lover*, and αδελφος, *brother*; q. d. one who loves his brother, or brethren.

Ptolemy *Philadelphus* erected a library at Alexandria, and furnished it with four hundred thousand, others say with seven hundred thousand volumes, by the advice, and with the assistance, of Demetrius Phalereus. See ALEXANDRIAN *Library*.

It was the same *Philadelphus* that procured the Greek version of the books of Moses, called the SEPTUAGINT.

Father Chamillart has a medal of the queen of Comagene, which bears the title of *Philadelpho*, without any other name. M. Vaillant tells us, that Philip king of Syria had also the title *Philadelphus*.

PHILADELPHUS, *mock orange*, or *pipe-tree*, in *Botany*, a genus of the *icosandria monogynia* class. Its characters are, that it hath a permanent empalement of one leaf, cut into five acute parts; it hath four or five roundish petals, which spread open; the germen is situated under the flower, supporting a slender style, divided into four parts, each being crowned by a single stigma; the ger-

ten afterwards becomes an oval, scale-pointed capsule, having four or five cells, which are filled with small oblong seeds. Linnæus reckons two, and Miller three species.

PHILANDER, in *Zoology*. See DIDELPHIS and OPOSSUM.

PHILANTHROPOS, in *Botany*, a name used by some authors for the common *sparrow, clivers*, or *goose-grass*.

PHILANTHROPY, Φιλανθρωπια, *love of mankind*, a general benevolence towards the species.

PHILARMONICI, is the denomination of a literary society established at Verona in 1543. See ACADEMY.

PHILAUTIA, Φιλαυτια, formed from φιλος, *amicus*, and αυτος, *ipse*, in the *Schools*, SELF-LOVE, a vicious fondness and complaisance for a man's self.

PHILELIA, the name of a song among the ancient Greeks, in honour of Apollo. Athenæus, lib. xiv. cap. 3.

PHILETERIUM, in *Botany*, a name used by some authors for the *hoben album*, the common white-flowered bladder-campion, called *white bin*.

PHILIPPICS, *Philippicæ, Φιλιππικοι λογοι*, in *Literature*, a name given to the orations of Demosthenes against Philip king of Macedon.

The *Philippics* are esteemed the master-pieces of that great orator: Longinus quotes abundance of instances of the sublime from them; and points out a thousand latent beauties therein. In effect, that pathetic wherein Demosthenes excelled, the frequent interrogations and apostrophes wherewith he attacked the indolence of the Athenians, where could they be better employed? How much delicacy soever there be in the oration against Leptines, the *Philippics* have yet the advantage over it, were it only on account of the subject, which gives Demosthenes so fair a field to display his chief talent, we mean, with Longinus, that of moving and astonishing.

Dionysius Halicarnassæus ranks the oration on the Halonese among the *Philippics*, and places it the eighth in order; but though the authority of that great critic be of no small weight, yet that force and majesty, wherein Cicero characterizes the *Philippics* of Demosthenes, seem to exclude the oration on the Halonese out of the number; and authorize the almost universal opinion of the learned, who reject it as spurious.

Libanius, Photius, and others, but above all the languidness of the style, and the lowness of the expressions, which reign throughout the whole, father it on Hegesippus.

PHILIPPIC is also applied to the fourteen orations of Cicero against Marc Antony. It was Cicero himself that gave them this title in his epistles to Brutus; and posterity have found it so just, that it has been perpetuated to our times.

Juvenal, Sat. x. calls the second the *divine Philippic*, and witnesses it to be of great fame, *conspicua divina Philippica fama*. That orator's intiding his last and most valued orations after the *Philippics* of Demosthenes shews the high opinion he had of them.

Cicero's *Philippics* cost him his life; Marc Antony having been so irritated with them, that when he arrived at the triumvirate, he procured Cicero's murder, cut off his head, and stuck it up in the very place whence the orator had delivered the *Philippics*.

PHILIPPISTS, a sect or party among the Lutherans; the followers of Philip Melancthon.

That reformer having strenuously opposed the the UBIQUISTS, who arose in his time; and the dispute growing still hotter after his death; the university of Watemberg, who espoused Melancthon's opinion, were called, by the Flacians, who attacked it, *Philippists*.

PHILTRA. See PHILTRUM.

PHILTRERS, or PHILTRERES. See PHLEGM.

PHILYREA. See *Mock* PRIVET.

PHILO, a term originally Greek, formed of φιλος, *amicus, friend, or lover*; now used in composition in several words in our language: as,

PHILELEUTHERUS, Φιλελευθερος, formed of φιλος, and ελευθερος, *free*, a lover of liberty.

PHILOLAUS, formed of Φιλος, and λαος, *people*, in *Mythology*, a denomination under which Esculapius was honoured in a temple at Afopus, in Laconia.

PHILOLOGY, Φιλολογια, formed from φιλος and λογος, *lover of discourse*, a science, or rather assemblage of several sciences, consisting of grammar, rhetoric, poesy, antiquities, history, and criticism.

Philology is a kind of universal literature, conversant about all the sciences, &c. their rise, progress, authors who have cultivated them, &c.

Philology makes what the French call the *belles lettres*. In the universities it is also called *humanities*, or *humaniores literæ*.

Anciently, *philology* was only a part of grammar.

Eratosthenes, library-keeper at Alexandria, was the first who bore the splendid title of *Philologus*, according to Suetonius; or that of *critic*, according to Clemens Alexandrinus. He lived under Ptolemy Philadelphus, and died in the 140th Olympiad.

PHILOMATHES, Φιλομαθης, formed from φιλος, *lover*, and μανθανω, *I learn*, a lover of learning or science.

PHILONIUM, in *Pharmacy*, an opiate, or electary whereof there are two kinds, the Roman, and the Persian.

The Roman, called also the great *philonium*, took its name from the physician Philo, who invented it. It consists of the seeds of henbane, pepper, opium, and other ingredients. It is used to promote sleep, and against colds, colics, &c.

The Persian *philonium* consists of several ingredients, among which are opium, terra sigillata, lapis hæmatites, castor, and saffron. It is used to stop hæmorrhages, dysenteries, &c.

PHILONIUS *Londinensis*, the name by which the medicine commonly called *philonium Romanum*, is called in the late London Dispensatory. The composition is also much altered, as well as the name, and is now ordered to be made thus: take white pepper, ginger, caraway-seeds, of each two ounces, opium six drams, syrup of diacodium, boiled to the consistence of honey, three times the weight of all the rest. The opium is to be dissolved in a little wine, and then mixed with the syrup; after which the powders are to be stirred in, and the whole made into an electary.

PHILOPATOR, Φιλοπατωρ, formed from φιλος, *lover*, and πατηρ, *father*, in *Antiquity*, a title or surname, assumed by several of the kings of Egypt and Syria; importing, lover of one's father.

Ptolemy *Philopator* succeeded Ptolemy Euergetes; and had for his successor Ptolemy Philometor. The Syrians had their Seleucus *Philopator*, Antiochus *Philopator*, &c.

PHILOSEBASTUS, Φιλοσεβαστος, i. e. *a friend of Augustus*, was a title assumed by several princes and cities, as a public testimony of their attachment to any emperor. This title is found on the marbles of Cyzicum and in other inscriptions.

PHILOSOPHER, Φιλοσοφος, a person well versed in philosophy; or who makes profession of, or applies himself to, the study of nature and morality.

The sects of *philosophers* are very numerous: and their dogmata or tenets very contradictory.

Helmont, and some of the chemists, denominate themselves *philosophers by fire*.

The alchemists, and adepti, are frequently denominated *the philosophers*, by way of eminence.

PHILOSOPHUS *lotion*. See LOTION.

PHILOSOPHERS *stone*, the greatest object of alchemy, is a long-sought-for preparation, which, when found, is to transmute or exalt impure metals, as tin, lead, and copper, into gold and silver.

Some of the Greek writers, in the fourth and fifth centuries, speak of an art, as being then known, of transmuting the baser metals into gold; and towards the end of the thirteenth century, when the learning of the East had been brought hither by the Arabians, the same pretensions began to spread through Europe. It is supposed that this art, called ALCHEMY, was of Egyptian original; and that, when the ancient Greek philosophers travelled into Egypt, they brought back some of the allegoric language of this Egyptian art, ill understood, which afterwards passed into their mythology. Alchemy was the earliest branch of CHEMISTRY, considered as a philosophical science: in the other parts of chemical knowledge, facts preceded reasoning or speculation; but alchemy was originally speculative. See TRANSMUTATION.

The alchemists supposed the general principles of metals to be chiefly two substances, which they called mercury and sulphur; they apprehended also, that the pure mercurial, sulphureous, or other principles of which they imagined gold to be composed, were contained, separately, in other bodies: and these principles, therefore, they endeavoured to collect, and to concoct and incorporate by long digestions; and by thus conjoining the principles of gold, if they could be so procured and combined, it might be expected that gold would be produced. But the alchemists pretend to a product of a higher order, called the ELIXIR, the medicine for metals, the tincture, the *philosopher's stone*; which, by being projected on a large quantity of any of the inferior metals in fusion, should change them into fine gold; which being laid on a plate of silver, copper, or iron, and moderately heated, should sink into the metal, and change into gold all the parts to which it was applied; which, on being properly heated with pure gold, should change the gold into a substance of the same nature and virtue with itself, so as thus to be susceptible of perpetual multiplication; and which, by continued coction, should have its power more and more exalted, so as to be able to transmute greater

greater and greater quantities of the inferior metals, according to its different degrees of perfection.

There are three ways whereby the alchemists have attempted to arrive at the making of gold: the first, by separation; for it is affirmed, that every metal yet known contains some quantity of gold: only, in most, the quantity is so little, that it will not defray the expence of getting it out.

The second is by maturation; for the alchemists hold mercury to be the basis and matter of all metals; that quicksilver purged from all heterogeneous bodies would be much heavier, denser, and simpler, than the native quicksilver; and that by subtilizing, purifying, and digesting it with much labour, and long operations, it may be converted into pure gold.

This method of maturation is only for mercury: the other metals it is ineffectual for, on two accounts: 1. Because their matter is not pure mercury, but has other heterogeneous bodies adhering to it: and, 2. Because the digestion, whereby mercury is turned into gold, would not succeed in other metals, in regard these had not been long enough in the mines.

Weight is the individual and inimitable character of gold, &c. Now mercury, they say, has ever some impurities in it; and those impurities are lighter than mercury. Could those be purged quite out, as it does not appear to them impossible but they might, mercury would be as heavy as gold; and what is as heavy as gold is gold, or at least might very easily be made gold. See *Fixing of* MERCURY.

The third method is, that of transmuting, or of turning all metals readily into pure gold, by melting them in the fire, and calling a little quantity of a certain preparation into the fused matter; upon which the feces immediately retire, are volatilized and burnt, and so carried off; and the rest of the mass is turned into pure gold. That which works this change in the metals is called the *philosopher's stone*. See TRANSMUTATION.

Whether this third method be possible or not, is very hard to say. We have so many testimonies of it from persons, who on all other occasions speak truth, that it is somewhat hard to say they are guilty of falsehood, even when they say, that they have been masters of the secret. All required is, they say, to do that by art, which nature does in many years and ages. For that as lead and gold do but differ little in weight, therefore there is not much in lead beside mercury and gold. Now, if I had any body which would so agitate all the parts of lead, as to burn all that is not mercury therein; and had also some sulphur to fix the mercury; would not the mass remaining be converted into gold? There is nothing in nature so heavy as lead, gold and mercury alone excepted. It is evident, therefore, there is something in lead that comes very near to gold. But in lead there is also some heterogeneous matter different both from mercury and gold. If now nineteen ounces of lead be dissolved by the fire, and eight ounces be thus destroyed, they argue that we shall have the rest good gold; the ratio of lead to gold being as eleven to nineteen. If then the *philosopher's stone* can purify the mercurial matter in lead, so as that nothing shall remain but the pure mercurial body, and you can fix and coagulate this, by means of sulphur, out of nineteen ounces of lead you will have eleven of gold. Or, if you reduce the lead from eighteen to fourteen, you will then have converted it into mercury; and if you farther purify this mercury to the proper standard, you will have gold, provided you have but a sulphur with which to fix and coagulate it. Such is the foundation of the opinion of the *philosophers stone*; which the alchemists contend to be a most subtile, fixed, concentrated fire, which, as soon as it melts with any metal, does, by a magnetic virtue, immediately unite itself to the mercurial body of the metal, volatilizes and cleanses off all that is impure therein, and leaves nothing but a mass of pure gold. Many frauds and artifices have undoubtedly been practised in this operation; and there might be political reasons why princes and others should encourage those who pretended a power of furnishing this inexhaustible source of wealth: but it would be wrong to censure as impostors, all those who have declared themselves convinced, from their own experiments, of the transmutability of base metals into gold. However there are strong reasons to believe that the authors have been deceived themselves by fallacious appearances. Mr. Boyle gives an account of a process, by which he imagines part of the substance of gold to have been transmuted into silver. See MENSTRUUM *peregrinum*. He also relates a very extraordinary experiment, under the title of the degradation of gold by an anti-elixir, which was published in his own life-time, and since reprinted in 1739. Hence many have been led to conclude in favour of the alchemical doctrine of the transmutability of metals. See an account of this experiment with remarks upon it by Dr. Lewis, in his Commerce of Arts, sect. 12. p. 297, &c.

King Henry VI. granted letters patent to certain persons, who undertook to find out the *philosopher's stone*, and to change other metals into gold, &c. to be free from the penalty of the statute 5 Hen. IV. made against the attempts of chemists of this nature. Par. 34 Hen. VI. 3 Inst. 74.

PHILOSOPHERS *tree*, a chemical preparation, called also ARBOR *Dianæ*, *Diana's tree*.

PHILOSOPHICAL, something that relates to PHILOSOPHY.

PHILOSOPHICAL *æther*. See ÆTHER.

PHILOSOPHICAL *chemistry*. See CHYMISTRY.

PHILOSOPHICAL *criticism*. See CRITICISM.

PHILOSOPHICAL *egg*, among the *Chemists*, is a thin glass body, or bubble, of the shape of an egg, with a long neck or stem; used in digestions.

PHILOSOPHICAL *month*. See MENSTRUUM, and MONTH.

PHILOSOPHICAL *sin*. See SIN.

PHILOSOPHICAL *Transactions*. See TRANSACTIONS.

PHILOSOPHIZING, the act of considering some object of our knowledge, examining its properties, and the phenomena it exhibits, and enquiring into their causes or effects, and the laws thereof; the whole conducted according to the nature and reason of things, and directed to the improvement of knowledge.

PHILOSOPHIZING, *rules of*, *regulæ* PHILOSOPHANDI, 1. established by Sir Isaac Newton, are, 1. That no more causes of a natural effect be admitted than are true, and suffice to account for the phenomena thereof.

This agrees with the sentiments of most philosophers, who hold that nature does nothing in vain; and that it were vain to do that by many things, which might be done by fewer.

2. Natural effects, therefore, of the same kind, proceed from the same causes. Thus, e. gr. the cause of respiration is one and the same in man and brute; the cause of the descent of a stone, the same in Europe as in America; the cause of light the same in culinary fire, and in the sun; and the cause of reflexion the same in the planets as the earth.

3. Those qualities of bodies which are not capable of being heightened, and remitted, and which are found in all bodies where experiments can be made, must be looked on as universal qualities of all bodies.

Thus the extension of body is only perceived by our senses, nor is it perceivable in all bodies: but since it is found in all that we have perception of, it may be affirmed of all. So we find, that several bodies are hard; and argue that the hardness of the whole only arises from the hardness of the parts: whence we infer, that the particles, not only of those bodies which are sensible, but of all others, are likewise hard. Lastly, if all the bodies about the earth gravitate towards the earth, and this according to the quantity of matter in each; and if the moon gravitates towards the earth also, according to its quantity of matter; and the sea again gravitates towards the moon; and all the planets and comets gravitate towards each other; it may be affirmed universally, that all bodies in the creation gravitate towards each other. This rule is the foundation of all natural philosophy.

PHILOSOPHY, Φιλοσοφια, the knowledge or study of nature and morality, founded on reason and experience.

Philosophy owes its name to the modesty of Pythagoras, who refused the title σοφος, *wise*, given to his predecessors, Thales, Pherecydes, &c. as too assuming; and contented himself with the simple appellation of φιλοσοφος, *quasi* φιλος και σοφια, *a friend or lover of wisdom*.

Chauvin rather derives the name from φιλεω, *desire*, or *study*, and σοφια, q. d. *studium sapientiæ*; and says, that Pythagoras, conceiving that the application of the human mind ought rather to be called *study* than *science*, set aside the appellation *wise*, and in lieu thereof took that of *philosopher*. For having discoursed with great judgment and learning before Leontius, king of the Phliasii, that prince asked him, what art he professed; or in what points his wisdom chiefly lay? To which he answered, that he neither understood any art, nor was he σοφος, but φιλοσοφος. Which title, St. Augustine observes, took so well with other authors, that whoever excelled in any thing relating to wisdom or knowledge had afterwards no other appellation. Accordingly Socrates, Plato, &c. ever refrained from the swelling title of *sophos*.

By *philosophy* we mean the knowledge of the reasons of things, in opposition to history, which is the bare knowledge of facts; or to mathematics, which is the knowledge of the quantity of things or their measures.

These three kinds of knowledge ought to be joined as much as possible. History furnishes matter, principles, and practical examinations, and mathematics completes the evidence. *Philosophy* being the knowledge of the reasons of things, all arts must have their peculiar *philosophy* which constitutes their theory: not only law and physic,

but the loweſt and moſt abject arts are not deſtitute of their reaſons, which might uſefully employ the time of the ſtudious. It is true, thoſe who call themſelves *philoſophers* and learned men have as yet done little towards forwarding the intelligence of arts: but we ſpeak not of what is done, but of what ought to be done.

One great obſtacle to the progreſs of arts and ſciences has been the neglect of practice in ſpeculative men, and the ignorance or contempt of theory in mere practical men. What chimeras and abſurdities the neglect of experience and practice has produced, need not be mentioned; the miſchiefs ariſing from a neglect of theory are not ſo obvious: yet certainly it retards the progreſs of arts. All invention or improvement muſt be either caſual or rational, including analogy or inference from ſimilar caſes, under the term rational. Now, although the foundations of arts have often been owing to ſome caſual diſcovery, as gunpowder, or the loadſtone, yet is this not to be truſted to alone. Improvements in no always flow from this ſource, but rather *from* the reflexions of ſenſible; and, if theſe reflexions were rendered more diſtinct, more communicable, and eaſier to be retained, by the proper uſe of ſigns and other *philoſophical* helps, great advantages might be expected: it being certain, that *philoſophical* knowledge is more extenſive, and more ſure in the application; and, beſides, gives a pleaſure to the mind not to be expected from that which is merely hiſtorical.

It is to be obſerved, that the bare intelligence and memory of *philoſophical* propoſitions, without any ability to demonſtrate them, is not *philoſophy*, but hiſtory only. However, where ſuch propoſitions are determinate and true, they may be uſefully applied in practice, even by thoſe who are ignorant of their demonſtrations. Of this we ſee daily inſtances in the rules of arithmetic, practical geometry, and navigation; the reaſons of which are often not underſtood by thoſe who practiſe them with ſucceſs. And this ſucceſs in the application produces a conviction of mind, which is a kind of medium between *philoſophical*, or ſcientifical, and hiſtorical knowledge.

The ingenious author of the Analyſt has gone ſo far as to ſuggeſt, that mathematicians have no other conviction of the truth of the doctrine of fluxions.

We have ſaid that *philoſophy* is the knowledge of the reaſons of things. It may be aſked, what are the reaſons of things, or what is the explication of phenomena or facts? An ingenious author tells us, that the explication conſiſts only in ſhewing the conformity any particular phenomenon hath to the general laws of nature; or, which is the ſame thing, in diſcovering the uniformity there is in the production of natural effects. This he thinks evident to any one whoever ſhall attend to the ſeveral inſtances wherein philoſophers pretend to account for appearances. By a diligent obſervation of the phenomena within our view, we may diſcover the general laws of nature, and from thence deduce, though not demonſtrate, other phenomena; all deductions of this kind depending on a ſuppoſition that the Author of Nature always operates uniformly, and in a conſtant obſervation of thoſe rules we take for principles; which we cannot evidently know.

If we take a view of the ſeveral phenomena, and compare them together, we may obſerve ſome likeneſs and conformity between them. For example, in the falling of a ſtone to the ground, in the riſing of the ſea towards the moon, in coheſion and cryſtalliſation, there is ſomething alike, namely, an union or mutual approach of bodies: ſo that any one of theſe, or the like phenomena, may not ſeem ſtrange, or ſurpriſing, to a man who has nicely obſerved and compared the effects of nature; for that only is thought ſo which is uncommon, or a thing by itſelf, and out of the ordinary courſe of our obſervation. That bodies ſhould tend towards the centre of the earth, is not thought ſtrange, becauſe it is what we perceive every moment of our lives; but that they ſhould have a like gravitation towards the centre of the moon, may ſeem odd and unaccountable to moſt men, becauſe it is diſcerned only in the tides; but a philoſopher, whoſe thoughts take in a larger compaſs of nature, having obſerved a certain ſimilitude of appearances, as well in the heavens as the earth, that argue innumerable bodies to have mutual tendency towards each other, which he denotes by the general name attraction, whatever can be reduced to that, he thinks juſtly accounted for. Thus he explains the tides by the attraction of the terraqueous globe towards the moon, which, to him, doth not appear odd or anomalous, but only a particular example of a general rule or law of nature.

If, therefore, we conſider the difference there is between natural philoſophers, and other men, with regard to their knowledge of the phenomena, we ſhall find it conſiſts not in an exacter knowledge of the efficient cauſe that produces them, for that can be no other than the will of a ſpirit; but only in a greater largeneſs of comprehenſion, whereby analogies, harmonies, and agreements are deſcried in the works of nature, and the particular effects explained; that is, reduced to general rules, which rules grounded on the analogy and uniformneſs obſerved in the production of natural effects, are more agreeable, and ſought after by the mind; for that they extend our proſpect beyond what is preſent, and near to us, and enable us to make very probable conjectures, touching things that may have happened at very great diſtances of time and place, as well as to predict things to come; which ſort of endeavour towards omniſcience is much affected by the mind. Berkeley, Princ. of Hum. Knowledge, ſects. 103, 105.

PHILOSOPHY is a term uſed in various ſignifications among ancient and modern writers. In its laxeſt ſenſe, it ſignifies the love of truth: thus Plato frequently calls it *philalethia*.

In other places it ſignifies the knowledge of many things; thus Zeno calls *philoſophy*, πολυμαθίαν, *manyknowledge*, becauſe comprehending all truth. Agreeable to which is Cicero's definition of philoſophy, that he is one who ſtudies to know the natures and cauſes of all things human and divine, and to attend to every good rule and method of life.

PHILOSOPHY, in a narrower ſenſe, is frequently confined to ſome one ſcience, or branch of ſcience: v. gr. to logic, as we find it in Plato and Ariſtotle: to phyſics, or the knowledge of nature; in which ſenſe it was chiefly uſed in the Ionic ſchool: and to ethics, or the rules of morality: thus it is Clemens of Alexandria relates, that among the Greeks there are philoſophers who hold diſputes about virtue.

Agreeable to this laſt application, Pythagoras defines *philoſophy* a meditation or ſtudy by which, according to Plato and Clemens, is meant an abſtraction or retirement from the body; which Apuleius thus explains: a philoſopher is to ſtudy nothing ſo much as to let his ſoul at liberty from its correſpondence with the body: thus Cicero calls *philoſophy*, *ars vitæ*, and Seneca, *ſcientia* and thus Plutarch. Conſtancy, fidelity, and a found mind, are the real *philoſophy*; all the other parts of wiſdom, tending any other way, are pretenſions and curioſities: and in this ſenſe it was, that *philoſophy* chiefly flouriſhed in the ſchools of Socrates, afterwards called the *Academic ſchool*, and among the Stoics.

PHILOSOPHY, again, is frequently uſed by Pythagoras and Plato for metaphyſics, or the knowledge of God: which Plato calls the *true philoſophy*, others the *prima philoſophia*; and in reſpect whereof, the Platoniſts call all other *philoſophy*, κατθυρια, *outward diſcourſe*.

Gale includes the ſeveral notions hitherto delivered, under this one general definition: *philoſophy* is the knowledge of things natural, moral, ſupernatural, and notional; originally granted by God to our firſt parents, and tranſmitted to us for the honour of the Creator and the good of the univerſe.

That definition of Epictetus is alſo pretty comprehenſive: *philoſophy*, he ſays, conſiſts in three things; the practice of precepts, the reaſon of precepts, and the proof of precepts.

Some having given the following appellations to the ancient *philoſophy*, under its ſeveral ſtages: *philoſophy*, ſay they, became *impious* under Diagoras; *vicious* under Epicurus; *hypocritical* under Zeno; *impudent* under Diogenes; *covetous* under Demochares; *contentious* under Metrodorus; *fantaſtical* under Crates; *fearleſs* under Metippus; *licentious* under Pyrrho; and *quarrelſome* under Cleanthes.

The ſeveral dogmata, maintained by the ſeveral philoſophers, are infinite: Cicero makes no ſcruple to aver, that there is nothing in the world, how abſurd ſoever, but has been maintained by one *philoſopher* or other.

From the firſt broachers of new opinions, and the firſt founders of ſchools, *philoſophy* is become divided into innumerable ſects; ſome ancient, others modern: ſuch are the Platoniſts, Peripatetics, Epicureans, Stoics, Pyrrhonians, and Academics; and ſuch are the Carteſians, Newtonians, &c. See the riſe, doctrines, &c. of each ſect under PLATONISM, PERIPATETICS, EPICUREANS, STOICS, PYRRHONIANS, ACADEMICS, CARTESIAN, NEWTONIAN, &c.

Philoſophy may be divided into two branches, or it may be conſidered under two habitudes, *theoretical* and *practical*.

PHILOSOPHY, *theoretical*, or *ſpeculative*, is that employed in mere contemplation, and which terminates therein. Such is phyſics, which is a bare contemplation of nature, and natural things.

Theoretical philoſophy, again, is uſually ſubdivided into three kinds; viz. pneumatics; phyſics, or fomatics; and metaphyſics, or ontologia.

The firſt conſiders being, abſtracted from all matter; its

objects are *spirits*, their natures, properties, and effects. The second considers matter, and material things: its objects are bodies, their properties, laws, &c.

The third extends to each indifferently: its objects are either body or spirit.

In the order of our discovery, or arrival at the knowledge of them, physics is first, then metaphysics; the last arises from the two first considered together: after an acquaintance with God, ourselves, and natural bodies, we come to consider what is common to them all, or the attributes that agree to all: and thus form a sort of universal *philosophy*, or doctrine *de ente* in general.

But in teaching, or laying down, these several branches to others, we observe a contrary order; beginning with the most universal, and descending to the more particular. And hence we see why the Peripatetics call metaphysics, and the Cartesians pneumatics, the *prima philosophia*. Others prefer the distribution of *philosophy* into four parts, viz. 1. Pneumatics, which considers and treats of spirits. 2. Somatics, of bodies. The third compounded of both, anthropology, which considers man, in whom both body and spirit are found. 4. Ontosophy, which treats of what is common to all the other three.

Philosophy may be divided into three parts; intellectual, moral, and physical; the intellectual part comprises logic and metaphysics; the moral part contains the laws of nature and nations, ethics and politics; and, lastly, the physical part comprehends the doctrine of bodies, animate or inanimate: these, with their various subdivisions, will take in the whole of *philosophy*.

Wolfius makes the three parts of *philosophy* to be the doctrine of God, the human soul, and of bodies. However when he subdivides, and comes to treat the several branches separately, his divisions readily come under the three heads, intellectual, moral, and physical, before mentioned. The doctrine of God, and the human soul, may be ranged under the same head, metaphysics, the notion of the divine nature being formed from that of the human soul, excluding limitations and imperfections. Muschenbroek divides *philosophy* into six parts, viz. Pneumatics, or the doctrine of spirits; physics, whose object is the universe and the bodies contained therein; teleology, which explores the design and end of the existence of all bodies, and of all their actions and changes, as far as human sagacity can discover them; metaphysics, which comprehends the general and abstract natures and qualities of objects, containing ontology and cosmology; practical or moral *philosophy*, which lays down rules for the right conduct of life, and the attainment of true happiness; and logic, which unfolds the powers and directs the exercise of the intelligent and reasoning faculty of the human mind.

PHILOSOPHY, *practical*, is that which lays down the rules of a virtuous and happy life; and excites us to the practice thereof.

Practical philosophy is properly ethics alone, or the method of leading a virtuous and happy life. Yet most authors divide it into two kinds, answerable to the two sorts of human actions to be directed thereby; viz. 1. LOGIC, which governs the operations of the understanding.

2. ETHICS, properly so called, which direct those of the will.

PHILOSOPHY, *natural*. See NATURAL.

PHILOSOPHY, *moral*. See MORAL.

PHILOSOPHY is also frequently used for the particular doctrine or system of opinions, broached by some considerable philosopher, and espoused, and adhered to by his followers.

In this sense we say,

PHILOSOPHY, *Arabian*, *Aristotelian*, *Cartesian*, *Epicurean*, *Hermetical*, *Lutherian*, *Newtonian*, *Oriental*, *Platonic*, and *Stoical*. See PERIPATETIC, &c.

PHILOSOPHY is also used for a certain manner of philosophizing; or certain principles, upon which all the enquiries thereby made do turn.

In this sense we say,

PHILOSOPHY, *corpuscular* or *atomical*, *mechanical*, and *experimental*. See the adjectives.

PHILOSOPHY, *again*, is considered with regard to the age, or the place, wherein it was taught.

In this sense we say,

PHILOSOPHY, *new*, &c. See MECHANICAL *Philosophy*.

PHILOSOPHY, *scholastic*, or *school*. See SCHOLASTIC.

PHILTER, PHILTRE, PHILTRUM, in *Pharmacy*, &c. a strainer, or FILTER.

PHILTRE, φιλτρον, formed of φιλεω, *I love*, is also used for a drug, or preparation, or charm, which it is pretended will excite love.

Philters are distinguished into true and spurious: the spurious are spells or charms, supposed to have an effect beyond the ordinary laws of nature, by some magic virtue; such are those said to be given by old women, witches, &c.

The true *philters* are supposed to work their effect by some natural and magnetical power. There are many enthusiastic authors who believe the reality of these *philters*; and alledge matter of fact in confirmation of their opinion: among the rest is Van Helmont, who says, that, upon holding a certain herb in his hand for some time, and taking afterwards a little dog by the foot with the same hand, the dog followed him wherever he went, and quite deserted his former master.

He accounts for the phenomena of love transplanted by the touch of an herb: by asserting, that the heat communicated to the herb, not coming alone, but animated by the emanations of the natural spirits, determines the herb towards the man, and identifies it to him: having then received this ferment, it attracts the spirit of the other object magnetically, and gives it an amorous motion. But all this is mere cant; and all *philters*, whatever facts may be alledged in their favour, are mere chimeras.

Naturalists ascribe an effect, somewhat of kin to that of a *philter*, to cantharides taken inwardly: these, it is true, tend to excite love, or rather lust; but it is lust in the general, not determined to any particular object; and they do it no otherwise than by irritating the fibres of the nerves and muscles, by whose action the emissio seminis is effected. See FILTER.

PHILTRATION, or FILTRATION. See FILTRATION.

PHILYRA, in *Natural History*, a name given to the substance on which some of the most ancient books are written. It is the inner bark of the *tilia*, or common lime-tree. The emperor's library at Vienna has a book, written by Tully, never yet published, which is written on this substance.

PHIMOSIS, φιμωσις, properly signifying a ligature with packthread, (φιμος denoting packthread,) in *Medicine*, a disease of the penis, wherein the præputium is by a violent inflammation glued, or strongly constringed, upon the glans; so as not to be capable of being drawn back, to uncover the glans.

Sometimes a *phimosis* conceals chancres on or about the glans; and sometimes it is so violent, as to prevent the flowing out of the matter; whence it causes an inflammation or mortification of the part. When the prepuce is detained behind the glans, the case is called a PARAPHIMOSIS.

This disorder is usually communicated by commerce with unclean women, whereby the virulent matter lodged in the sinuses of the vagina insinuates itself betwixt the glans and præputium, where remaining, it occasions an inflammation, with the *phimosis*: however instances have occurred of a natural strictare in the præputium, so that the glans cannot at all or with great difficulty be denudated. When the *phimosis* does not proceed from infection, it will be sufficient to bathe the parts in warm water: but if it be a venereal case, proper internal medicines are to be exhibited at the same time, whilst the pain and other symptoms are mitigated, by washing out the virulent matter with warm water, and frequently repeating an injection of decoction of barley and honey. To disperse the tumor, a discutient fomentation or cataplasm may be afterwards applied to the penis.

The cure of a paraphimosis in no-wise differs from that of a *phimosis*, except in the use of injections; and in both cases, if they still prove obstinate, the prepuce must be cut, in order to reduce it to its natural state or situation. See GONORRHŒA.

PHIMOSIS is also used for a disease of the eyes, wherein the eye-lids are so bound together by the mediation of some glutinous matter, that they are not to be opened.

PHLEBOTOMY, φλεβοτομια, compounded of φλεψ, vein, and τομη, *to cut*, in *Medicine* and *Surgery*, *bleeding*; or the art or operation of letting blood. See BLEEDING.

PHLEGM, φλεγμα, in *Chemistry*, an aqueous and insipid fluid, supposed to be found in all natural bodies; coinciding with what the other philosophers call *water*.

Phlegm makes the fourth of the chemical elements, or elementary principles.

In the distillation of vinegar, as also of all minerals and inodorous vegetables, *phlegm* comes out first; in that of wine, last.

This *phlegm* is supposed to be the common vehicle and diluter of all solid bodies; and in proportion to its quantity in their mixture are the other parts more languid and disabled in their attraction: yet on the chemists system, *phlegm* should be a principle of action, as being necessary to the dissolution of the salt in bodies, and without which the salt must remain inactive.

It is much to be questioned, whether this *phlegm* can ever be procured without some mixture of other matters; that, which has the least of them, must come nearest to the nature of a principle; and, on that account, rain-water should afford it most.

Phlegm, Boerhaave observes, drawn by distillation from vegetables, always carries with it somewhat of the smell

of the vegetable, which it derives partly from the oil, and partly from the ſpirit reſiding therein. The ſame *phlegm*, by frequently reiterated diſtillations, lays aſide moſt of its ſmell, and approaches nearer to pure water; but it never becomes perfectly ſuch. Add, that the pureſt diſtilled water, if expoſed a few days to the ſun, is much changed and rendered turbid.

That *phlegm* is not an elementary body, Mr. Boyle argues from its different powers and properties: the *phlegm* of wine, and that of moſt liquors, have qualities that make them differ from mere water, and alſo from each other: the *phlegm* of vitriol, that author obſerves, is an effectual remedy againſt burns, and a valuable noſtrum for diſſolving hard tumors; and that of vinegar will extract a ſaccharine ſweetneſs out of lead, and even diſſolve corals with long digeſtion; and that of ſugar of lead is ſaid to diſſolve even pearls.

In effect, the characters which ſerve to denominate a fluid, *phlegm*, or water, among the chemiſts, are inſipidity, and volatility; yet quickſilver has both theſe, which nobody pretends to be *phlegm*. Add, that it appears, from ſeveral experiments, that water itſelf, by repeated diſtillations, may be converted into earth: yet water, the ſame author obſerves, has a much fairer preſence to be an element, than any other of the *tria prima*.

Add, that, as to the qualities which occaſion that name to be given any viſible ſubſtance; viz. its being fluid, inſipid, and inodorous, we have never yet ſeen any of theſe ſeparated ſubſtances, which the chemiſts call *phlegm*, which were perfectly deſtitute both of taſte and ſmell.

Common ſalt, and ſeveral other ſaline bodies, diſtilled ever ſo dry, will each yield a large quantity of *phlegm*; which can no other way be accounted for but from this, that among the various operations of the fire on the matter of a concrete, ſeveral particles of that matter are reduced to a ſhape and ſize, requiſite to compoſe ſuch a liquor as the chemiſts call *phlegm*, or water.

PHLEGM, in the *Animal Oeconomy*, is one of the four humours, whereof the ancients ſuppoſed the maſs of blood to conſiſt.

Phlegm is the ſame that is otherwiſe called PITUITA.

PHLEGMAGOGUE, φλεγμαγωγὸς, formed from φλέγμα, *pituita*, and ἄγω, *to drive* or *draw*, a medicine proper to purge *phlegm*, or *pituita*.

Agaric, hermodactyls, turbith, and jalap, are reputed *phlegmagogues*.

PHLEGMASIA, a word uſed by ſome of the medical writers for an inflammation. Hippocrates alſo ſometimes uſes it to expreſs the violent heat in fevers.

PHLEGMATIC, φλεγματικὸς, a temperament, wherein *phlegm*, or *pituita*, is the prevailing humour.

Phlegmatic conſtitutions are ſubject to rheums, defluxions, &c.

PHLEGMON, φλεγμονὴ, formed from φλέγω, *to burn*, or *inflame*, in *Surgery*, a general name for all hot or inflamed tumors, formed in the fleſhy or bloody parts of the body.

An INFLAMMATION, attended with a conſiderable ſwelling of the parts, conſtitutes a *phlegmon*.

If the blood be good and laudable, and only peccant in quality, it is called a *true phlegmon*.

When corrupted and adulterated with bile, or pituita, it is called a *baſtard phlegmon*; in which caſe, it particepates of the eryſipelas, œdema, or ſcirrhus.

The blood, here extravaſated, produces a heat, redneſs, tenſion, remitency, pulſation, and great pain. The bubo, carbuncle, furuncle, puſtules, and other tubercles ariſing from the blood, are all reducible to the *phlegmon*, &c. The ophthalmia, parotides, ſquinancy, and even pleuriſy and peripneumony, are ſpecies of the *phlegmon*.

If the proximate cauſe of theſe tumors be enquired into, we ſhall find it generally riſes from too thick or viſcid a ſtate of the blood, ſtagnating in the anaſtomoſes of the ſmalleſt veins and arteries; ſo that the blood being propelled in larger quantities than can paſs through thoſe veſſels, it muſt of conſequence excite the ſymptoms that are the attendants of this tumor, and occaſion great diſorder at every part where ſuch ſtagnation is made.

No part of the body, whether external or internal, is perfectly exempt from this ſort of tumor, not even the bones themſelves; but it is more common in the fat and glands than elſewhere.

The cauſes of this ſtagnation of the blood are either external or internal.

Among the external, are all wounds, fractures, luxations, contuſions, punctures, by thorns and ſplinters, with a too great compreſſion of the veſſels, whether by too ſtrict a bandage, or by other means; each of which obſtructing the paſſage of the blood through its minute veſſels, either by dividing, bruiſing, compreſſing, or diſtorting them, may give riſe to this tumor.

And to theſe may be added burns of all kinds, with too violent cold, the too great motion of the body, the external application of ſharp and ſtimulating ſubſtances to the ſkin, and others, which ſtop the pores of the ſkin, and impede the circulation of the blood.

Among the internal cauſes, are to be reckoned the too great acrimony of the blood, as in ſcorbutic habits, the blood's abounding in too great quantities, or being of too thick a conſiſtence, or, laſtly, its circulating in the body with too violent a motion; for by this laſt means, the groſſer particles of the blood are protruded, and wedged in, as it were, in the ſmaller veſſels, through which they cannot find a paſſage; and this is eſpecially the caſe, when a ſudden cold is given to the body from a ſtate of extreme heat. In ſhort, every thing will produce an obſtruction that makes either the particles of the blood too large, or the mouths of the veſſels too ſmall and narrow to receive them.

The reſolution or diſperſion of a tumor of this kind is only practicable when the tumor is of a milder kind; when it is in a ſound habit of body, and when the blood is not yet too viſcid, or too violent in its motion: but ſuppuration follows when the inflammation is more violent, the circulation more rapid; but yet the maſs of blood ſomewhat temperate and free from acrimony.

That is, when the blood becoming more inſpiſſated, and its larger particles ſticking in the more minute veſſels, can find no paſſage; but the ſmall veſſels are burſt by the preſſure and impulſe of the obſtructed blood, ſo that their contents are extravaſated in the fat, fleſh, and adjacent parts. Upon this extravaſation, the more ſubtle and fluid parts of the blood putrefy, by means of the great heat, and become fœtid and acrimonious, and corrode the adjacent parts: the fluids thus changed or corrupted, are, by the ſurgeons, called matter or pus; and this of ſeveral kinds, according to its conſiſtence and colour: it is either white, yellow, greeniſh, reddiſh, or party-coloured.

When the forementioned ſymptoms are much more violent, and the blood at the ſame time more acrimonious than it ought to be, this inflammation generally terminates in a gangrene: for, in that caſe, the ſmalleſt arteries and veins are corrupted, burſt, and broke; and hence the adjacent parts are diſſolved and corrupted by theſe extravaſated acrimonious humours, and particularly the ſkin is very ſubject to be filled with puſtules, when its cuticle has been ſeparated, as in burns.

The ſanies contained in theſe puſtules and elſewhere is uſually termed ichor, and is generally of a pale reddiſh caſt, and ſometimes brown or livid, which is much worſe; for unleſs the patient in this caſe is timely aſſiſted, the ſymptoms of inflammation all go off, the tumor, reſiſtance, heat, redneſs, pain, and pulſation, gradually diſappear, and the limb becomes flaccid and cold; it afterwards turns pale, and becomes dead and inſenſible, and the inflammation creeps to ſome other part.

If this caſe be treated with medicines too hot, too aſtringent, cooling, fat, acrimonious, or narcotic; or if the parts be bound too tight, the fleſh quite dies, its paleneſs turns to a livid lead colour; and the incloſed ſanies, finding no vent, becomes more acrimonious, and ſo greatly corrodes the adjacent parts, as to deſtroy all ſenſe and motion, and brings on an entire ſphacelation of the whole limb. But if the inflamed part be full of glands, and the blood very thick, glutinous, and tough, the ſmall veſſels are then ſtrongly ſtuffed up with it, and impacted together; and the parts loſing their ſenſation, become changed into a hard tumor, called a ſcirrhus. The cure of *phlegmons* is by diſperſing or ſuppuration: the methods for bringing on theſe, ſee under INFLAMMATION and SUPPURATION. Heiſter.

PHILEOS, in *Botany*. See PHLEOS.

PHLEUM, in the Linnean ſyſtem of *Botany*, a graſs called *cypreidia*, or *cat's-tail graſs* by Scheuchzer, which makes, with this author, a diſtinct genus of plants, of the *triandria digynia* claſs: the characters of which are, that the cup is a glume, containing one flower; it is bi-valve, oblong, ridged, and compreſſed, and opens into a double-pointed ſummit; the valves are erect, hollowed, compreſſed, equal in ſize, and bearded; the flower is compoſed of two valves, ſhorter than thoſe of the cup, the outer one, which is the larger, ſurrounding the inner or ſmaller one; the ſtamina are three capillary filaments, longer than the cup; the antherœ are oblong, and divided into two at the ends; the germen of the piſtil is roundiſh; the ſtyles are two in number, ſmall and bent; and the ſtigmata are plumoſe: the cup and flower incloſe the ſeed, which is ſingle, and of a roundiſh form. There are five ſpecies.

PHLOGIDIAUGIA, formed from φλογίζω, *I inflame*, and αὐγὴ, *tranſparence*, in *Natural Hiſtory*, the name of a claſs of inflammable foſſils, of a pure texture, and in ſome degree tranſparent.

Of

Of this class are the sulphurs, orpiments, realgars, and amber.

They are by this name distinguished from the PHLOGISCHERIA. Hill.

PHLOGINOS, the name of a stone found in Ægypt, and called by some *chrysites*, from its colour resembling gold.

PHLOGISCHERIA, derived from φλογιζω, and χειρ, *a hand*, in *Natural History*, the name of a class of fossils, the characters of which are, that the bodies contained in it are inflammable, of a coarse and impure texture, and not pellucid.

The bodies of this class are divided into two general orders, and under those, into five genera. Those of the first order are such as are found loose, and in detached masses: those of the second, such as are found constituting whole strata. The genera of the first order, are ambergrise, jet, and the asphaltæ; and those of the second, canal and common coal.

PHLOGISTON, formed of φλογιζω, *I am inflamed*, in *Chemistry*, is defined to be the most pure and simple inflammable principle. That such a principle exists, in various degrees and modes of combination, in different bodies is a fact, which has been long and generally acknowledged. Some bodies have been observed to be capable, by exposure to fire with the concurrence of air, of being kindled, of producing flame, of augmenting the fire, and of maintaining and supporting it; while other bodies, by exposure to fire, did indeed, become hot, red, and luminous, but were incapable of producing flame and of maintaining fire. Hence chemists have been always led to distinguish these two kinds of bodies, calling the former combustible, and the latter incombustible; and they supposed, that the inflammability of combustible bodies was the effect of a principle, which did not exist in those that were incombustible. However some late writers have controverted this hypothesis, and the distinction founded upon it. Dr. Priestley conjectures, that the difference between the substances which are called inflammable, and others which also contain *phlogiston* may be this, that in the former the heat, or the vibration occasioned by the emission of their own *phlogiston*, may be sufficient to occasion the emission of more till the whole be exhausted; that is, till the body be reduced to ashes. Whereas in bodies which are not inflammable, the heat occasioned by the emission of their own *phlogiston* may not be sufficient for this purpose, but an additional heat *ab extra* may be necessary.

M. Beneber, another ingenious author who has treated of this subject, does not seem willing to allow, that there is any body to be found which is incombustible, or proof against fire; and he observes, that even if such a body were found, it would not be reasonable to conclude, that it had no *phlogiston*, but only that *phlogiston* adheres most tenaciously to those bodies which resist the impression of fire; and he adds, that there is no body which remains incombustible, if *phlogiston* be added to it, to facilitate the dispersion of that which it already contains. This inflammable principle cannot be separated from the other principles of bodies and obtained pure; and, consequently, as it is impossible to discover all the properties which are peculiar to it, and which distinguish it from all other substances, its precise nature has been very imperfectly understood. Hence the ancient chemists confounded it with oil and sulphur, which are only substances into the composition of which a great quantity of this principle enters: nor did they seem to know, that only one inflammable principle exists, always the same, always similar to itself, in oils, sulphur, coals, and all other bodies, which the modern chemists since the time of Stahl have sufficiently ascertained: so that it is now generally allowed, that *phlogiston* is the same in the three great classes of natural bodies, i. e. in the animal, vegetable, and mineral kingdoms. That which is extracted from minerals is precisely the same with that of the charcoal of animal and vegetable substances; *phlogiston* may also be transmitted from bodies of one class to those of another, and it produces, in this case, the same effects as if it had been taken immediately from the bodies of the class to which it is transmitted. After all the combinations, through which it may have passed, it remains invariably the same, and always comes forth with its primitive characters. Beecher calls this principle inflammable earth, and Stahl called it the principle of inflammability or *phlogiston*.

Some philosophers dislike the term *phlogiston*, and call the inflammable principle the elementary fire of bodies: but there seems to be no just objection against giving that or any other name to a real something, the presence or absence of which makes so remarkable a difference in bodies as that of metallic calces and metals, oil of vitriol and bituminous, &c. and which may be transferred from one substance to another, according to certain known laws: or, as one and the same unknown cause of certain well known effects. Whereas the term fire, used to denote a constituent principle of natural bodies, is more ambiguous, because in common acceptation it includes *heat*, which has no more proper connection with *phlogiston* than it has with water or any other constituent part of bodies; and it will be necessary to recur perpetually to the distinction of fire in a state of action and fire inactive or quiescent.

It has been controverted among writers on this subject, whether *phlogiston* be pure elementary fire in its state of combination with the bodies in which it is found, if in this state it be susceptible of combining without any intermediate substance; or whether, in order to this combination, it be necessary that this element should be previously combined with some other substance, and consequently, that it is only a secondary principle. In favour of the former opinion it is urged, that the inflammable principle of bodies cannot be separated and procured from bodies in any other state than that of free and active fire, and that it is deprived of its activity by the union which it contracts with other substances. If this be the case, *phlogiston* has no other property than those which arise from the union of pure fire with the several substances to which it is united. But it is alledged on the contrary, that when *phlogiston* is taken from one body by means of another applied to it, it unites with this as soon as it is disengaged from the former; and, therefore, the advocates of this opinion maintain, that it is not procured pure and alone, because it only quits one combination to enter at the same time into another.

Beneber maintains, that the *phlogiston*, which falls under our observation, seems to be always united to an acid; and that which appears to be the most generally combined with it is the vitriolic acid, which, at least, abounds in all combustible bodies. But he conjectures, that it is not always the same vitriolic acid, that is united to *phlogiston*; and that the difference in the effect produced by *phlogiston* in the bodies, where it is found, proceeds from the different acids with which it is combined in them. Thus, when it is united with the vitriolic acid, it forms sulphur; when it is combined with sea-salt, it produces, as he says, phosphorus; and joined with nitre, it loses its qualities and concentrates itself in bodies by means of that union. Although *phlogiston*, says this writer, exhibits itself almost always under an oily form, and more especially in charcoal, which is its proper mine or matrix, nevertheless it is not oil, but is possessed of qualities that are peculiar to it. The flame of charcoal has not the acidity of the flame produced by oil; the former is rather of a bluish cast; the latter of a whitish colour. The flame of charcoal leaves behind it neither smoke nor soot; the flame of oil produces both, in quantities that depend upon the nature of the oil; the ether itself is more or less impregnated with a fuliginous vapour; burning charcoal exhales a portion of subtile matter, which does not appear under a burning form, such as the gas; and the result of this observation seems to be, that *phlogiston* is not enveloped with a substance of sufficient density to let the fuliginous particles escape like oils which waste away. The malignant vapour, which is formed by burning charcoal, bears several characters of *phlogiston*; like this latter, it is not coagulable; it has the same affinity with acids; it produces the same effects that result from the vapours of bodies in putrefaction, with this exception, that the vapour of charcoal appears more disengaged than that which arises from putrified bodies; but nothing seems to ascertain more fully the resemblance of these three vapours, than their affinity with the acid; and accordingly we find that the only method of removing their pernicious effects, is to make an acid evaporate in all places, where these effects are apprehended: in the use of this method, the acid, probably, envelopes the *phlogiston*, and diminishes its activity and volatility. Thus also acids diminish the effects of intoxication from drinking, because they act upon the *phlogiston* of wine, which attacks the nerves, in the same manner as they act upon that of charcoal, when it is diffused through a chamber. Although *phlogiston* is essentially volatile, it is nevertheless fixed, when it is not exposed in the air to the action of fire. Beneber is inclined to consider flame as the conductor of *phlogiston*; and this notion seems to be confirmed by an experiment of M. de Buffon.

However the question concerning the nature of *phlogiston* be determined, the power which chemists have of transferring the inflammable principle from one combination to another, by combustion and dissipation, has furnished them with the means of making many important observations on the effects which it produces in chemical operations, and of discovering the properties which it communicates to the several substances with which it unites. Some of these we shall collect together, and recite in the sequel of this article.

The union of *phlogiston* with an uninflammable substance

produces a new compound, which becomes inflammable and capable of producing heat and light more or less eaſily, according to the quantity of *phlogiſton* united with it, and the manner of its combination. This principle, united with bodies naturally ſolid, diminiſhes their hardneſs and renders them more fuſible; and it likewiſe diminiſhes the fixedneſs of the body in which it is combined. It increaſes the abſolute gravity, and frequently the ſpecific gravity of bodies into which it enters; and in ſome caſes renders them opake. Subſtances, which have neither ſmell nor colour, acquire generally one or the other, and frequently both, by their union with the inflammable principle; and hence chemiſts have been inclined to conſider it as the principle of colours and ſmells; although ſome bodies which contain *phlogiſton* in a ſmall quantity have neither any ſenſible colour nor ſmell. It is obſerved that *phlogiſton* is not equally diſpoſed to unite with all ſubſtances; that it combines very difficultly with fluid, volatile and light matters, ſuch as air and water; but it may be eaſily combined with ſolid, fixed, and heavy ſubſtances, as earths. And it ſerves as a kind of intermedium ſubſtance for uniting together bodies that are either incapable of uniting, or that unite with difficulty without it. The combination of *phlogiſton* with different kinds of air and alſo with water, has been illuſtrated and evinced by a variety of experiments by Dr. Prieſtley: all the kinds of air, he ſays, that appear to be eſſentially diſtinct from each other are fixed air, acid, and alkaline; becauſe theſe and another principle, called *phlogiſton*, which he has not been able to exhibit in the form of air, and which has never yet been exhibited by itſelf in any form, ſeem to conſtitute all the kinds of air with which he is acquainted. See on this ſubject a Treatiſe on the various kinds of Gaſes, by the ingenious author of the Chemical Dictionary, in the Appendix, chap. 17.

Dr. Prieſtley has alſo ſhewn how common air is depraved and rendered unfit for the purpoſes of reſpiration, combuſtion, &c. by uniting with the *phlogiſton* diſcharged from the lungs of animals, from burning bodies, from calcined metals, from putrifying ſubſtances, &c. and in ſome caſes being ſaturated with it, ſo as hereby to become phlogiſticated. And as a variety of cauſes contributes to the releaſe and diſcharge of *phlogiſton* from bodies in which it is combined, and from which by certain proceſſes it is diſengaged, which by uniting with the air diminiſhes it, precipitates its fixed air, and renders it noxious, he has diſcovered that vegetating plants purify the air by imbibing its *phlogiſton*, and that the agitation of water is alſo conducive to the ſame beneficial purpoſe.

A general abſtract of his diſcoveries may be found under the articles AIR and BLOOD. See alſo FIRE and HEAT.

It is obſerved, that there is no claſs nor kind of ſalts, that do not contain *phlogiſton* and that have not affinities with it. It has the greateſt affinity with acids, inſomuch that ſome writers have contended, that there is no *phlogiſton* without an acid. Of all the acids, the nitrous is that which has the greateſt affinity with the inflammable principle: its volatility, colour, and ſmell, its inferiority of ſtrength compared with vitriolic acid, its inflammability and total decompoſition by inflammation prove, that *phlogiſton* is one of the conſtituent parts of that acid; and beſides, it is known to act more ſtrongly in general than vitriolic acid upon all bodies that contain the inflammable principle, and more effectually deprives them of this principle, as is the caſe in the ſolutions of metals. In a dry ſtate it unites with *phlogiſton* in the moſt intimate manner, and forms a kind of ſulphur that may be called nitrous ſulphur, which is ſo inflammable, that it kindles as ſoon as it is formed, and can never, therefore, be obtained alone and uninflamed.

The marine acid is that which it is moſt difficult to combine with *phlogiſton*; for though it is lighter and more volatile than the vitriolic acid, it is incapable of acting upon many inflammable matters, as oils, or at leaſt, acts upon them in a very feeble manner, and takes little of the *phlogiſton* from metals. Beſides Macquer ſays, that there is no immediate combination of marine acid with *phlogiſton*, or marine ſulphur; the PHOSPHORUS of Kunckel not being, he ſays, of this kind, as Stahl and other chemiſts have apprehended. The union of *phlogiſton* with the vitriolic acid in a dry ſtate is known to produce ſulphur, the inflammability of which is cauſed by the *phlogiſton* contained in it, and which is decompoſed by the burning of its *phlogiſton*. Some have even ſuppoſed, that the different combination of *phlogiſton* with different acids may be one of the cauſes of the different affinities of bodies to each other.

Phlogiſton alſo unites itſelf with alkalis; and this union is manifeſt in putrid exhalations. Moreover, volatile alkalis produce the ſame effects that ariſe from the *phlogiſton*; they render the blood more fluid, increaſe its circulation, and excite perſpiration; and the odours of both are equally ſuffocating to thoſe who breathe the air that is impregnated with them. The fixed alkalis ſaturate themſelves with *phlogiſton*, when they are calcined in cloſe veſſels with charcoal or ſimilar ſubſtances. Nevertheleſs theſe alkalis ſeem to have leſs affinity with *phlogiſton* than the vitriolic and nitrous acids, or even than the metallic earths. *Phlogiſton* alſo unites itſelf with earthy ſubſtances under a dry form, and which are much attenuated, ſuch as clays, to which it adheres with great force: and it ſeems to be moſt diſpoſed to unite with theſe earths when it is in the ſtate of oil, of ſoot, or of vapour. The coals of vegetable and animal matters are nothing elſe than ſingular combinations of the earthy part of theſe organiſed bodies with the inflammable principle of their oils or fat: and yet this principle does not ſo much adhere to the earth of coals as not to quit it, in order to combine with other ſubſtances with which it has a ſtronger affinity, as with the vitriolic, nitrous, and phoſphoric acids, and with metallic earths.

Moreover, *phlogiſton* appears to be intimately combined with metals; without it they loſe their metallic properties, and with it they recover them. This is a truth which has been long known and demonſtrated. The difference of weight between a metal and its calx has been a phenomenon, which has much puzzled the chemiſts and philoſophers. Some, in order to account for this difference, have aſcribed abſolute levity to *phlogiſton*, which, by being combined with the calx under the form of metal, diminiſhes its weight. The true cauſe of this difference was firſt ſuggeſted by Jean Rey, in the beginning of the laſt century (ſee *Eſſential* HEAT), but for many years it was little known or regarded: however, it has been ſufficiently aſcertained by the late experiments of Hales, Prieſtley, Lavoiſier, &c. on *fixed* AIR. See CALCINATION.

The diſtinguiſhing characters of *phlogiſton* are moſt clearly diſcerned by comparing the properties of metals with thoſe of their calces. The latter are generally harder, more ſolid, more fixed, leſs denſe, leſs fuſible, and leſs opake than the former. Thus lead and tin are very ſoft metals; nevertheleſs, when lead is calcined and afterwards melted, a glaſs is formed much harder than the lead from which it was produced. Tin, which calcines ſtill more completely than lead, is eaſily changeable into white earth, the parts of which, though very fine, are ſo hard, that they are employed to poliſh very hard bodies, as ſteel, glaſs, &c. See PUTTY.

The moſt volatile ſemi-metals, as regulus of antimony and zinc, are changed by burning their *phlogiſton* into perfectly fixed earths. Regulus of antimony and tin are fuſible with a gentle heat; yet the calces of theſe metals are juſtly conſidered among the moſt refractory bodies. The denſity, opacity, and ductility which metals receive from their *phlogiſton*, evidently proceed from the particular manner in which the parts of the *phlogiſton* are applied to thoſe of the metallic earths.

Many facts have been lately urged to evince the identity of *phlogiſton* and the electric matter: they reſemble one another in the light and ſmell they afford, and in the effects they produce on animals and vegetables; they both accelerate the circulation of the blood, and of the ſap; they augment the fluidity of both; they alike occaſion cutaneous eruptions, remove obſtructions in the veſſels, irritate the muſcles, and act upon them when all other ſtimulants are ineffectual. They concur in deveſoping the parts of animals and vegetables in promoting their growth: animals, that are killed by lightning or by the electrical ſpark, ſeem to be affected in the ſame manner with thoſe that are ſuffocated by mephitic or phlogiſtic vapours. The ſame cauſes, which diſſipate the electric fluid, ſeem alſo to diſſipate the *phlogiſton*, and to occaſion a ſtate of bodily inquietude in perſons who are valetudinary, by depriving them of too large a quantity of *phlogiſton*: thus, a moiſt and humid air affects both the one and the other in the ſame manner. The moments preceding thunder-ſtorms are burthenſome and oppreſſive, becauſe they accumulate on the nerves too great a quantity of *phlogiſton*, or electrical fluid. Thus, like *phlogiſton*, melts and calcines metals, and revivifies their calces.

Phlogiſton and the electrical fluid are known to promote evaporation; the electrical ſpark infects the air, juſt as *phlogiſton* does where it abounds; they both depoſit fixed air, diminiſh common air, and form a precipitate in lime-water.

From theſe and other ſimilar effects, it is concluded, and not without reaſon, that the electric matter either is or contains *phlogiſton*. See *Theory of* ELECTRICITY.

Light is alſo ſuppoſed to be a modification of *phlogiſton*; and this ſuppoſition is rendered probable, not only by many electrical phenomena, if the identity of the electric matter and *phlogiſton* be admitted, but by the known fact, that no other ſubſtances beſides thoſe which contain

phlogiston are capable of ignition, and of becoming luminous. For an account of several curious observations and experiments relating to *phlogiston*, in its connection with heat. See HEAT.

Modern chemists and philosophers have ascribed a very extensive operation and use to *phlogiston*, in the whole oeconomy of nature. See AIR, BLOOD, COMBUSTION, CONDUCTORS, METALS, MUSCULAR *Motion*, NUTRITION, PLANTS, PUTREFACTION, VEGETATION, &c.

A late author, however, in a Discourse on *Phlogiston*, has attacked the generally received doctrine concerning *phlogiston*; and he concludes with saying, that nothing true and certain is known concerning the nature of this principle. See on the subject of this article, Chemical Dict. Eng. edit. art *Phlogiston*. Scheibler's Mem. sur le Phlogistique, &c. published in the abbe Rozier's Journal; and Priestley's Observations, &c. on Air, in 2 vols 8vo. passim.

The ingenious and indefatigable Dr. Priestley informs the editor, that from some late experiments, not yet published, he has reason to conclude, that *phlogiston* is simply *inflammable air*, in a state of combination with any substance, just as fixed air is contained in chalk, &c. With a view of ascertaining the nature and reality of *phlogiston*, he threw the focus of a burning lens on some calx of lead, out of which all air had been expelled, when it was confined in inflammable air. The consequence was, that the air was rapidly absorbed, lead was formed, and what remained of the air was just as inflammable as at first. From about forty ounce measures of the air, obtained from iron by oil of vitriol, he got about five penny-weights of lead.

PHLOGITES, in *Natural History*, a name given by Pliny and other authors to a stone, which they say had the appearance of flames of fire, bubbling up and rising to several points within it. It is sometimes called also *phlegonites*.

Some have supposed that the ancients meant no more by this distinction, than to express a fire colour lodged in the stone.

Pliny ranks the *phlogites* among the gems, but Sabinus and others place it among the larger stones: and we have from some parts of Germany, a spar, with radiations of a fiery red in a white ground, which looks as like flames as any thing one could expect in a stone; but whether this, or some other, be the stone called petrified flames of fire by the collectors of that nation, we are not assured.

PHLOGONLÆ, in *Natural History*, the name of a class of fossils, usually included by authors with many others of a very different kind, under the general name pyrites. These are defined to be compound, inflammable, metallic bodies, found in small masses, and of determinately angular figures. Of this class of bodies there are three genera, viz. the *pyricubia*; the *pyrodactonia*; and the *pyripolygonia*. See PYRICUBIA, &c.

PHLOGOSIS, Φλογωσις, in *Surgery*, sometimes denotes a slight degree of the OPHTHALMIA: in general it denotes a disposition to inflammation.

When the inflammation of the eye is light and gentle, it is called a *phlogosis*, when very severe, a CHEMOSIS.

PHLOGUS, in *Botany*, a name given by some of the ancients to several species of the *iris* and *gladiolus*, and by some to the *flammula jovis*, a sort of clematitis, so called because of the violent heat of its leaves to the taste.

PHLOMIS, in *Botany*. See SAGE *tree*.

PHLOMON *Sephanmaticon*, in the *Botanical Writings of the Ancients*, a name given to the common white mullein. The upper part of the thyrsus, or spike of flowers of this plant, was frequently used in the garlands and coronæ of the ancients; and it is named by Dioscorides and others among the yellow flowers in general use on that occasion.

PHLOX, *Sybatica*, or *hastard hyacinth*, in *Botany*, a genus of the *pentandria monogynia* class: its characters are, that the corolla is hypocrateriform, the filaments unequal, the stigma trifid, the calyx prismatic, and the fruit a capsule containing three cells, and a single seed. There are ten species.

PHLYACOGRAPHIA, formed from φλυαξις, *to trifle*, or φλυαξ, *trifler*, of φλυω, among the *Ancients*, a merry and burlesque imitation of some grave and serious piece; particularly a tragedy travestied into a comedy.

The *phlyacographia* was the same thing with the HILARODIA, or *hilarotragedy*.

There were several kinds of *phlyacography*, which had their several names. See Salmasius on Solin.

The parodies, which have been made of some parts of the best poets, as the Virgil Travesty of Scarron and Cotton; the Rival Queens of Cibber, from the Rival Queens of Lee; and some pieces of operas, the music whereof is applied to low and ridiculous words, are comprehended under the notion of *phlyacographies*.

PHLYCTÆNÆ, Φλυκταινα, formed of φλυω, *I am hot*, little white itching pimples, or vesiculæ, arising on the skin, chiefly between the fingers, and about the wrist; and full of a limpid serum.

These sometimes degenerate into the itch, and sometimes into tetters. They are cured like other cutaneous eruptions.

PHLYCTÆNÆ also denote little ulcerous vesicles, arising sometimes on the adnata, and sometimes on the cornea, of the eye, like so many little bladders full of water: they are popularly called *blisters on the eyes*.

They appear like grains of millet; and, when produced by a sharp corroding humour, occasion violent pain: the pustules on the adnata are red; those on the cornea are blackish, if near to the surface; but whiter, if deeper.

They are cured by discutients and driers.

PHLYSIS, a term used by the ancients to express an eruption on the skin, from a redundance of humours.

PHLYSTÆNÆ, formed from φλυω, φλυζω, *vhallio, I boil, bubble*, &c. in *Medicine*, a disease which produces buboes, or tumors, full of a serous humour.

The *phlysteena* is a virulent disease. The buboes it occasions are sometimes large, livid, pale, black, or of any colour different from that of the natural flesh; and, when pierced, the flesh frequently appears ulcerated under them.

They are usually occasioned by a hot, sharp humour; and arise on all parts of the body; but they are most dangerous on the cornea of the eye.

PHLYZATION, a pustule or inflammation on the skin, or the blisters arising on it after being burnt or scalded with a hot liquor.

PHOBOS, *Fear*, in *Mythology*, was personified by the Greeks, and represented with the head of a lion. See FEAR.

PHOCA, in *Zoology*, a genus of the order of *feræ*, and class of *mammalia*, in the Linnæan system: its characters are, that the number of fore-teeth in the upper jaw is six, which are parallel, the exterior being larger than the others; in the lower jaw there are four, parallel, distinct, equal and a little obtuse; there is one canine tooth in each jaw, though Pennant reckons two; the grinders are five or six, which have three points; there are no external ears, and the hind feet are palmated. To this genus belong three species, viz. the SEA-*bear*, the SEA-*lion*, and SEA-CALF.

Dr. Parsons derives the generic name *phoca*, from φωκη, or according to Dr. Charleton, from φωκη, signifying a noise or kind of grunting made by these animals. He also reduces to this genus the MANATI, the SOIE OF SEAL, and the WALRUS or *morse*. Phil. Transf. vol. xlviii. p. 160, &c.

PHOCÆNA. See PORPESSE.

PHŒBUS, in *Mythology*, a name given to APOLLO.

PHŒNICIAN *character*. See CHARACTER.

PHŒNICOPTERUS, in *Ornithology*, a genus of the *grallæ*, in the Linnæan class of birds; of which there is one species. See FLAMINGO.

PHŒNICOPUS *gallinula*, in *Ornithology*, a name by which some authors have called a bird, more usually known by the name FRINGA.

PHŒNICURUS, Φοινικουρος, in *Ornithology*, a name by which the ancient naturalists called the *ruticilla*, or REDSTART.

PHŒNIGMUS, Φοινιγμος, formed from φοινιξ, *red*, a medicine which produces redness, with blisters, on the places it is applied to.

Such are mustard-seed, pepper, vesicatories, &c.

Phanigmi are used to draw the humour to the part they are applied on, and to divert it from the part affected.

PHŒNIX, Φοινιξ, in *Astronomy*, a constellation of the southern hemisphere; unknown to the ancients, and invisible in our northern parts.

The number of stars in this constellation is thirteen; the situation, longitude, latitude, and magnitude of which are as follow:

Names and situations of the stars.	Signs	Longitud. °	′	″	Latitude. °	′	″	Magnitude.
In the bright head	♑	0	1	1	0	1	1	2
		1	35	57	10	53	45	
In the neck		10	38	20	11	15	41	4
In the corner of the right wing		5	46	10	41	54	38	3-4
S. of three in right wing.	♒	29	47	46	38	49	12	4
Middle.	♑	1	5	35	16	5	3	4
5. North		3	23	49	51	39	56	5
In the end of left wing		24	14	17	47	33	17	3
In the foot of the same		11	54	10	15	14	6	4
At the right foot		7	41	33	16	51	5	4
Under the left wing 2.		19	38	31	52	34	22	3
10. N.		16	22	26	8	14	27	3
Under the right wing 1st		1	24	0	54	24	16	3-4
2d		8	27	38	55	5	23	4

This conſtellation took its name and form from that of a bird famous among the ancients; but generally looked upon by the moderns as fabulous.

The naturaliſts ſpeak of this bird as ſingle, or the only one of its kind: they deſcribe it as of the ſize of an eagle; its head finely creſted, with a beautiful plumage; its neck covered with feathers of a gold colour, and the reſt of its body purple; only the tail white, intermixed with carnation; and its eyes ſparkling like ſtars. They hold, that it lives five or ſix hundred years in the wilderneſs; that, when thus advanced in age, it builds itſelf a funeral pile of ſweet wood, and aromatic gums; then it fires it with the waſting of its wings, and thus burns itſelf; and from its aſhes ariſes a worm, which, in time, grows up to be another *phœnix*.

Hence the Phœnicians gave the name *phœnix* to the PALM-*tree*; becauſe, when burnt down to the very root, it naturally riſes again fairer than ever.

Ancient hiſtorians reckon four appearances of the *phœnix*, the firſt, in the reign of Seſoſtris; the ſecond, in that of Amaſis; the third, in that of the third Ptolemy; and the fourth, according, to Dion Caſſius, as a preſage of the death of Tiberius, but Tacitus refers it to Egypt under the empire of Tiberius, and Pliny to the conſulate of Quintus Plancius, which took place A. D. 36.

The ancients, however, ſpeak of the *phœnix* as a fabulous bird.

The ancient Chriſtians refer to the *phœnix* in ſome of their accounts of the reſurrection.

PHŒNIX, in *Botany*, a name given by medicinal writers to the graſs called *lolium rubrum*, and in Engliſh, *ray-graſs*.

PHŒNIX is alſo the name given by Kæmpfer and Linnæus to a genus of plants in Linnæus's Appendix, called by others *elate* and *kurzuindeli*. The characters are theſe: it produces ſeparate male and female flowers, in both the whole ſpatha ſerves for a cup which is divided into three parts, and the petals are three in both; in the male the petals are of an oval figure and concave; the ſtamina are three ſlender filaments, and the antheræ are very ſhort: in the female flower the germen of the piſtil is of a roundiſh figure; the ſtyle is ſhort and pointed, and the ſtigma is acute; the fruit is an oval drupe, having only one cell; this contains one ſeed, which is of a bony hardneſs, and of an oval figure, with a deep longitudinal furrow reaching from one end to the other. There is only one ſpecies. See PALM-TREE.

PHŒNIX, *penis*, among the *Ancients*, a muſical inſtrument not unlike the CITHARA.

PHŒOPUS, in *Ornithology*, a name uſed for two different birds: the one called by the Germans *brachvogel*, and the other the *wilmbrell*, or *aquata minor*, the ſmall curlew of authors.

The firſt of theſe, or the *brachvogel*, is of a deep black colour, ſpotted with a yelloviſh and reddiſh brown; its beak is long, ſlender, and black, and is moderately bent; its neck is grey, tending to reddiſhneſs towards the bottom, and its belly is white. Mr. Ray ſuſpects this not eſſentially to differ from the other, but the ſight of the bird alone can determine that.

PHOLAS, in *Natural Hiſtory*, the name of a genus of *ſhells* belonging to the *teſtacea* order in the claſs of worms, in the Linnæan ſyſtem; the characters of which are theſe: its animal is an aſcidia; the ſhell is bivalve, opening wide at each end, with ſeveral leſſer ſhells at the hinge; the hinges fold back and are united by a cartilage; beneath the hinge in the inſide there is an incurvated tooth. Linnæus enumerates ſix ſpecies. See *Tab. of Shells*, N° 29.

The word *pholas* is derived from the Greek φωλεὸς, and ſignifies no more than any thing which is hidden; the name was given to this genus of ſhell-fiſh from their cuſtom of making themſelves holes in earth, ſand, ſtones, or wood, and living hidden in them. Many being of opinion, that theſe could not work themſelves into the ſubſtance of hard ſtones, have thought that they were hatched in holes accidentally formed in ſtones, and that the ſhells naturally grew of ſuch a ſhape as was neceſſary to fill the cavity. Nor is this the only error propagated concerning the *pholas*; for as all that was ſignified by the name being only that the ſhell was hidden in ſome ſolid ſubſtance, whenever an author found a ſhell-fiſh of whatever kind thus buried in ſtone, he deſcribed it under the name of *pholas*.

There are many ſpecies of the ſhell-fiſh, and theſe of ſeveral different genera, which thus hide themſelves in ſtone; and theſe have therefore been called by different authors *pholades*; and hence it has been ſaid, that the *pholas* was in ſome ſpecies a bivalve, and in others a multivalve ſhell. The true *pholas*, which Liſter has very well deſcribed, is a genuine multivalve, being compoſed of five pieces; but this is a very ſcarce fiſh, and ſeveral of the muſcles and of the chamæ being often found in ſtone, they have all been called bivalve *pholades*; and ſuch as have found the chamæ thus immerſed, and found them really to conſiſt of only two ſhells, have cenſured the authors of error who have deſcribed the *pholas* as having five. Hiſt. Nat. Eclaire. p. 362.

All the ſpecies of ſhell-fiſh which are found in ſtone have certainly been the means of making the holes in which they are found: the fact is inconteſtible, but the means yet wholly unknown. Perhaps, when ſome accurate obſerver ſhall have an opportunity of examining the fiſh alive, the myſtery will be cleared up. All that we know at preſent is, that they are firſt buried in the ſtone while very ſmall; ſince the aperture on the ſurface of the ſtone is uſually much ſmaller than the diameter of the ſhell contained within, and only ſerves to admit the ſea-water, or to give paſſage to the probocſeis of the incloſed fiſh.

As to the luminous quality of this ſpecies of ſhell-fiſh, obſerved by Pliny and by modern naturaliſts, ſee DACTYLUS.

For an account of a particular ſpecies of *pholas*, called by Dr. Parſons *pholas conatus*, by others *pholas lignarum*, and in Dutch wood-muſcle, becauſe it is found burrowed in timber, ſee Phil. Tranſ. vol Ix. p. 1. &c.

PHOLIS, in *Natural Hiſtory*, the name of a genus of foſſils of the claſs of the gypſums or plaiſter ſtones, the diſtinguiſhing characters of which are, that the bodies of it are conſiderably hard, compoſed of ſomewhat broad particles, and of a bright cryſtalline luſtre.

The word is derived from φολὶς, *a ſcale*, or *ſmall flake*, from theſe bodies being compoſed of particles of that form.

The ſpecies of this genus are the moſt valuable of all the gypſums, as burning to the beſt and fineſt plaiſter, but ſo far as is yet known there are but two of them: the fine plaiſter-ſtone of Montmartre in France, called by us *plaiſter of Paris ſtone*, and *parget*; and the other the coarſer and ſomewhat reddiſh kind, common in many parts of England, and called *bull plaiſter*. Hill. See PARGET.

PHOLIS, in *Ichthyology*, the name of a ſmall anguilliform fiſh, the back of which is brown, the belly white, and the whole back and ſides ſpotted, and the ſkin ſoft and not covered with ſcales, but with a tough mucilaginous matter like the eel.

This moſt of all approaches to the *alauda*, and though uſually ſomewhat larger, yet Mr. Ray doubts whether it really differs from it in any thing eſſential; its great diſtinction being its colour, which, though a very obvious, is a very precarious one.

PHOLLIDES, a word uſed by the ancient phyſicians for ſoft and fungous tumors of the legs, ſuch as thoſe of people in an anaſarca, or leucophlegmacy.

PHOLLIS, as a *coin*. See FOLLIS.

PHONASCIA, Φωνασκια, derived from φωνη, *voice*, the art of forming the human voice.

In ancient Greece, there were combats or contells eſtabliſhed for the voice, as well as other parts of the gymnaſtice.

The combats continued to be held in the time of Galen; and they were theſe that brought the *phonaſcia* into vogue. Hence the maſters of this art, and thoſe who taught the art of managing the voice, were called *phonaſci*, φωνασκοι; and under their tutorage were put all thoſe deſtined to be orators, ſingers, comedians, &c.

PHONICS, Φωνικη, derived from φωνη, *voice*, or *ſound*, the doctrine or ſcience of SOUNDS; otherwiſe called ACOUSTICS.

Phonics may be conſidered as an art analogous to optics; and may be divided, like that, into *direct*, *refractive*, and *reflected*. Theſe branches the biſhop of Verni, in alluſion to the parts of optics, denominates *phonics*, *diaphonics*, and *cataphonics*.

Phonics is improveable, both with regard to the object, the medium, and the organ.

As to the object, ſound, it may be improved, both with regard to the production and the propagation of ſounds.

The firſt, in ſpeaking or pronouncing, in whiſtling or ſinging, or hallooing, or luring, which are all diſtinct arts, and all improveable. The ſecond, by the poſition of the ſonorous body.

With regard to the medium, *phonics* may be improved by the thinneſs and quieſcency thereof, and by the ſonorous body being placed near a ſmooth wall, either plain or arched, eſpecially cycloidally or elliptically: whence ariſes the theory of whiſpering places.

Add to theſe, that by placing the ſonorous body near water, its ſound is mollified; that, by placing it on a plain, the ſound is conveyed to a greater diſtance than on uneven ground, &c.

As to the organ, which is the ear, it is helped by placing it near a wall, eſpecially at one end of an arch; the ſound beginning

beginning at the other), or near the surface of water, or that of the earth.

Alſo by inſtruments, as the ſtentorophonicon, or ſpeaking-trumpet.

Alſo by an inſtrument to help weak ears, as ſpectacles do eyes; by an inſtrument to take in vaſtly remote ſounds, as teleſcopes do objects; by a microphone, or magnifying ear-inſtrument; and by a polyphone, or multiplying ear-inſtrument.

Catophonics, or reflected hearing, may be improved by ſeveral kinds of artificial echoes; for, in general, any ſound falling, either directly or obliquely, on any denſe body of a ſmooth ſurface, whether plain, or arched, is beat back again, or reflected; i. e. it echoes more or leſs. See ECHO.

PHONICUM *centrum*. See CENTRUM.

PHONOCAMPTICUM *cornu*. See CORNU.

PHORBÆA, or PHORBEIA, in the *Muſic of the Ancients*, a name given to a ſort of *frenum*, or *bandage*, applied to the mouths of people who played on the pipe.

It was a ſort of leather band, which went firſt acroſs the forehead, then behind each ear, and from thence making one or two turns round the head, it paſſed over the mouth, where its office was to reſtrain the lips from emitting too much breath at once, and cauſe them to diſcharge only juſt ſo much as would ſerve to inflate the pipe.

Simonides, deſcribing the trial of ſkill between Marſyas and Apollo, mentions this *phorbeia* or *capiſtrum*; and ſome antique gems, yet remaining among us, have the figure of a Marſyas's head, with the *phorbeia* upon it.

By the different ſtructure of the *phorbeia*, as expreſſed on the different coins, we find, however, that there were two ſpecies of it; the one was leſs complex, conſiſting only of a perpendicular piece down the cheek, and a tranſverſe one, running acroſs the lips, and covering the whole orifice of the mouth, only leaving a hole cut through it, at which the mouth-piece of the pipe was to be put in. The other conſiſted of ſeveral bandages, as at firſt deſcribed, and the lower tranſverſe piece of theſe did not come over the mouth, but only bore up the lower lip in a forcible manner, againſt the upper.

The old Greek writers diſtinguiſhed theſe by two different names added to the original word *phorbeia*; the firſt, or ſimple one, was called *monomeres*; and the other, or more complex one, *diomeres*: they were both called alſo, by Soranus, and others, *epideſma*, and ſometimes ſimply *deſma*. Soranus de Epideſmis.

PHORIMOS, a name given by ſome authors to *rach* ALLUM.

PHORINE, a word uſed by ſome authors to expreſs the ſkin of a hog, ſome alſo underſtand it to mean a ſkin of any kind, extending it even to the human cutis.

PHORMIX, among the *Ancients*, the ſame with CITHARA.

PHORMORAPHIS, in the *Materia Medica*, a name often uſed by the later Greek writers, and generally looked on as one of their unintelligible words, or the name of ſome drug not known at this time. See CARPESIA.

PHORONOMIA, derived from φορὰ, *motion*, and νόμος, *law*, is a ſcience comprehending the laws of motion, both of ſolids and fluids. The work of Hermannus, printed at Amſterdam in quarto, in 1715, under this title, is well known.

PHOS, a word uſed by ſome medical writers to expreſs a diſtemperature of the eye, in which there is ſeen a black circle wholly ſurrounding the pupil.

PHOSCAS, in *Ornithology*, the name of a freſh-water fowl of the duck kind, and of the ſize of the common wigeon. Its body is remarkably flat; its beak and legs are blue; its head and neck are of a brownith colour, variegated all over with numerous triangular black ſpots.

PHOSPHORIA, φωσφόρια, in *Antiquity*, a feſtival in honour of Phoſphorus or Lucifer.

PHOSPHORICAL *column*. See COLUMN.

PHOSPHORUS, φωσφόρος, formed from φῶς, *light*, and φέρω, *I bear*, a matter, which ſhines, or even burns, ſpontaneouſly, and without the application of any ſenſible fire.

Phoſphori are either *natural*, or *artificial*.

PHOSPHORI, *natural*, are matters, which become luminous at certain times, without the aſſiſtance of any art or preparation.

Such are the glow-worms, frequent in our colder countries; lantern-flies, and other ſhining inſects, in hot countries; rotten-wood; the eyes, blood, ſcales, fleſh, ſweat, feathers, &c. of ſeveral animals; diamonds, when rubbed after a certain manner, or after having been expoſed to the ſun or LIGHT; ſugar and ſulphur, when pounded in a dark place; ſea-water, and ſome mineral waters, when briſkly agitated; a cat's or horſe's back, duly rubbed with the hand, &c. in the dark; nay, Dr. Croom tells us, that upon rubbing his own body briſkly with a well-warmed ſhirt, he has frequently made both to ſhine; and Dr. Sloane adds, that he knows a gentleman of Briſtol, and his ſon, both whoſe ſtockings will ſhine much after walking.

All natural *phoſphori* have this in common, that they do not ſhine always; and that they never give any heat.

The natural *phoſphori* are either foſſile, vegetable, or animal.

The foſſile are, though very different in degree, ſome ſorts of earths, white ſand, lime-ſtones, ſtalactites, and ſeveral other figured ſtones, iſland cryſtals, flints, ſome ſpecies of agates, white arſenic; but no ſort of metals, metallic or ſulphureous bodies, as jet, amber, except the before mentioned arſenic.

On the other hand, ſalts imbibe light, provided they are diveſted of every metallic principle; otherwiſe not, though as pellucid as poſſible. For this reaſon none of the vitriols will imbibe light; but other ſalts will, though with a conſiderable difference as to quantity; for fal gem and rock ſalt imbibe very little; ſea ſalt, if dry, and in cryſtals, much more; and, in like manner, ſal ammoniac, ſal catharticum, and nitre yet more. This power is weak in the natron of the ancients, and alum; but brighteſt of all in borax.

In the vegetable kingdom we find very few *phoſphori*; that of dry rotten wood is weak and not laſting; it appears chiefly upon the edges and inequalities of the ſurface. But this is moſt remarkable in the rotten wood of the fir-tree, and ſome others, where, in the dark, you ſee ſhining ſpots as big as tares; whereas in full light the whole ſurface appears alike. Some few barks are luminous, but not conſiderably ſo; but no fruits, ſeeds, or their meals. Cotton, and the cryſtals of tartar, appear very bright, but fine loaf-ſugar appears the moſt luminous of all, both without and within; gums and reſins retain no light.

There is a vaſt variety of *phoſphori* in the animal kingdom, ſuch as the bones and teeth; to theſe may be added the ſhells of fiſh, egg-ſhells, the human calculus, bezoar, and thoſe parts of animals in which the terreſtrial principle is very predominant. But where there is a conſiderable quantity of oily matter, as in the hoofs, horns, and feathers, no light is manifeſt, or at leaſt in a ſmall degree. Light is viſibly retained by the ſkins of ſeveral living animals. Water cannot be made to imbibe light, though ice does exceedingly well, and eſpecially ſnow.

Beccarius propoſes ſome queries concerning the natural *phoſphori*, of which the firſt is, in what and how great a light the object ought to be placed? He tried different *phoſphori* in different degrees of light, and found them imbibe moſt light from the ſun itſelf; next in quantity when the ſky was clear; and the leaſt in foggy weather. Theſe experiments ſhould be made in the open air, and not in a houſe with the glaſs-windows ſhut; becauſe many bodies appear luminous when the light has come directly to them, which will not have that appearance when the light has paſſed through the glaſs. He laſtly tried what light they would imbibe from very bright flame, and found that alabaſter itſelf, which is ſaturated more than any ſubſtance by the ſun's rays, imbibed exceedingly little. The next query is, how long theſe bodies ſhould remain in the light to be ſufficiently ſaturated? Four or five ſeconds were found the utmoſt length of time required for that purpoſe. The other query is, how long the received light will continue in theſe *phoſphori*? It does not laſt the ſame time in all; but continues more or leſs, from two ſeconds to eight, in proportion to the ſtrength of the *phoſphorus*, and the quantity of light received.

But that which, of all natural *phoſphori*, has occaſioned the greateſt ſpeculation, is the

PHOSPHORUS, *barometrical*, or *mercurial*. M. Picard firſt obſerved, that the mercury of his barometer, when ſhaken in a dark place, emitted light; with this circumſtance, that, in ſhaking the mercury with rapidity, ſometimes above, and ſometimes below its equilibrium with the air, the light was only ſeen when below it, where it appeared as if adhering to the upper ſurface.

But this light is not found in the mercury of all barometers; which occaſions a great difficulty.

M. Bernoulli, upon examining the circumſtances of this phenomenon, invented a ſolution of the ſame: he imagines, that upon the mercury's deſcending, the vacuum in the tube increaſing, there iſſues out of the mercury, to fill up this exceſs of vacuity, a very fine ſubtile matter, before diſperſed throughout the pores of this mineral; and that, at the ſame time, there enters through the pores of the tube another fine matter: thus, the firſt matter emitted from the mercury, and collected over its ſurface, ſtriking impetuouſly againſt that received from without, has the ſame effect with Deſcartes' firſt element againſt the ſecond; that is, it produces the motion of light.

But why, then, is not the phenomenon common to all barometers? To this he answers, that the motion of the subtile matter out of the mercury may be weakened, and prevented, by any heterogeneous matter collected on its upper surface, into a kind of pellicle, so that the light should never appear, but when the mercury is perfectly pure. This reasoning seemed confirmed from the experiments of several barometers, which he made according to this plan; but the Royal Academy of Sciences, repeating experiments with barometers made after the same manner, did not meet with the same success; the light being found in some, but not in others.

M. Homberg, therefore, conjectured, that the difference consisted in the different qualities of the quicksilver: in some, he observed, they used quick-lime to purify it; in others, steel-filings. The mercury, then, rising in the distillation, and passing through the lime, might take away some parts thereof, capable, by their extreme smallness, of lodging in its interstices.

Hence, as quick-lime always retains some fiery particles, it is possible, in a place void of air, where they swim at liberty, they may produce this lustre.

Mr. Hauksbee has several experiments on the mercurial *phosphorus*. Passing air forcibly through the body of quicksilver, placed in an exhausted receiver, the parts were violently driven against the side of the receiver, and gave all around the appearance of fire; continuing thus till the receiver was half-full again of air.

From other experiments he found, that though the appearance of light was not producible by agitating the mercury in the same manner in the common air, yet that a very fine medium, nearly approaching to a vacuum, was not at all necessary.

And, lastly, from other experiments he found, that mercury inclosed in water, which communicated with the open air, by a violent shaking of the vessel wherein it was inclosed, emitted particles of light in great plenty, like little stars.

By including the vessel of mercury, &c. in a receiver, and exhausting the air, the phenomenon was changed; and, upon shaking the vessel, instead of sparks of light, the whole mass appeared one continued circle of light.

Farther, if mercury be inclosed in a glass tube, close stopped, that tube is found, on being rubbed, to give much more light, than when it had no mercury in it. When this tube has been rubbed, after raising successively its extremities, that the mercury might flow from one end to the other, one sees a light creeping in a serpentine manner all along the tube; that is to say, the mercury is all luminous. The mercury, being made to run along the tube afterwards without rubbing it, was found to emit some light, though much less than before; this proves that the friction of the mercury against the glass, in running along, does in some measure electrify the glass, as the rubbing it with the hand does, only in a much less degree. This is more plainly proved by laying some very light down near the tube, for this will be attracted by the electricity raised by the running of the mercury, and will rise to that part of the glass along which the mercury runs; and it is very plain from this, that what has been long known in the world under the name of the *phosphorus* of the barometer is not a *phosphorus*, but merely a light raised by electricity, the mercury electrifying the tube. Phil. Trans. N° 484. See ELECTRICITY and MERCURY.

PHOSPHORUS, *artificial*, are such as owe their luminous quality to some art or preparation.

Phosphori are, it is well known, often produced by art; some are made by the maceration of plants alone, and without any fire; such as thread, linen cloth, but above all paper. The luminous appearance of this last, which is now known to be an electrical phenomenon, is greatly increased by heat. This is confirmed by two experiments; the first is, by exposing the paper, spread upon an iron grate, to the naked fire, yet not near enough to scorch it, and then laying a warm brick thereon to retain the heat; by which means it was observed, that where the paper was not screened by the iron-grate, it was most luminous; so that by the lights and shades you might distinguish in the dark the image of the iron-grate a considerable time. The other experiment is, the application of the paper to a plate of warm brass; from which, when in the dark, you might very easily, by its being less luminous, distinguish the margin of the paper that had not been warmed by the brass.

However Beccarius, though he acknowledges that paper, after having been made red-hot and cooled again, is an excellent *phosphorus*, found, that it was much injured by being exposed to the light of the sun. He made experiments to the same purpose with a great variety of substances, mineral, vegetable, and animal; and observed, that the effects were the same, and that the stronger the light was, and the longer they were exposed to it, the more injury they received: and he found also, that the injury they received was lasting.

The same author takes notice also of those *phosphori* which become so by the assistance of fire; but the fire here spoken of is not great enough to dissolve their constituent parts, but only such as may affect the external parts of their texture, and that but gently; so that the process here mentioned is only drying or roasting. For it is not the watery or the saline parts in bodies which are torrified, but the oleaginous, wherewith many vegetables, and most animals abound. The white flesh of animals, such as that of chickens, become a *phosphorus* by roasting, as well as the tendons; and whatever parts of animals become gluinous by boiling, such as carpenters glue, isinglass, &c. to these may be added cheese. Bones, though they imbibe light without any preparation, have that property in a much greater degree when burnt, and their luminous appearance is much more lively. But roasting has not this effect upon feathers, hoofs, horns, and only in a small degree on whites of eggs, though the yolk when dry easily became a *phosphorus*.

The same operation which produces several *phosphori* from the animal kingdom, gives also several from the vegetable. Thus, by gently toasting gums, as myrrh, gum tragacanth, and others, they appear luminous, though different in degrees; and this light is clear in proportion to the gentle evaporation of their aqueous parts. By this treatment nuts of every kind, pulse, corn, coffee-berries, meal, bread, and wafers, also become *phosphori*. Turpentine, amber, and some resins, require more fire before they imbibe light; so that you must dissolve them of their acid, and their light ethereal oil, to make them appear luminous. But here great care must be taken that they boil no longer than from being white they turn yellow; for, if you proceed longer, your labour is lost. These *phosphori* produced by torrefaction soon lose their power, which, perhaps, neither time, nor a thorough dissolution of their parts, can deprive the natural ones of. In general, as long as the *phosphori* gained by torrefaction, preserve their power, their light is more sharp and striking, but the natural more weak. Those that are gained by calcination, and Baldwin's *phosphorus*, seem to possess both the striking light of these gained by torrefaction, and the weaker light of the natural *phosphori*: the last they preserve a long time, but the former is lost by degrees much sooner. The well calcined ashes of plants, or rather their terrestrial parts, remaining after the solution of their fixed salts by washing, and neutral salts, continue *phosphori* after many years: so that, as far as we can judge, the luminary power which is gained by calcination, though not so intense, continues perpetual; whereas that gained by torrefaction always decreases, and in a very little while is no longer visible. Some, even by this method, continue to imbibe light much longer than others. Gum arabic, which continues longest, fails six days; bread not one, and coffee only a few minutes. However, at any time, by a fresh torrefaction, you may recover these languid *phosphori*; in which property they have great likeness to the Bolognian stone, and other *phosphori* prepared by art.

Almost all bodies, by a proper treatment, have that power of shining in the dark, which, at first, was supposed to be the property of one, and afterward only of a few. How this is brought about is not easy to solve. If we suppose, with some, that the light from a luminous body, enters and abides in the *phosphori*, we shall find somewhat new to admire in light itself. It is no new opinion, that this fluid consists of very fine particles, which are continually darted forth from a luminous body in all directions, with a very great velocity; but it has by no body been laid down hitherto, that these particles are not dissolved by the violence of their agitation, nor dispersed, nor immediately cease to exist; but subsist still, and adhere to what bodies come in their way, as heat does. If therefore the particles of light are not dissolved as soon as they are emitted from a radiant body, but continue some time, what else is required but that we allow its atmosphere to every lucid appearance? If the *phosphori* shine with a borrowed light, but not with their own, and that only when put in motion, and fired by the rays of a shining body, which some experiments seem to confirm, then other new doctrines will arise. There must be then a hidden, a secret principle in bodies, to be lighted up by this most subtile fire. There will be in the universe a certain perpetual fire from these *phosphori*; the matter of which, though constantly dissipated by burning, does not waste enough to be obvious to our senses. See Phil. Trans. N° 478, in vol. xliv. art. 17. p. 83. and Beccarii Com. p. 52, 91, &c. See LIGHT, *Light from Diamonds*, and *Bolognian* PHOSPHORUS, *infra*.

Of artificial *phosphori* there are three principal kinds: the first

firſt *burning*, which conſumes every combuſtible it touches: the other two have no ſenſible heat; and are called the *Bononian* and *Hermetic phoſphorus*, to which claſs other of a ſimilar kind may be reduced.

PHOSPHORUS, *the burning*, which is a combination of phlogiſton with a peculiar acid, and, conſequently, a ſpecies of ſulphur, tending to decompoſe itſelf, and ſo as to take fire on the acceſs of air only, may be made of urine, blood, hairs, and generally of any part of an animal, that yields no oil by diſtillation. The matter it is moſt eaſily drawn from is human urine. It is of a yellowiſh colour, and of the conſiſtence of hard wax, in the condition it is left by the diſtillation; and, in this ſtate, is called *phoſphorus fulgurans*, from its coruſcations; and *phoſphorus ſmaragdinus*, becauſe its light is frequently green or blue, eſpecially in places that are not very dark. It is alſo called *ſolid phoſphorus*, from its conſiſtence.

It diſſolves in all kinds of diſtilled oils; and, in that ſtate, is called the *liquid phoſphorus*.

It may be ground in in all kinds of fat pomatums; in which caſe, it makes a luminous unguent.

So that the *phoſphorus fulgurans, ſmaragdinus, ſolid and liquid phoſphorus, and luminous unguent*, are all the ſame preparation, under different circumſtances. See FULGURATING *Phoſphorus*.

The diſcovery of this *phoſphorus* was firſt made in 1677, by one Brandt, a citizen of Hamburgh, in his reſearches for the philoſophers ſtone. Brandt communicated the ſecret to one Kraaft, of Dreſden, but with-held it from Kunckel; upon which this chemiſt, knowing that urine was the ſubſtance employed, ſucceeded in his attempts of making *phoſphorus*; accordingly, this *phoſphorus* is commonly called *Kunckel's phoſphorus*, after his name. A ſimilar *phoſphorus* was alſo made by Mr. Boyle, after having ſeen a piece of it in the hands of Kraaft, who brought it to London in 1679, in order to ſhew it to the king and queen of England; having been only informed that this *phoſphorus* was produced from ſome matter belonging to the human body. Kraaft, indeed, told Stahl, that he had communicated the proceſs for making it to Mr. Boyle; but this is ſuch an imputation on the integrity and honour of our Engliſh philoſopher, as can by no means be admitted on the teſtimony of a man, who had been treacherous to Kunckel, who traded in the ſecret of making *phoſphorus*, and after ſelling it to many perſons, publiſhed the proceſs for making it in the Mercure Galont, for June 1683. Kunckel, and a German chemiſt called Godfrid Hankwitz, to whom Boyle communicated the method of preparing it, were the only perſons who made it in any conſiderable quantities.

M. Hellot, in his Memoir upon this ſubject, Ac. Paris, 1737, enumerates all the proceſſes for making it, that were in uſe ſoon after the diſcovery of it: viz. that publiſhed by Mr. Boyle in 1680, in the Phil. Tranſ. N° 196. (See Phil. Tranſ. Abridg. vol. iii. p. 346). that of Kraaft; that of Brandt, in a collection of experiments and obſervations of Dr. Hooke, publiſhed by Dr. Derham in 1726; that of M. Homberg, in the Ancient Memoirs of the Academy, in 1692; and thoſe found in the works of ſeveral chemiſts, particularly of Thelckmeyer, Hoffman, and Nieuwentyt. However, the operation continued in a great degree a ſecret till the year 1737, when a ſtranger came into France, and obtained a reward from the miniſtry for communicating his proceſs, which was executed by Meſſ. Hellot, Du Fay, Geoffroy, and Duhamel. Since the publication of M. Hellot's Memoir, the operation has been no longer a ſecret; though ſeldom executed, becauſe it was rather curious than uſeful, and both troubleſome and expenſive.

PHOSPHORUS, *preparation of ſolid*, or PHOSPHORUS *of urine*. Evaporate a good quantity of urine of beer-drinkers to the conſiſtence of honey; cover it up in an earthen veſſel, and ſet it three or four months in a cellar, to ferment and putrefy. Mix two parts of ſand, or powder of pot-ſtreds, with one part of this urine, and put it into a retort, fitted to a long-necked receiver, with two or three quarts of water in it. Diſtil it in a naked fire, in a reverberatory furnace; at firſt gently; after two hours, augment the fire gradually, till all the black fetid oil be drawn off. Raiſe the fire to the higheſt degree; upon which, white clouds will come into the receiver, and fix, by little and little, on one ſide, in form of a yellowiſh ſkin; and another part will precipitate to the bottom in powder. Keep the fire thus violent for three hours, till no more fumes ariſe. Let all cool, and unlooſe the veſſels; and, throwing more water into the receiver, ſhake all well about, to looſen what ſticks to the ſides. Pour the whole into a glaſs veſſel, to ſettle.

The volatile ſalt will now diſſolve in the water, and the *phoſphorus* and oil will ſink to the bottom; then pour off the water, and gathering the remaining part together, put it into a glaſs veſſel, with a little freſh water, and digeſt it in a ſand-heat, ſtirring it from time to time with a wooden ſpatula.

By this means, the *phoſphorus* will ſeparate from the oil, and ſink to the bottom: pour off the oil, and make up the *phoſphorus*, while hot, into ſticks for uſe.

Boerhaave gives us other ways of preparing *phoſphorus*. Recent urine, he obſerves, digeſted three or four days in a tall glaſs, with a heat no greater than that of a healthy man, grows ruddy, fetid, and cadaverous; this digeſted urine, being put to diſtil in a retort, yields a clear fetid liquor, then a yellow volatile ſalt, which, evaporated to the conſiſtence of a ſapo, and mixed with four times its weight of dry ſand, and the diſtillation continued in a covered retort, there ſucceſſively comes over, by greater and greater degrees of fire, a fetid brown oil, bluiſh fumes, and, finally, a groſs ſhining matter, which ſinks in water, and is the ſolid *phoſphorus*.

To make it more eaſily, and to the beſt advantage, it may be proper to take a ſufficient quantity of human urine, afforded by a perſon not much given to drink wine, and exhale it away in anopen veſſel to a rob, or the conſiſtence of honey; then ſet it to putrefy for half a year, and, upon diſtillation, it will afford a large proportion of ſalt; after which, if ſix times its own quantity of ſand, or brick-duſt, be added to the remainder, and the diſtillation be continued, as in the caſe laſt mentioned, the *phoſphorus* will fall into the water. Or it may commodiouſly be prepared, by ſuffering the rob of urine to digeſt for two years in an open veſſel in the open air; during which time, a ſliny, feculent, unctuous, earthy matter, will fall to the bottom; which, being frequently waſhed with pure water, wherein it will not diſſolve, will leave a white matter behind it, neither of an alkaline, acid, ſaline, or terreſtrial, nor ſcarce of an unctuous nature: and this is of itſelf a proper matter for the making of *phoſphorus* by diſtillation with ſand.

In order to preparing the *phoſphorus*, and indeed moſt of the other preparations of urine, the firſt ſtep is to reduce that liquor to the conſiſtence of a rob or thick extract; thoſe who have worked on this ſubject ſufficiently know, how abominably naſeous and diſagreeable a taſk this is. The operator alone is not the perſon who is almoſt poiſoned by it, but the whole neighbourhood is affected; and it is well known, that our Godfrey, who uſed to prepare large quantities of this ſubſtance, was always obliged to keep a houſe in the fields to perform this part of the proceſs in.

There is an eaſy and excellent method propoſed by Stahl for the performing this troubleſome buſineſs, by means of condenſation by cold or freezing. There needs no more than to expoſe the proper quantity of urine to ſome froſty nights in winter; or at any time of the year to our ice-houſes, or other places where ice is preſerved all the year round. The froſt will, in this caſe, affect a large part of the urine, but not the whole; and the liquid part being ſeparated from the ſolid ice, it will be found that the watery parts alone have ſuffered the freezing, and that all the unctuous and ſaline ones are left behind in the unfrozen part, which is, by repeated freezings of its yet remaining aqueous parts, at length reduced to that ſort of rob which is required for all the purpoſes of diſtillation, and that without any trouble or offenſiveneſs, either to the operator or any body elſe. The power of condenſation by freezing in this manner, extends to wine, vinegar, and all fermented liquors; but it operates differently on the ſeveral different ones, and is to be regulated according to their natures. The natural cold of our climate is ſeldom too great for any of the liquors we deſire to condenſe; that is, it is never ſo great as to condenſe the whole into ice. It often is not ſufficiently great to condenſe the aqueous part, even after ever ſo many repetitions. In this caſe, it may be proper to bring in the uſe of the common freezing mixtures, made with ice, or ſnow and ſalt. To ſuit the artificial degree of cold, in theſe caſes, requires care and experience, and is almoſt as nice a point as the ſuiting the degrees of heat in the operations of chemiſtry.

In 1743, Mr. Margraaf publiſhed, in the Memoirs of the Academy at Berlin, a new and excellent proceſs for obtaining more eaſily and expeditiouſly, and at leſs expence than has hitherto been done, a conſiderable quantity of *phoſphorus*. In his proceſs, a kind of plumbum corneum is previouſly prepared, by diſtilling a mixture of four pounds of minium with two pounds of powdered ſal ammoniac; the reſiduum after the diſtillation, or the plumbum corneum, is to be mixed with nine or ten pounds of extract of putrefied urine, boiled to the conſiſtence of honey. This mixture is to be made ſlowly in an iron cauldron ſet upon the fire, and by frequently ſtirring the contents. Half a pound of powdered charcoal is then

then to be *added*, and evaporation is to be continued till the whole is reduced into a black powder, which is to be put into a retort, in order to extract from it, by a moderate and gradual heat, all the volatile products of urine, that is, volatile alkali, fetid oil, and an ammoniacal matter which adheres to the neck of the retort. In this diſtillation the heat is only to be raiſed ſo as to make the matter red-hot. After the diſtillation a black and friable reſiduum is left, from which the *phoſphorus* is to be extracted by a ſecond diſtillation, and a ſtronger heat. Before it is expoſed to another diſtillation it may be freed by throwing ſome of it upon hot coals. If the matter has been well prepared, a ſmell of garlic exhales from it, and a blue phoſphoriſcal *flame* is ſeen undulating along the ſurface of the hot coals. This matter is to be put into a good earthen retort, capable of ſuſtaining a violent fire, and which may be ſecured with a covering of clay and hair. Three quarters of the retort are to be filled with the matter which is to yield the *phoſphorus*. It is to be placed in the common furnace for diſtillation with a retort; excepting that inſtead of being terminated by an ordinary reverberatory or dome, this ought to be terminated by the upper piece of an air-furnace, to which a tube is to be applied, the diameter of which ought to be from four to ſix inches, according to the ſize of the furnace, and the height from eight to nine feet. This apparatus, which *Mr.* Beaume uſes, is neceſſary for raiſing a ſufficient heat, and for the convenience of throwing in a ſufficient quantity of fuel through the door of the upper piece of the furnace. The retort ought to be well ſuited to a receiver of moderate ſize, pierced with a ſmall hole, and half full of water. For this purpoſe ordinary fat lute may be bound on with ſtrips of linen, dipped in a lute prepared with lime and whites of eggs. The hole in the furnace through which the neck of the retort paſſes ought to be well ſtopped with furnace earth. Laſtly, a ſmall wall of bricks is raiſed betwixt the furnace and the receiver, to guard this veſſel againſt heat as much as is poſſible.

All theſe preparations being made the evening before the diſtillation is to be performed, we are then capable of proceeding to this operation, which is very eaſy. The retort is to be heated by ſlow degrees during an hour and a half; and then the heat is to be increaſed till the retort be red-hot, and the *phoſphorus* begin to paſs in luminous vapours: when the retort is almoſt of a white-red heat, the *phoſphorus* paſſes in drops, which fall and congeal in the water at the bottom of the receiver. This degree of heat is continued till no more paſſes into the receiver. When a retort contains eight pints or more, this operation continues about five hours.

Mr. Margraaf's apparatus is ſomewhat different from that above deſcribed. He divides the whole quantity of matter from which the *phoſphorus* is to be obtained into ſix ſmall retorts, which he places in a furnace that he deſcribes. The advantage of this diviſion is, that if any accident happens to one retort, the whole matter is not loſt; and as the retorts are ſmaller, a leſs heat is required. If indeed, much *phoſphorus* was to be made, this practice would be baſe and excellent; but Macquer aſſirms, that the method above deſcribed of Mr. Beaume is very convenient when a large quantity of *phoſphorus* is not wanted, and that he has never ſeen it fail.

Phoſphorus does not paſs pure in this diſtillation, but is blackened by ſoot or coal, which it carries along with it: it may be eaſily purified and rendered white and fine by a ſecond diſtillation or rectification. This rectification is made in a ſmall glaſs retort, to which is adjuſted a ſmall receiver half full of water. A very gentle heat is ſufficient, becauſe *phoſphorus* once formed is very volatile: and as the fuliginous matters with which it is ſoiled were raiſed merely by the violence of the heat, they remain at the bottom of the retort in this diſtillation, and the *phoſphorus* paſſes very pure.

The *phoſphorus* is then uſually divided into ſmall cylindrical rolls, for the convenience of uſing it. This is done by putting it in glaſs tubes immerſed in warm water. This very gentle heat is ſufficient to liquefy the *phoſphorus*, which is almoſt as fuſible as fuet. It takes the form of the glaſs tubes, from which it may be taken out when it is cold and hardened. That it may be more eaſily taken out of the tubes, theſe muſt be ſomewhat of the form of ſtraws of corn. All theſe operations ought to be made under water, to prevent the inflammation of the *phoſphorus*.

Phoſphorus is a kind of ſulphur compoſed of a peculiar acid united with phlogiſton. It is extremely fuſible, and has, like ſulphur, two kinds of inflammation; one very weak, emitting a flame not powerful enough to kindle other combuſtible matters, but ſufficient for the gradual conſumption and burning of its own phlogiſton; the other is vivid, brilliant, and ſtrong, accompanied with decrepitation, and capable of inſtantly kindling any combuſtible matter. *Phoſphorus* reſembles vitriolic ſulphur in this reſpect, that all its phlogiſton may be burnt, even with rapidity, without any decompoſition of its acid: but it differs from ſulphur in being much more combuſtible. A heat from twelve to fifteen degrees is ſufficient to decompoſe *phoſphorus*, and to make its phlogiſton burn, with a ſenſible light, eſpecially in open air; and, therefore, to prevent this decompoſition, it muſt be preſerved in water; though in water it will be partly decompoſed, and fill the containing bottle with luminous vapours; its ſurface loſing its ſemi-tranſparency, and the water becoming more and more acid.

Phoſphorus, heated by fire or friction, violently inflames, burns fiercely, and emits many vapours. It does not ſeem to be ſo ſtrongly diſpoſed to unite with metals as ſulphur. *Phoſphorus* is ſoluble in oils and inflammable liquors, and forms baſſams of *phoſphorus*; but in this ſtate of combination, it is more diſpoſed to decompoſe than when alone. The nature of the acid which enters into the compoſition of *phoſphorus* is not certainly known: Stahl and many others have ſuppoſed it to be the marine acid; and that nothing more was requiſite to produce it than to mix and combine properly marine acid with phlogiſton; but *M.* Margraaf, by many experiments found that the phoſphoric acid was different from that of common ſalt; and that it was contained in that ſingular kind of ſalt, which chemiſts call ſuſible ſalt, or native ſalt of urine. When the inflammable principle of *phoſphorus* burns, and is thus ſeparated from the acid, we obtain a diſengaged ſubſtance, which is at firſt dry, but quickly and powerfully attracts the moiſture of air, and is thus reduced to a liquor that has an acid taſte, that converts the blue colour of vegetables to a red, and that combines to the point of ſaturation with alkaline ſubſtances. This ſubſtance, being deprived of its moiſture by heat, and rendered red hot, may be thus converted into a ſolid and tranſparent matter, which has all the appearance of glaſs. Phoſphoric acid appears to be a very powerful ſolvent: it decompoſes nitre and common ſalt, uniting with their alkaline baſes, and when combined to the point of ſaturation with alkaline ſalts, forms neutral ſalts ſimilar to the ſuſible ſalt of urine. This acid diſſolves neither gold nor ſilver; acts in a ſmall degree on filings of copper, but eaſily diſſolves the calx of copper; entirely diſſolves iron; weakly corrodes tin and lead; changes the colour of mercury precipitated *per ſe*, from a red to a yellow and white, and by a long digeſtion to a black; and entirely diſſolves white arſenic and zinc.

With regard to the effects of phoſphoric acid on the ſolutions of metals by other acids, we may obſerve, that it produces no change in the ſolution of gold in aqua regia, but ſome time afterwards precipitates part of the gold in its metallic ſtate, and it affects the ſolution of ſilver nearly in the ſame manner: from the ſolution of mercury in nitrous acid, a copious white precipitate is formed by the phoſphoric acid, which is re-diſſolved by expoſure to the cold. A white precipitate is alſo obtained from a ſolution of lead in nitrous acid, by means of the phoſphoric acid. Such are the principal properties of this acid, enumerated by Margraaf, who found that it is not peculiar to animal urine, having been diſcovered in many vegetable matters, particularly farinaceous grains, when expoſed to great heat in cloſe veſſels. To which we may add, that M. Schloſſer perceived no farther effect than a diminution of weight by keeping it in hot and cold ſpirit of wine; that ſpirit of turpentine did not affect it; that no effervеſcence was perceivable by diſſolving it in water and adding fixed alkali; that an ounce of water was capable of diſſolving one hundred and eight grains of ſalt, when the thermometer was at 56°; that this ſalt cryſtallizes in ſmall parallel and equal priſms, with four oblong equal ſides, and two truncated extremities; that, when diſſolved, it did not affect gold, tin, lead, mercury or ſilver; that filings of ſteel rendered the ſolution whitiſh, but clear; that copper was ſlightly corroded, biſmuth not touched, zinc ſlowly diſſolved by means of heat; that it precipitated ſilver from aqua fortis, in form of a black powder, and mercury from aqua fortis in a white maſs, and copper, iron and tin, from aqua fortis; that it did not affect lead diſſolved in aqua fortis; that it precipitated biſmuth and antimony in form of a white powder; and that zinc diſſolved in aqua fortis remained undiſturbed. Dr. Prieſtley obſerves, that this acid may be eaſily procured from ſolid *phoſphorus* by expoſing it to the open air in the mouth of a phial, paſſing into a phial which receives the acid, as the *phoſphorus* gradually waſtes by this kind of accenſion; but it muſt be ſet in a place, neither very cold nor very warm. If it ſmokes, and is in danger of taking *fire*, it may be preſerved by plunging it inſtantly in water. This phoſphoric acid, he ſays, is ſoon ſaturated with nitrous vapour, and aſſumes a deep indigo

indigo blue colour; it yields no air by heat, even with substances containing phlogiston, except that in the solution of iron, which it readily dissolves, and by mixing it with minium, it yielded a strong inflammable air.

Dr. Ingenhousz observes that the phosphoric acid, when hot, dissolves glass. M. Scheele has lately discovered a curious and easy method of procuring the phosphoric acid from bones, by means of the oil of vitriol: the process for this purpose has been since stated and explained, in the various circumstances attending it, by other chemists.

Messrs. de Morveau, Maret, and Durande, in the Elemens de Chymie, &c. lately published at Dijon, used twelve pounds of bone calcined to whiteness, finely powdered and sifted, and added to them a sufficient quantity of the common or strong oil of vitriol, till an effervescence no longer appeared. They then added a little more of the acid, and afterwards a little water, in order to promote the action of the acid upon the earth.

An anonymous writer observes, that the effervescence appears to have no necessary connection with the expulsion of the phosphoric acid from the bones, as it depends only on the expulsion of a certain quantity of fixed air contained in them: and, as the quantity of oil of vitriol is not stated by other writers, he adds, from his own experience, that in a process of this kind, ten ounces in weight of the strongest oil of vitriol were added to eight ounces of burnt hartshorn, or the CCC. of the shops. The matter thus obtained is boiled for a long time, with the addition of a large quantity of water, and afterwards filtered; and the matter remaining in the filter repeatedly edulcorated with hot water. The whole quantity is then set to evaporate, first in earthen vessels, and afterwards in capsules of glass or china ware. To expel the vitriolic acid from the liquor thus concentrated, M. Scheele directs that it should be distilled to dryness in a glass retort placed in a reverberatory furnace. The other authors effect this expulsion with less trouble in the glass capsules; and then put the dry matter into a crucible, where it was kept in fusion till it ceased to yield sulphureous vapours. It was then poured out of the crucible in a vitreous state.

To procure the phosphoric acid in a state of greater purity, or more free from selenite, or earth, it is proper first to convert it into *phosphorus*. For this purpose, the authors of the Elemens Chymie, &c. just cited, having reduced the whole of the vitreous substance into powder, and mixed it with one-third of its weight of powdered charcoal, distilled the mixture in an earthen retort. From the quantity of calcined bones above mentioned, they obtained six ounces and seven drachms of excellent *phosphorus*. From this, the acid may easily be afterwards obtained in the purest state, by the usual method of accension, &c. It is observed that the phosphoric acid may be procured in still greater quantity from egg-shells; and that it has even been found in the mineral kingdom, and obtained from certain white lead ores. Monthly Review, vol. lxvi. p. 135, &c.

Dr. Priestley has made many experiments with *phosphorus*, in different kinds of air; and has found, that it smoked and gave light in the acid air, just as it would have done in common air confined, without being sensibly wasted for twelve hours, and with a very inconsiderable diminution of the bulk of the air; in alkaline air it gave no light and made no lasting change in its dimensions; in nitrous air, it gave no light, nor did it lessen its power of diminishing common air, and the *phosphorus* remained unchanged; and after having remained a day and two nights in vitriolic acid air, it produced no sensible effect, and gave no light.

Dr. Fordyce has suggested the following easy method of reducing *phosphorus* to powder: take *phosphorus* of urine two drachms; put it into a four-ounce phial; pour upon it three ounces of water; heat it gently by immersion in warm water, till the *phosphorus* melts; shut the phial with a cork; take it out of the water, and shake it briskly till it be cold; and the *phosphorus* will be found in powder. A receiver may be lined with this powder by adding a very small quantity of water to it, and then making the powder to adhere to its internal surface, by gently inclining and turning the receiver round. Chem. Dict. art. *Phosphorus*, and Priestley's Experiments and Observations on Air, &c. Phil. Trans. vol. lxi. part 2. p. 504, &c.

PHOSPHORUS, *properties of solid*. 1. With this *phosphorus* one may write on paper, as with a pencil, and the letters will appear like flame in the dark; yet, in the light, nothing will appear, but a dim smoke.

If the letters written with this *phosphorus* are warmed by the fire, they presently become dark lines, which continue upon the paper like ink.

2. A little piece, rubbed between two papers, takes fire instantaneously, and, if care be not taken in the management of it, there is danger of burning the fingers, the *phosphorus* being exceedingly inflammable.

3. Its burning is very vehement, and penetrates deeper into the flesh than common fire; and it is very difficult to be extinguished.

Dr. Shire, in order to determine whether air contains the pabulum of flame, as some have supposed, placed a large piece of *phosphorus* in a receiver; but upon exhausting it, he found that it became more luminous, and that upon admitting the air, it returned to its former state. This property was also ascertained by several experiments of Mr. Hauksbee.

M. Cassini happening to press a piece in a cloth between his fingers, the cloth immediately took fire; he endeavoured to put it out with his foot; but his shoe caught the flame, and he was obliged to extinguish it with a brass ruler, which cast forth rays in the dark for two months after.

The solid *phosphorus* ceases to shine and never spoils, provided it be kept in a phial full of water; but if any part of it emerge, it will shine, though the glass be hermetically sealed; and it will continue shining in a large glass without water for several days, with very little diminution of its light or weight; and even when immersed in water, it will sometimes make very bright and vigorous ebullitions in the air: that, in form of an unguent, does not keep so well; and the liquid *phosphorus* worst of all.

The liquid *phosphorus* is best made by digesting, in boiling, a little bit, or some scrapings, of the solid kind, for two days, in oil or essence of cloves, oil of turpentine, or the like. After dissolution, the oil will be impregnated with it, that, upon opening the bottle, the matter will appear on a flame.

PHOSPHORUS, *experiments with liquid*. By washing the face, hands, or the like, with liquid *phosphorus*, Dr. Stare tells us they will be made to shine very considerably in the dark, and the lustre thereof will be communicated to adjacent objects, yet without any offence to the skin.

As soon as the candle is brought in, the shining disappears, and no change is perceivable.

This *phosphorus* emits frequent flashes like lightning, even when close stopped, especially in warm water. Hence Mr. Boyle takes occasion to draw a parallel between lightning and *phosphorus*. Phil. Trans. Abr. vol. iii. p. 348, &c. Hauksbee's Physico Mech. Exper. p. 122.

In some cases animal sweat, which is similar to urine, has been observed to be phosphoraceous, without any preparation. An influence of this kind is related of a person, who used to eat great quantities of salt, and who was a little subject to the gout, after sweating with violent exercise. Stripping himself in the dark, his shirt seemed to be on fire, and an urinous smell was perceived, similar to that which issues from cabbage much salted and strongly fermenting. Act. Curiosorum, vol. v. p. 334.

PHOSPHORUS, *Bolognian*, or *Bononian*. The second kind of artificial *phosphorus* is a preparation of a stone called the *Bononian* stone, from *Bologna*, a city in Italy, near which it is found.

The first who undertook to make this stone luminous, was a chemist of that city, called Vicenzo Cascrorolo. Peterus, Licetus, &c. have described the process; but mistakenly. M. Homberg, who made a journey to Italy, expressly to learn the preparation, first communicated the same to M. Lemery, who published it in the seventh edition of his chemistry. See BOWONIAN *stone*, and LAPIS *Bononiensis*. Under those articles, the reader will find some account of the discovery of this stone, and of the method of preparing it. We shall here subjoin some farther particulars on this subject, chiefly extracted from the dissertations of M. Margraaf. The Bolognian stone, he says, is soft, friable, heavy, crystallized, and incapable of effervescing with acids, before it has been calcined in contact with fuel, and with a free access of air. These qualities have induced him to class it among the heavy fusible spars, which, by a preparation similar to that for the Bolognian stone, are rendered phosphoric. After analyzing these substances, he concludes that all contain a vitriolic acid, united to an alkaline or calcareous earth. In order to render these stones phosphoric, such of them ought to be chosen as are the clearest, but crystallized, most friable, most heavy, which exfoliate when broken, and which contain no heterogeneous parts. They are to be made red-hot in a crucible, and reduced to a very fine powder in a glass mortar, or upon a porphyry, and not in a copper mortar, which will obstruct the success of the operation. The powder thus obtained is to be formed into a paste with gum tragacanth, and divided into cakes as thin as a knife. These are to be dried by a gradual heat. An ordinary reverberatory furnace is to be filled to three quarters of its height with charcoal, and the fire to be kindled; upon

this charcoal the flat furfaces of the cakes are to reft; and more charcoal is to be placed above them, fo as to fill the furnace, which is then to be covered with its dome, the tube remaining open: all the coal is to be conſumed, and the furnace left to cool. The cakes are then calcined, and are to be cleanſed from the aſhes by blowing upon them with bellows. He further obſerves, that after this calcination, through the coals, if the ſtones be expoſed to a ſtronger calcination during a full half hour under a muffle, their phoſphoric quality will be rendered ſtronger. Ac. Berlin, 1749, and 1750.

This *phoſphorus* has not any ſenſible heat, and only becomes luminous after being expoſed to the ſun, or the day-light; in which ſtate it reſembles a burning coal, and preſerves its light five or ſix minutes in the dark, eſpecially if the perſon obſerving it has been ſome time in the dark, or has ſhut his eyes, that the pupils may be ſufficiently expanded; during which time, the light gradually diminiſhes; and, to recover the ſhining, it muſt be expoſed afreſh to the light.

PHOSPHORUS, *the hermetic*, or PHOSPHORUS *Baldwini*, which makes the third kind, and properly belonging to the ſame claſs with the former, is a preparation of Engliſh chalk, with aqua fortis, or ſpirit of nitre, by the fire.

This makes a body conſiderably ſofter than the Bolognian ſtone; but it has all the qualities thereof. It has its name from its inventor Baldwin, a German chemiſt, called *Hermes*, in the ſociety of the Naturæ Curioſorum; whence its other name *Hermetic*. It was diſcovered a little before the year 1677.

This *phoſphorus* of Baldwin is exactly ſimilar to thoſe made with Bolognian ſtone and phoſphoric ſpars, differing only in the kind of acid which it contains. It is evidently a nitre with a calcareous baſis, and in calcination acquires its phlogiſton from the nitrous acid, the chalk alſo containing ſome of this inflammable principle. It is obſerved, however, that this is not ſo good a *phoſphorus* as the Bolognian; it is not ſo luminous, it does not retain the light ſo long, it ſoon loſes its virtue, and never recovers it again. Acad. Par. 1692, p. 271.

The proceſs for making this *phoſphorus*, though Baldwin gave no directions for it, nor ſo much as mentioned the materials, was communicated to the Royal Society, in 1679, by Dr. Slare, and publiſhed by Grew, in his Muſ. Reg. Soc. p. 353; and is as follows: take good firm chalk, ignite it in a crucible, and then powder it; put into a pint or half a pint of ſtrong ſpirit of nitre, *reſolution*, as much of the powdered chalk as will ſerve well to ſaturate it, i. e. till it becomes ſweetiſh, and makes no effervescence upon the injection of the chalk. Then diſſolve this liquor with fair water, filter it through a paper, and ſo evaporate it in a large glaſs, or glazed veſſel, or good Italian crucible to a dry ſalt. The preparation may be performed in four hours.

To this claſs we may alſo refer ſome other *phoſphori*, enumerated in the ſequel of this article. As the

PHOSPHORUS, *ammoniacal*, compoſed of ſal ammoniac and lime, which Mr. Homberg firſt diſcovered.

The method of preparing it is this: take one part of ſal ammoniac in powder, and two parts of lime extinguiſhed by lying in the air: mix them exactly together, and fill a crucible with the mixture; ſet it in a ſmall melting heat. As ſoon as the crucible grows red hot, the matter in it will melt, and it muſt be ſtirred with an iron rod, leſt it ſwell over the edges of the crucible: as ſoon as the whole is melted, pour it into a copper baſon; it will appear of a greyiſh colour and vitrified, and if it be ſtruck upon with any hard body, there will be ſeen a fire all over the place where the blow was given. As this matter is brittle, however, and the ſame maſs will not ſerve often for the experiment, the beſt method is to dip iron rods in it while melting, and theſe will be covered with the matter, and will anſwer the purpoſe eaſily and often. Mem. Acad. Par. 1693.

This is a combination of quick-lime with the acid of ſal ammoniac, and receives its phlogiſton from the ſal ammoniac.

PHOSPHORUS, *antimonial*, is the name of a ſubſtance having the qualities of the *phoſphorus* diſcovered by Mr. Geoffroy in his experiments on antimony. This gentleman had prepared a ſoap from pot-aſhes, quick-lime, and oil, with which he made ſeveral experiments on antimony; among others he was deſirous, by means of this, to reduce ſome diaphoretic antimony, which he had before made from two parts of the regulus of antimony, and three parts of nitre; but, inſtead of the reduction which he was labouring after, his operation afforded him a much more ſingular phenomenon: the reſult of them being a *phoſphorus*, which he had never thought of; a matter which, after having remained perfectly quiet while cloſe ſtopped down, took fire as ſoon as ever it was expoſed to the air; and that with a violent detonation, and darting every way a ſhower of fire.

It is eaſy to ſee, that there are in the preparation all the requiſites for ſuch an effect; nitre, charcoal furniſhed by the burnt ſoap, and ſulphur both from the ſoap and from the regulus of antimony; and to all theſe, a fixt oil ſalt, either from the ſoap, or from ſome earthy parts of the antimony. It is eaſy to conceive, that all theſe ſubſtances, coming to a mixture together, ſhould be ready to catch fire and blaze, upon a proper application; but it is not leſs difficult to account for the effect's being produced merely by the air, after the whole had been for a long time in a ſtate of reſt.

The method of preparing this new ſpecies of *phoſphorus* is this: Mr. Geoffroy mixed two ounces of his ſoap with one ounce of this diaphoretic antimony; this mixture, being put by little and little into a red hot crucible, took fire, and ſwelled very much; after it had done flaming, the maſs ſubſided, and became a red or fire-coloured ſubſtance, of an even ſurface, but ſtill throwing up a vaſt quantity of bluiſh-green luminous vapours: and all this regularly happened on every freſh throwing in of the matter, without the leaſt variety; when the whole quantity was thrown in, and had ceaſed to give any flame or luminous vapour, it remained in the crucible in the form of an inverted muſhroom, being hollow, very porous, and of a black colour. When the crucible was taken out of the fire, the edges of this ſubſtance were beaten down into the middle, and the whole covered with an ounce of freſh ſoap; when this laſt ſoap was burnt, and a ſmall bluiſh flame appeared upon the ſurface of the maſs, the crucible was covered with a lid, and a large quantity of charcoal laid upon it, and the fire blowed up with bellows, by a hundred blaſts of the bellows, or thereabouts; but, notwithſtanding the fierceneſs of the fire, there was no fluid ſcoria formed, but the whole maſs remained ſpungy and porous; the fire was then ſuffered to go out, and the crucible placed in a corner of the elaboratory at reſt for five hours. In the evening, when the crucible was perfectly cold, Mr. Geoffroy went to examine the matter, and a ſervant went to uncover the maſs, by removing its ſurface with an iron inſtrument; but the moment the air was admitted, the whole maſs took fire, burning with a very conſiderable muſſle, and darting its flames every way to a great diſtance.

Mr. Geoffroy repeated the proceſs ſeveral times, and always with the ſame ſucceſs, whether he uſed his own diaphoretic antimony, or that made in the common manner. The great caution to inſure the ſucceſs, ſeems to be taking care of not carrying the fire too far before the addition of the laſt quantity of ſoap. Mem. Acad. Scien. Par. 1736.

PHOSPHORUS *of the Berneſtone*, is a name given to ſtone, (which, when heated, becomes a ſort of *phoſphorus*) from Berne, in Switzerland, the place where it is found.

This ſubſtance was ſent to the members of the Royal Academy at Paris, by M. Bourgnon, and referred by them to the examination of M. Du Fay, whoſe account of it is publiſhed in Mem. Acad. Paris. 1724.

The *Berne-ſtone* is of a moderate hardneſs, conſiderably pellucid, and uſually colourleſs, or whitiſh, though ſometimes with a tinge of green, yellow, or ſome other colours: it is compoſed of numbers of plates, or flakes, laid over one another, in the manner of the iſland cryſtal; and therefore, like that body, is plainly a ſpar. It breaks into ſeveral faces, and has different angles, but of a ſomewhat determinate meaſure, the acute ones being of ſixty degrees, and the obtuſe ones of one hundred and twenty.

This ſtone, when heated at one of its angles with the flame of a lamp or candle, ſplits by means of the flame's inſinuating itſelf into the interſtices of the plates that are leſs firmly united; and theſe ſeparate, and ſome fragments uſually fly off with conſiderable violence. One of theſe pieces, carried into an obſcure place, appears ſurrounded with a blue flame, which laſts about a minute. And it is to be obſerved, that theſe pieces which fly off have all the ſhape of an irregular pyramid, with an uneven baſe. If this ſtone be put into a crucible, and ſurrounded with coals, it becomes a very beautiful *phoſphorus*. The whole bottom of the crucible is ſeen, even though it be in broad day-light, ſhining with a bright and beautiful bluiſh white; and if it be carried into a dark place, the light is ſeen much more beautifully. If, after it is cold, it be again heated in a crucible, in the ſame manner it ſhews the ſame bright appearance. After this, if it be tried a third time, it does not ſhine at all. According to all theſe phenomena, the effects of fire upon this ſtone ſeem to depend on a ſulphur contained in it, probably of the ſame nature with that which enters the compoſition of the metals. This may, by means of a heat, ſuch as that

given by the candle or in the crucible, disengage itself so far from the body of the ſtone as to take fire; and when it has burnt ſo long as to conſume itſelf, the luminous property of the ſtone ſeems to ceaſe.

The coloured gems are cryſtals of a peculiar kind, tinged with the ſulphur or PHLOGISTON of metals: this ſulphur gives them their colour, and conſequently it ought to give them the properties of *the Bononian ſtone*, if it were not too fixed to be diſſipated in the ſame eaſy manner, and to take fire in the diſſipation. And it appears, on trial, that the baſtard emeralds of Auvergne and other places, the matrix of the amethyſt, the fragments of ſome of the accidental jaſpers, the hyacinths, and ſome ſort of rubies, are all *phoſphoruſes* of the nature of the *Bononian ſtone*, but with different degrees of brightneſs. The mother of the emerald, the yellow jaſper, the water ſapphire, the malachite, the opal, and the garnet, have none of them any of this property.

Since the ſame ſulphurs which take fire in the *Bononian ſtone* are what give colour to theſe other ſtones, it ſhould ſeem, that thoſe which are not of this *phoſphorus* kind, nor give a light after being heated, ſhould not loſe their colours in the fire; and this is found to be true in the garnet, which does not loſe any part of its colour, nor is it at all luminous; whereas the hyacinth, and ſome of the jaſpers and other ſtones, which loſe a part of their colour, not the whole, in the fire, become alſo in part luminous, or more ſo, in degree, according to the quantity of colour which they loſe. This however, is no certain rule, ſince the mother of the emerald, the topaz, and ſome other ſtones, loſe all their colours, and yet are not at all luminous. The reaſon of this ſeems to be, that the ſulphurs are driven out of theſe ſtones ſo ſlowly, and in ſuch minute quantities, that they are not at any time collected into body enough to be capable of flame. There is nothing to be objected as to the *Bononian ſtone* ſhining: though they are uſually white, they may poſſeſs no ſmaller portion of ſulphurs than the coloured ſtones: only in theſe the ſulphur may be colourleſs, or white in themſelves. It may be poſſible alſo that the ſulphurs in a ſtone of this kind, may be diſperſed in ſuch ſmall molecules, as not to form a body ſufficient to give any colour; but, when collected, in order to be driven off in the fire, they may then be ſufficient in quantity to give a blue tinge to the flame.

The iſland cryſtal, which is alſo a ſpecies of ſpar, and which greatly reſembles this *Bononian ſtone* in many particulars, flies to pieces alſo in the ſame manner, on being heated; and when carried into the dark, this alſo gives ſome ſparks of light, but they are few in number, and looſely ſcattered over the ſurface: when this ſtone is burnt a little in the crucible, there is ſome ſmall appearance of flame, with a ſmell of ſulphur, and the matter in the bottom of the crucible is found ſhattered to pieces; but all the pieces are regular parallelopipeds, as was the original maſs.

It is to be obſerved, that the *Bononian*, and others of the ſame kind, which only ſhine in the dark, and that only for a few minutes, when firſt taken out of the fire, are, properly ſpeaking, endued with no other luminous quality than that of a burning coal; but their light, having been generally conſidered, and requiring darkneſs to ſhew it, has obtained for them the ſpecious title of *phoſphori*.

PHOSPHORUS, *Canton's*, is an artificial *phoſphorus*, the method of preparing which was diſcovered by the late ingenious Mr. Canton, and publiſhed in the Phil. Tranſ. for 1768, vol. lviii. p. 337, &c.

This is much ſuperior to any ſingle natural ſubſtance, and has the advantage of being very eaſily and cheaply prepared. The proceſs is as follows: calcine ſome common oyſter-ſhells, by keeping them in a good coal fire for half an hour; let the pureſt part of the calx be pulverized, and ſifted; mix with three parts of this powder one part of the flowers of ſulphur; let this mixture be rammed into a crucible of about an inch and a half in depth, till it be almoſt full; and let it be placed in the middle of the fire, where it muſt be kept red hot for one hour at leaſt, and then ſet by to cool: when cold, turn it out of the crucible, and cutting, or breaking it to pieces, ſcrape off, upon trial, the brighteſt parts; which, if good *phoſphorus*, will be a white powder, and may be preſerved by keeping it in a dry phial with a ground ſtopple. The quantity of light which a little of this *phoſphorus* gives, when firſt brought into a dark room, after it has been expoſed for a few ſeconds, on the outſide of a window to the common light of the day, is ſufficient to diſcover the time by a watch, if the eyes have been ſtout, or in the dark, for two or three minutes before. By this *phoſphorus* celeſtial objects may be very well repreſented; as Saturn and his ring, the phaſes of the moon, &c. if the figures of them, made of wood, be wetted with the white of an egg, and then covered with the *phoſphorus*. And theſe figures appear to be as ſtrongly illuminated in the night, by the flaſh from a near diſcharge of an electrified bottle, as by the light of the day. This *phoſphorus* receives no injury from being expoſed to the direct rays of the ſun, which is the caſe with ſome of the more delicate kinds, as Beccarius has remarked, and Lemery impoſed with all. However, it cannot be expoſed to moiſture without loſing its property of imbibing and emitting light, and alſo its whiteneſs. Mr. Canton found, that it was more affected by mixture with ſpirit of wine than with æther. It had been long known, that heat promotes the expulſion of the light which has been formerly imbibed by theſe *phoſphori*: Mentzel, who wrote ſoon after the diſcovery of Baldwin's *phoſphorus*, aſſerted, that it had the property of becoming luminous by heat only; the ſame fact was obſerved by M. Du Fay; but the principle on which it depended was diſcovered by Beccarius, M. Margraaf, and Mr. Canton, independently of one another. Beccarius was firſt of opinion with Mentzel, that the light was produced by heat; but finding by repeated trials, that, without previous expoſing to the light, heat had no effect, he relinquiſhed that opinion. Mr. Margraaf fell at firſt into the ſame miſtake with Beccarius; but he afterwards obſerved, that the *phoſphorus* would not ſhine by being placed upon a hot furnace, unleſs it had been expoſed to the light two or three days before. Upon the whole, he concludes, that the light is held in this ſubſtance by attraction, and afterwards expelled by heat. Mr. Canton alſo, without any knowledge of the obſervations of Beccarius and Margraaf, found, by a variety of experiments, that when his *phoſphorus* had imbibed light, and had emitted all that it could in the common ſtate of the atmoſphere, it would emit more upon the application of heat, but that a continuance of the ſame degree of heat would only make it luminous for a certain time. Whence he infers, that there is a ſtrong attraction between light and the particles of natural bodies, and that the ſtrong vibrations into which heat throws them compels them, as it were, to quit their hold of each other; and the light which this *phoſphorus* gives, by being heated to a certain degree, appears to be cauſed by its throwing off adventitious particles, and not by any of its own; ſince its light will decreaſe, and be entirely gone, before the *phoſphorus* be hot enough to ſhine of itſelf, or to emit particles of light from its own body. Lemery and Muſchenbroeck have obſerved, that the Bononian *phoſphorus* imbibes leſs light when hot than cold, becauſe it appears leſs bright when carried into a dark room; but this circumſtance is accounted for by Mr. Canton, by its parting with its light ſooner when hot than when cold, and, therefore, parting with more in the time of the conveyance from one place to another: and this, he alſo ſays, ſeems to be the cauſe why the Bononian *phoſphorus* never appears ſo bright after it has been illuminated, and, conſequently, in ſome meaſure heated, by the direct rays of the ſun, as after it has been only expoſed in the ſhaded open air, to the common light of the day. However, there is reaſon to imagine, that the ſame degree of heat, which diſpoſes the *phoſphorus* to throw off the light after it has been imbibed, muſt likewiſe render it indiſpoſed to receive it. For an account of the reſult of Mr. Canton's experiments on this ſubſtance in favour of the materiality of light, ſee LIGHT.

PHOSPHORUS *fecalis*, a very fine kind of *phoſphorus*, exhibiting many wonderful phenomena, and prepared from human dung mixed with alum.

Mr. Homberg, who was the inventor of it, gives the method of preparing it in the following manner: take four ounces of human dung newly made, mix it with the ſame quantity of reſined alum groſly powdered; put the mixture into a ſmall iron ladle, capable of holding about a pint; ſet it over the fire in a chimney, and it will melt together, and become as fluid as water; let it boil groſly over a ſmall fire, continually ſtirring it with an iron ſpatula till it is dry; it will then be difficult to ſtir, but it muſt be kept ſtirring about, and all the lumps it runs into muſt be broken, and what adheres to the ſides of the ladle ſtirred in and blended with the reſt; this muſt be continued till it is perfectly dry, and the ladle muſt be now and then taken from the fire, and the matter ſtirred about in it, that it may not grow red-hot. When the whole is thus perfectly dried, it will ſtill be in little lumps, and when cold it muſt be rubbed to powder in a metal mortar; it muſt then be put into the ladle, and ſet over the fire again, in will then become a little moiſt again, and run into clods and grumes, but it muſt be again ſtirred till dry; when cold it is to be powdered again, and a third time put into the ladle; and when perfectly dried this time, it is to be laid by in a paper in a dry place; thus is the firſt or preparatory operation finiſhed.

Take two or three drams of this powder, put it into a ſmall matraſs, capable of holding an ounce and half of water, and which has a neck ſix or ſeven inches long; put

put a paper ſtopper lightly into the neck of the matraſs; then take a ſmall crucible of three or four fingers breadth high, put two or three ſpoonfuls of ſand into it, then ſet the bottom of the matraſs on the ſand, and take care that no part of it touches the ſides of the crucible; fill up the reſt of the crucible with ſand, and let the whole body of the matraſs be covered with it; then ſet the crucible in one of the common little earthen furnaces, and make a charcoal fire about it; for the firſt half hour let the coals only reach up to the middle of the crucible, but afterwards lay them up to the rim of it; continue this fire about half an hour, or till the powder within the matraſs is red-hot; then pile up more charcoal above the rim of the crucible, and continue this fire an hour, after which let the whole cool. There will riſe a large quantity of fumes during the operation, and they will often throw out the ſtopper of the matraſs; but this muſt be replaced, and the fire a little abated in that caſe: when theſe fumes ceaſe, the fire may be raiſed without hurting the proceſs, when the crucible is ſo cool that it may be taken out of the furnace without burning the hands. This is to be done, and the matraſs is to be half raiſed out of the ſand to make it bear the cold by degrees, and its mouth muſt then be ſtopped cloſely with a cork, inſtead of its paper ſtopper. If, on ſhaking the matraſs about, the matter falls into powder, it is a proof that the operation has been well performed; but, if it hangs together in form of a cake, it is a ſign that the matter was not well roaſted in the ladle before the putting it into the matraſs.

When the operation has been well performed, and the matter is in powder in the matraſs, pour out a ſmall quantity of it on a piece of paper, and immediately ſtop the matraſs again: the powder upon the paper will immediately fume and take fire, burning the paper, and any other combuſtible matter that is in the way. If there has been too much of the powder poured out of the matraſs, it muſt not be returned in again; for though that ſhould be done before it begins to ſmoak, yet it will certainly ſet fire to all that is in the matraſs; from this it may be eaſily ſeen alſo, that the matter cannot be emptied out of the matraſs into a phial, but muſt always be in the veſſel in which the calcination was made.

If too much alum be uſed, the powder will not take fire at all: it will be of different colours, according to the veſſel the firſt calcination was made in, and according to the degree of fire that was uſed; hence it is ſometimes black, ſometimes brown, ſometimes red, green, yellow, or white.

It takes fire equally well in the day-time and in the night, and that without the mixture of any other ſubſtance, or without the leaſt rubbing, or any other circumſtance beſide the mere expoſure to the air. In this it differs from all the other known artificial *phoſphori*; for that of urine requires a ſmall degree of heat, in order to its burning; the ſolargodine *phoſphorus* requires a conſiderable degree; the Bononian ſtone does not ſhine, except after having been expoſed to the day light; and all the others require violent rubbing, or a ſmart blow, to produce their light.

It is be deſired to keep this powder good for any time, it muſt be put in a dry place where there is not too much heat; the mouth of the matraſs muſt be kept cloſe ſtopped, and its body covered with paper; and the place where it ſtands muſt not be in too ſtrong a light; for the open day-light has been often known to weaken its power, and, in fine, wholly to ſpoil it through the glaſs. Mem. Acad. Par. 1711. See PYROPHORUS.

PHOSPHORUS, *ſulphurating*. See PULGERATING.

PHOSPHORUS *metallorum*, a name given by ſome chemiſts to a preparation of a certain mineral ſpar, which is found in the mines of Saxony, and other places, where there is copper. The ſpar to be uſed on this occaſion is that kind which is tinged green, and from its, in ſome degree, reſembling the colour of the emerald, is called by ſome *gemmæ viridis*, and by others *lapis smaragdi mineralis*. This is to be powdered very fine, and this powder is to be laid on a flat plate of copper, iron, or any other metal: this plate is then to be ſet over ſome lighted charcoal, and the whole placed in a dark place. The ſpar will receive its neceſſary degree of heat for ſhining long before the metal will, and, conſequently, as ſoon as it begins to ſhine, the fire is not to be made any briſker. While the plate of metal is held in this degree of heat, and does not appear at all red, the powder upon it will ſhine like a lighted coal, and will continue ſo for ſome time. If it be removed away, and ſuffered to cool, it will be fit to repeat the experiment a ſecond time with, but its light will not be ſo ſtrong as before. Phil. Tranſ. N° 246. p. 365.

PHOSPHORUS *of ſulphur*, the name given by the French academicians to a new-diſcovered ſpecies of *phoſphorus*, which readily takes fire on being expoſed to the open air. See PYROPHORUS.

The invention was Mr. Le Fevre's, and the proceſs is this: the ingredients are two drams of common *ſulphur*, half an ounce of ſteel filings, ten grains of colophony, and ſix drams of common water. Theſe things being all weighed and ſet apart, powder about half a dram of the *ſulphur* in a ſmall mortar, then add the colophony, and afterwards the remainder of the *ſulphur*. When this is all reduced to a fine powder, put in the filings of ſteel, and rub the whole together till it is ſo thoroughly mixed, that the ſteel does not appear, but the colour of the whole looks every where uniform and regular; then add about twenty drops of the water; and after beating the whole together add as much more, and continue to do ſo till the maſs is of the conſiſtance of a paſte, but not too moiſt. Put this paſte into a ſmall matraſs that will contain about three ounces, and pour on it more of the water till it ſwim above the ſurface of the paſte near a quarter of an inch. The matter of the paſte will then break, and appear in form of a granulated powder under the water; put the matraſs on a ſand furnace, but give it no greater heat than that the hand can bear to lie upon the matraſs. When it begins to heat, the mixture will ferment and ſwell, and become black; it is then to be ſtirred with an iron rod, and a little more water muſt be added every quarter of an hour, till the whole is uſed. The matter will then be very black and liquid; and it is to be then taken from the fire, and ſet by for the whole night. This is the firſt and moſt eſſential part of the operation, and in this great care is to be taken that the fire be not too violent; for if the *ſulphur* be burnt, the operation will be ſpoiled, and the matter would ferment ſo high as to run over at the mouth of the veſſel.

To finiſh the operation, a little water muſt be added to the matter, ſo as to ſwim over it, and the veſſel muſt be again ſet in the ſand, and a ſtronger fire given than before; this is known to be ſtrong enough when there is any humid vapour obſerved to ariſe out of the mouth of the veſſel. This fire is to be continued about two hours, that the greater part of the humidity may be evaporated; which is known by the iron rod finding ſome reſiſtance when put into the veſſel, and the matter it brings up being granulated and ſolid, or no longer moiſt, it muſt then be immediately taken from the fire, and the whole is then finiſhed. It is neceſſary to be very exact in this laſt and critical minute; for a very little longer handling on the fire will burn the *ſulphur*, and render all the former care of no effect. The black matter remaining in the matraſs is to be taken out, and the ſides ſcraped clean with an iron rod; any piece of this that happens to fall upon a paper takes fire in a very little time, and burns away like the other *phoſphorus*. The proceſs is a very nice one, but, by obſerving all the rules here laid down, ſeveral perſons have ſucceeded in making the *phoſphorus* to perfection: the whole intent of the operation ſeems to be to join together the minute particles of ſteel and *ſulphur*; which when thus joined cannot fail to be very inflammable, and to take fire on receiving the ſmalleſt humidity from the air to make them ferment.

It cannot but be obſerved, that this *phoſphorus* is founded on Lemery's experiments of ſteel and *ſulphur* taking fire together; but this is a much more nice and accurate operation, and a fine improvement on the original plan, which was only by mixing large quantities of ſteel-filings and *ſulphur* together into a paſte with water, and burying this in the earth to make it take fire of itſelf, and thus repreſent the natural phenomena of volcanoes, thunder, lightning, &c. Mem. Acad. Par. 1728.

Phoſphorus may be kindled by the effluvia of electricity. See Phil. Tranſ. N° 475. ſect. 14.

PHOSPHORUS, *rationale of the effects of*. It may be obſerved, that in moſt of the natural *phoſphori*, there is a briſk attrition or friction concerned; which we may ſuppoſe either to give the minute parts of the ſubſtance the proper motion and agitation neceſſary to convert them into fire, if fire be ſo producible (as Hooke, Boyle, Newton, and the generality of the Engliſh philoſophers, have ſuppoſed that it is), or elſe to expel and emit the particles of fire naturally contained in them.

In the factitious ſorts, we may note, that a long proceſs by fire is uſually required, wherein the matter undergoes divers cochions, torrefactions, calcinations, diſtillations, &c. in the courſe wherein a conſiderable quantity of fire muſt neceſſarily be imbibed, and may poſſibly be retained therein.

In that, e. gr. prepared of the fecal matter, M. Homberg obſerves, that the aqueous part of the ſubſtance muſt neceſſarily have all been evaporated, with the greateſt part of the oil, and volatile ſalt, leaving pores or vacuities in the places they poſſeſſed; ſo that what remains is a ſpongeous plexus of earth, and fixed ſalt, having nothing in its locuſts, or cavities, but ſome of the matter of the fire, which has been ſtopped and detained therein, much as in quick-lime.

This being supposed, we know, that the fixed salt, which is here pretty copious, will readily absorb the moisture of the contiguous air; and that the sudden introduction of such moisture into the pores of the powder, must produce a friction, which may excite a small degree of heat; and this joined with what fire was there already laid up, may make a heat sufficient to give fire to the small remains of oils too closely connected with the salt to have been carried off by the calcined fire; so that we have here every thing necessary to heat and light.

What confirms this doctrine is, that if the powder be kept in a vessel not sufficiently close, the air, insinuating by degrees, moistens and saturates it, but that so slowly, as not to produce friction enough to set it on fire; so that it is spoiled, and disabled from taking fire ever after: much as is the case in quick-lime, which, after it has lain some time in the air, ceases to grow hot, even by the affusion of water.

The reason why quick-lime, which contains a great quantity of particles of fire, as well as our powder, does not conceive heat by the access of the air, or the ingress of its moisture into the pores thereof, but that water must be thrown thereon, is, that the quick-lime, being more thoroughly calcined, retains too little fixed salt to imbibe the moisture readily and copiously enough to excite the necessary friction.

And the reason why quick-lime does not produce a flame, as the powder does, even when water is cast on it, is, that it did not retain enough of the oily matter to afford flame; for, if oil were mixed with it, a flame would readily ensue. Mem. de l'Acad. ann. 1711. See PYROPHORUS.

If we suppose, with Mr. du Fay, that all calcareous stones are capable of being rendered luminous, without the concurrence of an acid, we may then suspect that light is capable of adhering more to some bodies than to others, and that calcination gives to calcareous stones the property of retaining a greater quantity of light, and during a longer time, than other bodies can. This, however, as Mr. Macquer observes, is a vague conjecture, and not much supported by facts. But if we adopt M. Margraaf's opinion, which is more conformable to the result of experiments, that these stones cannot be rendered luminous without the concurrence of an acid, and the acid only contributes to give them, in a considerable degree, this property, we must conclude that acids have a principal share in its production. M. Macquer reasons on this general principle in the following manner: we know that acids in general, particularly the vitriolic and nitrous, have a strong affinity with PHLOGISTON; and that when they are united with this principle, they form compounds possessed of the properties of sulphur, or of *phosphorus*. It is also certain, that sulphur, *phosphorus*, and probably other compounds of acid and phlogiston, have two methods of burning; one, vivid and strong, in which their phlogiston forms a very sensible flame, and produces not only light, but heat sufficient to kindle combustible bodies; the other slow and weak, capable only of producing a light much less vivid, without any sensible heat, or with a heat too small to kindle the most combustible bodies. Hence, may we not with probability believe, that the acid contained in stones rendered *phosphoric* by calcination combines with the phlogiston of the coals, forming with it a sulphureous compound; and that the phlogiston of this kind of sulphur or *phosphorus* adhering but weakly to the acid, or exciting there perhaps only superabundantly, is very easily combustible; so that the mere action of the heat and light of the open air is sufficient to inflame it, but not so strongly as to produce heat and a total dissipation of the phlogiston, but to slowly and weakly, that only a faint light, observable in the dark, is produced? The English translator of the Chemical Dictionary adds, that the principal cause of the slow combustion which produces *phosphoric* light, seems to be, that the union between the acid and the phlogiston of *phosphoric* substances is weakened by the presence of some earth, to which the acid has also a disposition to unite; and that the phlogiston is thereby gradually disengaged, especially when it is in contact with air, to which it is at all times strongly disposed to unite, as we may perceive from the necessary concurrence of that fluid to maintain ordinary combustion, which is only a more rapid and copious disengagement of phlogiston from the burning substances. See Chem. Dict. art. *Phosphoric stones*, Eng. edit. and note z.

John Baptist Beccaria has shewn, Phil. Trans. vol. lxi. part i. art 25. that the *phosphorus* composed of sulphur and calcareous earth, imbibed the peculiar coloured rays to which it had been exposed. Thus, having exposed different *phosphoric* pieces to rays of the sun transmitted through green, yellow, and red crystals, he observed, that each of them, when afterwards viewed in the dark, exhibited that colour to which it had been exposed. This observation is decisive in favour of the opinion, that *phosphori* of this kind emits the same light that it receives, and no other; and that the light is not produced, but expelled by heat.

This experiment, which has often failed, for want of employing good glasses, or on account of the weakness of the solar rays, has been repeated by professor Allamand of Leyden; who says, that having exposed a prepared (probably by calcining it with some sulphureous substance) piece of the Bononian calcareous *phosphorus* to the coloured rays of the sun, after their being separated by one of his prisms, and looking to it in the dark, he found the *phosphorus* gave the colour of the separated rays to which it had been exposed.

PHOSPHUROUS, *aqueous*, a name given by Dr. Leigh, in his History of Lancashire, to a water found near Wigan in that county, which takes fire on holding a lighted candle to it. It is not properly the water, however, that takes fire in this case, but a flame which bursts out of the ground with it. The author also calls it a sulphurated water; but that very improperly, for it contains no sulphur, but only issues out with this bituminous vapour.

PHOSPHORUS, in *Astronomy*, is the morning star, or the planet VENUS, when she goes before the sun.

The same call it LUCIFER; the French *etoile de berger*, the Greeks *phosphoros*, from φως, *light*, and φερω, *I bear*, or *bring*.

PHOSSA, in *Ornithology*, a name understood by some to express the whole genus of pigeons, but more properly it is the name of one species only, the *columba turgetina*, or RUNT-DOVE.

PHOTINX, φωτιγξ, in *Antiquity*, a kind of flute in use among the Greeks. It was the same with the *plagiaulis* of the Romans.

PHOTINIANS, in *Ecclesiastical History*, a sect of ancient heretics, in the fourth century, who denied the divinity of Jesus Christ.

They took their name from *Photinus* their chief, who was bishop of Sirmium, and a disciple of Marcellus. This prelate published, in 343, his opinions concerning the Deity, which were equally repugnant to the orthodox and Arian systems. He maintained, that Jesus Christ was born of the Holy Ghost and the Virgin Mary; that a certain divine emanation (which he called the Word) descended upon this extraordinary man; that on account of the union of the divine word with his human nature, Jesus was called the Son of God, and even God himself; and that the Holy Ghost was not a distinct person, but a celestial virtue proceeding from the Deity. He was condemned by both parties in the councils of Antioch and Milan, held in the years 345 and 347, and by the council at Sirmium in 351. He was afterwards degraded from the episcopal dignity, and died in exile, in the year 372 or 375. His opinion was afterwards revived by Socinus.

PHOTOSCIATERICA, a term, which some authors use for the art of DIALLING.

The name is derived hence, that the art not only shews the hours by the shadow of a gnomon, whence it is called *sciatherica*, from σκια, *shadow*; but sometimes also by means of the sun's light, as in spot dials, reflecting dials, &c. from φως, *lux*, *light*.

PHOXINUS, in *Ichthyology*. See ROACH and MINNOW.

PHOXOS, φοξος, one with an acuminated or fastigiated head, that is, sharpened towards the top; the eminences of the forehead or occiput, or both, being depressed, or one or both of those parts beyond measure prominent. But *phoxi* are properly those who have the top of their head very much fastigiated and turbinated, and consequently deformed. Thersites is described in Homer with such a head.

PHRANIAN, in the *Botanical Writings of the Ancients*, a name given to a kind of *amomum* used in making garlands and other ornaments.

PHRASE, *phrasis*, φρασις, of φραζω, *I speak*, in *Grammar*, an elegant turn or manner of speech, peculiarly belonging to this or that occasion, this or that art, or this or that language.

Thus we say, an Italian *phrase*, an eastern *phrase*, a poetical *phrase*, or a rhetorical *phrase*.

A few elegant *phrases*, pertinently applied, are an ornament of discourse; but, if they come too thick, they have an ill effect, and make the style savour of affectation.

PHRASE is sometimes also used for a short sentence, or small set or circuit of words, constructed together.

In this sense, Father Buffier divides *phrases* into *complex* and *incomplex*.

PHRASES are *complete* where there are a noun and a verb, each in its proper function; i. e. where the noun expresses a subject, and the verb the thing affirmed of it. *Incomplete phrases* are those, where the noun and the verb together only do the office of a noun, as consisting of several

verial words, without affirming any thing, and which might be expressed in a single word.

Thus, *that which is true* is an incomplete *phrase*, which might be expressed in one word, *truth*: as, that which is true satisfies the mind; *i. e.* truth satisfies the mind.

PHRASE, *phrasis*, Fr. in *Music*, denotes the continuance of an air or harmony, which forms, without interruption, a sense more or less complete, and which is terminated by a cadence more or less perfect. In melody, the *phrase* is constituted by the air; but in harmony it is a regular series of concents, united together by dissonances expressed or understood.

PHRASEOLOGY, *phraseologia*, Φρασεολογια, a collection of the *phrases*, or elegant expressions, in any language.

PHREATTS, or PHREATTIUM, in *Greek Antiquity*, a court pertaining to the civil government of Athens, which was situated upon the sea-shore in the Piræus, and derived its name ἀπο τῶ φρεατος, because it stood in a *pit*, or, as others suppose, from the hero Phreatus. The causes heard in this court were such as concerned persons that had fled out of their own country for murder, or those that fled for involuntary murder, and had afterwards committed a deliberate and wilful murder. The first person that was tried in this place was Teucer, upon a groundless suspicion, that he had been accessory to the death of Ajax. The criminal was not permitted to come to land, or so much as to cast anchor, but pleaded his cause in his bark, and if found guilty, was committed to the mercy of the winds and waves, or, as some say, suffered there condign punishment; if innocent, he was only cleared of the second fact, and, according to custom, underwent a twelve month's banishment for the former. Potter's Gr. Antiq. vol. i. p. 111.

PHRATRIARCHUS, Φρατριαρχος, among the Athenians, a magistrate that presided over the *phratria*, or third part of a tribe. He had the same power over the *phratria*, that the PHYLARCHUS had over the tribe.

PHRENES, Φρενες, in *Anatomy*, the DIAPHRAGM.

It was thus called by the ancients, from φρην, *mind*; because they imagined this to be the seat of the rational soul: Hence,

PHRENESIS, *phrenesis*, or distraction. See PHRENSY and PARAPHRENESIS.

PHRENETIC *nerves*, called also *diaphragmatic* and *stomachic nerves*, are nervous branches derived from the cervical nerves, which, joining in a trunk, run through the mediastinum undivided, till arriving near the diaphragm, they again divide, and send off divers branches, some into the muscular, others into the tendinous part thereof.

PHRENIC *vessels*, an appellation given to a vein and some arteries of the human body, from their passing through the DIAPHRAGM.

The *phrenic* artery arises out of the descending AORTA, and distributes itself into the diaphragm and pericardium. See *Tab. Anat. Angeiol. fig.* 1. *n* 40.

The *phrenic* veins are two veins, which the descending CAVA receives immediately after its piercing the diaphragm. See *Tab. Anat. Angeiol. fig.* 6. *litt.* qq.

PHRENITIS, *phrenitis*, from φρην, *mens*, the *understanding*, or, as some will have it, from φρες, the *diaphragm*, because the ancients supposed it to have its seat in that part, in *Medicine*. See PHRENSY.

PHRENSY, in *Medicine*, a constant and vehement delirium, or distraction; accompanied with an acute fever, raving, waking, &c.

It differs from the *mania* and *melancholy*, as these are without fevers.

Physicians generally make the *phrenitis* to consist in an inflammation of the meninges of the brain; and distinguish it from the *peripneumonitis*, which they suppose to be an inflammation of the diaphragm.

Willis will have them the same disease, and both to consist in an inflammation of the animal spirits. He only distinguishes them as the inflammation arises from the cerebrum alone, or from the cerebrum and cerebellum together; and concludes, that they both arise in a fever, from the boiling blood's throwing its adust recrements into the brain.

Boerhaave makes the *phrenitis* either *vera*, wherein the cerebrum, or meninges, or both, are inflamed; or *spuria*, wherein the matter of a fever is translated into the cerebrum.

The true one either kills on the third, fourth, fifth, or seventh day; or it changes into a mania, lethargy, coma, &c. tremors, gnashing of the teeth, and grumous blood distilling from the nose in this case, are prognostics of death.

The disease is most frequently the effect of inflammatory or malignant fevers; though it sometimes arises from a suppression of the natural evacuations, as the menses, &c. When it succeeds an inflammation of the lungs, of the intestines, or of the throat, &c. it is owing to a translation of the disease from those parts to the brain, and generally proves fatal.

The preceding symptoms of this disorder are, long watchings, troubled sleeps, and very restless dreams, acute and terrible pains of the head, redness of the eyes, fiery look of the face, an entire forgetfulness of every thing, and a wandering of the mind, discovering itself by inconsistent answers to questions, a small delire of liquors, though the heat of the mouth plainly indicates all that can occasion the most intense thirst; dryness of the skin; large and slow respiration, a weak and slow pulse, singing of the ears, a small dropping of blood from the nose, watchfulness, suppression of urine, and an extreme sensibility of the nervous system.

All these signs predict an approaching *phrenitis*; but when it has already seized the patient, the blood-vessels of the head all swell, and the temporal arteries have so strong a pulsation, that they seem to beat very forcibly; the eyes sparkle and look wild and fierce; the talk is all wild and raving; and at certain times the patient has usually violent fits of struggling to get out of bed; the extremities are cold, and the urine thin, white, and pellucid. When the brain itself is inflamed, the pulse is always soft and low; but when the inflammation only affects the integuments of the brain, viz. the dura and pia mater, it is hard. Though the tongue is often black and dry, yet the patient seldom complains of thirst, and even refuses drink. A constant trembling and starting of the tendons is an unfavourable symptom; as are also a suppression of urine, a total want of sleep, a constant foaming, and a grinding of the teeth. The favourable symptoms are, a free perspiration or sweating, a copious discharge of blood from the nose, the bleeding piles, and a plentiful discharge of urine, which lets fall a copious sediment. Sometimes the disease is carried off by a looseness, and in women by an excessive flow of the menses.

The persons most subject to a *phrenitis* are those of a sanguineous and plethoric habit, and such given to anger; such as are addicted to a hot diet, and the use of strong liquors; such as are many hours together exposed to the sun in hot weather in their daily occupations; and such as have been subject to violent head-aches, or have had habitual hæmorrhages at the nose stopped upon them, or have had the blood usually discharged by the hæmorrhoids thrown up into the head; and women who have had the menses stopped upon them, and the blood to the same manner thrown up into the head. These persons are, from such circumstances and accidents, subject to the *phrenitis* as an idiopathic distemper, dependent on no other. But, besides these, others are also very subject to it as a symptom in other diseases. People in acute fevers are very often thrown into it by an incomplete critical congestion of blood about the head; and this principally happens to such as have been treated by apothecaries in an improper and injudicious manner. From the sudden checking of sweats, many also have been thrown into it, and some from improper bleedings, and more than all these by a too hot regimen.

An inflammation of the brain is sometimes the consequence of hard study, anxiety, or grief; of repellent or improperly used in an erysipelas, and of external injuries in the head.

Method of cure. In the cure, two things are chiefly to be attended to, viz. to lessen the quantity of blood in the brain, and to retard the circulation towards the head. A clyster is one of the first things to be prescribed in this case; or, if this cannot be given, from the violence of the patient, the bowels must be gently relaxed by large draughts of warm emollient liquors, with a small addition of nitre; after this bleeding is to be ordered, where the pulse and condition of the patient shew it to be necessary, and gentle diaphoretics are then to be given in repeated small doses, such as the mixtura simplex highly camphorated, and the like; and, in the intermediate times, the violent emotions of the blood are to be quieted by the use of powders of nitre, tartar of vitriol, crabs eyes, and a small portion of cinnabar; these are to be given with cooling emulsions; a placid regimen must be observed, and the patient kept in a gentle perspiration; and external applications are sometimes of great service: such are spirit of wine and camphor, rubbed on the forehead and temples, and frictions, cataplasms of various kinds, and blisters laid to the soles of the feet.

Others in this case apply epithems to the forehead, either of the absolutely repellent kind, such as vinegar of roses, or of lavender; these are most proper in the beginning; and, if these do not succeed, the resolvents are left afterwards to be tried; such are spirit of wine and camphor, and spirit or tincture of saffron; bags of camphor and nitre in powder may also be applied; and if these fail, it is proper to put on leeches to the temples and behind

hind the ears; bleeding in the jugular vein is another method; and blisters are to be applied to the legs and arms, and sinapisms to the feet, composed of yeast and strong vinegar, with mustard-seed, nitre, and other ingredients of that kind; and, finally, when all these fail, an irritation of the nostrils to promote an hæmorrhage, and bleeding in the nose, as practised in Egypt, and some other countries, is proper. A discharge of blood from the hæmorrhoidal veins is likewise of great service, and ought by all means to be promoted; natural or artificial evacuations should be restored, if they have been stopped, or others substituted in their stead; and if the disease proves obstinate, a blistering plaster should be applied to the whole head.

With regard to regimen, the patient should be kept quiet, and amused and soothed as much as possible. His aliment ought to be light, consisting chiefly of farinaceous substances; and his drink small, diluting, and cooling. Junker, Hoffler, and Buchan.

Dr. Freind has recommended bleeding at the jugular veins, in a *peripneumony* coming upon a fever; but Dr. Langrish endeavours to prove the bleeding in this case to be rather hurtful; and he thinks the cases quoted by Dr. Freind to prove his opinion, either do it not, or may be turned against him. See Med. Eff. abridg. vol. ii. p. 467.

PHRICODES, a term used by the ancients for a kind of fever, which is attended with a coldness and shivering, not only at the beginning of the fit, but at different intervals throughout its whole continuance. The semitertian fever is of this kind. The usual symptoms of these fevers are a remarkable lowness of the pulse, which is scarce to be felt, but recedes as it were from the finger; the belly is tumefied, and a rumbling noise is heard in it, and the tongue is very humid, and irrigated with a sharp acid humor, as with the saliva.

PHRONTIS, a word used by Hippocrates as the name of a peculiar disorder of the general nature of the melancholy affections. In this case the patient, he says, feels, as it were, a thorn pricking the abdominal viscera; he is extremely restless and uneasy, and always avoids light and company. He dreads being touched, and becomes timorous and afraid of every thing; he is molested with troublesome dreams, and imagines that he frequently sees spectres and frightful objects.

PHRYCTE, a word used by the ancient physicians as a name for common resin.

PHRYGANEA, in *Natural History*, a genus of the *neuroptera* order of INSECTS; the characters of which are, that the mouth is without teeth, the palpi are four, the stemmata three, the antennæ are longer than the thorax, and the wings are incumbent, the inferior being folded. Linnæus enumerates twenty-four different species. See CADE-*worm*.

PHRYGANICUS, in *Botany*, a term used by Dioscorides, and many other of the ancient Greeks, to express such herbaceous plants as have hard and woody stalks; such are the garden thyme, and several others of that kind. They also called these plants *xyloides*, *ξυώδης*, and *ξυώδεα φυτα*.

PHRYGIAN *mode*, in *Music*. See MODE, and DIAPASON.

PHRYGIAN *stone*, *Phrygius lapis*, in *Natural History*, the name of a stone described by the ancients, and used in their time in dying; probably from some vitriolic or aluminous salt contained in it, which served to enliven or fix the colours used by the dyers.

It was a light spungy mass, resembling a pumice, and the whitest and lightest were esteemed the best. Pliny gives us an account of their preparing it for use for dying, which was by moistening it with urine, and then heating it red hot, and suffering it to cool again: this calcination was repeated three times, and the stone was then fit for use; and Dioscorides recommends it in medicine after burning; he says it was drying and astringent.

PHRYGIANS, PHRYGES, or PHRYGASTÆ, as St. Epiphanius calls them, in *Church History*, were a branch of the MONTANISTS; so called from *Phrygia*, a country where they abounded.

They esteemed Montanus their prophet; and looked on Maximilla and Priscilla as great prophetesses.

This spirit of prophecy, or rather enthusiasm, was their distinguishing character. See CATAPHRYGIANS.

PHRYMA, in *Botany*, a genus of the *didynamia gymnospermia* class; the characters of which are, that it has only one seed. There is one species.

PHTHIRIASIS, *φθειριασις*, formed from *φθειρ*, *louse*, in *Medicine*, the morbus pediculosus, or lousy disease, wherewith children, and even sometimes adults, are afflicted.

Its cause is in the seeds or ova of that vermin laid in the cuticle, which here, happening to prove a proper nidus, cherishes and fosters the seed so as to hatch it.

The linen cloths, used by goldsmiths to wipe their vessels with after gilding, are excellent against the *phthiriasis* on account of the mercury they contain: they are to be applied by rubbing the child's head.

A good diet and cleanliness conduce much to the destruction of lice. When they are in the head, let it be combed every day, and, after combing, washed with the following lotion; viz. ℞ Staph. agr. vel. coq. Ind. contus. ℥i. aq. font. ℔ iß. & colatum adde acet. clavel. ℥ß; or, instead of this decoction, sprinkle the pulv. fem. staph. agr. vel. cocul. Ind. among the hairs every night, and confine it with a night-cap. The body lice are destroyed by any bitter, sour, salt, or mercurial medicine, applied to the skin. The black soap, and the flowers called cardamine, or lady's smock, are said to be specifics in all cases of lice on the human body.

PHTHIRION, in *Botany*, a name used by some authors for the *pedicularis*, or *red rattle*. See LOUSE-*wort*.

PHTHISIS, *φθισις*, in its general sense, denotes any kind of consumption of the body, in what part soever it be seated, or from what cause soever it arise.

Thus we have a nervous *phthisis*, and renal *phthisis*, dorsal *phthisis*, pulmonary *phthisis*, &c.

PHTHISIS, in its proper sense, is restrained to a pulmonary consumption, or a consumption arising from an ulcer, or other disorder of the lungs, accompanied with a slow hectic fever, which wastes, exhausts, and consumes the muscular flesh.

This disease is properly an ulcerous disposition of the lungs, taking its origin from a stasis of blood in that viscus, which in time degenerates into matter, and which is attended with a very remarkable wasting of the flesh, and loss of strength. A *phthisis* in different persons, and at different times, differs in degree; in some cases it is only a tendency to ulceration in the lungs, but in others it is an actual ulceration in that part.

In the first of these cases, where there is only a tendency to an ulceration, the lungs are only stuffed up with a quantity of tenacious and viscid matter, or of a mucous fluid, with a mixture of blood. This matter, by degrees, becomes more and more hard and tough, by the dissipation of its more fluid parts; and hence gives a scirrhous hardness to that part of the lungs where it is contained, but is not easily changed into absolute matter. In this case the patient may live many years, and often there is no suspicion of his being in a *phthisis*.

In the second case, or an actual exulceration of the lungs, the disease cannot long remain unknown, but the hectic fever, which is its constant attendant, readily discovers it; and the wasting of flesh, and spitting of matter, soon bring the patient to his end, if speedy and efficacious remedies are not applied.

Many are very anxious about the distinguishing a true *phthisis* from an abdominal hectic: but this is a distinction of very little use in practice, since both cases require the same regimen: the gently resolvent and discutient medicines, and balsamics, which have nothing acid in them, are the proper method in a *phthisis*, and are equally necessary in this hectic. The principal difference, however, between them, are these: the abdominal hectic always is attended with a fever, whereas the *phthisis* is often free from a fever, or at least is not attended with one of any consequence: if, in a strong inspiration, on drawing as much breath as may be into the lungs, the cough is always brought on, and there is a pain and straitness in the breast, that also declares the seat of the disorder to be in the lungs.

Atrophies are also much of the same nature with a *phthisis*, differing only in regard to the part they affect, and to the age of the patient. An atrophy is an injury of the glands of the mesentery, pancreas, or liver, and is common to infants; whereas the *phthisis* is a like distemperature of the lungs, and affects persons nearer the time of their growing to man's estate.

A true *phthisis* is, however, to be carefully distinguished from that marasmus which frequently affects old persons: this arises from many different causes, but never from that of a *phthisis*, or distemperature of the lungs. The vomica pulmonum is also by some confounded with a *phthisis*, but improperly; for though these distempers are nearly allied to one another, and often degenerate into each other, yet their origin is different. The *phthisis* takes its origin from an ulcer, properly so called; the vomica is an abscess, or imposthumation. The ulcer in a *phthisis* affects the humid parts of the lungs, where there is least blood; the vomica, on the contrary, is always seated in those parts where there is most abundance of blood; since it generally happens, that a vomica is a shorter disease in its period, and carries the patient off earlier; the *phthisis* does it more slowly and gradually. When a vomica, indeed, does not carry off the patient at first, it usually degenerates into a true *phthisis*; and, on the other hand, when the matter lodged in the lungs

in a true *phthisis* is so acrid as to corrode the vessels, then a vomica pulmonum often comes on in the course of that disease; but these are accidental degenerations of one disease into another; and though the first case is frequent, the other is more rare.

PHTHISIS, *true or a.* This disease, when it begins slowly and gradually, has scarce any signs at all by which it may be known: the utmost symptom of it in this case, is a dry cough, which, though not violent, will not be cured. This cough, by degrees, increases, and holds the patient always, in spite of medicines: in some cases it is moderate, but in others it becomes in a little time very violent. This cough is in some attended with a considerable spitting, in others with very little, and in some persons, both at the beginning and end of the distemper, with no spitting at all.

It is, however, a vulgar error to suppose every cough attended with spitting to be a consumption; for very frequently the faults of the first concoction will give origin to coughs more violent, and attended with a greater spitting than those in a genuine *phthisis*. Hence, for the proper distinguishing of a *phthisis*, many other symptoms are necessary: these are, that the patient be of an age suited to this disease, in general, between fifteen and thirty-five: the cough also, in a true *phthisis*, is continual, and always becomes much more violent on being exposed to the cold, as also on drawing the breath very deeply, or taking the effluvia of any acrid substances; and it is often accompanied with a disposition to vomit after eating; when the matter seems fetched up from a great depth, and is streaked with blood, of a faltish taste, and of an ill smell, and approaching to the nature of matter, this also denotes the case to be a true *phthisis*. This disease is always attended also with a decay of strength, a fenfation of ftraitnefs in the breaft, efpecially after motion, a more than ufual degree of heat, efpecially in the palms of the hands, and a flufhing of the face after eating, a want of appetite, or a defire for nothing but cold foods and drinks. The fleep in this cafe alfo rather tires and weakens than refreshes the patient, and the mouth is dry, the faliva glutinous, and the temper unufually peevifh, and affected ftrongly at trifles; the body alfo becomes extremely fenfible of all changes of the weather. The patient is apt to be fad, his appetite is bad, and his thirft great; the pulfe is generally quick, foft, and fmall; though fometimes pretty full, and rather hard. If thefe fymptoms happen in a cafe where there is either an hereditary difpofition to a *phthifis*, or where there has been any prior injury done to the lungs, there is no room to doubt but that the cafe is a true confumption or *phthifis*.

Thefe prior injuries of the lungs may be either from preceding difeafes, fuch as a fpitting of blood, a peripneumony, or the like; or from external contufions or wounds of the breaft; or, finally, from frequently being among the vapours of corrofive fubftances; and when thefe are attended with a hectic, or lofs of flefh in the whole body, and particularly in the face, there is not the leaft room to doubt but that the cafe is a dangerous *phthifis*. The fpitting of purulent matter is one of the moft certain figns of a perfect *phthifis*, but it is not an univerfal one; for there are fome cafes in which the bronchia and membranous portions of the lungs only are affected, in which a *phthifis* may arrive at its greateft degree with-out any fuch fpitting. It is alfo to be obferved, that the common thick, yellowifh, or greenifh matter, which is frequently voided in large quantities in fimple coughs, is not to be confounded with the purulent matter voided in a continued *phthifis*.

The urine of people in this difeafe is ufually very like that of perfons in health, except that it retains its froth longer: this, however, is no certain fymptom of the difeafe; for it frequently happens in cafes of fimple colds, in people of phlegmatic habits.

If a vomica pulmonum comes on from a *phthifis*, the fever, which was before a flow one, aflumes the appearance of an acute one; and the pain that attends the cough becomes more violent, and refpiration more difficult; finally, colliquative fweats, and diarrhœas, and an exceffive difcharge of urine, are very fatal fymptoms, ufually appearing towards the laft ftages.

PHTHISIS, *perfons fubject to a.* Thefe are principally young people of a plethoric habit, accuftomed to perfect health, and of found conftitution, particularly fuch as live idle lives. Thofe who labour hard, or are of a fcorbutic or phlegmatic habit, are more than all others free from this difeafe. Perfons who are fubject to hæmorrhages of any kind, or to violent pains in the head, and thofe who find their breath very fhort after a little exercife, and particularly fuch as have had at any time fpittings of blood, are moft fubject to this diftemper; as thofe, on the contrary, who are fubject to catarrhal defluxions, to fimple coughs, or to diarrhœas, or cutaneous eruptions, or external ulcers, are ufually free from it. Women in general are much more expofed to it than men; and that for the plain reafon: the fuppreffion of any habitual hæmorrhage endangers the patient as to this difeafe; and women are well known to be more fubject to evacuations of blood than men; and alfo to the fuppreffion of thofe evacuations.

Old people are very feldom found to have *phthifes*, unlefs they arife from violent external injuries; and very young perfons are as feldom liable to them, unlefs from fuppreffion of large and habitual hæmorrhages by the nofe.

PHTHISIS, *remote caufes of.* The remote caufe of this difeafe is a plethoric habit; the proximate caufe is a congeftion of florid, ruddy or ferous blood, in the breaft. The occafional, or accidental caufes, are either external injuries from blows, falls, or bruifes on the breaft, a violent cough in the autumn, at which feafon the air is peculiarly bad for all perfons inclined to a *phthifis*; a conftant or unwholefome air, violent paffions, great evacuations, the abufe of fpirituous liquors, the immoderate ufe of venery, the receiving the fumes of corrofive medicines, and, finally, the improper cure of other difeafes, particularly the fuppreffing of fevers and hæmorrhages by aftringents, without any previous cautions. An hereditary difpofition is alfo frequently in fault; the cough which attends this difeafe is only an effort of nature to break through the congeftion in the firft ftages, and, in the latter, to throw up the matter occafioned by it; to which we may add, that particular occupations contribute to this difeafe.

Sydenham obferves, that the heavieft *phthifes* ufually have its origin in the winter's cold; from a fharp humour trickling down upon the lungs, where, like a catarrh, it irritates them fo as to raife a cough.

This, by degrees, brings on other fymptoms; as a fpitting, firft, of a vifcid pituita, then a heavy fetid puftion of pure blood, and fometimes of the very fubftance of the lungs, raifed by a long exulceration: with night-fweats, falling off of the hair, and finally a colliquative flux, which is foon followed by death. The fame author adds, that the *phthifis* kills two thirds of thofe who die of chronic difeafes.

Dr. Arbuthnot obferves, that in his time conſumptions made up above one-tenth part of the bills of mortality in and about London; and it is well known, that this fpecies of difeafe prevails more in England than in any other part of the world; owing, perhaps, to the great ufe of animal food and ſtrong liquors, the general application to ſedentary employments, and the great quantity of pitcoal which is burnt here; to which may be added the perpetual changes in the atmoſphere, or the variableneſs of the weather.

In the laſt ſtage of the *phthiſis*, the feet and legs ſwell, the noſe appears ſharp, the eyes hollow, the temples fallen, the ears cold and contracted, the ſkin about the forehead hard and dry, and the complexion greenifh or livid, &c. This appearance is called the FACIES *Hippocratica*. See CONSUMPTION.

Among the cauſes of this diſeaſe may be reckoned intemperance, as it brings on a plethora or cacochymy, and alſo peripneumonies, aſthmas, pleuriſies, &c. Pitcairn adds, that the *phthiſis* frequently ariſes from an ill conformation of the breaſt; which is either natural, as when the breaſt is too narrow, the neck too long, &c. or accidental, where there happens a curvity or diſtortion of the breaſt. And he reckons among the ſpecies of *phthiſis* thoſe proceeding from the diarrhœa, dyſentery, gonorrhœa, hæmorrhages, and dropſy, and from many other diſeaſes; and perhaps there are many other remote cauſes which can produce a conſumption, without varying the common immediate cauſe of the diſeaſe, or the method of cure.

Prognoſtics in it. A true *phthiſis*, even in its beginning, is a dangerous diſeaſe, and admits but of a very dubious prognoſtic; but when in an advanced ſtate, it is always fatal. The reaſon of this is evident, becauſe there are in this caſe real ulcers in the lungs, and we well know that no ulcers can be cured till it is firſt perfectly cleanſed, and that it is not eaſy in an internal part; and, after that, the healing up of a wound in the lungs is ſcarce to be expected, as thoſe parts are continually diſturbed by the very drawing in and voiding the breath, and ſtill more ſo by the cough. There have been, however, inſtances of cures in the beginning of a *phthiſis*, in which there have been evident proofs of a reſtitution and conſolidation of the parts.

People of a dry habit are much ſooner carried off by it than thoſe of a moiſt one; as are alſo thoſe of a bilious diſpoſition, than thoſe of a more languid temper; and, finally, younger perſons uſually die ſooner in it, than thoſe who are more advanced in years. Women, as they

are more subject to a *phthisis* than men, so they are more easily cured. This distemper is often brought upon them merely from a suppression of the menses, and in that case it is often cured only by regularly bringing them again to their proper periods. The hectic fever in these cases is what hastens the death of the patient; for the less of that fever the patient has, the longer he lives under it.

When the spitting of true purulent matter is come on, and is attended with colliquative sweats and a diarrhœa, there is no further hope for the patient; and, in general, what is reported of the curing of consumptions, is founded on errors, and other cases have been ruthlessly so.

A diurnal cough becomes habitual, and attended with a raising of a thick, pulpy, greenish matter, is often mistaken for a consumption: as is also a slow fever, attended with copious sweats, and an extenuation of the body; or a recent hectic, arising from a continued slow fever; or a merely asthmatic disorder of the breast; or, finally, a hæmoptysis has been mistaken for a *phthisis*. In all the cases said to have been *recent*, and perfectly cured, either one of these has been the case, or the mere strength of nature, assisted by happy circumstances in the constitution, not to be expected from one person in a thousand, have carried the patient through it.

Method of cure. The general method in a genuine *phthisis*, is to reflect first the softening, ulcerating, and diffusing the ulcerous matter in the lungs; and after this to attempt the cleansing and healing of the ulcers; afterwards to relieve the hectic by analeptics, and to give the weakened parts their due tone again; and during this, the several symptoms, such as the cough, fever, &c. are to be palliated as much as may be.

To this end, in the beginning of the course, gentle laxatives are by all means to be given; such as small doses of rhubarb, with manna, tamarinds, and the like; and in subjects abounding with foul humours, jalap, scammony, and even mercurius dulcis, are found necessary; but this last medicine is only to be given with the utmost caution, for fear of a salivation. After a few doses of the laxatives, the resolvent, abstergent, and diffusient medicines, are to be given for several weeks together; such are, decoctions of pimpernel, cinquefoil, burnet, iris, birth-wort, and fruits of juniper, with maidenhair, horehound, hyssop, and dwarf-elder: the gum ammoniac are also to be given in small doses; such as ammoniacum, sagapenum, and the like; and mixtures of crabs eyes saturated with lemon juice, with vitriolated tartar dissolved in the pectoral waters, are to be given every day three or four times; a little nitre, cautiously given in the intermediate time, will also be of great use in abating or taking off the fever.

The cough, in the first stage of a *phthisis*, may sometimes be appeased by bleeding, and the expectoration may be promoted by the following medicines. Take fresh squills, gum ammoniac, and powdered carduus seeds, of each a quarter of an ounce; beat them together in a mortar; and if the mass proves too hard for pills, it may be softened with any syrup. This may be formed into pills of a moderate size, and four or five of them taken twice or thrice a day. These ammoniacum is likewise a proper medicine in this stage of the disease. A mixture made of equal parts of lemon juice, sour honey, and syrup of poppies, may be used, by sometimes four ounces of each of these over a gentle fire, and taking a table-spoonful of it, when the cough is troublesome. Oily and balsamic medicines, though often recommended, are generally more injurious than beneficial. See BALSAMS, and Lond. Med. Obs. vol. ii. p. 231, and p. 280.

Acids seem to be peculiarly useful as well as grateful in this disease; and especially those of the vegetable kind, as apples, oranges, lemons, &c. The patient's drink may be infusions of the bitter plants, as ground-ivy, the lesser centaury, ramsons, or water trefoil. But if he has any blood, he ought to die, for his ordinary drink, infusions or decoctions of the emollient roots, plants, &c. and recourse may be had to the use of nitre. See DIAPHORETICS.

We may observe in general, on the authority of Dr. Fothergill, that in the beginning of the disease, the most demulcent and cooling medicines are indicated; and when the symptoms of inflammation are abated, gentle anodynes will be useful. The common emulsion, made with good fresh sweet almonds, as a very proper vehicle for the several remedies indicated in this complaint; or an excellent emulsion may be prepared with fruit white poppy seeds, in the proportion of half an ounce to a pint of distilled or pure water. With regard to regimen, when a cough begins, to which every prudent and attentive physician cannot be direct too soon, if the patient is very young, the quantity of diet, especially of solid, must be lessened, and the deficiency made up with warm fomentings. Barley water, milk and water, thin gruel, and the lighter broths, should be used. The patient should keep chiefly to the use of vegetables and milk. After milk ought to make a considerable part of his food; this should be drunk in its natural warmth, and in a greater portion, in the quantity of half a pint, four times, or at least thrice, in a day; and if it should happen to purge, it may be mixed with old conserve of roses, or powder of crabs claws. Women's milk has been recommended in preference to any other. Buttermilk has also been of service; and cow's milk, with the addition of an equal quantity of barley-water, or a tablespoonful of rum or brandy to half a pint is proper, and may prove beneficial. Rice and milk, or barley and milk boiled, with a little sugar, is very suitable too; ripe fruits roasted, baked, or boiled, are likewise proper; the jellies, conserves, and preserves, &c. of ripe, subacid fruits, ought to be eat plentifully, as the jelly of currants, conserve of roses, preserved plums, cherries, &c. Such a course of diet, with wholesome air, and proper exercise, particularly on horseback, or a sea-voyage, is the most to be depended upon in an incipient consumption. In the further progress of this distemper, should the course above recommended fail, medicines of a different class are found of advantage; such as the bark, elixir of vitriol, Bristol, and other waters, and a total abstinence from animal food. When the spitting up of proof matter, expression of the breast, and the hectic symptoms indicate an impatthisme formed in the lungs, an ounce of the Peruvian bark in powder may be divided into eighteen or twenty doses, and one of them taken every three hours in the course of the day. If the bark should purge, it may be made into an electary with the confection of roses. Those who cannot take it in substance may infuse it in cold water, in the proportion of half an ounce of the powder to half a pint of water, and a common tea-cup full may be taken three or four times a day. The bark, however, should not be used, as long as there are any symptoms of an inflammation of the breast. After this, the healing the ulcerated parts is to be attempted by the more temperate balsamics; such as boiled turpentine, mastic, calamus, balsam of Peru and capiv, and Locatelli's balsam: with these there always must be joined such things as will nourish and give strength; such are emulsions made with fresh sweet almonds, with jellies, and conserves of roses.

If the violence of the disorder is found to resist on this method, it will be proper to give a mixture of spirit of sal ammoniac, with tincture of sal of tartar, in doses of about twenty drops, three times a day: this is greatly serviceable in resolving the parts to their due tone; and if the cough still continues violent, it will be proper to give small doses of the Borax pill at night. If the disease is finally taken off by this method, it will be proper afterwards, by way of prevention, to bleed frequently in the foot every spring and autumn; to recall, by all possible means, any habitual discharges of blood that had been stopped or suppressed; and, particularly in men, to promote a discharge by the hæmorrhoidal veins, by applying leeches to the part; the patient is not to be loaded with medicines in this case, but it will be sufficient always to keep the bowels moderately open, and to use moderate but not violent exercise, with diets that are soft and easy of digestion.

Nor do Hault and others to prove, that a consumption of the lungs always depends on tubercles, and that an ulcer there is only an effect of these tubercles; and when the disease is in its full fashion, and incurable, it then only becomes contagious, by small worms, which it communicates to others. The same author is for preparation for consumption, before it comes to the last degree, is to restore the tubercles with mercury, flesh, milk-plants, and the spanish and antihemetic plants. He remarks, that the liver is generally hard in this disease: and therefore he applies a warm emmenial plaster to the right hypochondriac region, rubbing some mercurial ointment every night on the skin of that part; then continues in the use of tabids made with flesh, mumpodes, bdellium, coral, and crabs eyes, of each half an ounce; cinnamon, three drachms; sugar, half a pound; these all with the mucilage of gum tragacanth, in the quantity of one cup of water.

The use of these tablets is to a drachm, morning and evening, rubbing it down with a pestle made of the root of mallow, two ounces of the juice of wormwood, and as much juice of chervil. Sweet oil fasten. He says, this method, with riding, has often been successful.

Dr. Cheyne thinks that a total milk and fruit diet, with frequent phlebotomies, vomits, bark in the morning, and rhubarb at night, will fairly cure consumptions.

This distemper, according to some, is principally to be cured by frequent bleedings in small quantities. Med. Ess. Edinb.

Sydenham ascribes the defluxion on the lungs, in the first stage, to be abated by blood-letting, &c. and pectorals to be used, accommodated to the various states of the disease, viz. incrassantia, attenuantia in village the hectic, &c. with emulsions, olives milk, &c. and ballamics to cure the ulcer. That the other assistance in this disease is to be expected from riding cautiously on horseback; be lets, the patient need not confine himself to any less or duty, &c. The whole, he adds, if used in time, is as much as sure a cure for a *phthisis*, as the cortex is for an intermitting fever.

Dr Barnard recommends butter-milk as an admirable succedaneum to asses milk. Milton Frys, he knows of no medicine, either internal or external, so good against fresh ulcers of the lungs, as balsam of sulphur, especially when prepared with oil of anise.

Etmuller observes, that the cough of *phthisical* people is, at first, only stomachical; but that at length it becomes pulmonary. He adds, that vomitories are good in a beginning *phthisis*, and that purgatives, by all means, are to be avoided; and commends the use of medicines made of tobacco, not only as they promote expectoration, but as they are vulnerary.

It is a common observation, that in those countries where they burn turf, people are rarely affected with the *phthisis*; which Willis ascribes to the sulphur abounding therein, and accordingly recommends tincture of sulphur as the best remedy he knows of in any cough without a fever; adding, that a fumigation, or mortifer, of sulphur and arcuile has also frequently proved a cure in the most desperate *phthisis*.

Bennetus holds the *phthisis* to be contagious; and that there are frequently instances of its being communicated by stools, linen, beds, &c.

Fuchsius recommends mercurius dulcis in the beginning of a *phthisis*. And Berhaave and Colbatch affert, that, contrary to the opinion of most authors, they have frequently cured scabs, with great success, in the *phthisis*.

PHU, in *Botany*, a name by which some authors call the great garden valerian.

PHYCIS, in *Ichthyology*, the name of a fish of the mullaceous kind, more usually called CALLYRIAS, or *asellus callaritus*, and *lucca marina*, or sea-tench.

PHYCIS, in *Ichthyology*, is also a name given by Arteni, after Ariftotle, Pliny, and the reft of the ancients, to a fish nearly allied to the genus of the *blenni*, and called by fome *trahias* and *phycis*; and, according to Rondeletius, the TINCA *marina* of the Italians. Salvian, however, thinks that it is the *tinca marina*, and the matter is yet undecided among the writers on this fubject.

PHYCITES, in *Natural Hiftory*, the name given by the ancients to a ftone which had the impreffion of a fea-plant on the furface of ufual kind; probably in the manner in which our black coal ftate is frequently found to contain the impreffions of fern and other vegetables.

PHYGETHLON, φυγεθλον, derived from φυω, *I breed*, or *engender*, in *Medicine*, is defined by Celfus, a hard, flat tumor, fomewhat refembling a puftule; occafioning an intenfe pain, and fometimes a fever.

The *phygethlon* only differs from the PHYMA, in that it does not rife fo high; it ripens very flowly, and produces but little pus.

The Latins call it *panus*, or *pamus*, and fometimes *furunculus*. Gorræus defines the *phygethlon* a phlegmon, arifing on the glandulous parts, efpecially about the neck, armpits, and inguina; in which laft place it is called a *bubo*. The *phygethlon* has the fame caufes, and the fame fymptoms, with the common BUBO. It frequently arifes after fevers, and pains of the belly; and is cured like other inflammatory tumors.

PHYLACISTÆ, among the *Romans*, officers to whofe keeping the faves in prifons and work-houfes were committed.

PHYLACTERY, φυλακτηριον, in *Church Hiftory*, a flip of parchment, wherein was written fome text of holy Scripture, particularly of the Decalogue; which the more devout people, among the Jews, inclofed in leather cafes, and bound with thongs on the forehead, and on the left arm. See FRONTAL.

They derived their name from φυλαττω, *I keep*, either becaufe they were fuppofed to preferve the law in memory, or rather, becaufe they were looked upon as a kind of amulets or charms to keep them from danger.

They were called תפלין *tephilin* by the Jews.

PHYLACTERY, in the general, was the name given by the ancients to all kinds of charms, fpells, or characters, which they wore about them, as amulets, to preferve them from dangers or difeafes.

The primitive Chriftians alfo gave the name *phylacteries* to the cafes wherein they inclofed the relics of the dead.

PHYLARCHUS, φυλαρχος, among the Athenians, *phylarchs* were magiftrates who had the care of them the remainder of a tribe committed to his charge; and whofe bufinefs was to take care of the public treafure belonging to each tribe, to manage all their concerns, and call them together as oft as anything happened that required the prefence of the whole body.

PHYLATERIA, a name given by fome botanical authors to the *fedum*, or poly-cotyledon.

PHYLICA, *Laurel alaternus*, in *Botany*, a genus of the *pentandria monogynia* claſs. Its characters are, that the perianthium is tubulated, and divided into five fegments; it has no petals; the five ſtamina are defcribed by fcales, and the fruit is a three-berried capſule. There are five fpecies.

PHYLLANTHUS, in *Botany*. See *Sea-side* DARNEL.

PHYLLIS, *ſpecies nulla, auricula muris* kind, in *Botany*, a genus of the *pentandria digynia* claſs. Its characters are three: the compliment of the flower is compoſed of two leaves fitting on the germen; the flower has five ovated fpear-fhaped petals, which turn backward; it has five ſhort hair-like ſtamina, terminated by oblong ſummits; the germen, which is ſituated under the flower, has no ſtyle, but is crowned by two awl-fhaped, reflexed, hairy ſtigmas, and turns to an oblong angular fruit, containing two parallel ſeeds, covered on their outſide, plain on the other, and bevel at the top. We know but one ſpecies, which is a native of the Canary Iſlands.

PHYLLITIS, in *Botany*. See HART'S-*tongue*.

PHYLLITIS *marina*, in *Natural Hiſtory*. See HART'S-*tongue*.

PHYLLOBOLIA, φυλλοβολια, in *Antiquity*, a cuſtom that prevailed among the ancients to ſtrew flowers and leaves on the tombs of the dead. The Romans adopted this cuſtom from the Greeks, and added likewiſe wool. See BURIAL.

The *phyllobolia* was alſo uſed on occaſion of a victory obtained at any of the public games; when not only the victors, but likewiſe their parents, were crowned with flowers and leaves.

PHYLOBASILEI, φυλοβασιλεις, among the Athenians, magiſtrates, who, with reſpect to particular tribes, had the ſame office that the *βασιλευς* had with reſpect to the commonwealth.

They were choſen out of the quarrelſome or nobleſt, for the care of public ſacrifices, and other divine worſhip peculiar to their reſpective tribes, and kept their court in the portico called *βασιλειος*, and ſometimes in the *πρυτανειον*.

PHYMA, φυμα, in *Medicine*, a roundiſh preternatural tumor, ariſing in the glandular parts, eſpecially under the lower jaw.

The *phyma* is ſmaller and ſmoother, leſs red and painful, than the PHYGETHLON.

It is eaſily cured in children, but more difficultly in adults; but in thoſe it is more rare. It is remedied by aſſiſting nature in the work of maturation, as, by a ſuppurating cataplaſm, &c. It is ſuppoſed to have its rife from putrified blood; and is moſt common in young children, where it frequently alſo ariſes from too rich food.

Gorræus obſerves, that ſome make *phyma* a general name for all tumors or ſpotthurnes, that maturate and ſuppurate readily, of what kind ſoever, as in whatſoever glandulous part they ariſe.

PHYRAMA, in the *Materia Medica*, a name given by ſome of the old writers to the gum ammoniacum, particularly to that kind of it which was ſoft and ductile between the fingers. It is not clear that the gum ammoniacum of their times was the ſame thing which we now know by that name; at leaſt it is certain, that the other kind of it, which they called *hermoniac*, or *ammoniacum thraſcium*, was not; for Diofcorides defcribes this as being of a reddiſh-brown colour, and very friable; and Avicenna ſays, that it is mixed a fine yellow or gold-colour upon paper. Theſe are properties by no means agreeing with our gum ammoniacum; and if juſtly applicable to that, muſt prove that it could not be the ſame; and the character given by Avicenna of its being eaſy, and making a yellow ſtain upon paper, ſeem to confute the ſuppoſition. This, however, by no means can agree with the other virtues attributed to it.

PHYSALIS, in *Botany*. See *Jerusalem* CHERRY.

PHYSALUS, a name given by Rondeletius to a ſpecies of ſea inſect, of the *fcolopendra marina* kind, ſuppoſed by ſome to be the ſame with the *ſcolopendra marina*, or *cipra*, of the antients, deſcribed by Mofquera; but this does not appear to be the caſe, on a firſt examiny. The *phyſalus* of Rondeletius has no mouth, whereas the *ſcolopendra* of Ireland has a remarkably large one; that of Rondeletius is wider in the middle, and tapers at each

end,

cold; but the little kind is furnished with the head, and rapers from thence all the way to the tail. Rondeletius, and others, on the back, but the Latin one has only fifteen fingers and toes; a peculiarity extraordinary, as of fourteen was found to the stomach of a cod-fish, which had eaten it for food. The figure given by Rondeletius agrees with our's well with the account he gives, but not with the figure of that drawn upon the face from the Indian fish, and given in the Philosophical Transactions. On the whole, nothing is more plain than that there are two different species of animals though of the same genus. See Tab. Zoology, n° xxx. See Monodon.

Physetus is found in Zoology. See Physeter.

PHYSETUS, in Zoology, the name of a genus of fishes of the abdominal kind, in the system of Artedi, but of the order of cete, and class of mammalia, in the distribution of Linnæus, the characters of which are these: the teeth are crooked, and are placed only in the lower jaw; there is one high fin on the back, and a fistula or hole on the forehead.

Artedi has described two species of this genus, the first of which, 1. The *physeter*, with the upper jaw longer than the under one, and with a long spine on the back. The head of this fish is large, that is, half as large as the body, and rather thicker than the middle part of it; the upper jaw runs out two feet beyond the under one, and is upon part more than five feet; the eyes are remarkably small, scarce larger than those of a bullock; the fistula or pipe is placed a little above the centre of the head; it is divided into two chambers, and covered with one common operculum; the teeth are in number forty-eight, and all of the shape of a triangular cone, smooth, and a little curved, thick and sharp pointed in the middle, and at the end terminating in a cone very sharp pointed; the back is thinner than the middle of the body. This is the *physeter macrocephalus* of Linnæus, which he says pursues and terrifies the *physeter* to such a degree as often to drive them on shore. It is called the Short-headed CACHALOT. 2. The *physeter* with a very high back fin, with the rays of the fourth fin. This is a species of whale, described, as well as the former, by Rondeletius. The head is very large in the fœtus, or young, as in the middle of the head; the fin flounds so high as the middle of the back, that it has been compared to the upper part of a dog. This is the *physeter longimanus* of Linnæus. Besides these, Linnæus enumerates two other species, viz. the CATODON, without a back-fin, and with the spout-hole at the extremity of the nose; and the *physeter macrocephalus* or CATODON, without a back-fin, and the spout-hole in the front.

The name *physeter* is of Greek origin, and is derived from the verb φυσαω to blow. It has this name from its quality of casting out a great quantity of sea-water, and then blowing it out again with great force and violence.

PHYSIC, or PHYSICK, *medica*, the art of healing; properly called *medicina*.

The word is formed from φυσις nature; because medicine consists principally in the observation of nature.

For the rise, progress, division, &c. of *physic*, see Medicine.

Physic, *hermetical*. See Hermetical.

Physic, *lunar*. See Lunar.

Physic nut, in Botany, the name of a species of the jatropha. See Curcas.

PHYSICAL, *physicus*, something belonging to, or really existing in nature.

In this sense, we say, a *physical* point, in opposition to a mathematical one, which has only existence in the imagination.

Or a *physical* hardness, or body, in opposition to spirit, or immaterial substance, &c.

Physical, or sensible horizon. See Horizon.

Physical *causes*, or *principles*, *causæ physicæ*, are those *agents*, *forces*, *powers*, *matter*, *motion*, *gravity*, *elasticity*, *fluidity*, *magnetism*, *fire*, *perspiration*, *digestion*, *putrefaction*, *fermentation*, *generation*, and *gravity*. See the several articles.

PHYSICIAN, a person who professes medicine, or the art of healing.

The ancients distinguished their *physicians* into various classes or sects, as,

Physicians, *dogmatic*, those who proceeded in a certain regular method, founded upon reason; declaring contemptuously against empirics. See Dogmatic.

Physicians, *eclectic*. See Methodists.

Physicians, *empiric*, those who laid down principles, and proceeded from those principles, and from experience. See Dogmatic.

Physicians, *expectant*, those who kept wholly to expectations, and excluded all use of medicine. Such were Asclepiades, Apollonius, Glaucias, &c. See Dogmatic.

Physicians, *rational*, were those who used their patients as beings to examine their cases.

They were thus called in opposition to the *empirics*, who used their medicines to the hazard, &c. See Empiric.

The moderns find all that although *physicians*, botanical persons, *anatomical physicians*, *chymical physicians*, pharmaceutical *physicians*, &c. besides *mechanical physicians*, *iatrophysicians*, or those who applied chymical medicines, and *iatrochymists*, or *galenic physicians* for the completion of *iatrochymists*, or *galenic physicians* for the completion of *iatrochymists*, or *galenic physicians* for the completion of

PHYSICS, *speculative*, or such as was couched in symbols: such was that of the old Egyptians, Pythagoreans, and Platonists, who delivered the properties of natural bodies under arithmetical and geometrical characters, and hieroglyphics.

Peripatetic, or that of the Aristotelians, who explained the nature of things by matter, form, and privation, elementary and occult qualities, sympathies, antipathies, attractions, &c. See ARISTOTELIAN and PERIPATETIC.

Experimental, which inquires into the reasons and natures of things from experiments: such as those in chemistry, hydrostatics, pneumatics, optics, &c. See EXPERIMENTAL *philosophy*.

And, finally, *Mechanical*, or *corpuscular*, which explains the appearances of nature from the matter, motion, structure, and figure of bodies, and their parts; all according to the settled laws of nature and mechanics. See MECHANICAL and CORPUSCULAR *philosophy*.

PHYSIOGNOMICS, a term used by some physicians and naturalists, for such signs as are taken from the countenance to judge of the state, disposition, &c. of the body and mind.

PHYSIOGNOMY, φυσιογνωμία, formed from φύσις, *nature*, and γνώμων, *I know*, the art of knowing the humour, temperament, or disposition of a person, from observation of the lines of his face, and the characters of its members or features.

Baptist. Porta and Robert Hudd are the last modern authors on *physiognomy*. The ancient ones are the foolish Adamantius, and Aristotle; the *physiognomy* of which last we have translated into Latin by de Laguna.

With respect to *physiognomy*, this, at least, may be said, that of all the fanciful arts of the ancients, diffused among the moderns, there is none less to much foundation in nature as this.

There is an apparent correspondence between the face and the mind; the features and lineaments of the one are directed by the motions and affections of the other: there is even a peculiar arrangement of the members of the face, and a peculiar disposition of the countenance, to each particular affection of the mind.

In effect, the language of the face, *physiognomy*, is as copious, nay, perhaps, as distinct and intelligible, as that of the tongue, speech.

The foundation of *physiognomy* is this; the different objects that present themselves to the senses, nay, the different ideas that arise in the mind, do each make some impression on the spirits; and each an impression correspondent or adequate to its cause: therefore each makes a different impression.

If it be asked, how such an impression should be effected, it is easy to answer, that it follows from the œconomy of the Creator, who has fixed such a relation between the several parts of the creation, as the end that we may be apprized of the approach or recess of things useful or hurtful to us.

The animal spirits, say the Cartesians, moved in the organ by an object, continue their motion to the brain; whence that motion is propagated to this or that particular part of the body, as is most suitable to the design of nature; having first made a proper alteration in the face, by means of its nerves, especially the pituitary, and oculorum motorii.

The face, here, does the office of a dial-plate; and the wheels and springs, withinside the machine, actuating its muscles, show what is next to be expected from the striking part.

Now if, by repeated acts, or the frequent entertaining of a favourite passion, or vice, whole natural temperament has hurried, or custom dragged one to, the face is often put in that posture which attends such acts as the animal spirits will make such potent passages through the muscles in which the efforts of an habit consists, that the face is sometimes unalterably set in that posture to the utmost resignous are by a long continued fitting in strange postures or their pagodity of, as itself, it falls, insensibly and mechanically, into that posture, under some peculiar object differs from others, or some dissimilitude hides it, and this reasoning, as has been said, is confirmed by observation; which, by being a little more accurate and minute, would serve to distinguish not only habits and tempers, but even professions. After all, this is a kind of science, which must be very precarious and deceitful.

PHYSIOLOGY, in *Botany*, those authors whose writings tend to set that study in its clearest light, by explaining and enumerating the various superfluities of the male and female parts in the flowers of plants.

PHYSIOLOGY, φυσιολογία, formed of φύσις, *nature*, and λόγος, *discourse*, or *reason*, the doctrine of nature, or natural bodies; called also PHYSICS, and *natural philosophy*.

PHYSIOLOGY properly denotes only an internal examination, discounting, which runs or terminates in the speculative or abstract contemplation of its object, viz. natural appearances, their causes, &c. and does not direct or prescribe rules for the *making* of natural *things*, as flames, plants, &c.

In which view, chemistry does not properly belong to *physiology*, but is a kind of counterpart thereto, as in many cases, imitating or mimicking nature, rather than considering and explaining her.

PHYSIOLOGY is more particularly used for a branch of medicine, which considers nature with regard to the cure of diseases; particularly the human body, its parts, structure, health, life, functions, œconomy, &c.

Physiology, in this sense, amounts to much the same with what we otherwise call the doctrine of the *animal œconomy*.

PHYSOCELE, a word used by many authors to express a *windrupture*. See PNEUMATOCELE.

PHYSTA, in *Ichthyology*, a name given by Gesner, and some others, to the fish called by the Greeks, and many of the later authors, BALLERUS and *ballerus*. Arteni denies its right to any generical name, reducing it to the genus of the esprini, to which it evidently belongs, and distinguishing it from the others of that numerous genus by the specific name of the very broad and thin *esprinus*, with forty rays in the pinna ani.

PHYSTE, in the *History of the Ancient Physicians*, a word used to express a mass of meat macerated in a *cadus* filled with wine, but not fit to ferment.

PHYTEUMA, in *Botany*, the RAMPION.

PHYTALIA, a word used by the ancients in two very different senses; with some expressing the latter part of the winter season, and with others a place where vines are planted, whether in standard vineyards or otherwise.

PHYTOLACCA, in *Botany*. See POKE-WEED and CURTIFARE.

PHYTOLOGI, φυτολόγοι, authors who have written any rectile anatomy, or the history or cures of vegetables.

PHYTOLOGY, φυτολογία, compounded of φυτὸν, *plant*, and λογος, *discourse*, or λόγος, *I discuss*, or *reason*, a discourse upon plants; or a description of their forms, kinds, properties, &c.

PIA *mater*, in *Anatomy*, called also *mater tenuis*, and *meninx tenuis*, a fine coat, or membrane, immediately investing the brain, and lying under the DURA mater. It is a fine thin membrane adhering so closely, and insinuating itself in such a manner, into all the folds and extravasation parts of the brain, that it is scarce to be separated from it. This membrane covers the whole brain, cerebellum, and medulla oblongata; and serves together with the joint, for the defence of the BRAIN, and the supporting of vessels.

The *pia mater* is formed of two very fine lamellæ, the outermost of which covers pretty uniformly all the convex surface of the brain, and lines in the same manner all the concave or inner surface of the DURA *mater*. The internal lamina forms a great number of plexus, duplicatures, and folds, which insinuate themselves into all the folds and circumvolutions, and between the different strata of the cerebrum and cerebellum. These two laminæ are connected only by a cellulous substance, which accompanies them through their whole extent, except in those parts of the basis of the cerebrum, &c. where the whole internal lamina containing its interstices, the external remains uniformly stretched over the processes, and the interstices of which are entirely separated from the other laminæ without any cellular substance between them. These separate portions of the external lamina have led some to consider it as a third membrane of the brain, distinct from the *pia mater*, and it has been called membrana ARACHNOIDEA, WILLIS. Phil. Anat. Cerebri, cap. 2. Lit. a.a.

According to Mr. Le Cat, the *pia mater* gives three membranes to the eyes; the first lines the sclerotic coat, and is joined to it by the second to the choroid coat, and the third to the vitreous membranes one, proceeding from the choroid, and is commonly called *Morgagni's tunic*. Med. Ess. Edinb. Art. vol. ii. p. 382.

PIABA, in *Ichthyology*, the name of a small freshwater fish, caught in all the rivers and brooks in the Brasils, and some other parts of America.

It is of the size of the common minnow; is a well-tasted fish, and much esteemed by the natives.

TARUCU, in *Ichthyology*, the name of an American fish, esteemed by the natives in many places. It is a very large fish, and so greedy of blood, that if a man happens to be in the water with a wound in any part of his body, this fish will make at it to suck the blood: it is a small fish, seldom exceeding four inches in length.

TACHE, PYRAMIS reversed in the *Arms*, or POINTED and POINTLE.

TAFFUR, in the *Arms*, a point, barry of six pieces, being full of mettles, or fire, issuing out and forming a great deal of motion, and an excellent figure to engrave upon

wards, makes this motion the more that you endeavour to keep him in, and bends his leg up to his belly. He snorts, traverses if he can, and by his fiery action shows his restlessness; whence some, though very improperly, say, he dances.

Such horses as these, or such as are bred to passage upon a straight line, are much admired in carousals and magnificent festivals. See SHORT, and PASSADE.

PIANISSIMO, in the *Italian Music*, is used to signify that the part to which it is added should be played very softly, and so as that the sound may seem at a great distance, and almost lost in air. See Corelli Concerto viii. in fine.

PIANO, in the *Italian Music*, signifies soft and sweet, by way of an echo.

PIANO *forte*, is the name of a well known musical instrument, resembling the harpsichord.

PIANO PIANO, or PIU PIANO, in the *Italian Music*, is nearly the same with *pianissimo*, or rather a degree between it and *piano*.

PIANO, *pia*, in the *Italian Music*, signifies more slow, or more soft, and is much the same with *piano piano*.

PIASTER, a Spanish money, more ordinarily called a PIECE *of eight*.

PIAZZA, in *Building*, popularly called *piache*, an Italian name for a portico, or covered walk, supported by arches. The word literally signifies a broad open place, or square; whence it also became applied to the walks, or porticoes around them.

PIC, an East Indian weight, containing one hundred CATTY.

PICA, or PYE, was a term formerly used in the same sense with ORDINAL, for a table or directory, pointing out the order in which the devotional services appointed for different occasions were to be performed. Accordingly some derive it from It. a contraction of *mat*, *a table*; and others from *littera picata*, a great black letter at the beginning of some new order in the prayer. In much the same sense the term was used by officers of civil courts, who called their calendars or alphabetical catalogues directing to the names and things contained in the rolls and records of their courts the *Pyes*.

PICA, in *Medicine*, *malacia*, or a depravation of appetite; which makes the patient absurdly covet things unfit for food, or incapable of nourishing, as coals, ashes, plaister, salt, lime, chalk, vinegar, pepper, &c.

The *pica* is frequent in girls, and in women with child; men are more rarely affected with it. The disorder is seldom original, but is usually an effect of an hypochondriacal infirmity in men; and of a chlorosis, stoppage of the menses, or their eruption about the second month of pregnancy in women: sometimes it seems to be hereditary in children, from some cause affecting the mother. The disease is usually supposed to have its rise from a vicious ferment of the stomach; to which may be added, also, some disorders of the imagination, occasioned by ill examples, and ridiculous prejudices.

The usual remedies in the *pica* are bleeding, purging, vomiting, and chalybeats.

PICA, in *Ornithology*. See MAGPYE.

PICA is also a name by which some have called the *lanius*, or BUTCHER *bird*.

PICA, in *Printing*. See PRINTING.

PICA *marina*, in *Ornithology*, the name of a bird called in English the *sea pie*, and by Bellonius and some others, the HÆMATOPUS. It is of the size of the common *magpye*; its beak is three fingers breadth long, strait, and of a reddish, or a blackish colour, and ending in a point, and seeming well fitted for its business of rooting up the limpets from the rocks, the bodies of this fish being its common food; its legs are red; it has no hinder toe, and has its other toes so far connected by a membrance, as to seem almost of a middle nature between the web-footed and other birds; its head, neck, back, throat, and half its breast are black, as is also its rump; its tail is half black, and half white, as are also its wings. It is common on the western shores of England, and on the shores of Wales.

PICA *marina* is also used by Gesner very improperly for the bird commonly known by the name of *anas arctica Clusii*. See PUFFIN.

PICA *nasi*, in *Medicine*, a name given by Cohausen to the immoderate taking of snuff. It seems a whimsical term, but he chuses to treat this habit as a disease, and has written an express treatise concerning it. The word *pica*, in general, denotes an absurd and unnatural appetite; and the desire of taking the powder of tobacco in this manner is called a distempered appetite of the part into which it is taken, that is, the nose.

The consequences of the taking snuff immoderately, are, that the sense of smelling is either entirely destroyed, or at least greatly impaired: for the nervous tubercles of the nostrils being continually vellicated by this powder, are by degrees clogged up, or wholly destroyed, and the sensible membrane, which lines the nostrils, is rendered callous, and wholly unfit for the discharge of its office in smelling. The voice is next affected by this powder; for it causes a sort of astriction at the bottom of the nose, which affects the palate, and consequently the speech; this gives the person who takes it a continual desire of taking more and more, to rid himself of that stoppage.

PICACIA, a name given by the ancients to that distempered appetite of women with child, and maidens at a certain time of life, which makes them long for things not fit for food. It is more usually called PICA.

PICACUROBA, in *Ornithology*, the name of a Brasilian species of pigeon, of a greyish colour variegated with a reddish brown, and with very red legs and feet.

PICÆ, *pies*, in the Linnæan system of *Ornithology*, is the name of one whole order of birds; the general character of which is, that they have a convex beak, flatted above. To this order belong twenty-two genera, and two hundred and forty-three species. See PARROT, TOUCAN, CROW, *Bird of* PARADISE, ORIOLE, CUCKOW, KING'S-FISHER, HOOPOE, CREEPER, &c.

PICARD, in our *Old Writers*, a kind of large boat, about fifteen tons or upwards, used on the river Severn. Stat. 35 Hen. VIII. *cap.* 9. 13 Eliz. *cap.* 11.

PICARDS, a religious sect, who arose in Bohemia in the fifteenth century; so called from their author, who, because he originally came from Picardy, was called *Picard*. He drew after him, as it has been very unjustly said, a great number of men and women, pretending he would restore them to the primitive state of innocence wherein Adam was created: and accordingly himself assumed the title of the New Adam.

Under this pretence he taught his followers to abandon themselves to all impurity; making them believe, that therein consisted the liberty of the sons of God; and that all those not of their sect were in bondage.

He first began in Germany, and the Low Countries, persuading many people to go naked, and giving them the name of ADAMITES. After this, seizing an island in the river Lausnez, a few leagues from Thabor, the head quarters of Ziska, he fixed himself and his followers therein; appointing his women to be common, but allowed none to enjoy them without his permission: so that when any man desired a woman, he carried her to *Picard*, who gave him leave in these words, *Go, increase, multiply, and fill the earth.*

At length, Ziska, the great general of the Hussites, (so famous for his victories over the emperor Sigismund), struck with their abominations, marched against them; and, making himself master of their island, put them all to death except two; whom he spared to inform himself of their doctrine.

Such is the very false and injurious account, which different writers, ultimately relying on the insufficient authorities of Æneas Sylvius, and Varillas, have given of the *Picards*, who seem to have been a party of the VAUDOIS, that fled from persecution in their own country, and sought refuge, about the beginning of the fifteenth century, in Bohemia. It is very doubtful, whether a sect of this denomination, chargeable with the licentious principles and conduct above recited, ever existed; and we cannot forbear expressing our astonishment that Mr. Bayle, in his art. *Picards*, should adopt the reproachful representations of the writers just mentioned.

It is most probable, that the whole is a calumny invented and propagated, in order to disgrace the *Picards*, because they deserted the communion and protested against the errors of the church of Rome. Lasitius relates, that *Picard* settled in Bohemia, in the year 1418, accompanied by forty other persons, besides women and children. The Jesuit Balbinus, in his Epitome Rerum Bohemicarum, lib. ii. concurs in this account, and charges on the *Picards* none of the extravagances or crimes ascribed to them by Sylvius. Schlecta, secretary of Ladislaus, king of Bohemia, in his letters to Erasmus, gives a particular account of the *Picards*; representing them as persons, who considered the pope, cardinals, and bishops of Rome, as the true Antichrists; who censured those that adored the consecrated elements in the eucharist, as idolaters, and denied the corporal presence of Christ. In this ordinance; who condemned the worship of saints, prayers for the dead, auricular confession, the penance imposed by priests, the feasts and vigils observed in the Romish church; and confined themselves to the observance of the sabbath, and of the two great feasts of Christmas and Pentecost. From this abstract of their sentiments, it sufficiently appears, that they were no other than the VAUDOIS; and M. de Beausobre has plainly shewn, that they were both of the same sect under different denominations. Besides, it is a certain fact, that the Vaudois were settled in Bohemia, in the year 1178, where some of them adopted the rites of the Greek church, and

others those of the Latin church. The former were generally adhered to till about the middle of the fourteenth century, when the establishment of the Latin rites occasioned great disturbance. When the national troubles commenced in Bohemia, on occasion of the opposition to the papal power (see MORAVIANS), the *Picards* appeared more publicly in the avowal and defence of their religious opinions, and they formed a considerable body in an island by the river Lusnitz or Lausnetz, in the district of Bechin, and recurring to arms, were defeated by Ziska. Encyclop. art. *Picards*.

PICATUM *vinum*. See VINUM.

PICICILLI, in *Ornithology*, the name of a bird in the Spanish West Indies, described by Nieremberg. Its head and neck are black, and its whole body grey; it is a small bird, and makes its appearance in Mexico after the rainy seasons; it is a bird of paſſage, and it is not known where it breeds.

PICK, among *Miners*, is a tool with which they uſe to cut down the clifts and rocks of ſtone to make paſſages in the earth.

PICK-*axe*, in the *Military Art*, a tool carried by the pioneers to dig up ground that is too hard for the ſpade; they are of great uſe for mending the ways, and in fortification.

PICKS, *ear*. See EAR-*picks*.

PICKAGE, or PICCAGE, *piccagium*, an ancient cuſtom, or duty, paid at fairs and markets, for breaking the ground, and pitching up ſtalls, or ſtandings.

This profit of *pickage* was uſually given, or granted, in charters for holding a fair or market.

PICKEERING, or PICKEROONING. See PICQUEERING.

PICKER, or *horſe*-PICKER, in the *Manage*, an iron inſtrument five or ſix inches long, bent or crooked on one ſide, and flat and pointed on the other. It is uſed by grooms to cleanſe the inſide of the horſes feet, and to pick out the earth, ſand, or ſmall ſtones that get into them.

PICKERELL, in *Ichthyology*, an Engliſh name uſed by ſome authors for the JACK or PIKE.

PICKET, PICQUET, or PIQUET, in *Fortification*, a ſtake ſharp at one end, and uſually ſhod with iron; uſed in laying out the ground, to mark the ſeveral meaſures and angles thereof.

There are alſo larger *pickets*, driven into the earth to hold together faſcines, or faggots, in any work caſt up in haſte.

PICKETS are alſo ſtakes driven into the ground by the tents of the horſe, in a camp, to tie their horſes to; and before the tents of the foot, where they reſt their muſkets, or pikes about them, in a ring.

When a horſeman hath committed any conſiderable offence, he is often ſentenced to ſtand on the *picket*; which is to have one hand drawn up as high as it can be ſtretched, and thus to ſtand on the point of a *picket*, or ſtake, only with his oppoſite foot: ſo that he can neither ſtand nor lean well, nor eaſe himſelf by changing feet.

PICKETS are alſo ſtakes with notches toward the top, to which are faſtened the cordages of tents. Thus, to plant the *pickets*, is to encamp.

PICKET, in *Gaming*. See PICQUET.

PICKLE, a brine, or liquor, ordinarily compoſed of ſalt, vinegar, &c. ſometimes with the addition of ſpices; wherein meats, fruits, and other things, are preſerved and ſeaſoned.

PICKLE is alſo uſed ſubſtantively, for a fruit, root, leaf, or other vegetable matter, prepared *in pickle*, to be uſed by way of ſauce, &c. See SALLET, &c.

They *pickle* artichokes, muſhrooms, athen-keys, barberries, aſparagus, beans, &c. Broom-buds, capers, and olives, are pickled with oil and vinegar.

PICKLED *fiſh*. See FISH.

PICLE, (*piſtillum*), a ſmall parcel of land incloſed with a hedge; a little cloſe. This word ſeems to come from the Italian *piccolo*, i. e. *parvus*; and in ſome parts of England is called *pightel*.

PICOLOS, the name of an ancient Pruſſian idol, to which human ſacrifice was offered. See POTRIMPOS.

PICOTA, a name given by ſome authors to a diſtemper which they deſcribe as conſiſting wholly in an eruption of a number of very minute pimples upon the ſkin, all over the body; it is attended with no danger, unleſs they are ſtruck in.

PICQUEERING, PICKEERING, or PICKEROONING, a little flying war or ſkirmiſh, which the ſoldiers make when detached from their bodies to pillage, or before a main battle begins.

PICQUET, or PICKET, a celebrated game at cards, much in uſe throughout the polite world.

It is played between two perſons, with only thirty-two cards; all the duces, threes, fours, fives, and ſixes, being ſet aſide.

In reckoning, at this game, every card goes for the number it bears, as a ten for ten; only all court-cards go for ten, and the ace for eleven: and the uſual game is one hundred up. In playing, the ace wins the king, the king the queen, and ſo down. Twelve cards are dealt to each, uſually by two and two; which done, the remainder are laid in the middle. If one of the gameſters finds he has not a court card in his hand, he is to declare he has *carte blanche*, and tell how many cards he will lay out, and deſire the other to diſcard, that he may ſhew his game, and ſatisfy his antagoniſt, that the *carte blanche* is real; for which he reckons ten.

Each perſon *diſcards*, i. e. lays aſide a certain number of his cards, and takes in a like number from the ſtock. The firſt, of the eight cards, may take three, four, or five; the dealer all the remainder, if he pleaſes.

After diſcarding, the eldeſt hand examines what ſuit he has moſt cards of; and, reckoning how many points he has in that ſuit, if the other have not ſo many in that, or any other ſuit, he tells one for every ten of that ſuit. He who thus reckons moſt is ſaid to win the *point*.

The point being over, each examines what *ſequences* he has of the ſame ſuit; viz. how many tierce, or ſequences of three; quarte, or fours; quintes, or fives; ſixiemes, or ſixes, &c. For a tierce they reckon three points, for a quarte four, for a quinte fifteen, and for a ſixieme ſixteen, &c. And the ſeveral ſequences are diſtinguiſhed in dignity by the cards they begin from: thus ace, king, and queen, are called *tierce major*; king, queen, and knave, *tierce to a king*; knave, ten, and nine, *tierce to a knave*, &c. and the beſt tierce, quarte, or quinte, i. e. that which takes its deſcent from the beſt card, prevails; ſo as to make all the others in that hand good, and deſtroy all thoſe in the other hand. In like manner, a quarte in one hand ſets aſide a tierce in the other.

The ſequences over, they proceed to examine how many aces, kings, queens, knaves, and tens, each holds; reckoning for every three, of any ſort, three; but here too, as in ſequences, he that with the ſame number of threes has one that is higher than any the other has, e. g. three aces, has all his other made good hereby, and his adverſary's are all ſet aſide. But four of any ſort, which is called a *quatorze*, always ſet aſide three.

All the game in hand being thus reckoned, the eldeſt proceeds to play, reckoning one for every card he plays above a nine, and the other follows him in the ſuit: and the higheſt card of the ſuit wins the trick. Note, unleſs a trick be won with a card above a nine (except the laſt trick), nothing is reckoned for it; though the trick ſerves afterwards towards winning the cards; and that he who plays laſt does not reckon for his cards, unleſs he win the trick.

The cards being played out, he that has moſt tricks reckons ten for *winning the cards*. If they have tricks alike, neither reckons any thing. The deal being finiſhed, and each having marked up his game, they proceed to deal again as before; cutting afreſh each time for the deal.

If both parties be within a few points of being up, the carte blanche is the firſt thing that reckons; then the point, then the ſequences, then the quatorzes or threes, then the tenth cards.

He that can reckon thirty in hand by carte blanche, points, quintes, &c. without playing, before the other has reckoned any thing, reckons ninety for them; and this is called a *re-pique*. If he reckons above thirty, he reckons ſo many above ninety. If he can make up thirty, part in hand, and part play, before the other has told any thing, he reckons for them ſixty. And this is called a *pique*. Whence the name of the game.

He that wins all the tricks inſtead of ten, which is his right, for winning the cards, reckons forty; and this is called a *capot*.

This game has in ſome caſes been the object of mathematical computations.

Thus Mr. *de* Moivre has propoſed and ſolved the following problems:

1. To find at *picquet* the probability which the dealer has for taking one ace or more in three cards, he having none in his hand. He concludes from his computation, that it is 29 to 28 that the dealer takes one ace or more.

2. To find at *picquet* the probability which the eldeſt has of taking an ace or more in five cards, he having no ace in his hand. Anſwer; 232 to 91, or 5 to 2, nearly.

3. To find at *picquet* the probability which the eldeſt hand has of taking an ace and a king in five cards, he having none in his hand. Anſwer; the odds againſt the eldeſt hand taking an ace and a king are 33 to 16, or 21 to 10 nearly.

4. To find at *picquet* the probability of having two cards dealt to, without king, queen or knave. Which caſe is commonly called *cartes blanches*. Anſwer; the odds againſt *cartes blanches* are [illegible]

5. To find how many different [illegible] from one another, one may have [illegible]

in. Anſwer; 28,967,278. This number falls ſhort of the ſum of all the diſtinct combinations, whereby twelve cards may be taken out of 32, this number being 225,792,840; but it ought to be conſidered, that its that number ſeveral ſets of the ſame import, but differing in ſuit, might be taken, which would not introduce an eſſential difference among the ſets.

Mr. de Moivre alſo gives ſome obſervations on this game which he had from an experienced player. See Doctrine of Chances, p. 179, &c.

M. de Monmort has alſo treated of *piquet* in his Analyſe des jeux de Hazard, p. 162.

PIQUET *guard*. See GUARD.

PICRA, *bitter*. See HIERA.

PICRIS, in *Botany*, the name given by Linnæus to a genus of plants, of the *ſyngeneſia polygamia æqualis* claſs, called by Vaillant *helminthoca*; the characters of which are theſe: the common cup is double; the outer cup is very large, and compoſed of five cordated leaves; the interior is imbricated and of an oval figure, and is not cloſe at the mouth, as the other, but open; the flower is of the compound kind, it is imbricated and uniform; and the ſmall flowers of which it is compoſed are equal and numerous; each is compoſed of one petal, and is narrow, ligulated and truncated at the end, where it is divided into five ſegments; the ſtamina are five capillary filaments, ſo ſhort that they are hardly ſeen; the antheræ are cylindric and tubulate; the germen of the piſtil ſtands under the flower; the ſtyle is of the length of the ſtamina, and the ſtigmata are two in number, and reflex; the cups both remain when the flowers are fallen, and ſerve as capſules for the ſeeds, which are ſingle, ventricoſe, obtuſe, and crowned with a plume or down; the receptacle is naked. There are three ſpecies.

In ſome of the ſpecies of this genus, the ſeeds are crooked, and have a ſeſſile down; in others they are ſtraight, and their down is placed on a pedicle.

PICTA *toga*. See TOGA.

PICTS *wall*, in *Antiquity*, a famed piece of Roman work, begun by the emperor Adrian, A. D. 124, on the northern bounds of England, to prevent the incurſions of the Picts and Scots.

At firſt it was made only of turf, ſtrengthened with paliſadoes, till the emperor Severus, coming in perſon into Britain, repaired it, as ſome ſay, with ſolid ſtone, reaching eighty miles in length, from the Iriſh to the German ſea, through Carliſle and Newcaſtle; with watch-towers garriſoned, now called caſtle-ſteeds, at the diſtance of a mile from each other.

It does not appear, with ſufficient evidence, that Severus's wall was formed of ſtone: Bede expreſly aſſerts the contrary, though Spartian intimates that Severus built both a *murus*, i. e. a wall of ſtone, and a *vallum*, or a wall of turf. Bede's words are theſe: Severus, after ſeveral great and difficult engagements, thought it neceſſary to ſeparate that part of the iſland which he had recovered, from the other nations that were unconquered; not with a *murus*, as ſome think, but with a *vallum*: now a *murus*, ſays he, is of ſtone; but a *vallum*, ſuch as they made round a camp to ſecure it againſt the attacks of the enemy, is made of turf cut regularly out of the ground, and built high above ground like a wall, with the ditch before it, out of which the turf has been dug; and ſtrong ſtakes of wood all along the brink. Severus, therefore, drew a great ditch, and built a ſtrong earthen wall, fortified with ſeveral turrets from ſea to ſea. The learned Camden adopts this opinion; and adds, that Severus's wall is expreſſed by no other word than *vallum*, either in Antoninus or the Notitia. Camd. Brit. vol. ii. p. 1045. See AGGER.

This wall was ruined ſeveral times by the *Picts*, and often repaired by the Romans. At laſt Attius, a Roman general, ordered it to be rebuilt of ſtone, about the year 420; but the *Picts* ruining it in the year following, it was no longer regarded but as a boundary between the two nations.

The wall was eight feet thick, and twelve high from the ground: it ran on the north ſide of the rivers Tyne and Iſthing, up and down ſeveral hills: the tract, or remains, of it, are to be ſeen to this day in many places both in Cumberland and Northumberland.

The inhabitants of the country pretend, that there was a brazen trumpet or pipe, ſo artificially laid in the wall between each caſtle and tower, that upon the apprehenſion of danger at any one place, by the ſounding of it, notice might be given to the next, and then to the third, &c. whence it derives the ancient name CORNAGE; and in the inſide a ſort of fortified little town, now called Cheſter, the foundations of which appear, in ſome places, in a ſquare form.

PICTAVENSIS, or PICTONUM *calica*, the name of a kind of very terrible nervous colic, more uſually called *colica pictonum*; and by the natives in the Weſt Indies, where it rages, the *dry belly-ach*. It is ſo popular a diſeaſe in the Leeward Iſlands, that it may be very juſtly reckoned endemic among them, moſt of the people there having been at one time or other ſubject to it in all its fury. See COLICA *Dammoniacum*.

PICTURE, *pictura*, a piece of painting, or a ſubject repreſented in colours, on canvas, wood, or the like; and incloſed in a frame.

Pictures or paintings in oil are preſerved by coating them with ſome tranſparent and hard ſubſtance, as a varniſh, in order to ſecure the colours from the injuries of the air or moiſture; and to defend the ſurface from ſcratches or any damages the painting might receive from ſlight violence. The ſubſtances, that have been, or may be uſed for this purpoſe, are gum arabic, diſſolved in water with the addition of ſugar or ſugar-candy, to prevent its cracking, glair or whites of eggs, mixed with a little brandy or ſpirit of wine in order to make it work more freely, and a lump of ſugar to prevent its cracking, iſinglaſs-ſize uſed as either of the former, or mixed with a fourth or fifth of its weight of honey or ſugar, and varniſhes formed of gum reſins diſſolved in ſpirit of wine, or oil of turpentine, which laſt are called *oil-*VARNISHES.

Paintings in miniature are preſerved by plates of glaſs or the talc called iſinglaſs placed before them in the frame. Paintings in diſtemper may be rendered more durable, and preſerved from ſoulneſs by varniſhing them with hot ſize, boiled to a ſtrong conſiſtence, in which a fifteenth or twentieth part of honey has been diſſolved. Crayons muſt be preſerved in the ſame manner with paintings in water colours, by plates of glaſs, or iſinglaſs.

When *pictures* are cut or torn, they may be repaired by laying them on an even board or table, carefully putting together the torn or diſided parts with ſome of the matter of the SMOUT-*pot* laid as a cement, in and over the joint, and keeping them in the ſame ſituation till the cement is thoroughly dried. The protuberance of the cement may be eaſily reduced with a penknife, and the repaired part properly coloured ſo as to correſpond with the *picture*. When part of the cloth is deſtroyed, a piece of canvas ſomewhat bigger than the vacant ſpace is to be plaiſtered over on the outſide of the cloth with the matter of the ſmouth-*pot*, and when it is thoroughly dry, the inequality of the *picture* in this part is to be filled up with the ſame matter, and properly reduced and coloured.

The art of cleaning *pictures* and paintings is of great conſequence in order to their preſervation: in this operation great ſkill and care are requiſite, ſo that the menſtruum uſed for taking off any foulneſs may not diſſolve the oil in the painting itſelf or diſorder its colours, and that each ſort of varniſh with which paintings are covered may be taken off without injury to the painting. The firſt and moſt general ſubſtance uſed for cleaning *pictures* is water, which will remove any foulneſs ariſing from many kinds of glutinous bodies, as ſugar, honey, glue, &c. and any varniſh of gum arabic, glair of eggs or iſinglaſs, without affecting the oil which holds the colours together. Olive oil or butter will diſſolve pitch, reſin, and other ſubſtances of a like kind, without injuring the oil of the painting. Pearl aſhes, diſſolved in water, form a proper menſtruum for moſt kinds of matter that foul paintings: but they muſt be very cautiouſly uſed, as they will corrode the oil of the painting, if there be no varniſh of the gum reſins over it. Soap is of the ſame nature, and ſhould be cautiouſly applied, and only to particular ſpots, that elude all other methods. Spirit of wine will diſſolve all the gums and gum reſins, except gum arabic, and is therefore very neceſſary for taking off from *pictures*, varniſhes compoſed of ſuch ſubſtances. but it alſo corrodes the oil of the painting. This is alſo the caſe with oil of turpentine, and eſſence of lemon, ſpirit of lavender, and roſe-mary, and other eſſential oils. With regard to paintings that are varniſhed with gum arabic, glair of eggs, or iſinglaſs, the varniſh ſhould be taken off when they are to be cleaned. This may be eaſily diſtinguiſhed by wetting any part of the painting, which will feel clammy, if varniſhed with any ſubſtance ſoluble in water. This kind of varniſh may be taken off with hot water and a ſponge, or by gentle rubbing with a linen cloth dipped in warm water. If paintings, on this trial, appear to be varniſhed with the gum-reſins, or ſuch ſubſtances as cannot be diſſolved in water, they may, in ſome caſes, be ſufficiently cleaned by a ſponge with warm water; and any remaining foulneſs may be removed by rubbing the painting over with olive oil made warm, or with butter, which ſhould be wiped off with a woollen cloth; and if the *picture* require farther cleaning, wood-aſhes or pearl-aſhes may be uſed in the following manner: take an ounce of pearl-aſhes, and diſſolve them in a pint of water; or take two pounds of wood aſhes, and ſtir them well in three quarts of water, once or twice in an hour for half a day. Then pour off the clear fluid,

and

and evaporate it to a quart or three pints: wash the painting well with a ſponge dipped in either of theſe leys, and rub gently any foul ſpots with a linen cloth till they diſappear. If this method fail, recourſe muſt be had firſt to ſpirit of wine, then to oil of turpentine, and if theſe are ineffectual, the eſſence of lemons; with either of which the foul ſpots ſhould be ſlightly moiſtened, and the part immediately rubbed gently with a linen cloth. After a little rubbing, if oil of turpentine or eſſence of lemons has been applied, olive oil ſhould be put upon the ſpot; and water, if ſpirit of wine has been uſed; which ſhould be taken off with a woollen cloth; repeating the operation till the foulneſs be removed. When paintings appear to have been varniſhed with thoſe ſubſtances that will not diſſolve in water, and after the uſe of the above means retain their foulneſs, the following method will ſucceed: place the *picture* or painting in a horizontal ſituation; and moiſten, or rather bood, by means of a ſponge, the ſurface with very ſtrong rectified ſpirit of wine: keep the painting thus moiſtened, by adding freſh quantities of the ſpirit, for ſome minutes; then flood the whole ſurface copiouſly with cold water; waſh off the whole without rubbing; and when the painting is dry, repeat the operation, till the whole varniſh is taken off. Handm. to the Arts, vol. i. p. 224. 245.

PICTURES, *method of taking off decayed.* See PAINTING.

PICTURE, *magical.* See MAGICAL.

PICUIPINIMA, in *Ornithology*, the name of a Braſilian ſpecies of pigeon, very ſmall, ſcarce exceeding the lark in ſize. Its head, neck, and wings, are all of a pale-lead colour, with a black ſemilunar mark at the extremity of each wing; but its long wing-feathers, which are ſeen when the wings are expanded in flying, are of a reddiſh-brown on one ſide, and blackiſh on the other, with black ends or tips; the tail is long, and is variegated with black, white, and brown; the belly is covered with white feathers, every one of which has a brown mark of the ſhape of a half moon at the end.

PICUS, or PICUS *martius*, in *Ornithology*, the name of a large genus of birds, of the wood-pecker kind, the characters of which are theſe: they have a ſtraight, very hard, ſtrong, and ſharp beak, proper for making holes in trees; and a very long cylindrical-ſhaped tongue, terminated by a rigid and ſharp bony ſpine, ſerrated or notched at each end, proper for the ſeizing on, and tearing to pieces, of worms and other inſects; and this they can, at pleaſure, thruſt out to a great length; and ſtriking it into the clefts of trees, faſten it into inſects that lie there, and draw them out with it; their thighs are very ſhort and ſtrong, and their toes four in number, placed two before and two behind; their tails are rigid, and bent downwards, and their feathers bare at the ends, the ſtumps aſſiſting the creature in climbing: they live only on inſects, and have only ten feathers in their tail. Ray. The *picus martius* in the Linnæan ſyſtem is a ſpecies of the PICUS.

Some underſtand the word *picus* in a larger ſenſe, making it take in the *fitta*, *picus muravius*, *junx*, *certhia*, and all the birds that climb trees. In which caſe the characters of the genus are only, that they have very ſhort, thick, and ſtrong legs, adapted to the running up the bodies and branches of trees.

The *pici*, or wood-peckers, properly ſo called, however, are a very large and numerous family.

In the Linnæan ſyſtem of Ornithology, the *picus* makes a diſtinct genus of birds of the order of the pyes. The character of this genus, according to this author, are, that the bill is ſtraight and angular, and terminates in the form of a wedge; the noſtrils are covered with briſtly feathers reflected down; the tongue is long, cylindric, formed for ſeizing worms, ſharp-pointed, and jagged; the feet are formed for climbing. See PICUS above. Linnæus enumerates twenty-one ſpecies.

Of this genus are the black, green, and variegated wood-pecker, and the three-toed ſpecies, deſcribed in the Acta Literaria Suecia, in 1740. See WOOD-*Picker*.

PICUS *imbrifarius*, or *picus principalis* of Linnæus, in *Ornithology*, the name of an American bird, deſcribed by Nieremberg, and called by the natives QUATOTOMIMI. It is of the ſize of the hoopoe, and is variegated with black and brown; it is of the wood-pecker kind, having a beak three fingers breadth long, with which it perforates trees; its head is ſmall and red, and has a fine red creſt; but the feathers are black on their upper ſide; it has on each ſide of the neck a broad white line, reaching to the breaſt; its legs and feet are of a bluiſh colour; it builds in high trees, and is principally found near the ſhores of the South Sea. It feeds on inſects. See IPECU.

PICUS *murarius*, in *Ornithology*, the name of a bird called in Engliſh the *wall-creeper*, and improperly ranked among the *pici*, as wanting many of the characters of that genus: and therefore claſſed in the Linnæan ſyſtem under the genus of CERTHIA, or CREEPER, which beſides this, comprehends alſo twenty-four other ſpecies. It is about the bigneſs of the common ſparrow; its bill is black, ſlender, and long; its head, neck, and back grey; its breaſt white, and its wings partly grey and partly red; its tail is ſhort and black; its long wing-feathers alſo, and the lower part of its belly, and its legs, are of the ſame colour; its legs are ſhort, but its feet are not placed as in the wood-pecker; but are three before and one behind: it is very common in Italy, Germany, and ſome parts of France; it is a very lively and chearful bird, and as the common wood-pecker climbs trees and feeds on the inſects in their cracks, ſo this bird runs up old walls, and feeds on what it finds in the cracks of the ſtones.

PICUS *nidum ſuſpendens*, a name by which ſome authors have called the GALBULA; a yellow bird of the thruſh kind, very remarkable for its beauty, and for the ſtructure and manner of hanging its neſt.

PICUS *ſalutiferus*, in *Ornithology*, the name under which Nieremberg has deſcribed a Mexican bird, called by the natives *hanguecholtzotli*.

It is of the ſize of the common black-bird, and has a long and black beak: its head and a great part of its neck are red; its breaſt and belly are grey, and it has a creſt of red feathers upon its head: it is of the wood-pecker kind, and has its name from the ſuppoſed virtues of its feathers, particularly thoſe of the creſt, in curing the head-ach.

PIECE, in *Commerce*, ſignifies ſometimes a whole, and ſometimes only a part of the whole.

In the firſt ſenſe we ſay, a *piece* of cloth, of velvet, &c. meaning a certain quantity of yards, regulated by cuſtom, being yet entire, and not cut.

In the other ſignification we ſay, a *piece* of tapeſtry; meaning a diſtinct member wrought apart, which, with ſeveral others, make one hanging.

A *piece* of wine, of cyder, &c. is a caſk full of thoſe liquors.

PIECE, *chimney.* See CHIMNEY.

PIECE, *detached.* See DETACHED.

PIECE, *eaſel.* See EASEL.

PIECE, *maſter.* See MASTER.

PIECE, in *Matters of Money*, ſignifies ſometimes the ſame thing with *ſpecies*: as when we ſay, this *piece* is too light, &c.

Sometimes, by adding the value of the *piece*, it is uſed to expreſs ſuch as have no other particular name: as a *piece* of eight rials, a *piece* of twenty-five ſols, &c.

In England, the *piece*, abſolutely, is ſometimes uſed for twenty ſhillings ſterling, and ſometimes for a guinea.

By 6 Geo. II. cap. 25. *broad-pieces*, of five-and-twenty, or three-and-twenty ſhillings value, or any halves or quarters thereof, are called in. And all perſons are forbid to receive or utter them in payment by tale.

PIECE *of eight*, or *piaſtre*, is a ſilver money, firſt ſtruck in Spain, afterwards in other countries, and now current in moſt parts of the world.

It has its name *piece of eight*, or *rial of eight*, becauſe equal to eight ſilver rials.

Its value is nearly on the ſame foot with the late French crown, viz. four ſhillings and ſix pence ſterling. In 1687, the proportion of the ſimple rial to the piaſtre was changed; and in lieu of eight rials they gave ten. At preſent the reduction is on the ancient ſtandard.

There are two kinds of piaſtres, or Spaniſh crowns; the one ſtruck at Potoſi, the other at Mexico: theſe latter are a little heavier than the former; but, in return, they are not quite ſo fine.

The *piece of eight* has its diminutions; viz. the demi-piaſtre, or *piece of four rials*; the quarter, or *piece of two*; the half-quarter, and the ſixteenth. The EXCHANGE between Spain and England is made in *pieces of eight*. See COIN.

PIECE is alſo a kind of money of account, or rather a manner of accounting, uſed among the negroes on the coaſt of Angola, in Africa.

The price of ſlaves, and other commodities here negotiated, as alſo the duties paid the petty Kings, are eſtimated on both ſides in *pieces*. Thus thoſe barbarians requiring ten *pieces* for a ſlave, the Europeans in like manner, value the money, or merchandize, to be given in exchange, in *pieces*.

PIECE, in *Heraldry*, denotes an ORDINARY, or CHARGE.

PIECES, in the *Military Art*, include all ſorts of great guns and mortars.

Theſe are alſo called *pieces of* [illegible] or *artillery*.

PIECES, *field.* See FIELD-*pieces*.

PIECES, *battery.* See *Great* GUNS.

PIECES, *garriſon.* See GARRISON.

PIECE, *poiſoning a.* See POISONING.

PIECE, *ſoldier's.* See FIRELOCK.

PIECE, *elevation of a.* See ELEVATION.

PIECE, *quadrating to*. See QUADRATING.

PIEDOUCHE, *French*, formed from the Italian *piedestal*, *foot*, in *Architecture*, a little ſtand, or pedeſtal, either oblong or ſquare, enriched with mouldings; ſerving to ſupport a buſt, or other little figure. This is called a bracket pedeſtal.

PIEDRA *de la hyada*, in *Natural Hiſtory*, the name given by the Spaniards to a ſtone found in many parts of America, particularly in New Spain; and famous among the Indians for curing the colic on being applied to the navel. It is green, and is a ſpecies of jaſper, approaching to the nature of the *lapis nephriticus*, and is called by many *ſcitum lapis*, from its virtues.

PIEDROIT, in *Architecture*, a pier, or a ſquare kind of pillar, part whereof is bid within a wall.

The only thing wherein it differs from a PILASTER is that the latter has a regular baſe and capital, which the other wants.

PIEDROIT is alſo uſed for a part of the ſolid wall annexed to a door or window; comprehending the door-poſt, chamfrain, fabian, jeſt, &c.

PIE-POUDER, *curt.* See COURT.

PIER, in *Building*, derived from the French *pierre*, a *ſtone*, denotes a maſs of ſtone, &c. oppoſed, by way of fortreſs, againſt the force of the ſea, or a great river, for the ſecurity of ſhips that lie at harbour in any haven. Such are the *pier* of Dover, deſcribed by Camden Brit. &c. the *pier* of Hamſgate, and the haven *pier* of Great Yarmouth, maintained 22 Car. II.

PIERS are alſo uſed in *Architecture* for a kind of *pilaſters*, or buttreſſes, raiſed for ſupport, ſtrength, and ſometimes for ornament.

PIERS, *circular*, are called *engaged* COLUMNS, and they are with or without caps, and are frequently ſeen in Gothic architecture.

PIERS *of a bridge*. See BRIDGE.

M. Belidor obſerves that, when the height of the *piers* is about ſix feet, and the arches are circular, it is ſufficient to make their thickneſs the ſixth part of the width of the arch, and two feet more; but when the arches become of a great ſpan, the thickneſs of the *piers* may be reduced to the ſixth part; but then the depreſſion of the two feet doth not take place at once; that is, in an arch of above forty-eight feet, three inches are taken off for every ſix feet of increaſe of the width of the arch. The thickneſs of the *piers* ſupporting elliptic arches is greater than in the former proportion; thus, in an arch of ſeventy-five feet wide, the thickneſs of the *piers*, whoſe height is about ſix feet, ſhould be 15.5 when the arch is circular, and fifteen feet when it is elliptical.

The ſame author makes the *abutments* one-ſixth part more than the *piers* of the ſame arch.

Mr. Muller has calculated the following TABLE, containing the thickneſs of the *piers* of bridges.

TABLE, containing the thickneſs of the *piers of bridges*.

	6	9	12	15	18	21	24
20	4.574	4.918	5.265	5.550	5.892	6.236	6.580
25	5.120	5.465	6.215	6.555	6.645	6.880	7.593
30	6.186	6.526	7.225	7.613	7.46	7.615	8.102
35	7.235	7.80	8.20	8.552	8.807	9.057	9.533
40	8.404	8.665	9.234	9.623	9.955	10.10	10.588
45	9.65	9.918	10.20	10.600	37	11.1	11.591
50	10.87	11.254	11.586	12.0	12.31	12.17	13.13
55	12.00	12.25	12.602	12.964	13.579	13.140	13.418
60	13.10	13.45	13.81	14.18	13.782	14.09	14.384
65	14.26	14.62	15.01	15.40	15.80	15.054	16.233
70	15.42	15.809	16.209	16.609	17.013	16.414	16.410
75	16.60	17.00	17.350	17.808	18.260	16.04	17.354
80	17.80	18.22	18.634	19.047	19.461	19.874	18.198
85	19.00	19.198	19.60	19.64	20.157	20.748	19.19
90	20.21	20.628	21.039	21.478	21.157	20.779	20.452
95	21.42	21.85	22.272	22.438	22.20	22.06	21.06
100	22.64	23.08	23.52	23.80	24.08	23.46	23.976

The firſt horizontal line expreſſes the height of the *piers* in feet, from 6 to 24 feet, each increaſing by 3: the firſt vertical column, the width of arches from 20 to 100 feet, for every 5 feet.

The other columns expreſs the thickneſs of *piers* in feet and decimals, according to the reſpective height at the head of the *piers*, and the width of the arch againſt it in the firſt column.

Flying *piers* are ſeldom uſed but in bridges over ſmall rivers; in all others they project from the bridge by a triangular prism, which prefents an edge to the ſtream, in order to divide the water more eaſily, to prevent the ice from ſettering there, as well as veſſels from running foul againſt them; this edge is terminated by the adjacent ſurfaces at right angles to each other at *Weſtminſter* BRIDGE, but thoſe of the *Pont-royal*, at Paris, make an acute angle of about 60°. However the French, in their later conſtructions, make this angle to terminate by two cylindric ſurfaces, whoſe baſes are arcs of 60 degrees. Muller's Pract. Fortif. part 2. ſect. 1. p. 25, &c.

PIERCEA, the *iſlandica* of Tournefort, and RIVINIA of Linnæus, in *Botany*, is made a diſtinct genus by Miller. The characters are theſe: the flower has no petals; the empalement which incloſes the parts of generation, is compoſed of four oblong, oval, coloured leaves; it hath four ſtamina which ſtand erect and cloſe together, terminated by ſmall ſummits; in the center is ſituated a large roundiſh germen, ſupporting a ſhort ſtyle, crowned by an obtuſe ſtigma; the germen afterwards turns to a roundiſh berry, ſitting upon the reflexed empalement, having one cell, including a rough ſeed of the ſame form. There are two ſpecies. Theſe plants grow naturally in moſt of the iſlands in the Weſt Indies. The juice of the berries of the olant will ſtain paper and linen of a bright red colour, and many experiments made with it to colour flowers, have ſucceeded extremely well in the following manner: the juice of the berries was preſſed out, and mixed with common water, putting it into a phial, ſhaking it well together for ſome time, till the water was thoroughly tinged; then the flowers, which were white and juſt fully blown, were cut off, and their ſtalks placed into the phial; and in one night the flowers have been finely variegated with red; the flowers on which the experiments were made were the tuberoſe, and the double white narciſſus.

PIERCED, PIERCE', in *Heraldry*, is when an ordinary is perforated, or ſtruck through; ſowing, as it were, a hole in it.

This *piercing* is ſaid to be expreſſed in blaſon as to its ſhape: thus if a croſs have a ſquare hole, or perforation, in the centre, it is blaſoned, *four-pierced*, which is more proper than *quarter-pierced*, as Leigh expreſſes it; and accordingly the French call it *percé en croix*. When the hole, or perforation is round, it muſt be expreſſed *round-pierced*; which Gibbon in Latin calls *perforata*; becauſe all holes made with pierces, or augres, are round. If the hole in the centre be in the ſhape of a *lozenge*, it is expreſſed, *pierced lozenge-ways*.

All *piercings* muſt be of the colour of the field, becauſe *piercing* implies the ſhewing of what is under the ordinary, or bearing. And when ſuch figures appear on the centre of a croſs, &c. of another colour, the croſs is not to be ſuppoſed *pierced*, but that the figure on it is a charge, and muſt be accordingly blaſoned.

PIERCING, among *Farriers*, To *pierce a horſe's foot low*, is to pierce it too near the edge of the iron. To *pierce it fleſh*, is to pierce it in barbing.

PIERIDES, among the *Ancients*, an epithet given to the Muſes, upon account of their having been born in that part of the country of Macedon which was called *Pieria*.

PIERRE *d'automne*, a French name tranſlated from the Chineſe. It is the name of a medicinal ſtone, famous throughout the Eaſt, for curing all diſorders of the lungs. Many people ſuppoſe it had its name of the *autumn-ſtone*, from its being only to be made at that ſeaſon of the year; but it may be made equally at all times, and the origin of the name is to be further ſearched into.

The Chineſe chemiſts, like thoſe of all other nations, delight in a ſort of gibberiſh. A part of this is, the referring the ſeveral parts of the body to the ſeveral ſeaſons of the year. The lungs are in this ſcheme referred to autumn. Thus appears in their writings; and thus the ſtone for diſeaſes of the lungs came to be called *autumn-ſtone*.

It is a tedious preparation of human urine, and made as follows: they put thirty pints of the urine of a ſtrong and healthy young man into a large iron pot, and ſet it over a gentle fire; and when it is got to boil, they add to it, drop by drop, about a large tea-cup full of rape-oil: it is then left on the fire till the whole is evaporated to a thick ſubſtance reſembling black mud; they then take it out of the pot, and having it on a flat diſh, they dry it ſo that it may be powdered very fine.

This powder they moiſten with freſh oil, and put the maſs into a double crucible, ſurrounded with aſhes; where it ſtands till thoroughly dried again. They uſually powder this again, and putting it into a china veſſel, covered with ſilk cloth and 2 double papers, they pour on boiling water, which makes its way, drop by drop, through theſe coverings, till ſo much is got in as is ſufficient to reduce it to a paſte. This paſte is well mixed together in the veſſel it is kept in, and this is put into a veſſel of water, and the whole ſet over the fire. The matter thus becomes again dried in balneo Mariæ, and is then finiſhed. Obſerv. ſur les Cout. de l'Aſie, p. 328.

PIES, in our *Ancient Law-Books*. *Vide* PIE, were a

sort of monks, so called because they were black and white garments, like magpies; the same, we suppose, with those since called *Carmelites*: who, for a like reason, were anciently called by the French *Freres Barrez*.

They are mentioned by Walsingham, p. 174. *In quodam vetere cœmeterio, quod fuerat quondam fratrum, quos* Freres Pies *vetera appellabant.*

PIESMA, a word used by the ancients to express the remaining mass after the expression of any fluid substance from among its more solid parts. Thus the cake remaining in the bag after the expression of oils, is called by this name: but there are instances of authors calling the expressed juice, instead of the residuum, by this name. Thus Dioscorides calls the expressed juice of the bay-berries, the *piesma laurinum*; and others, the expressed juice of roses, *piesma rosarum*, paying no regard to the rose-cake left behind.

PIESTER, the name used by the ancients for the press which they employed in preparing the several juices of plants, &c. hence the word *piesma*, which see.

PIESTRON, a word used by Hippocrates to express a sort of forceps, which he recommends to be used in difficult labours, to break the bones of the cranium of the fœtus, when its head is too large to suffer it to pass whole. It was also called *embryulcus*.

PIETANIA, or PITTANCE, a portion of victuals distributed to the members of a college, or other community, upon some great festivals.

PIETANIARIUS. See PITANCIARIUS.

PIETERMAN, in *Ichthyology*, the name used by some for a fish of the cordus kind, approaching to the nature of the *draco marinus*, or weaver; and more usually called among authors by its Brasilian name RIQUI. See TAB. III. *of Fish*, N° 249.

PIETISTS, a religious sect that sprung up towards the close of the seventeenth century, among the Protestants of Germany; seeming to be a kind of mean between the Quakers of England, and the Quietists of the Romish church.

This sect originated in the zeal of certain persons, who, with the best intentions, endeavoured to stem the torrent of vice and corruption, and to reform the licentious manners both of the clergy and of the people. However, many, deluded by the suggestions of an irregular imagination, and an ill-informed understanding, or guided by principles and views of a more criminal nature, spread abroad new and singular opinions, false ethics, unintelligible maxims, austere precepts, and imprudent clamours against the discipline of the church; all which excited the most dreadful tumults, and kindled the flames of contention and discord.

The learned Spener was at the head of the first reformers, who, by the private societies he formed at Francfort, with a design to promote vital religion, roused the lukewarm from their indifference, and excited a spirit of vigour and resolution in those who had been satisfied to lament in silence the progress of impiety. With this view he published a book, intitled Pious Desires, in which he represented in an affecting manner the disorders of the church, and proposed the remedies that were proper to heal them. The religious meetings above mentioned, or colleges of piety, as they were called, however well designed in their original establishment, tended in many places to kindle in the breasts of the multitude the flames of a blind and intemperate zeal, whose effects were impetuous and violent: so that these institutions of *pietism* became objects of reproach and occasions of complaint.

The tumult thus produced was further promoted by the commotions that arose at Leipsic in the year 1689, when certain pious and learned professors of philosophy, undertook to explain the Scriptures in their colleges, with a view of forming candidates for the ministry into a more accurate acquaintance with these sources of religious knowledge. The novelty of this method of instruction excited attention, and the lectures that were delivered to this purpose were much frequented. Suspicions and rumours of an unfavourable kind were soon industriously propagated, and the professors were prohibited from pursuing the plan of religious instruction which they had undertaken. During these troubles and divisions, the invidious denomination of *Pietists* was first invented; or at least, before this period it was not commonly known. It was originally applied by some inconsiderate persons to those who frequented the biblical colleges, and lived in a manner suitable to the instructions and exhortations that were there addressed to them; and afterwards it was used to characterise all who were distinguished by the excessive austerity of their manners, or, who, regardless of truth and opinion, were only intent upon practice, and turned the whole vigour of their efforts towards the attainment of religious feelings and habits. At this time the denomination was also sometimes applied to persons whose motley characters exhibited an enormous mixture of extravagancy and enthusiasm, and who better deserved the title of delirious fanatics. The contest, thus begun, very soon spread through all the Lutheran churches in the different states and kingdoms of Europe. Many persons of various ranks and professions, of both sexes, learned and illiterate, pretended a divine impulse for pulling up iniquity by the root, and restoring to its primitive lustre the declining cause of piety and virtue, and for establishing a better discipline in the Christian church. Assemblies similar to those established by Spener were introduced for this purpose into Leipsic and other places: but they were not all conducted with prudence and order. Into these assemblies there were introduced several extravagant and bare-headed fanatics, who foretold the destruction of Babel, i. e. the Lutheran church; who terrified the populace with fictitious visions, assumed the authority of prophets honoured with a divine commission, revived doctrines that had long before been exploded and condemned, declared the approach of the millennium, and were guilty of many outrages against order and peace. The governors of the church and of the state were alarmed at the progress of the divisions which these enthusiasts produced, and many severe laws were enacted against the *Pietists*.

These restorers of piety were of two kinds: one sect, at the head of which was Spener, proposed to carry on their plan without introducing any change into the doctrine, discipline, or form of government in the Lutheran church: the other party were for introducing considerable alterations both in doctrine and ecclesiastical polity. Many mistakes have been occasioned by confounding these two parties: the former of which were zealously intent upon a very important object, the revival of piety, and with this view, the reformation of public seminaries, where ministers were educated, both as to the mode of instruction and the extent of discipline: but the latter were, for the most part, totally deficient of reason and judgment: their errors were the results of a disordered brain; and they were rather to be considered as lunatics than as heretics. Some among them were less extravagant, and tempered the singular notions they had derived from reading meditation, with a certain mixture of the important truths and doctrines of religion. They were mostly, however, of the mystic kind. For a more particular account we must refer to Mosheim's Eccl. Hist. vol. iv. p. 454, &c. Eng. edit. 8vo.

Many gross errors are charged on the *Pietists*, in a book intitled Manipulus Observationum Antipietisticarum; but they have too much the severity of polemical exaggeration: at least it is certainly so with regard to a great part of them.

In effect, there are *Pietists* of several kinds: some run into gross illusions, and carry their errors to the overturning a great part of the Christian doctrine; others are only visionaries; and others very honest and good people, who, disgusted with the coldness and formality of other churches, and charmed with the fervent piety of the *Pietists*, are attached to their party, without giving into the grossest of their errors.

PIETISTS, otherwise called the *brothers and sisters of the pious and christian schools*, a society formed in the year 1678, by Nicholas Barre, and obliged, by their engagements, to devote themselves to the education of poor children of both sexes.

PIETOSA, in the *Italian Music*, signifies to play or sing in a soft manner, fit to move pity or compassion.

PIETRA *embolsata*, in *Natural History*, a name given by the Italians to the Florentine marble, so remarkable for its delineations.

This marble is found in thin strata, and is full of cracks; in these cracks there is usually found a black mineral matter, which, getting into the substance of the stone a little way on each side of the crack, forms there various delineations, or the figures of pieces of moss, bushes, and the like: the paler pieces of the marble usually have these delineations; the darker coloured [illegible] the forms of trees and houses, or the ruins of [illegible]

PIETY, *manuals of*. See [illegible]

PIEXE-*pala*, in *Ichthyology*, a [illegible] genus of a fish caught about [illegible] much resembling our *acer* [illegible] known among authors [illegible] TUAIA.

PIEXE-*puros*, in *Ichthyology* [illegible] have called the *weever*; [illegible] name is Portuguese, and [illegible] ture having a mouth like a hog.

PIG, *Guinea*. See GUINEA.

PIG *of lead*, the eighth part of a [illegible] about 256 *lb.* weight.

PIGAYA, in *Natural History*. See [illegible]

PIGEON, *columba*, in the Linnæan system of [illegible]

is a distinct genus of birds of the order of the PASSERES; the characters of which are, that the tongue is whole and even; the beak straight, and scurfy at the base; the noſtrils long, and covered externally with a tumid membrane. Linnæus enumerates forty species.

The tame *pigeon*, and all its beautiful varieties derive their origin from one species, the stock-dove. Varro obſerves, that they derive their Latin name *columba* from their voice or cooing. They were and ſtill are in moſt parts of our iſland, in a ſtate of nature; they breed in holes of rocks and hollows of trees. They are gregarious in their nature, lay only two eggs, and breed many times in the year, ſo that it is ſaid, fourteen thouſand ſeven hundred and ſixty may be produced in four years from a ſingle pair; they bill in their courtſhip; the male and female ſit by turns, and feed their young; they caſt their proviſion out of their craw into the young ones mouths; they drink by continual draughts, like quadrupeds, and their nares are membraneous or pilatrive.

Many of them are obſerved to migrate into the ſouth of England, not appearing with us till November, and retiring in the ſpring. Their ſummer haunts are probably in Sweden. The varieties produced from the domeſtic pigeon are very numerous and extremely elegant; they are diſtinguiſhed by names expreſſive of their ſeveral properties, ſuch as TUMBLERS, CARRIERS, JACOBINES, CROPPERS, POUTERS, RUNTS, TURBITS, OWLS, NUNS, &c. Pennant.

PIGEON, *Barbary*. See BARB.

PIGEON, *helmet*. See HELMET.

PIGEON-*holes*, in *Brick-Making*. See BRICK.

PIGEON-*pea*, in *Botany*. See *Cytiſus* TREFOIL.

PIGEON, *laughing*. See LAUGHER.

PIGEON, *Alabama*. See MARIGNY.

PIGEON-*houſe*, a houſe erected full of holes within, for the keeping, building, &c. of pigeons otherwiſe called a dove-cote. Any lord of a manor may build a *pigeon-houſe* on his land, but a tenant cannot do it without his lord's leave. When perſons ſhoot at or kill *pigeons* within a certain diſtance of the *pigeon-houſe*, they are liable to pay a forfeiture.

PIGER *Henricus*, ſloth'ful Harry, a fantaſtical name for a ſlow diſtilling chemical inſtrument; called alſo an ATHANOR.

PIGMENTS, *pigmenta*, preparations in a ſolid form, uſed by painters, dyers, &c. to impart colours to bodies, or to imitate particular colours.

Theſe require to be mixed with ſome fluid, as a vehicle, before they can be employed as paints, except in the caſe of crayons, where they are uſed dry.

When glaſs is ſtained, or coloured, as in painting on glaſs, or for counterfeiting gems, or precious ſtones; the *pigment* is always of a metalline, or a mineral nature.

In the gilding of wood, *pigments*, approaching as near as may be to the colour of gold itſelf, are both laid under the gold, and uſed alſo for the colouring of depreſſed parts, where gold leaf cannot be conveniently applied. The ſubſtance chiefly employed for this purpoſe is yellow ochre, the colour of which may be improved by a ſmall addition of vermilion or other red powders. See GILDING.

PIGMY, or PYGMY. See PYGMY.

PIGNE. See PINEA.

PIGNOLETTI, in *Ichthyography*, a name uſed by many for the ×PHUS *cabites*, a ſmall fiſh of the *gobius* or ſea-gudgeon kind, common in the Mediterranean, and brought to the markets of Rome and Venice.

PIG-*nut*, or RAGG-*nut*, *bunium*, in *Botany*, a genus of the *pentandria digynia* claſs. Its characters are theſe: the involucrum of the great umbel is compoſed of many ſhort narrow leaves; and the proper empalement of the flower is ſcarcely diſcernible; the *flowers* have five heart-ſhaped petals which are equal and turn inward; and they have five ſtamina; the oblong germen is ſituated below the receptacle, which afterwards becomes an oval fruit dividing into two parts, containing TWO oval ſeeds. Miller enumerates three ſpecies, which delight to grow among graſs, to cannot without difficulty be made to thrive long in a garden. Linnæus mentions only one ſpecies.

The root of this plant, which is the only part uſed, and either roaſted or raw, is of a pleaſant ſweetiſh taſte: it is accounted nouriſhing, and to be provocative of venery; it is commended againſt the ſtrangury, and bloody urine.

PIG-*nut*. See WALNUT-*tree*.

PIGUS, in *Ichthyology*, the name of a ſpecies of leather-mouthed fiſh, very much approaching to the nature of the carp.

It is of the ſame ſhape and ſize with the common carp, and has the eyes, fins, and fleſhy palate wholly the ſame; from the gills to the tail there runs a crooked dorſal line; the back and ſides are bluiſh, and its belly reddiſh; it is covered with large ſcales, from the middle of every one of which there riſes a fine, pellucid, and very ſharp prickle.

It is a finer fiſh than the carp for the table, and is in ſeaſon in the months of March and April. It is caught in lakes in ſome parts of Italy, and is mentioned by Pliny, though without a name.

It is a ſpecies of *cyprinus*, according to Artedi, and is diſtinguiſhed by that author under the name of the *cyprinus*, called *picta* and *pigus*. He adds, that the tail is forked, and the ſcales large; and that in ſpring and autumn there grow out of them white pyramidal prickles, which remain about five or ſix weeks, and then fall off; the back is of a blackiſh hue, and the belly white, with a faint caſt of red. It never grows to more than five or ſix pounds: the fleſh is well taſted. It is found in the lakes in the northern nations.

PIISSKER, in *Ichthyology*, the name of a fiſh of the *muſtela* kind, uſually called the *monſtrous foſſilis*, or *piſcis foſſilis*, the *foſſile fiſh*.

This fiſh is uſually found of a hand's breadth long, and as thick as one's finger; but they grow ſometimes to be much longer: the back is of a grey colour, ſpotted with a great number of ſpots and tranſverſe ſtreaks, partly black and partly blue; the belly is yellow, and is ſpotted with red and white and black: the white ones are the larger, the others look as if made with the point of a needle; and there is on each of the ſides a longitudinal black and white line. There are certain fleſhy excreſcences at the mouth, which, in ſwimming, they expoſed; and when out of the water, they contract them. They run into caverns in the earth, in the ſides of rivers, in marſhy places, and penetrate a great way, and are frequently dug up at conſiderable diſtances from waters; and often when the waters of brooks and rivers ſwell beyond their banks, and they are ſeen covered by them, they make their way out of the earth into the water; and when it deſerts them, they are left in vaſt numbers upon the ground, when they are eaten by the ſwine.

This ſeems very much of the kind of the *foſſilis* fiſh, and poſſibly is no other than the ſame ſpecies; and poſſibly alſo the *perilla* of Schoneveldt is the ſame.

PIKE, an offenſive weapon, conſiſting of a ſhaft of wood, twelve or fourteen feet long; headed with a flat-pointed ſteel, called the *ſpear*.

The name *pike* is ſaid to be derived from a bird, called by the French *pic*, by us wood-pecker; whoſe bill is ſaid to be ſo ſharp as to pierce wood like an augre. Du Cange derives it from the baſe Latin *picus*, or *picea*; which Turnebus ſuppoſes to have been ſo called, *quaſi ſpicea*, becauſe reſembling an ear of corn: Octavio Ferrario derives it *a ſpicula*. M. Fauchet ſays, it was the *pike* that gave name to the Picards, and to Picardy, which he will have to be modern, and to have been framed on occaſion of that people's renewing the uſe of the *pike*; the etymology whereof he fetches from the French *piquer*, to *pick*. But others will have the name *Picard* to have been given that people by reaſon of their readineſs to pick quarrels; called in French *picqueurs*.

The *pike* was a long time in uſe in the infantry, to enable them to ſuſtain the attack of the cavalry; but it is now taken from them, and the bayonet, which is fixed to the muzzle of the firelock, is ſubſtituted in its place.

It is ſtill uſed by ſome officers of infantry under the name of ſpontoon.

Pliny ſays, the Lacedæmonians were the inventors of the *pike*. The Macedonian phalanx was evidently a battalion of *pikemen*.

PIKE, *in Ichthyology*, a name given by us to the fiſh called by authors the *ſuculus* and *eſox*, and by the old Greek writers *belone*.

This is the *ſuculus* ROSTRO of Linnæus: its characters are, that the head is very flat; the upper jaw broad, and ſhorter than the lower, which turns up a little at the end; the body is long, ſlender, and compreſſed ſideways; the teeth are very ſharp, diſpoſed only in the front of the upper jaw, but in both ſides of the lower, in the roof of the mouth, and often the tongue; the fin of the mouth is very wide, and the eyes ſmall; the dorſal fin is placed very low on the back, and conſiſts of twenty-one rays; the pectoral of fifteen; the ventral of eleven; and the anal of eighteen; the tail is bifurcated. The *pike* is common in moſt of the lakes of Europe, but the largeſt are thoſe of Lapland, which are ſometimes eight feet long: they are there dried and exported for ſale. It is ſaid, that the *pike* was introduced into England in the reign of Henry VIII. in 1537, when a *pike* was ſold for double the price of a horſe-lamb in February. Beſides fiſh and frogs, which are its uſual food, it will devour the water rat and young ducks. It is very fierce and voracious. This fiſh is very remarkable for its longevity: we read of one that was ninety years old, and of another, that was not leſs than two hundred and ſixty-ſeven years old.

Pennant.

Pennant. See *Fading of* FISH, *Pike-*FISHING, and HAXING.

PIKE, *land.* See LUCIUS *terrestris.*

PIKE-*perch.* See LUCIO-*perca.*

PIKE, *sea.* See MERLUCIUS and SCUDI.

PIKE, in *Commerce.* To treat at the *pike*, or *pike's end, à la pique*, denotes a kind of commerce, which the Europeans hold with savage nations, wherein they are to keep on their guard, and, as it were, sword in hand.

To count at the pike also denotes a kind of prohibited traffick which the English, French, and Dutch, maintain in several parts of the Spanish West Indies, near the colonies which those nations have in the Caribbee islands.

Perhaps it should rather be called *treating at pike*, i. e. with the vessel at anchor; in regard this commerce, which is prohibited on pain of death, is only practised in roads where vessels lie at anchor, waiting for the Spanish merchants, who sometimes by stealth, though more frequently with the connivance of the governors, &c. come to exchange their gold, pieces of eight, cochineal, &c. for the European merchandizes.

Others will have it treating at the *pike*, i. e. at a *pile's length*, or *distance*; by reason of the distance strangers are obliged to keep at.

PIKE, is also the name of an Egyptian measure, of which there are two kinds, the large and the small.

The larger *pike*, called also the *pike* of Constantinople, is 27.$\frac{1}{2}$ English inches. They measure all foreign goods with this, except only such as are made of flax and cotton: for these they use the small *pike*, called *pike bellicle*, or the *pike* of the country; because they measure with it all the manufactures of the country. This *pike* consists of about 25.$\frac{1}{2}$ English inches.

PIKE, *half*, in the *Military Art*, is the weapon carried by an officer of foot. It differs from a *pike*; because it is but eight or nine feet long, and the spear is smaller and narrower. See SPONTOON.

PILA. See PILE.

PILA, PILE, in *Building*, a mass of masons work, in manner of a pillar; used hexagonal. See PIER.

The word comes from the Latin *pila*, used in the same sense by Vitruvius; and this probably from πιλος, *coges vortico.*

Evelyn observes, that *piles*, and their quoins, as we see them in ancient altars and monuments, were used for insculptions; but the shorter and more massy served for arches and buttresses to solid work. They are sometimes made semicircular; but the ancients preferred those pointed at right angles; as best able to resist the current.

PILA *marina*, the *sea-ball*, in *Natural History*, the name of a substance very common on the shores of the Mediterranean, and in some other places. It is usually found in form of a ball, about the size of the balls of horse-dung, and composed of a multitude of fibrillæ, irregularly complicated.

Its origin has been very variously guessed at by different authors. John Bauhine says, that it consists of small hairy fibres, and straws, such as are found about the fea-plant called *alga cornifera*; but he does not pretend to ascertain what plant it owes its origin to. Imperatus judged it to consist of the ravelly both of vegetable and animal bodies. Mercatus doubts whether it be a congeries of the fibrillæ of plants, wound up into a ball by the motion of the sea-water; or whether it be not the workmanship of some sort of beetle living about the sea-shore, and analogous to our common dung beetles ball, which it elaborates from dung for the reception of its progeny. Schwenkius will have it composed of the filaments of some plant of the red kinds: and Welchius supposes it to consist of the pappose part of the flowers of the reed. Maurice Hoffman thinks it the excrement of the hippopotamus: and others think it that of the phoca, or sea calf.

But Klein, who had thoroughly examined as well the balls themselves, as what authors had conjectured concerning them, is of opinion, that they are wholly owing to, and entirely composed of, the capillaments which the leaves growing to the woody stalk of the *alga cornifera* have, when they wither and decay. These leaves, in their natural state, are about the thickness of a wheat straw, and they are placed so thick about the tops and extremities of the stalks, that they enfold, embrace, and lie over one another; and from the middle of their clusters of leaves, and, indeed, from the woody substance of the plant itself, there arise several other very long, flat, smooth, and brittle leaves: these are usually four from each tuft of the other leaves, and they have ever a common vagina, which is membranaceous and very thin. This is the style of the plant, and the *pila marina* seems a collect of the fibres of the leaves of this plant, which cover the whole stalk, divided into their constituent threads, and by the motion of the waves, first broken and worn into short shreds, and afterwards wound up together into a roundish or longish ball. Klein, de Tubul. Marin. p. 22.

PILARIS, or PILARIS *turdus*, in *Ornithology*, the name by which authors in general call the VISCI-*vorus.*

PILASTER, in *Architecture*, a square column, sometimes insulated, but more frequently set within a wall, and only projecting with a fourth or fifth part of its thickness. See *Tab. Architect. fig.* 20. (*k*)

The *pilaster* is different in different orders; it borrows the name of each order, and has the same proportions, and the same capitals, members, and ornaments, with the columns themselves.

Pilasters in the Attic order are represented at Y *fig.* 40. They are sometimes at equal distances, and sometimes coupled; but this depends on the intercolumniation of the order below. If the Attic order be straight, and immediately over it, it must partake of the same distances and stand over the columns in the lower order.

Pilasters are made usually without either swelling or diminution, as broad at top as at the bottom; though some of the modern architects, as M. Mansard, &c. diminish them at top, and even make them swell in the middle, like columns; particularly when placed behind columns.

Pilasters, M. Perrault observes, like columns, become of different kinds, according to the different manner wherein they are applied to the wall. Some are wholly detached, called by Vitruvius *parastatæ*; others have three faces clear out of the wall; and others two; and others only one: these are all called by Vitruvius *antæ.*

Insulate *pilasters* are but rarely found in the antique. The chief use they make of *pilasters* was at the extremities of porticoes, to give the greater strength to the corners.

There are four principal things to be regarded in *pilasters*; viz. their projecture out of the wall, the diminution, the disposition of the entablature when it happens to be common to them, and to a column, and their flutings and capitals.

1. The projecture of *pilasters* which have only one face out of the wall, is to be one eighth of their breadth; at most, not above one-fifth. When they receive imposts against their sides, their projecture may be a quarter of their diameter.

They are made to project in different proportions to their diameters, as one-eighth, one-fourth, one-half, and three-fourths; but are never used gracefully quite a square, except at angles; and then only in massive buildings, as the portions of St. Paul's, Covent-garden.

2. *Pilasters* are but seldom diminished, when they have only one face out of the wall. Indeed where they stand in the same line with columns, and the entablature is continued over both, without any break, the *pilasters* are to have the same diminution with the columns, that is to say, on the face respecting the column; the other being left without any diminution.

When they are diminished they have an ill effect where it becomes necessary to make them correspond with the lines of the columns at top, as is sometimes the case in porticos and returns, then it is better for the architect to make them entirely of the smallest diameter of the column to which they are opposed.

3. *Pilasters* are sometimes fluted, though the columns they accompany be not so; and, on the other hand, the columns are sometimes fluted, when the *pilasters* that accompany them are not.

The flutings of *pilasters* are always odd in number, except in half *pilasters*, meeting at inward angles; where four flutings are made for three, &c.

4. The proportions of the capitals of *pilasters* are the same as to height with those of columns, but they differ in width, the leaves of the former being much wider, because *pilasters*, though of equal extent, have only the same number of leaves for their girt, viz. eight. Their usual disposition is to have two in each face in the lower row, and in the upper row one in the middle, and two halves in the angles, in the turns where they meet. Add to this that the rim of the vase, [illegible] it not straight, as the lower part is, but a little [illegible] prominent in the middle.

In *pilasters* that support ARCHI[illegible] the flowers, must be regulated [illegible] and at angles by the [illegible] which reason, keys in Rustic [illegible] best becomes them.

PILASTER, *demi*, called also [illegible] on an arch: it generally [illegible]

PILATIO, a word used by [illegible] fissure in the cranium, [illegible] of the head.

PILATRO, or PILATRO, *de* [illegible] girls made in some parishes [illegible]

from the froth of the sea, coagulated by heat in the hot countries.

PILCHARD, in *Ichthyology*, a fish much approaching to the nature of the common herring, but smaller and differing in several other particulars.

The distinguishing characters of it are these: the body of the *pilchard* is less compressed than that of the herring, being thicker and rounder; the nose is shorter in proportion, and turns up; the under jaw is shorter; the back is more elevated; the belly less sharp; the dorsal fin of the *pilchard* is placed exactly in the centre of gravity, so that when taken up by it, the body preserves an equilibrium, whereas that of the herring dips at the head; the scales of the *pilchard* adhere very closely, whereas those of the herring very easily drop off. Pennant.

It is generally found swimming in vast shoals, and is caught on many parts of the English coasts. Its flesh is better tasted than that of the herring. See *Pilchard* FISHERY.

PILE, in *Antiquity*, a pyramid built of wood, wherein were laid the bodies of the deceased, to be burnt.

PILE is also used in building, for a great stake rammed into the earth, for a FOUNDATION to build upon in marshy ground.

Amsterdam, and some other cities, are wholly built upon *piles*. The stoppage of Dagenham-breach is effected by dove-tail *piles* that is by *piles* mortised into one another, by a dove-tail-joint.

To estimate the force of the rammer made use of to drive *piles*, its weight ought to be multiplied into the velocity it acquires in falling. Thus, if a rammer which weighs 500lb. be let fall from four feet, it will fall that height in half a second, and have at the time of percussion a velocity capable to carry it uniformly eight feet in half a second, without any further help from gravity; so that we must multiply 500 by 8, or its weight by the number of feet it would fall in a second, and the product 8000 gives the momentum of the stroke. If a capstan, pullies, or windlass be made to raise the rammer to a considerable height, and then by an easy contrivance loosen it at once from its hook, the momentum of the stroke will always be as the square root of the height from which the rammer fell.

But it is to be observed, that the effect of the blow of the rammer will be as the square of its velocity; that is, as the height from whence it falls, and not as the square root of that height. Thus if the blow of the rammer drive the *pile* six feet deep, a blow given with twice the velocity, will, *ceteris paribus*, drive it twenty-four feet deep. This follows from the nature of the force of bodies in motion. See FORCE, Dcfag. Exp. Phil. vol. I. p. 330, &c.

We have the figure and description of a new machine for driving *piles*, invented by Mr. Valour, in Desaguliers Experim. Philosoph. vol. II. p. 417, 3d. and in Ferguson's Lectures, p. 61, quarto.

As this is the most complete engine of this kind that has yet been constructed, though others have been described by Leopold, Desaguliers, and Belidor, the following account, illustrated by a figure, may be agreeable: A (*Plate VI. Mechanics, fig. 9.*) is the great upright shaft or axle, on which are the great wheel B and drum C, turned by horses joined to the bars S, S. The wheel B turns the trundle X, on the top of whose axis is the fly O, which serves to regulate the motion, and to act against the horses, and keep them from falling when the heavy ram Q is discharged to drive the *pile* P down into the mud in the bottom of the river. The drum C is loose upon the shaft A, but is locked to the wheel B by the bolt Y. On this drum the great *rope* HH is wound; one end of the rope being fixed to the drum, and the other to the follower G, to which it is conveyed over the pulleys I and K. In the follower G is contained the tongs F that take hold of the ram Q, by the staple R for drawing it up. D is a spiral or lance fixed to the drum, on which is wound the small rope T that goes over the pulley U, under the pulley V, and is fastened to the top of the frame W. To the pulley-block V is hung the counterpoise W, which hinders the follower from accelerating as it goes down to take hold of the ram: for, as the follower tends to acquire velocity in its descent, the line T winds downwards upon the spiral, on a larger and larger radius, by which means the counterpoise W acts stronger and stronger against it, and so allows it to come down with only a moderate and uniform velocity. The bolt Y locks the drum to the great wheel, being pulled upward by the lever Z, which goes through a mortise in the shaft A, as at *a*, and is fixed in the bar 3 fixed into the great wheel B, and has a weight 4, which always tends to push up the bolt Y through the wheel into the drum. L is the great lever turning on the axis *m*, and resting upon the forcing bar 5, 5, which goes down through a hollow in the shaft and bears upon the little lever 2.

By the horses going round, the great rope H is wound about the drum C, and the ram Q is drawn up by the tongs F in the follower G, until the tongs come between the inclined planes E, which, by shutting the tongs at the top, open it at the foot, and disengage the ram, which falls down between the guides 6, 6 upon the *pile* P, and drives it by a few strokes as far into the mud as it can go; after which the top part is sawed off close to the mud, by an engine for that purpose. Immediately after the ram is discharged, the piece *o* upon the follower G takes hold of the ropes *n*, *n*, which raise the end of the lever L, and cause its end N to descend and push down the forcing bar 5 upon the little lever 2, which, by pulling down the bolt Y, unlocks the drum C from the great wheel B; and then the follower, being at liberty, comes down by its own weight to the ram; and the lower ends of the tongs flip over the staple R, and the weight of their heads causes them to fall outward, and then upon it. Then the weight 4 pushes up the bolt Y into the drum, which locks it to the great wheel, and so the ram is drawn up as before.

As the follower comes down, it causes the drum to turn backward, and unwinds the rope from it, whilst the horses, great wheel, trundle, and fly, go on with an uninterrupted motion: and as the drum is turning backward, the counterpoise W is drawn up, and its rope T wound upon the spiral furse D.

There are several holes in the under side of the drum, and the bolt Y always takes the first one that it finds when the drum stops by the falling of the follower upon the ram; until which stoppage, the bolt has not time to slip into any of the holes.

The peculiar advantages of this engine are, that the weight, called the ram, may be raised with the least force; that, when it is raised to a proper height, it readily disengages itself and falls with the utmost freedom; that the forceps or tongs are lowered down speedily, and instantly, of themselves, again lay hold of the ram, and lift it up; on which account this machine will drive the greatest number of *piles*, in the least time, and with the fewest labourers.

The theory of this engine depends on the following principles: viz. 1. If the resistance of the ground, and the masses of the *piles* be equal, the depths to which they will be driven with a single blow will be as the product of the weight of the ram into the height through which it falls.

2. If the masses of the ram, and heights through which it falls are both equal, the depths to which the *piles* will be driven, will be in the inverse ratios of the masses of the *piles* into the superficies of that part of them which is already immersed in the earth.

3. If all these things be unequal, the depths will be in a ratio compounded of the direct ratio of the heights through which the ram falls into its mass, and the inverse ratio of the mass of the *pile* into its immersed superficies.

4. If the weights of the ram be equal, and also the weights of the *piles*, the depths to which they will be driven will be as the heights through which the ram falls directly, and the immersed superficies of the *piles*. Or, because the immersed superficies of the *piles* are as the depths through which they are already driven into the earth, these depths are simply as the square roots of the heights through which the ram falls.

These principles are founded on the general supposition that the space through which the weight falls is eliminated by the product of its mass into the square of its velocity, or into the height through which it falls.

Hence it is inferred, that the distance through which a *pile* will be driven by each succeeding blow will be less and less, as the superficies of that part of the *pile* which is immersed in the ground increases; and, consequently that there is a certain depth, beyond which a *pile* of a given mass and figure cannot be driven; the mass of the ram and the height through which it falls at first being assigned. It appears also, that the loading the *pile* with weights, and thereby increasing its mass, will be so far from accelerating its descent, that it will absolutely retard it. See some curious observations on the structure and operation of this engine by Mr. Bugge, professor of astronomy and mathematics in the academy of Copenhagen, &c. in the Phil. Trans. for 1758, vol. lvii. part i. art. 12.

PILE is also used, among *Architects*, for a massive body of building.

PILE, in *Artillery*, denotes a collection or heap of shot or shells which are usually piled up by horizontal courses into a pyramidal form, the base being either an equilateral triangle, a square, or a rectangle. In the triangle and square, the *pile* terminates in a single ball; but in a rectangle, in a single row of balls. In the triangle and square *piles*, the number of horizontal rows, or the number counted on one of the angles from the bottom to the top, is always equal to the number counted on one side, in the bottom

bottom row. In triangular *piles*, each horizontal course is a triangular number, produced by taking the successive sums of the numbers 1 and 2; 1, 2, and 3; 1, 2, 3, and 4; *&c.* And the number of shot in a triangular *pile* is the sum of all the triangular numbers taken as far, or to as many terms, as the number in one side of the bottom course. In order to obtain the number in a triangular *pile*, count the number in the bottom row, and multiply that number more two by that number more one; and the product multiplied by one-fifth of the said number will be the whole sum required.

In square *piles*, each horizontal course is a square number, produced by taking the square of the number in its side: and the number of shot in a square *pile* is the sum of all the squares, taken from one as far as the number in the sides of the bottom course. To find the number, count the number in one side of the bottom course; to that number add one, and to its double add one; multiply the two sums together, then their product being multiplied by one-fifth of the said number will give the required number of shot in the *pile*.

From the examplification of these rules, it would appear, that when room is wanted, it is most convenient to stow the shot in triangular *piles*; for on the equilateral triangle, which is less than half the area of a square of one of its sides, there can be piled a greater number than half of those that can be raised on the square: and the height of a square *pile* is somewhat less than that of a triangular one; because a shot will sink lower in the space between four others, than between three others, when they are of equal diameter.

In rectangular *piles*, each horizontal course is a rectangle, the upper one being one row of balls: and every such oblong *pile* may be considered as consisting of two parts, one a square pyramid, and the other a triangular prism. To find the number of shot in a rectangular *pile*, take the difference between the number in length and breadth, in the bottom course; multiply the number in breadth, more one, by half the breadth; the product multiplied by the said difference will give the number in the prismatic *pile*: upon the square of the breadth, find the number in a pyramidal *pile*; and the sum of these two *piles* will give the number required. See CALIBER, and *Tab. Gunnery, fig.* 8.

PILE, PILL, in *Coinage*, denotes a kind of puncheon, which, in the old way of coining, with the hammer, contained the arms, cross, or other figure and inscription, to be struck for the reverse of the species.

Accordingly, we still call the arms-side of a piece of money the *pile*, and the head the *cross*; because, in the ancient money, a cross usually took the place of the head in our's.

Hence also the game of *cross* and *pile*.

Some will have it called *pile*, *pila*, because on this side, in our ancient coins, there was an impression of a church built on *piles*. Scaliger, with more probability, derives it from the old French word *pile*, a *ship*. Vide prima Scaligerana, in voc. Nummus Flaticus, p. 115.

In some ancient writings *pile* is used to signify the particular figure, or impression of money. Thus Fleta: he who brings an appeal of robbery, or theft, against another, shall throw the certain quantity, quality, price, weight, number, measures, value, and *pile*.

PILE, in *Heraldry*, is an ordinary, in form of a point inverted, or a flake sharpened; contracting from the chief, and terminating in a point towards the bottom of the shield; somewhat in manner of a wedge. See *Tab.* II. *Herald. fig.* 80.

It is formed, probably, in imitation of the Roman pilum, which was a tapering dart, about five feet long, and sharpened at the point with steel.

The *pile* is borne inverted, engrailed, *&c.* like other ordinaries; and thus indifferently from any point of the verge of the escutcheon. He beareth a *pile gules*, by the name of Chandos.

PILES, in *Medicine*, a disease by physicians called HEMORRHOIDS.

PILES, *Instrument for the*. See LENTIGENT.

PILE-*worms*, are a kind of *worms* found in the *piles* of the sea-banks in Holland. These worms are of various sizes; some of the young ones are not above an inch or two in length; but others have been found thirteen or fourteen inches long.

The heads of these creatures were covered with two hard shells or *hemicranias*, which together form a figure resembling an augre; and with which they bore the wood. The best remedy against them is, to perforate the *pile* with many small holes, about an inch asunder; then it must be done over with a varnish in the hottest sun; and while the varnish is hot, brickdust must be strewed over it; and this being several times repeated, the *pile* will be covered with a strong crust, impenetrable to all insects.

See a further account of these creatures in Phil. Trans. N° 455. sect. 5.

PILE-*wort*, in *Botany*. See RANUNCULUS.

PILEÆ, a name given by some authors to a genus of *mushrooms*. See CONCHA.

PILENTUM, among the Romans, an easy kind of chariot, used by the Roman ladies at games and religious processions.

PILETUS, in our *Ancient Forest Laws*, an arrow which had a round knob a little above the head, to hinder it from going far into the mark.

From the Latin *pila*, which signifies any round thing like a ball. *Et quod foresters sic sua non perimbant sagittas barbatas, sed* piletas. Charta Rogeri de Quincy.

PILEUS, in *Roman Antiquity*, was the ordinary cap or hat worn at public shews and sacrifices, and by the freed-men. It was one of the common rewards assigned to such gladiators as were slaves, in token of their obtaining their freedom. See RUDIS.

PILEUS *prefixtel*, in *Botany*, a name given by some writers to the *euonymus* or *fusanus*, a shrub which grows in our hedges, and bears a square fruit somewhat resembling the cap worn by some orders of priests.

PILGRIM, one who travels through foreign countries to visit holy places, and to pay his devotion to the relicks of dead saints.

The word is formed from the Flemish *pelgrim*, or Italian *pelegrino*, which signifies the same; and these originally from the Latin *peregrinus*, *a stranger*, or *traveller*.

The humour of going on pilgrimage anciently prevailed exceedingly; particularly about the time of the croisades. *Pilgrimages* were most in vogue after the end of the eleventh century, when every one was for visiting places of devotion, not excepting kings and princes themselves; and even bishops made no difficulty of being absent from their churches on the same account. The places most visited were Jerusalem, Rome, Compostella, and Tours; but the greatest numbers now resort to Loretto, in order to visit the chamber of the blessed Virgin, in which she was born, and brought up her son Jesus, till he was twelve years of age.

This chamber, it is pretended, was carried by angels into Dalmatia, about the year 1291, and afterwards in the same manner transported to Loretto, where a magnificent cathedral is built over it. In this chamber is the image of the blessed Virgin, almost covered with pearls and diamonds, and round the statue there is a kind of rainbow, formed of precious stones of various colours. Five hundred thousand *pilgrims* have sometimes resorted to this house in one year, in order to pay their devotions before this glorious image.

Several of the principal orders of knighthood were established in favour of *pilgrims* going to the Holy Land, to secure them from the violences and insults of the Saracens and Arabs, *&c.*

Such were the orders of the knights Templars, the knights Hospitalers, knights of Malta, *&c.*

The MAHOMETANS are commanded in the Koran to perform a *pilgrimage* to Mecca; this is one of the capital points of their religion, and therefore a prodigious cavalcade of *pilgrims* annually go thither, in the company of those who are sent with the grand seignor's presents to the tomb of Mahomet.

PILIANNAW, a name given by the Indians to a bird found in the forests on the back of some of our American plantations.

It is a bird of prey, very large and bold; it is described by Josselin as four times as big as our goshawk, and having a remarkable large head. All the birds are terrified at its approach; but it principally feeds on quadrupeds, as young fawns, and the like.

PILIMICHIO, a word used by several authors to express a discharge of small and long filaments, which resemble hairs among the urine.

PILING. See PALLIFICATION.

PILL, *pilula*, in *Pharmacy*, a form of medicine, taken dry, resembling a little ball; invented in favour of [illegible] as cannot well take ill-tasted medicines [illegible] to keep in readiness for [illegible]. No medicine, that is intended [illegible] to be made into *pills*, as the [illegible] time in the Stomach before [illegible] produce any effect.

Pills are of various kinds, [illegible] carminative, purgative, hysteric, antiscorbutic, [illegible] but they principally cathartic.

The bases of cathartic *pills* [illegible] are mixed again, turbith, [illegible] hiera, [illegible] hiera picra, [illegible] turbith, [illegible] colocynth. See EXTRACT, [illegible]

Pills are usually wrapped up [illegible] powder, [illegible] the like, to prevent their ill taste [illegible]

PILLS, *antiseptic*, are directed by [illegible] Edinburgh

to be made of three parts of quicksilver, two parts of golden sulphur of antimony, and two of resin of guaiacum, with the addition of two of white soap to promote their dissolution in the stomach, and as much common syrup as will reduce them into a mass of due consistence. If a dram of this mass is made into twenty *pills*, the dose may be increased from one to six or more, according to the operation.

PILLS, *aromatic*, *pilulæ aromaticæ*, a form of medicine in the New London Dispensatory, intended to stand in the place of the *pilulæ diambræ* of the former, and the *pilulæ alephangiuæ*, or *alephangiuæ*, of that, and some other dispensatories.

The composition is this: take Socotrine aloes, an ounce and half; gum guaiacum, an ounce; the aromatic species and balsam of Peru, of each half an ounce; let the aloes and gum guaiacum be powdered separately, and afterwards mixed with the resin, and formed into a mass with syrup of orange-peel.

PILLS, *asses*, a sort of *pills* good against coughs, so called from the Greek, ἄσσα, *cough*. They are also called *hypoglottides*, because left like lozenges to dissolve under the tongue.

PILLS *of colocynth with aloes*, *pilulæ e colocynthide cum aloe*, a name given in the New London Pharmacopœia, to the purging-*pill*, commonly known by the name of *pilulæ cochiæ minores*.

As this is originally a prescription of Galen, and the manner of proportioning the ingredients has been altered for the worse, since his time, by enlarging the quantity of that nauseous ingredient the *colocynth*; the college have reduced it to its former proportions, and ordered it to be made in this manner: take Socotrine aloes and scammony, of each two ounces; pith of coloquintida, one ounce; oil of cloves, two drams; let the dry species be reduced to powder separately, the oil mixed among them, and the whole formed into a mass, with syrup of buckthorn.

PILULÆ *e colocynthide simplicieres*, a name given in the late London Pharmacopœia, to the purging-*pill* commonly known by the name of *pil. in duobus*. It is made of equal parts of colocynth and scammony, with a considerable proportion of oil of cloves; and is beat up to a consistence with syrup of buckthorn.

PILLS, *cumphine*, are made by beating together ten grains of purified OPIUM and half a dram of Castile soap: the whole may be formed into twenty *pills*; and one, two, or three, may be taken, as occasion requires, when a quieting draught will not sit upon the stomach.

PILLS, *fœtid*, are prepared by mixing half an ounce of ASSA FOETIDA with any simple syrup. In hysteric complaints, four or five *pills* of an ordinary size may be taken twice or thrice a day. They will also be of service to persons afflicted with the asthma; and they may be made opening, if necessary, by adding a proper quantity of rhubarb, aloes, or jalap, to the above mass.

PILLS *of gamboge*. See GAMBOGE.

PILLS, *hemlock*, are made by taking any quantity of the extract of HEMLOCK, and adding to it about a fifth part its weight of the powder of the dried leaves, and forming it into *pills*.

PILLS *for the jaundice* are prepared by taking of Castile soap, Socotrine aloes, and rhubarb, of each one dram, and making them into *pills*, with a sufficient quantity of syrup or mucilage. See JAUNDICE.

PILLS, *mercurial*, *pilulæ mercuriales*, a form of medicine prescribed in the late London Pharmacopœia, and containing crude mercury mixed for internal use.

The composition is to be made as follows: take of pure quicksilver, two drams; of Strasburg turpentine, two drams; of the cathartic extract, four scruples; rhubarb in powder, one dram; grind the quicksilver with the turpentine till it makes one uniform mass, and then add the other ingredients, and beat up the whole into *pills*. If the turpentine be too hard, it must be softened with a little oil of olives.

The mercurial *pills* may also be prepared by grinding half a dram of quicksilver, with equal its weight of resin of guaiacum, the same quantity of white soap, and a little common syrup or mucilage of gum arabic, which is to be added after the quicksilver is united with the others. In order to render the mercurial *pills* purgative, let the same quantity of mercury be first ground with half its weight of resin of guaiacum, and then with the same quantity of rhubarb and extract of black hellebore.

Mercurial *pills* may likewise be made, by rubbing together [illegible] purified mercury and honey, of each half an ounce, in a mortar, till the globules of mercury are perfectly extinguished; and adding two drams of Castile soap, and a sufficient quantity of powdered liquorice or crumbs of bread to give the mass a proper consistence. Equal parts of this mass, and powdered rhubarb formed into a mass with syrup, will make mercurial purging *pills*.

Mercurial sublimate pills are made by dissolving fifteen grains of the corrosive sublimate of mercury in two drams of the saturated solution of crude sal ammoniac, and making this into a paste, in a glass mortar, with crumb of bread. This mass must be formed into one hundred and twenty *pills*. These *pills* have been found effectual, not only in curing the venereal disease, but also in killing and expelling worms, after other powerful medicines had failed. For the venereal disease, four of these pills may be taken twice a day, as an alterant three, and for worms two.

PILLS, *Misaubin's*. See *Calomel* MERCURY.

PILLS, *perpetual*, *pilulæ perpetuæ*, are regulas of antimony made up in *pills*; thus called, because being swallowed and voided fifty times, they will purge every time with undiminished force.

PILLS, *Plummer's*. See PLUMMER'S *Pills*.

PILLS, *purging*. See PILLS *of Colocynth*, &c. *supra*.

Purging *pills* may be made of Socotrine aloes and Castile soap, of each two drams, and a sufficient quantity of simple syrup. Four or five of these will generally prove a sufficient purge. For keeping the body open, one may be taken night and morning. They are reckoned both deobstruent and stomachic, and will be found to answer all the purposes of Dr. Anderton's *pills*, the principal ingredient of which is aloes. When aloetic purges are improper, let *pills* be formed of extract of jalap, and vitriolated tartar, of each two drams, and a sufficient quantity of syrup of ginger; which may be taken as the above.

PILL, *Radius's*. See EXTRACTUM *Catharticum*.

PILLS, *soap*, *pilulæ saponatæ*, a form of medicine prescribed in the late London Dispensatory, and ordered to be made in the following manner: take almond *soap*, four ounces; strained opium, half an ounce; essence of lemons, a dram; soften the opium a little with wine, and beat that and the *soap* with the essence, till it be reduced to the form of a *pill*. See OPIUM.

This is intended to supply the place of the *pill*, commonly called *Matthew's pill*, and is very happily corrected in regard to the taste of the *soap*, by the addition of the essence of lemons.

PILLS, *squill*, are formed of a dram and a half of powder of dried squills; gum ammoniac, and cardamom seeds in powder, of each three drams, and simple syrup. In dropsical and asthmatic complaints, two or three of these *pills* may be taken twice a day.

PILLS, *stomachic*, are made of extract of gentian, two drams; powdered rhubarb and vitriolated tartar, of each one dram; oil of mint, thirty drops; and a sufficient quantity of simple syrup. Three or four of these may be taken twice a day, for invigorating the stomach, and keeping the body gently open.

PILLS *of storax*, are formed of fifteen parts of styraxed storax, eight of saffron, and two of strained opium.

PILLS, *strengthening*, are made of soft extract of the bark and salt of steel, of each half an ounce. In disorders arising from excessive debility or relaxation of the solids, as the *chlorosis* or green sickness, two of these *pills* may be taken three times a day.

PILL, *Ward's*. See WARD's *pills*.

PILLAGE, among *Builders*, is sometimes used for a square pillar, standing behind a column to bear up the arches; having a round base and capital, as a pillar has.

PILLAR, in *Architecture*, a kind of irregular column, round and insulate; but deviating from the proportions of a just column.

Pillars are always either too massive, or too slender, for a regular architecture. In effect, *pillars* are not restrained to any rules: their parts and proportions are arbitrary.

Such, e. gr. are the *pillars* which support Saracenic vaults, and other buildings, &c.

A square *pillar* is a massive work, called also PIER, or *pilaster*; serving to support arches. See *Butting-pillar* is a buttment, or body of masonry, raised to prop, or sustain, the thrust of a vault, arch, or other work. See BUTTRESS.

It seems not impossible for stone to be cast into the shape of *pillars*. We find mention made in the Philosophical Transactions, of two *pillars* of stone, at Fontesraud, in France, each about sixty feet high, all of one solid piece, which are said to have been run. N° 481, p. 328, in Not. *Pillars* of stone were anciently erected as sepulchral monuments, near the highways; and also in memory of some victory. We find traces of this custom in Cornwall and Wales, where these *pillars* are often found, and called *meinegwair*, a stone for play, perhaps in memory of funeral games; and sometimes *lech*, that is *tabula lusoria*. Phil. Trans. N° 450. p. 471.

Pompey's pillar is a famous monument of antiquity, constructed of red granite, and situated on a rock, about a mile without the walls of Alexandria, in Egypt. By the measuration of Edward Wortley Montagu, esq. the capital of the *pillar* is nine feet seven inches, the shaft five feet 11 inch, the base five feet nine 1 inches, the pedestal ten feet five 1 inches, the height from the ground ninety-two feet, though Dr. Pococke, by the shadow, determined the whole height to be one hundred and fourteen feet; and its diameter nine feet and an inch. This prodigious mass stands, as on a pivot, on a receptacle of rubble; and was erected, as many have supposed, either by Pompey, or to his honour. But as no mention is made of it by Strabo, or any other ancient writers, Mr. Montagu concludes that it was not known before the time of Vespasian; and that it was erected to his honour. In proof of this opinion, he found within the circumference of the *pillar* a medal of Vespasian in fine order. See Pococke's Descr. of the East, vol. i. p. 8. and Philos. Trans. vol. lvii. art. 42.

PILLAR, in the *Manage*, signifies the centre of the volta, ring, or manege-ground, round which a horse turns, whether there be a wooden *pillar* therein, or not.

There are also *pillars* in manages on the circumference, or side, placed at certain distances, by two and two. To distinguish these from that of the centre, they are called the *two pillars*. When these latter are spoken of, it is usual to say, *to set the horse between the two pillars*. When the former, it is called, *Working round the pillar*.

The use of the *pillar* in the centre is for regulating the extent of the ground, that the manege upon the volts may be performed with method and fullness, and that they may work in a square, by rule and measure, upon the four lines of the volts; and also to break unruly high-mettled horses, without endangering the rider.

The *two pillars* are placed at the distance of two or three paces one from the other. The horse is put between these, to teach him to rise before, and work out behind, and put himself upon raised airs, &c. either by the aids, or chastisement.

It has been supposed, that the hint of using *pillars* in the manege was taken from a contrivance of Eumenes; who, as Plutarch relates it, being besieged at the fort of Nora, by Antigonus, and fearing lest his horses should suffer for want of action, contrived a method of working them, without removing them from their stalls. For this purpose he placed a pulley over their heads in the beams of the stables, with which, by means of running reins, he pulled up their fore-parts, causing at the same time people to stand behind them, who, urging and lashing them with whips, put them into motion, made them yerk out behind, raising and moving their fore-legs, and work and chafe themselves till they sweat copiously; by these means he preserved their health, kept them in wind, and ready for service. The single *pillars*, once so frequent in manages, but now laid aside, was first used in Naples, and owes its origin to the want of covered buildings for riding and breaking horses: in lieu of which they dug trenches, for working their horses; the sides of the trenches supplying the want of walls, and producing in a certain degree the same effect. The famous Pignatelli, of Naples, having no covered manege, worked his horses in the open air, and used to tie them to a tree and work them round it. Pluvinel, of France, was one of his scholars; and returning to France, where he professed horsemanship, he placed a post or *pillar* in his manege, in imitation of Pignatelli's tree, and made the same use of it as to that he soon added another of the same size and height; which two *pillars* were calculated to answer purposes different from those for which the single *pillar* had been erected: the two *pillars* are still in use, and reckoned an essential piece of furniture in all riding-houses.

The single *pillar* has been long discontinued, but may be employed to advantage upon certain occasions; especially where a horseman undertakes to *train* a horse, without the assistance of another person. It should be observed that no horse ought to be put between the two *pillars* till he is well supple, and has acquired the first principles of the union between the legs, which are the natural *pillars* that every horseman should employ. The horse should be gently worked at first, that he may not become furious, and he should be made to go only from side to side by means of the bridle, or from fear of the chambrette. In a few days, when he is accustomed to the subjection of the *pillars*, try to make him insensibly go into the croupade, and endeavour to get from him a step or two at first, and in time of the *pesade* or *passade*.

The worst effect of the *pillars* is the hazard you run of entirely ruining the backs of your horse, if you do not adjust his ears exactly between their parts and the haunches. Boyer's Hist. and Art of Horsemanship, vol. ii. p. 60, and 164, &c.

PILLARS, *rules of*. See RULE.

PILLE *of Feathers*, or PILE *Feathers*, in the county of Lancaster, a defence built on a creek of the sea, called *Pille*, by the whole of the county, for a *pile*, or fort, built for the safeguard or protection of any place.

This *pille* was erected there by the abbot of Fountenille, in the 33d year of *Edward* III. Camd. Brit. *Ex—dominus Henricus comitis Northumbriæ inquisitus, super pelam, & dominium de Man, &c.* Rot. Pat. 1 Hen. IV.

PILLORY was anciently a post erected in a cross road, by the lord, as a mark of his supremacy, with his arms on it, and sometimes with a collar to tie criminals to.

PILLORY, at present, is a wooden machine, wherein certain criminals, as perjurers, &c. are fastened, and exposed to the public derision.

With us it is in the form of a frame erected on a pillar, and made with holes and folding boards, through which the heads and hands of criminals are put.

The etymology of this word has been variously assigned by different writers: Spelman derives it from the French *pilorin*, *speculator*; Cowel from *pyx*, *janua*, and *ium*, *calx*; but the etymology of Du-Cange is the most probable, who derives it from *pila*, a *pillar*.

In the laws of Canute it is called *croftbrug*. Sir Henry Spelman says, it is *supplicii genus ad ludibrium, nostris quam parum*. It was peculiarly intended for the punishment of bakers who should be caught guilty in the weight, or fineness of their bread. In old charters it is called *collistrigium*.

The *pillory* in Paris is in the middle of a round tower, with openings on every side. It is ascended on an axis, or arbour; round which the executioner gives the criminal the number of turns appointed in court; stopping him at each opening, to shew him to the people. It was intended for several kinds of criminals, particularly for fraudulent bankrupts; and all those who made a cession, or surrender, of their effects to their creditors, were obliged to take some turns round the *pillory* on foot, with a green cap on.

PILLOW *of a plough*, a term used by the farmers to express that part of a *plough* which serves to raise or sink the coulter, and with it the share, in the land is to be *ploughed* shallower or deeper.

This *pillow* is a cross piece of wood, reaching from one of the cross-pieces, or uprights, to the other; and as they are bored with two rows of holes, this *pillow* can be flipped up or down to any height, and kept there by pegs or cords in the holes. See PLOUGH.

PILLOW, in a *ship*, is that piece of timber whereon the bow-sprit rests at its coming out of the hull aloft, close by the fore.

PILLVENKEGEN, in *Ornithology*, the name of a bird approaching to the snipe kind: described by Aldrovand, and supposed by some to be the bird we call the KNOT.

PILOSE *leaf*, among *botanists*. See LEAF.

PILOSELLA, in *Botany*, *creeping mouse-ear*. See HAWKWEED.

PILOT, the person who superintends the navigation of a ship, either upon the sea-coast, or on the main ocean; but it is more particularly applied to a person retained on board a ship to conduct it into a road, or harbour, or over bars or sands; or through serpentine and intricate channels, or the like.

Menage derives the word *pilot* from *πηδὸν* i. q. *οἰακὸν*, he who governs the prow, or head. Others fetch it from the old French *pile*, a *ship*.

Pilots are no constant and standing officers on board our vessels; but are mostly called in occasionally, on coasts and shores unknown to the master. And, having done their parts in piloting the vessel, they return to shore, where they reside.

The regulations, with regard to *pilots* in the royal navy, are as follow: the commanders of the king's ships, in order to give all reasonable encouragement to so useful a body of men as *pilots*, and to remove all their objections to his majesty's service, are strictly charged to treat them with good usage, and in equal respect with warrant-officers.

The purser of the ship is always to have a set of bedding provided on board for the *pilots*, and the captain is to order the boatswain to supply th[illegible] convenient place to lie in near [illegible] the common men; which bedd[illegible] be returned when the *pilots* le[illegible]

A *pilot*, when conducting [illegible] *pilot*-water, shall have the [illegible] the ship, and may give orders [illegible] ming, or furling the sails, [illegible] concerns the navigation; and [illegible] that all the officers and crew [illegible] captain is diligently to obey [illegible] and if he judges him to be [illegible]

into danger, he may remove him from the command and charge of the ship, and take such methods for her preservation as shall be judged necessary; notwithstanding the log-book the exact hour and time when the *pilot* was removed from his office, and the reasons assigned for it.

Captains of the king's ships, employing *pilots* in foreign parts of his majesty's dominions, shall, after performance of the service, give a certificate thereof to the *pilot*, which being produced to the proper naval officer, he shall cause the same to be immediately paid; but if there be no naval officer there, the captain of his majesty's ship shall pay him, and send the proper vouchers, with his bill, to the navy-board, in order to be paid as bills of exchange.

Captains of his majesty's ships, employing foreign *pilots*, to carry the ships they command into, or out of foreign ports, shall pay them the rates due by the establishment or custom of the country, before they discharge them; whose accounts being duly vouched, and sent with a certificate of the service performed, to the navy-board, they shall cause them to be paid with the same exactness as they do bills of exchange. Regulations and Instructions of the Sea Service, &c.

Pilots of ships taking upon them to conduct any ship from Dover, &c. to any place up the river Thames, are to be first examined and approved by the master and wardens of the Trinity-house, &c. or shall forfeit 20*l.* for the first offence, 40*l.* for the second, and 40*l.* for every other offence; one moiety to the informer, the other to the master and wardens; but any master or mate of a ship may *pilot* his own vessel up the river: and if any ship be lost through the negligence of any *pilot*, he shall be for ever afterwards disabled to act as a *pilot*. 3 Geo. I. cap. 13.

The lord wardens of the cinque-ports may also make rules for the government of *pilots*, and order a sufficient number to ply at sea to conduct ships up the Thames. 7 Geo. I. cap. 21.

No person shall act as a *pilot* on the Thames, &c. (except in collier ships) without licence from the master and wardens of Trinity-house, at Deptford, on pain of forfeiting 20*l.* *Pilots* are to be subject to the government of that corporation, and pay ancient dues not exceeding 1*l.* in the pound out of wages for the use of the poor thereof. 5 Geo. II. cap. 20. In charter parties of affreightment, the master generally covenants to find a *pilot*, and the merchant to pay him: and in case the ship shall miscarry through the insufficiency of the *pilot*, the merchant may charge either the master or the *pilot*; and if he charges the master, such master must have his remedy against the *pilot*. Lex Mercatoria, 360.

Among the French *pilots* also used for afterermost, or an officer on board a ship, who always watches her course, and directs it.

There are among the French two kinds of *pilots*; the one a coasting *pilot*, well acquainted with the coasts, ports, roads, bars, sands, &c. and who commands in sight thereof.

The other an officer who makes observations, and takes altitudes out at sea; uses the quadrant and fore-staff; and also watches the compass.

The *pilot* is always the second person in the ship, whether it be a man of war, or merchant-man. In the former the captain is the first, the *pilot* the second. In a merchant-ship, the master is the first, the *pilot* after him.

The *pilot* is also the steersman, who stands at the helm, and manages the rudder.

PILOTING, in *Navigation*, is either common or proper: common *piloting* is that art which consists in coasting along shore, or sailing within sight of land. Proper *piloting* is the art of sailing to distant places through the ocean, and out of sight of land. See Navigation, Pilot, and Sailing.

PIMENTA, *pepper-tree*, in *Botany*, the name of a very remarkable little plant, of which Mr. Bernard de Jussieu has given a very accurate account in the Memoirs of the Academy of Sciences of Paris, 1739. See *Tab.* XV. *Botany*, N° 121.

This is a genus of plants in the *icosandria* class of ferns in the Linnæan system: the characters of which are, that the male flowers are numerous, and stand on the sides of the leaves; and the female part of the fructification has no cup or petals, but consists of a round quadricapsular fruit, which contains a vast number of roundish seeds.

PILUM, in *Roman Antiquity*, a missive weapon, which in charging they darted against the enemy. It was commonly a four-square, sometimes round, compounded of a piece of wood three cubits long, and a flip of iron of the same length, looked and jagged at the end.

PILY *stone*; see Early *Tide*.

PIMENTO, in *Botany*, all *spices*, or *Jamaica* Pepper. Miller ranks these species under the genus of *caryophyllus*, or clove-*tree*; but Linnæus makes it a species of the *myrtus* or myrtle.

It grows on the hilly parts of Jamaica, and is much cultivated there; because of the great profit from the cured fruit sent in great quantities yearly into Europe.

It flowers in June, July, and August, sooner or later, according to its situation and the different scasons for rain; and after it flowers, the fruit soon ripens.

There is little difficulty in curing and preserving this fruit for use, which is done thus: the Negroes climb the trees and pull off the twigs with the unripe green fruit, and afterwards carefully separate the fruit from the twigs, leaves, and ripe berries; which done, they expose them to the sun from its rising to setting, for many days, spreading them thin on cloths, turning them now and then, and carefully avoiding the dews. By this management they become a little rugose or wrinkled, dry, and from a green change to a brown colour, and then they are fit for the market.

The ripe berries are very carefully separated from those to be cured; because their wet and plentious pulp renders them unfit for cure. See *Jamaica* Pepper.

It is accounted the best and most temperate, mild, and innocent, of common spices, and fit to come into greater use, and to gain more ground than it hath yet done. It surpasses most of the East Indian aromatics in promoting the digestion of meat, attenuating tough humours, moderately heating, strengthening the stomach, expelling wind, and doing those friendly offices to the bowels we generally expect from spices. Phil. Trans. N° 192.

Distilled with water, it yields an elegant essential oil, so ponderous as to sink in water, in taste moderately pungent, in smell and flavour approaching to oil of cloves, or a mixture of those of cloves and nutmegs: the remaining decoction, infusitated, leaves an extract somewhat ungrateful but not pungent. Rectified spirit is impure, by maceration or digestion, the whole of its virtue, together with a brownish-green tincture. The college of London directs a simple water to be distilled from this spice, in the proportion of a gallon from half a pound; and a spirituous water, by drawing off two or three gallons of proof spirit from the same quantity of the spice. Lewis.

PIMP-*tenure*, a kind of *tenure* mentioned in our old writers. *Willielmus Heppestort, tenet dimidiam virgatam terræ, per servitium custodiendi fen damoiselles fcil. meretrices, ad usum omnium Regis.* 12 Ed. I.

PIMPERNEL, *anagallis*, in *Botany*, a genus of the *pentandria monogynia* class. Its characters are these: the flower hath an empalement, which is cut into five sharp segments; the flower is of one leaf, spread open, and cut into five parts; the germen afterwards becomes a globular vessel with one cell, opening horizontally, in which are lodged several angular seeds. There are four species.

Pimpernel, is a plant moderately warm and dry, with a little stypticity; and is therefore accounted by some a good vulnerary. The juice being given inwardly by itself, or mixed with cow's milk, is useful in consumptions, and distempers of the lungs; it is often put in cordial waters as an alexipharmic, and is good against malignant distempers. It has been recommended by some writers of note as of singular advantage in maniacal cases, and in delirious fevers. James.

Lewis observes, that the leaves of the *pimpernel* are not wholly destitute of medicinal powers, for the expressed juice, on being depurated by settling, and then inspissated to the consistence of an extract, affects the organs of taste with a pungent saline austerity: so that they have some claim to the resolvent and detergent virtues ascribed to them by some writers; though neither a decoction nor tincture of them, nor their juice in its dilute state, and much less their distilled water, can exert those virtues in any considerable degree.

Pimpernel, *water*, a species of *veronica*, or speedwell. See Brook-lime.

Pimpernel, *round-leaved water*. See Samolus.

Pimpernel, *yellow, of the woods*. See Loose-strife.

PIMPILIM, in *Botany*, a name by which some authors have called the plant which produces the long pepper, used in medicine.

PIMPILLO, in *Botany*. See *Prickly* Pear.

PIMPINELLA. See *Burnet* Saxifrage.

PIMPLE, in *Medicine*, a small pustule arising on the face. By mixing equal quantities of the juice of hare's-leek, *fennel water*, passed through paper, and of spirit of wine rectified by itself, a white coagulum of a very volatile nature is formed; which Dr. Borghart commends for curing *pimples* of the face; and says, that the thin liquor separated from it, with sugar-candy, is an excellent remedy for thick viscid phlegm in the mouth. Satyr. Silefiac. Spec. 4. Ob. 2.

PIN, in *Commerce*, a little necessary implement, chiefly used by the women in adjusting their dress.

The form and application of this little moveable need no description; but its consumption, and the number of hands it employs are too considerable to be passed by unnoticed.

Pins are now altogether made of brass-wire, blanched; formerly they likewise made them of iron-wire, which being blanched, like the others, passed for brass: but the ill effects of these *pins* has quite discarded their use. The French, however, could not be driven off from them without several arrets of parliament. By a sentence of the lieutenant de police, July 1673, the tenants of some millions of those *pins* was confirmed, and the *pins* condemned to be burnt by the common executioner.

The *pins* most esteemed in commerce are those of England; those of Bourbonnois are next; then those made at Rogle, Nangle, and some places in Normandy.

The perfection of *pins* consists in the fineness of the wire, and its blanching; in the heads being well turned, and the points filed.

The London pointing and blanching are in most repute; because our *pin*-makers in pointing use two steel mills, the fall of which forms the point, and the latter takes off all irregularities, and renders it smooth, and as it were polished; and, in blanching, use block tin, granulated; whereas in other parts they use a mixture of tin, lead, and quicksilver; which not only blanches worse than the former, but is also dangerous, on account of the ill quality of that mixture, which renders a puncture with a pin thus blanched very difficult to be cured.

The consumption of *pins*, and the number of artificers employed in the manufacture thereof, are incredible. In Paris alone there were anciently above one thousand people employed in it; at present there are none; yet there is every year sold above fifty-thousand crowns worth of the *pin-wire* to the *pin*-makers of the neighbouring places, all brought thither from Buckholm. In the little town of Rogle, in Normandy, there are computed at least five-hundred workmen employed in the *pin* manufacture; the whole town being peopled therewith.

Notwithstanding that there is scarce any commodity cheaper than *pins*, there is none that passes through more hands before they come to be sold. They reckon twenty-five workmen successively employed in each *pin*, between the drawing of the brass-wire, and the sticking of the *pin* in the paper.

Pins are distinguished by numeros; the smaller called from N° 3, 4, 5, thence to the 14th; whence they are only accounted by two to two, viz. N° 16, 18, and 20, which is the largest size.

Besides the white *pins*, there are also black ones made for mourning, from N° 4, to N° 16. These are usually of iron-wire.

Lastly, there are *pins* with double heads, of several numeros; used by the ladies to fix the buckles of their hair for the night, without danger of being disturbed by their pricking, &c.

The first mention of *pins* that occurs in the English statute-book is found in a statute of Richard III. in 1483, prohibiting foreign manufactures; and it appears from the manner in which *pins* are described in a statute of the 34th and 35th of Henry VIII. cap. 6. (A. D. 1543) and the labour and time which the manufacture of them would require, that they were a new invention in this country, and probably but lately brought from France. However, in about three years time they fell into the present ingenious and expeditious manner of making them. One of the articles of the statutes of the ancient *pin*-makers of Paris was, that no master should open more than one shop for the sale of his wares, except on new-year's day, and the eve thereof; this we mention in an age of luxury and profusion, to recollect the agreeable simplicity of our forefathers, who contented themselves with giving *pins* for new-year's gifts.

Hence the custom of still giving the name *pins*, or *pin-money*, to certain presents, which accompany the most considerable bargains; in which it is usual to give something towards the *pins* of the wife, or children, of the person with whom the bargain is struck.

PIN, *bird*. See HOOK.

PIN, *painting*. See PROTRACTING.

PIN-*money*, the name given to that allowance usually made by the husband to his wife, for her own spending.

All PINNERS *before*, a method of drinking anciently used among the Danes in England. The custom was, to fix a pin in the side of the wooden cup or wassail-bowl; which no wash guest was to drink below, upon penalty of forfeiting.

PIN *and web*, a horny induration of the membranes of the eye, not much unlike a cataract.

The *pin* and *web* is the same with what we otherwise call PANNUS, UNGUIS, STAPHYLOMA, &c.

PIN-*wheel of a clock*, the same with the striking-wheel. See WHEEL and CLOCK.

PINACOTHECA, among the *Ancients*, a place where pictures, statues, and other curiosities were kept.

PINACIA, Πινακια, among the Athenians, tablets of brass, whereon the names of all the persons in each tribe duly qualified, and willing to be judges or senators of the areopagus, being severally written, they were cast into a vessel provided on purpose, and into another vessel were cast the same number of beans, a hundred of which were white, and all the rest black; then the names of the candidates and the beans were drawn, one by one; and those whose names were drawn out together with the white beans, were received into the senate. See PROBULEUMA.

In Solon's time there were only four tribes, each of which elected a hundred senators; so that the areopagus consisted of four hundred members; but the number of tribes being afterwards increased, the number of senators was consequently augmented by some hundreds; but the manner of election remained the same. See ARROPAGUS.

PINARII, among the Romans, an order of priests belonging to Hercules, who offered sacrifices to that god in a solemn manner every year. They were in this service connected with the POTITII.

PINASTELLA, in *Botany*. See HIPPURIS.

PINASTER, in *Botany*. See PINE.

PINCH, in *Music*, a kind of grace proper for certain instruments, particularly the harpsichord. It is formed by striking alternately the sound of the written note with the sound of the inferior note, and observing to begin and finish with the note which bears the *pinch*. The difference between the *pinch* and TRILL is this, that the latter is struck with the superior note, and the *pinch* with the inferior.

To PINCH, is to use the fingers, instead of the bow, to make the chords of an instrument sound. There are some chord instruments which have no bow, and which are played only by *pinching*, as the lute, guittar, &c. and sometimes those with which the bow is generally used are pinched, as the violin and violoncello; and this method of playing is marked in the Italian by the word *pizzicato*.

PINCHBECK. See GOLD-*coloured metal*.

PINCHING, in *Gardening*, a sort of pruning, performed by nipping or breaking off the branches or sprigs of a plant, or tree, between the nails of two fingers.

Most gardeners hold, that *pinching* contributes to the abundance of the fruit, as well as of the branches; and they say, that young shoots, thus lopped, are less apt to grow black and die, than when cut with a pruning-knife.

The season for *pinching* is chiefly in April or May; sometimes it is also practised in June and July. The fruits, it is practised on, are chiefly melons, cucumbers, &c. Quantity also prescribes it for fruit-trees.

It is chiefly to be practised on the large branches towards the top of the plant, or tree, which are useless, and yet consume a great quantity of good sap. It must rarely be employed on the large branches below; which ought always to be preserved for the winter's pruning, that they may yield others the following year, fit to fill the empty places. Nor must the operation of *pinching* be performed on the tender shoots; because, having only just sap enough for themselves, when they come to put forth more branches in the place where they are *pinched*, the small flock of sap allotted them, being divided, will starve them. The operation is to be performed within two or three eyes of the branch they grow out of.

The effect of *pinching* is, that, instead of one useless, and, perhaps hurtful wood-branch, a vigorous tree will put forth two or three at the eyes remaining; and the sap being thus divided, the branches will be less, and fit for both wood and fruit.

PINCHING, in the *Manege*, is when the horse, handling, the rider holds him fast with the bridle-hand, and applies the spurs just to the hairs of the sides, without pricking him.

If the horse is impatient under the spur, and draws himself up, and wants to go forward, this is a sign of vigour and mettle. But the purchaser must [illegible] on the horse's back; for the [illegible] ing the dullest horse seem to [illegible]

The purchaser must also diffinguish between [illegible] ons of the horse under this [illegible] vigour, and that which arises from [illegible] lith, and which goes off immediately.

Pinching is accounted an aid, [illegible] correction.

PINDARIC, in *Poetry*, an ode formed [illegible] manner of Pindar.

The *Pindaric* manner is distinguished by the [illegible] and length

height of the flights, the suddenness and surprizingness of the transitions, and the seeming irregularity, wildness, and enthusiasm, of the whole.

Pindar, whence the manner takes its name, was of Thebes; he flourished about four hundred and seventy-eight years before Christ, and was contemporary with Æschylus. When Alexander the Great destroyed Thebes, he ordered the house in which Pindar had lived to be preserved. What we have remaining of his is a book of odes, all in praise of the victors at the Olympian, Pythian, Nemean, and Isthmian, games; wherefore the first is entitled, the *Olympian*; the second, the *Pythian*; the third, the *Nemean*; and the fourth, the *Isthmian*. Pindar is full of fire and fire: his thoughts are sententious, his style impetuous, his sallies daring, and frequently running, as it were, at random; he affects a beautiful disorder, which, yet, is said to be the effect of the greatest art.

The supposed irregularity of his numbers has made several of his imitators imagine themselves *Pindaric* poets, by the mere wildness and irregularity of their verses. None of our writers seem to have succeeded in the *Pindaric* character better than Cowley.

In a *Pindaric* ode, the plan of the whole ought to be drawn first, and the places marked out where the elegant sallies and wanderings may best be, and how the return may be justly made to the subject.

PINE, *pinus*, in *Botany*, a genus of the *monœcia adelphia* class. Its characters are these: the male flowers are collected in a scaly conical branch, without petals, having many stamina, which are connected at their base, terminated by erect summits, included in the scales, which supply the want of petals and empalement; the female flowers are collected in a common oval cone, and stand at a distance from the male on the same tree; under each scale of the cone are produced two flowers, which have no petals, but a small germen, supporting an awl-shaped style, crowned by a single stigma; the germen afterward becomes an oval, oblong nut, crowned with a wing, included in the rigid scale of the cone. Linnæus reckons twelve, and Miller fourteen species.

The *pine*-tree, with five rough leaves in each sheath, the commonly called lord Weymouth's *pine*, and the *pine* with small whitish cones, called the Scotch *pine* or fir, the wood of which is the red or yellow DEAL, are the best worth cultivating of all the kinds for the sake of the wood; the others may be planted for variety in parks, &c. where they make a good appearance in winter, when other trees are destitute of leaves.

All the sorts of *pines* are propagated by seeds, which are produced in hard woody cones; the way to get the seeds out of those cones which are close, is to lay them before a gentle fire, which will cause the cells to open, and then the seeds may be easily taken out. If the cones are kept entire, the seeds will remain good some years. The best time for sowing the seeds of *pines*, is about the end of March; when the seeds are sown, the place should be covered with nets to keep off birds, otherwise, when the plants begin to appear with the buds of the seed on their tops, the birds will pick off the heads of the plants, and destroy them.

When the plants appear, they must be constantly kept clean from weeds; and in every dry season, if they are now and then gently refreshed with water, it will forward their growth; but this must be done with great care and caution; for if they are hastily watered, it will wash the tender plants out of the ground, or lay them down flat, which often ruins their thanks; and when this is too often repeated, it will have the same effect. If the plants come up too close, they may be thinned about the beginning of July.

The best season to transplant all the sorts of *pines* is about the latter end of March, or the beginning of April, just before they begin to shoot; for although the Scotch *pine*, and some of the most hardy sorts, may be transplanted in winter, especially when they are growing in strong land, where they may be taken up with balls of earth to their roots; yet this is frequently attended with bad consequences; but those which are removed in the spring rarely fail.

When these trees are planted in exposed situations, they should be put pretty close together, that they may shelter each other; and when they have grown a few years, part of the plants may be cut down, to give room for the others to grow; but this must be gradually performed, for by too much opening the plantation at once, the air, by being let in among the remaining trees too freely, checks their growth.

As the upright growth of these trees renders their wood the more valuable, they should be left, as before observed, for coverts; by this means they will draw each other up, and grow very tall. If they are left eight feet asunder each way, it will be sufficient room for their growth.

The first distance of their planting being therefore about four feet, if at the first thinning a fourth part of the trees are taken away, the rest may stand twelve or fourteen years longer; by which time they will be of a size for making ladders and standards for scaffolding, besides many other purposes they will then answer; so that from this sale as much may be made, as will defray not only the whole expence of the planting, but the rent of the land, with interest; while the standing trees may remain for the fortunes of younger children.

From the wild *pine*, or pinaster, is procured the common turpentine, which is chiefly used by farriers; and from it is distilled the oil of turpentine. The finer and more valuable part, which comes first, is called the *spirit*; what is left at the bottom of the still is the common resin.

The kernels of the nuts of the manured or stone *pine*, are of a balsamic and nourishing nature; good for consumptions, coughs, and hoarseness, restorative, and of service after long illness. Miller's Gard. Dict.

The leaves and tender tops of *pine* and FIR are used for diet-drinks, and allowed to be antiscorbutic and diuretic. See CROWBERRY.

The resinous exudations of *pines* and firs are an important branch in the materia medica, and not only useful in the prescriptions of physicians, but have also been thought otherwise conducive to health. Pliny tells us, that wines, in the time of the old Romans, were medicated with pitch and resin. And Josephus, in his Dendrographia, observes, that it is wholesome to walk in groves of *pine*-trees, which impregnate the air with balsamic particles. It is known that all turpentines and resins are good for the lungs, against gravel also, and obstructions; and it is said, that the medicinal properties of those drugs are found in TAR-water, which operate without heating the blood, or disordering the stomach.

Pitch, tar, rosin, and turpentine, are all made from these trees by a very familiar process. In the spring time, when the sap is most free in running, they pare off the bark of the *pine*-tree, to make the tap run down into a hole which they cut at the bottom to receive it; in the way, as it runs down, it leaves a white matter like cream, but a little thicker: this is very different from all the kinds of resin and turpentine in use, and it is generally sold to be used in the making of flambeaux, instead of white bees-wax. The matter that is received in the hole at the bottom, is taken up with ladles, and put into a large bucket; a great part of this immediately runs through, and this is the common turpentine. This is received into stone or earthen pots, and is ready for sale. The thicker matter, which remains in the bucket, they put into a common alembic, and adding a large quantity of water, they distil this so long as any oil is seen swimming upon the water: this oil they separate from the surface in large quantities, and this is the common oil or spirit of turpentine; the remaining matter at the bottom of the still is common yellow resin. When they have thus obtained all that they can from the tap of the tree, they cut it down, and hewing the wood into billets, they fill a pit dug in the earth with these billets; and setting them on fire, there runs from them, while they are burning, a black thick matter: this naturally falls to the bottom of the pit, and this is the tar. The top of the pit is covered with tiles, to keep in the heat; and there is at the bottom a little hole, out of which the tar runs like oil: if this hole be made too large, it lets the whole quantity of the tar on fire; but if small enough, it runs quietly out.

The tar, being thus made, is put up in barrels; and if it be to be made into pitch, they put it into large boiling vessels, without adding any thing to it; it is then suffered to boil a while, and being then let out, is found, when cold, to be what we call pitch. Phil. Trans. N° 203. p. 191.

PINE, *ground*, in *Botany*, a species of ORTHANDER.

PINE, *sinking ground*. See CARTHUSIONWA.

PINE, *heath*, *tree*. See CORIS.

PINE, *tree*, in *Botany*. A branch of this tree being brought from the Cape of Good Hope, by Mr. Goddard, and presented to the Royal Society, Dr. Sloane gave the following account of it: the twig of this tree had a great many leaves set round it, very close to one another, so as to hide the twig itself there where they grew; each of the largest being about four inches long, and three quarters of an inch broad in the middle where broadest, from whence they decrease towards both extremes, ending in a point; being like those of the osier willow, only broader, and all covered over with the thickest, finest, and longest, white silken hair, or down, of any plant the doctor remembers to have seen. The cones are of the bigness of those of the cedars of Lebanon, and

of

of the same shape; the calicles, or small scales of each scale, being covered over with a white short down or wool, shining also like silk. Between the scales is lodged the seed, which is about as large as the pine nut, near the same shape, of a dark brown colour, and having a rising eminent line or bolt running through the middle of it from end to end. This seed has a shining, reddish brown membrane, which has on its top four feathers, like those belonging to the seed of the clematitis; which being between the leaves, and rising above them, adds a very great beauty to the cone, and may in some degree be serviceable, by means of the wind, to loosen or carry the seed to distant places, thereby propagating itself. Dr. Plukenet calls it *tuberosum*. Phil. Trans. N° 198.

PINE, *spunge leaved*, in *Botany*. A branch of this tree being brought from the Cape of Good Hope by Mr. Goddard, and presented to the Royal Society, Dr. Sherard gave the following description of it: The bark was of a brown colour and smooth; the wood white and hard, with only a small pith; the leaves were round, without any order, very thick set, having no foot-stalks; being about two inches and a half long, and about one-third of an inch broad near the farther ends, where broadest; smooth, hard, and of a brownish or grey green colour; on the top of the branch comes the fruit, which is surrounded by three or four twigs overtopping it, and with their leaves almost hid in it; it is about five inches long, and is made up of many scales, hard and red, including one another; the lowermost and outermost being very short, the uppermost four inches long, each of them ending in a point; some scales having on their outsides a gummy piece. In the middle of these scales were the first rudiments of many seeds, the same not being fully ripe; each of which is fit about with a great quantity of yellow, fine, flaxen down, about three quarters of an inch long, having a fistula, or string, two inches long, each of all membranes inclosing the fistula and tomentum; being scattered at top for their better dispersion, in order to propagate themselves. Phil. Trans. N° 198.

PINE, wild. See TENGHIN.

PINE-*apple*, a delicious fruit, called by authors ANANAS. In the Linnæan system, this is a species of the BROMELIA; to which it has also added the EANATAS, making that genus include seven species. Its botanical characters are these: the flower consists of three oval petals, produced from the protuberance of the pyramidal fruit, which have its awl-shaped stamina, crowned with spear-shaped summits; the germen is situated below the flower, which becomes a cell, in which are lodged several angular seeds. Miller enumerates six varieties; and probably there might, by proper management in the sowing, be raised as many as we have of apples and pears in our orchards.

The fruit is produced from an herbaceous plant, which has leaves resembling those of aloe, and, for the most part, fawned on their edges, but much thinner, and not so juicy as the aloe; the fruit resembles the cones of the pine-tree, whence it is supposed to have its name.

The plant grows wild in vast abundance in many parts of Africa, and has been long cultivated in the better islands of the West Indies, where they are now very plentiful and very fine. It is now long since it has been introduced into the gardens of Europe; where, with proper management, it succeeds very well. There is, in my opinion, but three are more varied to good from the American plants, as from thole originally propagated by M. le Cour of Leyden; the firſt who ever ſucceeded in the bringing it to fruit in Europe; but this is an error, occasioned by ſome of the inſidierant Iſlands having been at firſt frequently ſent over from America; but of late we have had much finer from thence than ever Dr. le Cour knew.

The firſt ſort, or the oval ſhaped *pine-apple*, with a whitiſh flelh, is the moſt common in Europe; but the ſecond, or pyramidal *pine-apple*, with a yellowiſh flelh, called the ſugar-loaf *pine*, is greatly preferable to it, being much larger and better flavoured, and the juice being leſs ſtringent, the fruit may be eaten with leſs danger in large quantities. This uſually produces fix or ſeven ſuckers alſo under the fruit, from whence it may be propagated, and therefore is the moſt to be eſteemed of any. The third ſort, or pine-apple with ſmooth leaves, is propagated merely as a curioſity, the fruit being much inferior to that of the others. The fourth ſort, or green pine-apple, is the moſt tender of all, and is had from Barbadoes and Montſerrat. The fifth, or that with very ſmooth grafs-green leaves, is what is uſually brought from the Caſtor. Theſe plants are propagated by planting the crowns or ſuckers: theſe, after having been two days in a warming pot or hot place, are to be ſet in pots of five or ſix inches over at the top, filled with good freſh light earth, mixed with a little rotten dung; this mixture muſt be often turned, for eight or ten months, to make it mix the more perfectly. The moſt proper compoſt mould for the pine plant, ſays Mr. Speechly, is prepared by paring off the turf of a paſture, where the ſoil is a ſtrong rich loam, and of a reddiſh colour, about two inches thick; and laying it with the grafs ſide downwards, and one courſe thick in the pens of ſheep-paſtures, where it may continue two, three, or more months, being enriched by their urine and dung, and reduced by the treading of their feet. When it has lain in the pens till the quantity of ſheep's dung conſtitutes about one-third part, it may be laid in a heap for at leaſt ſix months, being often turned in that time: three wheel-barrows of this mill, one barrow of vegetable mould from decayed oak-leaves, and half a barrow of coarſe ſand, make a compoſt mould for crowns, ſuckers, and young plants. Three wheel-barrows of the above earth, two barrows of vegetable mould, one of coarſe ſand, and one-fourth of a barrow of ſoot, make a compoſt mould for fruiting plants. The plants, when ſet, muſt have a little water, to ſettle the earth to their roots; and the pot when plunged into a well-tempered bed of tanner's bark. See HOT-BED.

In the ſummer ſeaſon they ſhould be gently watered about twice in a week; and once a week over their leaves, in order to waſh the filth from them, and to promote the growth of the plants. Some perſons frequently ſhift their plants from pot to pot; but it is not adviſable to remove them oftener than twice in a ſeaſon; firſt about the end of April, and again in the beginning of Auguſt. At each of theſe times the bark-bed ſhould be ſtirred, and new bark added; and the plants, when they are plunged into it, ſhould be gently watered over their leaves. Here they may remain till the beginning of November; and in the winter ſeaſon they ſhould not be watered more than once a week. Their plants which ſhew their fruit ſhould never be removed, becauſe ſhifting them at this period will ſtint their growth, and retard their ripening. It is now the practice of thoſe who are deſirous of propagating this fruit, to raiſe low ſtoves, with pits in them, for the bark-bed. Some build them with upright glaſſes in front, about four feet high, and ſloping glaſſes over them, which riſe about ſix feet high, ſo that there is juſt height enough for perſons to walk upright on the back-ſide of the bark-bed. Others make only one ſlope of glaſſes from the top of the ſtove down to the pits, which lies about ſix or eight inches above the bark-pit in the front of the ſtove; but this ſtove is ſubject to an inconvenience, as there is no walk in the front between the bark-pit and the glaſſes. One of theſe ſtoves, about twenty-five feet long in the clear, with the pit for the tan reaching from end to end, and ſix feet and a half wide, will contain about a hundred plants. But it will be neceſſary to have a bark-pit under a deep frame, in order to raiſe the young plants; in this bed the ſuckers, when they are taken from the old plants, and the crowns which come from the fruit, ſhould be plunged, ſo that this frame will ſerve to raiſe the young plants for ſupplying the ſtove. Theſe young plants, unleſs the frame is built with brick-work, and flues for warming the air, ſhould be removed, in October, into the ſtove. In the beginning of March, if there be no nurſery for them, they muſt be removed into the bark-bed, which ſhould be properly renewed before, that the tan may have acquired a proper heat; care muſt be taken, that it be not too hot, leſt the roots be ſcalded. Air ſhould be covered with mats, but no water allowed. It ſhould be allowed to the pots in the ſtove, in order to promote the magnitude of the fruit. When the fruit is ripe, the glaſſes ſhould be taken off in order to let out the ſteam of the bed, and to admit freſh air; and in the end of the ſame day, in very hot weather, it will be proper to ſhade the glaſſes with mats. During the ſummer ſeaſon, the plants muſt be frequently watered in ſmall quantities at a time, and in the warmeſt they muſt have free air admitted to them every day, from ten o'clock till four. In winter the heat of the ſtove is to be raiſed by a thermometer, which ſhould never be kept to a greater warmth than ſeven or ſix diviſions above temperate, inclined to be moiſt than in many other ſtoves to. Sometimes they will require watering only once a week. When the plants are headed may be taken off the fruit, from which they will readily grow; and in the ſame manner ſuckers may be taken off, which ſhould be done about the beginning of October. The bark-bed ſhould be renewed, and the remainder of the tan, to the third of the old, which will augment the heat of the bed. warmth till February, when it ſhould be ſ... and a half or two at one time, ſuch ſo as to keep the bed as much as it firſt was. The autumn ſuckers will be proper to ſet on the bed again; and the freſh tan, to renew the warmth of the bed, as before the front. At this time it will be proper ...

young plants, which are deſigned to produce fruit the following year; and the tan-bed, into which theſe are plunged, muſt be renewed, in order to forward their growth, that they may have ſtrength enough by autumn to produce good fruit. Thoſe plants, which ſhew their fruit early in February, will ripen about June; but the ſeaſon in which the fruit is in greateſt perfection is from the beginning of May to the end of September. The method of judging when the fruit is ripe is by the ſmell, and from obſervation; nor ſhould it remain ſo long before it is cut as to become ſoft to the touch, for it will become flat and dead; and it ſhould be cut early in the morning, laid in a cool but dry place, preſerving the ſtalk and crown upon it, and eaten the ſame day in which it is cut. That ſort with green fruit, if ſuffered to ripen well, is of an olive-colour; but the ſugar-loaf ſort is preferable, and is eaſily diſtinguiſhed from all the others, by the purple ſtripes on the inſide of its leaves. The fruit, when ripe, is of a paler colour than the others, inclining to ſtraw colour. This ſort was brought from Brazil to Jamaica. The next in goodneſs to this is the Montſerrat *pine*; the leaves of which are of a dark brown, inclining to purple on their inſide; and the protuberances of the fruit are larger and flatter than thoſe of the common ſort. Miller.

One of the principal obſtacles attending the culture of the *pine-apple* has been to deſtroy the inſects which infeſt it. Mr. Speechley, in a late treatiſe on this ſubject, has enumerated three ſpecies, viz. the brown turtle-inſect, or *coccus heſperidum* of Linnæus; the white ſcaly inſect; and the white mealy crimſon-tinged inſect. The methods that have been formerly in uſe for extirpating them have been to ſhift the plants into freſh pots, at the ſame time cleanſing their leaves and roots, which is uſually denominated a dreſſing. Decoctions made from tobacco, wormwood, walnut-leaves, henbane, and other herbs of a bitter or poiſonous quality, have alſo been generally uſed on this occaſion, to which ſome have added ſnuff, ſulphur, and pepper; but none of theſe are in their nature ſufficiently penetrating. And it is well known, that ſhifting and dreſſing the plants conſiderably retard their growth, and give them a ſickly appearance, eſpecially in their fruiting ſeaſon. He therefore recommends the following receipt: take one pound of quickſilver; put it into a glazed veſſel, with one gallon of boiling water; let it ſtand till it becomes cold, and pour off the water for uſe. Repeat this on the ſame quickſilver, till a ſufficient number of gallons is provided; then to every gallon of this mercurial water add ſix ounces of ſoft green ſoap, diſſolved in a portion of it; let the mixture be milk-warm when it is uſed; then tie the leaves of the large fixed plants together; take them out of the pots, and diveſt them of their leaves, and dip them wholly in the mixture for three minutes, and ſet them out in the open air to dry, with their roots downwards; in a few hours repeat the operation a ſecond time, having added one table-ſpoonful of ſweet oil to every gallon of the mixture; then ſet them to dry, with their tops downwards, and afterwards remove them to the hot-houſe. The moſt eligible ſeaſons are March and September.

The ſame writer has alſo deſcribed a method of raiſing *pines* without the uſe of tanner's bark, or, at moſt, with only a covering of tan two inches thick, viz. by oak-leaves, collected in the fall of the year, laid in heaps ſix or ſeven feet thick to couch, well trodden, and occaſionally moiſtened, for five or ſix weeks, which, he ſays, are ſuperior to bark for this uſe. See Dr. Hunter's edition of Evelyn's Silva, 1776.

A ſimilar idea of uſing the decayed leaves of trees in the hot-houſe was before ſuggeſted by Mr. Clark of Chiſwick, and applied to the culture of melons. It appears, that leaves under proper management, i. e. after fermentation, &c. are a moſt valuable manure; mixed with dung they make the beſt hot-beds, which preſerve their heat much longer than thoſe which are made entirely with dung. Beſides, when reduced to black vegetable mould, and mixed with compoſt of earth, they are ſuperior to every other for flowers, as well as for all plants that grow in pots.

William Baſtard, eſq. has deſcribed a method of raiſing *pine-apples* in water. The plant contained in a pot of earth is placed in a pan, which is always kept full of water, and which, ſtands on a ſhelf near the higheſt, and conſequently the moſt heated, part of the back-wall of the hot-houſe, ſo that the *pine* plants ſtand as near as poſſible to the glaſs, without abſolutely touching it. The fruit raiſed in this manner is ſaid to be always much larger, as well as better flavoured, than when it is ripened in a bark-bed. Phil. Tranſ. vol. lxvii. part ii. art. 7.

PINE-*cake*, in *Metallurgy*, a word uſed to expreſs a ſort of mould, uſed in the refining ſilver. It has this name from its ſhape, reſembling the fruit of that name.

When the refiners have taken the mixture of the ſilver and mercury together out of the cauldron, and ſtrained it through two courſe wetted cloths, to make it the thicker, they then beat it with a fort of battledores, to drive out yet more of the quickſilver; and ſtraining it again after this, they take out the remaining thick amalgam, and forming it into little pellets, they put theſe carefully into the moulds called *pine-apples*, preſſing them down. The amalgam, when put into this veſſel or mould, is uſually ſo rich as to be about one fifth ſilver. The manner of diveſting this of the quickſilver afterwards is by means of fire; in which the quickſilver riſes in vapour, and the ſilver is left pure behind; but the careleſneſs of the workmen in doing this, and particularly the uſing bad veſſels, or the not luting them cloſe, cauſes a waſte of this mineral greater than could be conceived. Alcoſo tells us, that in the city of Potoſi alone, at the time of his writing, when the trading in metals ran but low, above thirty thouſand pieces of eight were waſted in quickſilver that was loſt one year with another. To prevent this, they then principally ſtudied the means of keeping the ſilver as dry of quickſilver as they could, in the *pine-apple*; but it then holding fourth-fifths of the whole maſs in quickſilver, the great waſte was in the ſeparating it afterwards.

PINE-*ſalt*, a name given to a preparation of the bark of the *pine*-tree, uſed as a ſort of ſeaſoning to food in the manner in which we uſe ſalt.

The Laplanders are very fond of this; and the manner of their preparing it is given in Scheffer's hiſtory of that country: they peel off the bark from the lower part of the bodies of thoſe trees, and ſeparating the outer rough part, they take the inner bark, which they carefully divide into its ſeveral thin coats; when they have thus reduced them to as thin pieces as they can, they expoſe them to the ſun in their ſummer months to dry, and when thoroughly dried, they tear them into thin and narrow ſlips, and put them up in boxes made of the outer bark of other trees freſh taken off. They bury theſe boxes in deep holes dug in the ſands, and let them remain thus one day; on the day following they bring together a number of ſtumps of trees, and other wood, and laying them over the place where the bark is buried, they ſet them on fire; the next day they take out their buried boxes, and the heat having penetrated ſo deep into the earth in a mild degree, the bark is found to have been greatly affected by it, and to have received a red colour, and a very agreeable flavour, ſomewhat ſweetiſh. This is their general ſauce; they eat it with all their food, as we do ſalt, but it has ſo little of the nature of ſalt, that the name is but ill adapted to it.

There is another vegetable ſubſtance, which, though of a diſagreeable taſte to us, yet cuſtom teaches them to be fond of. This is the angelica perroſa: they cut the large ſtalks of this plant before it runs to ſeed, and roaſt them; they eat this in conſiderable quantities with their *pine-ſalt*, and eſteem it not only an agreeable, but a more than ordinarily wholeſome ſort of food.

PINEA, or PIGNE, in *Commerce*, a term uſed in Peru and Chili, for a kind of light, porous maſſes, or lumps, formed of a mixture of mercury and ſilver-duſt from the mines.

The ore, or mineral, of ſilver, being dug out of the veins of the mine, is firſt broken, then ground in mills for the purpoſe, driven by water with iron peſtles, each of two hundred pounds weight. The mineral, thus pulverized, is next ſifted; then worked up, with water, into a paſte; which, when half dry, is cut into pieces, called *cuerpos*, a foot long, weighing each about two thouſand five hundred pounds.

Each cuerpo is kneaded up with ſea-ſalt, which, diſſolving, incorporates with it. They then add mercury, from ten to twenty pounds for each cuerpo, kneading the paſte afreſh until the mercury be incorporated therewith. This office, being exceedingly dangerous, on account of the noxious qualities of the mercury, is always made the lot of the poor Indians.

This amalgamation is continued for eight or nine days; and ſome add lime, lead, or tin ore, &c. to forward it; and, in ſome mines, they are obliged to uſe fire. To try whether or no the mixture and amalgamation be ſufficient, they waſh a piece in water; and if the mercury be white, it is a proof that it has had its effect; if black, it muſt be further worked.

When enough, it is ſent to the lavatories, which are large baſons that empty ſucceſſively into one another. The paſte, &c. being laid in the uppermoſt of theſe, the earth is then waſhed from it into the reſt by a rivulet turned upon it; an Indian, all the while, ſtirring it with his feet, and two other Indians doing the like in the other baſons.

When the water runs quite clear, out of the baſons, they find the mercury and ſilver, at bottom, incorporated.

This matter they call *pella*, and of this they form the *pinces*, by expreſſing as much of the mercury as they can; firſt, by putting it in woollen bags, and preſſing and beating it ſtrongly; then, by ſtamping it in a kind of wooden mould, of an octagonal form, at bottom whereof is a braſs plate pierced full of little holes.

The matter, being taken out of the mould, is laid on a trivet, under which is a large veſſel full of water; and the whole being covered with an earthen head, a fire is made around it.

The mercury ſtill remaining in the maſs is thus reduced into fumes, and, at length condenſing, it is precipitated into the water, leaving behind it a maſs of ſilver grains of different figures, which, only joining or touching at the extremes, render the matter very porous and light.

This, then, is the *pinca*, or *pigne*, which the workmen endeavour to ſell ſecretly to veſſels trading to the South Sea; and from which thoſe, who have ventured to engage in ſo dangerous a commerce, have made ſuch vaſt gains. Indeed, the traders herein muſt be very careful; for the Spaniſh miners are errant knaves, and to make the *pignes* weigh the more, they make a practice of filling the middle with ſand, or iron.

PINEAL, *pinealis*, in *Anatomy*, a name which Des Cartes gives to a ſmall gland, in the third ventricle of the brain, from its reſemblance to a pine-apple.

This gland he makes the ſenſorium, or ſeat of the reaſonable ſoul. Other authors call it *conoides* and CONARION.

PINEI *nuclei Malaccani ſive purgantes*, J. B. PINUS *Indica nucleo purgante* C. B. PINEI *nuclei Malaccani*. Park. in *Botany*, a ſpecies of the CROTON in the Linnæan ſyſtem. There grows, ſays Acoſta, in ſome gardens of Malabar, and alſo wild, in ſome woods, a tree of the bigneſs of a pear-tree, whoſe leaves are of a watry-green beneath, and of a deep green on the upper face, and are very tender and ſoft. They are of a very acrid taſte, and vellicate the tongue for a long while afterwards: the fruit is triangular, of the ſize of a filberd, and divided into many capſules, containing each a round ſort of white or dark greeniſh ſeed, equal to a pine-kernel, when taken out of its ſhell.

The Indians, as Acoſta ſays, take a couple of the kernels, peel them, and then pound them, and mix them in clyſters, againſt difficulty of urine, and the pain of the ſciatica; or exhibit them in cock-broth, for the evacuation of putrid, ſlimy, groſs, and cold humours, and particularly for the cure of an aſthma. They anoint the impetigo with thoſe kernels, bruiſed in water, and ſo cure it; but they are very burning. The cathartic pine-kernels, as Monardes ſays, purge very ſtrongly bile, phlegm, and water; and though milder than filberds, excite vomiting. When roaſted, they operate with leſs violence, and fewer gripes. They are exhibited in chronic diſeaſes, and have a peculiar virtue of evacuating groſs humours.

The fruit of this tree is the *grana tiglia* of other writers. It is intenſely hot and acrimonious; and ſo violent an evacuant, that it cannot be taken with any tolerable ſafety. This, as well as the PINHONES *Indici*, and AVELLANA *purgatrix*, which is a ſpecies of the JATROPHA, in the Linnæan ſyſtem, yield upon expreſſion a conſiderable quantity of oil, impregnated more or leſs with the taſte and purgative quality of the ſeeds; but they all appear too draſtic to be ventured on in ſubſtance. The wood and leaves of the plants are likewiſe ſtrong cathartics.

PINGUEDO, in *Anatomy*, the Latin term for FAT.

Some reſtrain *pinguedo* only to that *humid ſoft kind of fat* found in animals, next under the ſkin. See ADEPS.

PINHONES *Indici*, the name by which the Portugueſe call the purging nuts, as they are called, of America; the fruit of the JATROPHA *foliis cordatis angulatis* in the Linnæan ſyſtem, or the *ricinoides* and *curcas* of other writers. It is called Barbadoes nut; and has an oval, walnut-like fruit, with oblong black ſeeds. Their taſte is ſweetiſh, mucilaginous, and acrid; and they are powerful evacuants. In America it is ſaid to be taken in conſiderable quantities, and to purge without much inconvenience. See PINEI *nuclei*, &c.

PINGUICULA, in *Botany*. See BUTTER-*wort*.

It is ſaid, that the unctuous and glutinous juice of the *pinguicula* is uſed in ſome places as a liniment for chaps, and as a pomatum for the hair; that new milk, poured upon the freſh leaves, on a ſtrainer, and, after quick coagulature, ſet by for a day or two, becomes thick, tenacious, very agreeable, and ſalubrious, and throws off no whey, unleſs it be long kept; and that a little of the milk, to thicken it, ſerves for bringing freſh milk to the ſame ſtate; that a ſyrup made from the juice and decoctions of the leaves in broth, are uſed among the common people in Wales as cathartics; and that the herb is hurtful to cattle that feed upon it. Lewis.

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PINGUIN, in *Ornithology*, is made a diſtinct genus of birds, of the order of web-footed, by Mr. Pennant; the characters of which are, that the bill is ſtrong, ſtraight, and bending a little towards the point; the tongue is covered with ſtrong ſharp ſpines, pointing backwards; the wings are very ſmall, pendulous, uſeleſs for flight, and covered with mere flat ſhafts; the body is covered with thick ſhort feathers, with broad ſhafts, placed as compactly as ſcales; the legs are ſhort and thick, placed quite behind; the toes are four, ſtanding forward, the interior looſe, the reſt webbed; and the tail is very ſtiff, conſiſting only of broad ſhafts. He has enumerated and deſcribed three ſpecies; viz. 1. The Patagonian *pinguin*, which inhabits an iſle near the Cape of Good Hope, on the coaſts of New Guinea, the iſle of Deſolation, ſouth to the Cape, the ſouthern parts of America, and the ſeas among the ice, as high as ſouth lat. 64° 12′, long 38° 14′ eaſt. It lives much at ſea; the wings act as fins; it burrows on land, and is analogous to ſeals. The name *pinguin* is given to theſe birds, he ſays, *propter pinguedinem*, on account of their fatneſs; and he obſerves, that it has been corrupted to *perguin*; ſo that ſome, imagining it to be a Welch word, ſignifying *white head*, entertained ſome hopes of tracing the Britiſh colony, ſaid to have migrated into America, under Madoc Gwineth, ſon of Owen Gwineth, A. D. 1170. But he adds, as the two ſpecies of birds that frequent that coaſt have black heads, we muſt reſign every hope, founded on that hypotheſis, of retrieving the Cambrian race in the new world. 2. The leſſer *pinguin*, *diomedea demerſa* of Linnæus, or *anſer Magellanicus* of Cluſius. See *Magellanic* GOOSE. And, 3. The red-footed *pinguin*, the PHAETON *æthereus* of Linnæus, inferior to the laſt in ſize, with a thick, arched, red bill; plumage like the former in texture; the head, hind part of the neck, and the back, of a duſky purpliſh hue, and breaſt and belly white; brown wings, with the tips of the larger feathers white; inſtead of a tail, a few black briſtles; and red legs. It is found on *Pinguin* iſle, near the Cape of Good Hope. Phil. Tranſ. vol. lviii. art. 14.

The PINGUIN is of a different genus from thoſe birds.

PINION, in *Mechanics*, an arbor, or ſpindle, in the body whereof are ſeveral notches, into which catch the teeth of a wheel that ſerves to turn it round.

Or a *pinion* is a leſſer wheel, which plays in the teeth of a larger. See WHEEL.

In a watch, &c. the notches of a *pinion* (which are commonly 4, 5, 6, 8, &c.) are called *leaves*, and not teeth, as in other wheels.

PINION *of report* is that *pinion*, in a watch, which is commonly fixed on the arbor of a great wheel, and which, in old watches, uſed to have but four leaves; it drives the dial-wheel, and carries about the hand.

The quotient, or number of turns, to be laid upon the *pinion* of report, is found by this proportion: as the beats in one turn of the great wheel are to the beats in an hour; ſo are the hours of the face of the clock (viz. 12, or 24) to the quotient of the hour-wheel or dial-wheel divided by the *pinion* of report, that is, by the number of turns which the *pinion* of report hath in one turn of the dial-wheel; which, in numbers, is 26928: 20196 :: 12 : 9.

Or rather thus: as the hours of the watch's going are to the numbers of the turns of the fuſee; ſo are the hours of the face, to the quotient of the *pinion* of report. If the hours be 12, then 16 : 12 :: 12 : 9. But if 24, the proportion is 16 : 12 :: 24 : 18.

This rule may ſerve to lay the *pinion* of report on any other wheel, thus: as the beats, in one turn of any wheel, are to the beats in an hour; ſo are the hours of the face, or dial-plate, of the watch, to the quotient of the dial-wheel, divided by the *pinion* of report, fixed on the ſpindle of the aforeſaid wheel. See CLOCK and MOVEMENT.

PINION, *flying*. See FLYING.

PINIROLO, in *Ornithology*, the name of a bird of the fringa kind, ſomewhat approaching to the ſand-piper, but larger; its beak is a little more than a finger's breadth long, and black; it is of a mixed cheſnut-colour, and brown on the back; and its belly and breaſt are perfectly white: it is common in the Italian markets, and very much reſembles the common fringa.

PINK, in *Botany*. For the characters, ſee DIANTHUS.

Of *pinks* there is a great variety now cultivated in the gardens; the principal of which are, the damaſk *pink*, the white ſtock, the phealant's eye, with double and ſingle flowers, varying greatly in their ſize and colour; the Cob's *pink*, Dobſon's *pink*, white Cob *pink*, and Burr's *pink*: the old man's head, and painted lady *pinks*, alſo belong to the carnation.

The common *pinks* are propagated either by ſeeds (which is the way to obtain new varieties, or by parting the layers of them, as is practiſed for carnations; or by planting

flips, which, if carefully managed, will take root very well.

If they are propagated by ſeeds, there ſhould be care taken in the choice of them, and only the ſeeds of the beſt ſorts ſaved, where perſons are curious to have the fineſt flowers. Theſe ſeeds may be ſown in the ſpring, and the plants afterwards treated in the ſame manner as is directed for the CARNATIONS; with this difference only, that as the *pinks* are leſs tender, ſo they may be more hardily treated. Thoſe which are propagated by layers muſt be almoſt managed as the carnation.

The beſt time to plant the flips of *pinks* is about the end of July, when, if there ſhould happen rain, it will be of great ſervice to them; but if the weather be dry, they will require to be conſtantly watered every other day, until they have taken root; theſe ſhould be planted in a ſhady border, and the ground ſhould be dug well, and all the clods broken, and if no rain falls, it ſhould be well ſoaked with water a few hours before the flips are planted; then the flips ſhould be taken from the plants, and all their lower leaves ſtripped off, and planted as ſoon as poſſible after; for if they are ſuffered to lie long after they are taken from the plants, they will wither and ſpoil: theſe need not be planted at a greater diſtance than three inches ſquare, and the ground muſt be cloſed very hard about them; then they muſt be well watered, and this muſt be repeated as often as is found neceſſary, till the cuttings have taken root; after which they will require no other care but to keep them clean from weeds till autumn, when they ſhould be tranſplanted to the borders of the flower-garden, where they are to remain. There are ſome who plant the flips of *pinks* later in the ſeaſon than here directed; but theſe plants are never ſo ſtrong, nor flower ſo well as thoſe which are early planted. Miller.

PINK, *Indian*, a ſpecies of *ipomœa*. See QUAMOCLIT.

PINK, *Indian*, is alſo a ſpecies of *lonicera*. See *Upright* HONEYSUCKLE.

PINK, *Mompeliet*. See ANTHYLLANTHES.

PINK, *ſea*. See THRIFT.

PINK, *brown*, among *Painters*, is the tinging part of ſome vegetable of a yellow or orange-colour, precipitated upon the earth of alum, cuttle-fiſh bone, or ſome ſimilar calcareous ſubſtance. When good, it is a concentrated yellow, which, as a pigment, is tranſparent in oil, gives the effect of a dark colour, and ſerves for deep ſhades. There are many methods of preparing brown *pink*. One of the beſt and moſt common methods is the following: take of the French berries, one pound; of ſuſtic wood in chips, half a pound; and of pearl-aſhes, one pound. Boil them in a tin-boiler, with a gallon and a half of water, for an hour; and then ſtrain off the tincture through flannel, while the fluid is boiling hot. Having prepared in the mean time a ſolution of a pound and a half of alum, put it gradually to the tincture, as long as an ebullition ſhall appear; waſh the ſediment, as in the preparation of LAKES; and when it is brought, by filtering through paper with a linen cloth, to a proper conſiſtence, dry it on boards in ſquare pieces. Or, it may be made without the uſe of ſalts, by boiling two pounds of the berries in a gallon of water for two hours, and ſtraining off the tincture through flannel. In the mean time prepare a pound and a half of cuttle-fiſh bone, by levigating the ſoft inner part with water on a marble; add this to the tincture, and evaporate them in baſon Marie till the matter becomes of a ſtiff conſiſtence; when the whole has been well mixed by grinding, let it be laid on boards to dry.

The goodneſs of *brown pink* muſt be judged of by its tranſparency, and force of colour, when mixed with oil; but its qualities of ſtanding well, and not fattening in oil, in both which reſpects it is commonly defective, can only be aſcertained by trial and experience.

PINK, *Dutch*, is a pigment formed of chalk, coloured with the tinging particles of French berries, or other vegetables. It is principally uſed for coarſer purpoſes in water. It may be made by boiling one pound of French berries, and four ounces of powdered turmeric root in a gallon of water for two hours, and then ſtraining off the tincture through flannel, and boiling it again with an ounce of alum, till it be evaporated to one quart. Prepare in the mean time four pounds of chalk, by waſhing it over, and afterwards drying it; and mix the chalk with the tincture, by grinding them together, and then dry it on boards. It is ſometimes prepared in the ſame manner with ſtarch and white lead. Its goodneſs conſiſts in its being of a full gold-coloured yellow, and very bright.

PINK, *Engliſh*, is only a lighter and coarſer kind of Dutch *pink*; and may be prepared in the ſame manner, the quantity of chalk being increaſed in proportion, as it is intended to be inferior to the Dutch.

PINK, *light*, is of two kinds; the one being the ſame with the Dutch *pink*, only with much leſs colour, ſo that the proportion of the French berries and turmeric muſt be leſſened to one half: the other is the ſame with the brown *pink*, that is, tranſparent in oil, but with leſs colour. It may be prepared by boiling one pound of French berries in a gallon of water, for an hour, and adding to the ſtrained fluid two pounds of pearl-aſhes, diſſolved and purified, by filtering through paper; then precipitate with alum diſſolved in water, by adding the ſolution gradually, till the ebullition ceaſes; and proceed as with *brown* PINK.

PINK, *roſe*, is a LAKE, the earth or baſis of which is principally chalk, and the tinging ſubſtance is extracted from Braſil or Campeachy wood. This pigment, which does not ſtand, is ſeldom employed, except for the coarſe work of houſe-painters, or for paper-hangings, and ſometimes with varnith. It may be prepared by boiling ſix pounds of Braſil wood, or three pounds of Braſil and three of Campeachy wood, in three gallons of water, in which a quarter of a pound of alum has been diſſolved, for an hour. Purify the fluid, by ſtraining through flannel, and put back the wood into the boiler with the ſame quantity of alum, and proceed as before; repeating the operation a third time; mix the three quantities of tincture together, and evaporate them till only two quarts of fluid remain. Prepare eight pounds of chalk, by waſhing it over in water, in which a pound of alum has been diſſolved, and afterwards fuſing the chalk from the fall, formed by the alum, and drying it to the conſiſtence of a ſtiff clay. Grind the chalk and tincture together; and lay the maſs to dry out of the ſun or cold air. The goodneſs of roſe *pink* conſiſts chiefly in the brightneſs of the colour, and fineneſs of its ſubſtance.

PINK, *pompe*, Fr. in *Sea-Language*, is a name given to a ſhip with a very narrow ſtern; whence all veſſels, however ſmall, whoſe ſterns are faſhioned after this manner, are called *pink-ſterned*.

PINNA, or PENNA, a Latin word ſignifying a FEATHER. It is alſo uſed figuratively, in divers arts, to expreſs things which bear ſome reſemblance, in form, to feathers; as the fins of fiſhes, &c. See FIN.

PINNA *auris*, in *Anatomy*. See EAR.

PINNA *naſi* is the ſame as *ala naſi*. See NOSE.

PINNÆ, *aculei* PINNARUM, in *Ichthyology*. Every apophyſis, or eminence on the head or body of a fiſh, which is ſo ſharp at the end as to be capable of pricking, is called an *aculeus*; but the *aculei pinnarum* in particular are thoſe prickly *radii* or bones, which ſerve to ſupport the fins; and being carried out beyond the rim of the membrane, end in ſo many points.

Theſe *aculei* are ſimple cylindric oſſicles; whereas the other oſſicles, which ſuſtain the fins, are leſs rigid, and are bent and not prickly; and theſe are not ſimple, but are compoſed each of two oſſicles cloſely cohering one to another. Many of theſe *radii* are divaricated at their extremity into two, three, or more branches; theſe, when they are carried out beyond the rim of the membrane, are harmleſs, and are ſeen to be compoſed of two oſſicles, as the body of the radius is. The *aculei* of the back and belly of all fiſhes are ſo fat of the ſame nature, that they never ſtand ſingle, as ſome have ſuppoſed them to do in particular inſtances; but they are always connected one to the other at the bottom by a membrane, though that be ever ſo ſmall and low, as in ſome it is ſcarce viſible.

PINNARUM *radii*. See RADII *pinnarum*.

PINNA, in the Linnæan ſyſtem of *Zoology*, is a genus of the *teſtacea vermia*. Its animal is a ſlug; it is bivalve, fragile, and furniſhed with a beard; it gapes at one end, and has a hinge without a tooth. Linnæus enumerates eight ſpecies.

The *pinna marina* is a ſhell-fiſh like the muſcle, held in its place by a number of threads, which proceed from its body, and are fixed to any adjoining ſubſtance, and is one of thoſe fiſh, which, like the muſcle, has a power of ſpinning in the manner of the ſpider and caterpillar. The threads which theſe fiſh ſpin are infinitely finer and ſlenderer than thoſe of the muſcle, notwithſtanding that the fiſh is vaſtly larger; its ſhells being often found two feet long. Theſe threads are indeed ſcarce leſs fine than the ſingle ſilk threads of the ſilk-worm, and like it have in all times been worked into uſe. The fineſt kind of the byſſus of the ancients was wrought out of theſe threads, and at preſent they are manufactured at Palermo, and at many other places, into gloves, ſtockings, and other ſorts of wearing apparel.

It is eaſy to conceive, that threads ſo fine as theſe can be of no great ſtrength; but what is wanting in the force of each, is made up in the number of them; which are ſpun by every fiſh, for this is almoſt infinite. They differ in nothing from the threads of the muſcles beſide their

their fineneſs and their length; which is in theſe much greater, and therefore makes them much the more valuable. They are probably formed in the ſame manner with thoſe of the muſcles; and the *pinna* may be called, by way of diſtinction, the ſilk-worm of the ſea; and the muſcle, the caterpillar. See *Tab. of Shells*, N° 20. Mem. Acad. Par. 1711.

PINNARUM *dilatator proprius*, in *Anatomy*, a name given by Santorini to one of the muſcles of the face, which he has alſo called *myrtiformis noſi*, and which Cowper has called *depreſſor labii ſuperioris, ſeu conſtrictor alæ noſi*, and Albinus the DEPRESSOR *alæ noſi*.

PINNACE, a ſmall veſſel, navigated with ſails and oars, and carrying generally two maſts; chiefly uſed as a ſcout for intelligence, and for landing of men.

One of the boats belonging to a great man of war, ſerving to carry the officers to and from the ſhore, is alſo called the *pinnace*. It reſembles a barge, but never rows more than eight oars, whereas a barge properly never rows leſs than ten. *Pinnaces* are for the accommodation of lieutenants, &c. as barges are for admirals and captains of ſhips of war.

PINNACLE, from *pinna*, or *pinnaculum*, in *Architecture*, the top or roof of a houſe, terminating in a point.

This kind of roof, among the ancients, was appropriated to temples; their ordinary roofs were all flat, or made in the platform-way.

It was from the *pinnacle*, that the form of the pediment took its riſe.

PINNATED *leaf*, among *Botaniſts*. See LEAF.

PINNATIFID *leaf*, among *Botaniſts*. See LEAF.

PINNATUS, in *Heraldry*, a term uſed by the Latin writers on theſe ſubjects, to expreſs that ſort of line in arms which is called by our heralds the EMBATTLED *line*, or *crenelle*. It is alſo called by ſome *linea pinnis aſperata*, and by Sylveſter Petro Sancto *murales pinnulæ*. When this line is only embattled on one ſide, it is properly expreſſed by this word; but when it is embattled on both ſides, as in ſome arms, it is called *bretteſſe* and *contre bretteſſe*.

PINNING, in *Building*, the faſtening of tiles together, with pins of heart of oak; for the covering of a houſe, &c.

PINNIRAPI, in *Antiquity*, an order of GLADIATORS, who being matched with the SAMNITES, uſed to catch at the *pinnæ* which adorned their helmets, and bear them off in triumph, as marks of victory.

PINT, *pinta*, a veſſel or meaſure uſed in eſtimating the quantity of liquids, and even ſometimes of dry things.

Budæus derives the word *pint* from the Greek πωτὸς; others from the German *pint*, a little meaſure of wine; Nicod from the Greek πινω, *to drink*.

The Engliſh *pint* is a wo'old; the one for wine-meaſure, the other for beer and ale-meaſure.

The wine *pint* is ſaid to contain a full pound, avoirdupois, of common running water; two *pints* make a quart, two quarts a pottle, two pottles a gallon, &c.

The Paris *pint* is eſtimated at one ſixth of the ancient congius, and contains two pounds of common water, and is therefore nearly equal to an Engliſh wine quart; it is divided into ſeſtiers, which ſome call ſeptiers; the ſeptiers into two demiſeptiers, the demiſeptiers into two poſſons, each poſſon containing 12 cubic inches. Two *pints* make a quart, quarteau, which ſome call a pot: the *pint* of St. Denis is almoſt double that of Paris.

In the Engliſh beer-meaſure, the *pint* is the eighth part of a GALLON; conſequently contains 35¼ cubical inches.

As to the *pint* uſed in Scotland, there are different opinions concerning the number of cubical inches it contains. Dr. Gregory makes them 1697; others, from ſeveral careful menſurations of the ſtandard kept at Edinburgh, make the Scotch *pint* to contain 103,2; and thoſe in common uſe are ſaid to contain berwixt 105 and 106 cubical inches. Another experiment was made with weal, which was found to contain 464 Scotch *pints*, and 18,5 Engliſh ale gallons. Suppoſing this menſuration juſt, the Scotch *pint* will be to the Engliſh ale gallon as 289 to 270; and if the Engliſh ale gallon be ſuppoſed to contain 282 cubical inches, the Scotch *pint* will contain 302,84 ſuch inches.

PINTADO, or AVIS AVIS, in *Natural Hiſtory*, a name given by the ancient Roman authors to the GUINEA-*fowl*.

PINTLE, in *Artillery*, a long iron bolt, fixed upon the middle of the limber bolſter, to go through the hole made in the trail-tranſom of a field-carriage, when it is to be tranſported from one place to another. The hole through which the *pintle* paſſes is wider above than below, in order to leave room for the *pintle* to play in.

PINTLE-*plate* is a flat iron, through which the *pintle* paſſes, and nailed to both ſides of the bolſter, with eight diamond-headed nails.

PINTLE-*waſher*, an iron ring, through which the *pintle* paſſes, placed cloſe to the bolſter for the trail to move upon.

PINTLE, *priſtil*, in *Botany*. See WAKE-*robin*.

PINTLES, in a *Ship*, are hooks by which the rudder hangs to the ſtern-poſt.

PINUS. See PINE-*tree*.

PIONEER, in *War*, a labourer employed in an army, to ſmooth the roads, paſs the artillery along, and to dig lines and trenches, mines, and other works.

Menage derives the word from the Latin *poſitores*, a diminutive of *poſites*. Bochart deduces it from the Peones, a people of Aſia, whoſe principal employment was to dig the earth in mines, &c.

Moſt of the foreign regiments of artillery have half a company of *pioneers* well inſtructed in their buſineſs. Our regiments of infantry and cavalry have three or four *pioneers* each, provided with aprons, hatchets, ſaws, ſpades, and pick-axes. They have alſo a cap with a leathern crown, and a black bear-ſkin front, on which is the king's creſt in white, on a red ground, and the number of the regiment on the back part of the cap.

PIONY, *pæonia*, in *Botany*, a genus of the *polyandria digynia* claſs. Its characters are theſe: the flower has a permanent empalement, compoſed of five concave, reflexed leaves; the flower has five large, roundiſh, concave petals, which ſpread open, and a great number of ſhort hairy ſtamina, with two, three, or four, oval, erect hairy germina in the centre, having no ſtyles; the germina afterward become ſo many oval, oblong, reflexed, hairy capſules, having each one cell opening longitudinally, containing ſeveral oval, ſhining-coloured ſeeds, fixed to the furrows. Linnæus reckons two, and Miller ſix ſpecies.

The ſeveral ſorts of this plant, with double flowers, are all very hardy, and will grow in almoſt any ſoil and ſituation; they are propagated by parting the roots, which multiply very faſt. They ſhould be planted in Auguſt, or the beginning of September, and will then flower the ſucceeding ſummer. The off-ſets ſhould not be too ſmall, and ſhould all have a faſt bud or eye. The ſingle kinds may alſo be propagated by ſowing their ſeeds in Auguſt in a light earth, and managing them in the method of all other ſeedling plants. There may probably be ſome good varieties of the flowers produced this way. The ſingle Portugal *piony* is of ſo ſweet a ſmell as to deſerve a place in any garden, though but a ſingle flower. Miller.

The roots, flowers, and ſeeds, of the male and female *piony*, are looked upon as lightly anodyne and corroborant; to the latter of which virtues they appear to have ſome claim. They have been principally recommended in ſpaſmodic and epileptic complaints; in which Dr. Lewis apprehends their effects are not very conſiderable.

PIP, or PEP, *pepia*, a diſeaſe among poultry, conſiſting of a white thin ſkin, or film, that grows under the tip of the tongue, and hinders their feeding.

It uſually ariſes from want of water, or from the drinking puddle-water, or eating filthy meat. It is cured by pulling off the film with the fingers, and rubbing the tongue with ſalt. Hawks are particularly liable to this diſeaſe, eſpecially from feeding on ſtinking fleſh.

PIPE, in *Building*, &c. a canal or conduit for the conveyance of water, and other liquids.

Pipes for water, water-engines, &c. are uſually of lead, iron, earth, or wood. The latter are commonly either oak or alder.

Thoſe of iron are caſt in the forges; their uſual length is about two feet and a half; ſeveral of theſe are commonly faſtened together, by means of four ſcrews at each end, with leather, or old hat, between them, to ſtop the water.

Thoſe of earth are made by the potters. Theſe are fitted into one another, one end being always made wider than the other.

To join them the cloſer, and prevent their leaking, they are covered with pitch and tow. Their length is uſually about the ſame with that of the iron *pipes*.

The wooden *pipes* are bored with large iron augres of different ſizes, ſucceeding one another from leſs to larger; the firſt pointed, the reſt formed ſpoon-wiſe, increaſing, in diameter, from one inch to ſix. See BORING *of wooden-pipes*. They are fitted into the extremities of each other, and are ſold by the foot.

Leaden *pipes* are of two kinds; the one ſoldered, the other not ſoldered: for the conſtruction of each kind whereof, ſee PLUMBERY.

For the PIPES *of organs*, See ORGAN.

*Bag-*PIPE. See BAG-PIPE.

PIPE is alſo a popular machine uſed in the ſmoaking of tobacco; conſiſting of a long ſlender tube, made of earth or clay; having, at one end, a little bole, or furnace, called the *bowl*, for the reception of the tobacco; the

fumes whereof are drawn by the mouth through the other end.

Pipes are made of various fashions, long, short, plain, worked, white, varnished, unvarnished, and of various colours, &c. The Turks use *pipes* three or four feet long, made of rushes, or of wood bored; at the end whereof they fix a kind of nut, of baked earth, which serves as a bowl, and which they take off when smoking. These they carry with them when they travel; they have made to screw three joints, to put into a bag; they cover the tube sometimes with cloth, and dip it in water to make it smoke cool.

The instrument used by the Persians for smoking, and called *nargui*, is so constructed, that the smoke of the tobacco passes through water before it comes into the mouth.

PIPE-*office*. See ACTS and TOBACCO-*pipe fish*.

PIPE, *tone*. See HORN-*fish*.

PIPE-*fish*, in *Botany*. See PHILADELPHUS and BILAC.

PIPE-*wort*, *tobacco*. See CASSIA.

PIPER, in *Mining*, is where the ore runs for warm endeavs in a body, and doth not sink downwards, or lie a vein.

PIPE-*ore*, an invention of the late ingenious Mr. Sutton, to clear flues of foul air. This he does by a *pipe*, the branches of which are laid in the hold, and the extremity of which is fixed into the altarside of the furnace. Mr. Watson has shewn how these *pipes* may be laid, so as to be no way inconvenient, and relates the success of a trial of them, made on a sink. See Phil. Trans. N° 462, p. 42.

We have now three different contrivances published for cleaning flues, and other close places, of foul air.

One by Dr. Desaguliers, which will change the air in the chamber of sick people, in a little time; either by drawing out the foul air, or driving in fresh; or doing both successfully, without opening doors or windows. See Phil. Trans. N° 437.

The other by Mr. Button before mentioned; and the third by means of Dr. Hales's ventilators, which seems to be the most expeditious and simple method. See VENTILATOR.

PIPE, *pipa*, in *Law*, is a roll in the exchequer, called also the *great roll*.

PIPE-*office* is an office wherein a person called the *clerk of the pipe* makes out leases of crown lands, by warrant from the lord-treasurer, or commissioners of the treasury, or chancellor of the exchequer.

Clerk of the pipe makes up all accounts of sheriffs, &c. and gives the accountants their quietus est. To this office are brought all accompts which pass the remembrancer's office, and remain there; that if any fleated debt be due from any person, the same may be drawn down into the great roll of the *pipe*, from the form of which he receives his name; upon which the comptroller issues out a writ, called the *summons of the pipe*, for recovery thereof. And if there be no goods or chattels, the clerk then draws down the debts in the lord-treasurer's remembrancer, to write threats against their lands.

All tallies, which touch the payment of any sum contained in such accompts, are examined, and allowed, by the chief *secretary of the pipe*.

Besides the chief clerk, and his deputy, in this office are a first and second secondary, six attorneys, or sworn clerks, and a comptroller, deputy and clerk, board-clerk, clerks, and tub-bearer.

PIPER, in *Botany*. See PEPPER.

PIPER *Africum*, in *Botany*, a name given by some authors to the *cubebs-berry-tree*, or *cassia caryophyllata*.

PIPER, in *Ichthyology*, the English name of a Species of TRIGLA, with a tubid snout, and tubulose nostrils. It is called by the generality of authors LYRA. See TRIGLA.

PIPER *Jamaicæ*, the *pepper-tree* of Jamaica. See PIMENTO.

PIPER *Nigrum*, *Negro pepper*. The plant called at present by this name is the CAPSICUM; or *Guinea pepper*, a remarkable herb, bearing large pods as red as coral, of which the Cayan button is made in America. But this is not the plant that was anciently known by this name. Avicenna and Serapion both mention a plant, which they call *fulfel albeth*, the English of which is, *the pepper of the white pepper*. But this was properly what has been since called the *Ethiopian pepper*; a sort of but seeds approaching to the nature of the common *pepper*, and containing several together in pods.

It is not easy, from the account we have left, to say what it is; but they have left description enough of it for us to say what it is not, and to find that they have all been mistaken, who have supposed it to be either the root tabi, or the sarmæ of the Arabians, which last was as large as a pear.

PIPER, *pied*, in *Ornithology*. See AREDARIA and SANDpiper.

PIPER *sylvestris*, in *Botany*, the clove-berry-tree, or *cubeba caryophyllata*, a tree whose bark is used in medicine.

PIPERARIUM, an old name of a plant found in Apulcius, and said to have had name from its use to the table; which was to offend us to the best, that if a piece of it were flung up in their hive, it would drive them all out.

This is a very strange account; and as we meet with nothing to countenance it in any other author, *there is reason to suspect it to be an error*; and there seems this occasion for it. The *acorus* root is said by Dioscorides to be the root of a plant allied to the papyrus, or paper-reed of the river Nile; and is thence called by that author *papyrosacus*. Avicenna and Serapion copy this, and frame the acorus plant to the *papyrus*; but in all the copies of the Greek author, it is often found written *piperosacus*. This word *piperosacus* may have been formed by Apuleius into *piperarium*, by way of an endowment, and all the rest might be occasioned by this.

PIPERITIS, in *Botany*, a name given by some authors to the *mint-plant*, or *mint*. See MENTHA *aquat.*

PIPERIVORA *avis*, in *Ornithology*, a name given by some authors to the TOUCAN, or Brasilian magpie, from its feeding on pepper.

PIPING, in *Sea-Language*. See CALL.

PIPPERIDGE-*tree*, in *Botany*. See BARBERRY-*tree*.

PIPRA, in *Ornithology*, a name given by Aristotle, and other ancient writers, to the *picus varius major*, the great spotted wood-pecker, or wet-wall.

PIPRA, in the Linnæan System of *Ornithology*, a genus of the PASSERES. Its characters are, that the bill is shorter than the head, three-cornered at the base, entire, and incurvated at the apex; the feet are formed for walking. Linnæus enumerates thirteen species.

PIQUE, in *Natural History*, a name given by the Spaniards to an insect of the tick of a flea, called by the Indians TUNG. It is common in the East and West Indies, and eats its way into the flesh under the nails, &c.

PIQUET. See PACKET.

PIQUETTE, among the *Florists*, a term used for a certain sort of carnations, which have always a white ground, and are spotted, or, as they call it, pounced with scarlet, red, purple, or other colours.

PIQUITINGA, in *Ichthyology*, the name of a small American river-fish. It seldom exceeds two inches in length; its mouth appears very small, but it can so plentifully open it to a great width; its eyes are very large and bright, with a silvery iris; it has six fins besides the tail, which is forked; its head is of a silvery white; its back olive colour, and its belly and sides are covered with silvery scales; the fins are all white, and the finlets are black, and very bright and shining. Margrave.

PIRA, in *Ichthyology*, a name by which Margrave and some other authors have called a quite horned fish of the West Indies, called by Clusius and others, the MONOCERAT *pisces*, or unicorn fish.

PIRA-*acanga*, in *Ichthyology*, the name of a Brasilian fish, resembling the perch in face and shape. It is of a small size, seldom exceeding four or five inches in length; its mouth is small; its tail is forked; and it has on the back only one long fin, which is supported by rigid and prickly spines; this it can depress at pleasure, and lurk within a cavity made for it in the back; its scales are of a silvery white. It is a wholesome and well-tasted fish. Margrave.

PIRA-*cucha*, in *Ichthyology*, a name used by some authors for the MILVUS, or kite-fish.

PIRA-*jubda*, in *Ichthyology*, the name of an American fish of the multifarious kind, much esteemed for the delicacy of its flesh. It grows to about twelve inches in length; its nose is pointed, and its mouth large, but without teeth; the upper jaw is longer than the other, and hangs over it in form of a cartilaginous prominence; its eyes are very large, and its tail forked; under each of the gill-fins it has a beard made of six white filaments, and is covered all over with silvery scales. Margrave.

PIRA-*jurumbaia*, in *Ichthyology*, the name of a Brasilian fish, called by many the *lupus minor*. It lives in the muddy bottom of the American seas, and is a long-bodied not flatted fish; it grows to a sufficient size, being sometimes caught of nine, and sometimes even of ten or eleven feet long, and two feet and a half thick; it has one long fin on the back, the anterior part of which is thin and prickled, and has a cavity on the back, into which the creature can depress the fin at pleasure; its tail is not forked; its scales are all of a silvery colour and brightness. It is a very well-tasted fish. Margrave.

PIRA-*sapanga*, in *Ichthyology*, the name of a Brasilian fish of the cardus or wrasse kind, and called by some the *gut-fish*. Its usual length is four or five inches; its mouth is considerably large, and furnished with very small and sharp teeth; its head is small, but its eyes large and pro-

minent; the pupil of a fine turquoise colour, and the iris yellow and red in various shades; the coverings of the gills end in a triangular figure, and are terminated by a short spine or prickle; its scales are very small, and so evenly arranged, and closely laid on the flesh, that it is very smooth to the touch; its tail is not forked, but rounded at the end; its whole body, head, tail, and fins, are of a pale yellow, variegated all over with very beautiful blood-coloured spots; these are round, and of the bigness of hemp-seed on the back and sides, and something larger on the belly; the fins are also spotted in the same manner, and are all marked with an edge of red. It is caught among the rocks, and about the shores, and is a very well tasted fish. Marggrave.

PIRANHA, in *Ichthyology*, a name given to the American fish more commonly known by the name PIRAYA.

PIRAQUIBA, or IEIRAQUEIRA, in *Ichthyology*, a name originally Brasilian, by which some authors express the REMORA, or sucking-fish.

PIRATE, *pyrata, piratus, raver*; a person, or vessel, that robs on the high seas, or makes descents on the coasts, &c. without the permission, or authority, of any prince or state.

The colours usually displayed by *pirates* are said to be a black field, with a death's head, a battle-axe, and an hour-glass.

By the ancient common law, *piracy*, if committed by a subject, was held to be a species of treason, and by an alien to be a felony only; but now, since the statute of treasons, 25 Edw. III. cap. 2. it is held to be only felony in a subject. Formerly it was only cognizable by the admiralty courts, which proceed by the rules of the civil law; but the statute 28 Hen VIII. cap. 15. established a new jurisdiction for this purpose, which proceeds according to the course of the common law. The offence of *piracy*, by common law, consists in committing those acts of robbery and depredation upon the high seas, which, if committed upon land, would have amounted to felony. But, by statute, some other offences are made *piracy* also; as by 11 & 12 W. III. cap. 7. if any natural born subject commits any act of hostility upon the high seas, against others of his majesty's subjects, under colour of a commission from any foreign power, this, which would be only an act of war in an alien, shall be construed *piracy* in a subject. And further, any commander, or other sea-faring person, betraying his trust, and running away with any ship, boat, ordnance, ammunition, or goods, or yielding them up voluntarily to a *pirate*, or conspiring to do these acts; or any person confining the commander of a vessel, to hinder him from fighting in defence of his ship, or to cause a revolt on board, shall, for each of these offences, be adjudged a *pirate*, felon, and robber, and shall suffer death, whether he be a principal or accessory. By 8 Geo I. cap. 24. the trading with known *pirates*, or furnishing them with stores or ammunition, or sitting out any vessel for that purpose, or in any wise consulting, combining, confederating, or corresponding with them; or the forcibly boarding any merchant vessel, though without seizing or carrying her off, and destroying or throwing any of the goods overboard, shall be deemed *piracy*; and all accessories to *piracy* are declared to be principal *pirates* and felons, without benefit of clergy. Commanders or seamen wounded, and the widows of such as are slain, in any *piratical* engagement, shall be entitled to a bounty, to be divided among them, not exceeding one fiftieth part of the value of the cargo on board; and such wounded seamen shall be entitled to the pension of Greenwich hospital. And if the commander shall behave cowardly, by not defending the ship, if she carries guns or arms, or shall discharge the mariners for fighting, so that the ship falls into the hands of *pirates*, such commander shall forfeit all his wages, and suffer six months imprisonment.

In different parts *pirates* are differently denominated; as in the West-Indies, *buccaneers, free-booters*, &c. In the Mediterranean, *corsairs*, &c.

Alexander, reproaching a *pirate* with his condition, was answered, "If I am a *pirate*, it is because I have only "a single vessel; had I a fleet, I should be a mighty "conqueror."

PIRATE was also anciently used for the person to whose care the mole, or port, of a haven, which in Latin was called *portus*, was entrusted.

PIRATE was sometimes too, according to Spelman, used for a sea-captain, or soldier. After, in the life of King Alfred, tells us, *infelix navim longam fabricavit, longitudine pariter in illius vitæ navigia cæteris duplo excedentem.*

PIRATIA-*piso*, in *Ichthyology*, the name of an American sea-fish, which grows to a very large size, and, while young, is eaten and accounted a delicacy; but, when full grown, is too coarse, rank, and strong; it has six fins besides the tail, which is made of a very large fin, of a somewhat square figure, and is not at all forked; it is all over of a dusky orange colour, but more obscurely so on the back than elsewhere; and its sides are variegated with grey spots, so disposed as to represent a sort of net-work. Piso.

PIRATIAPIA, in *Ichthyology*, the name of a Brasilian fish, approaching to the nature of the turbot or wrasse. Its body is oblong, not flatted, and very thick; it is a large fish, and sometimes grows even to fifty pounds weight. It is a very delicate and valuable fish. Marggrave.

PIRAUMBU, in *Ichthyology*, the name of a Brasilian fish, somewhat approaching to the nature of the turbot, and called by the Portuguese *thargarreo*. It is of the figure of the carp, and its usual length is six or seven inches, and its breadth in the broadest part about three inches, but gradually diminishing to the tail. It is caught among the rocks, and near shores, and is a well-tasted fish. Marggrave.

PIRAYA, in *Ichthyology*, the name of a fish caught in the American rivers. There are two kinds of it; the one growing to a foot long, and very broad in proportion; this loves the muddy bottoms of rivers; the other is much of the same size, but has two fins on its back, whereas the other has but one; this loves the sandy bottoms of rivers. There is also a smaller species of this; all three are eatable fish.

PIRIT, in *Natural History*, a name given by the people of the Philippine islands to a peculiar species of sparrow, which is very common with them. It is much smaller than our common sparrow, and feeds only on the seeds of the canary-grass, which is very commonly wild there.

PIROUETTE, or PYROUET, in the *Manege*, a turn or circumvolution which a horse makes, without changing his ground, his haunches remaining firm in the centre, and his shoulders forming and describing the circle. In this action the inner hind-leg must not be lifted from the ground, but turned round in the same place, like a pivot, while the other three legs, and the body of the horse, turn and wheel round it at the same time.

The word is French, and literally signifies a whirligig.

Pirouettes are either of *one tread* or *fish*, or of *two*. The first is an entire short turn which the horse makes upon one tread, and, almost, in one time; in such manner as that his head comes to the place where his tail was, without putting out his haunches. In the *pirouette* of *two treads* or *fishes*, he takes a small compass of ground, almost his length, and marks both with the fore-part and the hind.

PISCARY, *piscaria*, in our *Ancient Statutes*, the liberty of fishing in another man's waters.

This differs from a free fishery, which is an exclusive right: in this last a man has a property in the fish before they are caught; in a common of *piscary*, not till afterwards.

PISCES, in *Astronomy*, the twelfth sign, or constellation, of the zodiac.

The stars in *Pisces*, in Ptolemy's Catalogue, are 38; in Tycho's 36; in Hevelius 30; in the Britannic Catalogue 113; the longitudes, latitudes, magnitudes, &c. whereof are as follow.

Names and situations of the stars.	Mans Cons.	Signs.	Longitude.	Latitude.		Magnitudes.
			° ′	° ′		
		X	11 06 21	7 12 40	B	7
			12 06 22	6 41 30	B	6
			12 04 30	6 02 00	B	6
In the mouth of the south. fish	β		14 15 00	9 02 00	B	3
	A		14 41 18	7 01 30	B	6
		☉				
South. of 2 in the hind part of the head	γ		17 03 42	7 16 43	B	4
North. in the hind part of the head	δ		18 41 18	8 52 18	B	6
Perced. of two in the belly	ε		18 24 18	4 56 26	B	4
A small one conspicuous to it	ζ		18 35 48	4 16 24	B	5
Preced. in the back	η		19 13 23	9 01 58	B	5
			17 56 42	1 13 54	B	6
			18 16 10	3 22 30	B	6
			18 48 18	1 46 36	B	6
			19 13 58	1 24 52	B	6
			20 34 42	3 13	B	6
Soldier, in the back			21 [illegible]	[illegible]		
South. of two in the belly	A		23 16 [illegible]	[illegible]		
			23 56 [illegible]	[illegible]		
All of these perceived by a square under the south. fish			24 48 [illegible]	[illegible]		

Names and situations of the stars.	Bayer's Cha.	Signs.	Longitud.	Latitude.	Magnitude.
			° ′ ″	° ′ ″	
			6		
		♈	13 41 07	2 01 47 B	6
			24 59 44	3 28 57 B	6
		♈	1 55 57	20 32 59 B	6
Second.			27 47 44	2 11 39 A	6
			14 55 24	2 36 30 B	6
25.					
			27 21 55	6 58 13 B	6
Preced. of north. in the square			23 57 34	3 07 49 A	5
In the tail of the south. fish			28 14 55	6 22 15 B	5
Sout. of the north. in the square			24 53 04	2 57 45 A	5
Prec. of the south. in the square			23 42 36	5 42 35 A	5
30.					
			19 46 22	7 57 50 B	6
That which follows over the tail			29 38 45	7 31 43 B	5.6
Subseq. the south. of those in the square under *Pisces*			24 36 38	5 46 55 A	5.4
			2 26 25	9 32 37 B	6
			2 27 10	6 36 03 B	6
35.					
			2 45 08	5 54 26 B	6
			5 05 00	11 05 37 B	6
			5 12 38	6 24 02 B	7
			6 28 45	13 12 04 B	6
			6 46 18	12 55 03 B	6
40.					
In the line next the tail of *Pisces*			3 19 13	5 27 28 B	6
			6 09 42	10 09 08 B	6
			7 01 06	10 41 54 B	6
			2 16 10	0 44 47 A	6
			4 36 55	4 50 42 B	6
45.					
			9 57 46	15 06 45 B	6
			9 46 48	13 57 30 B	6
			8 23 31	12 10 56 B	7
			9 08 48	11 59 13 B	7
			12 05 11	15 29 04 B	6
50.					
Second from the tail in the line			5 49 21	5 11 08 B	6
			21 19 37	15 24 27 B	6
			10 04 47	10 21 41 B	7
			13 17 39	15 32 12 B	6
			13 25 26	15 44 47 B	6
55.					
			13 25 49	15 42 03 B	6
			12 26 42	9 38 42 B	6
			11 06 49	6 22 26 B	7
			14 16 36	13 19 58 B	6
			9 12 22	1 32 48 B	6
60.					
			14 57 38	14 30 43 B	7
			9 37 31	1 57 28 B	6
Preced. of the bright stars in the line			9 49 47	2 09 44 B	4
Preced. of three in the head of the north. fish			3 34 02	10 44 49 B	6
			28 17 46	10 30 43 B	6
65.					
			15 43 29	12 17 33 B	6
Middle of those in the head			19 23 44	19 29 39 B	6
Last of 3 in the head of the north. fish			20 33 56	20 57 08 B	6
Preced. of 2 against the eye of the north. fish			22 53 41	23 03 4 B	5
			13 01 46	3 09 28 B	6
70.					
Middle of the bright stars in the south. line			25 22 11	2 04 07 B	4
			26 23 36	7 23 22 B	6
			12 46 46	1 10 55 A	6
Preced. of 2 in fin of the back			29 06 00	13 21 08 B	5
			15 43 21	5 31 13 B	6
75.					
Subseq. against the eye of the north. fish			23 46 30	23 06 23 B	5
			12 41 41	1 55 30 A	6
			24 04 18	22 47 51 B	6
Middle in the fin of the back			29 12 25	12 28 46 B	6
			5 36 42	1 30 14 A	5
80.					
Last of 3 in the fin of the tail			19 17 30	21 18 09 B	6
North. of 2 against the mouth of north. fish			24 47 32	19 59 06 B	6
South of the same			23 58 26	20 42 10 B	5
That following the fin of back			20 11 45	13 25 09 B	5
South of 2 in the belly			22 08 31	15 29 02 B	5
85.					
Last of 3 bright ones in south. line			15 32 13	0 13 25 A	4
			18 53 31	7 19 21 B	7
			25 30 53	8 32 30 A	6.7
South. of 2 in fold of south. line			25 00 04	4 17 13 A	6
North. in the belly			24 27 46	15 26 30 B	5
90.					
Another following it			25 25 21	18 39 53 B	6
			21 40 54	8 20 43 B	7

Names and situations of the stars.	Bayer's Cha.	Signs.	Longitud.	Latitude.	Magnitude.
			° ′ ″	° ′ ″	
Prec. of ninth, in bending of the line		♈	22 45 18	9 22 02 B	5
Subseq. of the same			22 58 27	9 23 58 B	5
			17 56 00	3 34 56 A	7
95.					
			18 57 55	1 54 51 A	6.7
			25 14 23	8 17 40 B	6.7
3d of those in nor. line before the knot		♓	18 46 49	3 04 25 A	5
Middle of 3 in north. line			22 29 29	5 27 02 B	5.3
			22 13 58	2 28 04 B	6
100.					
			23 11 38	4 20 45 B	6
South. of those in north. line			22 55 18	1 32 06 B	5
			24 41 59	3 31 46 B	6.7
			23 50 06	3 40 33 B	6.7
			24 42 32	5 37 12 B	6.7
105.					
Middle of 3 in the hind line before the knot			21 10 57	4 43 13 A	5
			26 47 42	9 01 34 B	6.7
			28 22 53	11 24 08 B	6
			27 14 27	8 36 20 B	8
That next the knot in nor. line			23 24 40	1 38 58 A	5
110.					
1st behind the knot in south. line			23 11 18	7 55 41 A	6
			24 42 05	8 35 03 A	6.7
In the knot of the two lines			25 02 23	9 05 10 A	5

PISCIDIA, in *Botany*, a genus of the *decandria dimynia* class. Its characters are, that it has an acute stigma, and a winged pod. There are two species.

PISCINA, in *Antiquity*, a large bason, in an open public place, or square, where the Roman youth learnt to swim; and which was surrounded with a high wall, to prevent the exiling of fish into it.

The word is formed from the Latin *piscis*, *fish*; because men here imitated fishes in swimming, and because fishes were actually kept in some of these places.

PISCINA was also used for the square bason in the middle of a bath.

PISCINA *probatica* was a pool or reservoir of water, near the court of Solomon's temple; so called from the Greek *προβατον*, *sheep*; because here they washed the cattle which were destined for sacrifice.

By this *piscina* it was that our Saviour wrought the miraculous cure of the paralytic. Davila observes, there are still remaining five arches of the portico, and part of the bason, of this *piscina*.

PISCINA, or *lavatory*, among the Turks, is a large bason placed in the middle of the court of a mosque, or under the porticus that encompass it.

Its form is usually a long square. It is built of stone or marble, furnished with a great number of cocks, where in the mussulmans wash themselves before they offer their prayers; as being persuaded, that ablution effaces sin.

PISCIS, in *Zoology*. See FISH.

PISCIS *australis*, in *Astronomy*. See AUSTRALIS.

PISCIS *fossilis*, in *Ichthyology*, a name given by Jonston to a kind of the cobitis, found buried in the land, and dug out by the people of many parts of Germany for food. It is called by many authors the *mustela fossilis*, and by some the *perca*. It is properly a species of cobitis, and is called by Artedi the *cobitis cirris*, with five longitudinal black lines on each side of the body.

PISCIS *fossilis Petri*, in *Ichthyology*, a name given by Jonston and some other authors to the *faber* or *John* DORE. It is properly a species of ZEUS.

PISCIS *volans*, the *flying fish*, in *Astronomy*, is a small constellation of the southern hemisphere, unknown to the ancients, and invisible to us in these northern regions. It contains eight stars, whose longitudes and latitudes, &c. are as follow:

Names and situations of the stars.	Signs.	Longitud.	Latitude.	Magnitude.
		° ′ ″	° ′ ″	
In the head	♋	16 36 14	72 22 35 S	5
In the middle of the body		10 25 40	77 44 32 S	5
In the tail	♍	0 1 30	68 15 22 S	5
In the left wing, upper	♋	11 19 45	72 33 22 S	5
Lower		15 38 28	72 27 26 S	5
In the right wing, upper	♍	3 31 11	76 45 0 S	6
Lower		11 51 58	79 21 46 S	5
Informis, between Chamæleon and the *Flying fish*		14 11 45	67 52 34 S	5

PISCIVOROUS *animals*, are such as feed on fish. See BIRD.

PISELAMIN *plum*, in *Botany*. *See Indian Date* PLUM.

PISMIRE, or ANT.

PISONIA, in *Botany*, the name given by Plumier, in honour of *Piso*, to a genus of plants, called by Vaillant *Guettarda*. See PINGRICO.

PISSASPHALTUM, or PISSASPHALTUS, *mineralogy*, compounded of *pissa*, *pitch*, and *asphaltum*, *bitumen*, in *Natural History*, denotes a native, solid bitumen, found in the Cevennes mountains of Apollonia; of an intermediate nature between pitch and asphaltum. Its characters are these: *The pissasphaltum* is a solid mineral bodies, of a form so that thick consistence, dusky, and opaque; of a strong smell, and readily inflammable, but leaving a reddish mass after burning.

There are three known species of this genus. 1. A thin and blackish kind, called *oleum petræ*. See OIL of the earth, and PETROL.

2. A thicker black one, called *pissasphaltum Indicum*, or BARBADOES *tar*. And, 3. A black and viscous one, called simply *pissasphaltum* in the shops.

Pissasphaltum is as tough and viscous as bird-lime, and of the same consistence when old. It very much resembles the common black pitch, when softened a little by heat; and has been generally thought to have something of the smell of that substance; but this seems to have arisen from its being too frequently adulterated by mixing pitch with it, and the true genuine substance has no other smell than the rank one of all the bitumens, which somewhat resembles that of oil of amber. It is produced in several parts of the world, and there are large quantities of it in Germany, in Persia, and in France. It yields a liniment oil by distillation, which very much resembles the native petroleum; and is too often sold with it under the name, being annually imported in large quantities from those parts of Germany where it is manufactured, and having itself no particular name in the shops of our druggists.

Pissasphaltum was much recommended by the ancients for external use, as an emollient, maturant, and digestive: with this intention it was used in cataplasms, for ripening all sorts of tumours, and against the sciatica and other pains of the limbs. They also had recourse to it for strengthening the limbs, after the reduction of dislocations. It is little used at present, the petroleum being thought very proper to supply its place.

PISSAVHELETUM is also a name given to a fictitious substance, compounded of pitch and asphaltus, or the true bitumen Judaicum.

The coarseness of this, the black colour, and the fetidness of the smell, distinguish it from the true asphaltum.

PISSAVHELTUM is also used, by some writers, to denote the sweet pitch, or simple asphaltus.

PISSELÆUM, *wax-cake*, *clean* PICTUM, or oil of pitch, a medicament compounded of oil and pitch.

PISSELEUM *Indicum*, among *Modern Writers*, denotes a bituminous substance brought from the West Indies, popularly called BARBADOES-*tar*.

It is a heavy, thick, and dusky-looking mineral fluid, of the colour and consistence of common treacle, and of a very opake hue: it is of a disagreeable smell, faintly approaching to that of oil of amber, and is very inflammable. It is found trickling down the sides of the mountains at the back of several of our plantations in America, and is in great esteem there for coughs and disorders of the lungs. We meet with very little in England that is genuine, several different sophistications of it being in common use, even upon the spot. See PETROL. It has a strong smell not unlike the common tar, and is not very pleasant to sight or taste. It is accounted a good balsamic, and where the stomach can dispense with it, will do great service in many disorders of the breast, which has also been experienced of common tar.

PISSEROS, the name of an ointment greatly recommended by Hippocrates in many cases, as in burns, fresh wounds, &c. It was made of oil of roses, beeswax, and pitch, proportioned so as to give the whole a soft consistence. It was of the nature of our modern black basilicon, and found a good ointment in many cases.

PISSINUM. Pliny says it was customary for the ancients to hold fleeces of wool over the steam of boiling tar, and squeeze the moisture from them, which watery substance was called *pissinum*.

But will have this to be the same with the *pisselæum* of the ancients: but Hardouin, in his notes on Pliny, thinks the *pissinum* to have been produced from the cones of cedars. What use they made of these liquors anciently is not known; but it may be presumed they were used in medicine, though at present it does not appear they are used at all.

PISSITES, a name given by the ancients to a wine impregnated with the virtues of liquid pitch or tar. To prepare it, the tar was ordered to be washed in sea-water or brine, and afterwards in fresh water many times; and after a tedious preparation of this kind, two ounces of it were ordered to be put to eight gallons of must, which is to be suffered to work together, and then the clear liquor to be bottled off.

This was accounted a warm wine, very assistant to concoction, and of an abstersive faculty, and a good pectoral: on these accounts it was given in disorders of the breast, and in obstructions of the liver, spleen, and uterus, if not attended with a fever; and was a common medicine in coughs and asthmas of all kinds.

PISSOCEROS, a name given by the old naturalists to a fubstance found very frequently in the lines of trees, and consisting of a mixture of propolis and wax. The ancients were well acquainted with the use of this substance, which was called the stopping up the cracks and chinks in the hives: they mention, indeed, three sorts of matter used by the bees for this purpose; the mercy, the *pissoceros*, and the propolis; but later authors call them all by the general term propolis, the *pissoceros* and mercy being only the same substance, mixed with wax in different proportions. This PROPOLIS is a resinous substance, of a soft and viscous consistence, collected from the buds of the poplar and other trees.

PISSOSUS, a word used by the old writers on medicine for the depraved appetite of young women about the full eruption of the menses, and of some women with child.

PISTACHIA *bastard*, in *Botany*, a name improperly given by some authors to the tribulant American BLADDER-NUT.

PISTACHIA, or PISTACH-*nut*, a fruit brought from several parts of Asia, chiefly from Aleppo and Persia. When swept in all its coats, it is of the size of a green almond; but when stripped of all but its shell, it resembles a small nut. The kernel is red without, and green within; its taste is very agreeable.

The word is formed from the Latin *Pistacium*, of the Greek *pistakion*, which, according to Menage, the city Pistacium took its name.

The tree that produces it is a kind of turpentine-tree. See MASTICH-*tree*.

The nuts are to be chosen new, heavy, and full; as to those that are broken, such as have kept their colours best are to be preferred; for nothing depends upon the fize.

Pistachios are aperitive, and propre to give vigour; and are used in confections, &c. in phthisical and nephritical cases. They also cure several agues, and are comfited, made into conserves, &c. There is likewise a kind of false *pistachio*, brought from the Caribbee islands, which some confound with the last-named, though very different, both with regard to the plants that produce them, and their quality. The former *pistachio* plant does not rise above a foot high, nor does the fruit grow on the branches, but is found at root. The pod sometimes only contains a single nut, which resembles an olive; but usually several; and in that case they are irregular. The substance is white, compact, and heavy.

This fruit is rarely eat raw, because of the ill effects it produces; it is usually roasted or comfited; it is used in ragouts, and to make tarts, &c.

PISTACHIA-*tree, shrub Pistachio*, a species of the *Rhamnus*. See *Plate* HALF.

PISTANA, in *Botany*, a name by which some authors have called the *sagittaria aquatica*, or water arrow-head.

PISTATIO, among *Pharmaceutic Writers*, a word used to express that preparation of simples which consists in covering them with, or including them in, a pulse, and feeding them in a baker's oven till tender throughout. Squills are sometimes prepared thus.

PISTEREEN, a Spanish coin, worth about a shilling.

PISTE, in the *Manege*, the track or trail, which a horse makes upon the ground he goes over.

The word is French, and literally signifies a *track*.

The *piste* of a horse may be either *high* or *low*.

If the rider make him go but an ordinary gallop, in a circle, or rather circles, he will make but a *large piste*: if he either make him gallop with his haunches in, or go terra à terra, he will make two *pistes*, one with the forepart, another with the hind. And the same if the rider make him manage, by go sideways, either in a strait line, or upon a circle.

PISTIA, *water-cabbage*, or *lettuce*, in *Botany*, the name given by Linnæus to a genus of plants of the gynandria-polyandria class and order, called *pistia* by Plumier, and in the Hortus Malabaricus. The characters of these are these: there is no cup: the flower consists of one petal, which is cucullated and rubinated, and the [illegible] linæ, and long lip, bent and folded [illegible] are no stamina, but six double anthers [illegible]

under the ſtigma; the germen of the piſtil is of an oval oblong figure; the ſtyle is ſhorter than the flower; the ſtigma is peltated, and obtuſely divided into ſix ſegments; the fruit is a capſule of an oval figure attenuated at the baſe, and contains one cell; the ſeeds are truncated. This genus ſeems nearly allied to the birth-worts. There is one ſpecies.

PISTIL, among *Botaniſts*, the female organ of generation in flowers. It is compoſed of three parts, the germen, the ſtyle, and the ſtigma: the germen ſupplies the place of the uterus in plants; its ſhape is various, but it is always ſituated at the bottom of the *piſtil*, and contains the embryo ſeeds: the ſtyle is a part of various figures alſo, but is always placed on the germen; in ſome it is extremely ſhort, in others it ſeems entirely wanting: the ſtigma is alſo of various figures; its place, however, is certain, as it always ſtands on the top of the ſtyle, and if there is no ſtyle, on the top of the germen.

The *piſtil* is an eſſential part of a flower; and the principal female organ of generation; it being in this that the ſeeds or young plants are formed.

It ariſes from the pedicle of the flower, or the centre of the calyx; and at length becomes the young fruit, which is ſometimes hid in the calyx, and ſometimes ſtands quite out.

The figure of the *piſtil* is very different in different flowers: ſometimes it is a little ſtalk, which enlarges at the two ends like a peſtle; ſometimes it is a mere ſtamen, or threat; ſometimes it is round, ſometimes ſquare, triangular, oval, &c.

Almoſt all *piſtils* are furniſhed at top, either with fine hairs, which make a kind of velvetting; or with little filaments diſpoſed in plumes; or elſe they are beſet with little veſicles full of glutinous juice.

Some flowers have ſeveral *piſtils*; or rather the *piſtils* terminate in ſeveral branches or horns, which have their riſe from as many young fruits, or as many different capſulæ, containing ſeeds.

All theſe *piſtils*, whatever form they be in, have certain apertures at their tops, or certain clefts continued the whole length, to the baſe or embryo of the fruit. This is very viſible in the lily, daffodil, and melon, either by cleaving the *piſtils* lengthwiſe, or cutting them tranſverſly. If, after cutting the *piſtil* of the lily, you immerge one extremity in water, and ſuck through the other end, the water will riſe through it as through a pipe.

By opening the *piſtils* in their different ſtates of growth, it appears evidently, that theſe form the young fruits, and contain within them the embryos of the ſeeds; whether thoſe ſeeds be diffuſed through the whole length of the *piſtil*, or whether they be all incloſed in its baſe; and that they are always open at top, and perforated either more or leſs ſenſibly, to the bottom; though this cavity is frequently effaced as the young fruit grows; and ſometimes a part of the *piſtil*, which Malpighi calls the *ſtyle*, or bodkin, dries and falls off.

The *piſtil*, we have obſerved, is the female organ of generation; its baſe does the office of the uterus, or womb, in women; and its length that of the vagina.

It is encompaſſed with the ſtamina, the apices whereof are full of a fine duſt called *farina fœcundans*; which burſting its veſicuhæ, or apices, when mature, is ſhed on the upper part of the *piſtil*, and thence is conveyed by the cavity thereof to the baſe or uterus; where being ſeſ with a fine juice, ſecreted by the petals, it grows, expands, and thus forms the embryo of a new plant, &c. For a more diſtinct account of the office of the *piſtil* in the generation of plants, ſee PLANT.

PISTIS, in the *Materia Medica of the Ancients*, a name given to the gum bdellium, particularly to that kind of it which was brought from Arabia, and was of a fine yelloviſh white, and in ſmall round drops, or lumps of a roundiſh ſhape, and firm conſiſtence.

PISTOL, a little fire-arm, borne at the ſaddle-bow, at the girdle, or in the pocket.

The *piſtol* is ſaid to have taken its name from *Piſtoya*, a city in Italy; where, as Fauchet tells us, it was firſt made. Borel derives the word from *fiſtula*, *pipe*; the barrel of this piece bearing ſome reſemblance to a flute.

PISTOLE, *doubloon*, in *Commerce*, a gold coin ſtruck in Spain, and ſeveral parts of Italy, Switzerland, &c.

It has its augmentations, and diminutions; which are *quadruple-piſtoles*, *double piſtoles*, and *half piſtoles*.

The *piſtole* is about the ſame weight, fineneſs, and value, with the French louis d'or; viz. it is equal to about ſixteen ſhillings and ſix pence ſterling.

In Spain the *piſtole* is accounted equal to four pieces of eight, or thirty-two rials, or a thouſand and eighty-eight maravadis, or a thouſand three hundred and ſixty maravadis of billon; the old money current at Seville and Cadiz, in Andaluſia, &c. being 25 per cent. better than the money they now reckon by at Madrid, Bilboa, &c. which augmentation was made by Charles II. in 1668, to prevent the exportation of money out of the kingdom.

Moſt of the exchanges in Italy are made on the foot of the *piſtole*.

PISTOLOCHIA, in *Botany*, a name uſed by ſome authors for the plant of which the Virginian ſnake-root of the ſhops is the root.

PISTON, a part or member in ſeveral machines, particularly pumps, air-pumps, ſyringes, &c. called alſo the *embolus*, and popularly the *ſucker*.

The *piſton* of a pump is a ſhort cylinder of metal, fixed exactly to the cavity of the barrel, or body; and which, being worked up and down alternately therein, raiſes the water; and when raiſed, preſſes it again, ſo as to make it force up a valve where with it is furniſhed, and to eſcape through the noſe of the PUMP.

There are two ſorts of *piſtons* uſed in pumps; the one with a valve, which is called a *ſucker*; and the other without a valve, which is called a FORCER.

The *piſtons* of air-pumps, ſyringes, &c. ſee deſcribed under AIR-PUMP and SYRINGE.

PISUM, in *Botany*. See PEA.

PIT *and gallows*, in our *Ancient Cuſtoms*. See FURCA and FOSSA.

PIT, *brine*, the name given by the people of Worceſterſhire and Cheſhire, to the wells or *pits* affording the ſalt water, out of which they extract the ſalt.

Theſe waters, though they all contain ſalt, yet have other things alſo in them, and theſe not in ſmall quantity. They all contain a very large proportion of ſtony matter; this is common to the whole ſet, but particular ſubſtances beſide this are found in the particular *pits*. At Northwich, in Cheſhire, there are four *pits*, the water of all which ſtinks very ſtrongly of ſulphur, and contains ſo much vitriol, that it will turn black like ink, with a decoction of galls; yet this is boiled into a very fine and pure kind of ſalt, common at our tables under the name of baſket ſalt, and having no ſuch properties.

There is a vaſt quantity of ſtony matter precipitated from theſe pans of *brine* in the boiling them to ſalt; this is partly ſaved in ſmall pans ſet at the ſide of the boiler, and partly precipitates to the bottom of the pan, where it forms a cruſt like that at the bottom and ſides of our tea-kettles, which the workmen find it neceſſary to remove every week; but there is no vitriol or ſulphur ſeparated. Phil. Tranſ. N° 150.

In the country near where theſe *brine-pits* are, the inſtruments uſed in boring often bring up fine and hard ſalt; ſo that they give proofs of there being rocks of ſalt in many places.

All along the river Weever, on each ſide, the earth affords *brine* wherever it is opened: but all theſe are not fit for boiling, many of the *pits* affording a *brine* too weak to be worked to any advantage. The very ſtrongeſt *pits* ſometimes alſo become at once too weak; this is owing to the irruption of freſh ſprings into them, and ſometimes the river itſelf makes its way into them, and overflows them with ſuch a quantity of freſh water, that they are utterly ſpoiled. The *brine-pits* at Weſton near Stafford afford a *brine* that ſtinks like rotten eggs; this turns inſtantly to ink with galls, and purges and vomits violently, if taken even in a ſmall quantity. This in boiling depoſits a white flaky ſand, or ſtony matter, without ſmell or taſte, and the ſalt is pure and fine.

The *pit* at Droitwich, in Worceſterſhire, affords no ſand in the boiling, nor any the leaſt ſediment of the ſtony matter at the bottom of the pan, and the ſalt is the pureſt of all the others: and by the people of the country it is eſteemed the moſt wholeſome; becauſe of its being without the ſand.

This and the other *pits* hereabout, all have the ſmell of rotten eggs, eſpecially after a little reſt, as on the Monday morning after the Sunday's reſt. If meat be put to pickle in the brine of theſe *pits*, inſtead of being preſerved it will ſtink in twenty-four hours, ſometimes in twelve, yet they yield the beſt ſalt of any inland *pits* in the world.

The ſulphur ſpaws of Yorkſhire, which are very numerous in different parts of the county, all ſtink violently of rotten eggs; but if well drawn and worked, they would prove as inoffenſive as the reſt, and only ſo many weaker or ſtronger brine *pits*; and the ſmell is no other than that of the Cheſhire and Staffordſhire brine, when it has been left ſome time at reſt. It is remarkable, that though the ſtony matter is depoſited in ſuch vaſt plenty by the waters of all our ſalt ſprings, it is not found in any abundance in thoſe places where ſalt is made out of ſea-ſand, as in Lancaſhire and ſome other places; ſo that it is much more than the natural quantity of ſpar contained in water that is thus depoſited; and indeed it appears from trial, that the brine of our ſalt ſprings, in

general, contains more than twenty times the quantity of four that common water does.

This stony matter separates itself from the water before the salt does, and thus it appears in many other waters impregnated with mineral particles. The vitriolic waters all contain ochre and salt, and in all these the ochre separates itself first in the boiling, and then the vitriol; and the stony matter precipitated from common salt springs affords, on an analysis, the salt called *nitrum calcarium*, in considerable abundance. Phil. Transf. N° 156.

PIT, *coal*. See COAL.

PIT, *teeth*. See COCK *pit*.

PIT, *foss*. See SAW.

PIT *of a theatre*, all that space between the amphitheatre or galleries, and the theatre or stage; called by the ancients *orchestra*; and by the French, *parterre*.

This being the most commodious part, it was here the Roman senate was placed. It has its name *pit*, in Latin *cavea*, from its being sunk below the level of the stage.

PIT-*fish*, or PIT-*worfe*, in *Ichthyology*, the Dutch name of an East Indian fish, approaching very much to the nature of the European turdus, but that it has no scales; its body is not flat but rounded, and is variegated with blue and yellow spots; its eyes stand very prominent, and the fish is able, at pleasure, to thrust them out or draw them in; its back-fin is prickly: it loves muddy and foul places, yet is a very well tasted fish.

PITANCIARIUS, PITANCIARIUS, or PITANTIARIUS, an office, in the ancient monasteries, whose business it was to provide and distribute the pittances of herbs and meat amongst the monks. See PITTANCE.

PITANGUAGUACU, in *Ornithology*, the name of a Brasilian bird of the starling kind, called by the Portuguese there the *bemetevi*. It is of the size of the common starling; its beak is long, thick, and of a pyramidal figure; its head broad and flatted; its neck short, which as it lies it contracts also, so as to make it appear much shorter; its legs and feet are of a dusky brown; it has a very loud and shrill voice; its head, neck, back, wings, and tail, are all of a brownish black, with a faint admixture of green; the lower part of the throat, the breast, and the belly, are yellow, the upper part of the throat white; its beak is very sharp-pointed.

PITCH, PIX, a tenacious sort of juice, or gum, drawn from fatty woods, chiefly from pines and firs; and used in shipping, in medicine, and in various other arts.

Pitch is properly a juice of the wild PINE, or pitch-tree; and is conceived to be no other than the oil thereof inspissated, and turned black, farther than in the balsam. For the method of procuring it from the wood of this tree, see PINE.

The best is that brought from Sweden and Norway. Its goodness consists in its being of a glossy black colour, dry, and brittle.

This is less pungent and less bitter than the liquid TAR, and used only in some external applications, as a warm, adhesive, resinous substance. Neumann observes, that when melted with oils, resins, and fats, into ointments and plasters, the *pitch* is very apt to separate and precipitate.

The ancients had a peculiar kind of *pitch* called AMUSIA, which was inspissated to a higher than ordinary degree for certain uses; such as the receiving a proper quantity of bees wax, to render it the zopissa used in coating the bottoms of ships; which the common *pitch* could not do, being of too soft a consistence for this use. Pliny tells us that it was made in this manner: the wood was cleaved and formed into a pile, with proper trenches cut in the earth to receive what run from it in burning. When the pile was lighted, the first thing that flowed into these trenches was a thin fluid liquor like water.

PITCH-*tree*, in *Botany*. See PINE-*tree*.

PITCH, *Burgundy*, is brought to us from Saxony, and is supposed to be a preparation of the same kind with the common ROSIN of the shops, only less divested of the oil, made by boiling the common TURPENTINE till it acquires a due consistence.

PITCH, *naval*, *pix navalis*, is that drawn from old pines, ranged and burnt like charcoal. This, with a mixture of tow, or beaten cables, serves for the pitching of vessels.

PITCH, *mineral*, is also a denomination given to that scraped from off the sides of old vessels; and which is supposed to have acquired an astringent virtue, by means of the salt water. It serves to make plasters; though it is certain the apothecaries usually substitute the common *black pitch* in its stead.

PITCH, *Greek*, or *Spanish* PITCH, is that boiled in water till it has lost its natural smell; upon which it becomes dry and friable.

The ancients called it *colophane*; from Colophon, a city in Greece, whence great quantities were brought.

PITCH, *oil of*, *oleum picinum*, is an oil procured from *pitch*, by separating the aqueous matter that swims a-top of the melted *pitch*. This, for the great virtues attributed to it, is also called *balsam of pitch*.

PITCH, *ointment of*, in *Medicine*, is made by melting tar with an equal weight of mutton suet, and straining the mixture whilst hot: this is used sometimes as a digestive, and said to be particularly serviceable against scorbutic and other cutaneous eruptions.

PITCH, *pills of*, are made of tar mixed with so much powdered liquorice, or other such powdered matter as is sufficient to render it of due consistence for being formed into pills.

PITCH *of Castro*, in the *Materia Medica*, the name given by Boccone and some other writers, to a thick kind of bitumen found issuing out of the cracks of some rocks near the village of Castro; from whence it has its name: it is famous in the ecclesiastical state for its medicinal virtues.

PITCH, *Jew's*. See ASPHALTUM.

PITCH, in *Music*. See GRAVITY *of Sound*, and KEY.

PITCH, in *Building*, denotes the angle or GABLE-end.

If the length of each rafter be three-fourths of the breadth of the building, the roof is said to be *true pitch*. This is used when the covering is of plain tiles.

If the rafters be longer, it is said to be a *high* or *sharp-pitched* roof; if shorter, which seldom happens, it is said to be a *low* or *flat-pitched* roof.

If the length of the principal rafters be equal to the breadth of the building, it is called *Gothic pitch*. This is used when the covering is of pantiles.

If to rule as a pediment, it is said to be pediment *pitch*. The perpendicular height of this *pitch* is equal to $\frac{3}{8}$ of the breadth of the building. This *pitch* is used when the covering is lead.

PITCHED, in the *Sea Language*. They say the mast is *pitched*, when it is put or let down into the step: also the mast is *pitched* too far aft, when placed too near the stern. When a ship falls with her head too much into the sea, or beats against it so as to endanger her top-masts, they say, she will *pitch her masts by the board*.

This motion may proceed from two causes; the waves which agitate the vessel, and the wind upon the sails, which makes her stoop to every blast thereof.

PITCHING. See PAVEMENT.

PITCHING-*penny*, a duty, commonly of one penny, paid for *pitching* or setting down every sack of corn, or pack of merchandize, in a fair or market.

PITCHT, *boulder*. See SHOULDER *pitcht*.

PITH, in *Vegetation*, the soft spongy substance contained in the central part of plants and trees. As the substance of the trunk in trees become more woody, the *pith* is compressed and straitened to such a degree, that it wholly disappears.

It is plain from this, that the office of the *pith* in vegetation cannot be very great, since it is not of perpetual duration. By its spongy structure, it seems fitted to receive any superfluous moisture that might transude through the pores of the woody fibres. If by the excess of such moisture, or from any other cause, it happens to rot and perish, as frequently happens in elms, the tree is found to grow full as well without it; a proof it is of no essential use in vegetation. Boerhaave, Chem. p. 139.

The *pith* of trees is continued farther into their minute parts than is generally conceived; the smallest branches and pedicles of the leaves and flowers have their share of it, according to the nature of the tree they belong to; and even the middle ribs of the leaves, when examined by the microscope, are not without it: a transverse section of one of these ribs of the leaf of a *pith* tree shows a very beautiful arrangement of vessels, or little bladders, containing a quantity of clear liquor, and resembling in all respects those of which the *pith* in the branches is composed. The *pith* in these is not round, however, as in the others, but flat, and runs from one end of the pedicle to the other, in form of a thin white rib, gradually lessening to a point.

The *pith* of plants, in fine, seems what the marrow is in animals, a congeries of an infinite number of vesicles, which seem destined to separate a finer juice than is necessary for the nourishment of the coarser parts of the tree. It is observed of plants which have a larger than ordinary share of *pith*, that they produce larger quantities of flowers than others; instances of this are seen in the rose, the lilac, and the common elder: and in the fesculaceous plants, the quantity of flowers is not only profusely large, according to the great quantity of *pith* in their stalks; but the *pith* seems carried up the stalks all the way to the seeds themselves; the long seed [illegible] the sweet myrrhis, and other the like plants, which [illegible] being only *pith*. Mem. Acad. Scienc. 1705.

Dr. Hales shews that the *pith* serves to supply [illegible] moisture for the tender shoots of plants; and that the figure of these may be oblong, and not round. In the fruit, there are tough diaphragms, or partitions in the

pith

pith at small distances from each other, which check the lateral expansion; as also horizontal fibres, which serve for the same purpose.

Of the same sort is the *pith* in the large growing feathers of birds; being composed of vesicles that can be distended lengthways, but have sphincters at the ends, to prevent too large a lateral dilatation. Vid. Hales's Veget. Statics, vol. i. p. 337.

PITHECALOPEX, the *semivulpa*, or *apo-fox*, a name given by Aldrovandus and some others, to that strange American animal which we call the OPOSSUM.

The name is compounded of that of the *fox* and the *ape*; of the natures of both which animals it is supposed by some to participate.

PITHIA, and PYTHIAN. See PYTHIA, and PYTHIAN.

PITHOS, or PITHITES, with some writers, a sort of comet, or rather meteor, in form of a tub. Of these it is said there are divers kinds, viz. some of an oval figure, others like a tun or barrel set perpendicular, and some like one inclined, or cut short off; others having a hairy train or bush, &c.

PITHYUSA, in *Botany*, a name used by many authors for a small species of SPURGE.

PITT. See PIT.

PITTACIUM, *Tarbeam*, in *Surgery*, a name which some authors give to a piece of cloth spread with a salve, to be laid on a part affected.

PITTANCE, *portantia*, the common, or allowance of meat, be it fish, flesh, or the like, ftatedly eaten at meals, besides bread.

The word is not much used except among religious, and those who live in college, or community. Du-Cange derives it from *pittantia*, used in the lower Latin for a monachal portion given to two monks in the same dish, consisting of something better than pulse.

Hence we sometimes also find it denote a meal, or commons, better than ordinary; such as is allowed in communities on feast days.

Others derive the word a *pittate*; and others, with Salmasius, from *pittacia*, a mess, or portion, allowed the soldiers, mentioned in several laws of the Theodosian code. It is added, that the word *pittacia* properly signified a title, or written label, added a-top of the vessel, to shew what was within-side, or for whom it was intended.

PITUINA, in the *Materia Medica*, a name for the resin of the pitch-tree.

PITUITA, one of the four humours found in the bodies of animals, on which their temperament is commonly supposed to depend.

The *pituita*, called also *phlegm*, is properly the most viscid and gluinous part of the blood, separated in the largest glands, where the contortions of the arteries are greatest, and give the greatest retardation to the blood's velocity; as in the glands about the mouth and head.

The class of phlegmagogues, as manna, &c. are supposed particularly to purge *pituita*.

Physicians give several epithets to the *pituita*, according to its conditions, or qualities; as *saline*, *vitreous*, *gypseous*, *acid*, &c.

Pituita is supposed to be the prevailing humour in cold, heavy, slow people, inclined to seriousness and study; as the bile is in those inclined to war, &c.

The *pituita*, discharged at the nostrils, is separated in the membrane that lines the cavities of the nose, cheeks, &c. Its use is, to keep that membrane soft, and defend it from injuries of extraneous bodies, especially those of the air, which passes this way, in inspiration, when the mouth is shut.

PITUITARY *gland* is a gland in the brain, somewhat difficult to be seen without removing it out of its place; and of a singular kind of substance, which seems to be neither medullary nor glandular. In figure, it is transversely oval or oblong, and in the lower part in some subjects it is divided by a small notch with two lobes, like a kidney bean. See *Tab. Anat. (Angiol.) fig.* 1. *lit.* 6.

It is of the size of a very large pea, and is placed in the sella of the os sphenoides, under the infundibulum, wherewith it communicates; and covered by the pia mater as by a bag; receiving a lympha, or juice, which the infundibulum derives from the plexus choroides, and pineal gland; and from this lympha does the gland itself take its name.

It also filtrates a juice itself; separating from the blood a white liquor, very subtile, and apparently very spirituous.

M. Littre observes a sinus, or reservoir of blood, which touches this gland; and which is open to it in the place of contact, so that the gland lies partly in the blood. This, that author takes to do the office of a balneum Mariæ, in keeping the gland of the degree of warmth necessary for the discharge of its functions.

This gland is found in all quadrupeds, fishes, and fowls, as well as in men. M. Littre gives an instance of a tedious disease, and at length death, arising solely from an obstruction and inflammation of the *pituitary* gland.

PITUITARY *membrane*, is that which lines the whole internal nares, the cellular convolutions, the conchæ, the sides of the septum narium, and, by an uninterrupted continuation, the inner surface of the sinus frontales and maxillares, and of the ductus lacrymales, palatini, and sphenoidales. It is likewise continued down from the nares to the pharynx, septum palati, &c. It is so called, because it separates from the arterial blood a mucilaginous lympha called PITUITA.

This membrane is of different structure in different parts. Near the edge of the external nares it is very thin, in other places it is thick and spongy; it is thickest on the septum narium, the lower portion of the internal nares, and the conchæ: in the sinuses its texture is more slender; and on the side next the periosteum and pericbondrium it is furnished with many small glands. Winslow.

PITY, in *Ethics*. See COMPASSION.

PITYIDES, a name used by some authors for the kernels inclosed in the cones of the fir or pitch-tree; they are recommended by the old physicians, in disorders of the breast.

PITYLISMA, a name of one of the exercises described by the ancient physicians, as of great service in chronic cases. It consisted in a person's walking on tip-toe, and stretching his hands as high above his head as he could, keeping the whole body also as much upon the stretch as might be. In this condition the patient was to walk as far as he was well able, all the while moving about both hands as much as he could, in all directions.

PITYRIASIS, a name given by the ancients to a scurfy disorder of the head and eye-brows, and of any other part where there is hair. It makes the skin seem as if covered with bran, and is attended with a troublesome itching.

PIVA, in the *Italian Music*, a HAUTBOY or CORNET.

PIVOT, or PIVOT, a foot or shoe of iron, or other metal, usually conical, or terminating in a point; whereby a body intended to turn round, bears on another fixed at rest, and performs its circumvolutions.

The *pivot* usually bears or runs round in a sole or piece of iron or brass, hollowed to receive it.

Large gates, &c. usually turn on *pivots*. The ancients tell us, they had theatres in Rome, that held eighty thousand people, which yet turned on a single *pivot*.

PLACAGNODIAUGIA, in *Natural History*, the name of a genus of spars.

The word is derived from the Greek πλαξ, *a cruſt*, αγνυω, *pure*, and διαυγης, *pellucid*.

The bodies of this genus are cryſtalline terrene ſpars, or ſparry bodies with much of the brightneſs and tranſparence of cryſtal, but debaſed by an admixture of earthy matter, and are imperfectly pellucid, and formed into thin plates with flat ſurfaces, but covered at times either in part or entirely, with tubercles or botryoide prominences, and are compoſed of arrangements of oblong concretions, of no determinately angular figure.

Of this genus there are only two known ſpecies, viz. a hard ſemipellucid and yellowiſh brown one; and a brittle pellucid and whitiſh one. Hill.

PLACAGNOSCIERIA, in *Natural History*, the name of a genus of ſpars.

The word is derived from the Greek πλαξ, *a cruſt*, αγνυω, *pure*, and σκληρος, *opake*.

The bodies of this genus are dull and opake cryſtalline terrene ſpars, formed into cruſts, and of an irregular and not ſtriated texture within.

Of this genus there are three known ſpecies, viz. a hard whitiſh brown one, a dull crumbly whitiſh one, and a dull pale brown friable one, of a very coarſe texture, which encruſts the ſides and bottoms of veſſels, in which water is frequently boiled. Hill.

PLACARD, or PLACART, PLACAERT, a foreign term, frequent in Gazettes, ſignifying a leaf, or ſheet of paper, ſtretched and applied upon a wall, or poſt. Edicts, regulations, &c. are to be made public in *placards*.

The word *placard* is alſo uſed for a libel or lampoon. At Rome, *placards* againſt the pope are frequently fixed, in the night-time, to the ſtatue of Paſquin. See PASQUINADE.

PLACARD, in *Architecture*, denotes the decoration of the door of an apartment, which is ſometimes a corniche ſupported by conſoles.

PLACARD, in *Our Cuſtoms*, denotes a licence whereby a perſon is permitted to ſhoot with a gun, or to take otherwiſe unlawful game.

PLACE, *locus*, in *Philoſophy*, that part of immoveable ſpace which any body poſſeſſes.

Ariſtotle, and his followers, divide *place* into *external*, and *internal*.

PLAGE,

PLACE, *internal*, is that ſpace, or room, which the body contains.

PLACE, *external*, is that which includes or contains the body; which is alſo called, by Ariſtotle, the firſt or concave and immoveable ſurface of the ambient body.

It is controverted, in the ſchools, whether *internal place* be a real entity, or only an imaginary being; i. e. whether it be any thing intrinſically, or only an aptitude and capacity of receiving bodies.

Some maintain it a poſitive being, incorporeal, eternal, independent, and infinite; and aſſert it even to conſtitute the immenſity of the Godhead.

The Carteſians, on the contrary, hold *internal place*, abſtractedly conſidered, to be no other than the very extenſion of the bodies contained therein; and therefore in no wiſe different from the bodies themſelves.

The ſchoolmen likewiſe diſpute, whether *external place* be moveable, or immoveable? Its immobility is argued from this conſideration; that what moves, muſt neceſſarily leave its *place*; which it cannot do, if it go along with the moveable. Others charge an abſurdity on this opinion of Ariſtotle; viz. that hence it follows, that a body really at reſt is continually ſhifting *place*: a tower, for inſtance, on a plain; or a rock in the middle of the ſea; becauſe the one and the other are continually incloſed with new air, or new water, muſt be ſaid to be in motion, or to change *place*.

To ſolve this difficulty, and ward off the abſurdity which follows from Ariſtotle's laying down external place as immoveable, many expedients have been had recourſe to. The Scotiſts contend for *place*'s being only immoveable, by equivalence. Thus, when the wind blows, the air which inveſted the ſurface of the tower does indeed recede, but then other ſimilar and equivalent air takes place. The Thomiſts chuſe to deduce the immobility of *external place*, from its keeping the ſame diſtance from the centre, and the cardinal points of the world; and the Nominaliſts, from a correſpondence with certain virtual parts of the divine immenſity.

The Carteſians deny *external place* to be either a ſurrounding ſurface, or a body ſurrounded, or a mean term between the two; and conceive it to be the ſituation of a body among adjacent bodies conſidered as at reſt. Thus the tower muſt be deemed to remain in the ſame *place*, though the ambient air be changed; ſince it retains the ſame ſituation, with regard to the neighbouring hills, trees, and other parts of the earth.

Sir Iſaac Newton better, and more intelligibly, diſtinguiſhes *place* into *abſolute*, and *relative*.

PLACE, *abſolute*, and *primary*, is that part of infinite and immoveable ſpace which a body poſſeſſes.

PLACE, *relative*, or *ſecondary*, is the ſpace it poſſeſſes, conſidered with regard to other adjacent objects.

Dr. Clark adds another kind of *relative place*, which he calls *relatively common place*; and defines it, that part of any moveable or meaſurable ſpace which a body poſſeſſes; which *place* moves together with the body.

PLACE, Mr. Locke obſerves, is ſometimes likewiſe taken for the portion of infinite ſpace poſſeſſed by the material world, though this, he adds, were more properly called extenſion.

The proper idea of *place*, according to him, is the relative poſition of any thing, with regard to its diſtance from certain fixed points; whence we ſay, a thing has or has not changed *place*; when its diſtance is, or is not altered with reſpect to thoſe bodies.

For the viſion of *place*, ſee VISION, and VISIBLE.

PLACE, in *Optics*, or *Optical* PLACE, is the point to which the eye refers an object.

Thus the points D and E (*Tab. V. Optics. fig.* 89.) to which two ſpectators in *d* and *e* refer the object C, are called *optic places*.

Here, if a right line joining the optic *places* D and E, be parallel to a right line paſſing through the eyes of the ſpectators *d*, *e*; the diſtance of the optic *places* D, E will be to the diſtance of the ſpectators *d* and *e*, as the diſtance of one of the optic *places* from the *place* of the object EC, to the diſtance of the other ſpectator from the ſame object *d* C.

PLACE, *optic*, of a ſtar, is a point in the ſurface of the mundane ſphere as C or B (*Tab. Aſtronomy, fig.* 27.), wherein a ſpectator in E, or T, ſees the centre of the ſtar S.

This is divided into *true*, and *apparent*.

PLACE, *true*, or *real optic*, is that point of the ſurface of the ſphere B, wherein a ſpectator, placed in the centre of the earth, ſees the centre of the ſtar, or phenomenon.

Or it is a point among the fixed ſtars, determined by a line drawn from the centre of the earth through that of the ſtar, and terminated in B among the ſtars.

PLACE, *apparent*, or *viſible optic*, is that point of the ſurface of the ſphere, wherein a ſpectator, placed on the ſurface of the earth in E, ſees the centre of the ſtar S. Or a point C found by a line paſſing from the ſpectator's eye through the ſtar, and terminated in the ſphere of the ſtars.

The diſtance between the two optic *places* makes what we call the PARALLAX.

The *apparent place*, in optics, is different from the *real* one; for when, by refraction through glaſſes, that parcel of rays which falls on the pupil of the eye, from each point of any near object, is made to flow as cloſe together, as that which comes from a diſtant one; or when, by the ſame means, the rays coming from diſtant objects are made to diverge as much as if they flowed from near ones; then the eye muſt neceſſarily ſee the *place* of the object changed; which change is its *apparent place*.

If an object be placed nearer to a convex glaſs than is the diſtance of its focus, its *apparent place* may be determined: but if the object be in the focus of the glaſs, the *locus apparens* of the object cannot be determined; only that it will appear vaſtly remote.

Nor can the *locus apparens* be determined if the object be beyond the focus of a convex glaſs: but if the object be farther diſtant from a convex glaſs than its focus, and the eye lie beyond the diſtinct baſe, its *apparent place* will be in the diſtinct baſe. See LENS.

PLACE *of the ſun*, a *ſtar*, or *planet*, ſimply, denotes the ſign and degree of the zodiac, which the luminary is in.

Or, it is that degree of the ecliptic, reckoned from the beginning of Aries, which the planet's or ſtar's circle of longitude cuts: and therefore it coincides with the longitude of the ſun, planet, or ſtar.

As the ſine of the ſun's greateſt declination 23° 30': to the ſine of any preſent declination given or obſerved, v. gr. 23° 1' 12" ſo is radius 10: to the ſine of his longitude 80° 53', which, if the inclination were north, would give 20° 51' of Gemini, if ſouth, 20° 52' of Capricorn, for the ſun's *place*.

PLACE, *aphrontical*. See ASTRONOMICAL.

PLACE, *mean*, is that point of her orbit wherein ſhe is found at any time.

This, by reaſon of the great inequalities in the lunar motions, which render a number of equations and reductions neceſſary before the juſt point be found, is of various kinds; viz. her *fictitious place*, which is the moon's *place* once equated; her *place mean in anno*, which is her *place* twice equated; and the moon's *true place*, which is her *place* thrice equated.

PLACE, *excentric*, *of a planet in its orbit*. See ECCENTRIC, and E, *Tab. Aſtron. fig.* 26.

PLACE, *heliocentric*, of a planet. See HELIOCENTRIC, and R, *fig.* 26.

PLACE, *geocentric*. See GEOCENTRIC, and R, *fig.* 26.

PLACE, *computation of a planet's*. See PLANET.

PLACE *of radiation*, in *Optics*, is the interval, or ſpace in a medium or tranſparent body, through which any viſible object radiates.

PLACE, in *Geometry*, is a line uſed in the ſolution of problems; more uſually called by the Latin name, *locus*.

See the doctrine of geometrical *places* under LOCUS; ſee alſo PLANE.

PLACE, in *War*, is a general name for all kinds of fortreſſes, where a party may defend themſelves.

In which ſenſe it may be defined to be a *place* ſo diſpoſed, as that the parts which encompaſs it defend and flank one another.

PLACE, *ſtrong*, or *fortified*, is a *place* flanked and covered with baſtions. See FORTIFIED *place*.

PLACE, *regular*, is that whoſe angles, ſides, baſtions, and other parts are equal; and this is uſually denominated from the number of its angles: as a pentagon, a hexagon, &c. Palma Nova, built by the Veneſians, is a dodecagon.

PLACE, *irregular*, is that whoſe ſides and angles are unequal.

PLACE *of arms*, in *Fortification*, is a ſtrong city or town, pitched upon for the chief magazine of an army. See *Tab. II. Fortific. fig.* 21. *lit.* ſſ, &c. and *Tab. VII. fig.* 38.

PLACE *of arms*, in a *city* or *garriſon*, is a large open ſpot of ground, uſually near the centre of the place, where the grand guard is commonly kept, and the garriſon holds its rendezvous at reviews, and in caſes of alarm, to receive orders from the governor.

PLACE *of arms*, of an *attack*, in a ſiege, is a ſpacious place covered from the enemy by a parapet or epaulement, where the ſoldiers are poſted ready to ſuſtain thoſe at work in the trenches, againſt the ſoldiers of the garriſon. It is cuſtomary to make three *places of arms*, when the ground will permit; the firſt and moſt diſtant from the place is about three hundred toiſes from the glacis of the covert way; the ſecond is within one hundred and forty toiſes: and the third at the foot of the glacis. See PARALLELS.

PLACE *of arms particular*, in a *garriſon*, is a place near every baſtion, where the ſoldiers, ſent from the grand

place to the quarters assigned them, relieve those that are either upon the guard, or in fight.

PLACE *of arms without*, is a place allowed to the covert-way, for the planting of cannon; to oblige those who advance in the approaches to retire.

Those *places of arms* that are in the covered way, are places made at the entering and saliant angles, considerably larger than the street of the covered way, and formed by turning the head of the glacis into two faces, projecting towards the country: those at the saliant angles are formed by the rounding of the counterscarp; those at the entering angles are constructed by taking the gorget at the head of the glacis of a certain length, drawing the faces at a certain angle, and parallel to those faces drawing a glacis. See FORTIFICATION *according to M. Vauban, and according to M. Cochorn.*

PLACE *of arms*, in a camp, is properly the bell-tents at the head of each company, where the arms are lodged. Italso denotes a large space at the head of the camp, for the army to be ranged in and drawn up in battalia.

PLACE *of arms* of a troop or company, is the spot of ground on which the troop, or company, draws up.

PLACE, *face of a*. See FACE.

PLACE, *tenaille of the*. See TENAILLE.

PLACE, *view of a*. See VIEW. See FORTIFICATION, *according to M. Vauban's first method.*

PLACE, *fire*. See FIRE-PLACES.

PLACE, among *Logicians* and *Orators*, denotes the seat or source of an ARGUMENT; or that from which it is taken.

PLACE is used in the doctrine of artificial memory; and these *places* may be either such in a proper sense, as a door, a window, a corner, &c. or familiar and known persons; or any thing at pleasure, provided they be placed in a certain order, animals, plants, words, letters, characters, historical personages, &c. though some of these are more and some less fit for the purpose; but such kinds of *places* greatly help the memory, and raise it far above its natural power. See MEMORY.

PLACE, *common*. See COMMON *place*.

PLACE *of units, tens, &c.* See UNIT, and NUMERATION.

PLACES, *topical*, in *Astrology*. See HYLEGIAL.

PLACE, *whispering*. See WHISPERING.

PLACE, *additions of*. See ADDITION.

PLACE, *unities of*. See UNITY.

PLACE *bricks* were kiln-burnt red *bricks* of a full size, now entirely disused in the metropolis; but in lieu of them, the soft insufficiently burnt bricks from the outside of the clamps are called, by way of distinction from stock or hard burnt bricks, *place bricks*. These are of a foul red colour, and will easily break or crush to pieces. The particular manner in which *place bricks* were formerly made was by dipping the mould in water before the clay was put in; which made the outer surfaces which burnt very coarse and hard. See BRICK.

PLACENTA, in *Anatomy*, a soliſh roundiſh maſs, found in the womb of a pregnant woman; wherein the ancients ſuppoſe the blood was purified, and prepared for the nourishment of the fœtus. See *Tab. Anat. (Splanchn.) fig.* 16. *lit.* e e.

Hence they alſo called it *hepar uterinum*, the liver of the womb, as if it did the office of a liver in preparing the blood.

It is called by the moderns *placenta*, q. d. womb-cake, becauſe in form of a cake.

The *placenta* is ſuppoſed by ſome to be only a maſs of coagulated blood: for, in the preſſing or waſhing it, it diſſolves; and its real uſe to be, to ſerve as a pillow for the umbilical veſſels to reſt on.

Its figure is not unlike that of a plate without brims; it is uſually three-quarters of a foot over, and ſometimes a foot. It is round, and generally concave and convex; the convex ſide adheres to the uterus, and is uneven, having divers protuberances and pits, by which it makes impreſſions upon, and receives others from, the uterus. Its place in the uterus, whatever ſome pretend, is not certain.

In women, unleſs in caſe of twins, &c. there is but one *placenta*: however, the number generally anſwers the number of the fœtus. In ſome brutes, eſpecially cow or ſheep, they are very numerous, ſometimes near a hundred, even for one fœtus; but ſmall, and only reſembling large conglomerate glands. From the external or concave ſide, which likewiſe has its protuberances, though covered with a ſmooth membrane, iſſue the umbilical veſſels, which are in great plenty diſtributed through the whole ſubſtance of it.

Some even imagine this part to be no more than a plexus of the veins and arteries, by whoſe extremities opening into the ſides of the hypogaſtric veſſels, the circulation is performed between the mother and the fœtus: for that ſide of the *placenta* which adheres to the womb appears to be nothing but the extremities of an infinite number of ſmall threads, which, in labour, dropping out of the pores in the ſides of the hypogaſtric blood-veſſels, into which they had inſinuated themſelves, is the occaſion of the flowing of the lochia, till the uterus collapſes, or the *porus*, by the natural elaſticity of the veſſels, contracts by degrees.

It is a great diſpute among the anatomiſts of the Royal Academy of Paris, whether the *placenta* have any external coat, whereby it is connected to the womb? M. Mery maintains it has none, and that nothing hinders the blood of the mother from paſſing out of the womb into the *placenta*, and thence to the fœtus: in which opinion he is ſeconded by M. Rohault. Meſſ. Vieuſſens and Winſlow maintain the contrary. In a ſubſequent memoir, M. Rohaule endeavours to ſhew, that the *placenta* is no particular part, but only a portion of the CHORION condenſed or thickened.

The *placenta* has generally been looked upon as an original part among the ſecundines; but according to Dr. Thomas Simſon of St. Andrew's, it ſeems to have no place in the ovarium, nor in the uterus, *till* once the ovum becomes contiguous to the fundus, and then every contiguous part becomes really a *placenta*. He thinks the fundus uteri, a place peculiarly fitted for the growth of the *placenta*, as proper ſoils encourage the growth of the roots of trees and ſhrubs, many of which are propagated by the branches however placed; ſo that every part of them ſeems equally fitted to be root or branch. Hence he thinks extra-uterine conceptions can have no *placenta*; and he ſays, there are no inſtances in authors to contradict his opinion. The *placenta* does not increaſe in the ſame proportion which the fœtus does; for the ſmaller the fœtus is, the *placenta* is proportionably larger.

The *placenta* generally adheres to, or near the fundus of the womb, and is covered on the ſide next to the womb, with a fine membranous continuation of the chorion. Vid. Monro, Medic. Eſſ. Edinb. vol. ii. p. 128, and the authorities there quoted.

The ſeparation of the *placenta* from the womb muſt produce abortions, and this may be occaſioned by different cauſes operating in various manners, and requires very different treatment to prevent the loſs of the fœtus.

PLACENTA, in *Botany*, a term improperly given by Mr. Houſton, in the Philoſophical Tranſactions, N° 421, to what is uſually called *receptacle*. See RECEPTACULUM *ſeminum*.

PLACENTA, in *Natural Hiſtory*, the name of one of the claſſes of the echini marini. The characters of theſe are, that they are of a ſuperficial or plano-convex form, and are wrought in various ſhapes, as the paſſey pears: under theſe echini they all have a cinquefoil flower as their baſe, and their mouth is in the middle of the baſe; the aperture for their anus is uſually near the edge.

Of this claſs there are three genera: 1. The *orbicularis*. 2. The *cordiformis*. And 3. The *ovalis*. Which ſee under their ſeveral heads.

PLACENTA, among the *Ancients*, a kind of cheeſe-cake, the moſt ſimple kind of which was made of flour mixed with oil and cheeſe, to which honey was added: but the more luxurious ſort of people added likewiſe a great variety of herbs and fruits, as alſo ſugar, eggs, butter, &c.

PLACITA, PLEAS, a term frequent in our laws and coſtoms.

Originally, *placita* ſignified certain public aſſemblies, of all degrees of men, wherein the king preſided, and where the great affairs of the kingdom were conſulted upon.

Theſe aſſemblies were called *placita generalia*; becauſe *generalitas univerſorum majorum tam ecclesiarum quam laicorum ibidem convenebat*. And hence the decrees, ordinances, ſentences, &c. of this aſſembly, were alſo called *placita*.

Sim. Dunelmenſis tells us, they were held in the open fields; *ut, ſive lis, ſive quæſtio aliqua ſuperſit regem in literis ad ſuam curiam, quia ibi ea judicat in aperto, ubicunque curia ſua.*

Some will have theſe *placita generalia*, and *curiæ regis*, of ancient times, to be much the ſame with what we now call a *parliament*.

The lords courts came hence alſo to be called *placita generalia*, though oftener *curiæ generales*; becauſe all their tenants and vaſſals were obliged to appear in them.

We alſo meet with *placitum commune*, for the day appointed a criminal to appear in, and make his defence. Leg. Hen. I. And *placitum fractum*, i. e. when the day is lapſed.

Lord Coke derives the word *placitum à placendo; quia homines placitare ſuper omnia placet*: indeed, this ſeems a very fanciful etymon; and others have more reaſon in deriving the word from the German *platz*, or the Latin *platea*, *plateæ*, or *ſtratæ*, where theſe aſſemblies were originally held.

PLACITARE, in the *Old Law Books*, ſignifies to plead cauſes. See PLEADING.

Mos placitandi, ante Conquæstum, fuit coram aldermannis, & præpositis, & coram hundredariis, &c. baronibus, majoribus, maneriorum, seneschallis, & aschenis. Misc. in Bibl. Cottob. Tit. Vitellius.

Hence, *placitator*, a pleader. Ralph Flambard is recorded to have been *tetius regni placitator*, in William the Second's time.

PLACITUM, in *Law*, a sentence of the court; or an opinion, ordinance, or decree.

Curia PLACITORUM *coronæ*. See CURIA.

PLAFOND, or PLATFOND, in *Architecture*, the ceiling of a room, whether it be flat or arched; lined with laths and plaister, and sometimes also enriched with paintings, &c. See CEILING.

PLAFOND is also more particularly used for the bottom of the projecture of the larmier of the corniche; called also the SOFFIT.

PLAGIARY, in *Philology, author-theft*; or the practice of purloining other people's works, and putting them off for a man's own.

Among the Romans, *plagiarius* was properly a person who bought, sold, or retained a freeman for a slave; so called, because the Flavian law condemned such a person *ad plagas*, to be whipped.

Thomasius has an express treatise *de plagio literario*; wherein he lays down the laws and measures of the right which authors have to one another's writings. Dictionary-writers, at least such as meddle with arts and sciences, seem in this case to be exempted from the common laws of meum and tuum; they do not pretend to set up on their own bottom, nor to treat the reader at their own cost. Their works are supposed, in great measure, compositions of other people's; and whatever they take from others, they do it avowedly. In effect, that quality gives them a title to appropriate every thing that may be for their purpose, wherever they find it, and, they do no otherwise, than as the bee does for the public service.

Their occupation is not pilaging, but collecting contributions; and, if you ask them their authority, they will produce you the practice of their predecessors of all ages and nations.

PLAGIAULUS, Πλαγιαυλος, among the *Ancients*, a kind of FLUTE.

PLAGIOPLATEUS, in *Natural History*, a term used by Artedi and others to signify depressed, in opposition to the term CATHETOPLATUS, which signifies compressed.

PLAGIUM, in *Civil Law*, the offence of spiriting away and stealing men and children; whence the offenders were called plagiarii, and were punishable with death. See KIDNAPPING.

PLAGIURI, in *Natural History*, the name of one of the great classes, or families of fish; the characters of which are, that the tail is placed horizontally; they respire by means of lungs, and have usually a double fistule in the head; they are viviparous, and the males have a penis and testes, the females the vulva, ovaria, mammæ, &c. and they bring up their young with milk.

The term is derived from the Greek πλαγιος, *transverse*, and ουρα, *a tail*.

Dalechamp distributes all fish are comprehended the following genera: the physeter, delphinus, balæna, monodon, catodon, and thrichechus; which see under their respective articles.

PLAGUE, PESTILENCE, PESTIS, a very acute, destructive, malignant, and contagious disease; being a putrid fever in its worst degrees, and usually proving mortal.

The *plague* is commonly defined by a malignant fever; but Dickenbrock thinks the two ought to be distinguished: the fever not being the essence, but only a symptom or effect, of the *plague*.

The *plague* is reckoned by Dr. Lister, and many others, as an exotic disease, never bred or propagated in England, but always imported from abroad, and particularly from the Levant, the coasts of Asia the Less, Egypt, &c. where it is familiar. Sydenham observes, that it rarely infects England oftener than once in forty years; but through the mercy of God, it is now greatly beyond this period since we have been visited.

The origin and cause of the *plague* have been a celebrated subject of controversy among physicians. The disorder is generally supposed to be communicated by the air; but how, and in what manner, the air becomes thus deadly, is the question.

Some will have infects the cause of *plagues*, as they are of blights: these, they say, being brought in swarms from other parts by the winds, are taken into the lungs in respiration, mix with the blood and juices, and attack and corrode the viscera. Mr. Boyle, on the other hand, attributes *plagues* principally to the effluvia or exhalations breathed into the atmosphere, from noxious minerals.

The air, in effect, is depraved in far more places than improved by being impregnated with subterraneous expirations. Indeed a long the minerals known to us, there are many more noxious than wholesome ones; and the power of the former to do mischief is more efficacious than of the latter to do good, as we may guess by the small benefit men receive in point of health, by the effluvia of any mineral or other known fossil, in comparison of the great and sudden damage often done by the expirations of orpiment, sandarac, and white arsenic.

Amongst the various sorts of particles wherewith the atmosphere is replete, some may be so small and solid, or so conveniently shaped, as to enter many of the numerous orifices of the minute glandules of the skin, or at other pores thereof. Thus, though neither paper nor bladder be pervious to the elastic parts of the air; yet may either of them be easily penetrated by other corpuscles of the atmosphere; and Mr. Boyle says, he has prepared a dry body, which being inclosed in either, would, without wetting or discolouring, or any ways sensibly altering them, pass immediately through the pores thereof, in such plenty, as to exert a manifest operation on bodies placed at some distance beyond them.

This is also confirmed from the sudden check almost every summer given to the *plague* at Grand Cairo; for since morbific causes operate more effectually than curative ones, it seems more than probable, that exhalations ascending from under-ground may produce pestilential fevers, and the *plague* itself; since the corpuscles which impregnate the Egyptian air upon the swelling of the Nile, put a speedy stop not only to the contagion, but to the malignity of the *plague*, assisted even by the summer's heat, which is there excessive.

It is possible there may be noxious minerals in a country, that are not often able to produce pestilences; they may be in strata, or beds, so deep, that even a small earthquake shall not affect them, though a more violent stroke may.

And hence we may account for the *plague*'s raging in some parts of Africa once in thirty, or once in a hundred years; since there may be periodical paroxysms, or grand and vehement commotions in the subterranean parts, though not yet observed in them.

It is probable, peculiar kinds of venomous exhalations may sometimes be emitted, especially after earthquakes; and thus occasion mortal diseases in animals of one kind, and not of another; as in this or that place, and not elsewhere. It is very easy to conceive, that the air we breathe, which is the general repository of the various effluvia emitted, not only by minerals and metals, but by stagnant waters, putrifying substances of different kinds, burning bodies, breathing animals, &c. may on some particular occasions, become in a peculiar degree noxious and fatal. How this effect is produced the reader will be able to perceive by consulting the articles AIR, DAMP, EFFLUVIA, PHLOGISTON, PUTREFACTION, &c.

Fernelius gives us an account of a *plague*, or murrain, in 1546, which invaded no creatures but oxen. Thomas Hollerianthus mentions a *plague*, which attacked none but mares; and that which raged in the time of Gemelin, killed scarce any women, and very few but fatter men. Boterus mentions another *plague*, which assaulted none but the younger sort; and we have instances of the same kind of a hasty handing. Cardan speaks of a *plague* at Basil, with which the Switzers, and not the Italians, Germans, or French, were infected; and Joh. Utenhovius takes notice of a cruel *plague* at Copenhagen, which, though it raged among the Danes, spared the Germans, Dutch, and English, who went with all freedom, and without the least danger, to the houses of the infected.

The *plague*, according to Sydenham, usually begins with a chilliness and shivering, like the accets of an intermitting fever; then comes on a nausea, with vehement vomitings; an intense pain about the region of the heart, as if pinched in a press; and a burning fever, which continually preys on the patient, till either death, or the eruption of some bubo, parotis, or other tumor, in the inguina or axillæ, or behind the ears, relieve him, and discharge the matter of the disease. Sometimes, indeed, it attacks without any fever; purple spots appearing all at once, the certain signs of present death; but this rarely happens except at the beginning of some terrible *plague*.

It has also been known to make its first appearance in tumors, without any fever, or other violent symptom.

Heaviness, pain in the stomach, head, and back, cardialgy, broken sleep, anxiety, alteration in the look, difficulty of breathing, hoccough, syncope, delirium, convulsive twichings, diarrhœa, eyes sunk or inflamed, tongue black and dry, vehement drought, fœtid breath, carbuncles, spots livid, purple, green, &c. are also symptoms usually attending this disease.

A great deal depends on the circumstances of the tumors, or *plague-sores*; as they appear and increase, the fever abates; and as they sink or diminish, it renews again. When they happen about the time of the crisis, and suppurate kindly, they are good prognostics of a happy recovery.

In acute diseases, says Hippocrates, prognostics are ever fallacious.

fallacious. However, in the terrible *plague* at Nimeguen, Diemerbroe who attended the sick through the whole progress of the disease, relates, that those taken ill about new and full moon rarely escaped; that faintings, sweatings, and palpitations of the heart, were usually deadly signs; an intermitting pulse always mortal; drowsiness, sneezings, tremulous motions, dosing, sore throat, &c. were ill omens: diarrhœas always mortal; costiveness a good sign: a diarrhœa almost constantly fatal; and that bloody stools or urine always presaged ill.

As to the cure, physicians are much divided. It is generally attempted with alexipharmics and cardiacs, with the assistance either of sudorifics, or phlebotomy, or both. Many eminent physicians, both ancient and modern, highly commend blood-letting; Sydenham particularly says, that if used copiously, and in time, it never yet did harm: but that sudorifics often prove pernicious. Diemerbroek, on the contrary, with other very experienced writers, protests against phlebotomy, as very dangerous, and often deadly; the chief hopes they founded on diaphoretics and sudorifics: emetics and purgatives are by most absolutely forbid; and yet Dr. Sayer used the former with good success, in the beginning of the disease in the *plague* at London, Ann. 1640. See ALEXIPHARMIC, &c.

The juice of lemons is commended, if singular efficacy in the *plague*, and pestilential severs: Piso relates, that it is the principal remedy of the Indians; and protests he never knew any thing come up to it. Dr. Harris observes, that the same remedy is what the Turks have principally recourse to. Camphor is also much extolled; this, Etmuller assures us, was the basis of Heinsius's antipestilential oil, who had a statue erected to him, when dead, in the city of Verona, for the service he had done thereby. It was prepared from equal quantities of camphor, citron-peel, and amber. The viperine salt, and rob of elder-berries, are also greatly commended.

For preservatives against the *plague*, they are usually summed up in that popular distich:

Hæc tria habitetur tollant adverbia pestem:
Aufer, longe, tarde, cito, procul, ride.

Cauteries, and especially issues, and setons in the inguins, are found of great service in preserving from infection. A piece of myrrh, held in the mouth in contagious places, is also commended. But Diemerbroek assures us, that there is nothing better to this intention, than smoking tobacco; but he adds, that it is only to such as have not made the practice familiar to them. The other preservatives used by that author were the rad. helenii, cardamoms, white-wine vinegar, and cheerfulness; and when he found his spirits low, as if the disease were taking possession, a cup of generous wine sometimes, even to a degree of ebriety. See *Pestilential* DISEASES, and EPIDEMIC.

Dr. Dover says he cured the *plague* among some sailors, in a voyage, by one very plentiful bleeding to the quantity of a hundred ounces, and with drink sharpened with spirit and oil of vitriol. Mem. Ed. Edinb.

Mayors, bailiffs, head officers of corporations, and justices of peace have power to tax inhabitants, houses, and lands, &c. within their precincts, for the relief of persons infected with the *plague*; and justices of the county may tax persons within five miles round, on a parish's inability; the taxes to be levied by distress and sale of goods, or in default thereof by imprisonment. Infected persons going abroad after being commanded to keep house for avoiding further infection, may be resisted by watchmen, &c. and punished as vagrants, if they have no sores upon them; and if they have infectious sores on them it is felony. Justices of peace, &c. are to appoint searchers, examiners, and buriers, of the dead, in places infected, and administer oaths to them for the performance of their duties, &c. 1 Jac. 1. cap. 31. See QUARENTINE.

PLAGUE-*water aqua epidemica*, is one of the compound waters of the shops, distilled from mint, rosemary, angelica roots, &c.

PLAIN, *planus*, an epithet applied to various things, generally importing them to be smooth, even, level, or superficial, or simple, or obvious, or the like.

In these senses the words stand opposed to rough, solid, laboured, enriched, &c.

It is a maxim in heraldry, that the *plainer* the coat, the nearer to antiquity. *Plain* coats are such as are least incumbered with figures, or charges, and which have nothing in them but what is natural.

PLAIN *figure*, in *Geometry*, is an uniform surface, from every point of whose perimeter, right lines may be drawn to every other point in the same.

Or, it is a figure which lies evenly between its bounding lines; and as a right line is the shortest extension from one point to another, so a *plain surface* is the shortest extension from one line to another.

PLAIN *angle* is an angle contained under two lines or surfaces.

It is so called in contradistinction to a *solid* angle.

PLAIN *triangle*, is a triangle included under three right lines, or surfaces; in opposition to a *spherical*, and a *mixt* triangle.

PLAIN *trigonometry* is the doctrine of plain triangles, their measures, proportions, &c.

PLAIN *glass*, or *mirror*, in *Optics*, is a glass or mirror whose surface is flat, or even. See the phenomena and laws of *plain* mirrors, under the article MIRROR.

PLAIN *style*. See DIAL.

PLAIN *scale* is a thin ruler, whereon are graduated the lines of chords, sines, tangents, secants, leagues, rhumbs, &c. of ready use in most parts of the mathematics, chiefly in navigation.

See its description and use under SCALE.

PLAIN *chant*, in *Music*. See CHANT.

PLAIN *descant*. See DESCANT.

PLAIN *chart*, in *Navigation*, is a sea-chart, wherein the meridians and parallels are represented by parallel straight lines; and where, of consequence, the degrees of longitude are the same in all the parallels of latitude.

See the properties, construction, &c. of this chart under CHART.

PLAIN *sailing*, in *Navigation*, is the art of working the several cases and varieties in a ship's motion on a *plain* CHART.

Plain sailing is founded on the supposition of the earth being a plane or flat; which though notoriously false, yet, places being laid down accordingly, and a long voyage broken into many short ones; the voyage may be tolerably performed by it, near the same meridian.

In *plain sailing* it is supposed that by the rhumb line, meridian, and parallel of latitude, there always will be formed a right-angled triangle; and that so posited, as that the perpendicular side may represent part of the meridian, or north and south line, containing the difference of latitude; the base of the triangle represent the departure; and the hypothenuse, the distance sailed. The angle at the vertex is the course, and the angle at the base, the complement of the course; any two of which, with the right angle, being given, the triangle may be protracted, and the other three parts found.

For the doctrine of *plain sailing*, see SAILING.

PLAIN *table*, in *Geometry*, &c. an instrument used in the surveying of land; whereby the draught, or plan, is taken on the spot, without any future protraction, or plotting.

The *plain table*, represented *Tab.* II. *Surveying*, *fig.* 34. consists of a parallelogram of wood, about fifteen inches long and twelve broad; round this goes a boxen jointed frame, by means whereof a sheet of paper is fastened right to the table, so that lines may be conveniently drawn upon it.

On each side the frame, which may be put on either side upwards, towards the inward edge, are scales of inches subdivided, for the ready drawing of parallel lines. Beside which, on one side are projected the 360 degrees of a circle, from a brass centre in the middle of the table (each degree halved) with two numbers to every tenth degree, the one expressing the degree, the other its complement to 360, to save subtraction: on the other side are projected the 180 degrees of a semicircle, from a brass centre in the middle of the table's length, and at ¼ of its breadth; each degree halved, and every tenth noted with two numbers, viz. the degree and its supplement, to 180°.

To one side of the table is fitted a compass, for placing the instrument by; and the whole is fixed by a socket, upon a three-legged staff for a stand, on which it is turned round, or fastened by a screw, as occasion requires.

Lastly, to the table belongs an index, which is a ruler at least fifteen inches long, and two broad; usually graduated with scales, &c. and having two sights perpendicularly placed on its extremities; and a sloped edge called the fiducial edge.

PLAIN *tables, use of the*. To take an angle by the *plain table*: or to find the distance of two places accessible from the same third.

Suppose D A, D B (*Tab. Surveying, fig.* 35.) the sides of the angle required; or A B the distance required. Place the instrument horizontally, as near the angle as possible; and assume a point in the paper on the table, v. gr. *a*. To this point apply the edge of the index, turning it about this and that way till through the sights you see the point B; and, in this situation of the ruler, draw by its edge the line *c c* indefinitely.

After the same manner turn about the index on the same point till through the sights you see the point A; and draw the right line *e d* indefinitely. Thus have you the quantity of the angle laid down.

Measure the lines D A, D B, with a chain; and from a scale

scale set off the measures thus found, on the respective lines; which suppose to reach from *c* to *A*, and from *c* to *o*. Thus will *cb* and *ca* be proportional to DB and DA. Transfer the distance *ab* to the same scale, and find its length; the length, thus found, will be the length, or distance of AB required.

2. *To find the distance of two places, one whereof is inaccessible, by the* plain table. Suppose the distance required AB (*fig.* 36.) and A the accessible point. 1. Place the *plain table* in C; look through the sights till you see A and B; and draw *ac* and *cb*. Measure the distance from your station to A; and set it off from the scale upon *ca*. 2. Remove the table to A, where place it so as that the point *a* representing A, and the index laid along the line *ac*, you see backwards the former station C (Note, in this fixing the instrument, lick the use of the compass; for the needle will hang over the same degree of the card in the first and the second case; so that some set the instrument by the needle alone; others only use it to shorten the trouble, by bringing the instrument nearly to its due position by means thereof; and then fixing for good by the back sight). 3. The instrument fixed, turn the sights to B, and draw the line *ab*. 4. On the scale measure the interval *ab*; which will be the distance of AB required.

3. *To find the distance of two inaccessible places by the* plain table. Suppose the distance of AB (*Tab. Surveying, fig.* 37.) required. 1. Choosing two stations in C and D, in the line, C, place the *plain table*; and through the sights look to D, B, and A, drawing, by the edge of the index the lines *cb*, *ca*, *cd*. 2. Measure the distance of the stations CD; and set this off from a scale on *cd*. 3. Removing the table from C, fix it in D; so as the point *d*, hanging over the place D, and the index lying along the line *dc*, through the sights you see the former station C. The instrument thus fixed, direct the sights to A and B, and draw the right lines *da* and *db*; lastly find the distance of *a* *b* on the scale, and this will be the distance of AB required. After the same manner may the distance of any number of places be found from two stations; and thus may a field, part of a country, &c. be surveyed.

4. *To take the plot of a field from one station, whence all the angles may be seen, with the* plain table. Placing the instrument in the station, assume a point in the paper, to represent the same, v. gr. O (*Tab. Surveying, fig.* 8.) laying the edge of the index to this point, direct it to the several angles of the field, ABCDEF, &c. and draw indefinite lines by its edge towards every angle; viz. O*a*, O*b*, O*c*, &c. measure the distance of each angle from the station; viz. OA, OB, OC, OD, &c. and from a scale set these off from O on their corresponding lines; the extremities hereof will give points, which, being connected by lines, will represent the field.

5. *To take the plot of a field, round, or the like, by going round the same, with the* plain table. Place the instrument horizontally at the first angle, v. gr. A; the needle being on the meridian of the card; assuming a point on the paper, to represent it; to that point lay the index, directing it till through the sights you see a mark in the angle B, and draw an indefinite line along it; measure the distance of A and B, and from a scale set it off on the line thus drawn; the extremity of this distance will represent the point B. Remove the instrument to B, where fix it so as that the needle hang over the meridian of the card; and so as the index lying along the line last drawn, you see the former station A through the sights: here fasten it, lay the index to the point B, and turn it till through the sights you see the next angle C, in this situation draw a line, as before, measure the distance BC, and set it off from a scale on the line. Remove the instrument to C, where, fixing it by the needle, and the back sight, as before, turn the index on the point C till you see the next angle D; draw the line, measure and set off the distance CD, as before, and remove the *plain table* to E; where fix it, as before; look in the next angle F, draw the line, measure and set off the distance, &c.

In this manner having compassed the whole field, you will have its whole perimeter plotted on the table; which may be now cast up, and its contents found, as in the article SURVEYING.

Manner of shifting paper on the plain table. When in large parcels of grounds the plot is found to exceed the dimensions of the plain *table*, and to run off from the paper, the sheet must be taken off the table, and a fresh one put on: the way of managing which shifting is as follows: suppose H, K, M, Z, (*Tab.* III. *Surveying, fig.* 41.) the limits of the *plain table*; so that having laid down the field from A to B, thence to C and D; you want room, the line DE running off the paper; draw as much of the line DE as the paper will well hold; viz. DO. And by means of the divisions on the edge of the frame, draw the line PQ through O, parallel to the edge of the table HM; and through the point of intersection O, draw ON parallel to MZ. This done, take off the frame, remove the sheet, and put a fresh one (*fig.* 42.) in its stead; drawing on it a line RS near the other edge parallel thereto. Then lay the first sheet on the table, so that the line PQ lie exactly on the line RS, to the best advantage, as at O. Lastly, draw as much of the line OD, on the fresh sheet, as the table will hold; and from O continue the remainder of the line D to E. From E proceed with the work as before to F, G, and A.

Use of the plain table, *as a theodolite, semicircle, or circumferentor.* The great inconveniency of the *plain table* is, that its paper renders its use impracticable in moist weather. Even the dew of the morning and evening is found to swell the paper considerably, and, of consequence, to distort the work. To avoid this inconvenience, and render the instrument useful in all weathers; by leaving off the paper, and fetting up a pin in the centre, it becomes a theodolite, a semicircle, or a circumferentor, and is applicable like them.

The *plain table*, ſtripped of its paper, becomes either a theodolite, or a ſemicircle, as that ſide of the frame, which has the projection of the degrees of a circle, or a ſemicircle, is turned upwards. *It is be to* ſerve for a theodolite; then index (the *plain table* turning on any point as a centre) is conſtantly to turn about the braſs centre-hole in the middle of the table.

If it be for a ſemicircle, it muſt turn on the other braſs centre-hole; in both caſes it is done by reaſon of a pin rivited in the holes. When the *plain table* is to ſerve as a circumferentor, ſcrew the compaſs to the index, and both of them to the head of the ſtaff, with a braſs ſcrew-pin fitted for the purpoſe; ſo that the ſtaff and table may ſtand fixed, the index, ſights, &c. may be eaſily moved, and *vice verſa*.

To take an angle by the plain table, *conſidered as a theodolite.* Suppoſe the quantity of the angle EKG (*Tab. Surveying, fig.* 6.) required. Place the inſtrument at K, ſo that the theodolite ſide of the frame upwards, laying the index on the diameter. Turn the whole inſtrument about, the index remaining on the diameter till through the ſights you ſpy E. Screw the inſtrument faſt there, and turn the index on its centre till through the ſights you ſpy G. The degrees here cut on the frame by the index, is the quantity of the angle ſought; which may be laid down on paper by the rules of common protraction.

Thus you may proceed to do every thing with the *plain table*, as with the common theodolite.

To take an angle with a plain table, *conſidered as a ſemicircle.* Proceed in the ſame manner with the inſtrument conſidered as a ſemicircle, as when conſidered as a theodolite; only laying the ſemicircular ſide of the frame, and turning the index on the other centre-hole in the middle of the length, and at about one-fourth of the breadth of the table.

To take an angle with the plain table, *conſidered as a circumferentor.* Suppoſe the former angle EKG required. Place the inſtrument at K, the fleur-de-lis towards you. Direct the ſights to E, and obſerve the degree cut by the ſouthend of the needle, which ſuppoſe 296. Turn the inſtrument about, the fleur-de-lis ſtill towards you, and direct the ſight to G, noting the degree cut by the other end of the needle, which ſuppoſe 32. Subtract the leſs from the greater, the remainder 264° is the quantity of the angle ſought. If the remainder chance to be more than 180°, then it muſt be again ſubtracted from 360. This ſecond remainder will be the angle required; which may be protracted, &c. as under PROTRACTOR.

Thus you may proceed to do every thing with the *plain table*, as with the common circumferentor.

PLAIN *number*. See NUMBER.

PLAIN *place*, in *Geometry*, *locus* PLANUS, or *locus ad* PLANUM, is a term which the ancient geometricians uſed for a geometrical locus, when it was a right line, or a circle, in oppoſition to a ſolid place, which was an ellipſis, parabola, or hyperbola.

Theſe *plain loci* the moderns diſtinguiſh into *loci ad rectum*, and *loci ad circulum*. See LOCUS.

PLAIN *problem*, in *Mathematics*, is ſuch a one as cannot be ſolved geometrically, but by the interſection either of a right line and a circle, or of the circumferences of two circles.

Such is the problem following. Given, the greateſt ſides, and the ſum of the other two ſides, of a right-angled triangle; to find the triangle. Such alſo is this, to deſcribe a trapezium that ſhall make a given area of four given lines.

Such problems can only have two ſolutions, becauſe a right line can only cut a circle, or one circle cut another in two points.

PLAIN, in *Heraldry*, is ſometimes uſed for the point of the ſhield, when coupled ſquare, a part remaining under the

the square, of a different colour, or metal, from the shield.

This has been sometimes used as a mark for bastardy, and called *champayne*: for when the legitimate descendants of bastards have taken away the bar, fillet, or traverse, borne by their fathers, they are to cut the point of the shield with a different colour, called *plain*.

PLAIN, used substantively, in *Perspective*, *Mechanics*, *Astronomy*, &c. See PLANE.

PLAINT, PLAINTE, in *Law*, the propounding or exhibiting any action, real or personal, in writing.

Hence, the party inveighing against, is called plaintiff.

PLAINTE, in the *Antient Customs of France*, was a request, or petition, presented to the king, against the judges of the provinces, and afterwards against bailiffs and seneschals, for denying justice, or for rendering judgment contrary to the laws of the realm.

For in those days there was no appeal from their decisions; but they all pronounced in the dernier resort; so that the *plainte* was not directed against the party, but against the judge; who was cited to see his own sentence declared null.

This was a kind of supplement to the way of appeals, which was then but up. The *plaintes*, in the Capitulars of Charlemagne, are called *querimoniæ*.

PLAINTIFF, in *Law*, he that sues, or complains, in an action, or in an action personal; as in an action of debt, trespass, deceit, detinue, and the like.

Plaintiff stands opposed to *defendant*.

PLAISE, in *Ichthyology*, the English name for the fish called by authors *platessa* and *passer laevis*, by some *quadratulus*, and the PLEURONECTES *platessa* of Linnæus.

It is, according to the Artedian system, a species of the pleuronectes, and is distinguished by that author by the name of the *pleuronectes* with smooth sides, and with a spine near the anus, and the eyes and six tubercles placed on the right side of the head.

It is a flat fish, of a dusky olive-colour, spotted with red on the back, and white on the belly.

The *plaise* are common on most of our coasts: the best and largest are taken off Rye, on the coast of Sussex, and also off the Dutch coasts. They spawn in the beginning of February.

PLAISTER, in *Building*. See PLASTER, MORTAR, &c.

PLAISTER, *casting in*. See CASTING.

PLAISTER, in *Medicine*. See EMPLASTER, and PLASTER.

PLAISTERED *walls*. See WALL.

PLAN, a representation of something, drawn on a plane.

Such are maps, charts, and ichnographies.

PLAN, in *Architecture*, is particularly used for a draught of a building; such as it appears, or is intended to appear, on the ground; shewing the extent, division, and distribution of its area into apartments, rooms, passages, &c.

The *plan* is the first device or sketch the architect makes; it is also called the *ground plot*, *platform*, and *ichnography*, of the building.

PLAN, *geometrical*, is that wherein the solid and vacant parts are represented in their natural proportion.

PLAN, *raised*, is that where the elevation, or upright, is shewn, upon the geometrical plan, so as to hide the distribution. See ELEVATION.

PLAN, *perspective*, is that conducted and exhibited by degradations, or diminutions, according to the rules of perspective.

To render *plans* intelligible, it is usual to distinguish the massive with a black wash. The projectures on the ground are drawn in full lines, and those supposed over them in dotted lines. The augmentations or alterations to be made are distinguished by a colour different from what is already built; and the ruins of each *plan* are made lighter as the stories are raised.

In large buildings, it is usual to have three several *plans* for the first three stories.

PLAN *of a fortification*, in the *Military Art*, is the same with the FACE of a *bastion*.

PLANCHER, or PLANCHER, in *Architecture*, the under part of the corona, or drip; making the superior part of the cornice, between two cymatiums.

PLANE, *planum*, in *Geometry*, denotes a *plain* figure, or a surface lying evenly between its bounding lines.

Wolfius defines *plane*, a surface, from every point of whose perimeter a right line may be drawn to every other point in the same.

As the right line is the shortest extent from one point to another, so is a *plane* the shortest extention between one line and another.

PLANE, *oblique*. See OBLIQUE.

PLANE, *parallel*. See PARALLEL.

PLANES are frequently used in *Astronomy*, &c. for imaginary surfaces, supposed to cut, and pass through, solid bodies, and on this foundation it is, that the whole doctrine of conic sections, and of the sphere, turns.

When a *plane cuts* a cone parallel to one of its sides, it makes a parabola; when it cuts the cone parallel to its base, it makes a circle.

The sphere is wholly explained by *planes*, imagined to cut the celestial luminaries, and to fill the areas or circumferences of the orbits; and they are differently inclined to each other; and by us the inhabitants of the earth, the *plane* of whose orbit is the *plane* of the ecliptic, their inclination is estimated with regard to this *plane*. See PLANETS.

PLANE, in *Mechanics*. A *horizontal* PLANE is a *plane* level or parallel to the horizon.

The determining how far any given *plane*, &c. deviates from a horizontal one makes the whole business of LEVELLING.

PLANE, *inclined*, in *Mechanics*, is a *plane* which makes an oblique angle with a horizontal *plane*.

A machine has been contrived for measuring the acceleration of a ball down an inclined *plane*, and comparing it with that found in bodies falling at liberty. See its description in Mem. de l'Acad. Roy. de Scienc. 1699, p. 343.

The doctrine of the motion of bodies on *inclined planes* makes a very considerable article in mechanics: the general principle of it has been already illustrated under MECHANICAL *powers*; and the substance of it is as follows:

Laws of descent of bodies on inclined planes. I. If a body be placed on an *inclined plane*, its relative gravity will be to its absolute gravity, as the height of the *plane*, *e.g.* AB (*Tab.* VI. *Mechan. fig.* 91.) to its length AC. For, the construction being as in the figure, it is evident that the absolute gravity, tending in a direction to the horizon, is to the relative gravity in the direction of the *plane*, as DF: FG or DE, *i.e.* because the triangles DEF and BAC are conjangular, as CA: AB.

Hence, 1. Since the ball D only gravitates on the *inclined plane*, with its relative gravity, the weight L, applied in a direction parallel to the length of the *plane*, will retain or suspend it, provided its weight be to that of the ball, as the altitude of the *plane* BA is to its length AC.

2. If the length of the *plane* CA be taken for the whole sine, or radius, AB will be the sine of the angle of inclination ACB. The absolute gravity of the body, therefore, is to its respective gravity applied to the *inclined plane*; and therefore, also the weight D to the weight L acting according to the direction DA, which sustains it, as the whole sine is to the sine of the angle of inclination.

3. Hence the respective gravities of the same body on different *inclined planes*, are to each other as the sines of the angle of inclination.

4. The greater therefore the respective gravity is, the greater is the angle of inclination.

5. As, therefore, in a vertical *plane*, where the inclination is greatest, viz. perpendicular; the respective gravity degenerates into absolute; so in a horizontal *plane*, where there is no inclination, the respective gravity vanishes: and hence it appears, that the inclination of the *plane* may be so small, that the greatest weight may be sustained on it by the smallest power.

II. To find the sine of the angle of inclination of a *plane*, on which a given power will be able to sustain a given weight. Say, as the weight it to the given power, so is the whole sine to the sine of the angle of inclination of the *plane*. Thus, suppose a weight of 1000 lb to be sustained by a power of 50, the angle of inclination will be found 3° 35′.

III. If the weight L descend according to the perpendicular direction AB, and raise up the weight D in a direction parallel to the *inclined plane*, the height of the ascent of D will be to that of the descent of L, as the sine of the angle of inclination C to the whole sine.

Hence, 1. The height of the ascent CD of the weight L, is to the height of ascent DH of the weight D, reciprocally as the weight D to the equivalent weight L.

2. Since then CD × L = DH × D, and the actions of the equiponderating bodies D and L are equal; the moments of the weights D and L are in a ratio compounded of their masses, and the altitudes through which they ascend or descend in a *plane*, either inclined or perpendicular.

3. The powers that raise weights through altitudes reciprocally proportional to them, are equal. This Des Cartes assumes as a principle whereby to demonstrate the power of machines.

Hence we see why a loaded waggon is drawn with more difficulty up an inclined than on an horizontal *plane*; as being pressed with a part of the weight which is to the whole weight in a ratio of the altitude of the plane, to its length.

IV. Weights E and F, *fig.* 92. equiponderating upon *inclined planes* A C and C B of the ſame height C D, are to each other as the lengths of the *planes* A C and C B.

S. Stevinus gives a very pretty demonſtration of this theorem, which, for its cafineſs and ingenuity, we ſhall here add. Put a chain, whoſe parts do all exactly weigh in proportion to their length, over a triangle, G I H, *fig.* 93; it is evident the parts G K and K H do balance each other. If then I H did not balance G I, the preponderating part would prevail; and there would ariſe a perpetual motion of the chain about G I H: but this being abſurd, it follows that the parts of the chain I H and G I, and conſequently all other bodies which are as the lengths of the *planes* I H and I G, will balance each other.

V. A heavy body deſcends on an *inclined plane*, with a motion uniformly accelerated.

Hence, 1. The ſpaces of deſcent are in a duplicate ratio of the times, and likewiſe of the velocities; and therefore in equal times they increaſe according to the unequal numbers, 1, 3, 5, 7, 9, &c.

2. The ſpace paſſed over by a heavy body deſcending on an *inclined plane* is ſubduple of that which it would paſs over in the ſame time, with the velocity it has acquired at the end of its fall.

3. Heavy bodies, therefore, deſcend by the ſame laws on *inclined planes*, as in perpendicular *planes*. Hence it was, that Galileo, to find the laws of perpendicular deſcent, made his experiments on *inclined planes*, becauſe the motions are ſlower in the latter than the former; as in the following theorem:

VI. The velocity of a heavy body deſcending on an *inclined plane*, at the end of any given time, is to the velocity which it would acquire in falling perpendicularly in the ſame time, as the height of the *inclined plane* is to its length.

VII. The ſpace paſſed over by a heavy body on an *inclined plane* A D (*fig.* 94.) is to the ſpace A B, it would paſs over in the ſame time in a perpendicular *plane*, as its velocity on the *inclined plane* is to its velocity in the perpendicular deſcent, at the end of any given time.

Hence, 1. The ſpace paſſed over on the *inclined plane* is to the ſpace it would deſcend in the ſame time in the perpendicular *plane*, as the altitude of the *plane* A B to its length A C; and therefore as the ſine of the angle of inclination C, to the whole ſine.

2. If then, from the right angle B, a perpendicular be let fall to A C; A C : A B :: A B : A D. So that in the ſame time wherein the body would fall perpendicularly from A to B; in an *inclined plane* it will deſcend from A to D.

3. The ſpace, therefore, of perpendicular deſcent being given in the altitude of the *plane* A B; by letting fall a perpendicular from B to A C, we have the ſpace A D to be paſſed over in the ſame time on the *inclined plane*.

4. In like manner, the ſpace A D, paſſed over on the *inclined plane*, being given, we have the ſpace A B, through which it would deſcend perpendicularly in the ſame time, by raiſing a perpendicular at D meeting the altitude of the *plane* in B.

5. Hence in the circle C D E F, *fig.* 95. the body will deſcend through all the *planes* A D, A E, A F, A C, in the ſame time; viz. in that time wherein it would fall through the diameter A B, ſuppoſing that perpendicular to the horizontal *plane* L M: becauſe all the angles D, E, F, C, in the ſemicircle, are right angles.

VIII. The ſpace A D, (*fig.* 94.) paſſed over an *inclined plane* A C being given, to determine the ſpace which would be paſſed over in any other *inclined plane* in the ſame time.

From the point D erect a perpendicular D B, meeting the altitude A B in B; then will A B be the ſpace through which the body would fall perpendicularly in that time. Wherefore if from B a perpendicular B E be let fall to the *plane* A F; A E will be the ſpace in the *inclined plane* which the body will paſs over, in the ſame time wherein it falls perpendicularly from A to B; and conſequently A D will be the ſpace in the other *inclined plane* A C, which it paſſes through in the ſame time.

Hence, ſince A B is to A D as the whole ſine to the ſine of the angle of inclination C; and A B is to A E as the whole ſine to the ſine of the angle of inclination F; the ſpaces A D and A E, which the body will paſs over in the ſame time on different *inclined planes*, are as the ſines of the angles of inclination, C and F, and reciprocally as the reſpective gravities on the ſame *planes*. And conſequently, they are alſo reciprocally as the lengths of *planes* equally high, A C and A F. Whence the problem may be reſolved various ways by calculation.

IX. The velocities acquired in the ſame time on different *inclined planes*, are as the ſpaces paſſed over in the ſame time.

For A D, A B, and A E, are the ſpaces paſſed over in the ſame time; and ſince A B : A C :: the velocity acquired in paſſing over A D to the velocity acquired in it, paſſing over A B; and A B : A F :: the velocity acquired in paſſing over A E to the velocity acquired in paſſing over A B; A B : A C :: A D : A B; and A B : A F :: A E : A B; the velocity acquired in paſſing over A D is to the velocity acquired in A B :: A D : A B, and the velocity acquired through A B to the velocity through A B :: A E : A B; therefore the velocities acquired in the ſame time in paſſing over A D and A E, will be as the ſpaces of A D and A E paſſed through in the ſame time.

Hence alſo, they are as the ſines of the angles of inclination C and F; reciprocally as the reſpective gravities on the ſame *planes*; and reciprocally as the lengths of equally high *planes* A C and A F.

X. A body deſcending on an *inclined plane* A C, when it arrives at the horizontal line C B, has acquired the ſame velocity which it would have acquired in a perpendicular deſcent A B, to the ſame horizontal line C B.

For A D is the ſpace paſſed over in the ſame time with A B; and, therefore, the celerity acquired in paſſing through A B is to that acquired through A D as A C to A B: but the celerity through A C is to that acquired through A D :: $\sqrt{AC} : \sqrt{AD}$, and, ſince A C : A B :: A B : A D, A C : A D :: A C : A B², and $\sqrt{AC} : \sqrt{AD}$ :: A C : A B: conſequently the celerity acquired through A C is to that acquired through A D as A C is to A B: therefore the celerity acquired through A C is equal to that acquired through A B.

Hence, 1. A heavy body deſcending through different *inclined planes*, A C, A G, A F, hath acquired the ſame velocity when it arrives at the ſame horizontal line B F. Hence alſo, 2. A body, continuing its deſcent through ſeveral contiguous *inclined planes*, acquires the ſame velocity which it would acquire in deſcending perpendicularly to the ſame horizontal *plane*.

XI. The time of deſcent along an *inclined plane* A C, is to the time of perpendicular deſcent through A B, as the length of the *plane* A C, to its altitude A B: but the times of deſcent through different *inclined planes* equally high, A C and A G, are as the lengths of the *planes*.

For the time through A C is equal to the time in which A C would be deſcribed uniformly with half the celerity acquired in C; and the time through A B is equal to that in which A B would be deſcribed uniformly with half the celerity acquired in B; but theſe celerities are equal; conſequently the times are as A C and A B. In the ſame manner it might be ſhewn, that the times of deſcent through A C and A G are as A C and A G.

XII. If the diameter of a circle A B (*fig.* 95.) be perpendicular to the horizontal line L M; a body will deſcend from any point of the periphery D, E, or C, to B, along an *inclined plane* D B, E B, and C B, in the ſame time wherein it will deſcend through the diameter A B.

For, letting fall the perpendicular C G, the time in which G B is deſcribed is to the time in which B C is deſcribed as B G : B C: but the time in which B C is deſcribed is to the time in which A B is deſcribed, in the ſubduplicate ratio of B G to A B; i. e. becauſe B G : B C :: B C : A B, in the ratio of B G to B C; conſequently, the time of deſcent through G B has the ſame ratio to the time of deſcent through B C and the diameter A B: therefore the time in which B C is deſcribed is equal to the time in which A B is deſcribed, &c. Hence,

XIII. The deſcents of bodies through a ſemicycloid D E F (*fig.* 96.) and through any arc thereof D G, are always iſochronal, or performed in the ſame time; on which principle is founded the doctrine of pendulums vibrating in a cycloid. See CYCLOID, and PENDULUM.

PLANES, *laws of deſcent of bodies on inclined.* I. If a body aſcend in a medium void of reſiſtance, in any direction, whether perpendicular, or along an *inclined plane*; its motion will be uniformly retarded.

Hence, 1. A body aſcending either perpendicularly or obliquely, in ſuch a medium, paſſes over a ſpace which is ſubduple of that it would paſs over in the ſame time in an *horizontal plane*, with an uniform celerity equal to that it has at the beginning of its motion.

2. Such ſpaces, therefore, performed in equal times, decreaſe in a retrograde order, as the uneven numbers 7, 5, 3, 1: and therefore the aſcent is ſo much impeded; and conſequently, when the impreſſed force is exhauſted, the body will deſcend again by the force of gravity.

3. They are, therefore, inverſely as the ſpaces deſcribed in the ſame times by a body deſcending through the ſame altitude. For, ſuppoſe the time divided into four parts; in the firſt moment, the body A deſcends through the ſpace 1, and B aſcends through 7 in the ſecond, A deſcends through 3, B aſcends through 5, &c.

4. Hence

4. Hence a body, rising with an impreſſed force, aſcends to that altitude, from which it muſt fall to acquire that velocity in falling wherewith it aſcended.

5. Hence, by falling, it acquires a force to riſe again to the height from whence it fell.

II. The time wherein a body aſcends to a given altitude, being given; to determine the ſpace paſſed over each moment.

Suppoſe the ſame body to deſcend from the ſame altitude in the ſame time; and find the ſpaces paſſed over each moment.

Theſe, taken inverſely, are the ſame with the ſpaces of aſcent required.

Suppoſe, v. gr. a body projected perpendicularly, to aſcend through a ſpace of 240 feet in four ſeconds; and the ſpaces of aſcent performed in the ſeveral times required; if now the body had deſcended, the deſcent in the firſt minute had been 15 feet, in the ſecond 45, in the third 75, in the fourth 105, &c. The deſcent therefore will be in the firſt moment 105, in the ſecond 75, &c.

III. If a body deſcend either perpendicularly through AD (*fig.* 96.) or in any other ſurface FED, and with the velocity it has there acquired, again aſcend along another ſurface DC, at points equally high, e. gr. at G, H, and Q, it will have the ſame force, and the ſame velocity.

Hence, if a body deſcend along any ſurface, FED, and again aſcend along another ſimilar and equal ſurface DGC, it is in the ſame as if it paſſed over the ſeveral parts of the ſame line twice.

Whence, the times of aſcent and deſcent through equal ſpaces are equal.

On this principle are founded the conſtruction and uſe of pendulums.

PLANE *of gravity*, or *gravitation*, is a plane ſuppoſed to paſs through the centre of gravity of the body, and in the direction of its tendency; that is, perpendicular to the horizon.

PLANE *of reflexion*, in *Catoptrics*, is a plane which paſſes through the point of reflexion; and is perpendicular to the plane of the glaſs, or reflecting body.

PLANE *of refraction* is a plane drawn through the incident and refracted ray.

PLANE, *perſpective*, is a plain pellucid ſurface, ordinarily perpendicular to the horizon, and placed between the ſpectator's eye and the object he views; through which the optic rays, emitted from the ſeveral points of the object, are ſuppoſed to paſs to the eye, and in their paſſage to leave marks that repreſent them on the ſaid plane.

Such is the *plane* HI (*Tab. Perſpect. fig.* 3). Some call it the *table*, or *picture*, becauſe the draught, or perſpective, of the object, is ſuppoſed to be thereon; others, the *ſection*, from its cutting the viſual rays; and others, the *glaſs*, from its ſuppoſed tranſparency. See PERSPECTIVE.

PLANE, *geometrical*, in *Perſpective*, is a plane parallel to the horizon, whereon the object to be delineated is ſuppoſed to be placed.

Such is the *plane* LM (*Tab. Perſpect. fig.* 3.) This *plane* is uſually at right angles with the *perſpective plane*. See PERSPECTIVE.

PLANE, *horizontal*, in *Perſpective*, is a plane paſſing through the ſpectator's eye, parallel to the horizon, cutting the perſpective *plane* when it is perpendicular to the geometrical one, at right angles.

PLANE, *vertical*, in *Perſpective*, a *plane* paſſing through the ſpectator's eye, perpendicular to the geometrical *plane*, and uſually at right angles to the perſpective *plane*. See PERSPECTIVE.

PLANE, *objective*, in *Perſpective*, is any *plane* ſituate in the horizontal *plane*, whoſe repreſentation in perſpective is required.

PLANE *of the horopter*, in *Optics*, is a *plane* that paſſes through the horopter AB (*Tab.* II. *Optics, fig.* 31) and is perpendicular to a *plane* paſſing through the two optic axes IC and CH. See HOROPTER.

PLANE *of the projection*, in the *Stereographic Projection of the Sphere*, is the ſame with the *perſpective plane*; which ſee.

PLANE *of a dial*, or *Dial*-PLANE, the ſurface whereon a dial is drawn. See DIAL.

We have *horizontal*, *vertical*, *inclining*, *declining*, *reclining*, *declinating*, *direct*, *oblique*, &c. *dial-planes*. See DECLINER, RECLINER, DIRECT, &c.

PLANE, *declination and inclination of a*. See DECLINATION and INCLINATION.

For the method of finding both, ſee DECLINATOR.

PLANE *glaſs*, *mirror*, *figure*, *number*, *problem*, &c. See PLAIN *glaſs*, *mirror*, *number*, *figure*, *problem*, &c.

PLANE, in *Joinery*, &c. denotes an edged inſtrument, uſed to pare or ſhave woods ſmooth, even, &c.

It conſiſts of a piece of wood very ſmooth at the bottom, ſerving as a ſtock, or ſhaft; in the middle whereof is an aperture, through which paſſes a ſteel edge, or chiſel, obliquely placed, and very ſharp, which takes off the inequalities of the wood it is ſlid along.

The *plane* acquires various names according to its various forms, ſizes, and uſes; as the

Jack plane, which is about eighteen inches long, and is that commonly firſt uſed; the edge of its iron is not ground ſtrait, but riſes with a convex arch in the middle, to bear being ſet the ranker; its uſe being to take off the greater irregularities of the ſtuff, and to prepare it for the

Long plane, which is about two feet in length, and ſmooths the work after the rough ſtuff is taken off by the former. This prepares the work for the *jointer*, if for the edges of a board; or for the

Smoothing-plane, which is ſhort and ſmall, being about ſix or ſeven inches in length, its iron fine; it takes off the great irregularities left by the *fore-plane*.

Jointer is the longeſt of all, being about ſix inches larger than the *long plane*; its edge very fine, not ſtanding out above a hair's breadth; it comes after the *ſmoothing-plane*, and is chiefly intended to ſhoot the edge of a board perfectly ſtraight for joining ſmooth tables, &c.

Rabbet-plane is uſed to cut the upper edge of a board, ſtraight or ſquare, down into the ſtuff, ſo as the edge of another, cut after the ſame manner, may join with it on the ſquare; it is alſo uſed to ſtrike faſeras in mouldings. Its iron is full as broad as its ſtock, that the angle may cut ſtraight; and it delivers its ſhavings at the ſides, not, like the others, at the top.

The *plough*, a narrow *rabbet-plane*, with the addition of two ſtaves, whereon are ſhoulders, and on the ſhoulders a fence. Its uſe is to plow a narrow ſquare groove on the edge of a board, &c.

Moulding-planes, called alſo *forſe-planes*. Of theſe there are various kinds, accommodated to the various forms and profiles of the mouldings.

Such are the *round-plane*, the *hollow*, the *O G*, the *ſnipe-bill*, &c. which are all of ſeveral ſizes, from half an inch to an inch and a half.

To uſe the *moulding-planes* on ſoft wood, as deal, pear-tree, &c. they ſet the iron to an angle of 45°, with the baſe or ſole of the *plane*. On hard wood, e. gr. ebony, box, &c. they ſet to an angle of 80°; ſometimes quite upright. To work on hard wood, the edge or baſil is ground to an angle of 18 or 20°; on ſoft wood to an angle of about 12°. For the more acute the baſil, the ſmoother the iron cuts; but the more obtuſe, the ſtronger. A method has been uſed of forming mouldings in marble with the *plane*.

PLANE, among *Fowlers*. To *plane*, is to fly or hover, as a kite or other bird does, without moving its wings.

PLANE-*tree*, *platanus*, in *Botany*, a genus of the *monœcia polyandria* claſs. Its characters are theſe: it hath male and female flowers growing ſeparate on the ſame tree; the male flowers are collected in a round ball; they have no petals, but have oblong coloured ſtamina, which are terminated by four-cornered ſummits; the female flowers have ſmall leafy empalements, and ſeveral ſmall concave petals, with ſeveral awl-ſhaped germina ſitting upon the ſtyles, crowned by recurved ſtigmas; theſe are collected in large balls; the germina afterward turn to roundiſh ſeeds ſitting upon the briſtly ſtyle, and ſurrounded with downy hairs. There are two ſpecies.

It is generally ſuppoſed, that the introduction of this tree into England is owing to the great lord-chancellor Bacon, who planted a noble parcel of them at Verulam, which were very flouriſhing ſome years ſince, but have lately been deſtroyed.

Notwithſtanding the *plane-tree* is backward in coming out in the ſpring, and the leaves decay ſoon in autumn, yet for the goodly appearance and great magnitude to which it will grow, it deſerves a place in large plantations, or ſhady receſſes near habitations, eſpecially if the plantation be deſigned on a moiſt ſoil, or near rivulets of water; in which places this tree will arrive to a prodigious ſize.

They are all propagated very eaſy by layers; every twig of them will take root, if they are but covered with earth; theſe layers will be well rooted in one year, when they ſhould be cut off from the old trees or ſtools, and planted in a nurſery, where they may remain two or three years to get ſtrength, and then be tranſplanted where they are to ſtand; for the younger theſe trees are planted, the better they will thrive. Miller.

PLANE-*tree*, *baſtard*, or *falſe*. See MAPLE.

PLANET, *planeta*, πλανήτης, *wanderer*; in oppoſition to a *ſtar* which remains fixed, in *Aſtronomy*, a celeſtial body, revolving round the ſun as a centre, and continually changing its poſition with reſpect to the other ſtars.

The *planets* are uſually diſtinguiſhed into *primary* and *ſecondary*.

PLANETS, *primary*, called also simply, and by way of eminence, *planets*, are those which move round the sun as their proper centre. Such are Saturn, Jupiter, Mars, the Earth, Venus, and Mercury.

PLANETS, *secondary*, are such as move round some *primary planet*, as their respective centre, in the same manner as the *primary planets* do round the sun. Saturn, Jupiter, and the Earth, are each attended with *secondary planets*; Jupiter with four, and Saturn with five, called the SATELLITES of those two *planets*.

The earth has one *secondary planet*, called the *moon*.

The motion of the primary *planets* is very simple and uniform, as being compounded only of a projectile motion, forward in a right line, which is a tangent to the orbit; and a gravitation towards the sun at the centre. See GRAVITY. Add, that being at such vast distances from each other, the effects of their mutual gravitation towards one another are in a considerable degree, though not altogether, insensible; for the action of Jupiter on Saturn, e. gr. is found to be $\frac{1}{1067}$ of the action of the sun upon Saturn, by comparing the matter of Jupiter with that of the sun, and the square of the distance of the sun from Saturn, with the square of the distance of Jupiter from Saturn; so that the elliptic orbit of Saturn will be found to be more just, if we suppose its focus not to be in the centre of the sun, but in the centre of gravity of the sun and Jupiter, or rather in the centre of gravity of the sun, and of all the *planets* below Saturn. In the same manner, the elliptic orbit of any other *planet* will be found more accurate, by supposing its focus to be to the centre of gravity of the sun, and of all the *planets* that are below it. But the matter is far otherwise, in respect of the *secondary planets*; for every one of these, though it chiefly gravitate towards its respective primary one, as towards its centre, yet at equal distances from the sun, it is also attracted towards him with an equally accelerated gravity, as the primary one is towards him; but with greater distance with less, and at a nearer distance with greater: from which double tendency towards the sun, and towards their own primary *planets*, the motion of the satellites, or *secondary planets*, comes to be very much compounded, and affected with many inequalities: as, for instance,

1. The satellite shall be continually accelerated in its motion, from the time of its quadrature with the sun to the next following conjunction or opposition; but contrariwise from the syzygies to the quadratures, it shall be retarded: and therefore it will always move swifter in or near the syzygies, and slower near the quadratures. From whence will follow that,

2. The orbits of these *secondary planets* will be of a figure more circular in the quadratures than in the syzygies, where the swiftness of the motion will make the figure of the orbit more rectilinear, and therefore the satellite will run farther from its primary planet at the quadratures than at the syzygies; so that the orbit will be a little elliptical, having the primary *planet* for its centre, and the longer diameter will coincide with the line of the quadratures, and the shorter with that of the syzygies. Which irregularities will arise, if the sun's power of disturbing the motion of the satellite be excluded, and the orbit be concentric with that of the primary *planets*: for if the orbit be eccentrical, it may happen that the satellite shall be farther off from the primary one in the syzygies, and so move slower than it does at the quadratures; and when this is the case, that the satellite's orbit is not a circle concentric to the primary orbit, but an ellipsis, in one of whose foci is the primary *planet* is placed, then the motion of the satellite will be so disturbed by the *sun*, that, as it proceeds in its orbit, the apsides of the orbit will be moved sometimes *in consequentia*, and sometimes *in antecedentia* (wherein the nodes and apsides of the primary *planets* are at rest).

3. When the plane of the satellite's orbit is inclined to the plane of the primary orbit, the line of the nodes of the *secondary* orbit will be moved *in antecedentia*, with an angular motion, and an unequal velocity; for it will recede most swiftly when the nodes are in quadrature to the sun; after which, it will move slower; and at the time of the nodes being in the syzygies, it will be perfectly at rest.

4. The inclination also of the plane of the *secondary* orbit, to the primary one, will be continually varying, and will be greatest when the nodes are in the syzygies with the sun, and less, *ceteris paribus*, when they are in the quadratures; and from the time of the nodes being in the syzygies, to the quadratures, it will be always decreasing, and from the time of their being in the quadratures to the syzygies, it will be always increasing: and all these irregularities, whether in any eccentric or concentric orbit, will always be something greater, when the satellite is in conjunction with the sun, than when he is in opposition to him. See MOON.

The *primary planets* are in number six, which are again distinguished into the *superior* and *inferior*.

PLANETS, *superior*, are those farther from the sun than our earth is. Such are Mars, Jupiter, and Saturn.

PLANETS, *inferior*, are those nearer the sun than our earth, and situate between the earth and sun. Such are Venus and Mercury. See the order, position, &c. of the *planets*, under *Copernican* SYSTEM.

The *planets* are represented by the same characters as the chemists use to represent their metals by, on account of some supposed analogy between these celestial and subterraneous bodies.

Saturn is represented by the character ♄. This *planet*, on account of its great distance, appears to the eye with a feeble light. It performs its revolutions round the sun in about thirty years.

Jupiter, marked ♃, is a bright refulgent star, finishing its course round the sun in about twelve years.

Mars, characterized ♂, is a ruddy fiery-coloured *planet*, finishing its course in about two years.

Venus, ♀, is the brightest of all the *planets*, constantly attending the sun, and never distant from him above 48 degrees. It finishes its course in about seven months.

When it goes before the sun, it is called PHOSPHORUS and *Lucifer*; and when it follows him, HESPERUS.

Mercury, ☿, a little bright *planet*, the sun's constant companion, from whose side it never departs above 28°, and by that means is usually hid in his splendor. It performs its course in about three months.

To which we now add Tellus, the earth, marked ⊕, performing its course about the sun, between Mars and Venus, in the space of a year.

From these definitions, a person may easily distinguish all the *planets*. For if after sun-set he sees a *planet* nearer the east than the west, he may conclude it is neither Mercury nor Venus; and may determine whether it is Saturn, Jupiter, or Mars, by the colour and light; by which also he may distinguish between Mercury and Venus.

PLANETS, *nature of*. From the several phases and appearances of the *planets*, they are found to be all like the moon, which we have shewn to be like our earth; whence it follows, that the *planets* are also dark, opake, spherical, &c. bodies, like our earth.

This may be shewn almost to a demonstration. 1. Venus observed with a telescope, is rarely found full, but with variable phases, like those of the moon; her illuminated part still turned towards the sun, viz. towards the east when she is the morning-star, and towards the west when the evening-star. And the like phases are observed in Mercury and Mars.

2. Gassendus first, and after him others, have observed Mercury on the face of the sun, across which he appeared to pass like a black round spot. Hevelius, in 1639, also observed Venus in the sun; where she made the same appearance. See PARALLAX and TRANSIT.

3. De la Hire, in 1700, with a telescope of fifteen feet, discovered mountains in Venus, larger than those of the moon.

4. Cassini observed two spots in Venus; four in Mars, likewise observed by Campani; and several, at several times, in Jupiter; and from his observations of these spots, he found that they had a rotation round their axes: he even determined the velocity of that motion, or the period wherein it was effected; v. gr. that of Jupiter, 9 hours 56′; that of Mars, 24 hours 40′; and that of Venus, 24 hours; and since the sun, moon, Jupiter, Mars, Venus, and the earth, are found to revolve on their axes, i. e. to have a diurnal rotation, no doubt Mercury and Saturn have the same; though the great nearness of the former to the sun, and the great distance of the latter, prevent any spots from being observed on them, whence that rotation might be demonstrated.

5. In Jupiter are observed two swathes, or belts, different from the rest of his disk, and moveable; they are sometimes found in one part, sometimes in another; and are sometimes broader, sometimes narrower.

6. In 1609 were first observed the little stars, or moons, moving about Jupiter, by Sim. Marius; and in 1610 the same were observed by Galileo: these are now frequently observed to disappear in a clear sky, when Jupiter happens to be diametrically interposed between them and the sun. Whence it appears they are void of light, at such time when the sun's rays, intercepted by Jupiter, cannot be propagated to them in right lines; and hence also that, like the moon, they are opake bodies illuminated by the sun; and hence again, since Jupiter does not illuminate his satellites when placed behind him, he himself, in that part turned from the sun, may be argued to be void of light.

7. When Jupiter's moons are diametrically interposed between Jupiter and the sun, there is seen a round spot on Jupiter's disk, which is sometimes larger than the satellite

tellite itſelf. Whence it appears, that the ſatellites are opake bodies, illuminated by the ſun; that they project a ſhadow from the ſun; and that the round ſpots, ſeen in Jupiter, are the ſhadows of the ſatellites.

Whence, alſo, the interſection of that ſhadow being found to be a circle, the ſhadow muſt be conical; and therefore the figure of the ſatellites, at leaſt as to ſenſe, is ſpherical.

3. The earth being between Jupiter and the ſun; if, at the ſame time, any of the ſatellites happen to be between Jupiter and the ſun, it is loſt in Jupiter's light; though ſometimes appearing like a black ſpot. This phenomenon has been frequently obſerved by Caſſini and Maraldi, who have likewiſe noted very conſiderable alterations in the apparent magnitudes of the ſatellites; for which no reaſon could be given from the diſtance of Jupiter, the ſun, or the earth: e. gr. that the fourth, which is uſually ſeen the ſmalleſt, is ſometimes the largeſt; and the third, which is uſually the largeſt, appears ſometimes the ſmalleſt. Hence, as the ſatellites are illuminated by the ſun, even then when immerged in Jupiter's light, yet do appear obſcure, there muſt be ſome alteration in their atmoſpheres, to prevent the ſun's rays being equally reflected from every part of their ſurface; which muſt likewiſe be the cauſe why their ſhadow is ſometimes larger than themſelves. Now, to ſum up the evidence: 1. Since in Venus, Mercury, and Mars, only that part of the diſk illuminated by the ſun, is found to ſhine; and, again, Venus, and Mercury, when between the earth and the ſun, appear like dark ſpots or maculæ, on the ſun's diſk, it is evident, that Mars, Jupiter, and Mercury, are opake bodies, illuminated with the borrowed light of the ſun. And the ſame appears of Jupiter, from its being void of light in that part to which the ſhadow of the ſatellites reaches, as well as in that part turned from the ſun; and that his ſatellites are opake, and reflect the ſun's light, is alſo abundantly ſhewn. Wherefore, ſince Saturn, with his ring and ſatellites, do only yield a faint light, fainter conſiderably than that of the fixed ſtars, though theſe be vaſtly more remote, and than that of the reſt of the *planets*, it is paſt doubt, that he too, with his attendants, are opake bodies.

2. Since the ſun's light is not tranſmitted through Mercury and Venus, when placed againſt him, it is plain they are denſe opake bodies; which is likewiſe evident of Jupiter, from his hiding the ſatellites in his ſhadow; and therefore, by analogy, the ſame may be concluded of Saturn.

3. From the variable ſpots in Venus, Mars, and Jupiter, ſome have concluded that theſe *planets* have a changeable atmoſphere; which changeable atmoſphere may, by a like argument, be inferred of the ſatellites of Jupiter; and therefore, by ſimilitude, the ſame may be concluded of the other *planets*. But we want a ſufficient number of obſervations to eſtabliſh this fact: there is reaſon, on the contrary, to apprehend, that ſome, at leaſt, of the *planets* have no atmoſphere. See MOON.

4. In like manner, from the mountains obſerved in Venus, the ſame may be ſuppoſed in the other *planets*.

5. Since then Saturn, Jupiter, the ſatellites of both, Mars, Venus, and Mercury, are opake bodies, ſhining with the ſun's borrowed light, and are furniſhed with mountains, and encompaſſed, as ſome have ſuppoſed, with a changeable atmoſphere, they have, of conſequence, waters, ſeas, &c. as well as dry land, and they are bodies, therefore, like the earth. Q. E. D.

And hence nothing hinders but that the *planets* may alſo be concluded to be inhabited. Huygens, in his Coſmotheoros, argues very plauſibly for the exiſtence of planetary inhabitants, from the ſimilitude of the *planets* with our earth: thoſe, like this, being opake, denſe, uneven, round, heavy, illuminated, and warmed by the ſun, having night and day, ſummer and winter, &c.

Wolfius deduces ſomething relating to this purpoſe from arguments of another kind. Thus, e. gr. it is fcarce to be doubted, that the inhabitants of Jupiter are much larger than thoſe of the earth, and, in effect, of the giant kind. For it is ſhewn in optics, that the pupil of the eye dilates in a ſtrong light, and contracts in a weak one: wherefore, ſince in Jupiter the ſun's meridian light is much feebler than on the earth, on account of Jupiter's greater diſtance from the ſun, the pupil will need to be much more dilatable in the inhabitants of Jupiter than in thoſe of the earth. But the pupil is obſerved to have a conſtant proportion to the ball of the eye, and the eye to the reſt of the body; ſo that in animals, the larger the pupil the larger the eye, and the larger the body.

To aſcertain the ſize of theſe Jovial inhabitants, it may be obſerved, that the diſtance of Jupiter from the ſun is to the earth's diſtance from the ſame, as 26 to 5; the intenſity of the ſun's light in Jupiter is to its intenſity on the earth, in a duplicate ratio of 5 to 26; but it is found by experience, that the pupil dilates in a ratio greater than that wherein the intenſity of light decreaſes; otherwiſe, a body at a great diſtance might be ſeen as clearly as a nearer: the diameter, therefore, of the pupil in its greateſt dilatation, in the earth, is to its diameter in the like ſtate in Jupiter, in a ratio greater than that of the duplicate of 5 to 26. If then we put it as 10 to 26, or as 5 to 13; ſince the ordinary ſtature of the inhabitants of the earth is computed at 5 Engliſh feet 4 inches and ½ (which Wolfius tells us was his own height), the ordinary ſtature of Jupiter's inhabitants will be found 14 feet ½, which is very nearly the ſize of the giant Og, mentioned by Moſes, whoſe iron bed was 9 cubits long, and its breadth 4. But arguments of this kind being more whimſical than ſolid, are needleſs, in order to juſtify the ſimilarity of the other *planets* to our earth, and a conjecture, that they are deſtined by the Creator for the ſame purpoſe.

PLANETS, *motion of the*. That the *planets* do all revolve round the ſun as their centre, and not round the earth, is evident from a thouſand phenomena. 1. The orbit wherein Venus, e. gr. moves, does certainly encompaſs the ſun; and therefore, in deſcribing that orbit, the *planet* muſt turn round the ſun.

That her orbit includes the ſun, appears hence, that ſhe is ſometimes above the ſun, ſometimes below it, ſometimes beyond it, and ſometimes on this ſide; all which are evident from the circumſtances of her phaſes.

That ſhe does not move round the earth, is no leſs apparent from her being ever obſerved in the ſame quarter with the ſun, never receding from him above 48°. She never therefore comes to be in oppoſition to the ſun; no, not to be in a quartile aſpect, or to have a quarter of the heavens between them; both which, like the earth, ſhe muſt frequently have, did ſhe attend and move round the earth.

2. That Mercury revolves round the ſun, appears in like manner from his phaſes, which reſemble thoſe of Venus and the moon; and from his neighbourhood to the ſun, from whom Mercury never recedes ſo far as Venus does.

3. That the orbit of Mars includes the ſun, is evident from that *planet*'s being found both in conjunction and oppoſition with the ſun; and in both caſes ſhining with a full face. Indeed, from the ſame circumſtances it appears, that the orbit of Mars encompaſſes the earth; but then it follows, likewiſe, from Mars's diameter appearing ſeven times as big when in oppoſition, as when in conjunction, that he is ſeven times nearer the earth in the former than the latter poſition. The earth, therefore, is far from being the centre of Mars's *motion*; but Mars is ever nearly at the ſame diſtance from the ſun. Again, Mars viewed from the earth moves very irregularly; is ſometimes ſeen to proceed ſlower, ſometimes faſter; ſometimes he ſtands ſtill, and ſometimes he goes backward (the reaſons whereof, ſee under the article OPTICAL *inequality*); but viewed from the ſun, he will ever appear to move with the ſame conſtant uniform tenor; whence it is evident, he reſpects the ſun, not the earth, as the centre of his *motion*.

4. The ſame appearances whence Mars is ſhewn to revolve round the ſun as a centre, are likewiſe obſerved in Jupiter and Saturn; whence the ſame concluſion may be made of them.

Laſtly, that the earth revolves round the ſun, as a centre, is evident from her place, which we have obſerved to be between the orbits of Mars and Venus; and from the phenomena of the ſuperior *planets* viewed from it. If the earth ſtood ſtill, we ſhould never ſee thoſe *planets* either ſtationary or retrograde: the earth therefore moves, but it is ſtill found between the orbits of Mars and Venus, which encompaſs the ſun; therefore the earth alſo encompaſſes the ſun.

To this aſtronomical demonſtration, may be added a phyſical demonſtration of the earth's motion from Sir Iſaac Newton. It appears from abundant obſervation, that either the earth turns round the ſun, or the ſun round the earth, ſo as to deſcribe equal areas in equal times; but he demonſtrates, that bodies revolving about one another according to ſuch law, do of neceſſity gravitate toward each other. Whence, if the ſun gravitate to the earth, action and reaction being ſtill equal, the earth will likewiſe gravitate toward the ſun. But he proves, farther, that two bodies gravitating towards each other, without directly approaching one another in right lines, muſt both of them turn round the common centre of gravity of both. The ſun and earth, therefore, do both revolve round one common centre; but the earth being but a point in compariſon of the ſun, the common centre of gravity of the two will be within the ſun's body, and not far from its centre. The earth, therefore, revolves round a point, within the body of the ſun, and therefore round the ſun. See the arguments for the earth's motion, under EARTH.

From the transit of Venus over the sun on the 6th of June, 1761, Mr. Ferguson has given the following account of the magnitudes, distances, revolutions, &c. of the sun and *planets*. See PARALLAX.

The sun's diameter is 890,000 Englifh miles, his fuperficial contens (or number of fquare miles contained in his furface) is 2,488,461,300,000, and his folid content, in cubic miles, is 369,121,768,400,000,000. He revolves round his axis in 25 days 6 hours, and his axis is inclined to the plane of the ecliptic at an angle of 8°.

Mercury's diameter is 3000 miles, its fuperficial content is 28,274,400 fquare miles, and its folid content is 14,137,200,000 cubic miles. Its diftance from the fun is 36,841,408 miles; it goes round the fun in 87 days 23 hours, moving at the rate of 109,699,$\frac{5}{8}$ miles per hour. The inclination of its orbit to the plane of the ecliptic is 6° 54'; the plane of its aphelion ♌ 13° 8', and the place of its afcending node ♈ 14° 43'.

Venus's diameter is 9330 miles, its fuperficial content is 273,472,824 fquare miles, and its folid content is 425,250,241,693 cubic miles. Its diftance from the fun is 68,891,486 miles; it goes round the fun in 224 days 17 hours, moving at the rate of 80,285,$\frac{2}{8}$ miles per hour; and round its own axis in 24 days 8 hours; its axis is inclined to the plane of its orbit at an angle of 75°; its orbit inclined to the ecliptic at an angle of 3° 20'; the place of its aphelion ♊ 4° 20'; and the place of its afcending node in 13° 59'.

The Earth's diameter is 7970 miles; its furface contains 199,537,259 fquare miles, and its folid content or bulk is 265,078,559,633 cubic miles. Its diftance from the fun is 95,173,000 miles; it goes round the fun in a year, moving at the rate of 68,243,$\frac{3}{8}$ miles per hour. Its axis is inclined to its orbit 23° 29'; and the place of its aphelion is ♑ 8° 1'.

Mars's diameter is 5400 miles; its fuperficial content is 91,608,456 fquare miles, and its folid content, in cubic miles, is 82,148,140,400. Its diftance from the fun is 145,014,148 miles; it goes round the fun in 1 year 321 days 17 hours, moving at the rate of 55,287 miles per hour. It revolves round its axis in 24 hours 40'; its orbit is inclined to the ecliptic at an angle of 1° 52'; the place of its aphelion is ♓ 0° 32', and of its afcending node ♉ 17° 17'.

Jupiter's diameter is 94000 miles; its fuperficial content is 27,759,077,600 fquare miles, and its folid content, in cubic miles, is 434,803,787,400,000. Its diftance from the fun is 494,990,976 miles; it goes round the fun in 11 years 314 days 18 hours, moving at the rate of 29,683,$\frac{3}{8}$ miles per hour. It revolves round its axis in 9 hours 56'; its orbit is inclined to the ecliptic at an angle of 1° 26'; the place of its aphelion is ♎ 9° 10', and of its afcending node ♋ 7° 20'.

Saturn's diameter is 78000 miles; its fuperficial content is 19,113,494,400 fquare miles; and its folid content, in cubic miles, is 248,475,427,200,000. Its diftance from the fun is 907,936,130 miles; it goes round the fun in 29 years 167 days 6 hours, moving at the rate of 22,101,$\frac{7}{8}$ miles per hour. His orbit is inclined to the ecliptic at an angle of 2° 30'; the place of its aphelion ♐ 25° 50', and of its afcending node ♋ 11° 13'.

The Sun is 539$\frac{1}{2}$ times as big as all the *planets* put together.

The Sun is 26,169,963 times as big as Mercury, 845,019 times as big as Venus, 1,392,500 times as big as the Earth, 4,477,011 times as big as Mars, 849 times as big as Jupiter, and 1,490 times as big as Saturn.

The Earth's bulk is to Mercury's bulk as 1 to 7,$\frac{1}{8}$, to Venus's bulk as 1 to 1,$\frac{1}{8}$, to Mars's bulk as 1 to 1,$\frac{1}{8}$, to Jupiter's bulk as 1 to 1640, and to Saturn's bulk as 1 to 937.

Supposing the light and heat received by the earth to be 1, thofe of Mercury will be 6$\frac{1}{2}$, of Venus 1$\frac{1}{2}$, of Mars $\frac{1}{3}$, of Jupiter $\frac{1}{27}$, of Saturn $\frac{1}{90}$.

If a body, projected from the fun, fhould continue to fly at the rate of 480 miles per hour (which is about the fwiftnefs of a cannon ball), it would reach the orbit of Mercury in 8 years 276 days; of Venus in 16 years 136 days; of the Earth in 22 years 226 days; of Mars in 34 years 169 days; of Jupiter in 117 years 234 days; and of Saturn in 215 years 287 days.

The Moon's diameter is 2180 miles; her bulk is in proportion to the Earth's bulk as 1 to 48,$\frac{1}{2}$; her diftance from the earth's centre is 240,000 miles, and a cannon ball would go from the earth's centre to the moon in 26 days 20 hours. She goes round her orbit in 27 days 7 hours 43 minutes, moving at the rate of 2209,$\frac{7}{8}$ miles per hour.

The quantities of matter in the Sun, Jupiter, Saturn, and the Earth, as determined by the Newtonian theory of gravity, are to each other as the numbers 1, $\frac{1}{1067}$, $\frac{1}{2855}$, and their denfities as the numbers 100, 94$\frac{1}{2}$, 67, and 400; and their attractive powers at their furfaces as the numbers 10000, 9425, 529, 435, refpectively.

Mr. Hutton, by very elaborate calculations, founded on the furvey and meafures taken at Schehallien, with a view to afcertain the ATTRACTION *of mountains*, has deduced the mean denfity of the earth, in comparifon with water, to be as 4$\frac{1}{2}$ to 1; and the relative denfities of the fun and *planets*, in refpect of water, admitting the denfities compared with each other to be as M. de la Lande has ftated them in his Aftronomy, will be as follow; viz. water 1, the fun 1,$\frac{1}{4}$, Mercury 9$\frac{1}{2}$, Venus 5$\frac{1}{4}$, the Earth 4$\frac{1}{2}$, Mars 3$\frac{1}{2}$, the Moon 3,$\frac{1}{4}$, Jupiter 1,$\frac{1}{2}$, and Saturn $\frac{1}{2}$. Phil. Tranf. vol. lxviii. part ii. art. 33.

For the diameters of the fun and *planets*, as feen from the earth, and the diameters of the *planets*, as feen from the fun, fee DIAMETER.

For the relative mean diftances of the *planets* from the fun, fee DISTANCE.

For the eccentricities of the *planets*, fee ECCENTRICITY.

The orbits of the *planets* are all ellipfes; one of whofe foci is in the fun. This Kepler firft found from Tycho's obfervations; before him, all aftronomers took the planetary orbits for eccentric circles.

The planes of thefe orbits do all interfect in the fun; and the line wherein the plane of each orbit cuts that of the earth, is called the *line of the nodes*; and the two points wherein the orbits themfelves touch that plane, *the nodes*.

The diftance between the centre of the fun, and the centre of each orbit, is called the ECCENTRICITY *of the planets*.

And the angle at which each plane cuts that of the ecliptic, is called *the inclination of the planes*.

To account for the *motion of the planets* about the fun, there needs nothing but to fuppofe an uniform projectile *motion*, in ftraight lines, at firft given them; and a power of attraction or gravitation, fuch as we obferve in all the great bodies in our fyftem. For a body A (*Tab. Aftron. fig.* 45) proceeding uniformly along the line AB, will, by the intervention of the attracting body C, be every moment diverted out of its rectilinear, and bent into a curvilinear path, according to the laws of central forces. If, then, the projectile *motion* be perpendicular to a line, CA, drawn from the attracting body C; and its velocity be fo proportioned to the force of attraction of A, as that the centripetal and centrifugal forces are equal, i. e. that the conatus to fall to the central body C, in a right line, AC; and that to proceed in the direction of the tangent, A B, balance each other; the body will revolve in a circular orbit, A, *b*, 7, 3, &c.

It is not improbable, that at the beginning this was the ftate of things; and that the velocities impreffed on the feveral *planets* were fo combined with their refpective maffes and diftances from the fun at which they were to roll, as that their momenta fhould counterbalance the fun's attractive force, and be precifely counterbalanced thereby; whence the primitive orbits muft have been perfect circles, from which they do not even now deviate very far. See ECCENTRICITY.

If the *planet's* projectile *motion* be not perfectly adjufted to the fun's attraction, the orbit defcribed will be an ellipfis. If it be too fwift, the orbit will be greater than a circle, and the nearer focus coincides with the central body; if too flow, the orbit will be lefs than a circle, and the farther focus coincide with the central body.

Indeed the form of the planetary orbits does not only depend on the adjuftment of the firft projectile velocity with the fun's attraction, but alfo on the direction wherein that motion was originally impreffed. If that direction were according to the tangent AB, as above fuppofed, and the central forces exactly balanced, the orbit would be circular; but if that direction were oblique, in any manner, whether afcending to or defcending from the fun, the orbit of the *planet*, notwithftanding any adjuftment of its velocity to the attraction, would be an ellipfis.

The *motions of the planets* in their ellipfic orbits are not equable, becaufe the fun is not in their centre, but their focus. Hence they move, fometimes fafter, and fometimes flower, as they are nearer or farther from the fun; but yet thefe irregularities are all certain, and follow according to an immutable law.

Thus, fuppofe the ellipfis BEP, &c. (*Tab. Aftron. fig.* 47.) the orbit of a *planet*, and the focus S, the fun's place; AP, the axis of the ellipfis, is called the *line of the apfides*; the point A, the *higher apfis* or *aphelion*; P, the *lower apfis* or *perihelion*; SC, the eccentricity; and ES, the mean diftance of the *planet* from the fun.

Now the *motion of the planet* in its perihelion, is fwifteft, and in its aphelion, floweft; at E the *motion* as well as the

the diſtance is mean, i. e. it is ſuch as would deſcribe the whole orbit in the ſame time it is really deſcribed in. The law whereby the *motion* is regulated in every point of the orbit, is, that a line, or radius, drawn from the centre of the ſun to the centre of the *planet*, and thus carried along with an angular *motion*, does always deſcribe an elliptic area proportional to the time. Suppoſe, e. gr. the *planet* in A, and thence in a certain time to proceed to B; the ſpace or area the radius SA deſcribes, is the triangle ASB: when, at length, the *planet* arrives at P, if from the centre of the ſun S there be drawn SD, in ſuch manner as that the elliptic area PSD is equal to that of ASB, the *planet* will here move through the arch PD, in the ſame time wherein it moved through the arch AB; which arcs are unequal, and nearly in a reciprocal proportion to their diſtance from the ſun. For from the equality of the areas it follows, that the arch PD muſt exceed AB as much as SA exceeds SP. This law was firſt demonſtrated by Kepler, from obſervation; and is ſince accounted for by Sir I. Newton from phyſical principles; and to this all aſtronomers now ſubſcribe, as of all others that which beſt ſolves the planetary phenomena.

Computation of a PLANET's *motion and place.* As to the periods and velocities of the *planets*, or the times wherein they perform their courſes, they are found to have a wonderful harmony with their diſtances from the ſun, and with one another. The nearer each *planet* is to the ſun, the quicker ſtill being its motion, and its period the ſhorter. The great law they here all immutably obſerve is, that the ſquares of their periodical times are as the cubes of their diſtances from the centres of their orbits. The knowledge of this law we alſo owe to the ſagacity of Kepler, who found it to obtain in all the primary *planets*; as aſtronomers have ſince found it alſo to do in the ſecondary ones.

Kepler deduced this law merely from obſervation, and compariſon of the ſeveral diſtances of the *planets* with their periods: the glory of inveſtigating it from phyſical principles is due to Sir Iſaac Newton, who has demonſtrated, that, in the preſent ſtate of things, ſuch a law was inevitable.

A *planet*'s motion, or diſtance from its apogee, is called the *mean anomaly* of the *planet*; and is meaſured by the arc or area it deſcribes in the time. When the *planet* arrives at the middle of its orbit, or the point G, the diſtance or time is called the *true anomaly*. When the *planet*'s motion is reckoned from the firſt point of Aries, it is called its *motion in longitude*; which is either mean, viz. ſuch as the *planet* would have, were it to move uniformly in a circle; or true, which is that wherewith the *planet* actually deſcribes its orbit, and meaſured by the arc of the ecliptic it deſcribes.

Hence may the *planet*'s place in its orbit for any given time after it has left the aphelion be found. For ſuppoſe the area of the ellipſis ſo divided by the line SG, that the whole elliptic area may have the ſame proportion to the area ASG as the whole periodical time wherein the *planet* deſcribes its orbit has to the time given: in this caſe G will be the *planet*'s place in its orbit.

PLANETS, *the phenomena of the inferior*, are their conjunctions, elongations, ſtations, retrogradations, phaſes, and eclipſes. See CONJUNCTION, ELONGATION, STATION, RETROGRADATION, &c.

PLANETS, *phenomena of the ſuperior*, are the ſame with thoſe of the inferior; with an additional one, viz. oppoſition.

PLANET, *the particular phenomena, circumſtances, &c. of each*, ſee under the name of the reſpective *planet*, &c. JUPITER, MARS, &c.

PLANETS, *configuration of the*. See CONFIGURATION.

PLANETS, *theories of the*. See THEORY.

PLANETARIUM, an aſtronomical machine, made to repreſent the motions of the planets, as they really are in nature, or at leaſt agreeably to the Copernican ſyſtem, and commonly called an ORRERY.

The moſt remarkable of theſe machines was that invented by Huygens, and deſcribed by him. See Deſcript. Automati Planetarii, ap. Huygen. Opuſcul. poſthum. tom. ii. p. 157, edit. Amſt. 1728.

In this *planetarium*, the five primary planets perform their revolutions about the ſun; and the moon performs her revolution about the earth, in the ſame time that theſe revolutions are really performed in the heavens. The orbits alſo of the moon and planets are repreſented with their true proportions, eccentricity, poſition, and declination, from the ecliptic or orbit of the earth; ſo that by this *planetarium* the ſituation of the planets, the conjunctions, oppoſitions, &c. may not only be known for the preſent time, but for any time paſt, or future, as in a perpetual ephemeris.

This machine is now preſerved among the curioſities of the univerſity of Leyden.

But the *planetariums* or orreries now moſt commonly uſed do not repreſent the true times of the celeſtial motions, but only their proportions; and are of uſe to beginners, to give them an idea of the planetary ſyſtem; as alſo, if conſtructed with ſufficient accuracy, to ſolve queſtions relating to the motions of the planets, and of the earth and moon, &c.

Theſe machines are made of various ſizes, ſome repreſenting more planets than others. However, theſe complex ones are far from being improvements upon the original *planetarium*, or orrery, which ſhewed only the motion of the moon round the earth, and of the earth and moon round the ſun. They give but very confuſed, and even falſe ideas of the diſtances and bigneſs of the planets; which muſt always be ſo whilſt the orbits of the moon, and other ſecondary planets, are fixed to the ſame machine, which contains the primary one. In the original one, every thing was well and properly executed; as the phenomena of day and night, and their gradual increaſe and decreaſe according to the ſeaſons; the places of the earth where the ſun is ſucceſſively vertical, and ſeems to deſcribe its parallels; the real annual motion of the earth, which gives the ſun an apparent annual motion; the rotation of the ſun about its axis; the periodical and ſynodical month; the ſolar and ſydereal days; the ſucceſſive illumination of all the parts of the moon, &c.

It is therefore proper to have a machine for repreſenting the general ſolar ſyſtem by itſelf; the ſun, moon, and earth, ought alſo to be ſhewn ſeparately; and the ſyſtem of any other primary planet; as Jupiter, for inſtance, with all its ſatellites, ſhould have a ſeparate machine ſo contrived, as to repreſent in true proportion their magnitudes, diſtances, and other phenomena.

Dr. Deſaguliers deſcribes a *planetarium* of his own contrivance, the frame of which, containing the clock-work, is made of ebony; its outſide is adorned with twelve pilaſters, between which are painted, on as many vertical planes, the twelve ſigns of the zodiac. The upper ſurface is flat, and made of poliſhed braſs; on the outward circumference of which are ſcrewed ſix braſs pillars, ſupporting a large flat ſilvered ring. On this ring, which repreſents the ecliptic, are drawn ſeveral circles; the three innermoſt being divided into twelve parts for the ſigns of the zodiac, and each of theſe into thirty degrees; and among thoſe degrees are graved in their proper places the nodes, aphelia, and greateſt north and ſouth latitudes of the planets. The next three circles have the months and days of the month, exactly correſponding to the ſun's place at noon each day throughout the year; and upon the braſs ſurface of the machine graduated are ſilver circles, which carry the planets, repreſented by ſilver balls, and raiſed upon arbors or ſtems to the height of the ecliptic.

Above the ecliptic ſtand ſome of the principal circles of the ſphere, according to their reſpective ſituation in the heavens, viz. the two colures, one half of the equinoctial circle, the tropic of Cancer, the arctic circle, &c. The whole machine is alſo ſo contrived, as to be ſet to any latitude, without injuring any of the inſide motions. Within the ecliptic ſtand the ſun and other planets; the ſun being in the centre of the whole ſyſtem, and the reſt repreſented agreeably to the above mentioned magnitudes and diſtances. When things are thus diſpoſed, by turning about the handle, or winch, of the *planetarium*, all the planets perform their revolutions round the ſun, according to their periodical times; and being furniſhed with indices of blued ſteel, theſe ſhew the longitudes of the planets, by pointing to the diviſions on the graduated ſilver circles, as they move round.

As the diſtances of the planets are in their true proportions to each other, ſo likewiſe are their magnitudes; but it cannot be expected, that the diameters of the planets ſhould be in proportion to the diameters of their orbits; for to effect this, the machine muſt either be made three thouſand times bigger than uſual, or the balls repreſenting the planets three thouſand times leſs than uſual; whereby they would all be rendered inviſible, excepting the ſun, and even it would be leſs than $\frac{1}{100}$th part of an inch in diameter. For the ſame reaſon it is found impracticable to repreſent the ſun by a ball, proportionally bigger than thoſe repreſenting the other planets.

Now as the orbit of the moon, as well as of the ſatellites of Jupiter and Saturn, bear no manner of proportion to the orbits of the primary planets, the diſproportion between theſe and their ſatellites muſt be ſtill greater. Hence appears the abſurdity of crowding them all into one machine, as is the caſe in the common orreries.

To give a right notion of the diſtances and magnitudes of the ſatellites with reſpect to their primary planets, it will be neceſſary to have a ſeparate machine for each ſyſtem; or, the ſame machine may be ſo contrived, as

to

to represent one system after another, by shifting and adjusting the magnitudes and distances of the balls. In this manner, the general solar system may be first exhibited; then that of the moon and earth round the sun; afterwards that of Jupiter and its satellites; and, lastly, that of Saturn and its satellites.

We have already taken notice of some of the phenomena explained by the general *planetarium*, as well as of that contrived to exhibit the revolution of the earth and moon round the sun. By these is likewise plainly shewn the causes of eclipses, as well as of the apparent stationary and retrograde motions of the planets.

By the *planetarium* adapted to the system of Jupiter, and its satellites, are exhibited the immersion or entrance of a satellite into the shadow of Jupiter; its emersion out of the shadow; when these are visible; when a satellite is hidden by the body of Jupiter before it comes into, or after it is gone out of the shadow; when a satellite may be seen to cross the body of Jupiter; when a satellite makes a solar eclipse in Jupiter; and when satellites eclipse one another. See Desaguliers's Exper. Phil. vol. i. p. 470, &c.

PLANETARY, something that relates to the *planets*.

In this sense we say *planetary* worlds, *planetary* inhabitants, &c. Huygens and Fontenelle bring several probable arguments for the reality of *planetary* worlds, and animals, plants, men, &c. The former in his *Kosmotheoros*, five de Terris Coelestibus; the latter in his Dialogues, Sur la Pluralité des Mondes.

PLANETARY *globe*. See GLOBE.

PLANETARY *system*, is the system or assemblage of the *planets*, primary and secondary, moving in their respective orbits round their common centre, the sun.

PLANETARY *hours*, in *Chronology*. See HOUR.

PLANETARY *days*. Among the ancients, the week was shared among the seven planets, each planet having its day. This we learn from Dion Cassius, and Plutarch, Synpos. lib. iv. q. 7. Herodotus adds, that they were the Egyptians who first discovered what god, that is, what planet, presides over each day; because among this people the planets were directors. And hence it is, that, in most European languages, the days of the week are still denominated from the planets; Sunday, Monday, &c.

PLANETARY *years*, the periods of time wherein the several planets make their revolutions round the sun, or earth.

As from the proper revolution of the sun, the solar year takes its original; so from the proper revolutions of the rest of the planets about the earth, so many sorts of years do arise; viz. the Saturnian year, which is defined by 29 Egyptian years, 174 hours 58 minutes, equivalent in a round number to 30 solar years. The Jovial year, containing 317 days 14 hours 59 minutes. The Martial year, containing 321 days 23 hours 31 minutes. For Venus and Mercury, as their years, when judged of with regard to the earth, are almost equal to the solar year; they are more usually estimated from the sun, the true centre of their motions: in which case, the former is equal to 224 days 16 hours 40 minutes; the latter to 87 days 23 hours 14 minutes.

PLANETARY *hours*, those wherein the *planetary* hours are inscribed.

PLANETARY *squares*, the squares of the seven numbers from 3 to 9, disposed magically.

Corn. Agrippa, in his famous book of magic, has given the construction of the seven *planetary* squares: M. Poignard, canon of Bruffels, in his Treatise of Sublime Squares, gives new, easy, and general methods, for making the seven *planetary* squares, and all others to infinity, by numbers in all sorts of progressions. See MAGIC *Square*.

PLANIFOLIOUS *flowers*. See FLOWER.

PLANIMETRY, *planimetria*, that part of geometry which considers lines and plain figures; without any consideration of heights or depths.

Planimetry is particularly restrained to the mensuration of planes or surfaces: in opposition to *stereometry*, or the mensuration of solids. See MEASURING and SURVEYING.

Planimetry, or the art of measuring the surfaces and planes of things, is performed with the squares of long measures, as square feet, square inches, square yards, square perches, &c. that is, by squares whose sides are an inch, a foot, a yard, a perch, &c. so that the area or content of any surface is said to be found, when we know how many such square inches, feet, yards, &c. it contains.

PLANISPHERE, a projection of the sphere, and the several circles thereof, on a plane; as upon paper, or the like.

In this sense, maps of the heavens and the earth, wherein are exhibited the meridians, and other circles of the sphere, are called *planispheres*.

PLANISPHERE is sometimes also considered as an astronomical instrument, used in observing the motions of the heavenly bodies; consisting of a projection of the celestial sphere upon a plane, representing the stars, constellations, &c. in their proper situations, distances, &c. Such is the ASTROLABE, which is a common name for all such projections.

In all *planispheres*, the eye is supposed to be a point viewing all the circles of the sphere, and referring them to a plane whereon the sphere is as it were flattened. This plane is called the *plane of the projection*.

A perspective plane is only a plane of projection placed between the eye and the object, so as to contain all the points which the several rays drawn from the object to the eye impress thereon. But in *planispheres* or astrolabes, the plane of the projection is placed beyond the object; which is the sphere. The plane of the projection is always some of the circles of the sphere.

Among the infinite number of *planispheres* which the different planes of projection, and the different positions of the eye, would furnish, there are two or three that have been preferred to the rest. Such are that of Ptolemy, where the plane of projection is parallel to the equator: that of Gemma Frisius, where the plane of projection is the colure, or solstitial meridian, and the eye the pole of the meridian: that of John de Royas, a Spaniard, whose plane of projection is a meridian, and the eye placed in the axis of that meridian, at an infinite distance. This last is called the ANALEMMA.

The common defect of all these projections is, that they distort and alter the figures of the constellations to as it is not easy to compare them with the heavens; and that the degrees in some places are so small, that they afford no room for operation.

All these faults M. de la Hire has provided against in a new projection, or *planisphere*; where it is proposed the eye shall be so placed, as that the divisions of the circles projected shall be sensibly equal in every part of the instrument. The plane of his projection is that of a meridian.

PLANISPHERE, *nautical*. See NAUTICAL.

PLANKING, in *Naval Architecture*, the art of covering and lining the sides of a ship with an assemblage of oak planks, which completes the process of ship-building, and is sometimes called by artificers laying on the skin.

PLANKS, in a *Ship*, are the timbers which go fore and aft on each side of the ship, whereon lie the beams of the first orlop.

PLANK, *garboard*, in a *Ship*. See GARBOARD.

PLANO-*concave glass*, or *lens*. See LENS.

PLANO-*convex glass*, or *lens*. See LENS.

PLANT, *planta*, an organical body, consisting of a root, and other parts; and producing usually leaves, a stem, branches, and flowers.

A *plant* may be defined in Boerhaave's manner to be an organical body composed of vessels and juices; to which body belong a root, or a part whereby it adheres to some other body, and particularly the earth, from which it derives the matter of its life and growth.

A *plant* is distinguished from a fossil by its being organical, and consisting of vessels and juices; and from an animal, by its adhering to another body, and deriving its nourishment therefrom.

That *plants* are organized bodies and endued with life is evident from many considerations: every body that has spontaneous motion must also have life; for proper and internal motion in every body depends on the spontaneous propulsion of fluids, and where this manifests itself, there is life. This kind of motion in *plants* appears in a variety of circumstances: thus herbs in green-houses or flores incline or turn towards the light. When shut up, if they find a hole in the wall, shutters, or frames, there they endeavour to penetrate. Several *plants* in the day-time turn their flowers towards the sun; most *plants* in a serene sky expand their flowers; but before rain, shut them up, or contract them at the approach of night. The flowers of many *plants* hang down in the night, as if the *plants* were asleep, lest rain or the moist air should injure the fertilizing dust. The trefoile, &c. shut up, or double their leaves before storms and tempests, but unfold them in a clear sky. The tamarind-tree is said by Alpinus and Acosta to enfold within its leaves the flowers or fruit every night, in order to guard them from cold or rain. Some of the sensitive *plants* and the wood-sorrel with pinnated leaves, upon being touched, roll up their leaves, and turn downwards or shrink, and after a little time expand them again, as if they had both life and sensation. And it farther appears, that motion is no less necessary to the vigour of *plants*, than exercise to the health and strength of animals. Thus *plants* in stoves and green-houses, though they have sufficient heat and nourishment, are slender, weak, and lose the colour of their leaves, and

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ſeem to languiſh for want of motion; and trees, ſurrounded with high walls or buildings, and confined within narrow bounds, are ſlender, and grow tall, but not ſtrong.

The organization and life of *plants* will be farther evinced in the ſequel of this article by many conſiderations, deduced from their anatomy, generation, œconomy, and vegetation.

Plant is a general name, under which are compriſed all vegetable bodies, as trees, ſhrubs, and herbs.

Trees are defined to be perennial *plants*, which riſe to a very great height, with a ſimple, woody, and durable ſtem or trunk: and by theſe characters they are accurately diſtinguiſhed from herbs, whoſe ſtems are frequently compound, herbaceous, or ſucculent, and die down to the root every year. Theſe differences ſuggeſted the very ancient diviſion of vegetables into herbs and trees; ſo that, from the time of Ariſtotle and Theophraſtus, this diviſion has obtained a principal place in almoſt every ſyſtem, except that of Linnæus, which mixes herbs, ſhrubs, and trees promiſcuouſly together: and thus is preſerved the harmony of his ſyſtem, which is ſolely founded on the fructification of every individual genus and ſpecies. Among the celebrated names in botany, which have retained the ancient diſtinction, are numbered Cæſalpinus, the father of ſyſtematic botany, Moriſon, Hermannus, Chriſtopher Knaut, Boerhaave, Ray, Pontederæ, and Tournefort. On the oppoſite ſide are ranged Rivinus, Chriſtian Knaut, Linnæus, Ludwig, &c. The diſtinction into trees and ſhrubs, though of equal antiquity, is neither ſo obvious, nor are its limits ſo accurately aſcertained.

The learned Dr. Alſton, in his Tyrocinium Botanicum, wiſhes to conſider the diſtinction into trees and ſhrubs, as a true natural diſtinction, and endeavours to trace its foundation in the internal ſtructure of the *plants* themſelves. All trees, ſays he, whether they bear buds or not, are covered with two barks, the outer and inner, called by the botaniſts *cortex* and *liber*.

Shrubs differ from herbaceous vegetables in the duration of their ſtems; from trees, in the nature of their covering, which is not a bark but a cuticle or ſimple ſkin: but this fact is not ſufficiently aſcertained. The farther diſtinction into ſhrubs and under-ſhrubs, which is exceedingly arbitrary and indeterminate, was firſt ſuggeſted by Cluſius, in a work intitled Rariorum & Exoticæ Plantæ, publiſhed in 1576, and adopted by Cæſalpinus and others. See Dr. Hunter's edition of Evelyn's Sylva, p. 2. note *.

From the obſervations of Malpighi, Dr. Grew, M. Reaumme, Bradley, and others, there appears a great ſimilitude between the mechaniſm of *plants*, and that of animals; the parts of the former bear a conſtant analogy to thoſe of the latter; and the vegetable and animal œconomy appear both formed on the ſame model. To give an idea hereof, it will be neceſſary to deſcribe the parts whereof *plants* conſiſt.

PLANTS, *anatomy of*. The general and obvious parts of a *plant* are five, *viz.* the root, the ſtem, the branches, the leaves, and the flower. A good microſcope diſcovers the conſtituent parts of a *plant* to be, 1. A very thin outer rind. 2. An inner rind, much thicker than the former. 3. A blea, of a ſpongy texture. 4. A vaſcular ſeries. 5. A fleſhy ſubſtance, which anſwers to the wood of a tree or ſhrub. 6. Pyramidal veſſels, contained within the fleſh. And 7. A pith. Whatever part of the *plant* we examine, we obſerve theſe and no more. The root, its aſcending ſtalk, and deſcending fibre, are one, and not three ſubſtances. This reduces the entire vegetable to one body; and what appears in the flower to be many parts is only compoſed of the extremities of theſeven above mentioned. The cup terminates the outer bark; the inner rind ends in the outer petals; the blea forms the inner petals; the vaſcular ſeries ends in the nectaria; the fleſh makes the ſtaments; the pyramidal veſſels form the receptacle; the pith furniſhes the ſeeds and their capſules.

Trees, ſhrubs, and herbs are organized in the ſame manner; but the colour and thickneſs of their component parts are different, according to their reſpective natures.

1. The outer bark, which firſt preſents itſelf to view, has the appearance of a fine film full of irregular meſhes, though in reality it conſiſts of two membranes, with a ſeries of veſſels between them. Theſe take their courſe upwards, and as they advance towards the cup of the flower, inoſculate with the ſmall veſſels of the inner bark, into which they pour part of the juices they have received from the earth and atmoſphere. The fine meſhes ſerve the purpoſes of inhalent or exhalent pores, according to the circumſtances of the weather.

2. The inner bark is much thicker than the outer. It is made up of ſeveral flakes laid evenly upon one another, each of which conſiſts of two membranes, incloſing a ſeries of veſſels. Theſe communicate freely through the whole ſubſtance of the rind, and as they inoſculate with the veſſels of the outer bark, ſo they alſo communicate with thoſe of the blea.

3. The blea lies immediately under the inner bark. It is a ſingle ſubſtance of uniform ſtructure, of conſiderable thickneſs, and made up of beds of hexagonal cells; in the angles formed by theſe cells, we obſerve the veſſels of the blea, which pour their contents into the cells, that appear to be reſervoirs for the water imbibed by the *plant*. Underneath the blea lies,

4. The vaſcular ſeries, whoſe ſtructure is extremely ſimple, being a ſingle courſe of greeniſh veſſels lodged between two membranes. At a certain ſeaſon of the year, the juices of the vaſcular ſeries are very mucilaginous. Its veſſels have a free communication with the wood and blea. The favourers of a circulation aſſert, that through theſe veſſels, which Mr. Bradley calls the venal veſſels, the returning ſap deſcends; but by the moſt accurate experiments of Dr. Hales, it appears that the vegetable juices do riſe and fall in the ſame ſeries of veſſels, and conſequently have no CIRCULATION.

5. The wood, or fleſhy part of a *plant* is that in which the life of the vegetable ſeems to be placed. It is univerſal in the *plant*, and made up of ſtrong fibres. From this all the other parts are produced; it ſhoots a pith inward, and a rind, blea, and vaſcular ſeries outward. Through every part of the wood or fleſh, there are veſſels, called by the advocates of circulation, arterial veſſels, that convey a juice highly elaborated, the greateſt part of which has undergone the concoction of the rinds, blea, and vaſcular ſeries. The woody fibres conſtitute an order of veſſels, which are named trachææ. Theſe are filled with elaſtic air, and may be diſcovered by the eye, in the wood of all trees. The trachææ form an arterial ſyſtem, and ſupply the place of the heart in animals. Being filled with air, they become ſubject to the alternate effects of heat and cold.

6. The pyramidal veſſels ſpread through the whole ſubſtance of the fleſh, and, as they advance upwards, their ramifications inoſculate, ſo as to prevent any poſſible obſtruction of the ſap. Their juices are very highly elaborated, having paſſed through all the orders of ſap-veſſels. Their ſides are conſtantly in contact with the trachææ; ſo that they are at all times ſubject to the viciſſitudes of the weather. The pyramidal veſſels communicate with,

7. The pith, which is found in all trees, ſhrubs, and *plants*, occupying the centre, but not always regularly continued. When examined by a microſcope, it has the appearance of a number of veſicles, and is of an uniform ſtructure. It does not appear to be abſolutely neceſſary to vegetation, becauſe elms and other trees live and thrive without it. In trees it is found in the branches, being obliterated in the trunk. The veſſels of the fleſh communicate with it, from which it receives a fluid, and it is probably the receptacle of part of the ſap; it is alſo diſcovered in tranſverſe ſections of the ribs of leaves; and when minutely traced, it is found to run up to the ovarium, where it forms the ſeeds and their capſules.

The fibres of a root are ſuppoſed to be ſimple capillary tubes; but upon a minute inſpection, we diſcover them to conſiſt of the ſeven component parts of a *plant*. At their extremities we obſerve a ſpongy kind of excreſcence pierced with innumerable ſmall holes, through which the nutritive juices of the earth are abſorbed, and which Boerhaave conſiders as analogous to the lacteals in animals. When a *plant* has been pulled up, it will be retarded in its growth, until nature has renewed that ſpongy nipple. The bark and leaves of a *plant* imbibe, at proper ſeaſons, the moiſture of the atmoſphere: at other times they perſpire the ſuperfluous nouriſtment. The leaves are broad, in order the more readily to receive the moiſture of the air. The roots are formed ſharp and pointed, to make their paſſage more eaſily through the earth. But experiments ſhew, that a young tree may have its branches placed in the earth, and its roots elevated in the air; and in that inverted ſtate it will continue to live and grow. The air contains, eſpecially during the ſummer months, all the principles of vegetation, which are greedily abſorbed by the veſſels of the leaves and bark; and conveyed to the innermoſt parts of the *plant* for its growth and fructification. When the air happens to be cold and moiſt, this abſorption takes place; when it is hot and dry, the ſame veſſels throw off the ſuperfluous moiſture by perſpiration.

PLANTS, *œconomy, or uſe of the parts of*. The analogy, that ſubſiſts between *plants* and animals, has induced ſome very eminent naturaliſts to ſuppoſe a regular circulation of the vegetable juices. M. Perrault, M. Major, M. Marriotte, Malpighi, and Grew, contended, much about the ſame time, for the CIRCULATION *of the ſap*.

According to their microſcopical obſervations, the wood

of trees and the flesh of *plants* conſiſt of fine capillary tubes, which run parallel from the root, through the trunk and branches. Theſe they looked upon as arteries. Other minute veſſels were obſerved running between the wood and inner bark, which they diſtinguiſhed by the name of veins. They alſo deſcribed very correctly, the tracheæ or air-veſſels, which take their courſe through the fibres of the wood. From theſe preliminaries they reaſoned in this manner: the root having abſorbed a quantity of juice from the earth, it is made to aſcend through the veſſels of the wood, by the alternate expanſion and contraction of the tracheæ, aſſiſted by the natural abſorption of the ſap-veſſels themſelves. They ſuppoſe the ſap to be rarefied to the degree of a fine vapour, in which ſtate it mounted upward to the extreme parts of the *plant*, where, meeting with the external air, it became condenſed into a liquor, and in that form, returned to the root by the veſſels, between the wood and bark.

Dr. Hales, in the moſt ſatisfactory manner, exploded this doctrine, and ſubſtituted another in its place, more conſonant to reaſon and experiment: and it is remarked, that, as Dr. Harvey eſtabliſhed the *circulation of the* BLOOD, in oppoſition to moſt of the anatomiſts in Europe, Dr. Hales clearly diſcovered the CIRCULATION *of the ſap*, againſt the opinion of almoſt every naturaliſt of his time.

In order to have a diſtinct view of the motion of the ſap, it is neceſſary to reflect, that the root, ſtem, branches, and leaves are conſtructed in the ſame manner. Sallows, willows, vines, and moſt ſhrubs, will grow in an inverted ſtate, with their tops downward in the earth. Dr. Bradley deſcribes the manner of inverting a young cherry-tree, the roots of which will put forth leaves, and the branches become roots. Hence it is evident, that the nutritive matter may be conveyed by the leaves as well as by the roots, their veſcular ſtructure being the ſame.

For underſtanding the motion of the ſap, according to theſe principles, it is to be conſidered, that, during the heat of a ſummer's day, all plants perſpire freely from the pores of their leaves and bark. At that time the juices are highly rarefied. The diameters of the tracheæ, or air-veſſels, are enlarged, ſo as to preſs upon and ſtraiten the veſſels that carry the ſap; in conſequence of which, their juices, not being able to eſcape by the roots, are preſſed upward, where there is the leaſt reſiſtance, and perſpire off the excrementitious parts by the leaves and top-branches, in the form of vapour. When the ſolar heat declines, the tracheæ are contracted: the ſap-veſſels are enlarged, and the ſap ſinks down in the manner of the ſpirits of a thermometer. In conſequence of this change, the capillary veſſels of the leaves and top-branches become empty. Being ſurrounded with the humid vapours of the evening, they fill themſelves, from the known laws of attraction, and ſend down the new-acquired juices to be mixed with thoſe that are more elaborated. As ſoon as the ſun has altered the temperature of the air, the tracheæ become again diſtended, and the ſap-veſſels are ſtraitened. The ſame cauſe always produces the ſame effect; and this alternate aſcent and deſcent through the ſame ſyſtem of veſſels, continues as long as the *plant* ſurvives. The irregular motion of the ſtem and branches is another cauſe that contributes to the aſcent of the ſap. Whenever theſe parts are agitated by the air, they are made to aſſume a variety of angles, whereby the ſap-veſſels are ſuddenly ſtraitened. The contained juices, conſequently, receive reiterated impulſes, ſimilar to what happens to the blood of animals from the contraction of the heart. Theſe obſervations convey a general idea of the motion of the ſap, which varies according to the temperature of the weather; which is ſeldom the ſame in any ſucceeding moment: and, therefore, the ſap muſt ſometimes move quick, and ſometimes ſlow. It may riſe and fall many times in a day, puſhed upward by ſudden heats, and falling by ſudden cold. Thus the juices are blended, and the ſecretions forwarded.

As to the manner in which the nutritive juices of the earth and atmoſphere are conveyed into the ſap-veſſels, we are to conſider, that the outer bark which covers every external part of the vegetable, as well below as above the ſurface, is full of perſpiratory or abſorbent holes. The veſſels of this bark, being endowed with the power inherent in capillary tubes, draw up the moiſture that is applied to their ſurface. From them it is committed to the veſſels of the inner bark. After receiving ſome degree of meliioration, the ſap is delivered to the bleа, from the bleа, it paſſes, by anaſtomoſing canals, to the veſcular ſeries. From thence to the wood or fleſh, where it receives its laſt concoction. The nutritive particles, being ſeparated by the mechaniſm of theſe numerous canals, are applied towards the ſuuſiſtence and increaſe of the *plant*; while the watery and excrementitious parts are carried expeditiouſly to the leaves, where they are perſpired off in the form of vapour.

It is evident, however, that, as water contains but few particles that are fit for nouriſhment, it was neceſſary that *plants* ſhould have a power of imbibing a large portion of that fluid. For which reaſon the ſun-flower, conſidered bulk for bulk, takes in ſeventeen times more nouriſhment than a man, and conſequently perſpires more. Air, likewiſe, which contains the life of vegetables, as well as of animals, and which exiſts in two ſtates, both elaſtic and fixed, paſſes in both ſtates into the abſorbent veſſels of *plants*, and, mixing with their juices, circulates through every part.

Dr. Hales, in his Statical Experiments upon the Vine, diſcovered in aſcending with the ſap in the bleeding ſeaſon; and we learn from him that *fixed air* conſtitutes near one third part of the ſolid contents of the heart of oak: and it is found to bear the ſame proportion in peas, beans, and other vegetable ſubſtances. From the combinations of the nutritive particles thus received, a number of different fluids are prepared in the ſame *plant*.

The univerſal juice of a *plant* is a limpid ſub-acid liquor, which, as it moves through the innumerable ſmall veſſels, becomes more and more concocted, and is the general maſs from which all the juices are derived. It may be called the blood of the *plant*. By a certain modification it produces high-flavoured oils, gums, honey, wax, turpentine, roſin, and even the conſtituent parts of the *plant* itſelf. See *Food of* PLANTS.

PLANTS, *generation of*. All *plants* are produced from ſeeds, as all animals are produced from eggs, and the proceſs of nature is very ſimilar in both kinds of generation. The ſmalleſt vegetables have ſeeds, though often not diſcoverable by the naked eye: Valiſneria has diſcovered the ſeeds in ducks-meat, and Micheli has diſcovered them in the mucor and byſſus; Bobart in the ferns; Linnæus in the moſſes; and Reaumur in the fungi. Miſſletoe is alſo known to be produced from ſeed; and the teſtile and flat fungoſes, which ſome conſider as morbid excreſcences, are now known to be true ſpecies of thoſe agarics, which are furniſhed with caps and ſtems, and grow on the ground, whoſe ſeeds falling on a moiſt tree, produce, as it were, half caps without ſtems. Beſides, that ſeeds are the eggs of *plants* appears from hence, that as every egg produces an offspring ſimilar to the parent, ſo do alſo the ſeeds of vegetables, and, therefore, they alſo are eggs. A ſeed reſembles the egg of a hen; as this, as well as the egg, has a ſhell, external membrane or film, a membrane incloſing the yolk, the yolk itſelf, and the ſcar or point of life. In ſeeds the white is wanting, becauſe the moiſture of the earth ſupplies its place, and nouriſhes the embryo of the *plant*. When the flower is going off, the ſeed begins to ſwell, and on the outſide there is ſeen a veſicle, which is the amnion of Malpighi, furniſhed with an umbilical chord or navel-ſtring, which is produced through the chorion to the oppoſite ſide of the egg. While with the egg, the amnion increaſeth, on its top is obſerved another ſmall body, which likewiſe increaſeth continually, till it has filled the whole chorion and egg; and the amnion and chorion are turned into the external ſhell or coat of the ſeed. Thus, as the ſame changes are brought about on the ſeed as in the egg, the ſeeds muſt be the eggs of *plants*. Farther, that *plants* ſpring from eggs, is plain from the lobes, which, when we ſpeak of ſcows and ſimilar quadrupeds, are nothing elſe than ſeveral ſecundines, always adhering to the fœtus, drawing their ſupply of fluids from the matrix, which fluids they prepare for the nouriſhment of the tender fœtus. That moſt *plants* have ſeminal leaves or lobes is very well known. Theſe ſeminal leaves once conſtituted the whole ſeed, except the hilum, or little heart, in which is the point of life; and theſe lobes prepare the nouriſhment for the very tender plant, until it be able to ſtrike root in the earth; in the ſame manner as the yolk in an egg, becoming the placenta, prepares the nouriſhment, and feeds it by the navel-ſtring to the chick; after which they drop off. Hence it appears, that the ſeminal leaves are the lobes; but ſince all lobes proceed from the egg or ſeed, we may fairly conclude that *plants* are produced from eggs. But as no egg can produce an animal, till it be impregnated or fecundated by the male, it will be neceſſary to inveſtigate the ſituation of the genital organs deſtined by nature for this purpoſe in *plants*.

It is plain, that the genital organs of *plants* muſt be ſituated where the ſeeds are produced, but the ſeeds are produced where the flower and fruit are; therefore the flower and fruit are the genital organs of *plants*. And as there was never a clear and evident example produced of any plant which wanted flowers and fruit, though they might not be diſtinctly known on account of their exceeding minuteneſs, we may juſtly ſay, that the eſſence of *plants* conſiſts in their fructification. Moreover, as generation

precedes the birth in animals, the flower in *plants* always precedes the fruit; and, therefore, we are neceſſarily led to aſcribe fecundation to the flower, and the birth or excluſion of the ſeed to the ripe fruit. The flower may, conſequently, be defined to be the genital organs of a *plant*, ſerving for fecundation, and the fruit to be the genital organs ſerving for the birth or maturation of the ſeed. And ſince we know that there are many *plants*, ſome of which want the calyx, others the corolla, others the filaments of the ſtamina, and others the ſtyle, but that all flowers, the meſſes only excepted, are furniſhed with the antheræ or ſtigmata, or both together; theſe parts muſt conſtitute the eſſence of the flower. If we find a flower with antheræ, but no ſtigmata, we may alſo aſſuredly find another flower either in the ſame, or a different *plant* of the ſame ſpecies, which has ſtigmata with the antheræ, or without them. The act of fecundation is performed in the flower, and, therefore, the genital organs of both ſexes muſt be preſent in the flower; not, indeed, always in one and the ſame flower, but it is ſufficient that thoſe of the male be in *one* flower, and thoſe of the female in the other; and theſe genital organs are the antheræ and ſtigmata. The antheræ, or male organs of generation in flowers, are nothing elſe but the bodies which prepare and contain the male ſperm; therefore theſe antheræ are the teſticles together with the ſeminal veſicles, and their duſt the genuine male ſperm of *plants*, anſwering to thoſe particles which are called animalcules in the male ſperm of animals. This propoſition may be evinced by the following arguments: the antheræ and their duſt always come before the fruit; and when they ſhed their duſt, which they do before the flower has attained its full vigour, they have performed their office, and then they drop and become uſeleſs. Beſides, the antheræ are ſo ſituated in the flower, that their duſt, which is the male ſperm, may reach the piſtil or female organs; for the ſtamina either ſurround the piſtil, as in moſt flowers, or if the piſtil incline to the upper ſide of the flower, the ſtamina do the ſame; or if the piſtil nod, the ſtamina aſcend.

Farther, the antheræ and ſtigmata are in full vigour at the ſame time, both when they are in the ſame flower and when they are in ſeparate flowers. Moreover, if we cut aſunder the antheræ before they have ſhed their duſt, their ſtructure will be found altogether as wonderful and curious as that of the ſeed-veſſels themſelves; for within they conſiſt of one, two, three, or four cells, and they open either longitudinally, or at the baſe, ſeparating into pieces or valves, or from the top, or at the two points or horns. And, if we cut off the antheræ of any plant which bears but one flower, taking care at the ſame time that no other *plant* of the ſame ſpecies is near it, the fruit proves abortive, or at leaſt produces ſeeds which will not vegetate. Finally, the figure of the fertilizing duſt will clearly convince any one that this fine powder is not accumulated by chance, or from the dryneſs of the antheræ. Malpighi, Grew, Moreland, and Geoffroy, who have viewed the figure of theſe particles with good microſcopes, found all of them exactly equal to one another, but in different genera as great a difference in ſhape and figure as the ſeeds themſelves ever have. The powder of the antheræ, in point of fecundation, anſwers to Leeuwenhoeck's animalcules in the male ſperm; and the ſtigma which receives this duſt is always moiſtiſh, that the duſt may inſtantly adhere or ſtick to it. That the ſtigmata, which are the other eſſential parts of a flower, are the female organ of generation, may be proved by the following conſiderations: the parts of the piſtillum are the germen, the ſtyle, and the ſtigma; the germen, or ſeed-bud, while the *plant* is in flower, is always imperfect and immature, being only the rudiment of the future fœtus; the ſtyle is no eſſential part, for it is wanting in many ſpecies of *plants*; but the germen can never bring the fruit to maturity, except it be within the flower along with the ſtigma. Hence it follows, that the ſtigma is that part of the flower which receives the impregnating duſt. This will farther appear, if we conſider, that the ſtigma is always ſo ſituated, that the antheræ, or their impregnating duſt, can reach it: moreover, it has always a figure peculiar to itſelf, ſo that in moſt (though not all) *plants* it is double when the fruit conſiſts of two cells; triple when the ſeed-veſſel has three cells; quadruple when it has four cells, &c. Again, the ſtigmata are always in full vigour at the ſame time with the antheræ; beſides, the ſtigmata in moſt *plants*, when they have diſcharged their office, drop off in the ſame manner as the antheræ do; which proves, that the ſtigmata contribute nothing to the ripening of the fruit, but ſerve only for the purpoſe of generation. If the ſtigmata be cut off before they have received the impregnating duſt of the antheræ, the *plant* is caſtrated as to the female organs, and the fruit periſhes. The ſtigma of the flower has, beſides, two other ſingular properties: viz. that it is always diveſted of the cuticle or film, that has it any bark as the other parts have, and then it is always bedewed with a moiſture. Upon the whole it appears, that the *generation of plants* is accompliſhed by the antheræ ſhedding their duſt on the ſtigmata. It is not ſufficiently clear, in what way the generation of animals is accompliſhed; but thus far we are certain, that the male ſperm muſt come in contact with the female organ, if there be any impregnation. In the vegetable kingdom the genital duſt is carried by the air to the moiſt ſtigmata, where the particles burſt and diſcharge their exceeding fine or ſoluble contents, which impregnate the ovary. This will appear if it be conſidered, that when a *plant* is in flower, and the duſt of the antheræ flying about, part of this duſt viſibly lights upon and clings to the ſtigma; the ſtamina and piſtillum are generally of the ſame height, that the male duſt may more eaſily come at the ſtigma, and in thoſe *plants* where this is not the caſe, a ſingular proceſs of fecundation may be obſerved; thus in the African tree crane's-bill, or *geranium inquinans*, where the piſtillum is ſhorter than the ſtamina, the flowers before they blow are pendulous, but upon their opening they ſtand upright, that the powder may fall upon the ſtigma; after which they again nod till the fruit is ripe, and then ſtand upright a ſecond time, that their ſeeds may be more eaſily ſcattered about. In ſome of the pinks, the piſtilla, which are longer than the ſtamina, are bent back like ram's horns towards the antheræ.

Again, the ſtamina for the moſt part ſurround the piſtillum, ſo that ſome of the duſt is always blown by the wind on the ſtigma. Moreover, the ſtamina and piſtillum come at the ſame time, not only in one and the ſame flower, but alſo where ſome are male and others female, on the ſame plant, very few excepted.

Farther, in almoſt all ſorts of flowers we ſee how they expand or open by the heat of the ſun, but in the evening and a moiſt ſtate of the air, they cloſe or contract their flowers, leſt the moiſture getting to the duſt of the antheræ ſhould coagulate the ſame, and render it incapable of being blown on the ſtigma; but when once the fecundation is over, the flowers neither contract in the evening, nor yet againſt rain.

The culture of palm-trees furniſhes a deciſive confirmation of the ſame doctrine of vegetable generation. That the cultivators of the common palm-tree or date-tree, cut off the male ſpadixes, and place them over the females, is recorded by Theophraſtus, Pliny, Proſper Alpinus, Tournefort, Kæmpfer, and others; and if they neglect to do this, the dates are harſh, bad-taſted, and many trees wholly deſtitute of nuts or fruit. The date-tree is every year thus impregnated in Arabia, Perſia, and Egypt, by the inhabitants. The wind does on many occaſions ſerve as a vehicle for bringing the farina of the males to the females. M. Geoffroy cites a ſtory from Joſius Fontanus, who relates, that in his time there were two palm-trees, the one male, cultivated at Brindiſi, the other female, in the wood of Otranto, fifteen leagues apart; that this latter was ſeveral years without bearing any fruit; till at length, riſing above the other trees of the foreſt, to as it might ſee (ſays the poet) the male palm-tree at Brindiſi, it then began to bear fruit in abundance. M. Geoffroy makes no doubt but that the tree then only began to bear fruit, becauſe, it was in a condition to catch on its branches the farina of the male brought thither by the wind. In the male and females of the piſtachia nut-tree they obſerve the ſame method as in thoſe of the date-tree. We may obſerve farther, that ſince the male duſt is generally of greater ſpecific gravity than the air, in moſt plants that have the piſtillum longer than the ſtamina, the all-wiſe Creator has made the flowers nodding, that the powder may more eaſily reach the ſtigma. With reſpect to thoſe *plants*, whoſe ſtems grow under water, the flowers, a little before they blow, emerge or riſe above the ſurface of the water; and thoſe, all whoſe parts grow under water, about the time of flowering, raiſe their flowering ſtems above the water, which ſtems ſink again as ſoon as the time of flowering is over. A ſimilar concluſion may be farther eſtabliſhed from the conſideration of all ſorts of flowers; but enough has been ſaid to prove, that the generation of *plants* is performed by the genital duſt of the antheræ falling on the moiſt ſtigma or female organ, which duſt, by the help of the moiſture, adhers and burſts, diſcharging its contents, the ſubtile particles of which are abſorbed by the ſtyle, into the ovarium, germen, or ſeed-bud. However, the duſt of the antheræ does not penetrate through the ſtyle to the germen and rudiments of the ſeed, as ſome writers have ſuppoſed: the contrary appears to be the caſe from opening a flower of the Oriental rough poppy, with a large flower, cutting its piſtillum perpendicularly downwards; and the ſame-

le or folds, the placentæ and the small seeds sticking to them will be found of a pure white colour, though at the same time the style and all the stigma are wholly tinged with a purple hue from the dust of the antheræ. Hence we may conclude, that not one grain or particle of the farina enters the folds of the receptacle or seeds themselves.

We may close this account with observing upon the whole, that the calyx is the marriage-bed, in which the stamina and pistilla, the male and female organs, celebrate the nuptials of *plants*, and where they are cherished and defended from external injuries: the coroila or petals are the curtains, closely surrounding the genital organs, in order to keep off storm, rain, or cold; but when the sun shines bright, they freely expand, both to give access to the sun's rays, and the fecundating dust: the filaments are the spermatic vessels by which the juice, secreted from the *plant*, is carried to the antheræ; the antheræ are the testicles, and may not improperly be compared to the soft roe or milt of fishes: the dust of the antheræ answers to the sperm and seminal animalcules; for though it is dry, that it may be the more easily conveyed by the wind, yet it gets moisture upon touching the stigma: the stigma is that external part of the female organ, which receives the male dust, and on which the male dust acts: the style is the vagina or tube, through which the effluvia of the male dust pass to the germen or seed-bud: the germen is the ovary, for it contains the unimpregnated or unfertilized seeds: the pericarpium or seed-vessel, answers to the impregnated ovary, and in fact, is the same with the germen or seed-bud, only increased in bulk and loaded with fertile seeds; the seeds are the eggs. Moreover, the calyx is a production of the external bark of the *plant*: the coroila of the inner bark; the stamina of the alburnum or white sap; the pericarpium or seed-vessel of the woody substance; and the seeds of the pith of the tree; for in this manner they are placed, and in this they are also unfolded; so that in the flower we find all the internal parts of a *plant* unfolded.

The stomach of *plants* is the earth, from which they receive their nourishment, and the finest and most subtile parts of its soil is their chyle: the root, which carries the chyle from the stomach to the body of the *plant* is analogous to the lacteals or chyliferous vessels of animals: the trunk, which supports and gives strength to the whole plant, is analogous to the bones: the leaves, by which *plants* transpire, are instead of lungs, and they may be also compared to the muscles of animals, for by their agitation with the wind the *plant* is put in motion; on which account herbs furnished with leaves cannot thrive, except they have air; but succulent *plants* which have no leaves, though shut up in green-houses and quite deprived of the external air, thrive very well: heat is to *plants* analogous to the heart in animals, for they have no heart nor have they occasion for any; because they live like polypes in the animal kingdom; their juices mixed with air being propelled through their vessels, but not circulated back again by returning vessels. *Plants* have generally their genital organs placed at their ramifications, as animals have theirs at the ramification of the iliac vessels, with this difference, that the ramifications of *plants* ascend, whereas those of animals go downwards or backwards; whence the ancients called a *plant* an inverted animal. Pliny observes, that there is in *plants* a natural instinct to generation, and that the males by a certain blast, and subtile powder do consummate the nuptials on the females. See Hunter's edit. of Evelyn's Sylva, p. 216, &c. notes.

For the manner wherein the farina fecundifies, M. Geoffroy advances two opinions:—1. That the farina being always found of a sulphureous composition, and full of subtile penetrating parts (as appears from its sprightly odour) falling on the pistils of the flowers, there resolves, and the subtilest of its parts penetrating the substance of the pistil and the young fruit, excite a fermentation sufficient to open and unfold the young *plant*, inclosed in the embryo of the seed. In this hypothesis the seed is supposed to contain the *plant* in miniature, and only to want a proper juice to unfold its parts, and make them grow. The second opinion is, that the farina of the flower is the first germ or bud of the new *plant*, and needs nothing to unfold it, and enable it to grow, but the juice it finds prepared in the embryon of the seed.

These two theories of vegetable generation, the reader will observe, bear a strict analogy to those two of animal generation; viz. either that the young animal is in the semen masculinum, and only needs the juice of the matrix to cherish and bring it forth; or that the animal is contained in the female ovum, and needs only the male seed to excite a fermentation, &c.

M. Geoffroy rather takes the proper seed to be in the farina; inasmuch as the best microscopes do not discover the least appearance of any bud in the little embryos of the grains, when examined before the apices have shed their dust. In leguminous *plants*, if the leaves and stamina be removed, and the pistil, or that part which becomes the pod, be viewed with the microscope, before the flower be opened; the little green transparent vesiculæ, which are to become the grains, will appear in their natural order; but still shewing nothing else but the mere coat or skin of the grain. If the observation be continued for several days successively, in other flowers, as they advance, the vesiculæ will be found to swell, by degrees to become replete with a limpid liquor; wherein, when the farina comes to be shed, and the leaves of the flower to fall, we observe a little greenish speck, or globule, floating about at large. At first there is not any appearance of organization in this little body; but in time, as it grows, we begin to distinguish two little leaves like two horns. The liquor diminishes insensibly, as the little body grows, till at length the grain becomes quite opake; when, upon opening it, we find its cavity filled with a young *plant* in miniature; consisting of a little germ or *plumula*, a little root, and the lobes of the bean, or pea, &c.

The manner wherein this germ of the apex enters the vesicula of the seed, is not very difficult to determine. For, besides that the cavity of the pistil reaches from the top to the embryon of the grains, those grains or vesiculæ have a little aperture corresponding to the extremity of the cavity of the pistil, so that the small dust, or farina, may easily fall through the aperture into the mouth of the vesicula, which is the embryo of the grain. This cavity, or cicatricula, is much the same in most grains, and it is easily observed in peas, beans, &c. without the microscope. The root of the little germ is just against this aperture, and through this it passes out when the little grain comes to germinate.

The process of nature in the generation of vegetables, and the apparatus she has contrived for that purpose, are so curious, and withal so little known among us, that we shall illustrate them farther with figures; taking the melon for our example, in regard the parts of generation are here very distinct.

By the way it must be observed, that though the melon contains both sexes, yet the disposition of the organs differs, here, from that of the tulip: in effect, on the melon *plant* are two distinct flowers, or blossoms, the one doing the male office, the other the female; which we shall therefore call the *male* and *female flowers*.

In *Tab. Nat. Hist. fig.* 10. is represented the male flower or blossom of the pumpion, a plant of the melon kind, the leaves being stripped from the circle F F. A B E represent the head, placed in the centre of the flower, and formed of the circumvolutions of the apices B, and sustained by four columns, G G G G. The part B of the head represents the circumvolutions of the apices while yet thus; and the part E represents them open, and covered with the farina, which they before contained, but which is diffused on the outside when the *plant* arrives at maturity. Each apex forms a kind of canal separated by a partition into two. A grain of the farina is represented by D. H represents the pedicle that sustains the flower, and which in the male flower produces nothing.

Fig. 11. represents the female flower, or blossom of the pumpion, or that which bears the fruit. The leaves are stripped off the circle F F, as before, the better to shew the other parts. The knot of the flower, or the embryo of the fruit, is represented by A. The pistil is represented by B B; and is only a continuation of the embryo of the fruit A. The top of the pistil spreads in B B into several oblong bodies, each separable into two lobes. These bodies are very rough, furnished with hairs and little vesicles proper to catch the dust of the male flower, and to conduct them to the mouths of the canals, which communicate as far as the cells of the grains contained in the young fruit. Upon cutting the pistil transversely in its smallest part, we find as many canals as there are divisions in its head; which canals correspond to as many little cells, each including two orders of grains, or seeds, ranged in a spongy placenta.

This doctrine of generation affords us a hint how to alter, improve, &c. the taste, form, and quality, of fruits, &c. viz. by impregnating the flower of one, with the farina of another of the same class.

To this accidental coupling and intermixing it is, that the numberless varieties of new fruits, flowers, &c. produced every year by our gardeners, with many other phenomena in the vegetable kingdom, are to be ascribed.

PLANTS, *diseases of*. See DISEASES *of Plants*.
PLANTS, *fecundity of*. See FECUNDITY, and *propagation of* PLANTS, *infra*.
PLANTS, *flowering of*. See FLOWERING.
PLANTS, *food, pabulum, or pasture of*, is the matter of their nourishment

nourishment and increase. What this matter is, has been the subject of considerable dispute. We shall endeavour in the sequel of this article to collect the principal opinions that have occurred to us on this subject, and to state what appears to be the most rational and the most conformable to the latest experiments and observations. The ancients, in general, ascribed to the earth the power of producing *plants* and animals; and for this reason they gave it the general title of parent earth, and mother of all things. They supposed that into this common parent all things returned again at last; and that after a time of dissolution in its bowels, they reverted back again into the formation of more bodies of the same kind. Even those among them, who asserted the doctrine of the four elements, allowed that the earth was the matter which constituted those bodies, and that the other three, that is, fire, air, and water, served only to convey and distribute this as occasion required; and Thales is only misunderstood, when he is supposed to deviate in his opinion from this general system of the ancients.

But though the ancients generally ascribed to the earth the power of producing animals and other bodies, the moderns have adopted another opinion, viz. that water is the origin of all. Lord Bacon was one of the first who argued on this principle: he says, that *plants* derive their nourishment principally, if not altogether, from water; and that the earth only serves to keep the stalk upright, and to defend the root from an excess of heat or of cold. Since the time of this great author, many have been more express in asserting and more positive in defending this opinion; and they have affirmed, that water is the only principle of all natural things, supposing that, by some secret process of nature, water is transmuted into stones, *plants*, and other substances. Helmont attempted to establish this doctrine by many experiments: and Mr. Boyle, who followed him through the whole course of his experiments, seems to assent to his opinion, that water is transmuted by nature into wood and stone; though, in his usual way, he delivers his thoughts with great modesty and caution.

The two principal facts upon which their opinion is founded, are that of mint and some other *plants* growing in water; and that of a tree being planted in a small quantity of earth, which, being baked to a dryness, and weighed before the tree was set in it, and again baked, and weighed afterwards, will be found to have lost nothing of its own weight; though the tree has increased to a very great degree, merely, as they say, from the water with which they have, from time to time, moistened this earth.

To the last experiment it might be objected, that it is not easy to bake earth to the same degree of dryness twice over, so as to have any hopes of being exact in the weight; but allowing the greatest possible degree of exactness, the experiment must be inconclusive, unless it could be proved that the water which was used was pure and homogeneous, and not charged with any terrestrial matter: for if it were, the plant might owe its increase to that alone, and the water only serve, according to the doctrine of the ancients, to convey and distribute this grand nourishing element, in a necessary and proper manner. Water always contains a solution of animal and vegetable substances; and these may constitute the nourishment of *plants*, whilst the element, in which they are suspended, acts only as a vehicle, in guiding them through the fine vessels of the vegetable body. In conformity to the first experiment, it has been alledged, that the hyacinth, and other bulbous roots are known to perfect their flowers in pure water. See FLOWERING *of Plants*.

Hence superficial observers have deduced an argument in favour of water being the food of vegetables.

But the truth is, the roots, stem, and flowers of such *plants* are nourished by the mucilaginous juices of the bulb, diluted by the surrounding water: this mucilage is just sufficient to perfect the flower, and no more. Such a bulb neither forms seeds, nor sends forth off-sets; at the end of the season, it appears weak, shrivelled, and exhausted, and is rendered unfit to produce flowers the succeeding year. A root of the same kind, that has been fed by the only and mucilaginous juices of the earth, essentially differs in every particular. It has a plump appearance, is full of mucilage, with off-sets upon its sides.

That water is the food of vegetables has been also argued, from setting a sprig of balm, mint, or such plant in a phial of pure water, without any mixture of earth; in which state the sprig grows, and puts forth roots, leaves, and branches. Agreeable to which is another experiment of Van Helmont; who, drying two hundred pounds of earth, and planting a willow which weighed five pounds in it, watered it only with rain or distilled water; and to secure it from any earth, covered it with a perforated tin cover; at five years end, weighing the tree with all the leaves it had borne in that time, he found it to weigh one hundred and sixty nine pounds, three ounces; yet the earth was only diminished two ounces.

Dr. Woodward has made many experiments, with a view of ascertaining this point; from the result of which he draws conclusions favourable to the opinion which has very generally prevailed, till of late, that earth is the nutriment of *plants*. Most of his experiments were made with sprigs of mint, and some other *plants*, nicely weighed and inclosed in equal glass phials, well covered up with parchment; leaving room for the stems to ascend through it, and filled with water; some with spring water, others with rain water, and others with Thames water. At the end of seventy-seven days, he took them all out again, and weighed them, and also the water left; and computed the weight of water expended on them, and the proportion of the increase of the plant to the expence of the water. The next year, viz. 1692, he made fresh experiments with the same phials and the same sorts of *plants*, weighed as before, only some were filled with Hyde-park conduit water alone, others with the same water, and a certain proportion of garden earth dissolved in it; and others with the same water distilled. At the end of fifty-six days, he weighed the *plants*, waters, &c. and computed what each plant had gained, what quantity of water was expended on the *plant*, and the proportion of the increase of the *plant* to the decrease of the water.

The result of all these experiments he gives us in the following observations and reflections. 1. In *plants* of the same kind, the less they are in bulk, the smaller quantity of the fluid wafts, in which they are set, is drawn off: the consumption, where the mass is of equal thickness, being nearly proportional to the bulk of the *plant*. In reality, the water seems to ascend up the vessels of *plants* in much the same manner as in a filtre; and, therefore, it is no wonder, that the larger filtre should draw off more water than the smaller: or that a *plant*, which hath more and larger vessels, should take up a greater share of the fluid in which it is set, than one that has fewer. 2. Much the greater part of the fluid mass, thus drawn off and conveyed into the *plants*, does not settle or abide there, but passes through their pores and exhales up into the atmosphere. See *Perspiration of* PLANTS. The least proportion of the water expended was to the augment of the *plant* as 46 or 50 to 1; and in some as 109, 200, nay in one as 700 to 1. Nor does this humidity go off alone; but it usually carries with it many parts of the same nature with those, of which the *plant*, through which it passes, consists: the grosser, indeed, are not so easily borne up into the atmosphere, but are usually deposited on the surface of leaves, flowers, and other parts of the *plant*; whence proceed our manna, honeys, and other plentiful exudations of vegetables; but the finer and lighter parts are with greater ease transmitted to the atmosphere, where they are conveyed to our organs of smell, and by the air we draw in respiration; and they are pleasant or offensive, beneficial or injurious to us, according to the nature of the *plants* from which they arise. And as these owe their rise to the water that ascends out of the earth, through the bodies of *plants*, we may hence perceive the reason why they are more numerous in the air in wet summers, and a greater quantity of odours is found exhaling from vegetables in warm humid seasons, than in any other. 3. A great part, says Dr. Woodward, of the terrestrial matter that is mixed with water ascends up into the *plant*, as well as the water. There was much more terrestrial matter, at the end of the experiment, in the water of the glasses that had no *plants* in them, than in those which had *plants*. The garden mould dissolved in some of the glasses was considerably diminished and carried off: nay the terrestrial and vegetable matter was borne up in the tubes filled with sand, cotton, &c. in such a quantity as to be evident to sense; and the bodies in the cavities of the other tubes, that had their lower ends immersed in water, wherein saffron, cochineal, &c. had been infused, were tinged with yellow, purple, &c. Marine *plants*, he observes, absorb mineral matter with the vegetables. As for the vegetable matter, this is so fine and light, as to be surprisingly adapted and disposed to attend water in all its motions, and into each of its recesses: for if water be percolated with all the care imaginable, and filtered over so many times, yet some terrestrial matter will remain. Dr. Woodward filtered water through several sheets of thick paper, and afterwards, through very close fine cloth, twelve times doubled; and this he did repeatedly: and yet a considerable quantity of this matter discovered itself, after all his pains, in the water. Hence he reasons, that if it there passes interstices that are so very small and fine, along with the water, it is less strange that it should attend it in its passage

through the ducts and vessels of *plants*: and although in filtering and distilling the water, some of the earthy matter with which it was before impregnated is intercepted, and made to quit it, yet that which remains in the water after these operations is fine and light, and such as, in his apprehension, is peculiarly fit for the nourishment and growth of vegetables. This, he says, is the case of rain-water; the quantity of terrestrial matter in it is not great; but it is chiefly of the light kind, and is perfectly dissolved and reduced to simple corpuscles, fit to enter the tubules and vessels of *plants*; on which account this water is so fertile and prolific. The reason why all the terrestrial matter mixed with the water does not ascend into the *plant* is, that the mineral matter comprises a great part of it; and this is not only gross and ponderous, but fixed and inflexible, and not disposed to enter the pores of the roots; besides many of the simple vegetable particles, by degrees, unite and form small clods or molecules, which adhere to the extremities of the roots; and others of them, entangled in a loose manner, form the substance or green bodies so commonly observed in stagnant waters: these, when thus combined, are too large to enter the pores or attend up the vessels of *plants*, which simply they might have done.

We shall here observe, that this green matter is itself a *plant*, probably belonging to the genus of CONFERVA. The seeds of it are invisible in the air, insinuate themselves into vessels of water, through the smallest apertures, and then diffuse themselves through the whole mass of it: and are capable of producing *plants* in all seasons of the year, whenever they meet with water, especially if it be impregnated with a proper proportion of vegetable or animal substance, or a state of putrefaction. But though the richest pabulum for this *plant* is the nutritious parts of animal and vegetable substances, some of them are unfavourable to it, and prevent its growth.

Dr. Priestley has made many curious *experiments* on this green matter, or water-moss, as he calls it; and shews how powerfully the influence of light, it contributes to depurate or disembarrass the air previously contained in water.

Of *earth*, *water*, and *air*.

Hence it is, as Dr. Woodward proceeds, that to ASCERTAIN, let the earth be ever so rich, good, and fit for the production of corn, or other vegetables, little will come of it, unless the parts of it be separated and loosened; and it is on this account, such gains are bestowed in digging, plowing, fallowing, harrowing, and otherwise tumbling the cloddish lumps of earth; and thus, Dr. Woodward says, sea-mud, marle, and other salts promote vegetation.

Mr. Tull has founded his new system of HUSBANDRY, to a great measure, on this principle, that earth is the food of *plants*. The increased fertility of a well pulverized soil induced him to imagine that the plough, &c. could do nothing more than divide the particles of earth, as to fit them for entering into the roots of *plants*. The mouths of the vessels destined to take in the food or nourishment of the *plant* are all situated on the convex surface of the roots; and these, according to him, take their pabulum or food, which is extremely small particles of earth, blended with a due proportion of water, from the superficies of the pores or cavities within which the roots are included. It is certain, he says, that the earth is not digested for this purpose by any other means than by the roots of *plants*: for actual fact shews, that where no vegetables are suffered to be, the ground will always grow the richer. Plough it or harrow it as often as you please; let it be exposed to the sun in hot, dry, parts all the summer, and to the frosts all the winter; let it be covered by water at the bottom of ponds and ditches, or grind it to fine powder; the longer it is exposed or treated by any or all of these methods, or in any other possible way, except actual fire be used, the more fertile it will be. Those particles, which are the pabulum of *plants*, are so extremely subtile and light, as not to be much attracted to the earth, if separated from those parts to which they adhere, or with which they are in contact. They adhere in the earth like dust on the surface of a smooth clay, which, though you turn it up and down, still remains in its place, as these particles do to those parts of the earth, till they are removed by some external agent. The proper agent for this purpose is the root of a *plant*, but this cannot act upon them unless they are first moistened by water, which dissolves to some extent, and goes with them into the mouths of the vessels in the roots. It is necessary also that the parts of the air come in contact with the matter of this pabulum, in order to relax and render it fit to be separated and imbibed by the roots of those *plants* which are in the way of it. As to the size of the particles of the pabulum of *plants*, it is not unlikely that the roots may take in some grosser than those on which the colours of bodies depend; but to discover the magnitude of these corpuscles, Dr. Hooke thinks will require a microscope that will represent things five or six hundred times bigger than they appear to the eye at a foot distance, and that with sufficient distinctness. We are well assured, he adds, that the fine particles of the food of *plants*, after they have been reduced into the bodies of *plants*, do perspire through their pores in a large quantity, and fly off into the air; which affords a proof, that they are not to be separated from the parts of the earth with which they are in contact, otherwise than by means of *plants*; for if they could, then all our stirring and digging the earth would make it the poorer, by giving them occasion to evaporate; the contrary of which is found by experience. Water alone affords, in appearance, nourishment to *plants*, since they will grow in water; but this water is allowed never to be free from earth; and that makes it so very nutritive to *plants*, even when just descending in rain. This is the earthy matter, which is properly the pabulum, or food of *plants*, which is continually in great abundance evaporated from *plants* and trees into the air, and in a manner fills the whole atmosphere about them; this is not to be embodied in the watery vapours in their ascent, and again brought down to the earth in showers of rain with them. Hence it is no wonder that rain water proves so very nutritive to *plants*, since it contains the very matter of their food, ready separated from the rest of the earth, and mixed in that vehicle with which, and by means of which alone, it can be received into the bodies of *plants*, through the mouths of the vessels of their roots. The pores, cavities, and interstices of the earth being of two sorts, viz. natural and artificial, the one adapted to the natural, the other to artificial pasture for *plants*; all depending on the different nature of the interstices or cavities of the earth. But from the system of Mr. Tull, it seems to follow, that all this, equally good, would prove equally prolific. It is certain, that an open soil, if not too light in its own nature, will always produce plentiful crops; because it readily receives the air, rains, and dews into its bosom, and at the same time gives the roots of *plants* a free passage or smell of food. This seems to be the true reason why land well tilled is so remarkably fruitful. But to return to the further reasoning of Dr. Woodward. Some authors imagine nitre essential to *plants*; but this author affirms on, that by all the trials he has been able to make, the case is quite otherwise, and that nitre, when contiguous to the *plant*, destroys instead of nourishing it. But nitre, and other salts, loosen the earth, and thus dispose its parts to be attenuated by the water, and carried up into the food or *plant*, for its formation or increase. In the same way, lime is likewise serviceable to vegetation: the husbandman say, it does not famen, but only mellows the ground; rendering it more capable of entering the foods of vegetables let in it, in order to its nourishment, than otherwise it would have been.

4. The *plant*, according to Dr. Woodward, is more or less nourished in proportion as the water in which it stands, contains more or less proper terrestrial matter in it. The truth of this proposition, he infers, from the whole process of his experiments. The mint in one of his glasses was of much the same bulk and weight with that of two or three others; but the water in which the first was, being river-water, which was apparently more copiously furnished than the others with terrestrial matter, this occasioned it to arrive at almost double their bulk, and with a less expence of water: so likewise the mint in another glass, in which water was dissolved a small quantity of good garden mould, though it had the disadvantage of being last, when first set, than either of the mints in two other glasses, whose water was the same with the first, without any mixture of earth in it, yet, in a short time, the plant merely overtook it in growth, but much out-stripped the others. However, Dr. Woodward is of opinion, that every kind of vegetable, and even every part of the same vegetable, requires a peculiar and specific matter for its formation and nourishment; so that if the soil in which any vegetable or seed is planted, contains all or most of the proper ingredients for its composition, and these in due quantity, it will grow and thrive; otherwise it will not prosper at all, or not attain its natural stature; and it will be defective in taste, smell, colour, or some other respect. Besides, the soil once proper for the production of some sort of vegetable does not always continue to be so, but in length of time less or more, as it becomes barren; the vegetative matter with which it was accustomed, being reduced and lurking, bearing another succession of the same vegetables, it must be supplied with a new fund of matter similar to that which it contained at first, either by lying fallow and ex-

posed to the air and rain, or by being manured. And this simply consists chiefly of the parts of vegetables or of animals. Many facts of this kind, which Dr. Woodward alledges, point out a peculiar terrestrial matter, and not water, for the subject to which *plants* owe their increase; for if it were water only, there would be no need of manure or transplanting; since the rain falls in all places and, perhaps, these facts and even the doctor's reasoning upon them, would lead us to presume, that some other substance, which pervades the terrestrial matter under peculiar modifications of it, may be necessary for the purposes of vegetation; as we shall see more particularly in the sequel of this article.

5. Vegetables, Dr. Woodward concludes, are not formed of water, but of a certain terrestrial matter. A little distillation shews, that there is a considerable quantity of this matter contained in rain, spring, and river-water; and experiments shew, that the much greatest part of the fluid mass that receives into *plants* does not settle or abide there, but passes through their pores and exhales into the atmosphere; and that a great part of the terrestrial matter, mixed with the water, passes up into the *plant* along with it; and that the *plant* is more or less augmented, in proportion as the water contains a greater or smaller quantity of that matter: from all which we may reasonably infer, that earth, and not water, is the matter that constitutes vegetables. One of the sprigs of mint drew up into it two thousand five hundred and one grains of the fluid mass, and yet had received but three and $\frac{1}{2}$ grains of increase from it: a second, though it was at first less than the third, yet, being set in water with which earth was plentifully mixed, and the other in water without such earth, had very much outgrown it; weighing, at last, one hundred and forty five grains more than the former: a fourth *plant*, though at first much less than the fifth, yet, being set in the foul thick water, that was left in the still, after that in which the last was set was drawn off, had gained in weight, at the end, above double what that in the finer and thinner water had gained. The proportion of the augment of that *plant* which those mull was to the fluid mass spent upon it but as one to forty-six; in others as one to fifty, one hundred, two hundred, and in the categoric but as one to seven hundred and fourteen. One of the sprigs took up thirty-nine grains of water a day, one day with another; which was much more than the whole *plant* weighed originally, and yet it gained not $\frac{1}{3}$ of a grain a day in weight; and another took up two hundred and fifty-three grains a day, which was near twice as much as its original weight; and after all the daily increase of the *plant* was no more than $2\frac{1}{2}$ grains.

6. Spring and rain-water contain nearly an equal charge of vegetable matter; and river-water more than either of them. Their proportions hold in the main, though, for various reasons, a strict and just comparison is hardly to be expected. Some rivers abound with this matter more than others; of this we have a remarkable instance in the Nile, the Ganges, and other rivers, that yearly overflow the neighbouring plains; their lands producing the largest crops of any in the world.

7. Water serves only for a vehicle to the terrestrial matter which forms vegetables, and does not itself make any addition to them. Where the proper terrestrial matter is wanting, the *plant* is not augmented, though ever so much water ascend into it; so that water is not the matter that compoles vegetable bodies: this is only the agent that conveys the matter to them, and distributes it to their several parts for their nourishment: that matter is sluggish and inactive, and would be eternally confined to its beds of earth, without advancing up into *plants*, if water or some such instrument did not draw it forth, and convey it to them. This fluid is fit for such a necessary vehicle on various accounts; the figure of its parts, which are exactly spherical, renders it fit for motion and for moving other bodies; the intervals of such parts are, with respect to their bulk, larger than those of any other; and, therefore, the fittest to receive and contain other matter in them: the constituent corpuscles of water are also, singly considered, absolutely solid, and do not easily yield to any external force, which secures their figure, and, consequently, their intervals from any alteration. Water is further capacitated to be a vehicle for this matter by the tenacity of the corpuscles of which it consists; so that they will pass through pores and interstices, which are impassable to air and any other fluid. Thus they are capable of entering into the finest tubes and vesicles of *plants*, and of introducing the terrestrial matter with them, conveying it to all their parts; whilst each, by means of organs with which it is endued for this purpose, intercepts and assumes to itself such particles, as are suitable to its own nature, letting the rest pass on through the common duct.

8. Water is not capable of performing this office to *plants*, unless it is assisted by a due degree of heat. This must concur, or vegetation will not succeed. The *plants* set to the gasses in October and the following colder months, had not nearly the quantity of water conveyed into them, or nearly such an additional increase, as those that were set in June and the better months. The particles of water are perceptible of every impression, and are eafily put into motion by heat. Besides, it is observable in autumn, that as the sun's power is gradually less and less, so its effect on *plants* is remitted, and vegetation slackens by little and little. Its failure is first observable in trees, next in shrubs, and then in herbs and the lower tribes of vegetables; the heat being, at length, not sufficient to supply even those which are to near the earth and the fund of their nourishment. As the heat returns in the succeeding spring, they will recruit again, and are furnished with fresh supplies and verdure; the lowest first, then the shrubs, and lastly the trees. The greater the heat given to *plants* to a certain degree in the natural way, the sooner they pass through the several stages of fructification. In the northern regions, e. gr. in Lapland, where the greater part of the year is subject to intense and inceslant frosts, the summer season affords an excessive heat for two months, the sun never setting in all that time. This season comes on towards the latter end of June, and the grass and other herbs then first begin to appear in their young shoots above the ground; but after this vegetation is carried on with such speed, that in a fortnight the flowers of the herbs and trees are expanded, and the leaves attain to their full size and maturity. Thus, as the heat of the several seasons affords us a different face of things, so the several distant climates exhibit the different scenes of nature, and productions of the earth. The hotter countries ordinarily yield the largest and tallest trees, and in greater variety than the colder; and those *plants* common to both attain to a much greater bulk in the southern than in the northern climes; nay, there are some regions so cold, that they raise no vegetables at all to any considerable size: thus we learn from Greenland, Iceland, and other places of like cold situation: in these there are no trees, and the shrubs are poor, small, and low. We also find, that even in the warmer climates, if there happen a remission or diminution of the usual heat, their productions are always impeded in proportion. But it is not merely the sun, or the ordinary emission of the subterranean heat, that promotes vegetation, but likewise any other, according to its degree and power; as we find from our stoves and hot-beds.

Such are the systems of vegetation, that have been founded on the supposition, that water or earth is the principal pabulum of *plants*. *See* Food *of Plants*.

Modern experiments and discoveries have loft the way to another theory with respect to the food of *plants*, that seems to be less exceptionable than either of the former. Dr. Hales, whose experiments and reasoning on the subject of vegetation have been deservedly applauded, observes, that the substances of vegetables appear, by a chemical analysis, to be composed of sulphur, volatile salt, water, and earth; which principles, he says, are all endued with mutually attracting powers; and also of a large portion of air, which has a wonderful property of strongly attracting, in a fixed state, or of repelling in an elastic state, with a power which is superior to great compressive forces; and it is by the infinite combinations, action, and re-action of these principles, that all the operations in animal and vegetable bodies are effected. These active aereal principles are very serviceable in carrying on the work of vegetation to its perfection and maturity; not only in helping by their elasticity to dilate and subtilize part, but also by enlivening and invigorating their hopwhere, uniting with the other mutually attracting principles, they are by gentle heat and motion let at liberty to stimulate into the nourishment of the respective parts. The sum of the attracting powers of these mutually acting and re-acting principles is, while in this nutritive state, superior to their repelling power; whereby the work of nutrition is gradually advanced by the nearer and nearer union of these principles from a less to a greater degree of consistency, till they are advanced to that viscid ductile state, whence the several parts of vegetables are formed; and are at length firmly compacted into hard substances, by the flying off of the watery dilating vehicle: but when they are again dissolved by the watery particles, then repelling power is thereby become superior to their attracting power, and the union of the parts of vegetables is so thoroughly dissolved that putrefaction commences. Of these principles of vegetables they are found greater proportions at out in the more exalted and elaborate parts, as in the seeds and flowers. Hence it is argued, that nature's chief business in bringing the parts of a vegetable, especially its fruit and seed, to maturity,

is to combine together in a due proportion the more active and noble principles of sulphur and air, that chiefly constitute oil, which in its more refined state is never found without some degree of earth and salt in it.

Dr. Hunter, so well known, and so justly celebrated both as an anatomist and naturalist, is induced by a number of experiments, accurately conducted, to believe, that all vegetables receive their principal nourishment from oily particles incorporated with water, by means of an alkaline salt, or absorbent earth. Till oil is made miscible, it is unable to enter the radical vessels of vegetables: and, on that account, Providence has bountifully supplied all natural soils with chalky or other absorbent particles; and those soils which have been assisted by art are full of materials for that purpose; such as lime, marl, soap-ashes, and the volatile alkaline salt of putrid dunghills. Natural soils receive their oily particles from the air or atmosphere, which, during the summer months, is full of putrid exhalations arising from the steam of dunghills, the perspiration of animals and insects; and every shower brings down these oleaginous particles for the nourishment of *plants*. All rich soils, in a state of nature, contain oil, and in lands that have been ploughed for some years, it is found in proportion to the quantity of putrid dung that is laid upon them, allowance being made for the crop they have sustained. By attending to the effects of manures of an oily nature, Dr. Hunter apprehends that we must be satisfied, that oil, however qualified, is one of the chief instruments of vegetation. Thus, rape-shell, laid on land, is a certain and speedy manure, as it contains the food of *plants* ready prepared: soot is also an oily manure, but different from the former, because it contains alkaline salt, in its own nature calculated as well for opening the soil, as for rendering the oily parts miscible with water: the dung of pigeons, which feed chiefly upon grains and oily seeds, is a rich and lasting manure: the dung of horses that are kept in stables, and fed upon beans, oats, and hay, which contain much oil, is also a strong manure, more especially when it has undergone the putrid ferment, in order to mix and assimilate its oily, watery, and saline parts. Swine's dung is of a dispositions and oily nature, and perhaps is the richest of the animal manures. The dung of ruminant animals, as cows and sheep, is preferable to that of horses at grass, owing to the quantity of animal juices mixed with their food in chewing; and the latter the animal, *cæteris paribus*, the richer is the dung. Human ordure, which is full of oil and a volatile alkaline salt, is of itself too strong a manure for any land: the dung of carnivorous animals is plentifully stored with oil; animals that feed upon fowls and grains come next, and after them follow those which subsist upon grass only.

Besides, the argument in favour of oil being the principal food of *plants*, is confirmed by the observation, that all vegetables, whose seeds are of an oily nature, are found to be remarkable impoverishers of the soil, as hemp, rape, and flax; and the best manures for lands worn out by these crops are such as have a good deal of oil in their composition, provided that they are laid on with lime, chalk, marl, or soap-ashes, so as to render the oily particles miscible with water.

Farther, oily particles constitute the nourishment of *plants* in their embryo state; and by a fair inference we may suppose that something of the same nature is continued to them as they advance in growth. The oily seeds, as rape, hemp, line, and turnip, consist of two lobes, which, when spread upon the surface, form the seminal leaves, in these the whole oil of the seed is contained. The moisture of the atmosphere penetrates the cuticle of the leaves, and, mixing with the oil, constitutes an emulsion for the nourishment of the *plant*. The oleaginous liquor being consumed, the seminal leaves having performed their office decay. The leguminous and farinaceous *plants* keep their placenta, or seminal leaves, within the earth; in which situation they supply the tender germ with oily nutriment, until its roots are grown sufficiently strong to penetrate the soil. See VEGETATION.

It has been a received opinion, that lime enriches the land, upon which it is laid, by supplying it with a salt fit for the nourishment of *plants*; but by all the experiments that have been made upon lime, it is found to contain no kind of salt. Its operation, therefore, should be considered in a different light: by the fermentation which it occasions, the earth is opened and divided, and, by its absorbent and alkaline quality, it unites the oily and watery parts of the soil. It seems also to have the property of collecting the acid of the air, which it readily forms into a neutral salt, of great use in vegetation. It is probable, therefore, that lime tends to rob the soil of its oily particles, and will, in time, render it barren, unless care be taken to support it with rotten dung, or other manures of an oily nature. Its great excellence, however, upon a sandy soil, is by mechanically binding the loose particles, and thereby preventing the liquid parts of the manure from escaping out of the reach of the radical fibres of the *plants*. Upon clay its effect is different, for, by the gentle fermentation it produces, the unsubdued soil is opened and divided; the manures laid on readily come into contact with every part of it; and the fibres of the *plants* have full liberty to spread themselves. Clay, well limed, will fall in water, and ferment with acids; and in these circumstances, the air, rains, and dews, are freely admitted, and the soil is unable to retain the nourishment which they respectively afford. In consequence of a fermentation raised in the soil, the fixed air is let at liberty, which, in a surprising manner, promotes vegetation.

To the universal principle of oil, Dr. Hunter adds another of great efficacy, which is the nitrous acid of the air. The existence of such a principle is demonstrable from the method of making salt-petre in different parts of the world. See NITRE.

And though experiments have not yet ascertained the efficacy of nitre, considered as a manure, Dr. Hunter considers it as a vivifying principle in the process of vegetation.

In order to conceive how *plants* receive their nourishment, we must recur to the analogy that is known to subsist between *plants* and animals. Oil and water seem to make up the nourishment of both. Earth enters very little into the composition of either. It is known that animals take in a great many earthy particles at the mouth, but they are soon discharged by urine and stool. Vegetables take in the smallest portion imaginable of earth; and the reason is, they have no way to discharge it. It is highly probable, that the radical fibres of *plants* take up their nourishment from the earth, in the same manner that the lacteal vessels absorb the nutriment from the intestines; and as the oily and watery parts of our food are perfectly united into a milky liquor, by means of the spittle, pancreatic juice, and bile, before the orifices of the lacteals, we have all the reason imaginable to keep up the analogy, and suppose that the oleaginous and watery parts of the soil are also incorporated, previous to their being taken up by the absorbing vessels of the *plant*. To form a perfect judgment of this, we must reflect that every soil, in a state of nature, has in itself a quantity of absorbent earth, sufficient to incorporate its inherent oil and water; but when we load it with fat manures, it becomes essentially necessary to bestow upon it, at the same time, something to assimilate the parts. Lime, soap-ashes, kelp, marl, and all the alkaline substances, perform that office. In order to render this operation visible to the senses, dissolve one drachm of Russia pot-ash in four ounces of water; then add one spoonful of oil; shake the mixture, and it will instantly become an uniform mass of a whitish colour, adapted to all the purposes of vegetation. This easy and familiar experiment is a just representation of what happens after the operation of BURN-*baking*, and, consequently, may be considered as a confirmation of the hypothesis advanced. In this process, the sward being reduced to ashes, a fixed alkaline salt is produced; the moisture of the atmosphere soon reduces that salt into a fluid state, which, mixing with the soil, brings about an union of the oily and watery parts, in the manner demonstrated in the experiment. When the under-stratum consists of a rich vegetable mould, the effects of burn-baking will be lasting; but when the soil happens to be thin and poor, the first crop frequently suffers before it arrives at maturity. The farmer, therefore, who is at the expence of paring and burning a thin soil, should bestow upon it a portion of rotten dung, or thambles manure, before the ashes are spread, in order to supply the deficiency of oily particles: in this way, the crop will be supported during its growth, and the land will be preserved in health and vigour. But *plants* not only receive nourishment by their roots, but also by their leaves. Vegetables that have a lanceolate leaf, such as vetches, peas, beans, and buck-wheat, draw a great part of their nourishment from the air, and on that account impoverish the soil less than wheat, oats, barley, or rye, the leaves of which are of a firmer texture. Rape and hemp are oil-bearing *plants*, and, consequently, impoverishers of the soil, but the former less so than the latter, on account of the greater succulency of its leaf. The leaves of all kinds of grain are succulent for a time, during which period the *plants* take little from the earth; but as soon as the ear begins to be formed, they lose their softness, and diminish in their attractive power. The radical fibres are then more vigorously employed in extracting the oily particles of the earth, for the nourishment of the seed. Dr. Hales observes, that the leaves of *plants* serve, not only as excretory ducts to separate and carry off the redundant watery fluid, which, by being long detained in the plants, would turn

turn rancid and prejudicial to them; but likewise to imbibe the dew, and rain, which contain salt, sulphur, &c. and to be of the same use to *plants*, that the lungs are to animals. However he adds, that as *plants* have not a dilating and contracting thorax, their inspirations and expirations will not be so frequent as those of animals, but depend wholly on the alternate changes from hot to cold for inspiration, and *vice versâ* for expiration. But the greater part of their nourishment is derived from the roots. These, therefore, are found to bear a considerable proportion to the body of the *plant* above ground; the superficies of the former being above four-tenths of that of the latter. Hence appears the necessity of cutting off many branches from a transplanted tree; because in digging it up, a great part of the roots is cut off. See *Oeconomy and use of the parts of* PLANTS, and *Perspiration of* PLANTS.

The facts above stated, with regard to the influence of putrid air, arising from dunghills and the perspiration of animals, on the nourishment and increase of *plants*, were published by Dr. Hunter in his Georgical Essays, in 1769 and 1770; but they were afterwards ascertained, in the most satisfactory manner, by a variety of curious experiments made by Dr. Priestley, in the years 1771 and 1772, an account of which was presented to the Royal Society, in 1773. Having discovered, that sprigs of mint thrive, in a most surprising manner, in air that had been freshly and strongly tainted with putrefaction, and that was immediately fatal to animal life, he was led to conclude, that *plants*, instead of affecting the air in the same manner with animal respiration, reverse the effects of breathing, and tend to keep the atmosphere sweet and wholesome, when it is become noxious in consequence of animals either living and breathing, or dying and putrefying in it. See AIR *philosophical*.

In order to ascertain this, he took a quantity of air, made thoroughly noxious, by mice breathing and dying in it, and divided it into two parts: one of which he put into a phial immersed in water, and to the other, which was contained in a glass jar, standing in water, he put a sprig of mint. After eight or nine days, he found that a mouse lived perfectly well in that part of the air, in which the sprig of mint had grown, but died the moment it was put into the other part of the same original quantity of air, exposed in the same manner, but without any *plant* growing in it. This experiment was several times repeated, with different kinds of tainted air, and generally with the same success. From these facts he reasons thus: since the *plants* that were made use of manifestly grow and thrive in putrid air; since putrid matter is well known to afford proper nourishment for the roots of *plants*; and since it is likewise certain that they receive nourishment by their leaves as well as by their roots, it seems to be exceedingly probable, that the putrid effluvium is in some measure extracted from the air, by means of the leaves of *plants*; and, therefore, that they render the remainder more fit for respiration.

Dr. Priestley repeated and varied experiments of the same kind, and established the principle, that air, rendered noxious by respiration, putrefaction, the burning of inflammable substances, &c. was restored by vegetation. He also found, that common air is rendered in some measure dephlogisticated by vegetating *plants*, so as to be much more diminished by *nitrous* AIR than before: and also, that *plants do* not grow so well in dephlogisticated air as in common air, which affords a presumption, that dephlogisticated air does not supply that *pabulum*, which *plants* derive even from common air: and farther, that aquatic *plants*, by means of the action of light upon them, depurate the air contained in the water, in which they grow. So that air, combined with water, is liable to be dephlogisticated by vegetation as well as to be phlogisticated by respiration, as much as air in an elastic state, out of water.

Dr. Priestley having ascertained the fact, that vitiated air was restored by vegetation, and considered that common air is vitiated by being combined, in various ways, with PHLOGISTON, (see *Fixed* AIR), was led to conjecture, that this restoration was effected by *plants* imbibing the phlogistic matter with which air is loaded by any of those processes, that tend to injure it. And hence it was natural to conclude, that phlogiston is the principal pabulum or food of *plants*, upon which their nourishment and increase very materially depends. See on the subject of this article, Phil. Trans. N° 253. Dr. Hunter's Georgical Essays, vol. i. Evelyn's Silva, with Dr. Hunter's notes, quarto, 1776. Hales's Statics, vol. i. Priestley's Observations on Air, vol. i. p. 49, 87, vol. iv. p. 299, 305, vol. v. p. 12, &c. See VEGETATION *of Plants*.

PLANTS, *fructification of*. See FRUCTIFICATION, *Oeconomy, &c. of* PLANTS, and *Food of* PLANTS.

PLANTS, *perpendicularity of*. See PERPENDICULARITY.

PLANTS, *perspiration of*. We have already observed under *Oeconomy, &c. of* PLANTS, and *Food of* PLANTS, that vegetables imbibe and perspire moisture and air very copiously. These properties of *plants*, on which their nourishment and vigour depend, are very elaborately illustrated and evinced by Dr. Hales. In order to try what moisture *plants* would imbibe, the shorter cut off several branches of apple-trees, pear, cherry, and apricot-trees; and having immersed them into a known quantity of water, he found some of them imbibing fifteen ounces, some twenty ounces, and others twenty-five or thirty ounces, in twelve hours day; more or less, according to the quantity of leaves they had: and yet when he weighed them at night, they were lighter than in the morning, which undoubtedly was owing to their perspiration. The quantity imbibed decreased very much every day, the sap-vessels being probably shrunk at the transverse cut, and too much saturated with water, to let any more pass, so that usually in four or five days, the leaves faded and withered much. He made the same experiments with elm-branches, oak, osier, willow, fallow, aspen, currant, gooseberry, and filbeard branches; but none of these imbibed so much as the foregoing; and several sorts of evergreens much less. From an experiment with the stem of an apple-tree, he concludes, that the imbibing and perspiring powers of leaves, &c. are proportionable to their surfaces; and thence he infers, that the use of those leaves, which are placed just where the fruit joins to the tree, is to bring nourishment to the fruit. From another experiment with hop-vines, he determined, that one of them with its leaves imbibed in twelve hours day, four ounces, and the other without leaves 4 of an ounce: whence, allowing 1000 hills in an acre of hop-ground, three poles to each hill, and three vines to each pole, so that the number of vines is 9000, each of which imbibes four ounces, the sum of the ounces imbibed in an acre in twelve hours day, will be 36000 ounces = 1576800 grains, = 62047 cubic inches, or 202 ale gallons, which, divided by 6272640 the number of square inches in an acre, will give the quantity of liquor perspired by all the hop-vines, equal to an area of liquor as broad as an acre, and $\frac{1}{100}$ part of an inch deep. In a kindly state of the air, this moisture is daily carried off, so that the hops are kept in a healthy state; but in a rainy moist state of air, the moisture hovering about the hops hinders the kindly perspiration of the leaves, so that the stagnating sap corrupts and breeds mouldy sets, which spoils many hop-grounds. See FIRE-*blight*, and HONEY-*dew*.

Farther, Dr. Hales made several experiments to ascertain the force with which *plants* imbibe moisture. This he did by putting the stump of a branch into one end of a glass tube, cementing it fast, and then immersing the other end of the tube, after being first filled with water, into a cistern of mercury; on which, removing his finger that stopped up the lower end of the tube, the stump imbibed the water with so much vigour, that in six minutes time the mercury was raised eight inches in the tube. For the method of conducting these experiments, &c. see *Aqueo-mercurial* GAGE.

The imbibing force of a great variety of trees being tried in the same manner, by immersing branches of them in aqueo-mercurial gages, it was found that the pear, quince, cherry, walnut, peach, apricot, plum, black-thorn, white-thorn, gooseberry, waterelder, and sycamore, raised the mercury from three to six inches high. The elm, oak, horse-chesnut, filberd, fig, mulberry, willow, fallow, osier, ash, linden, and currant, raised the mercury only one or two inches. But the evergreens, and the following trees and *plants*, viz. laurel, rosemary, laurustine, phyllorea, furze, rue, barberry, jessamine, cucumber-branch, pumkin, and Jerusalem artichoke, did not raise it at all. In another experiment it was found, that the force with which peas dilate by imbibing water, is sufficient to lift up a weight of one hundred and eighty-four pounds laid upon them; and the dilatation of the peas is always equal to the quantity of water they imbibe.

In order to discover with what force the sap of the vine is pushed forth in the bleeding season, the following experiments were made. Dr. Hales cut off a vine on a western aspect, within seven inches of the ground, the remaining stump having no lateral branches, and being four or five years old, and $\frac{3}{4}$ of an inch in diameter. To the top of this stump he fixed a glass tube, twenty-five feet high, securing the joint with stiff cement made of bees-wax and turpentine, besides several folds of wet bladder fastened over it with packthread. As the stem did not at first bleed into the tube, he filled the tube two feet high with water, which the same afternoon was imbibed by the stem within three inches of the bottom. Next day the stem began to bleed so, that the sap in the tube continued rising daily, till it was above twenty-one feet high, and would very probably have risen higher, if the joint had

not several times leaked. In the chief bleeding season, it would continue rising night and day; but much more in the day than night; and most of all in the greatest heat of the day. When the sun shone hot upon the vine, there was always a continued series of air-bubbles ascending from the stem through the sap in the tube, in so great plenty, as to make a large froth on the upper part of the sap, which shews the great quantity of air drawn in through the roots and stem.

This force of the sap is five times greater than the force of the blood in the great crural artery of a horse; seven times greater than the force of the blood in the like artery of a dog; and eight times greater than the blood's force in the same artery of a fallow doe.

The free communication of the sap-vessels of *plants* appears from hence; that though deep gaps or notches be cut in a branch, it will nevertheless imbibe water in the manner already mentioned. In order to try whether it would not be the same in branches, as they grow on trees, the doctor cut two such opposite gaps in a duck-cherry branch, three inches distant from each other, notwithstanding which, the leaves of this branch continued green, within sight or ten days as long as the leaves on the other branches of the same tree.

As to the quantity of moisture perspired by *plants* and trees, there appears to be a very considerable difference in different vegetables. The lemon-tree, which is an evergreen, perspires much less than the sun-flower, or than the vine, or the apple-tree, whose leaves fall off in winter. Thus, from equal areas, the lemon-tree was found to perspire only $\frac{1}{250}$ of an inch in height, during twelve hours of the day in the month of July; the apple-tree $\frac{1}{154}$, a cabbage $\frac{1}{34}$, a vine $\frac{1}{17}$, and a sun-flower $\frac{1}{13}$, in a day and night. Dr. Hales, having taken a pretty exact account of the weight, size, and surface of the sun-flower, and of the quantities imbibed and perspired by it, formed a curious comparison of what is taken in and perspired by a human body, and this plant. The weight of a well-sized man is equal to 160 pounds; the weight of the sun-flower was 3 pounds: so that their weights are to each other as 160 to 3, or as 53:1. The surface of such human body is equal to 15 square feet, or 2160 square inches. The surface of the sun-flower is 4616 square inches; and, therefore, it is to that of the human body as 26:10. The quantity perspired by a man in twenty-four hours is about thirty-one ounces, according to Dr. Keill. The quantity perspired by the *plant* in the same time is twenty-two ounces; so that the perspiration of a man to that of the sun-flower is as 141:100. Abating the 6 ounces of the 31 ounces to be carried off by respiration from the lungs in the 24 hours, the 25 ounces, multiplied by 438, the number of grains in an ounce avoirdupoise, give a product of 10950 grains; which, divided by 254, the number of grains in a cubic inch of water, gives 43 cubic inches perspired by a man; which, divided by the surface of his body, viz. 2160 square inches, gives a quotient, which is nearly $\frac{1}{50}$th part of a cubic inch perspired off a square inch in 24 hours. Therefore in equal surfaces and equal times, the man perspires $\frac{1}{50}$, the *plant* $\frac{1}{70}$, or as 50:35. Dr. Keill, by estimating the quantities of the several evacuations of his body, found that he ate and drank every 24 hours 4 pounds 10 ounces; the sun-flower imbibed and perspired in the same time 22 ounces; so the man's food to that of the *plant* is as 74 ounces to 22 ounces, or as 7:2. But, compared both for both, the *plant* imbibes 17 times more fresh food than the man; for deducting 5 ounces, which Dr. Keill allows for the *faeces alvi*, there will remain 4 pounds 5 ounces of fresh liquor, which enters a man's veins, and an equal quantity passes off every 24 hours. Then it will be found, that 17 times more new fluid enters the sap-vessels of the *plant*, and passes off in 24 hours, than there enters the veins of a man, and passes off in the same time. One reason of this greater plenty of fresh fluid in the vegetable than in the animal body may be, because the fluid which is filtrated through the roots immediately from the earth is not near so full freighted with nutritive particles as the chyle which enters the lacteals of animals; not to add, that the motion of the sap is thereby much accelerated. Since then a plentiful perspiration is found so necessary for the health of a plant or tree, it is probable that many of their diseases are owing to a stoppage of this perspiration by inclement air. It appears also, that the power of perspiration much depends on exposure to the air; and that the perspiring matter is more actuated by warmth and so exhaled, than protruded by the force of the sap upwards. For this purpose the roots of trees and *plants* are, by means of the sun's warmth, constantly irrigated with fresh supplies of moisture from those parts of the earth which are not immediately adjacent to them; which, by the same means, insinuates itself with some vigour into the roots, and ascends, by the principle of attraction, up their fine capillary vessels, and is carried off in perspiration by the action of warmth; without which perspiration the *sap* must stagnate. This perspiration is greatest in the middle of the day, but decreases towards evening, and probably wholly ceases when the dews fall.

In animals it is the heart which sets the blood in motion, and makes it continually circulate; but in vegetables no other cause of the sap's motion can be discovered, but the strong attraction of the capillary sap-vessels, assisted by the brisk undulations and vibrations caused by the sun's warmth, whereby the sap is carried up to the top of the tallest trees, and there perspired off through the leaves; but when the surface of the tree is greatly diminished by the loss of its leaves, then also the perspiration and motion of the sap is proportionably diminished; so that the ascending velocity of the sap is principally accelerated by the plentiful perspiration of the leaves, thereby making room for the fine capillary vessels to exert their great attracting power, which perspiration is effected by the brisk rarefying vibrations of warmth; a power, says Dr. Hales, that does not seem to be in any respect well adapted to make the sap descend from the tops of vegetables by different vessels to the root. This excellent author has urged many arguments to prove, that there is no uniform CIRCULATION *of the sap in trees*, like that of the blood in animals; for this reason, besides others, that if there were such a circulation, the leaves of the ilex grafted upon the English oak would fall in winter equally with those of the oak itself, which is not found to be the case. See *Anatomy, Oeconomy*, &c. and *Food of* PLANTS, *supra*.

PLANTS, *perforation of*. See PERFORATION, &c.

PLANTS, *propagation of*. Though the most natural, as well as most universal method of propagating *plants* is that of sowing the seeds of each kind in a proper soil, yet such is the prolific power of nature, that in some instances, like the polype animal, they may be propagated by sets, pieces, slips, or cuttings, taken from the parent-tree, or *plant*, and set in such a soil as they are known to delight in. The whole family of willows are propagated in this manner with the greatest ease. Those sorts which grow to be large trees, and are cultivated for timber, are generally planted from sets of about seven or eight feet long, sharpened at their larger ends, which are thrust into the ground by the sides of ditches and banks where the ground is moist; in which places they make a considerable progress, and are a great improvement to such effates; because their tops will be fit to lop every fourth or fifth year. The tallows are planted of lesser sets, only three feet long, thrust two feet into the ground, and one foot above it. The rows should be three feet asunder, and the sets in each row eighteen inches; observing always to place the rows sloping, in the same manner as the ground. The best season for planting these cuttings is in February; and if the soil be good, they will produce a great crop of shoots every year, which will produce, at a moderate computation, ten pounds per acre.

Besides the willow kind, the plane-tree, mint, &c. may be propagated in this manner; only it ought to be remarked, that in providing the slips, sprigs, or cuttings, such branches as have knots or joints should be cut off two or three inches beneath them; and that small top sprigs, of two or three years growth, are the best for this operation.

Another way of propagating *plants*, is by parting or dividing their roots, each part of which will, by proper management, thrive and send out fresh roots, which may be separated in the same manner.

The manner of propagating *plants*, by laying the tops of branches in the ground, is described under the head LAYER; and the common way by sowing of the seeds, is sufficiently explained under NURSERY, SOWING, SEED, &c. *Plants* are also propagated by their bulbs.

The number of vegetables that may be propagated from an individual, is very remarkable, especially in the most minute *plants*.

It has been recorded, that in so large a *plant* as the common mallow, the annual product of one seed was no less than 200,000; but it has been since proved, by a strict examination into the more minute parts of the vegetable world, that so despised a *plant* as the common scarlet moss produces a much more numerous offspring. In one of the little heads of this *plant* there have been counted 13824 seeds. Now allotting to a root of this *plant* eight branches, and to each branch six heads, which appears to be a very moderate computation, the produce of one seed is $6 \times 13824 = 82944$; and 8×82944 gives 663552 seeds, as the annual produce of one seed, and that to small that 13824 of them are contained in a capsule, whose

whose length is but one ninth of an inch; its diameter but one twenty-third of an inch, and its weight but the thirteenth part of a grain. Phil. Trans. N° 478, sect. 12. See FECUNDITY *of plants*.

PLANTS, *resuscitation of*, in *Chemistry*. See RESUSCITATION.

PLANTS, *sleep of*, *somnus plantarum*, is that faculty which the leaves of many *plants* have of assuming in the night-time a situation different from what they bear in the day. The term was first used by Linnæus in his treatise on this subject, though the property denoted by it has been long known. Acosta and Prosper Alpinus, who wrote near the conclusion of the sixteenth century, are the first who recorded this nocturnal change in the leaves of *plants*. However, it is an observation of Pliny, Hist. Nat. lib xviii. cap. 35. that the leaves of trefoil assume an erect situation at the approach of storms. The same is observable of our wood-sorrel; and Linnæus adds, of almost all *plants* with decompound flamina. The examples of sleeping *plants* instanced by Alpinus are few; he says, that it was common to several Egyptian species, but specifies only the acacia, abrus, abius, lotus, and the tamarind-tree. Linnæus discovered the same property in many other *plants*; and there is reason to believe, that no *plant* or tree is wholly unaffected by it. This property was ascribed by Ray and many others to the coldness of the evening air; but Linnæus found that this was not the true cause, since *plants* were alike influenced by it when placed in stoves, where the temperature of the air was always the same. Dr. Hill, in his Sleep of *Plants*, ascribes this alternate change of position in the leaves of *plants* to the impulse of light upon their leaves. This is very different from that other property of *plants*, called the VITALE *plantæ*.

PLANTS, *systems of*. Ray's system is delivered below, under the article PLANTS. The system of Linnæus is to be found under FRUCTIFICATION; and the system of Tournefort under PETAL. See BOTANY.

PLANTS, *trachea of*. See TRACHEÆ and *Anatomy of* PLANTS.

PLANTS, *transpiration of*. See TRANSPIRATION.

PLANTS may be divided, with regard to the manner of their generating, into

Male, or such as bear no fruit or seed, and have only the male organ of generation, viz. the farina. Of this kind are the

Male palm-tree, willow, poplar, hemp, nettle, and hop-plant.

Female, or such as bear fruit, and have the female organ; viz. the pistil, or uterus, but want the farina. Such are the *female* palm, willow, poplar, &c.

Hermaphrodites, or such as have both male and female parts, or both the farina and pistil.

These are again subdivided into, 1. Those in whose flower both sexes are united; as the lily, gilliflower, tulip, and much the greater part of the vegetable species, whose pistil is surrounded by the flamina. And, 2. Those whose male and female parts are distinct, and at a distance from each other: such as the rose, whose uterus is beneath the petals; the melon, and all of the cucumber kind, which have their male and female flowers apart; and all fruit, nut, and mast-bearing trees; as the apple, plum, goodberry, and the walnut, hazel, filbert, oak, beech, pine, cypress, cedar, juniper, mulberry, pistachio, &c. which have catkins.

Plants may be again distinguished, with regard to their food, and the element they live in, into

Terrestrial, which are those that live only on land; as oak, beech, flax, &c.

Aquatic, which live only in water; either in rivers, as the water-lily, water-plantain, &c. or in the sea, as the fucus, &c.

Amphibious, which live indifferently either in land or water; as the willow, alder, &c.

Plants are again distributed, with regard to their destined year, or period, into

Annual, which are those whose root is formed and dies in the same year; such are all the leguminous *plants*, wheat, rye, &c.

Biennials, or *triennials*, which only produce flowers and seeds the second, or even third year after their being raised, and then die: such are fennel, mint, &c.

Perennial, which are those that do not die after they have once borne seed. Of these, some are evergreens; as the afarabacca, yew, &c. Others lose their leaves one part of the year; as rugwort, coltsfoot, &c.

Plants, again, are distinguished, with regard to their magnitude, &c. into

Trees, or *bores*; as the oak, pine, fir, elm, sycamore, &c.

Shrubs, or *frutices*; as the holly, box, ivy, juniper, &c. and

Herbs; as mint, sage, fennel, thyme, &c.

With regard to certain remarkable qualities, into inert and *sensitive*, such as give some tokens of sense. On which account they were called, by the ancients, *zoophytomorum*; plants (from *ασχημονεω*, *to be bashful*); and, by the moderns *living* or *animal plants*.

But these divisions are rather popular than just and philosophical.

The botanists give us more accurate and minute arrangement, or distributions, of the vegetable kingdom, into classes, genera, species, &c. with regard to their nature, characters, &c. But it is a point they are not well agreed upon, from what consideration the division into genera is best taken; some, as Gesner, Columna, Tournefort, &c. chusing only the flower and fruit; and others taking in the roots, leaves, stems, &c. See BOTANY.

The classification of Linnæus is now generally followed. Our ingenious Mr. Ray distributes plants into twenty-five genera, or classes, under the following denominations.

1. PLANTS, *imperfect*, which are such as appear to want the flower and seed. These were once a very large tribe of *plants*, but the more accurate observations of the moderns have proved, that most of these *plants* really contained seeds, and those very numerous, though so small as not to appear obvious to the naked eye; and probably the farther discoveries of the microscope will in time leave us no one *plant* deserving the appellation of *imperfect*. In Mr. Ray's time, many whole genera of *plants* were esteemed imperfect; but he includes the several kinds he calls to under three general heads. 1. The submarine. 2. The fungules. And, 3. The moles. But it has been evinced by later authors, that some of these are not plants, and that many of those which really are plants, have true seeds, and it is hence to be hoped of the rest. See CONFERVA of Hair-weed, CORAL, CORALLINES, FUCUS, FUNGUS or MUSHROOM, MUSEUS or MOSS, &c.

2. PLANTS producing an imperfect flower, and whose seed is too small to be discerned by the naked eye: such are fern, polypody, &c.

3. Those whose flowers want petals. Such are hops, hemp, nettles, and docks.

4. Those with a compound flower, and which emit a milky juice when cut or broken; as lettuce, dandelion, succory, &c.

5. Those with a compound flower of a discous form, and whose seed is elated, or, as it were, winged with down; as coltsfoot, fleabane, &c.

6. *Herbæ capitatæ*, or those whose flower is composed of several long tubulous flowers gathered into a round head, and covered with a scaly coat; as the thistle, great burdock, bluebottle, &c.

7. PLANTS, *corymbiferous*, with a discous flower, but no down to the seeds; as the daisy, yarrow, cornmarigold, &c.

8. PLANTS with a perfect flower, and only one seed to each flower; as valerian, agrimony, burnet, &c.

9. PLANTS, *umbelliferous*, with a flower of five petals, and two seeds to each flower. This, being a large genus, is subdivided into seven orders; viz. those with a flat broad seed, as wild garden parsnip; with a longish and larger seed, swelling in the middle, as cow-weed, and wild chervil; with a shorter seed, as angelica; with a tuberous root, as the earth-nut; with a small striated seed, as caraways, saxifrage, and burnet; with a rough hairy seed, as parsly, and wild carrot; and with entire leaves, as fanicle, and thorough-wax.

10. PLANTS, *stellate*, whose leaves go round the stalks, at certain intervals, in form of stars; as clivers, madder, &c.

11. PLANTS, *rough-leaved*, which have their leaves placed alternately, or in no certain order, along the stalks; as hounds-tongue, mouse-ear, &c.

12. PLANTS, *verticillate*, whose leaves grow, by pairs, on their stalks, one leaf right against another, the flower being monopetalous, and usually in form of a lobiate; as thyme, mint, pennyroyal, vervain, &c.

13. *Polyspermous*, or those with many naked seeds, at least five, succeeding their flowers; as crows foot, marshmallows, cinquefoil, strawberries, &c.

14. PLANTS, *baciferous*, or such as bear berries; as briony, honeysuckle, Solomon's seal, lily of the valley, nightshade, asparagus, &c.

15. PLANTS, *multisiliquous*, or *corniculate*, which after each flower produce several long slender siliquæ, or cases, wherein their seed is contained; as orpine, navel-wort, bears-foot, columbines, &c.

16. PLANTS, *vasculiferous*, *with a monopetalous flower*, and which, after each flower, have a vessel beside the calyx, containing the seed; as henbane, bindweed, campions, foxglove, eyebright, &c.

17. Those with *an uniform tetrapetalous flower*, bearing their seeds in oblong siliquous cases; as stockgilly-flower, mustard, radish, &c.

18. PLANTS, *vasculiferous, with a forming tetrapetalous flower*, but of an anomalous or uncertain kind, and, in reality, only monopetalous, falling off altogether in one; as speedwell, fluellin, plantain, yellow and wild poppy, &c.

19. PLANTS, *vasculiferous, with a pentapetalous five-leaved flower*; as maiden pinks, campions, chick weed, St. John's-wort, flax, primrose, wood-sorrel, &c.

20. PLANTS, *leguminous*, or such as bear pulse, with a papilionaceous flower, consisting of four parts joined at the edges; as peas, beans, vetches, tares, lentils, liquorice, trefoil, &c.

21. PLANTS *with a true bulbous root*; as garlic, daffodils, hyacinth, saffron, &c.

22. Those whose roots approach nearly to the bulbous form; as fleur-de-lys, cuckoo-pint, &c.

23. PLANTS, *culmiferous*, with a grassy leaf, and an imperfect flower, having a smooth, hollow-jointed stalk, with a long sharp-pointed leaf at each joint, and the seeds contained in a chaffy husk; as wheat, barley, rye, oats, reeds, and most kinds of grass.

24. PLANTS with a grassy leaf, but not culmiferous, with an imperfect or flamineous flower; as rushes, cat's-tail, &c.

25. PLANTS whose characters are uncertain; chiefly water-plants; as the water-lily, milk-wort, mouse-tail, &c. See FRUCTIFICATION.

PLANTS, *for the fancied transmutation of one species of into another*, see TRANSMUTATION, DEGENERATION, &c.

The properties and virtues of *plants* have been observed, by some naturalists, to bear an analogy to their forms. In the Philosophical Transactions we have a discourse of Mr. James Pettiver, to shew, that *plants* of the same or like figure have the same or like virtues and uses. Thus the umbelliferous tribe, he observes, have all a carminative taste and smell, are powerful expellers of wind, and therefore good in all flatulent disorders. The galeate or verticillate kind are a degree warmer, and more powerful, than the last, and therefore may be reputed aromatic, being proper for nervous disorders. The tetrapetalous kind are hot like the two former, but exert their power in a different way, viz. by a diuretic volatile salt, which makes them of use in chronical diseases, obstructions, cacochymies, &c.

PLANTS, *analysis of*. The common method of attempting the *analysis of plants*, by common distillations, gave hopes that it would prove very useful in determining their virtues; but experiment shewed it to fail of this intent, since the wholesome *plants* and the poisonous ones afforded by this means much the same sort of principles; and on the whole, these appeared in a great measure to be creatures of the fire rather than parts of the subject. This set M. Boulduc of the Paris academy upon trying whether there might not be some way invented at once more simple and more certain; and with this view he attempted to examine the juices and decoctions of several *plants*, to find their essential salts, which had not been procured in their natural state by the chemical trials. The *plant* this gentleman chose as the subject of his experiments in this view, was the common borage.

First, he made a large quantity of a decoction of borage; this he divided into three equal parts: the first of these he evaporated to a pellicle, or to the consistence of a syrup; it was then of a blackish colour, and was charged with a great quantity of oily particles. This being set by for some days in a warm time of the year, covered itself with a thick skin, which was again covered by a mouldiness. When this skin was removed, there appeared underneath a large quantity of crystals, in fine slender filaments like needles, mixed among a large quantity of other crystals, which were small, and of no regular figures; all these were swimming in a liquor of the thickness of a syrup. These long crystals being taken out of the liquor, and laid upon a hot iron, took fire, and flamed in the manner of salt-petre when mixed with any sulphureous substance; and, in truth, this was a salt-petre, yet loaded with the oily matter of the decoction.

Here, therefore, is a clear proof, not only of the nitrous acid being in this plant, but of plain nitre itself; for on pouring oil of tartar on a solution of this salt, there was no precipitation made of any substance whatever; which would have been the case, had there been in this state any earthy matter for its basis.

The second portion of this decoction was divested of its oil by means of lime, and then evaporated to a light pellicle over a very gentle heat. This was set by to rest for some days, and finer and more perfect crystals were found, shot in the form of needles in it; these were truly nitrous, and occupied the upper part of the liquor; below these there were a great number of other cubic ones, which were easily known to be crystals of sea salt.

The long crystals of this operation took fire on a lighted charcoal, and appeared plain nitre; and the others, when dry, crepitated in the fire exactly in the manner of sea salt; and when a solution of them was poured upon a solution of silver, made in spirit of nitre, it immediately occasioned a white curd to appear, which being separated, washed, and put to the fire, became a true luna cornea, being transparent, and easily cut with a knife. Here, therefore, are plain proofs of nitre and sea salt in this *plant*. Mem. Acad. Scienc. Par. 1734.

The third portion of the decoction was poured upon some fresh wood-ashes; and being afterwards evaporated to a pellicle, and set by for some days, there was found in this more nitre than in any of the others; and that whiter and more clear; the others being usually coloured brownish or reddish by the decoction. The occasion of this seems to be, that part of the nitrous acid, which in the other experiments neither joined with any earthy matter, nor with the fatty matter of the decoction, mixed with the salts of the lixivium, made by pouring the liquor which contained it on wood-ashes, and thus yielded a much larger quantity of salt-petre than before.

The fatty substance which covered the first decoction being dried, was found to contain a great quantity of nitre, which it had not sufficient to shoot, or form itself into crystals: this dried cruft being laid on a burning charcoal, took fire in the same manner as if nitre and powder of charcoal had been thrown into a crucible made and hot.

The taste of the *plant* being thus obtained from its decoction, it was determined to try whether the *plant* remaining after the decoction had any more to yield. To try this, it was gently dried in a shade, and burned in a covered vessel to a black coal, and afterwards, in an open fire, to ashes.

Of these ashes there was made a lixivium in the common way, in order to be evaporated for the salt: this lixivium being mixed with syrup of violets, scarce at all altered it from its blue colour, only just bringing on a faint greenishness, which soon went off again, and left the syrup of as fine a blue as before: this made it evident, either that there was very little alkali salt there, or else that it was blended with salts of some other kind, which altered its effects; and this proved to be the true state of the matter on further experiment; for evaporating the lixivium to a pellicle, there very soon shot in it regular and beautiful crystals of a salt, having all the characters of tartarum vitriolatum. A second evaporation of the lixivium afforded more of the same salt, but in smaller crystals. Evaporating the liquor to about half its quantity, and setting it again to shoot, there appeared plain cubic crystals of sea salt; which being strictly examined, were found to be perfect sea salt, no way altered, but having stood the force of the calcination.

After these salts had been separated from the lixivium, it changed syrup of violets immediately to a beautiful green, which colour it always retained.

It is evident from these experiments, that this *plant* affords four different kinds of salts, viz. nitre, sea salt, tartarum vitriolatum, and the common fixed alkali; and it is hence no trivial observation, that the three mineral acids are found here all in one *plant*.

The virtues of *plants* are very variable; a change of climate will alter or destroy them, as we see in many of the medicinal *plants* of other countries brought over hither, which, though they seem to flourish with us, never possess their virtues in the same degree as in their native climate. The bodies of different animals also render the effect of the same *plant* different: the tithymals or spurges are all of them very violent cathartics, when taken by us; but yet they are eaten by goats and several other animals without hurt, or without any purgative effect, and seem to give them a particular share of vigour and spirits. The fish are, on the other hand, more strongly affected by it than we are; for the juice made into paste with flower and honey, poisons, or at least intoxicates them so, that they may be taken out of the water with one's hand. Bitter almonds are of no ill consequence to us, yet they kill all sorts of birds.

PLANTS, *ashes of*. The ashes of a *plant* carefully prepared, retain its exact form till disturbed by accidents. The way of preparing them is this: take a whole *plant* which has been used for the distillation of the oil, water, &c. lay it evenly upon a flat plate of iron, and place this on a clear fire, that no smoke may prevent the success of the operation; continue and raise the fire, till the whole substance of the *plant* appears perfectly ignited. There first arises a light smoke from it; this gradually becomes darker, and at length as black as pitch; the smell of burning increases as the smoke increases; at length the smoke breaks out into flame, and then the smell in a great measure ceases; the *plant* by degrees grows black, within

smoke

ſmoke ariſes, and as ſoon as perfectly black all over, it takes fire. When the flame ceaſes, the leaves appear white; but if any black ſpots remain, there are always ſeen ſparks of fire ſcattering themſelves about on them, till the blackneſs is perfectly conſumed. The aſhes being now become perfectly white, yield no ſmell, nor the leaſt appearance of fire; and they yet retain, after all this violence of fire, the perfect form of the *plant*, even to a microſcopic obſervation: for, if examined by glaſſes, there will be found every feature and lineament of the *plant*, even the hairineſs of the ſtalks or down upon the leaves; every riſing and cavity natural to the *plant* appear alſo diſtinct, and every the ſmalleſt fibre. But this only remains while they are unmoved; the moment they are diſturbed, though but by breathing upon them, the whole falls to duſt, and the form is irrecoverably loſt.

The aſhes thus carefully prepared, are perfectly inſipid and feculeſs; and when lixiviated in the common way for making the fixed ſalt, afford no ſalt at all, but only on the evaporation leave a ſmall quantity of a matter reſembling lime; the remaining aſhes are wholly terreſtrial, and ſerve excellently for the making copels, for the uſe of aſſaying. Boerhaave's Chem. part ii. p. 19.

From this we learn, that the *plant*, by having been previouſly boiled in water in the diſtillation, was diveſted of all its ſalts; and that in general, water, with a great degree of heat, is capable of extracting from any vegetable all its ſaline particles, whether volatile or fixed. We find, however, that water can never ſeparate the fixed oil, which here ſhews itſelf to have wholly remained in the *plant*, by the ſmoke, ſmell, and flame it yields; and by the ſparks of fire in the remaining black parts of the *plant*, which were wholly owing to the remains of this oil, no fire being able to make the ſmalleſt ſpark afterwards appear in the aſhes.

Air, as well as fire, is neceſſary to this oil's taking flame; for in a covered veſſel it will not blaze till the cover is taken off. This thick oil is extremely different from what we call the eſſential oil of a *plant*, and ſeems to be the ſame in all vegetables; and to this they owe their coheſion; while the eſſential oil and ſalt are extracted from the *plant* by boiling, it yet holds together in its native figure and ſtrength; but as ſoon as the black oil is diſſipated by burning, the whole firmneſs of the *plant* is loſt, and a breath of air blaſts it to duſt.

The aſhes of different woods, burnt to perfect whiteneſs, and freed from their alkaline ſalt, have been found to be, in part, of the ſame nature with the true MAGNESIA. Of vegetable aſhes, moderately or ſtrongly calcined, only a part was found to diſſolve in acids, and this part appeared to be perfect magneſia. It is probable that the remainder might be reduced to the ſame ſtate, by repeating the calcination. See POT-*aſhes*.

PLANTS, *juices of*. Moſt juices of vegetables coagulate when expoſed to the air, whether it be that they are drawn out of the *plant* by wounds, or that they naturally run out; though what is called naturally running out, is generally the effect of a wound in the *plant*, from a ſort of cancer, or ſome other internal cauſe. The flowers of the St. John's wort, and the leaves of the rorella, or ſun-dew, afford us purple blebs and veins, and large drops of a clear fluid; yet it does not ſeem certain that theſe are coagulated juices. The ſmall green leaves, forming the cup of the flower of the common erect tuſſan St. John's wort, are ſurrounded with purple blebs, and the points or tops of the leaves alſo have each two or three ſuch blebs, all containing a purple juice; yet the ſtalk of this *plant*, being cut and ever ſo nicely examined, does not ſhew to the naked eye, nor even to the microſcope, any veſſels containing ſuch a purple fluid. Whence it may appear not improbable, that what is thus found in ſmall blebs is a matter ſeparated by coagulation only from the reſt of the juice of the flower.

In the common St. John's wort the edges of all the leaves of the flower are ſurrounded with theſe purple blebs, and the ſtalk, though round, has a double edge, one on each ſide, and the blebs or bags are to be ſeen riſing on theſe edges of the ſtalk. The cup of the flower has ſeveral purple veins, yielding a purple juice, and the leaves of the flower have alſo ſome ſuch veins, and even the apices all contain a purple matter.

In the ſquare-ſtalked St. John's wort, commonly called St. Peter's wort, the edges of all the leaves, from the top to the bottom of the ſtalk, are ſurrounded with rows of theſe purple bags, and the apices of the flower are ſo many purple bags; but the cup and the petals of the flower have but very few purple veins in this ſpecies.

In the *hypericum pulchrum erectum*, or upright elegant St. John's wort, the leaves and ſtalks have no purple blebs, but only the cup and the flower have them. Theſe juices alone are what give the red colour to the oil of St. John's wort kept in the ſhops. And it is worthy a ſtrict enquiry, what they really are, and by what means produced.

Diverſe parts of the ſame *plant* yield different juices. The ſame veins, in their courſe through the different parts of the *plant*, yield juices of a different appearance. Thus the milky juice, in the root of the cow-parſnep, is of a brimſtone colour; but in the ſtalk it is white.

Among thoſe juices of vegetables which are clammy, and readily coagulate, there are ſome which readily break with a whey. The great wild lettuce, with the ſmell of opium, yields the greateſt plenty of milky juice of any known Engliſh *plant*. When the ſtalk is wounded with a knife, the juice flows readily out like a thick cream, and is white and ropy; but if theſe wounds be made at the top of the ſtalks, the juice that flows out of them is daſhed with a purple tinge, as if cream had been ſprinkled over it, with a few drops of red wine, and has ſome veins. Some little time after the letting this out, it becomes much more purple, and thickens, and finally the thicker part of it ſeparates, and the thin whey forms at the top. Herein the juice of this plant exactly reſembles the blood of animals, which, though a ſimple fluid, when drawn from the veſſel, yet ſoon ſeparates into a thick cake, and a thin fluid, or ſerum.

The whey, or thin part of this ſeparated matter, is eaſily preſſed out from the curd by ſqueezing between the fingers, and the curd then will remain white, and, on waſhing in fair water, becomes like rags. The purple whey, for in this part all the colour is lodged, ſoon dries into a cake of the ſame colour, and may be crumbled between the fingers into a purple powder. The white curd being dried, and kept ſome time, becomes hard and brittle. It breaks with a ſhining ſurface like reſin, and is inflammable, taking fire at a candle, and burning all away with a ſtrong flame. The ſame thick part being held over a gentle heat, would draw out into tough long threads, melting in the manner of wax.

The purple cake, made from the whey, is wholly different from this, and when held to a candle, ſcarce flames at all, but burns to a black coal. The whole virtue of the *plant* ſeems alſo to conſiſt in this thin part of its juice, for the coagulum or curd, though looking like wax or reſin, has no taſte at all, whereas the purple cake made from the ſerum is extremely bitter, and of a taſte ſomewhat reſembling that of opium.

It is poſſible that the artifice of bees may conſiſt, in a great meaſure, in the ſeparating in this manner the thick and the thin parts of the juices of peculiar *plants*, the curd or thick part of which, being glutinous and inſipid, may ſerve them as wax, and the thin part may make their honey.

The throat-wort, ſpurge, and many other *plants*, replete with milky juices, are of this kind, and their juice, when let out, ſeparates into curd and whey. But this, though a common law of nature, is not univerſal; for there are many *plants* which yield the like milky juices which do not ſeparate and break into curds and whey, but coagulate all together into one ſimple maſs. The white juice of the *ſanchus* never ſeparates, but dries into an uniform cake; the common red wild poppy bleeds freely with a milky juice, and the heads or capſules of ſeed bleed not leſs than the reſt of the *plant*, even after the flowers is fallen. This juice, on being received into a ſhell or other ſmall veſſel, ſoon changes its white to a deep yellow colour, and dries into a cake which ſeems reſinous and oily, but no whey ſeparates from it.

It ſeems by the experiments on the juice of the opium lettuce before mentioned, that theſe milky liquors are of a mixed kind, and compoſed of different fluids, of various and perhaps of contrary qualities; ſo that if the curd part be ſimple and harmleſs, the whey may be a powerful medicine, and ſo of the reſt; but in thoſe which do not ſeparate in this manner, we are forced to take the whole together, unleſs ſome way may be found of ſeparating them by art. Perhaps the ſetting them in wooden veſſels, and after a time adding freſh juice to them, may do it; and poſſibly the adding a little calf's rennet may be able to effect it.

The tragopogon, or goat's beard, when wounded, bleeds freely a milky juice; it is at firſt white, but becomes immediately yellow, and after that more and more red; at length it is wholly of a duſky red; it never ſeparates, but dries together into one cake, and is oily and reſinous, but of an inſipid taſte. The great bindweed bleeds freely alſo a white juice; the flowers, as well as the ſtalks and leaves, afford this liquor. It is of a ſharp taſte; and as many of the purging plants are of this claſs, it would be worth trying whether this milk be not purgative.

Theſe juices, as well as the generality of others which bleed freely from *plants*, are white like milk; but there are ſome of other colours. The juice of the great celandine is of a fine yellow; it flows from the *plant* in the

thickness of cream, and soon dries into a hard cake, without any whey separating from it. Another yellow juice is yielded by the seed-vessels of the yellow centaury, in the month of July, when the seeds are full grown. This is of a fine yellow colour, and very clammy; it soon hardens all together into a cake, no whey separating from it; it sticks to the fingers like birdlime, and is of the colour of pale amber, and will never become harder than soft wax, if dried in the shade; but if laid in the sun it immediately becomes hard like rosin. These cakes burn like wax, and emit a very pleasant smell. The great angelica also yields a yellowish juice on being wounded, and this will not harden at all, but if kept several years will still be soft and clammy, drawing out into threads like wax, or half melted resin.

Another kind of juices, very different from all these, are those of a gummy nature; some of these remain liquid a long time, and are not to be dried however without the assistance of heat; the others very quickly harden of themselves, and are not inflammable. The gum of the juice of rhubarb-leaves soon hardens, and is afterwards soluble in common water, and sparkles when put into the flame of a candle. These two qualities shew that these gums have a watery part in them, and they melt also in the flame of a candle, and become fluid like; and this shews that they have also the earthy part, though this does not separate from the whey in drying, as in some other cases. These do not sparkle in the flame so much as some others which contain more water; and their not kindling out into an actual flame, shews that they want oil. The clusters of the common honeysuckle are full of a liquid gum; they frequently throw this out, and it falls upon the leaves, and retains its own form there; the red hairs of the sun-dew are all terminated by large bladders of a thin watery fluid. This is also a liquid gum; it sticks to the fingers, and draws out into long threads; and this through the heat of the sun all day. In the centre of each of these dews drops, there is a small red bladder, which stands immediately on the summit of the red hair. This is of the nature of the blebs on the leaves and flowers of the St. John's wort, containing a purple juice which may be squeezed out of it. The pinguicula, or butter-wort, has also some gummy liquid matter on its leaves. It does not stand upon such long hairs as that of the sun-dew, but it is in much greater quantity. The hairs of the leaves of these two *plants* stand on the upper side of the leaves, and are very thick set there, while the under side is smooth. This is a singularity not observable in any other *plant*, at least of our own growth. Vide Lister, in Phil. Trans. N° 244. and Lowthorp's Abridg. vol. ii. p. 656, 657.

Mr. Boyle tells us, that the fumigated juices of *plants* may be successfully preserved by adding a small quantity of the white coagulum, made by the pure spirits of wine and urine. See OSTEA *alba*.

Some *plants* yield juices which are of a manifestly oily nature, which, being rubbed between the fingers, are not at all clammy, but make them glib and slippery; and these juices do not harden at all on being exposed to the air. If the flark of elecampane be wounded, there flows out a plain oily juice swimming upon a watery one. The stalks of hemlock also afford the same oily liquor swimming upon the other; and the common white mullein, if the leaves are pulled off in the month of June, yields the same sort of oil very freely along with its watery juice. The berries of ivy, the bay, juniper, dog-berry-tree, and the fruit of the olive, when wounded, shew their oil in the same manner floating on the watery juice.

Some of these oily juices, soon after they are let out of the *plant*, coagulate and harden into a kind of resin. Our ivy yields such a juice very abundantly, and the juice of the small purple-berried juniper is of the same kind, being hard and fat, and not very gummy.

If the bark of the common ivy be wounded in March, there will come out a tough and greasy matter of a yellowish colour; if this be taken up between the fingers, it feels not at all gummy or sticking, but melts in handling into a sort of oil, which in process of time hardens and crusts upon the wounds, and looks like brown sugar; it burns with a lasting flame, and smells very strong. The tops of the wild lettuce, and the leaves growing near the tops, if examined with a magnifying-glass, shew a great number of small bladders or drops of an oily juice of a brownish colour, hardening into a kind of resin; they are easily wiped off when of any size, and are truly an oily juice hardened a little. It is probable also, that the fine blue flower or powder called the bloom, upon the surface of our common *plums*, is no other than such an oily juice exudating from their pores in small particles, and hardening into a sort of resin. The leaves and stalks of the common English mercury are all over covered with small transparent drops looking like pearls; and if the *plant* is taken into the hand, these feel rigid and greasy. The leaves of the stinking orach abound also with the same sort of drops, and these are only small portions of the oily juices of the *plant*, which are continually exsudating through its pores, and harden into these resiny pearls. Phil. Trans. N° 224.

The sap or juice of trees appears to be very different, according to the species or genus of the tree, as we find by experiments, or by their spontaneous exudations. The extravasations of sap in the plum and cherry-kind, being all clammy, and hardening into a gum like gum arabic; and, on the other hand, those of the vine, the oak, and many other trees, being thin as water. The clamminess of the sap in trees seems one of the great things that renders them hardy, and not liable to injuries from cold, &c. In the hard frosts, those trees which have watery juices perish, and even split and cleave of themselves; while those which have gummy and viscous juices escape. In our gardens the vines crack and split with the frost, while the plums, cherries, peaches, and other gummy trees, stand without any damage or danger; and in the fields no trees so readily split in severe frosts as the oaks, which though the hardest wood of all our timber-trees, yet have of all the most thin and watery juices. The trees which have deciduous leaves, have in general thinner and more watery juices than the evergreens; so the freezing of these, or their decay from want of due heat, and other accidents, is owing the decay and fall of these leaves, while the others remain in their places, though not increasing, or no new ones growing, the juices remaining unaffected, though stagnated in the vessels, and safe from injury, though waiting the sun's heat to put them in motion. The earlier or later germination of trees and *plants* of different kinds, is probably owing also to the same cause. The thinnest juices, as they are soonest injured by cold, so they are probably soonest influenced also by heat; and that warmth may make them move, and prepare the *plant* for growing, which could scarce begin to attenuate the tough and gummy ones. Phil. Trans. N° 165.

PLANT'S, *salts of*. It has been observed by all who have examined the different essential *salts of plants*, that some of them, when thrown on the fire, have the crackle of sal-petre, and others of common sea-salt; and it has been concluded from hence, that they really contained particles of those salts, which their roots had taken in with their nourishment, and conveyed up into the stalk and leaves with the juices; and that these salts still retained their original nature, and were no otherwise altered than by the mixture with other substances in the *plant*. But as two *plants* of different qualities, when set in the same earth closely by one another, shall out of the same juices make a medicine, a salad, or a poison, it cannot be, but that the substances abiding by the root, be they what they will, must be greatly altered in the *plant*; insomuch, that a salt purely nitrous, when received into the root, might become of the nature of sea-salt, or of the volatile urinous kind, according to the different organs of the *plants*, and the different natural fermentations it might meet with there. To be perfectly informed of this, Mr. Homberg made the following experiment:

He took a large quantity of rich black garden mould, and washed it in several waters, to carry off all the salts it might contain: this done, he divided the earth into four boxes or cases of wood, into each of which there was put about two hundred weight. Two of these cases of earth he watered with a solution of sal-petre, so as to make each imbibe about two ounces of that salt; the other two cases were left with the earth insipid as the washing had made it, and care taken to water them with none but perfectly pure water, so that they might remain as simple as possible. In one of the cases of nitrous earth, and in one of those of simple earth, he sowed fennel, and in the other two, garden cresses.

The herbs in all the cases grew very well, and when they were grown to about eight inches high, they were all gathered, and when the roots were cleared, and the whole product weighed, those *plants* which had grown on the simple earth weighed twenty-five ounces, and those in the nitrous earth twenty-six; their smell and taste manifested no sort of difference in either. In order to examine these *plants*, while yet quite fresh, by means of fire, he put a pound and a half of each, with their roots, into a retort of glass: he placed these retorts first in a balneum Mariæ, and then in a sand-heat, in order to drive over all the aqueous humidity. The quantity of water from each retort was within a few grains of the same weight; and from the beginning to the end of the distillation there was not the least appearance of any acid.

After this, the cresses which had grown in the insipid

earth yielded a drachm of volatile salt; and that which had grown in the earth which had imbibed salt-petre, yielded seventy-five grains.

The oil of each was very nearly the same in quantity; that from the plants in the salt-petre earth weighing six grains more than that of the *plants* of the insipid earth. The lixivial oil was two drachms from the *plants* in the nitrous earth, and one drachm and sixty-seven grains from those in the insipid.

The differences between these two parcels of *plants* upon the analysis, appeared on the whole so little, that it could not be counted any thing; since the more or less chemistration of the vessels, or many other accidents in the distilling, might have easily occasioned as much in *plants* perfectly the same in all respects. If there be any thing, however, to be collected from the experiment, it is, that the earth impregnated with a solution of nitre, yielded more of the principles than the other; probably from its actually affording a quantity of oil to the juices of the *plants* in the growth: but as the nitrous earth afforded a *plant* which yielded more oil than that from an insipid soil, it will be from this that the portions of the earth not being able to carry off any of the fatty parts, they remained in the same quantity in both; but that the nitre, where it was, had contributed somewhat to the breaking of them, and the rendering them more fit to be absorbed by the *plants*. From the different weights of the *plants* when gathered, after the time of growth, from the same seed, and with all the same advantages in common, it may be concluded, that the nitrous salts in the earth are not essentially necessary to vegetation, since the *plants* in the insipid earth grew very well without them; yet that they are very useful, since the *plants* produced there were of a greater bulk, and according to the whole analysis, if the differences are to be depended on as resulting wholly from the nature of the subjects, they yielded more of all the active principles; and therefore, that they were to all purposes better *plants*. *Mem. Acad. Par.* 1693.

The weights above mentioned are French, the word *gros* being translated drachm, though really exceeding it by twelve grains. See WEIGHT.

PLANTS, *fossile*. Many species of reedlet and herbaceous *plants* are found at this day, in great abundance, buried at considerable depths in the earth, and converted, as it were, into the nature of the matter they lie among; fossile wood is often found very little altered, and often impregnated with substances of almost all the different fossile kinds, and lodged in all the several strata, sometimes firmly embedded in hard matter; sometimes loose: but this is by no means the case with the tenderer and more delicate subjects of the vegetable world. These are usually immersed either in a shockish clay substance, found lying over the strata of coal, or else in loose nodules of ferruginous matter of a pebble-like form, and they are always altered into the nature of the substance they lie among: what we meet with of these are principally of the fern kind; and what is very singular, though a very certain truth, is, that these are principally the forms of American growth, not those of our own climate.

The most frequent *fossile plants* are the polypody, spleenwort, ofmund, trichomanes, and the several larger and smaller ferns; but beside these there are also found pieces of the equisetums, or horse-tails, and joints of the reed-like *plants*, as the rivers, rudder, and the like; and these have been too often mistaken for flowers; sometimes there are also found complete grasses, or parts of them, as also reeds and other watery *plants*; sometimes the ears of corn, and not unfrequently the rinds or bark, and impressions of the bark, and fruit of the pine or fir kind, which have been, from their scaly appearance, mistaken for the skins of fishes; and sometimes, but that very rarely, we meet with moffes and sea-*plants*.

Many of the ferns not unfrequently found, are of very singular kinds, and some species yet unknown to us; and the leaves of some appear set at regular distances, with round protuberances and cavities. The stones which contain these *plants* split readily, and are often found to contain, on one side, the impression of the *plant*; and on the other the prominent *plant* itself: and, beside all that have been mentioned, there have been frequently supposed to have been found with us ears of common wheat, and of the maiz or Indian corn; the first being in reality no other than the common endmoft branches of the fir, and the other the thicker boughs of various species of that and of the pine kind, with their leaves fallen off; fuch branches in fuch a ftate cannot but afford many irregular tubercles and papillæ, and, in fome fpecies, fuch as are more regularly difpofed.

Thefe are the kinds moft obvious in England; and thefe are either immerfed in the flaty ftone which conftitutes whole ftrata, or in ftatted nodules, ufually of about three inches broad, which readily fplit into two pieces on being ftruck.

They are moft common in Kent, on coal-pits, near Newcaftle, and the foreft of Dean, in Gloucefterfhire; but are more or lefs found about almoft all our coal-pits, and many of our iron mines. See *Tab. of Foffils, claſs* 6.

Though thefe feem the only fpecies of *plants* found with us, yet in Germany there are many others, and thofe found in different fubftances. A whitifh ftone, a little harder than chalk, frequently contains them: they are found alfo often in a grey flaty ftone, of a firmer texture, not unfrequently in a blackifh one, and at times in many others: nor are the bodies themfelves lefs various here than the matter in which they are contained: the leaves of trees are found in great abundance, among which thofe of the willow, poplar, whitethorn, and pear-tree, are the moft common; fmall branches of firs, leaves of the olive-tree, and ftalks of garden ſtuffe, are alſo found there; and fometimes ears of the various fpecies of corn, and the largeſt as well as the fmalleſt moſſes in great abundance.

Thefe feem the tender vegetables, or herbaceous *plants*, certainly found thus immerfed in hard ſtone, and buried at great depths in the earth; others of many kinds there are alſo named by authors, but, as in bodies fo imperfect, errors are eaſily fallen into, theſe ſeem all that can be aſcertained beyond mere conjecture. Hill's Hiſt. of Foſſils, p. 64.

PLANT, *burning thorny*. See SPURGE.

PLANT, *egg*, a ſpecies of *ſolanum*, or NIGHTSHADE.

PLANT, *ice*. See ICE.

PLANTS, *marine*. See SEA-*plants*.

PLANT, *parafitical*. See PARASITE.

PLANT-*root*, a term uſed by Dr. Grew, to expreſs the radicle in ſeeds; he by this name diſtinguiſhes it from what he calls the SEMINAL *root*; which is a very different ſubſtance diſtributed throughout the parenchyma of the ſeed, but wholly different from it, and preying upon it as the *plant-root* does upon the earth.

PLANT, *ſenſitive*, is the Engliſh name of a diſtinct genus of *plants*, called by the botaniſts *mimoſa*. See SENSITIVE *plant*.

PLANT, *laſting & fruitleſs*. See ACHRONOMENE.

PLANTA, in *Anatomy*, the loweſt part, or ſole of the FOOT of a man, comprehended between the tarſus and the toes.

PLANTAGENET, in *Hiſtory*, an addition, or ſurname, borne by many of our ancient kings.

The term *Plantagenet* has given infinite perplexity to the critics and antiquaries, who could never fettle its origin and etymology.

It is allowed, that it firſt belonged to the houſe of Anjou and was brought to the throne of England by Henry II. where his male poſterity preſerved it till the time of Henry VI. a ſpace of above four hundred years.

It is diſputed, who it was that firſt bore the name. Moſt of our Engliſh authors conclude, that our Henry II. inherited it from his father Geoffrey V. earl of Anjou, ſon of Fulk V. king of Jeruſalem, who died in 1144. This Geoffrey they will have the firſt of the name; and not Henry II. the iſſue of Geoffrey, by Maud, only daughter of Henry I. the ſecond.

Yet Mainge will not allow Geoffrey to have borne the name; and adds, that, in effect, the old annaliſt of Anjou, J. Bourdigne, never calls him ſo. The firſt, Mainge adds, to whom he gives the appellation, is Geoffrey, third ſon of this Geoffrey V.

Yet moſt the name be much more ancient than either of theſe princes, if what Skinner ſays of its origin and etymology be true. That author tells us, that the houſe of Anjou derived the name from a prince thereof, who, having killed his brother to enjoy his principality, took to repentance, and made a voyage to the Holy Land, to expiate his crime; diſciplining himſelf every night with a rod made of the plant genet, genilla, broom; whence he became nicknamed *Planta-genet*.

Now it is certain, that our Geoffrey made the tour of Jeruſalem; but then he did not kill his brother, nor did he go thither out of penance, but to aſſiſt king Amaurin his brother. Who then ſhould this prince of the houſe of Anjou be? Was it Fulk IV? It is true he diſpoſſeſſed his elder brother Geoffrey, and put him in priſon; but he did not kill him: nay, Bourdigne obſerves, he was even releaſed out of the ſame by his ſon Geoffrey V. already mentioned.

Father; this Fulk did make a journey to Jeruſalem; and that, too, partly out of a penitential view: we are aſſured, by Bourdigne, he did it out of apprehenſion of the judgments of God, and eternal damnation, for the great effuſion of Chriſtian blood in the many mortal battles he had been in. The annaliſt alſo adds, that he made a ſecond voyage; but it was to return God thanks for his mercies, &c. to which we may add, that Fulk was never called *Plantagenet*; ſo that what Skinner advances, appears to be a fable.

There

There is another common opinion, which appears no better founded; and it is this: that the name *Plantagenet* was common to all the princes of the house of Anjou, after Geoffrey V. whereas, in fact, the name was only given to a few; and that, as it should seem, to distinguish them from the rest. Thus Bourdigne never applies it to any but the third son of Geoffrey V. and distinguishes him, by this appellation, from the other princes of the same family. Though it is certain that it was likewise given to the elder brother, Henry of England, as before observed.

PLANTAGINELLA, in *Botany*, a name given by Dillenius to a genus of plants since called by Linnæus LIMOSELLA.

PLANTAGO, in *Botany*. See PLANTAIN.

PLANTAIN, *plantago*, in *Botany*, the name of a genus of plants, the characters of which are these: the empalement is quadrifid; the flower consists of one leaf, of the *tetrandria monogynia* class; and is wide, expanded at the opening, and with a reflex limb, and usually divided into four segments; from the bottom of this flower rises a pistil surrounded with stamina of considerable length; the fruit is a capsule, which when ripe separates transversely into two pieces, and is divided by an intermediate septum into two cells, filled with oblong seeds.

The species of *plantain*, enumerated by Linnæus are twenty-one, comprehending, besides the several species of *plantains*, usually so called, the psyllium, or fleawort, and the coronopus or buckhorn.

The *plantains* grow naturally in pastures in most parts of England, and are frequently very troublesome weeds. The common broad-leaved *plantain*, and the narrow-leaved or ribwort are used in medicine; they possess much the same qualities, though the first has been generally directed for medicinal use in preference to the other. The leaves and seeds, recommended as vulneraries, in phthisical complaints, spittings of blood, alvine fluxes, &c. appear to be of the milder kind of restringents or corroborants. The expressed juice of the leaves, depurated by settling and colature, or clarified with white of eggs, and inspissated to the consistence of honey, and called the extract of *plantain*, manifests a considerable saline austerity. The leaves are, in some places, the usual application made by the common people to slight wounds.

Of the buckhorn *plantain* there are two varieties growing in England, one of which is plentiful every where on heaths, and was formerly cultivated in gardens as a salad herb, and the other is the narrow-leaved Welsh sort, which is found on many of the Welsh mountains.

The seeds of the *psyllium*, or FLEA-*wort*, have been usually brought from the south of France. The mucilage which they yield has been chiefly employed in emollient glysters, in gargarisms for hoarseness and asperity of the fauces, and in external applications for chaps of the lips, and inflammations of the eyes. Prosper Alpinus relates, that, among the Egyptians, the mucilage, or an infusion of the seeds, is given internally in ardent fevers, and that it generally either loosens the belly or promotes sweat. Lewis.

PLANTAIN, *water*, *alisma*, in *Botany*, a genus of the *hexandria polygynia* class and order: its characters are, that the empalement is composed of three leaves, that the flower has three petals, and that the seeds are numerous. Linnæus enumerates seven species.

PLANTAIN, *lesser water*. See LIMOSELLA.

PLANTAIN *shot*. See CANNA.

PLANTAIN, *star-headed water*, *damasonium*, in the Linnæan system of *Botany*, is a species of the *alisma*, or *water*-PLANTAIN: but Mr. Miller has made it a distinct genus with the following characters: it hath a flower composed of three leaves, which are placed orbicularly, and expand in form of a rose; out of the flower-cup arises the pistil, which afterward becomes a star-shaped fruit, with many cells, which are full of oblong seeds. He reckons two species.

PLANTAIN-*tree*, *musa*, in *Botany*, a genus of the *polygamia monœcia* class. Its characters are these: it hath male and female flowers upon the same stalk, several of which are hermaphrodite; these are produced on a single stalk, or spadix; the male flowers are situated on the upper part of the spike, and the female below; these are in bunches, each bunch having a sheath or cover, which falls off; the flowers are of the lip kind; the two petals constitute the upper lip, which is erect, and furnished with five horizontal points, and the nectarium, which is concave and shorter; they have six stamens, five of which are perfect; the germen is situated under the flower, which is long, having three obtuse angles, supporting an erect cylindrical style, crowned by a roundish stigma; the germen afterwards turns to an oblong, three-cornered, fleshy fruit or berry, covered with a thick rind, divided into three parts.

Here we may observe, that the *musa paradisiaca*, or *plantain-tree*, produces a spadix, which contains often two hundred germina, the few female flowers of which continue in blow for some days; when the female flowers have done blowing, the males succeed, and continue in flower till the fruit is ripe, in which are to be found no seed at all. Wherefore the authors of the Hortus Malabaricus have asserted that seeds were evidently wanting, in the *plantain-tree*, and this seemed a paradox to Linnæus; but when he saw the first female flowers destitute of males, and that the males which followed came too late to impregnate the females, he clearly perceived that no seeds would ever be produced in this species, unless several plants placed together were to flower nearly at the same time, and then one could impregnate the other. There is one thing farther remarkable in the *musa*, viz. that it produces two sorts of flowers very different in the same plant, some of which want the stigmata, and others the antheræ; the first may be called male hermaphrodites, and the latter female hermaphrodites. So that here we have a peculiar kind of polygamy, where those different flowers may impregnate each other, and one female joined with barren males is impregnated by the males belonging to another female, which is itself barren. See *Generation of* PLANTS.

Of this genus Miller reckons two, and Linnæus four species.

The first sort, or *musa* with a nodding spike, and a long three-cornered fruit, is cultivated in all the islands in the West Indies, where the fruit, which is roasted in the embers, serves the negroes for bread; and some of the white people also prefer it to most other things, especially to the yams and cassada bread. This plant rises with a soft herbaceous stalk fifteen or twenty feet high; the lower part is often as large as a man's thigh, diminishing gradually to the top, where the leaves come out on every side.

The fruit is eight or nine inches long, and above an inch diameter; the skin is tough, and within is a soft pulp of a luscious sweet flavour; the spikes of fruit are often so large as to weigh upward of forty pounds. The leaves are used for napkins and table-cloths, and are food for hogs.

The second sort, with a nodding spike, and a cucumber shaped fruit, which is commonly called BANANA, differs from the former, in having its stalks marked with dark purple stripes and spots; the fruit is shorter, straighter, and rounder; the pulp is softer, and of a more luscious taste, so is generally eaten by way of desert, and seldom used in the same way with the former; therefore is not cultivated in such plenty.

It grows in both the Indies, and the fruit is used, which is very nourishing, provokes urine, and stimulates to venery.

PLANTANOCEPHALUS, in *Botany*. See BUTTON-*tree*.

PLANTARIS, in *Anatomy*, a muscle which has a fleshy beginning from the back-part of the external protuberance of the thigh-bone, and, descending a little way between the gemellus and soleus, becomes a long and slender tendon; which proceeds, by the inside of the great tendon over the os calcis to the bottom of the foot, and expands itself, under the sole, upon the musculus perforatus, to which it adheres closely, as the palmaris does to the hand. See *Tab. Anat. (Myol.) fig.* t. *n.* 68.

Some reckon this among the extenders of the foot. See EXTENSOR.

PLANTATION, in the *Islands and Continent of America*, a spot of ground which some planter, or person arrived in a new colony, cultivates and tills for his own use.

Plantations, or colonies in distant countries, are either such where the lands are claimed by right of occupancy only, by finding them desart and uncultivated, and peopling them from the mother country; or where, when already cultivated, they have been either gained by conquest, or ceded to us by treaties. See COLONY.

But there is a difference between these two species of colonies, with respect to the laws by which they are bound. For it hath been held (Salk. 411, 666), that if an uninhabited country be discovered and planted by English subjects, all the English laws then in being, which are the birth-right of every subject, are immediately there in force. But this must be understood with very many and very great restrictions. Such colonists carry with them only so much of the English law, as is applicable to their own situation and the condition of an infant colony; such, for instance, as the general rules of inheritance, and of protection from personal injuries. But in conquered or ceded countries, that have already laws of their own, the king may indeed alter and change those laws; but, till he actually does change them, the ancient laws of the country remain, unless such as are against the

law of God, as in the case of an infidel country. 7 Rep. 17. Calvin's case. Show. Parl. cap. 31.

Our American *plantations* are principally of this latter sort, being obtained in the last century either by right of conquest and driving out the natives, or by treaties. And, therefore, the common law of England, as such, has no allowance or authority there; they being no part of the mother country, but distinct, though till the late unhappy contest, dependent dominions. They, says Judge Blackstone, are subject, however, to the controul of the parliament: whilst, on the other hand, it is as strenuously contended, that they neither are nor can be subject to the legislative authority of the parliament of Great Britain. But the litigation and decision of this question has been unfortunately referred to the issue of a war, the wished for termination of which may produce alterations in the state of our American *plantations*, and their connection with this country, which render it impossible now (1782) to say, how their government may be conducted for the future.

Previous to our late contest, our colonies, with respect to their interior polity, were of three sorts: viz. Provincial establishments, proprietary governments, and charter-governments. See CHARTER-*governments*.

PLANTATIONS and *Trade, board of*. See BOARD.

PLANTE-*ver*, in *Natural History*, the name of a herb sent over from China, where it is called *hoiffatzaotcheom*; that is to say, a plant which at a certain time of the year changes into a worm. The Chinese say, that this is a plant during the summer season; but that in winter its stalk dies, and the root becomes a worm. Mr. Reaumur has well observed, that in the present improved state of natural knowledge, we can give no credit to such marvellous accounts; and of the roots sent over to the Academy at Paris, it appeared, that only a certain part of each was to undergo this change: this, however, if true, was no less a marvel than that the whole should.

Father Parenin, who sent it to France, observes, in his account of it, that it was a very scarce plant even in China; being found only at the palace of Pekin there, where also it was not native, but brought from the mountains of Tibet, and some other places on the confines of the Chinese dominions. This father had never seen the leaves or flowers of the plant, but only its roots, which were in high esteem there, not only because of their miraculous changes, but from their possessing the virtues of the famous ginseng; but with this advantage, that the use of them was not subject to be attended with those hæmorrhages which frequently affected the persons who take large quantities of that famous root. The roots of this *plante-ver* are usually about a quarter of an inch thick, and from an inch to three inches in length; but there are much larger in the places where they grow.

These roots had nothing particular in their figure or appearance; but with these the father sent some of those which were supposed to be changed into worms, concerning which he observed, that nothing could more exactly express a worm or caterpillar; the head, the eyes, the feet, and the mouth, being all plainly distinguishable, as well as the several folds and cuttings-in of the body. This account was found to be perfectly true; but the mistake was the want of proper accuracy in the observation; for this body, which was supposed to be the root transformed, had in reality never been any part of the plant, but was found to be really and truly a caterpillar.

This was one of the under-ground kind, or at least of those which go into the ground to pass their transformation: of these we have a great many different species in all parts of Europe, and some of them, when they are entering into their nymph state, have a custom of fastening themselves to the roots of plants. Of this kind was the Chinese insect, which, when the time of its change approached, always selected the roots of this plant as of a proper size and dimension for its purpose; and, gnawing off the end, hollowed away the stump, so as to introduce its tail into the cavity; where it remains covered with the bark of the root, which so nicely joins to it, that people who observe it in a slight way cannot but mistake it to be a part of the root, or the remainder of the root a continuation of its body. The more accurate naturalists will, however, easily distinguish the vegetable fibres, which make up the root from the animal ones of the caterpillar; and to an eye accustomed to such researches, the nice joining of the tail to the remainder of the root will easily discover itself. Mem. Acad. Par. 1720.

PLANTED *coat*, in the *Manege*. See HAIR.

PLANTING, in *Agriculture* and *Gardening*, the setting of a tree, or plant, taken up from its former place, in a new hole or pit, proportionable to its bulk, throwing fresh earth over its root, and filling up the hole to the level of the other ground.

As PLANTATIONS of trees are not only profitable to the owner, as well as ornamental to the country around them, but a national advantage, it may not be improper to give some general directions concerning them; referring to the several articles for more particular instructions.

First, then, care must be taken to prepare the ground before trees are taken out of the earth; because they should never be suffered to remain long out of the ground. Care likewise is to be taken not to tear or bruise the roots of the trees, in raising them in order to be transplanted. When taken up, the next thing to be done is to prepare them for *planting*; which is done by cutting off all the small fibres of the roots, and such roots as are any wise injured in pulling up, or which cross one another. The downright roots of fruit trees are likewise to be pruned off, as should all their irregular branches; that when agitated by the wind, they may not rub against or bruise each other. However, the main shoots ought by no means to be cut off, as is but too often injudiciously practised.

Having thus prepared the trees for *planting*, they are next to be fixed in the ground; in doing which, if they have been long out of the ground, their roots should be previously immersed in water for eight or ten hours; and care must be taken to place them deeper or shallower, according to the nature of the soil; in which, if it be cold and moist they should be planted very shallow: but if it be a hard rock or gravel, the best method of all is to raise a hill of earth, wherein to plant them. They should be placed as erect as may be, with the roots as deep in the ground as they were growing before they were taken up, and the earth gently pressed down about their roots; for it is a fault to make it too hard. Poles or stakes should be fixed round those that are standards, in order to prevent their being displaced or blown down by the wind.

When the trees are thus *planted* and secured, a little mulch should be laid upon the surface of the ground, to prevent its drying; and as to watering them, it ought to be done with great moderation, nothing being more hurtful to them than over-watering.

The seasons for *planting* are various, according to the different sorts of trees, or the soil in which they are to be planted.

For such trees whose leaves fall off in winter, the best time is the beginning of October, provided the soil be dry; but for a wet soil, it is better to defer it to the latter end of February, or the beginning of March; and for many kinds of ever-greens, the beginning of April is by far the best season; though some sorts may be safely removed at Midsummer, provided they are not to be carried far. They should always be removed in a cloudy moist season, by which means they will take root in a few days.

As the method of cultivating most trees, especially garden ones, is explained under their respective articles, there is the less reason to be particular on that head in this place. However, one thing more deserves to be well attended to, as regarding plantations in general. It is this; that plantations of fruit and other trees should be raised always from trees transplanted from nurseries, and never from hedge-rows, or trees of a large size, because these last seldom come to good account, often dying after continuing alive for many years.

Another general rule in regard to plantations, is, to keep the ground clear of weeds, at least for the space of seven years; for which purpose it should be annually dug or plowed, where that can be done. This will encourage the roots of the trees to extend themselves, whereby they will draw a larger proportion of nourishment. Miller's Gard. Dict.

PLANTING *an orchard*. See ORCHARD.

PLANTING *of forest trees*. See SEMINARY, NURSERY, TIMBER, and TREE. See also ASH, CHESTNUT, ELM, OAK, &c.

PLANTING *of wall fruit-trees*. After two years growth in the nursery, stone-fruit, being first inoculated or grafted, are ready for removal; which is best done in October or November.

To prepare the soil for its new guest, a hole is dug two feet deep; or, if the soil be not very good, the pit is made shallower, and the earth raised above it. With the soil dug up, they frequently mix either a rich soil from elsewhere, or manure, so as the mixed be at least as rich as the soil out of which the tree came. The hole being half filled up with this compost, it is trodden down, to afford a firm rest to the root; all the extremities whereof are cut off, and the tree fitted to the wall, by cutting off such branches as grow directly either towards or from the wall, and leaving only the side-branches, which are to be nailed to it.

This done, the tree is set in its hole, as far from the wall

as is consistent with the head's spreading thereon, that the root may have the more room backwards; and the hole is then filled up with the compost.

If the soil be poor, it is proper to manure round the tree; and, at the end of February, to cover it with fern, or straw. It will also be necessary to prune and nail the tree to the wall, at least twice or thrice every year.

PLANTING, *inverted*, or *reverse*, is a method of *planting* wherein the ordinary position of the plant, or shoot, is inverted; the branches being set in the earth, and the roots reared into the air.

Agricola mentions this monstrous way of *planting*, which, he assures us, succeeds very well in most, or all sorts of fruit-trees, timber-trees, &c. both foreign and domestic. Bradley affirms to have seen a lime-tree, in Holland, growing with its first roots in the air, which had shot out branches in great plenty, at the same time that its first branches were turned into roots, and fed the tree.

The industrious Mr. Fairchild has practised the same with us, and gives us the following directions for the performance thereof.

Chuse a young tree of one shoot, of alder, elm, willow, or any other tree that takes root readily by laying; bend the shoot gently down, till the extreme part be in the earth, and so let it remain till it has taken good root. This done, dig about the first root, and gently take it up out of the ground, and raise it till the stem be nearly upright; in which state stake it up.

Then prune the roots, now erected in the air, from the bruises and wounds they received in being dug up; and anoint the pruned parts with a composition of four parts of bees-wax, four of tallow, two of resin, and two of turpentine, melted together, and applied pretty warm. Then prune off all the buds or shoots upon the stem, and dress the wounds with the same composition, to prevent any collateral shootings; and leave the rest to nature.

PLASTING, in *Architecture*, denotes the laying the first courses of stone on the foundation, according to the measures, with all the exactness possible.

PLASHING, a term used by our farmers to express an operation performed at certain times upon their quick-set-hedges, in order to assist their growth and continuance.

This operation is performed sometimes in October, but more usually in February; and this is by much the better season for it. Suppose a hedge to be of twenty or thirty years growth, and full of old stubs as well as young shoots: this is the kind of hedge that requires *plashing* most of all.

The old stubs must be cut off within two or three inches of the ground, and the best and longest of the middle-sized shoots must be left to lay down. Some of the strongest of these must be left to answer the purposes of stakes. These are to be cut off to the height at which the hedge is intended to be left; and they are to stand at ten feet distance one from another: when there are not proper shoots for these at the due distances, their places must be supplied with common stakes of dead wood. The hedge is to be first thinned, by cutting away all but those shoots which are intended to be used either as stakes, or the other work of the *plashing*: the ditch is to be cleaned out with the spade: the ditch must be now dug as at first, with sloping sides each way; and when there is any cavity on the bank on which the hedge grows, or the earth has been washed away from the roots of the shrubs, it is to be made good by facing it, as they express it, with the mould dug from the upper part of the ditch; all the rest of the earth dug out of the ditch is to be laid upon the top of the bank, and the owner should look carefully into it that this be done; for the workmen, to spare themselves trouble, are apt to throw as much as they can upon the face of the bank; which, being by this means overloaded, is soon washed off into the ditch again, and a very great part of the work undone again, whereas what is laid on the top of the bank always remains there, and makes a good fence of an indifferent hedge.

In the *plashing* the quick, two extremes are to be avoided; these are, the laying it too low, and the laying it too thick: this makes the sap run all into the shoots, and leaves the *plashes* without sufficient nourishment into the *plashes*, and so makes the shoots small and weak at the bottom, and, consequently, the hedge thin. This is a common error in the north of England. The best hedges made any where in England, are those of Hertfordshire; and they are *plashed* in the middle way between the two extremes, and the cattle are by that prevented both from cropping the young shoots, and from going through; and a new and vigorous hedge soon forms itself.

When the shoot is bent down that is intended to be *plashed*, it must be cut half way through with the bill; the cut must be given sloping, somewhat downwards, and then it is to be wound about the stakes, and after this its superfluous branches are to be cut off, as they stand out at the sides of the hedge. If for the first year or two the field where a new hedge is made can be plowed, it will thrive the better for it; but if the stubs are very old, it is best to cut them quite down, and to secure them with good dead hedges on both sides, till the shoots are grown up from them strong enough to *plash*; and wherever void spaces are seen, new sets are to be planted to fill them up. A new hedge raised from sets in the common way, generally requires *plashing* about eight or nine years after. Mortimer's Husbandry, p. 10.

PLASM, PLASMA, is sometimes used for a MOULD, wherein any metal, or such like running matter, which will afterwards harden, is cast, to receive its figure.

PLASTER, or PLASTER, in *Building*, a composition of lime, sometimes with hair, sometimes with sand, &c. to parget or cover the nudities of a building.

There is also a *plaster* of a coarser sort than the PLASTER of Paris, which is sometimes used in this country for floors in gentlemen's houses, and for corn-granaries: it is made of a bluish stone, taken out of quarries, which are generally at the side of a hill, much like the stone of which Dutch terrafs is made: the stone is burnt like lime, becomes white by burning, and when mixed with water does not ferment like lime: when cold, it is beat into a fine powder, and when it is used, the quantity of about a bushel is put into a tub and water applied to it, till it becomes liquid: in this state it is well stirred with a stick, and used immediately; for in less than a quarter of an hour it becomes hard and good for nothing, as it will not bear being mixed a second time like lime. See GYPSUM, and PLASTERING.

PLASTER, in *Pharmacy*, an external application of a harder consistence than our ointments: these are to be spread according to the different circumstances of the wound, place, or patient, either upon linen or leather.

If the part upon which they are to be laid be naturally hairy, it must be shaved; but that they may stick the better, the natural shape of the part must be consulted, and the *plaster* spread and formed accordingly, either round, square, triangular, elliptical, in a lunar form, or in shape of the letter T. Some also are divided at both ends, and others are perforated in the middle; those last are of frequent use in fractures attended with a wound: for by this contrivance the wound may be cleansed and dressed without removing the *plaster*.

Indeed there is almost no part of the body which a *plaster* of one of those forms may not be made to serve for, if it be notched about the edges with a pair of scissars. See EMPLASTER.

The use of *plasters* are various; they are serviceable in securing the dressings, they also forward the maturation of the pus, agglutinate and heal wounds, unite broken bones, heal burns, assuage pain, and strengthen weak parts. Heister.

The calces of lead boiled with oils unite with them into a *plaster* of a proper consistence, which makes the basis of several other *plasters*: in boiling these compositions, a quantity of hot water must be added from time to time, to prevent the *plaster* from burning and growing black; but this should be done with care, lest it cause the matter to explode.

PLASTERS, *adhesive*, *anodyne*, *blistering*, *common*, *drawing*, *gum*, *mercurial*, *plumbeo*, and *strengthening*. See EMPLASTRUM.

PLASTER, *warm*, is made by melting together over a gentle fire, one ounce of gum *plaster*, and two drachms of blistering *plaster*. This is useful in the sciatica, and other fixed pains of the rheumatic kind; it ought, however, to be worn for some time, and to be renewed, at least, once a week.

PLASTER, *wax*, is formed by melting together one pound of yellow wax, half a pound of white resin, and three-quarters of a pound of mutton fat. This is generally used instead of the MELILOT *plaster*, and is a proper application after blisters, and in other cases where a gentle digestion is necessary.

PLASTER *of Paris* is a fissile stone, serving many purposes in building; and used likewise, in sculpture, to mould and make statues, basso relievos, and other decorations in architecture.

It is dug out of quarries, in several parts of the neighbourhood of Paris; whence its name. The finest is that of Montmartre.

Plaster of Paris, among our workmen, is of two kinds, viz. *crude*, or in the stone, and *burnt*, or beaten.

The *crude* is the native *plaster*, as it comes out of the quarry; in which state it is used as shards in the foundations of buildings.

The *burnt plaster* is a preparation of the former, by calcining

cining it like lime in a kiln or furnace, and then beating it into powder, and diluting and working it. In this ſtate it is uſed as mortar, or cement, in building.

This, when well ſifted, and reduced into an impalpable powder, is alſo uſed to make figures, and other works of ſculpture; and is, beſides, of ſome uſe in taking out ſpots of greaſe, &c. in ſtuffs and ſilks.

In the *plaſter* quarries is alſo found a kind of falſe talc, or plated ſelenites, wherewith they counterfeit all kinds of marble. See GYPSUM.

The method of repreſenting a face truly in *plaſter of Paris*, is this: the perſon whoſe figure is deſigned is laid on his back, with any convenient thing to keep off the hair. Into each noſtril is conveyed a conical piece of ſtiff paper, open at both ends, to allow of reſpiration. Theſe tubes being anointed with oil, are ſupported by the hand of an aſſiſtant; then the face is lightly oiled over, and the eyes being kept ſhut, alabaſter freſh calcined, and tempered to a thinniſh conſiſtence with water, is by ſpoonfuls nimbly thrown all over the face, till it lies near the thickneſs of an inch. This matter grows ſenſibly hot, and in about a quarter of an hour hardens into a kind of ſtony concretion; which being gently taken off repreſents, on its concave ſurface, the minuteſt part of the original face. In this a head of good clay may be moulded, and therein the eyes are to be opened, and other neceſſary amendments made. This ſecond face being anointed with oil, a ſecond mould of calcined alabaſter is made, conſiſting of two parts joined lengthways along the ridge of the noſe; and herein may be caſt, with the ſame matter, a face extremely like the original.

If finely powdered alabaſter, or *plaſter of Paris*, be put into a baſon over a fire, it will, when hot, aſſume the appearance of a fluid, by rolling in waves, yielding to the touch, ſteaming, &c. all which properties it again loſes on the departure of the heat; and being thrown upon paper will not at all wet it, but immediately diſcover itſelf to be as motionleſs as before it was ſet over the fire; whereby it appears, that a heap of ſuch little bodies as are neither ſpherical, nor otherwiſe regularly ſhaped, nor ſmall enough to be below the diſcernment of the eye, may, without fuſion, be made fluid, barely by a ſufficiently ſtrong and various agitation of the particles which compoſe it; and, moreover, loſe its fluidity immediately upon the ceſſation thereof.

Two or three ſpoonfuls of burnt alabaſter, mixed up thin with water, in a ſhort time coagulate, at the bottom of a veſſel full of water, into a hard lump, notwithſtanding the water that ſurrounded it. Artificers obſerve, that the coagulating property of burnt alabaſter will be very much impaired or loſt, if the powder be kept too long, eſpecially if in the open air, before it is made uſe of; and when it hath been once tempered with water, and ſuffered to grow hard, they cannot, by any burning or powdering of it again, make it ſerviceable for their purpoſe as before. Boyle's Works Abr. vol. i. p. 133, 318, 341.

This matter, when wrought into veſſels, &c. is ſtill of ſo looſe and ſpongy a texture, that the air has eaſy paſſage through it. Mr. Boyle gives an account among his experiments with the air-pump, of his preparing a tube of this *plaſter*, cloſed at one end and open at the other, and on applying the open end to the cement, as is uſually done with the receivers, it was found utterly impoſſible to exhauſt all the air out of it; for freſh air from without preſſed in as faſt as the other, or internal air, was exhauſted, though the ſides of the tube were of a conſiderable thickneſs. A tube of iron was then put on the engine; ſo that being filled with water, the tube of *plaſter of Paris* was covered with it; and on uſing the pump, it was immediately ſeen, that the water paſſed through into it as eaſily as the air had done, when that was the ambient fluid. After this, trying it with Venice turpentine inſtead of water, the thing ſucceeded very well; and the tube might be perfectly exhauſted, and would remain in that ſtate ſeveral hours. After this, on pouring ſome hot oil upon the turpentine, the caſe was much altered; for the turpentine melting with this, that became a thinner fluid, and in this ſtate capable of paſſing like water into the pores of the *plaſter*. On taking away the tube after this, it was remarkable that the turpentine, which had pervaded and filled its pores, rendered it tranſparent, in the manner that water gives tranſparency to that ſingular ſtone called *oculus mundi*. In this manner, the weight of air under proper management, will be capable of making ſeveral ſorts of glues penetrate *plaſter of Paris*; and not only this, but baked earth, wood, and all other bodies porous enough to admit water on this occaſion. Phil. Tranſ. N° 122.

Plaſter of Paris, diluted with water into the conſiſtence of a ſoft or thin paſte, quickly ſets or grows firm, and at the inſtant of its ſetting, has its bulk increaſed; for Mr. Boyle has found, that a glaſs veſſel, filled with the fluid mixture and cloſely ſtopped, burſts whilſt the mixture ſets, and ſometimes a quantity of water iſſues through the cracks.

This expanſion of the *plaſter* in paſſing from a ſoft to a firm ſtate, is one of its valuable properties; rendering it an excellent matter for filling cavities in ſundry works, where other earthy mixtures would ſhrink and leave vacuities, or entirely ſeparate from the adjoining parts.

It is probable alſo, that this expanſion of the *plaſter* might be made to contribute not a little to the elegance of the impreſſions which it receives from medals, &c. by properly confining the ſoft matter, that its expanſion may force it into the minuteſt traces of the figure; the expanſion of the matter doing the ſame office as the preſſure by which the wax is forced into the cavities of a ſeal.

Plaſter of Paris promotes the fuſion of forged IRON.

This ſubſtance is commonly uſed for taking caſts and impreſſions from figures, buſts, medals, &c. as it is adapted to the double uſe of making both caſts and moulds for forming them. See *Impreſſions of* MEDALS.

PLASTERING. The modern taſte runs greatly into *plaſtering*; and it were much to be wiſhed that this art could be again brought to its ancient perfection. In our beſt buildings the *plaſtered* walls and ceilings crack and fly, and in a little time grow damp, or moulder to decay. The Romans had an art of rendering their works of this kind much more firm and durable, and there is no reaſon to deſpair of reviving this art by proper trials.

The ancient *plaſtering* of theſe people, preſerved to this time, where it has not met with violent blows or injuries from accidents is ſtill found as firm and ſolid, as free from cracks or crevices, and as ſmooth and poliſhed on the ſurface, as if made of marble. The bottoms and ſides of the Roman aqueducts were made of this *plaſtering*, and endured many ages without hurt, unleſs by accidents; witneſs that wherein ſome yards are ſtill to be found on the top of the Pont de Carde, near Nifmes, for the ſupport of which that famous bridge was built to carry water to the ſaid town. The roofs of houſes, and the floors of rooms at Venice are covered with a ſort of *plaſter*, made of later date, and yet ſtrong enough to endure the ſun and weather for ſeveral ages, without cracking or ſpalling, and without much injury from people's feet.

The ſecret of preparing this Venetian *plaſter* is not among us; but it would be worth while to try whether ſuch a ſubſtance might not be made by boiling the powder of gypſum dry over the fire, for it will boil in the manner of water; and when this boiling or recalcining was over, the mixing with it reſin, or pitch, or both together, with common ſulphur, and the powder of ſea-ſhells. If theſe were all mixed together, and the water added to it hot, and the matter all kept hot upon the fire till the inſtant of its being uſed, ſo that it might be laid on hot, it is poſſible this ſecret might be hit upon.

Wax and oil of turpentine may be alſo tried as additions: theſe being the common ingredients in ſuch cements as we have accounts of as the firmeſt. Strong ale-wort is by ſome directed to be uſed, inſtead of water, to make mortar of lime-ſtone of a more than ordinary ſtrength. It is poſſible, that the uſe of this tenacious liquor to the powdered ingredients of this propoſed *plaſter*, might greatly add to their ſolidity and firmneſs. Phil. Tranſ. N° 93.

PLASTIC, Πλαστικὸς, from πλάσσω, of πλάττω, or πλάσσω, *fingo*, *I faſhion*, *form*, &c. imports as much as *formative*, or a thing endued with a faculty of forming or faſhioning a maſs of matter after the likeneſs of a living being.

Some of the ancient Epicureans, and perhaps the Peripatetics too, imagine a *plaſtic* virtue to reſide in the earth, or at leaſt to have anciently reſided therein; and that it was by means hereof, and without any extraordinary intervention of a Creator, that it firſt put forth plants, &c. Nay, ſome of them, whether ſeriouſly or not we do not undertake to determine, taught that animals, and even man, were the effects of this *plaſtic* power.

Some learned modern writers have ingenuouſly contended for the doctrine of a *plaſtic nature*, which they have deſcribed to be an incorporeal created ſubſtance, endued with a vegetative life, but not with ſenſe or thought, penetrating the whole created univerſe, being co-extended with it, and under God, moving matter ſo as to produce the phenomena, which cannot be ſolved by mechanical laws; active for ends unknown to itſelf, not being conſcious of its own actions, and yet having an obſcure idea of the action to be exerted upon. Dr. Cudworth reaſons thus: ſince neither all things are produced fortuitouſly, or by the unguided mechaniſm of matter, nor God himſelf may reaſonably be thought to do all things immediately and miraculouſly, it may well be concluded, that there is a *plaſtic* nature under him, which as an inferior

and

and subordinate instrument, doth drudgingly execute that part of his providence, which consists in the regular motion of matter; yet so as that there is also, besides this, a higher providence to be acknowledged, which, presiding over it, doth often supply the defects of it, and sometimes over-rule it: for as much as this *plastic* nature cannot act electively, nor with discretion. This doctrine, he says, hath had the suffrage of the best philosophers of all ages; Aristotle, Plato, Empedocles, Heraclitus, Hippocrates, Zeno, and the Stoics, and the latter Platonists and Peripatetics, as well as the chemists and Paracelsian, maintained this doctrine. Intell. System. vol i. p. 147, &c. Birch's Ed. More's Imm. of the Soul, lib. iii. cap. 12.

PLASTICE, Πλαστικὴ, the PLASTIC *art*, a branch of SCULPTURE; being the art of forming figures of men, birds, beasts, fishes, plants, &c. in plaister, clay, fluceo, or the like.

The workmen concerned herein are also called *plastæ*, πλάσται.

Plastice differs from carving, because here the figures are made by addition of something that is wanting; but in carving, always by subtraction of what is superfluous.

The *plastic art* is now chiefly used, among us, in fret-work cielings; but the Italians apply it also to the mantlings of chimneys with great figures.

PLAT, a popular term, among *Mariners*, &c. for a sea-chart.

PLAT-*veins*, in the *Manege*, called in French *arts*, are the veins in which we bleed horses, one in the lower part of each shoulder, when we bleed a horse in the shoulders; and in the flat part of the thighs.

PLATS, in a *Ship*, flat ropes made of rope-yarn, and twilled into forms; they serve to save the cable from galling in the hawse, or to wind about the flukes of the anchors, to save the pennant of the sore-sheet from galling against them.

PLATA, PLATE, in *Commerce*, a Spanish term, signifying silver; as vellon, which they pronounce vellion, signifies copper.

These two terms are not only used to express the species of those metals struck in Spain, but also to distinguish between their several monies of account. Thus they say, a DUCAT of *plata*, and a ducat of vellon; a rial of *plata*, and a RIAL of vellon: which denominations augment and diminish the value by almost one half; thirty-four maravedis of *plata* being equal to sixty-three of vellon; and the PIECE *of eight* being only two hundred and seventy-two MARAVEDIS of *plata*, but five hundred and ten of vellon. See COIN.

PLATÆ, a word used by some anatomical writers to express the scapulæ.

PLATALEA, in *Ornithology*. See SPOON-*bill*.

PLATAMON, a word used to express a low and smooth rock, just appearing above water.

PLATANARIA, in *Botany*, a name by which some authors have called the *spargarium*, or bore-reed, from its round echinated fruit, which in shape and size much resemble those of the *platanus*.

PLATANUS, in *Botany*. See PLANE-*tree*.

PLAT-BAND, in *Gardening*, a border, or bed of flowers, along a wall, or the side of a parterre; frequently edged with box, &c.

PLAT-BAND, in *Architecture*, is any flat square moulding, whose height much exceeds its projecture. See *Tab. Architect. fig.* 25.

Such are the faces, or fascia, of an architrave, and the *plat-bands* of the modillions of a cornich.

The *plat-band* is signified in Vitruvius, and others, by the words FASCIA, *taenia*, and *corsa*.

PLAT-BAND of a door or window, is used for the lintel, where that is made square, or not much arched.

These *plat-bands* are usually crossed with bars of iron when they have a great bearing: but it is much better to case them by arches of discharge built over them.

PLAT-BANDS of flutings, the lists, or fillets, between the flutings of columns.

PLATE, in *Commerce*, denotes gold or silver wrought into vessels for domestic uses.

PLATE, in *Heraldry*, is a round, flat piece of silver, without any impression; but, as it were, formed ready to receive it.

The term is used only by the English heralds. In other nations they are known by the name of BESANTS *argent*.

PLATE, a term used by our sportsmen to express the reward given to the best horse at our races.

The winning a *plate* is not the work of a few days to the owner of the horse, but great care and preparation are to be made for it, if there is any great dependence on the success. A month is the least time that can be allowed to draw the horse's body clear, and to refine his wind to that degree of perfection that is attainable by art.

It is first necessary to take an exact view of his body, whether he be low or high in flesh; and it is also necessary to consider whether he be dull and heavy, or brisk and lively, when abroad. If he appear dull and heavy, and there is reason to suppose it is owing to too hard riding; or, as the jockies express it, to some grease that has been disliked in hunting, and has not been removed by sweating, then the proper remedy is half an ounce of diapente, given in a pint of good sack; this will at once remove the cause, and revive the creature's spirits. After this, for the first week of the month, he is to be fed with oats, bread, and fruit beans, giving him sometimes the one, and sometimes the other, as he likes best; and always leaving some in the locker, that he may feed at leisure when he is less alone. When the groom returns at the feeding time, whatever is left of this must be removed, and fresh given; by this means the creature will soon become high spirited, wanton, and full of play. Every day he must be rode out an airing, and every other day it will be proper to give him a little more exercise; but not in such a degree as to make him sweat too much.

The beans and oats in this case are to be put into a bag, and beaten till the hulls are all off, and then winnowed clean; and the bread, instead of being chipped in the common way, is to have the crust clean cut off.

If the horse be in good flesh and spirits when taken up for his month's preparation, the diapente must be omitted; and the chief business will be to give him good food, and so much exercise as will keep him in wind, without over sweating or tiring his spirits. When he takes larger exercise afterwards, towards the end of the month, it will be proper to have some horses in the place to run against him. This will put him upon his mettle, and the beating them will give him spirits.

This, however, is to be cautiously observed, that he has not a bloody heat given him for ten days or a fortnight before the *plate* is to be run for; and that the last heat that is given him the day before the race, must be in his cloaths: this will make him run with greatly more vigour, when stripped for the race, and feeling the cold wind on every part. In the second week the horse should have the same food and more exercise, and in the last fortnight he must have dried oats, that have been hulled by beating; after this they are to be wetted in a quantity of whites of eggs, beaten up, and then laid out in the sun to dry; and when as dry as before, the horse is to have them. This sort of food is very light of digestion, and very good for the creature's wind. The beans in this time should be given more sparingly, and the bread should be made of three parts wheat, and one part beans. If he should become coslive under this course, he must then have some ale and whites of eggs beaten together: this will cool him, and keep his body moist.

In the last week the mash is to be omitted, and barley-water given him in its place; and every day, till the day before the race, he should have his full of hay; then he must have it given him more sparingly, that he may have time to digest it; and in the morning of the race-day, he must have a mash or two of white bread, soaked in sack, and the same just before he is led out of the field. This is an excellent method, because the two extremes of fullness and fasting are at this time to be equally avoided; the one hurting his wind, and the other occasioning faintness that may make him lose. After he has had his food, the litter is to be shook up, and the stable kept quiet, that he may be disturbed by nothing till he is taken out to run. See RACING.

PLATE, in *Gunnery*. The *prize-plates* are two *plates* of iron on the cheeks of a gun-carriage, from the cap-square to the centre, through which the prize-bolts go, and on which the hand-spike rests when it poises up the breech of the piece. *Breast-plates* are the two *plates* on the face of the carriage, one on each cheek. *Train-plates* are the two *plates* on the cheeks at the train of the carriage. *Bulidge plates* are the fixed *plates* on the wheel of a gun-carriage, where the fellows are joined together, and serve to strengthen the bulidges.

PLATES, *copper*, in *Engraving*. See COPPER-*plates*.

PLATES, *ground*, in *Building*. See GROUND-*plates*.

PLATES, *pintle*. See PINTLE.

PLATE-*glass*. See GLASS.

PLATES, *colours of glass*. See COLOURS.

PLATE-*lines*, in the *Manege*, a woven strap, four fathoms long, three fingers broad, and as thick as one. It is used for miling a horse's legs and sometimes for taking him down, in order to facilitate several operations of the farrier. Some improperly give the name of *plate-lines* to a MARTINGALE.

PLATEA, in *Ornithology*, the name of a bird of the long-necked kind, approaching to the nature of the stork and heron, and called in English the SPOON-*bill*.

PLATESSA, in *Ichthyology*, a name by which Ausonius and some other authors have called the paller-fish, or common PLAICE.

PLAT-FOND, in *Architecture*, the same as SOFFIT.

PLAT-FORM, in the *Military Art*, an elevation of earth, a floor of wood or stone, on which cannon is placed to fire on the enemy.

Such are the mounts in the middle of the curtins. On the rampart there is always a *platform*, where the cannon are mounted.

It is made by the heaping up of earth on the rampart, or by an arrangement of mashers, rising insensibly for the cannon to roll on, either in a casemate, or an attack in the outworks.

Plat-forms are generally laid sloping towards the parapet nine or ten inches; this declivity carries off the rain, prevents the gun from recoiling so much when fired as it would do if laid level; and when loaded, it is more easily brought to the embrasure.

In temporary batteries, the *plat-forms* are made of planks laid across ground timbers or sleepers, usually five in number, and kept steady by stakes at each end; there is usually a *plat-form made* to each gun: it is commonly about eighteen feet long, eight feet broad next the parapet, and about fourteen feet broad at the tail, the intermediate spaces between the *plat-forms* serving for the shot and other necessaries. When a *plat-form* is to be laid on marshy ground, first lay a floor or two of fascines; cover these with hurdles, twelve or fifteen feet long, and six or seven broad; on these lay a floor of three or four inches of earth, and therein lay the sleepers, and over them the planks. When a BATTERY is built of stone or brick, the *plat-form* is generally a flat stone-pavement ranging the whole length of the battery: this, on account of its resisting the injuries of the weather for a long time, is to be preferred to planks: but in case of bombardment such a *plat-form* is to be avoided, because the shells will not only break the pavement, but also, by driving about the broken stones, do much mischief to the troops.

All practitioners are agreed, that no shot can be depended on, unless the piece be placed on a solid *plat-form*; for if the *plat-form* shakes with the first impulse of the powder, it is impossible but the piece must likewise shake; which will alter its direction, and render its shot uncertain.

To prevent this accident, the *plat-form* is usually made extremely firm to a considerable depth backwards, so that the piece is not only well supported in the beginning of its motion, but likewise through a great part of its recoil. However, it is sufficiently obvious, that when the bullet is separated from the piece, it can be no longer affected by the trembling of the piece or *plat-form*; and by a very easy computation it will be found, that in a piece ten feet in length, carrying a bullet of twenty-four pounds, and charged with fifteen pounds of powder, the bullet will be out of the piece before it has recoiled half an inch; whence if the *plat-form* be sufficiently solid at the beginning of the recoil, the remaining part of it may be much slighter, since its unsteadiness beyond the first half inch will have no influence on the direction of the shot: and hence a more compendious method of constructing *plat-forms* may be found out. New Princip. of Gunnery, p. 42.

PLAT-FORM, in *Architecture*, is a row of beams, which support the timber-work of a roof, and lie on the top of the wall where the entablature ought to be raised.

PLAT-FORM is also used for a kind of terrace, or broad, smooth, open walk, at the top of a building, from whence we may take a fair prospect of the adjacent country.

Hence an edifice is said to be covered with a *plat-form*, when it is flat at top, and has no ridge.

Most of the oriental buildings are thus covered, as were all those of the ancients. Cæsar was the first among the Romans who procured leave to build his house with a ridge or pinnacle.

PLAT-FORM, in a *Man of War*. See ORLOP.

PLATTASMOS, or πλατασμὸς, *Lalage*, formed from πλατὺς, *wide*, a word used by many authors to express a fault in pronunciation, owing to a person's opening his mouth too wide, and thence speaking indistinctly.

PLATICORIA, formed of πλατὺς, *wide*, and κόρη, *pupil*, a word used by medical writers to express a preternatural dilatation of the pupil of the eye, usually owing to a paralytic disorder.

PLATINA, in *Natural History*, a metallic substance, lately discovered, analogous to the perfect metals, and especially to gold: many of the properties of which it possesses; and, in consequence of modern experiments, supposed to be itself a *perfect* metal.

The name *platina* seems to be a diminution of *plata, silver*, and expresses the most obvious appearance of this body, which is that of a silver-coloured metal in small grains. It is also called *platina de Pinto*, probably because Pinto is the name of some particular district, which affords it; *Juan blanco, white Jack, white regule, white mock metal*, and *diabolus metallorum*, because it was found to be refractory and unmanageable, and, though resembling true metals in aspect and weight, found to elude all attempts for smelting or running it down; and *to blanc, or white gold*, on account of its relation to gold.

PLATINA, *history of*. D'Ulloa is the first writer who mentions *platina* by name. In his voyage to South America, in 1735, and the following years, printed at Madrid, in 1748, speaking of the gold and silver mines of Quito, he relates, that in the territory of Choco there were gold mines which they were obliged to abandon, because the mineral was mixed with *platina*; which he describes as a stone, in hard, that it is not easily broken by a blow upon an anvil; that it is not subdued by calcination; and that it is very difficult to extract the metals it contains, even with much labour and expence.

In 1741, Mr. Charles Wood found some *platina* in Jamaica, which was brought thither from Carthagena; and in his account of it he observes, that the Spaniards have a method of calling it into different kinds of ores, which are common in the Spanish West Indies. But Dr. Lewis has since found, that this calt metal, which has been often confounded with the native or mineral *platina*, is a composition of the true *platina* with some other metallic bodies. Some have supposed that *platina* is the produce of the East as well as West Indies; but this does not appear to be the case. It is undoubtedly obtained from the Spanish West Indies, and in the greatest quantities from the provinces of Quito and Peru.

Soon after the importation of this substance into England, it was found that the Spaniards, having discovered that it sustained all the ordinary trials of gold, possessed nearly the same specific gravity, and rendered gold much less pale than silver, had a method of adulterating gold with it, which was so brittle, that it could not be refined nor applied to any use. And it is said, that, in order to prevent frauds of this kind, the king of Spain ordered the mines that afforded it to be stopped up: but there is now no danger of such fraud, since modern experiments have discovered easy means for distinguishing with certainty gold debased by *platina*, and for completely parting the two metals, however they may be blended together by accident or by design.

The first experiments that were made with this substance, were those of Mr. Wood; one of which, viz. the capellation of the cast metal with lead, was afterwards repeated, more circumspectly, by Dr. Brownrigg, who presented an account of the whole to the Royal Society by Dr. Watson, and the account was published in the Phil. Trans. vol. xliv. art. 12. p. 584, &c.

But we owe the greatest part of our knowledge concerning this substance, to the numerous and accurate experiments of Dr. Lewis, published, in six papers, in the forty-eighth and forty-ninth volumes of the Transactions; and farther pursued in his excellent work, intitled Commercium Philosophico-Technicum.

In 1752, Mr. Scheffer, of the Swedish Academy, published two Memoirs on the same subject; and another, containing remarks on some of the experiments of Dr. Lewis in 1757. A French translation of the four first papers of Dr. Lewis, and the two first Memoirs of Mr. Scheffer, was published at Paris by M. Morin, in 1758, under the title of La Platine, l'Or blanc, ou le huitieme Metal, &c. In consequence of this publication, Messrs. Marggraaf, Macquer, and Baume, directed their attention to this subject; the experiments of the former were first published among the Memoirs of the Berlin Academy, for the year 1757, printed in 1759, and since in the first volume of his Chemical Writings; those of the two latter gentlemen were published in the Memoirs of the Academy of Paris, for 1758, printed in 1763.

Some farther experiments on this singular anomalous substance have been more lately made and published by Messrs. de Buffon, de Lisle, and Morveau. See Buffon's Supplement, vol. ii. and Rozier's Journal for September 1775.

PLATINA, *description and properties of*. *Platina* in grains, as it is brought into England, is of a shining whitish colour, somewhat approaching to that of silver, but less white. Its colour is not tarnished or altered by air or moisture, or by any vapours usually floating in the atmosphere, even by those which discolour silver, and appears to be equally permanent with that of pure gold. As it is incapable of acquiring rust, it is also perfectly indestructible in the fire. The grains are of various sizes; some few being as large as linseed, but most of them much smaller. In figure, some of them are triangular, others circular, but most of them flat, with a smooth surface, and the edges and angles generally rounded off. Some few of the grains are weakly attracted by a magnetic bar.

Dr. Ingenhousz (Phil. Trans. vol. lxvi. part i. p. 262), observes, that every one of the particles of some fine *platina*, which he examined, obeyed the magnet, more or less,

less, except some transparent stony particles; and that even these were all magnets in themselves; or that each particle had two poles, which he could change at pleasure by the application of magnetical bars. In those grains of *platina*, which Dr. Lewis examined, he found an intermixture of several heterogeneous particles: such as a considerable quantity of blackish dust, some particles of which were of a deep sparkling black colour, resembling the black sand of Virginia, and were much attracted by a magnetic bar; and others of a brownish hue, not attracted at all, with which several bright particles, that appeared to be fragments of the grains of the *platina*, were intermixed. The magnetic dust just mentioned seemed to be fragments of other irregular dark-coloured particles, which resembled pieces of emery or lead-stone; some of these were attracted by the magnet very weakly, and others not at all. There were also some rough yellow particles, very malleable, which appeared to be gold, with some mixture of *platina*.

Most of the gold particles of *platina*, says Dr. Ingenhousz, ubi supra, are evidently attracted by the magnet, and discovered upon the surface of the water their two distinct poles; and this magnetical quality he ascribes to some *platina* mixed with the gold.

Dr. Lewis farther observes, that the grains of *platina* consist likewise of a few globules of quick-silver with some particles of the *platina* intermixed, and pretty strongly adhering; which have been also discovered by M. Margraaf. They contain also fine colourless transparent particles which were hard to break under the hammer, and were not sensibly acted upon by aqua fortis, and which are probably fragments of quartz: and a few irregular particles of a jet-black colour, which easily broke, and laid on a red-hot iron emitted a yellowish smoke, and smelt like burning coal.

Dr. Lewis observes, that there is reason to suspect, that this mineral does not come to us in its native form; but that it has probably been ground in mills and worked with quick-silver, in order to extract the particles of gold intermixed with it: and some later accounts confirm this conjecture, that *platina* is found in large masses, and is reduced into smooth grains by stamping and grinding. M. de Buffon expressly says, that a portion of credit had allured him, that *platina* is sometimes found in large masses, and that he had seen a lump of it weighing no less than twenty pounds, which had not been melted, but had been taken in that state out of the mine.

However this be, all the matters above mentioned are entirely adventitious to the *platina*, and their quantities are very various: the magnetic or ferruginous matter being always the most considerable and possibly the only constant admixture.

When we consider the heterogeneous particles with which *platina* is combined, we need not wonder at the different accounts which different writers give of its specific gravity. Dr. Lewis found, by weighing hydrostatically several different particles, that the gravity compared with that of water was very nearly as seventeen to one, never less than 16.500 nor greater than 17.200. Dr. Pemberton and Mr. Ellicott reported it to be about 17; and Dr. Davies found the gravity of a parcel which he tried to be 17.233. M. Margraaf states the gravity of *platina* to that of gold as 18\frac{1}{2} to 19: and Dr. Lewis, having taken previous pains to cleanse and prepare a quantity of the larger grains, in order to come as near as possible to the specific weight of the pure *platina*, found its gravity on many trials to be upwards of eighteen; though the microscope still discovered a portion of blackish matters in the cavities of the grains. These accounts are very different from those which result from the experiments of M. de Buffon, and M. Tillet, who affirm, that *platina* is specifically lighter than gold by at least an eleventh or twelfth part, and that its density is a mean between that of gold and iron.

The great weight of *platina*, Dr. Lewis apprehends, instead of being a proof of its containing gold, affords rather a presumption of its being a ponderous body distinct from gold.

By experiments on this substance, some of the purer grains of it have been found, by gentle strokes of a flat hammer on a smooth anvil, to bear extension into thin plates, without breaking or cracking about the edges; and therefore *platina* appears to be a malleable metal; though different grains seemed to possess this property in a different degree, some being more brittle than others, and all being more brittle when red hot than when cold. The brittleness of those that cracked soonest and were most easily reduced to powder is supposed to proceed from some accidental cause.

As fusion is necessary for the application of metals to use, chemists have made their utmost efforts to melt *platina*. The most violent heat which could be raised in air-furnaces, or by the united action of several large bellows, has been applied repeatedly, and continued a long time without success. In all these trials the grains of *platina* remained unaltered in form and weight, and were only agglutinated to each other, nearly as sand is by exposure to violent heat, but so slightly, that they were separable by the smallest effort.

Messrs. Macquer and Beaumé exposed *platina* during five days and five nights to the greatest heat of a glass-house furnace, which trial did only confirm the unfusibility and unalterability of *platina* by ordinary fires, as it was found to be only a little agglutinated, and its weight to be a little increased; which latter phenomenon has also been observed by Mr. Margraaf and Dr. Lewis. This increase of weight M. Macquer very justly suspects to be owing to the CALCINATION of some heterogeneous substances mixed with the *platina*.

Platina has been also exposed to the fire in contact with the burning fuel, and yet has come out of the crucible unmelted and unaltered in its form. However Messrs. Macquer and Beaumé, having exposed it to the focus of a large burning-glass twenty-two inches diameter, and of twenty-eight inches focus, melted a little of it in a minute. It first smoked, then emitted sparks, and those parts of it melted well which were exposed to the centre of the focus. These chemists carefully examined the properties of this *platina*. The melted parts, they observe, were distinguished from the others by a brilliancy like that of silver, and by a rounded, shining, polished surface. They are easily flattened upon an anvil, and formed into very thin plates without cracking or splitting; so that these grains seemed to be much more malleable than *platina* in its natural state. These metals by repeated strokes of the hammer became hard and brittle, like all other metals, especially gold and silver; and by annealing, their malleability was restored, as that of other metals is also by the same means. It has been also found, that *platina* is fusible by the electric fire; and Dr. Ingenhousz observes, that common fire diminishes the magnetical virtue of *platina*, but that electrical fire increases it. M. de Lisle has lately discovered a method of melting *platina*, by dissolving the crude substance in aqua regia, precipitating it from the acid menstruum by sal ammoniac, and by fusing this precipitate, without addition, in a double crucible, exposed to the intense heat of a large fire, excited by double bellows. M. Morveau has repeated this experiment: from seventy-two grains of *platina* he obtained a regulus, which weighed 50\frac{1}{2} grains, and seemed to have undergone a very imperfect fusion, for it did not adhere to the crucible nor take its form; but seemed to be the *platina* merely revived: its specific gravity also was found to be to that of water no more than as 10.245 to 1; but it was found to be nearly as malleable as silver, and when it had been sufficiently hammered, its specific gravity was found to be to water as 20.170 to 1.

Platina resists as perfectly as gold the action of the vitriolic, marine, and nitrous acids; and, indeed, of any pure acid, however applied. These acids, concentrated or diluted, may be boiled for any length of time upon *platina*, without dissolving an atom of it; but aqua regia, the proper menstruum for gold, is also the solvent of *platina*. M. Macquer having tried different proportions of the nitrous and marine acids, found that an aqua regia, composed of equal parts of the two acids, dissolve most of this metal; but *platina* appears to require a much greater quantity of this solvent, in what way soever it is prepared, than gold, and to dissolve with greater difficulty. The aqua regia, employed by Margraaf consisted of one part of sal ammoniac and sixteen parts of aqua fortis; and one ounce of *platina* required twenty-four ounces of this menstruum: but sixteen ounces of the aqua regia of Macquer dissolved, by digestion, one ounce of *platina*: and Dr. Lewis, preparing an aqua regia by diluting 10\frac{1}{2} ounces of strong smoking spirit of nitre with eight ounces of water, and afterwards the mixture from six ounces of common salt, dissolved one ounce of *platina* with fourteen ounces of the menstruum; but by performing the operation in close vessels, and by distillation and cohobation, a much less quantity of the aqua regia would have been sufficient.

Solutions of *platina* in aqua regia, when saturated with the metal, which requires considerable heat, are of a dark, almost opake, brown-red colour; when only slightly impregnated, they are yellow like those of gold. They communicate a rich tinge to watery fluids, but, according to Dr. Lewis, impart no durable colour or stain to other bodies; in which respect they differ from solutions of gold: though Macquer observes, that, in certain circumstances, they tinge the skin and other animal matters with a blackish-brown colour, and that ether mixed with this solution, by agitation, quickly separates from it, and becomes tinged with a fine yellow colour, as it does with the

the solution of gold: but this fact is contrary to the observation of Dr. Lewis, who affirms, that *platina* is not taken up from its solution in aqua regia by ether. Solutions of *platina* are observed to cryſtallize much more eaſily than thoſe of gold; and the cryſtals are nauſeous, ſlightly acid, and corroſive.

Platina may be precipitated from its ſolvent by fixed and volatile alkalis; the precipitates by volatile alkalis being of a dark kind of red colour, are conſiderably ſparkling, but thoſe of the fixed being of a paler dull reddiſh, with little brilliancy. M. Margraaf has diſcovered, that the mineral alkali produces no precipitation at all. The ſame writer alſo obſerves, that when ſolution of *platina* is mixed and ſaturated with a lixivium of fixed alkali that has been calcined with blood, it yields a fine blue precipitate, which in certain circumſtances proves as beautiful as the beſt *Pruſſian* BLUE: count de Milly has made a ſimilar obſervation, and inferred from it that iron is a conſtituent part of *platina*: but probably the *platina* which theſe gentlemen uſed was impure; more eſpecially as M. Morveau has ſince found, that no Pruſſian blue was formed on the addition of phlogiſticated alkali, if the experiment was made with thoſe particles of the *platina* that were inſenſible to the magnet.

It has ſufficiently appeared by many experiments, that *platina* is not only of itſelf refractory in the fire, but obſtinately reſiſts the additions and managements, by which every other known metallic body is corroded, diſſolved, or changed into a vitreous ſtate. Neither borax, nor alkali, nor nitre, which calcines all the known metallic bodies, except gold, ſilver, and mercury, nor common ſalt, nor vitriolic ſalts, nor the eſſential ſalts of urine, nor the phoſphoric acid, nor the black flux, nor ſulphur, nor earthy bodies, nor vitreous bodies, produce any material alteration in *platina*. However, Dr. Lewis diſcovered that the liver of ſulphur is capable of diſſolving *platina*, as it alſo does gold by fuſion.

Platina, like gold, is capable of being alloyed with all metals, and in theſe alloys exhibits intereſting phenomena. We are indebted to Dr. Lewis for many important facts and obſervations to this purpoſe; the principal of which we ſhall here ſubjoin. *Platina* appears to be capable of amalgamating with mercury, though with difficulty, and after long trituration in a ſolution of common ſalt with water, and a few drops of ſpirit of ſalt; part of it being diſſolved by the mercury, and the undiſſolved parts coated with it. Equal parts of *platina* and biſmuth being dropped into a mixture of black flux, and common ſalt fuſed in a crucible, and being urged with a quick fire ſtrongly excited by bellows, melted together in a few minutes; and the *platina* was ſo blended with the biſmuth, that no grain of it could be ſeen. All the compoſitions of *platina*, with different proportions of biſmuth, were extremely brittle; and on expoſure to the air changed from a dull greyiſh colour to a yellowiſh, purpliſh or bluiſh, and at length to a purpliſh black.

Platina may be melted with tin in the ſame manner, in all proportions, from equal parts of the two metals to twenty-four of tin; and it appears from ſeveral alloys of this kind, that *platina* diminiſhes the malleability of tin, renders its texture coarſer, and debaſes or darkens its colour more or leſs, as the *platina* is in greater or leſs proportion. And the malleability poſſeſſed by both metals ſeparately, is deſtroyed by their combination, when the *platina* is about one-third of the tin, or upwards.

Lead alſo may be alloyed in different proportions with *platina*, nearly as tin may; with this difference, that a much greater fire is neceſſary for the formation of this latter alloy, eſpecially when the quantity of *platina* is great. The metal, reſulting from it, has a leafy or fibrous texture, and a dark colour, ſomewhat approaching to a purple or blue; or it has a diſpoſition to acquire theſe colours freedily in the air, and changes at length into black. When the two metals, fuſed together, are left in a crucible to cool, a conſiderable part of the *platina* ſeparates, and falls to the bottom.

Platina alſo melts with arſenic, as Scheffer obſerved, and Dr. Lewis has confirmed; but leſs perfectly than with other metals; but it is next to impoſſible to fuſe it ſufficiently, in order to its being poured out into a mould. All the arſenicated pieces are very brittle, internally of a greyiſh colour, and a looſe granulated texture; and they retain the ſame appearance for many years.

Of all metallic matters zinc may be moſt eaſily alloyed with *platina*, and moſt effectually diſſolved by fuſion. Dr. Lewis obſerved, that theſe alloys did not appear very different from pure zinc; but that when the proportion of *platina* is conſiderable, their grain is cloſer, their colour is leſs clear, and more bluiſh than that of zinc. They do not tarniſh, nor change colour, by expoſure to air; and they are harder than zinc, and have not the malleability of this ſemi-metal. With regulus of antimony, *platina* formed a darker and harder compound than the pure regulus.

Silver and *platina* may be melted and alloyed together in equal parts with a very violent fire. The alloy, thus formed, is much harder and darker-coloured than ſilver, and of a large grain, although it preſerves ſome ductility. Theſe qualities are leſs ſenſible when one part of *platina* is added to ſeven parts of ſilver; but this alloy is ſtill coarſer grained and leſs white than ſilver. This coniſtence of grain ſhews an imperfect union; and, indeed, ſilver and *platina* do not ſeem to unite very perfectly; for Dr. Lewis obſerves, that when the alloy of theſe two metals was left, after fuſion, in the crucible, a conſiderable part of the *platina* was ſeparated, and ſunk to the bottom. The *platina* did not appear to communicate any good quality to the ſilver, excepting a greater hardneſs. Gold and *platina* may be combined in various proportions, with conſiderable heat; and from ſeveral experiments Dr. Lewis concludes, that *platina* diminiſhes the malleability of gold much leſs than it does that of the other malleable metals; and infinitely leſs than lead, tin, iron, and the brittle metals do that of gold; that in conſiderable proportions it debaſes the colour of gold far more than the uſual alloy, communicating a peculiar and remarkably ill colour; and that it both hardens and debaſes the colour of ſtandard gold, with copper alloy, much more than fine gold; that in ſmall proportions, as one forty-ſeventh and downwards, it does not ſenſibly injure either the colour or malleability of gold, and conſequently, that large proportions of *platina* mixed with gold, are diſcoverable at ſight; but that ſmall proportions, if perfectly united with the gold, will not betray themſelves either to the eye, or in the workman's hands. Copper ſeems to be moſt improved by being alloyed with *platina*. When, indeed, a large proportion of *platina* is added to copper, as equal parts or two-thirds, the alloy is hard, brittle, and coarſe; but when a leſs quantity of *platina* is added, as from $\frac{1}{3}$ to $\frac{1}{12}$, or even leſs, a golden-coloured copper is produced, very malleable, harder, ſuſceptible of a finer poliſh, ſmoother grained, and much leſs ſubject to calcination and ruſt than pure copper. Dr. Lewis was not able to fuſe forged iron with *platina*, but he alloyed *platina* with caſt IRON, by throwing one part of *platina* to four parts or more of the iron, when it was juſt beginning to flow.

This alloy was much harder, and much leſs ſubject to ruſt, than pure iron, and ſuſceptible of a very fine poliſh. The ſame ingenious philoſopher combined *platina* at the ſame time with two metallic matters, ſuch as braſs compoſed of copper and zinc, and bronze compoſed of copper and tin. The latter alloy was hard, and capable of receiving a fine poliſh; equal parts of *platina* and braſs formed a compound very hard and very brittle, capable of receiving a very fine poliſh, and not ſubject to tarniſh. This metal might be advantageouſly employed for the ſpecula of teleſcopes.

The cupellation of *platina* was one of the moſt deſirable diſcoveries with regard to this ſubſtance; becauſe on the ſucceſs of this operation depended our obtaining compact and malleable maſſes of pure *platina*, in the ſame ſtate with a metal which has been well *fuſed*, and of which all ſorts of utenſils might be made, either by caſting or forging. Dr. Lewis made many unſucceſsful experiments with this view; the proceſs of cupelling with lead went on well at firſt, but as the quantity of lead diminiſhed, the matter became leſs fuſible, and required a ſtronger fire, till at laſt it could not, with the greateſt degree of heat, be made to flow at all. The regulus obtained was always dark-coloured, rough, and brittle, and weighing more than the *platina* originally employed. Meſſrs. Scheffer and Margraaf were equally unſucceſsful with Dr. Lewis; Meſſrs. Macquer and Beaumé tried what might be effected by a long duration of fire, and, therefore, they kept the matter expoſed to a violent fire for about fifty hours, and in this way they obtained *platina*, which, though tarniſhed and rough in its ſurface, was entirely white and ſhining, eaſily ſeparable from the cupel, and a little diminiſhed in weight, which afforded a certain proof that no lead remained in it. This *platina* was alſo ductile, and capable of extenſion under the hammer. Dr. Lewis purſuing the ſame kind of proceſs, and uſing vehement fires for twenty hours or more, ſucceeded in obtaining *platina*, ſo much diſengaged from the lead, as to be malleable; but he obſerves that the ſucceſs of the operation very much depends upon ſpreading the metal thin upon the bottom of the cupel; the thinner the metalline plates, the ſooner and the more effectually were they freed from the lead, and rendered malleable. How far, he ſays, the diſſipation of lead or biſmuth may be practicable on maſſes of a conſiderable thickneſs, his experiments have not abſolutely determined. M. Macquer ſeems to make no doubt that *platina*

this may thus be rendered manageable by the workmen in large quantities, so as to furnish us with burning concaves, specula for reflectors, innumerable vessels and utensils for chemical and culinary uses, and almost all the works of the locksmith. He observes, that *platina* would for these purposes be an excellent material, as its vivid and brilliant polish is never tarnished by any kind of vapour, and as it not only resists the action of air, water, fire, acids, and the voracious metals as well as the purest gold does, but joins to these admirable qualities a property still more precious, which gold wants, viz. the force and hardness of iron.

The affinities of *platina*, as stated by Dr. Lewis, are as follow; observing, that the body placed uppermost is always understood to have a greater affinity to that which is immediately under it than to the third or lowermost.

1. Mercury.	2. Mercury.	3. *Platina.*	4. Aqua regia.	5. Aqua regia.
Platina.	Gold.	Lead.	Zinc.	Iron.
Lead.	*Platina.*	Iron.	Cobalt.	*Platina.*

6. *Platina.*	7. Aqua regia.	8. Aqua regia.	9. Aq. regia.	10. Aqua regia.
Aqua regis, and solution of iron from vitriol	Copper.	Tin.	Mercury.	Nickel.
Gold.	*Platina.*	*Platina.*	*Platina.*	*Platina.*

One of the most important advantages hitherto obtained from the experiments made upon this metal, is that of preserving the fineness and value of gold, and preventing it from being fraudulently debased by the admixture of a body so much resembling itself. The principal methods of alloying any mixture of *platina* and gold, and of separating them from one another, are as follow: the first is by *cupelling a mixture of platina* and gold with mercury, and grinding the amalgam for a considerable time with water, in which process the *platina* will be gradually thrown out, and the gold retained by the quicksilver. Another method is by mixing a few drops of a solution of *platina* with above a hundred times the quantity of a solution of gold, and gradually adding a pure fixed alkaline salt as long as it occasions any effervescence or precipitation. The remaining liquor in this case will be so yellow, that it has been judged the *platina* would discover itself, though its proportion had been less than a thousandth part of that of *gold*. A *third* mode of separating *platina* and gold is that of precipitation, by means of mineral fixed alkali; for when this alkali is mixed with a solution of gold containing *platina*, the gold alone is precipitated, and all the *platina* remains dissolved. Another method is by precipitation of the *platina* with sal ammoniac: for this purpose to a solution of the metal in aqua regia, add a small quantity of the solution of sal ammoniac in water; and if the gold contained any *platina*, the liquor will instantly grow turbid, and a fine yellow or reddish precipitate will quickly fall to the bottom; if the gold were pure, no precipitation or change of transparency would ensue. The *fifth* method of separation is by means of inflammable liquors: let the compound to be examined be dissolved in aqua regia, the solution mingled with twice its quantity or more of rectified spirit of wine, and the mixture suffered to stand for some days in a glass slightly covered, the gold will rise to the surface, leaving the *platina* dissolved. Otherwise, add to the solution of the metal in aqua regia about half its quantity of any colourless essential oil; shake them well together, and suffer them to rest, the oil will rise immediately to the surface, carrying the gold with it, and leave the *platina* dissolved in the acid under it. Or, the gold may be taken up still more readily and more perfectly by ether, or the ethereal spirit of wine. But after all, the most effectual and advantageous method of purifying GOLD from the metallic bodies commonly found mixed with it appears to be by dissolving it in aqua regia, and precipitating with a large proportion of a filtered solution of green vitriol: the same process serves for purifying it from *platina*; the vitriolic solution precipitating the gold, and leaving the *platina* dissolved. This property, which *platina* possesses, of being precipitated by green vitriol, was first discovered by Mr. Scheffer.

From all the preceding properties of *platina*, and other circumstances enumerated by Dr. Lewis, Scheffer, Margraaf, Macquer, Bewme, &c. we may infer, that *platina* is a mineral substance, whose metallic aspect, great weight, malleability, and perfect infusibility with all the common metallic bodies, are sufficient characters of its being a true metal; which abides fixed and unalcined in the strongest fires, is no wise ironified by nitre, or by lead or bismuth, nor dissolved by vitreous bodies, and which is, therefore, a perfect metal of the same class with gold and silver, and, perhaps, more perfect or less alterable than these; which with the colour of silver, possesses the specific weight and several other of the most discriminating properties of gold; resisting, equally with gold, many agents, which dissolve, corrode, dissolve, or scorify silver, and the base metals, as air and sulphureous exhalations, the nitrous, marine, and vitriolic acids, both in their liquid state, and when resolved by fire into fume, and sulphur and antimony in fusion. With these valuable properties, it adds some to gold itself, making it both less soft and less fusible, which no other alloy does; so that some a due proportion of it bids fair to remove those inconveniencies, which the enamellers complain of, when they work upon plates either of fine gold or of alloyed gold. But, though *platina* undoubtedly belongs to the same genus of bodies with gold and silver, of which genus no more than these three species have been hitherto discovered; and though it agrees with gold in many of its distinctive properties, yet there are other important characters in which it remarkably differs from gold. Its white colour; its want of fusibility; the singular alterations which it produces in some of the other metals, and in gold itself; its being difficultly and sparingly acted upon by hepar sulphuris, by which gold is plentifully dissolved; its solution in aqua regia giving no stain to the substances which by solutions of gold are tinged red or purple; its being in part precipitated from its solution by sal ammoniac, which does not in the least precipitate gold; its being precipitated only partially by vegetable fixed alkalis, and by volatile alkalis, and not in the least by the mineral alkalis, or by solution of green vitriol, by all which gold is precipitated entirely; its precipitates by alkalis having nothing of the fulminating power, which precipitates of gold possess in a more eminent degree than any other known kind of matter; its solutions in aqua regia suffering no decomposition from essential oils or ether, by both which gold is imbibed from the acid, not from inflammable spirits, by which gold is revived and thrown out in its proper form; its being rejected, on infusion, from its solution in quicksilver, while gold is retained and continues dissolved; its being separable from gold, in virtue of these distinctions of affinity, without augmentation or diminution of either metal, as easily and as perfectly as any one metal is separable from any other, are characters abundantly more than sufficient for establishing a specific difference between *platina* and gold. However, there are some authors who still maintain, that *platina* is not a true metal, or semimetal, of a peculiar kind: Vogel apprehends that it is a mixed mineral; the dross of the small amalgam-works in which gold is separated by quicksilver from a mixed ore. De Bonon supposes *platina* to be a compound of gold and iron, such as would result from a combination of these metals in the proportion of three-fourths of the former to one of the latter, formed by the action of some volcano, or by the water which has forced upon those two metals in a state of dissolution, and united them in the form under which they actually appear in *platina*. The principal arguments he alledges in favour of this hypothesis are, that *platina* has neither the ductility nor malleability that constitute the character of all metals; that its specific gravity is less than others have supposed, and that the ferruginous sand, which is so abundant in all the specimens of *platina*, is not peculiar to that substance, or to the mines from which it is taken, as he has found a matter of the same nature, though in very small quantities, in several iron mines. Supplement, *ubi supra*. See on the subject of this article D'd. Chem. art. *Platina*, and particularly the complete history and analysis of it by Dr. Lewis in his Commercium Philosophico-Technicum, &c. p. 443—612.

PLATONIA, in *Natural History*, a name given by the modern Greeks to the *pyxe* of Aristotle, and of other ancient writers in that language. This is the *ornus platyceros*, or broad-horned flag. Some have translated this *ilama*, but they are to be understood in this as meaning the *ilama* of their own times, not that of the ancients; that being the *isarus*, or chamois-goat, not any animal of the flag kind, nor by any means meriting that title.

PLATONIC, something that relates to Plato, his school, philosophy, opinions, or the like.

PLATONIC *bodies* are the same with what we otherwise call REGULAR *bodies*.

PLATONIC *love* denotes a pure spiritual affection, subsisting between the different sexes, abstracted from all carnal appetites, and regarding no other object but the mind, and its beauties: or it is even a sincere disinterested friendship, subsisting between persons of the same sex, abstracted from any selfish views, and regarding no other object but the person.

The term took its rise from the philosopher Plato, a strenuous advocate for such kind.

The world has a long time laughed at Plato's notions of love and friendship. In effect, they appear airy chimeras, contrary to the intentions of nature, and inconsistent with the great law of self-preservation; which love and friendship are both ultimately resolvable into.

PLATONIC *year*, or the *great year*, is a period of time determined by the revolution of the equinoxes, or the space wherein the ſtars and conſtellations return to their former places, in reſpect of the equinoxes.

The *Platonic* year, according to Tycho Brahe, is 25816; according to Ricciolus, 35920; and according to Caſſini, 24800 years.

This period, which is more than five times the age of the world, once accompliſhed, it was an opinion among the ancients, that the world was to begin anew, and the ſame ſeries of things to return again.

PLATONISM, the doctrine and ſentiments of Plato, and his followers, with regard to philoſophy, &c.

The founder of this ſyſtem of philoſophy, Plato, the ſon of Ariſto, was an Athenian, related by his father to Codrus, and by his mother to Solon; born on the ſeventh of Thargelion, in the eighty-ſeventh Olympiad, about the year of the world 3625, who, after having ſpent his youth in exerciſes of the body, painting, poetry, rhetoric, and muſic, became a diſciple of Socrates. After his maſter's death, he applied himſelf to Cratylus and Hermogenes; till, being a maſter of the Greek philoſophy, he travelled into Italy, where he learnt alſo that of the Pythagoreans. Thence he proceeded into Egypt; where, in ſeveral years reſidence, he became fully acquainted with the ſecrets of the Egyptian prieſts.

At his return to Athens he began to teraſh the flock of learning he had collected, among his countrymen; philoſophizing daily in the Academy, a delicious villa in the neighbourhood of that city. And hence his diſciples, among whom were Xenocrates, Ariſtotle, Lycurgus, Demoſthenes, and Iſocrates, were called *Academics*. In phyſics, he chiefly followed Heraclitus; in ethics and politics, Socrates; and in metaphyſics, Pythagoras.

After his death, at the age of eighty-one years, two of the principal of his diſciples, Ariſtotle and Xenocrates, continuing his office, and teaching, the one in the Academy, the other in the Lyceum, formed two ſects, under different names, though, in other reſpects, the ſame; the one retaining the denomination of ACADEMICS, the other aſſuming that of PERIPATETICS.

In after-times, about the firſt ages of the Chriſtian church, the followers of Plato quitted the title of *Academiſts*, and took that of *Platoniſts*.

It is ſuppoſed to have been at Alexandria, in Egypt, that they firſt aſſumed their new title, after having reſtored the ancient academy, and re-eſtabliſhed Plato's ſentiments; which, in proceſs of time, had many of them been laid aſide.

Porphyry, Plotin, Iamblichus, Proclus, and Plutarch, are thoſe who acquired the greateſt reputation among the Greek Platoniſts; and, among the Latins, Apulcius and Chalcidius. Among the Hebrews, Philo Judæus. The modern Platoniſts own Plotin the founder, at leaſt the reformer, of their ſect.

The *Platonic philoſophy* appears very conſiſtent with the Moſaic; and a great party of the primitive fathers follow the opinions of that philoſopher, as being favourable to Chriſtianity. Juſtin is of opinion, that Plato could not learn many things which he has ſaid in his works, from mere natural reaſon; but thinks he might have learnt them from the books of Moſes, which he might have read when in Egypt.

Hence Numenius the Pythagorean expreſly calls Plato the *Attic Moſes*, and upbraids him with plagiariſm; becauſe he ſtole his doctrine about the world and God from the books of Moſes.

Theodoret ſays expreſly, that he has nothing good and commendable about the Deity, and his worſhip, but what he ſtole from the Hebrew theology; and Clemens Alexandrinus calls him the *Hebrew philoſopher*.

Gale is very particular in his proof of the point, that Plato borrowed his philoſophy from the Scriptures, either immediately, or by means of tradition; and, beſide the authority of the ancient writers, he brings ſome arguments from the thing itſelf. As, e. gr. Plato's confeſſion, that the Greeks borrowed their knowledge of the one infinite God, from an ancient people, better and nearer to God than they; by which people, our author makes no doubt, he meant the Jews, from his account of the ſtate of innocence; as, that man was born of the earth, that he was naked, that he enjoyed a truly happy ſtate, that he converſed with brutes, &c. In effect, from an examen of all the parts of Plato's philoſophy, phyſical, metaphyſical, and ethical, this author finds, in every one, evident characters of its ſacred original.

As to the manner of the creation, Plato teaches, that the world was made according to a certain exemplar, or idea, in the divine Architect's mind. And all things in the univerſe, in like manner, he ſhews, do depend on the efficacy of eternal ideas. This ideal world is thus explained by Didymus: "Plato ſuppoſes certain patterns, "or exemplars, of all ſenſible things, which he calls "ideas; and, as there may be various impreſſions taken "off from the ſame ſeal, ſo, he ſays, are there a vaſt "number of natures exiſting from each idea." This idea he ſuppoſes to be an eternal eſſence, and to occaſion the ſeveral beings in nature to be ſuch as itſelf is. And that moſt beautiful and perfect idea, which comprehends all the reſt, he maintains to be the world.

Farther, Plato teaches that the univerſe is an intelligent animal, conſiſting of a body and a ſoul, which he calls *θεον γενητον, the generated God*, by way of diſtinction from the ἀιδιον, or immutable eſſence, who was the cauſe of the generated God, or the univerſe.

According to Plato, there were two ſorts of inferior and derivative gods; the mundane gods, all of which had a temporary generation with the world; and the ſupramundane eternal gods, which were all of them, one excepted, produced from that one, and dependent on it as their cauſe. It is obſerved by the learned Dr. Cudworth, that though ſome of the ancient fathers impute to Plato the opinion, that matter was an unmade ſelf-exiſtent being, there ſeems to be no ſufficient ground for their ſo doing; and Porphyry, Iamblichus, Proclus, and other Platoniſts, do not only profeſſedly oppoſe the ſame as falſe, but alſo as that which was diſſonant from Plato's principles. However, he acknowledges, that Plato did aſſert a plurality of gods, meaning animated or intellectual beings, or dæmons, ſuperior to men, to whom honour and worſhip are due, and applying the appellation to the ſun, moon, and ſtars, and alſo to the earth. Nevertheleſs he aſſerts, at the ſame time, that there was one ſupreme God, the ſelf-originated being, the maker of the heaven and earth, and of all thoſe other gods. He alſo maintains, that the Pſyche, or univerſal mundane ſoul, which is a ſelf-moving principle, and the immediate cauſe of all the motion which is in the world, was neither eternal nor ſelf-exiſtent, but made or produced by God in time; and above this ſelf-moving Pſyche, but ſubordinate to the ſupreme Being, and derived by emanation from him, which he calls τὸ ὂν, and τ' ἀγαθὸν, the *good*, he ſuppoſes an immoveable Nous or intellect, which was properly the Demiurgus, or former of the world.

The firſt matter whereof this body of the univerſe was formed, he obſerves, was a rude indigeſted heap, or chaos: now, adds he, the creation was a mixed production; and the world is the reſult of a combination of neceſſity and underſtanding, i. e. of matter, which he calls neceſſity, and the divine wiſdom: yet ſo that mind doth rule over neceſſity; and to this neceſſity he aſcribes the introduction and prevalence both of moral and natural evil; maintaining, however, that the evils reſulting from the neceſſity of imperfect beings are over-ruled by Mind or God for good.

The principles, or elements, which Plato lays down, are fire, air, water, and earth.

He ſuppoſes two heavens, the *empyreum*, which he takes to be of a fiery nature, and to be inhabited by angels, &c. and the *ſtarry* heaven, which he teaches is not adamantine, or ſolid, but liquid and ſpirable.

With regard to the human ſoul, Plato maintained its tranſmigration, and conſequently its future immortality and pre-exiſtence. He aſſerted, that human ſouls are here in a lapſed ſtate, and that ſouls ſinning ſhould fall down into theſe earthly bodies. Euſebius expreſly ſays, that Plato held the ſoul to be ungenerated, and to be derived by way of emanation from the firſt cauſe.

His phyſics, or doctrine *de corpore*, is chiefly laid down in his Timæus, where he argues on the properties of body in a geometrical manner; which Ariſtotle takes occaſion to reprehend in him. His doctrine *de mente* is delivered in his tenth book of Laws, and his Parmenides.

St. Auguſtine commends the *Platonic philoſophy*; and even ſays, that the *Platoniſts* were not far from Chriſtianity. He adds, that the generality of the new *Platoniſts* of his time embraced the faith; and he expreſly acknowledges, that it was by means of the Platonic ſyſtem he was able to underſtand the doctrine of the trinity. Juſtin Martyr profeſſes, that Plato's doctrine was of the utmoſt advantage to him, in helping him to believe the myſteries of the Chriſtian faith. To which it may be added, that it was, in good meaſure, by Plato's help, that Origen confuted Celſus.

Indeed, the late author of Platoniſme Devoile carries things to an extravagant length, when he contends, that the dogmata of our religion are only the opinions of Plato; that the fathers give us nothing of the myſteries thereof, but what they learnt from him; and that Chriſtianity is only *Platoniſm* veiled, or covered over. To which opinion, however, M. le Clerc ſeems alſo a little inclined.

It is certain, that most of the celebrated fathers were Platonists, and borrowed many of their explanations of scripture from the Platonic system. In order to account for this fact, we may observe, that, towards the conclusion of the second century, a new sect of philosophers, called the modern, or later Platonics, arose of a sudden, spread with amazing rapidity through the greatest part of the Roman empire, swallowed up almost all the other sects, and proved extremely detrimental to Christianity. The school of Alexandria in Egypt, instituted by Ptolemy Philadelphus, renewed and reformed the Platonic philosophy. The votaries of this system distinguished themselves by the title of Platonics, because they thought that the sentiments of Plato, concerning that most noble part of philosophy, which has the Deity and things invisible for its objects, were much more rational and sublime than those of the other philosophers. This new species of *Platonism* was embraced by such of the Alexandrian Christians as were desirous to retain, with the profession of the Gospel, the title, the dignity, and the habit of philosophers. Ammonius Saccas was its principal founder, who was succeeded by his disciple Plotinus, as he was by Porphyry, the chief of those formed in his school. From the time of Ammonius until the sixth century, this was almost the only system of philosophy that was publicly taught at Alexandria. It was brought into Greece by Plutarch, who renewed at Athens the celebrated Academy, from whence issued many illustrious philosophers. The general principle on which this sect was founded, however the partizans of it might differ with respect to particular opinions, was, that truth was to be pursued with the utmost liberty, and to be collected from all the different systems in which it lay dispersed. None, however, who were ambitious to be ranked among these new Platonists, called in question the main doctrines; those, for example, which regarded the existence of one God, the fountain of all things; the eternity of the world; the dependance of matter upon the Supreme Being; the nature of souls; the plurality of gods; the method of interpreting the popular superstitions, &c.

In the fourth century, under the reign of Valentinian, a dreadful storm of persecution arose against the Platonists; many of whom, being accused of magical practices, and other heinous crimes, were capitally convicted. In the fifth century Proclus gave new life to the doctrine of Plato, and restored it to its former credit in Greece; with whom concurred many of the Christian doctors, who adopted the Platonic system. The Platonic philosophers were, in general, opposers of Christianity; but in the sixth century, Chalcidius gave the pagan system an evangelical aspect; and those who, before it became the religion of the state, ranged themselves under the standard of Plato, and repaired to that of Christ, without any considerable change of their system. Under the emperor Justinian, who issued a particular edict, prohibiting the teaching of philosophy at Athens, which edict seems to have been levelled at modern *Platonism*, all the celebrated philosophers of this sect took refuge among the Persians, who were, at that time, the enemies of Rome; and though they returned from their voluntary exile, when the peace was concluded between the Persians and Romans, A. D. 533, they could never recover their former credit, nor obtain the direction of the public schools. Thus, says Mosheim, expired that famous sect, which was distinguished by the title of the modern or later Platonics, and which, for a series of ages, had produced such divisions and tumults in the Christian church, and which had been, in other respects, prejudicial to the interests and progress of the Gospel. For a further account of this sect, see ECLECTICS.

Platonism, however, prevailed among the Greeks, and was by them, and particularly by Gemistius Plethon, introduced into Italy, and established, under the auspices of Cosmo de Medicis, about the year 1439; who ordered Marsilius Ficinus to translate into Latin the works of the most renowned Platonists.

PLATONISTS. See PLATONISM, and ACADEMICS.

PLATOON, or PLOTTOON, formed, by corruption, of the French *peloton*, a *button*, or *clue of thread*, in *War*, a small body of men, drawn out of a battalion of foot, and placed between the squadrons of horse, to sustain them; or in ambuscades, straits, and defiles, where there is not room for whole battalions, or regiments.

Platoons are also used when they form the hollow square, to strengthen the angles.

The grenadiers are generally posted in *platoons*.

A battalion is generally divided into fifteen *platoons*, exclusive of the grenadiers, which form two or four *platoons* more, as occasion may require.

PLATOON *firing*. See FIRING.

PLATTS, on *Board a Ship*. See PLATE.

PLATYCEROS *ovis*, in *Natural History*, the name given by Gesner and some others to a species of sheep, commonly called *ovis laticauda*, or the broad-tailed SHEEP.

PLATYOPHTHALMON, a name given by some to antimony, from its use among the ladies of old time, to make their eye-brows broad and black.

PLATYRYNCHOS, in *Ichthyology*, a name given by some to the NASUS, or *nose*, a fresh water fish, caught in the Danube, and most of the large rivers in Germany, and much resembling the chub.

PLATYSMA *myoides*. See MUSCLE.

PLATYSTERNOS, a word used by the old physicians to express a person with a very broad chest or sternum.

PLAUSUS, among the Romans. See ACCLAMATION.

PLAY, *ludus*. See GAME, and GAMING.

PLAY, in the *Doctrine of Chances*, is used for the probability of the play's ending in a given number of games.

PLAY, in *Poetry*, &c. See DRAMA, TRAGEDY, COMEDY, &c.

PLAY-HOUSE. See THEATRE, AMPHITHEATRE, &c.

The most ancient English *play-houses* were the Curtain in Shoreditch, and the Theatre. In the time of Shakspeare, who commenced a dramatic writer about the year 1592, there were no less than ten theatres open, four private houses, and six that were called public theatres. Most, if not all of Shakspeare's *plays*, were performed either at the Globe, which was an hexagonal building, partly open to the weather, and partly covered with reeds, on the southern side of the river Thames, called the Bankside, and a public theatre, where they always acted by day-light; or at the theatre in Black-friars, which was a private *play-house*, and where plays were usually represented by candle-light. Both these belonged to the same company of comedians, viz. his majesty's servants, which title they assumed after a licence had been granted to them by king James, in 1603; having before this time been called the servants of the lord chamberlain. The exhibitions at the Globe seem to have been calculated chiefly for the lower class of people, and those at Black-friars for a more select and judicious audience. The former was a summer, and the latter a winter theatre. Many of our ancient dramatic pieces were performed in the yards of carriers' inns, in which, in the beginning of queen Elizabeth's reign, the comedians, who then first united themselves in companies, erected an occasional stage. The form of these temporary *play-houses* seems to be preserved in our modern theatre. Many circumstances concur to render it probable, that our ancient theatres, in general, were only furnished with curtains, which opened in the middle, and a single scene composed of tapestry, sometimes ornamented with pictures. In the year 1605 Inigo Jones exhibited an entertainment at Oxford, in which moveable scenes were used; but they were not then used in the public theatres. When Sir William Davenant first opened, by virtue of his patent, the duke of York's theatre in Lincoln's Inn fields, in the spring of the year 1662, with one of his own plays, the Siege of Rhodes, then scenes made their first appearance upon the English stage; and about the same time actresses were also introduced, probably by him, in imitation of the foreign theatres; and Mrs. Perserton is said to have been the first woman that appeared on the English stage. Before this time, female characters were represented by boys or young men. In the time of Shakspeare plays began at one o'clock in the afternoon, and the exhibition was usually finished in two hours; and so late as 1667, they commenced at three o'clock. See Malone's Supplemental Observations to Steevens's edition of Shakspeare.

If any persons shall in *plays*, &c. jestingly or prophanely use the name of God, they shall forfeit 10*l.* 3 Jac. I. cap. 21. And players speaking any thing in derogation of religion, &c. are liable to forfeitures and imprisonments. 1 Eliz. Also acting plays or interludes on a Sunday is subject to penalties, by 1 Car. I. cap. 1. No person shall act any new *play*, or addition to an old one, &c. unless a true copy thereof, signed by the master of the *play-house*, be sent to the lord chamberlain fourteen days before it be acted, who may prohibit the representing any stage play; and persons acting contrary to such prohibitions shall forfeit 50*l.* and their licences, &c. Stat. 10 Geo. II. cap. 28. And by this statute, no licence is to be given to act plays, but in the city and liberties of Westminster, or places of his majesty's residence. Ibid.

PLEA, *placitum*, in *Law*, that which either party alledgeth for himself in court, in a cause then depending to be tried.

Pleas are either *of the crown*, or *common pleas*.

PLEAS *of the crown* comprehend all crimes and misdemeanors in which the king, on behalf of the public, is the plaintiff.

plaintiff. Such are treasons, felonies, misprisions of either, and trespass.

Pleas, common, include all civil actions depending between subject and subject. The former of these were the proper object of the jurisdiction of the court of king's bench; the latter of the court of common *pleas*.

Pleas are of two sorts; viz. DILATORY *pleas*, and *pleas to the action*.

Dilatory *pleas* are such as tend merely to delay or put off the suit, by questioning the propriety of the remedy, rather than by denying the injury. And they are, to the jurisdiction of the court, called foreign *pleas*, or, to the disability of the plaintiff, and in ABATEMENT.

Pleas to the action are such as dispute the very cause of suit.

Pleas of this kind are general to the declaration, or a special *plea*, in bar. A general *plea* traverses, thwarts, and denies at once the whole declaration, without offering any special matter whereby to evade it. Thus, in debt on contract, it is, *He owes nothing*; in debt on bond, *It is not his deed*, or *He paid it at the day*; in action of the case upon a promise, *He hath not promised*; in trespass upon the case, *Not guilty*; in covenant, *Performance of covenants*, &c. In real actions, *No wrong done*. *No disseisin*; and in a writ of right, *That the tenant hath more right to hold than the demandant has to demand*. These *pleas* are called the general issue, because they amount at once to an issue, or a fact affirmed on one side, and denied on the other. A special *plea* contains the matter at large, concluding to the declaration or action; and special *pleas* are many, as by *durefs* and *per minas*, and in JUSTIFICATION, that in assault and battery, the plaintiff struck the first blow, &c. In trespass, that the defendant did the thing complained of in right of some office which warranted him to do; or, in an action of slander, that the plaintiff is nearly as bad a man as the defendant call'd he was.

Special *pleas* in answer to the plaintiff's declaration are of two kinds; *pleas* in bar, and in abatement; and every *plea* must be pleaded either in bar, to the action brought, or in abatement of the writ; upon which the action is framed, or it is but a discourse, and not a *plea*.

PLEAS, in *Equity*, may be either to the jurisdiction, shewing that the court has no cognizance of the cause; or to the person, shewing some disability in the plaintiff, as by outlawry, excommunication, and the like; or in bar, shewing some matter wherefore the plaintiff can demand no relief, as an act of parliament, a fine, a release, or a former decree. And the truth of this *plea* the defendant is bound to prove, if not upon it by the plaintiff.

PLEAS *of the forest*. Ranulph earl of Chester, 2 Hen. III. granted to his barons of Cheshire an ample charter of liberties, *exceptis placitis ad gladium meum pertinentibus*. The reason of the exception was, that William the Conqueror gave the earldom of Chester to his half-brother Hugh, commonly called Lupus, ancestor of this Ranulph, *sicuti sui liberi ad gladium, sicut ipse rex tenuit de forestâ & coronâ*.

Accordingly, in all indictments for felony, murder, &c. in the county palatine, the form was, *Contra pacem domini comitis, gladium & dignitatem suam*; or, *contra dignitatem gladii Cestriæ*. Such were the *pleas* for the dignity of the earl of Chester.

PLEAS, *court of common*, called also common bench. See COURT *of common pleas*.

PLEADING, *placitatio*, a discourse spoken at the bar, in defence of the cause of a party.

From the time of the Conquest, all *pleadings* was performed in French, till the time of Edward III. when it was appointed, that the *pleas* should be *pleaded* in English, but that they should be entered, or recorded, in Latin. But now by 4 Geo. II. cap. 26. it is enacted, that all proceedings in courts of justice shall be in English.

At Athens, and even in France and England, it was prohibited to have any formed, or prepared *pleadings*, or to amuse the court with long artificial harangues; only, in important matters, it was the settled custom to begin the *pleadings* with a passage in holy Scripture.

It is but of late years that eloquence was admitted to the bar, where it has been much practised and encouraged.

Among the Athenians, an equal time was allowed both parties to *plead*, which was measured by a water hour-glass; and in order to see justice done in this respect, there was an officer appointed to distribute the water to each, whence he was called EPHYDOR.

PLEADINGS, in the stricter sense, are all the allegations of the parties to a suit, made after the count, or declaration, till issue is joined.

In this sense the *pleadings* express what is contained in the bar, replication, and rejoinder; and not what is in the declaration itself. Hence defaults in the matter of declaration are not comprised within the *miſpleading*, or insufficient *pleading*; which only extends to that committed in the bar, replication, or rejoinder.

PLEASURE, the effect of a sensation, or perception, agreeable to the mind, or of the gratification of some appetite.

Pleasures may be distinguished into two kinds. The first, those which anticipate, or go before the reason; such are all agreeable sensations. These are popularly called *pleasures of sense*, or *of the body*.

The second are those which do not precede, or anticipate, either the senses or reason. These we call *pleasures of the mind*. Such is the joy arising from a clear perception of some future good, or the confused sensation of a present one.

For an instance of each. A man frequently finds *pleasure* in eating a fruit he was before unacquainted with: this is *anticipating pleasure*, which he feels before he knows the fruit to be good. On the other hand, a hungry hunter expects, or perhaps actually finds victuals; where the joy he conceives is a *pleasure* that follows from the knowledge of his present or future good.

Pleasure and *pain* seem to be no other than engines in nature's hand, whereby we are directed to consult our own preservation, and avoid our ruin. To things that may contribute to the one, as food, venery, &c. she has annexed *pleasure*; and to those that may convince to the other, as hunger, diseases, &c. pain. She durst not leave it to our discretion, whether we would preserve and propagate the species, or not; but, as it were, constrains us to both. Were there no *pleasure* in eating, nor pain in hunger, what numbers would be starved, through negligence, forgetfulness, or slothfulness? What is it induces people to the office of generation, but *pleasure*? Without this the world had scarce subsisted to this time.

Among the multiplicity of things to be done, and to be avoided, for the preservation of animal life, &c. how should we have distinguished between the one and the other, but for the sensation of *pleasure* and pain? These are not only spurs to urge us on, but also guides, to direct us whither we are to go. Wherever nature has fixed a pleasure, we may take it for granted, she there enjoins a duty; and something is to be there done, either for the individual, or for the species.

Hence it is, that our *pleasures* vary at different stages of life; the *pleasures*, e. gr. of a child, a youth, a grown man, an old man, &c. all tending to those particular things required by nature in that particular state of life, either for the preservation, simply, or, jointly, for that and propagation, &c.

Hence, from the different constitutions of the body, at different ages, it were very easy to account for all the particular tastes and *pleasures* thereof; not by deducing the *pleasures* mechanically from the disposition of the organs in that state, but by considering what is necessary for the perfection and well-being of the individual in that state, and what it is to contribute to that of the species. In a child, e. gr. mere preservation in the present state is not enough; it must likewise grow: to bring this to pass, nature has made the returns of hunger, &c. more frequent, as well as more acute, and the *pleasures* of feeding more exquisite. And that the excess of aliment, in proportion to the bulk of the body, may be dispensed with, she has made one of the great *pleasures* of the state to consist in a series of sportive exercises; by means whereof the parts of the body come to be opened and expanded, and arrive at maturity. This done, the *pleasures* that conduced thereto disappear; and others, suited to the new state, succeed.

For the PLEASURES *of hearing, muſic*, &c. see BEAUTY, MUSIC, &c.

PLEASURE *boat*, among the *Ancients*. See THALAMEGUS.

PLEBANUS was anciently the title of a *rural* DEAN.

The denomination arose hence, that these deaneries were then affixed to the *plebanie*, or chief mother-church within such a district; which, at first, was usually ten parishes.

PLEBANUS seems also to have been used for a parish-priest of such a large mother-church, as was exempt from the jurisdiction of the ordinary; so that he had the authority of a rural dean committed to him by the archbishop; to whom the church was immediately subject.

PLEBEIAN, *plebeius*, a person of the rank of the populace, or common people.

The term is chiefly used in speaking of the ancient Romans; who were divided, about the time of Tarquin's expulsion, into senators, knights, and *plebeians*, or commons.

The *plebeians* were those who could not claim their descent from the ancient senators appointed by Romulus and the kings who succeeded him.

PLEBEIAN *games*, were games celebrated by the Roman people,

people, in remembrance, as some say, of their reconciliation with the senators, after their expulsion from the city, in the year of Rome 261; or, according to others, in token of their public rejoicing, when the kings were driven from Rome U. C. 245, and the people enjoyed their liberty. These games were celebrated in the Circus for three days, and commenced on the seventh of the calends of December. Adrian instituted *plebeian* games in the circus U. C. 874.

PLEBISCITUM, among the Romans, a law enacted by the common people, at the request of the tribune, or some other plebeian magistrate, without the intervention of the senate.

PLEBISCITUM is more particularly applied to the law which the people made, when, upon some misunderstanding with the senate, they retired to the Aventine mount.

PLECHAS, a word used by Hippocrates to express that region of the body which is terminated backward by the anus, forward by the pudenda, and sideways by the hips.

PLECTANÆ, a word used by some to express the cornua uteri, and by others for any plexus of vessels.

PLECTRONIA, in *Botany*, a genus of the *pentandria monogynia* class. Its characters are, that it has five petals inserted in the empalement; and the fruit is a berry containing two seeds. There is only one species.

PLECTRONITÆ. See CONICHTHYODONTES.

PLECTRUM, a word used by some anatomical writers to express the styloide process of the os petrosum; by others for the uvula; and by others for the tongue.

PLECTRUM, among the *Ancients*, an instrument used in playing upon the LYRE. We have a description of it in Mem. Acad. Inscrip. vol. v. p. 168.

PLEDGE, *plegius*, in *Common Law*, a surety, or gage, either real or personal, which the plaintiff, or demandant, is to find, for his prosecuting the suit.

The word is sometimes also used for FRANK *pledge*.

To PLEDGE, in *Drinking*, denotes to warrant, or be surety to one, that he shall receive no harm while he is taking his draught.

The phrase is referred, by our antiquaries, to the practice of the Danes, heretofore, in England; who frequently used to stab, or cut the throats of the natives while they were drinking.

PLEDGERY, or PLEGGERY, suretiship, or an undertaking, or answering, for another.

The appellant shall require the constable and marefchal to deliver his pleggs, and to discharge them of their *pledgery*; and the constable and marefchal shall ask leave of the king to acquit his pleggs, after that the appellant is come into the lists to do his devoir. Orig. Jur. ex Vet. Cod. MS. in Bibl. Selden.

PLEDGES *of goods for money*, &c. See PAWN.

PLEDGET, in *Surgery*, a kind of flat tent, made, not to enter a wound, but to be laid upon it, to imbibe the superfluous humours, and keep it clean and dry.

PLEGII *de retorno*, &c. in *Law*. See REPLEVY, and RETORNO *Habendo*.

PLEGIS *acquietandis*, a writ that lies for a surety, against him for whom he is surety, in case he pay not the money at the day. Fitz. Nat. Brev.

PLEIADES, Πλειάδες, in *Astronomy*, an assemblage of seven stars in the neck of the constellation Taurus.

They are thus called from the Greek πλεῖν, *navigare*, *to sail*; as being terrible to mariners, on account of the rains and storms that frequently rise with them.

The Latins call them *corniculæ*, from *cor*, *horn*; because of their rising about the vernal equinox.

The largest is of the third magnitude, and is called *Lucida Pleiadum*. See their several longitudes, latitudes, magnitudes, &c. under TAURUS.

There are now only six stars visible in *Pleiades*, and this appears to have been the case so long ago as the time of Ovid:

Quæ septem dicti, sex tamen esse solent.

PLEIADES, in *Mythology*, were the seven daughters of Atlas, called Maya, Electra, Taygeta, Alcyone, Celeno, and Merope. These Atlantides, it is said, were translated to the heavens, and formed the *Pleiades*; the meaning of which fable is, that Atlas first observed these stars, and called them by the names of his daughters.

PLEIADES, *poetical*, is a name which the Greeks gave to seven celebrated poets, flourishing under the reign of Ptolemy Philadelphus.

In imitation of the Greeks, Ronsard formed a *Pleiades* of French poets under the reign of Henry II. It consisted of Daurat, Ronsard, du Bellay, Belleau, Baif, Tyard, and Jodelle.

On the same model, some of their authors afterwards projected a new *Pleiades* of the Latin poets of the last century; but they were not agreed about the names of those that should compose it; much less on him who should be the *Lucida Pleiadum*. M. Baillet named F. Rapin, F. Commire, F. de la Rue, M. de Santeuil, M. Menage, M. du Perier, and M. Petit.

PLEMMYROS, a word used by the old Greek writers to express a redundance of humours. Its proper signification is the flowing in of the tide.

PLENARTY, in *Law*, a term used in ecclesiastical matters, to denote that a benefice is full, or possessed of an incumbent.

In which sense it stands opposed to VACANCY.

Institution, by six months, is a good *plenarty* against a common person, but not against the king, without induction. See INSTITUTION, and INDUCTION.

PLENARY, formed of the Latin *plenarius*, of *plenus*, *full*, something complete, or full. Thus we say, the pope grants *plenary indulgences*, i. e. full and entire remissions of the penalties due to all sins.

PLENE *administravit*, in *Law*, is a plea pleaded by an executor or administrator, where they have administered the deceased's estate faithfully and justly before the action brought against them. On *plene administravit*, pleaded by an executor, if it be proved that he hath goods in his hands which were the testator's, he may give in evidence that he hath paid to the value of his own money, and need not plead it specially; for when an executor before the action hath paid the money to equal degree with that demanded by the plaintiff, he may plead fully administered generally, and give the special matter in evidence. 2 Litt. Abr. 330.

PLENILUNIUM, compounded of *plenus*, and *luna*, in *Astronomy*, that phasis or state of the moon, popularly called the *full moon*.

PLENIPOTENTIARY, compounded of *plenus*, *full*, and *potentia*, *power*, a person who has full power and commission to do any thing.

The word is chiefly understood of the ministers or ambassadors sent from princes or states to treat of peace, marriages, and other important matters.

The first thing done in conferences of peace, is, to examine the power of the *plenipotentiaries*.

PLENITUDE, *plenitudo*, the quality of a thing that is full, or that fills another.

In physic, it is chiefly used for a redundancy of blood and humours.

Physicians reckon two kinds of *plenitude*. The one called *ad vires*, when the abundance of the blood oppresses the patient's strength.

The other *ad vasa*, when it fills the vessels too much; swelling them to a degree of bursting.

PLENNA, a word used by some writers to express any mucous humour.

PLENUM, in *Physics*, a term used to signify that state of things, wherein every part of space, or extension, is supposed to be full of matter.

It is used in opposition to a *vacuum*, which is a space supposed devoid of all matter.

The CARTESIANS adhere firmly to the doctrine of an absolute *plenum*. This they do on this principle, that the essence of matter consists in extension; from whence, indeed, the consequence is very easy, that wherever there is space or extension, there is also matter.

But this principle we have shewn to be false; and, therefore, the consequence drawn from it falls to the ground. See MATTER.

But that there is a real vacuum, in the nature of things, is likewise demonstrated by arguments *à posteriori*, under VACUUM.

PLEONASM, *pleonasmus*, formed from πλεονάζειν, q. d. *superabundancy*, in *Rhetoric*, a figure of speech, whereby we make use of words, seemingly needless or superfluous, in order to express a thought with the greater force and energy.

Such is, *I saw it with my own eyes*; or, *he heard it with his own ears*, &c.

The *pleonasm* is called by the Latins *redundantia*.

Pleonasm, by grammarians, is usually defined a fault in discourse, wherein we say more than is necessary.

M. Vaugelas will not allow the phrase, *I saw it with my own eyes*, to be a *pleonasm*; inasmuch as there are no superfluous words in it; none but what are necessary to give a stronger assurance of the thing affirmed. It is sufficient that one of the phrases say somewhat more than the other, to avoid the imputation of a *pleonasm*.

In effect, though we give the name *pleonasm* to any thing that is not necessary, or that enters the discourse independently of the sense or construction, yet there are frequently words which, in that view, would be pertinent, and even are used to good purpose, to give a greater force or grace to discourse, and to ascertain the truth of what is said.

He spoke with his mouth, is a *pleonasm* in English; it is none in Latin: Virgil says, *fit ore locutus*. Some French authors deny *unir ensemble*, *to unite together*, to be a *pleonasm*.

PLEROSIS, a word used by the old Greeks to express the repletion

repletion or restoring the body to its natural state, after it has been emaciated by sickness.

PLEROTICS, Πληρωτικα, formed from πληρω, *I fill*, in *Medicine*, a kind of remedies, otherwise called INCARNATIVES, and EPULOTICS.

PLESMONE, a word used by the ancients to signify plenitude or satiety.

PLESSYA, in *Ichthyology*, a name given by Bellonius to a fresh water fish of the leather-mouthed kind, appearing to be no way essentially different from the more common kind of cucullus, called by authors *cucullus tertium genus*.

PLETHORA, Πληθωρη, in *Medicine*, such an abundance of any good and laudable humour, as proves hurtful to the animal functions.

Plethora is chiefly understood of the blood, though sometimes of the other humours.

The *plethora* is the consequence of a good chylification, sanguification, &c. attended with a too sparing discharge by perspiration, &c.

It is usually described either as *ad vires*, or *ad vasa*. See PLENITUDE.

The *plethora* is chiefly produced in a body whose organs of digestion are strong, blood-vessels lax, diet full of good juice, temperament sanguine, mind at ease and indolent, of a middle age, and in a moist air. It renders heat and motion unequal; it stretches the great vessels, and compresses the smaller. And hence slippery and heavinesses, and on the least occasion ruptures in the vessels, suffocations, &c.

Dr. Freind makes the catamenia, or MENSES, the mere result of a *plethora*.

Medical writers now usually distinguish four kinds of a *plethora*. 1. The simple *plethora*, which is that state of the body in which the blood is too abundant in quantity, but in as yet of no bad quality. 2. The cacochymous *plethora*, which is that where the blood is abundant in quantity, and at the same time is subject to a too great tenderness or some other deficacy. 3. The *plethora ad vasa*, wherein the blood, from its over great quantity, renders the vessels turgid, without any further ill effect. And, 4. The *plethora ad vires*, in which there is joined to too great a plenitude of the vessels, a lassitude and torpor, or numbness of the limbs.

The signs of a *plethora* are, 1. A florid constitution of the body. 2. A tolerable use of the non-naturals, a good appetite to food, and a sound sleep: this is the case while the *plethora* is simple and unmoved, but when any commotion happens from without, the signs are inquietude at night, dreams of bleeding, and of wounds from swords or other weapons, robust looks in the face, and a general turgescence of the vessels, a heaviness of the limbs, an inaptitude to motion, and difficulty of breathing, a vertiginous disorder of the head, a sense of a pricking or tingling in the flesh from the slightest heat, an easy heating of the body from the weather, a moisture of the eyes, and in hysteric women a sensation as if a piece of cold ice were suddenly laid on some part of the head.

PLETHORA *getbus and full of it*, are, 1. People of sedentary lives, who live high. 2. The younger rather than persons more advanced in years. 3. The female sex rather than the men. 4. All persons who have been accustomed to large evacuations, and have hastily suppressed them. And, 5. Those persons who have suddenly changed a life of labour or exercise to a sedentary one, without making the necessary changes in the non-naturals.

PLETHORA, *prognostics from it*. 1. *Plethoric* persons are more subject to diseases in general than others. 2. They are particularly subject to hæmorrhages, inflammations, and acute fevers. 3. The lighter diseases coming upon persons of a *plethoric* habit, are usually more stubborn and dangerous than on others. 4. The *plethora* itself can scarcely be called a disease, but it is the parent of many diseases. Chronic diseases are with more difficulty cured in *plethoric* patients than in others, because they are always averse to exercise. 6. A *plethoric* habit, disturbed by violent motion, by passions of the mind, or by stimulating medicines, is capable of producing very terrible consequences. 7. The diseases arising from a *plethora*, from stopping some accustomed evacuation, are with difficulty cured; and *plethoras* are more efficaciously relieved by natural hæmorrhages than by any artificial means.

PLETHORA, *method of cure in*. A simple *plethora* is easily removed by bleeding and gentle exercise, and by a more spare diet; to these may be added, gentle purging once a month. The *plethora* with a cacochymy requires gentle purging, bleeding, and cupping, diaphoretics and diuretics. If a violent commotion of the blood happen with a *plethora*, temperance is to be still prescribed, then the use of nitre and crabs eyes saturated with lemon juice, and other cooling and alterative remedies. Juncker's Conspect. Medic. p. 4.

PLETHRON, a Grecian measure, by some said to contain 1444, by others 10,000 square feet. Arbuthnot.

PLEVIN, *plevina*, in *Law*, a warrant or assurance; the same with pledge. See PLEDGE, REPLEVIN, &c.

PLEURA, Πλευρα, derived from πλεω, which, primarily, signifies *fide*, in *Anatomy*, a membrane which lines the inside of the cavity of the breast, and includes all the parts contained therein, being of the same figure and extent as the thorax itself, and of the same substance with the PERITONÆUM. The Latins call it *succingens*.

It is of a very fine texture, and plentifully stored with blood-vessels and nerves; and made up of an inner true membranous lamina, and a cellular substance on the outside, which is a production of the lamina. The cellular portion goes quite round the inner surface of the thorax, but the membranous portion is disposed in a different manner. Each side of the thorax has its particular *pleura*, entirely distinct from the other, and forming, as it were, two great bladders, situated laterally with respect to each other in the great cavity of the breast, in such a manner as to form a double septum or partition running between the vertebræ and the sternum, their other sides adhering to the ribs and diaphragm. This particular duplicature of the two *pleuræ* is termed MEDIASTINUM. The cellular portion of the *pleura* connects the membranous portion to the sternum, ribs, and muscles; to the diaphragm, pericardium, thymus, and vessels, and to every part that lies near the convex side of the membranous portions of the *pleuræ*. It likewise insinuates itself between the laminæ, of the duplicature of which the mediastinum is formed, and unites them together. It even penetrates the muscles, and communicates with the cellular substance in their interstices, all the way to the membrana adiposa on the external convex side of the thorax. The inner surface of the *pleura* is moistened by a lymphatic serosity, which transudes through the pores of the membranous portion; and this fluid is said to be secreted by imperceptible glands, the existence of which has not yet been demonstrated. The arteries and veins of the *pleuræ* are chiefly ramifications of the intercostals, and also of the mammariæ internæ and diaphragmaticæ. The nerves are ramifications of the true intercostales, called otherwise costales and dorsales. Winslow.

The use of the *pleura* is to defend the inside of the thorax, and to render it smooth, that the lungs may not be hurt in their motion.

PLEURISY, *pleuresis*, *pleuritis*, πλευρίτις, in *Medicine*, a violent pain in the side, attended with an acute fever, a cough, and a difficulty of breathing.

The *pleurisy* arises from an inflammation of some part of the pleura, to which is frequently joined that of the exterior and superficial part of the lungs.

This inflammation seizes any part of the integuments of the thorax, viz. either the pleura or mediastinum; and, the more, the pricking pain may be felt in any part of the thorax; but the place it most ordinarily infests is the side; sometimes the right, sometimes the left; sometimes higher, sometimes lower.

The *pleurisy* sometimes succeeds another fever, occasioned by a precipitation of the febrile matter upon the pleura.

When it rises to an impostume, it is called an EMPYEMA. When it happens in the mediastinum, or diaphragma, it is called PARAPHRENITIS.

The *pleurisy* and peripneumony have some resemblance in their general symptoms, and are thence sometimes mistaken one for the other. They are, however, extremely different in their place of origin, as well as in their several symptoms; the *pleurisy* being a stasis of blood in the *pleura*, and the *peripneumony* a stasis of the same fluid in the lungs. They are both attended with an acute, continuous, and inflammatory fever, by means of which nature is labouring to break through the obstructions made by the stasis of the blood in those parts.

The spurious *pleurisy* is to be carefully distinguished from these two diseases. In the true *pleurisy*, or *peripneumony*, a pain is felt either about or a little below the nipple; but the spurious *pleurisy* generally shews itself higher, usually about the clavicle; the pain is more external, and usually affects the muscles between the ribs. In the genuine diseases the pains are equal and regular, answering to the pulse; in the spurious *pleurisy* they are vague, and wholly irregular. In the true, they are also continual; but in the spurious, they have frequent intermissions and remissions. The true have always a cough attending them, usually attended with a spitting of coloured matter, at first thin, afterwards prolix, and often streaked with blood, though sometimes with little or no spitting, which has given occasion for distinguishing the true *pleurisy* into the moist and dry; but the spurious often has no cough at all attending it, or if it has, it is either dry, or there

is no difference seen in the matter voided by spitting. The true has always an acute continuous fever, which attacks the patient at first with a shivering; the spurious either has no fever at all with it, or it is at the utmost a slight and irregular one. The pulse is quick, and there is a difficulty of lying on the affected side, which does not always occur in the true *pleurisy*.

The true diseases do not terminate in less than seven days; the others much sooner. The true usually attack young people; the spurious are common to young and old. The bastard or spurious *pleurisy* generally goes off by keeping warm for a few days, drinking plenty of diluting liquors, and observing a proper regimen. In some cases, indeed, it proves more obstinate, and requires bleeding, cupping, and scarification of the part affected. These operations, with the use of nitrous and other cooling medicines, seldom fail to effect a cure. The difference between the true and spurious diseases is determined by the observation of these symptoms; but it yet remains to distinguish justly the true diseases from one another. This is done by the following observations.

The *pleurisy* is a very rare disease; and the *peripneumony* a very common one; but this is exactly contrary to the common opinion, from these diseases being too generally confounded with, and mistaken for, one another.

In a *peripneumony*, a spitting of blood usually happens about the close of the second day: this is a primary symptom in a *peripneumony*, but is usually erroneously attributed to a *pleurisy*, though reason shews how easily such a spitting may happen from an inflammation of the lungs; and it is very different to conceive how it should happen so readily from an inflammation of a part so remote from having any communication with the organs of expectoration as the pleura.

In the *peripneumony*, the pain extends itself further, affecting the whole breast, whereas in the *pleurisy* it is rather fixed to the right side, and felt a little below the breast. These are the symptoms by which these diseases are distinguished from one another, and the use of the distinction is principally this, that in the *pleurisy* the application of external remedies often is of great service, whereas it is of no effect in the other case, though the mistake is of no great consequence in this respect, as the applications in the *peripneumony* can do no harm; but in an unhappy termination of these diseases by suppuration, the distinction becomes of some consequence; since, in the *pleurisy*, the matter may be evacuated by a paracentesis, or the letting in a canula; which in the *peripneumony* can by no means be done, unless in such an accidental case that the disease terminates in an external *vomica pulmonum*; then indeed the matter being discharged from the abscess into the cavity of the thorax, may be let out in the same manner as in the suppurated *pleurisy*; but this is a case that does not occur in an age.

The usual opinion of medical writers, in regard to this case, is, that the *peripneumony* is always a disorder affecting only the external surface of the lungs; and they observe, that even its name expresses this, the signification of it being a dilemperature spreading round about the lungs: this, however, is not agreeable to observation or experience; for in dissections of bodies that have died of this disease, the very internal part of the lungs is always found affected; and indeed if the surface only were so, it is not easy to conceive how the spitting of blood should come on so soon as the second day.

Signs of these diseases. These are in general common to both, and are the following: a vertiginous disorder of the head usually precedes all the other symptoms; this is succeeded by a shivering and chillnefs all over the body; this increases by degrees, and usually brings on with it cardialgias, naufea, and anxieties: after this there comes on a very remarkable heat, with very intenfe thirft, and a violent pain in the head; this is accompanied with a ftraitnefs of the breaft, and difficulty of refpiration; and the patient feels a violent and fevere pricking pain in one of the fides amongft the *ribs*, which fometimes extends towards the back-bone, fometimes towards the fore-part of the breaft, and at other times towards the fhoulder blades: this pain becomes continual, is always greatly exafperated by the cough that attends the difeafe, and is generally moft violent when the patient draws in his breath. The urine in the firft days is red, and after a few days more it becomes turbid, when it has ftood to be cold; and finally depofits a thick pale-red fediment. The pulfe in the *pleurify* is commonly quick and hard; and if blood be let, it is covered with a tough cruft or buffy coat. Baglivi remarks, that *pleurifies* are frequently occult, and gives the method of difcovering them: make the patient lie on his right or left fide, and bid him breathe ftrongly, and cough; if he feels any pain or heavinefs after it, he is certainly pleuritic. The fame author adds, that a hard pulfe is a certain attendant of the *pleurify*.

Perfons fubject to them. Thefe are difeafes not equally common to all ages, but they principally affect young and labouring people; they are moft frequent in the beginning of the fpring feafon, and moftly affect fuch as are of a fanguine plethoric habit. Perfons who have been fubject to bleeding at the nofe, but have been for fome time free from returns of them, often fall into thefe difeafes; and in general men are much more fubject to them than women.

Caufes of them. Thefe difeafes are brought on by any thing that gives a violent commotion to the blood, fuch as immoderate exercife, the abufe of fpirituous liquors, and violent fits of anger. The fuddenly cooling the body when very hot, by drinking cold liquors, fleeping on damp ground, wet clothes, and expofing the body to cold water or air in this ftate, has alfo often occafioned them, by fhutting the pores and forcing the blood inwards. The neglect of habitual bleedings, the ftoppage of ufual evacuations, and the ftriking in of any eruption, may alfo occafion them; and they have been fometimes occafioned by blows, or other external injuries on the breaft, and by endeavouring to lift great weights.

Prognoftics in them. All inflammatory fevers are dangerous, but the *pleurify* and *peripneumony*, when they attack young perfons, or fuch as are under thirty years of age, are attended with the leaft danger of any, provided that they are properly treated. When they affect perfons advanced in years, they ufually prove very dangerous, in fpite of all the care and caution with which they can be treated.

When they have been treated in a judicious manner, they ufually go off on the feventh, or at the utmoft the eleventh day, in copious fweats, which come on of themfelves; after this crifis, the pulfe in a very little time returns to its natural ftate, the violent heat goes off, and the ftrength, appetite, and fleep, return. When they go beyond the days of their crifis, which is often the cafe in old people, they then become very dangerous. If the urine is obferved to be turbid before the fourth day, and afterwards depofits a fediment, and the reft remain clear at the top, there is great hope that the difeafe will terminate happily, on the critical day, by a fweat. When a yellowifh matter is thrown up by coughing, and is neither very vifcid nor frothy, and particularly when in a *peripneumony* it is ftreaked with blood, there is great reafon to expect that the difeafe will go happily off; but, on the contrary, when the patient cannot fpit at all, and the urine continues crude, there is great reafon to fear the difeafe will have a fatal period.

Finally, when a difcuffion and refolution of the ftafis cannot be effected by nature, or obtained by art, a corruption and fuppuration follow, and often an ulcerous difpofition of the lungs, or true phthifis, is the confequence.

Method of cure. The bowels are to be kept gently lax during the whole courfe of the difeafe; but no irritating medicines muft by any means be given to promote this. For this purpofe, a clyfter of thin water-gruel, or of barley-water, in which a handful of mallows, or any other emollient vegetable has been boiled, may be daily adminiftered. When there is a remarkable plethora with a narrownefs of the breaft, and a fenfible ftuffing up of the lungs, then bleeding is neceffary; but a fmall quantity only fhould be taken away, and the fame repeated the next day or oftener, if the fame fymptoms continue to require it; always after bleeding the patient muft take fome gently diaphoretic medicines, and drink plentifully of water and weak liquors. In the ufual and more common cafes, bleeding, according to fome, is not neceffary in thefe difeafes, though fo greatly recommended by others. Every day before noon it is proper to give two doles of the mixtura fimplex, or fome other fuch temperate diaphoretic, with large draughts of warm liquors; and in the afternoon the antifebrile powders of nitre, diaphoretic antimony, crabs eyes fated with lemon juice fhould be given; and emulfions are alfo very proper, made of fweet almonds and barley water, or of the feeds of carduus Marise. When thefe medicines have been given for fome days, if the pain continues ftill violent, the tincture of caftorilla muft be taken; and in cafes of the *pleurify*, cloths four or more times doubled and wetted in camphorated fpirit of wine, are to be applied to the part. Fomentations may be prepared by boiling a handful of the flowers of elder, chamomile, and common mallows, or any other foft vegetables, in a proper quantity of water. The herbs may be either put into a flannel bag, and applied warm to the fide, or flannels dipped in the decoction muft be fucceffively ufed in the fame manner. The fide may alfo be frequently rubbed with a little of the volatile liniment; leaves of various plants, and efpecially young cabbage leaves, may be applied warm to the fide with advantage. Plaifters may alfo be applied occafionally, but they muft not be fuffered to remain on

too

too long, lest they stop respiration; an equal regimen and perfect quietness are to be observed during the whole time of the disease; but particularly on the critical days, on which nature must be by no means ruffled or disturbed.

The diet ought to be cool, slender, and diluting; the drink may be sweet whey, an infusion of pectoral and balsamic vegetables, barley water, with a little honey or currant jelly mixed with it, or the decoction of figs, raisins, barley, &c. These liquors should be drank often and in small quantities. Every thing the patient takes should be a little warm.

Authors differ greatly in their opinions about bleeding in this disease: some judge it absolutely necessary in all cases; and others wholly reject it in all. Etmuller observed, that bleeding in these diseases always gave the ftalis a tendency to suppuration, and much recommends sudorifics in the *pleurisy*; others are of opinion, that it is to be done, or omitted, according to the peculiar indications in the case; and some throw aside all the dissolvent and discutient medicines, and rely on the volatile salts alone for the promoting sweats, and accomplishing the cure by that means alone, only observing, that if the disease will not yield to these, bleeding is to be added.

Others again contend, that it is a rash attempt to endeavour to discuss the ftalis already formed, by hot medicines, which expand the blood, and seem calculated only to add to it; and that the natural ftate of the disease does not indicate bleeding, though the urgency of certain symptoms, such as ftrictness of the breaft and infarctions of the lungs, in perfons of plethoric habits, may render it neceffary and beneficial.

Perfons of very plethoric habits, who have died of these distempers, on diffection, have been found to have one side of the lungs to ftuffed up with blood, that it would sink in water; and unqueftionably in such cases bleeding is neceffary.

Sydenham's method of curing by large and often repeated bleedings, and the ufe of gentle expectorants, has been found, fays Junker, very dangerous in its effects, and seems the only reproachable thing in the works of that excellent writer. And he adds, though Riverius gives an instance of a person cured of a *pleurify* in a few hours, by bleeding alone, the account does not seem wholly to be depended upon; for some circumftances in the relation seem to fhew, that the disease was not properly either a *pleurify*, or a *peripneumony*, but an inflammation of the liver or ftomach.

Nevertheless, moft medical writers have recommended bleeding as soon as poffible, and large quantities at once, in the beginning of a *pleurify*, in preference to ftall repeated bleedings. An adult, fays Dr. Buchan, may lofe twelve or fourteen ounces of blood as foon as it is certainly known that he is feized with a *pleurify*. If the ftitch and other violent symptoms continue, eight or nine ounces more of blood may be taken away at the diftance of twelve or eighteen hours. When the symptoms do not abate, and the blood manifefts a ftrong buffy coat, a third and even a fourth bleeding may be neceffary. But the operation of bleeding is feldom neceffary after the third or fourth day of the fever, and ought not to be performed unless in very urgent circumftances. Topical bleeding by leeches, or cupping, has a very good effect. If the ftitch continues after repeated bleedings, fomentations, &c. a blittering plafter muft be laid on the parts affected, and fuffered to remain for two days. Some people recommend the flowers of the common red poppies in these cases, as a fpecific remedy; but Etmuller allows them no such quality, but fays they act in this case merely as a gentle opiate and anodyne; a sort of medicines very dangerous in these cases.

The seeds of carduus marise, or the milk thiftle, are also by some recommended as fpecifics: it is very evident that they mitigate the pain; but the fever will always continue to its regular period on the seventh day.

Expectorating medicines, in general, are of no ufe in these cases, only if the fpitting of a bloody matter do not succeed fufficiently by the fourth day, it may be neceffary to give a dose or two of something of this kind; and to this purpose a decoction of hyffop is preferred by many before all other medicines.

The fpitting may be promoted by taking two table fpoonfuls of a mixture of an ounce of the oxymel or vinegar of squills with fix ounces of the *pectoral* DECOCTION: or the *julep* EMULSION may be administered; or if oily medicines are naufeous, two table-fpoonfuls of the folution of gum ammoniac in barley water may be given three or four times a day.

Nitre is to be given boldly for the four firft days; but after this, if the disease go on regularly, it is to be given in smaller quantities, and not oftener than twice in a day. All oily and fatty fubftances are to be excluded from external ufe, but camphor in any form is found to do fervice.

When the patient does not perfpire, and has a burning heat on his fkin, and diffolves little water, two drams of purified nitre may be rubbed with five or fix grains of camphor in a mortar, and the whole divided into fix doses, one of which may be taken every five or fix hours in the patients common drink. Dr. Buchan mentions another medicine, which he fays, fome reckon almoft a fpecific in the *pleurify*; viz. the decoction of the fcutch rattle-fnake-root. After bleeding and other evacuations, the patient may take two, three, or four table-fpoonfuls of this decoction, as his ftomach can bear it, three or four times a day. If it occafions vomiting, the quantity may be leffened or mixed with fimple cinnamon-water.

Opiates in these cases are dangerous, for as there is in all of them a tenacity of the blood, this ftate of it requires concuffion, refolution, and excretion, but opiates effect the exact contrary of all these. Caftorilla properly given, will almoft always mitigate the pain; and when that fails of its effect, it is certain that opiates cannot procure it, but muft inevitably do harm. Junck. Conf. Med. p. 297, and feq. Buchan's Dom. Med. ch. 16.

Mr. Du Hamel found the polygala vulgaris of fervice in promoting expectoration in *pleurifies*. Med. de l'Acad. Science. 739.

PLEUROCYSTUS, in *Natural Hiftory*, the name of one of the general arrangements of the echini marini.

The word is derived from the Greek πλευρον, *the fide*, and κυστις, *the anus*.

The echini of this division are diftinguifhed from the others, by having their anus neither on the fummit, nor in any part of the base, but in fome part of the fuperficies of one of the fides.

PLEURONECTES, in *Ichthyology*, the name of a genus of fifhes of the malacopterygious kind, the characters of which are these: the branchioftege membrane, on each fide, contains fix bones of a cylindric figure; and in the middle between these, but lower down, there are two others joined together at the end, but these are fcarce confpicuous. Both the eyes are placed in one fide of the head; in fome they are in the right fide, and in others in the left; the eyes are covered with a fkin; one fide of the fifh is always white, the other is fpotted or obfcure.

Of these fifh there are fome which have a very fhort fpine at the anus, and the eyes ufually on the right fide. The fpecies of this fort, enumerated by Artedi, are seven. The other species of the *pleuronectes* have their eyes on the left fide of the head, and have no fpine, or fcarce any at the anus. Of these Artedi enumerates three fpecies.

The name is of Greek origin, and is derived from the words πλευρα, *the fide*, and νηκω, *a fwimmer*; and expreffes the peculiar and diftinctive character of these fifhes; which is, that they all fwim on one fide, not as other fifhes.

In the Linnæan fyftem, this is a genus of the *thoracici*, comprehending feventeen fpecies, as the *hippoglossus*, *platessa*, *flounder*, *dab*, *fole*, *pearl*, *turbot*, &c.

PLEUROPNEUMONY, a name given by medical writers to a disease approaching to, and partaking of the nature of both the PLEURISY and PERIPNEUMONY.

PLEURORTHINOPŒA, a term ufed by medical writers to express that kind of pleurify in which the patient cannot breathe, unless in an erect posture.

PLEXUS, in *Anatomy*, a name common to feveral parts in the body, confifting of bundles of little veffels interwoven in form of net-work.

The nerves, in their progrefs, form feveral *plexuses*; efpecially the par vagum, or eighth pair, the intercoftals, and the fifth.

The par vagum, at its interfection with the intercoftal nerve, forms the *plexus ganglioformis* fuperior and inferior. A branch of this nerve joining near the heart, with others from the intercoftals, forms the *plexus cardiacus fuperior*. A little further it fends off feveral branches, which, reuniting, form the *plexus pulmonalis*. In each trunk of the intercoftal, before it arrives at the thorax, are two *plexus ganglioformes*, called *plexus cervicales*. When arrived in the thorax, it receives three or four twigs from the vertebral nerves, together with which it conftitutes the *plexus intercoftalis*; whence, defcending into the abdomen, it forms that famous piece of net-work, called on the right fide *plexus hepaticus*; and on the left, *plexus fplenicus*. From the hepatic *plexus* arife a number of branches, proceeding fome to the liver, others to the pancreas, others to the capfula of Glifon, and other larger ones to the right kidney. The fplenic *plexus* fends out branches to the left part of the ventricle and pancreas, the fplen, the left atrabiliary capfula, and left kidney. Laftly, feveral branches both from the hepatic and fplenic *plexus*, paffing along the mefenteric arteries, efpecially the upper, to which they ferve as a kind of cover, form the mefenteric *plexus*, which bears fome refemblance to a fun, from the circumference whereof proceed feveral

little branches or threads, in manner of rays, continued thence to the intestine, though still accompanying the arteries.

PLEXUS *choroides*. See CHOROIDES.

It is sometimes, also, called *plexus reticularis*, from its net-like structure.

PLICA *Polonica*, in *Medicine*, a disease of the hair, almost peculiar to Poland, though there are instances of it in Hungaria, Alsatia, Switzerland, &c.

Writers are not agreed as to the history of the origin of this disease. Some assert that it was not known before the year 1564; others, with the greatest probability, fix its epocha to the year 1287, when the Tartars corrupted the waters of the country: whilst others apprehend, that it has existed from time immemorial.

The *plica* is a severe, malignant, and dangerous disease, wherein the hair of the head is matted and glued together beyond all possibility of being extricated; and is attended with a grievous disorder of all the limbs of the body; and, before the hair becomes complicated, a violent pain; a sweat usually attending it.

An unseasonable cutting off the hair, in this case, is dangerous; nor is there any proper and adequate remedy for the disease yet discovered.

In Poland and Lithuania, this disorder is endemial, and well known; it consists in a preternatural bulk of the hair, which being firmly conglutinated and wrapped up in inextricable knots, affords a very monstrous and unseemly spectacle. When this is cut, blood is discharged from it, the head is racked with pain, the sight impaired, and the patient's life frequently endangered. This misfortune is principally incident to the Jews who live in those countries. Though it seems difficult to account for this disorder, and assign its true causes, we shall, nevertheless, make an attempt of this kind.

What therefore contributes not a little to its production, is the sordid and nasty manner of life to which these people are addicted, for they rarely comb their hair, sleep in low moist rooms, and drink large quantities of brandy. The waters, also, concur and assist in the generation of this disorder. Henric Gehema, in Epist. ad Bontekoe de *Plica* Polonica, is justly of opinion, that the causes of this disease are lodged in some particular waters of Poland, which if either drank, or used for washing the body, produce the *plica*. This he confirms by the fate of two soldiers, who, when intending to wash their bodies, had scarce immersed their heads in the water of a certain pond, before their hairs were contracted into many folds. Beside these causes, we suppose an hereditary fault conveyed from the parents, &c. which consists in too great a bulk of the pores, and bulbous hairs under the skin of the head. Hence the thick and glutinous nutritious juice, produced by their coarse aliments, and impure waters, is, by the heat excited by their drinking brandy, forced into the cavities of the hairs, and sweating through their pores, produces this terrible disorder. Hoffman. de Morb. cert. Reg. propr.

From the symptoms that precede and accompany the *plica*, it seems to be a species of malignant fever or acute scurvy, whose distinguishing symptom or crisis is a complication of the hair. Some authors have pretended, that the earth mosi, hence called *plicaria*, used externally in fomentation, and internally in decoction, is a specific in this disease. Others have attributed extraordinary virtues to mercury.

PLICARIA, in *Botany*, a name used by some for the club-mosi.

PLICATED *leaf*, among *Botanists*. See LEAF.

PLIGHT, in our *Old Law-Books*, a term which signifies the estate, with the quality of the land; though, sometimes, it extends also to the rent-charge, and the possibility of a dower. Coke's Inst. fol. 221.

PLINIA, in *Botany*, the name of a genus of plants of the *polyandria monogynia* class, described by Plumier and Linnæus, the characters of which are these: the empalement is divided into five segments; the flower consists of five petals; the stamina are numerous filaments, very slender, and of the length of the flower; the antheræ are small; the germen of the pistil is small; the style is subulated, and of the length of the stamina; the stigma is simple; the fruit is a large globose berry, of a striated or sulcated surface, containing only one cell, in which is a very large, smooth, and globose seed. There is one species.

PLINTH, from πλινθος, *brick*, in *Architecture*, a flat square member, in form of a brick: sometimes, also called the slipper. See *Tab. Archit. fig.* 25, N° 3.

The *plinth* is used as the foot, or foundation of columns: being that flat square table, under the mouldings of the base and pedestal, at the bottom of the whole order; seeming to have been originally intended to keep the bottom of the primitive wooden pillars from rotting.

The *plinth* is also called the *tile* or BRICK.

Vitruvius also calls the Tuscan abacus, *plinthus*, from its resembling a square brick.

PLINTH *of a statue*, &c. is a base or stand, either flat, round, or square, serving to support a statue, &c.

PLINTH *of a wall*, is a term for two or three rows of bricks advancing out from the wall; or in the general, for any flat high moulding, serving in a front wall to mark the floors; or to sustain the eaves of a wall, and the larmier of a chimney.

PLINTHITIS, a kind of alum found in some of the islands of the Archipelago, and called also *plumbitis*, from its usually being found in thin cakes.

PLINTHIUM, a name given by the ancients to a machine invented for the making extension of dislocated or fractured limbs. Oribasius describes several kinds.

PLITE *of lands*, in our *Old Writers*, seems to be an ancient measure, as a yard or ell, at this time: it is mentioned in the stat. 3 Ed. IV. cap. 5.

PLOCE, in *Rhetoric*, a figure whereby a word is repeated, by way of emphasis; in such manner, as not only to express the subject, but some particular character or property of it.

Cruelty! yes, cruelty beyond all example. His wife's a wife indeed! So Cicero says, Young Cato wants experience, but yet he is Cato.

PLOK-PENIN, a term used in the public sales at Amsterdam for a little sum given by the last bidder.

The *plok-penin* is a kind of earnest, whereby it is signified, that the commodity is adjudged to him.

The *plok-penin* differs according to the quality of the commodity, and the price of the lot. Sometimes it is arbitrary, and depends on the pleasure of the buyer; and, sometimes, it is regulated by the ordinances of the burgomasters.

PLOMO, *in Metallurgy*, a name given by the Spaniards, who have the care of the silver mines, to the ore of that metal, when it is found adhering to the surface of stones, and incrusting their cracks and cavities in the form of small and loose grains of gunpowder. Though these grains be but few in number, and the rest of the stone have no silver in it, yet they are always very happy in meeting with it, as it is a certain token that there is a very rich vein somewhere in the neighbourhood. And if in digging forwards they still meet with these grains, or the *plomo* in greater quantity, it is a certain sign that they are getting more and more near the good vein.

PLONKETS, in our *Old Writers*, a kind of coarse woollen cloth. 1 Rich. III, cap. 8.

PLOT, or PLOTT, in *Gardening*. See GRASS-*plot*, &c.

PLOT, in *Dramatic Poetry*, the FABLE of a tragedy or comedy; or the ACTION represented therein.

PLOT, is more particularly used for the knot or intrigue, which makes the difficulty and embarrass of a piece.

The unravelling puts an end to the *plot*.

PLOT, in *Surveying*, the plan or draught, of any parcel of ground, e. gr. a field, farm, or manor, surveyed with an instrument, and laid down in the proper figure and dimensions. See PLOTTING.

PLOTTING, among *Surveyors*, the art of describing or laying down on paper, &c. the several angles and lines of a tract of ground surveyed by a theodolite, or the like instrument, and a chain.

In surveying with the plane-table, the *plotting* is needless; the several angles and distances being laid down on the spot as fast as they are taken.

But, in working with the theodolite, semicircle, or circumferentor, the angles are taken in degrees; and the distances in chains and links. So that there remains a subsequent operation, to reduce those numbers into lines; and so to form a draught, plan, or map. The operation is called *plotting*.

Plotting, then, is performed by means of two instruments, the protractor and *plotting-scale*. By the first, the several angles observed in the field with a theodolite, or the like, and entered down in degrees in the field-book, are protracted on paper in their just quantity.

By the latter, the several distances measured with the chain, and entered down, in like manner, in the field-book, are laid down in their just proportion.

Under the articles *protractor* and *plotting-scale*, is found, severally, the use of those respective instruments in the laying down of angles and distances; we shall here give their use conjointly, in the *plotting* of a field, surveyed either with the circumferentor, or theodolite.

PLOTTING, *method of, from the circumferentor*. Suppose an inclosure, e. gr. ABCDEFGHK (*Tab. Survey. fig.* 8) to have been surveyed, and the several angles, as taken by a circumferentor in going round the field, and the distances, as measured by a chain, to be found entered in the field-book, as in the following table:

	Deg.	Min.	Chn.	Link.		Deg.	Min.	Chn.	Link.
A	191	00	10	75	F	324	30	7	54
B	207	00	6	83	G	98	30	7	54
C	246	30	7	82	H	71	00	7	78
D	325	00	6	96	K	161	30	8	22
E	12	24	9	71					

1. On a paper of the proper dimensions, as L M N O *(Tab.* III. *Survey. fig.* 43.) draw a number of parallel and equidistant lines, representing meridians, expressed in dotted lines. Their use is, to direct the position of the protractor; the diameter whereof muſt always be laid either upon one of them, or parallel thereto; the ſemicircular limb downwards for angles greater than 180°, and upwards for thoſe leſs than 180°.

The paper being thus prepared, aſſume a point on ſome meridian, as A, whereon lay the centre of the protractor, and the diameter along the line. Conſult the field-book for the firſt angle, i. e. for the degree cut by the needle at A, which the table gives you 191°.

Now, ſince 191° is more than a ſemicircle or 180°, the ſemicircle of the protractor is to be laid downwards; whence, keeping it to the point with the *protracting pin*, make a mark againſt 191; through which mark, from A, draw an indefinite line A *b*.

The firſt angle thus protracted, again conſult the book, for the length of the firſt line A B. This you find 10 chains 75 links. From a convenient ſcale therefore, on the *plotting ſcale*, take the extent of 10 chains 75 links between the compaſſes; and fetting one point in A, mark where the other falls in the line A *b*, which ſuppoſe in B: draw therefore the full line A B, for the firſt ſide of the incloſure.

Proceed then to the ſecond angle; and, laying the centre of the protractor on the point B, with the diameter as before directed, make a mark, as *c*, againſt 207°, the degrees cut at B; and draw the indefinite line B *c*. On this line, from the *plotting-ſcale*, as before, ſet off the length of your ſecond line, viz. 6 chains 83 links; which extending from B to the point C, draw the line B C, for the ſecond ſide.

Proceed now to the third angle or ſtation: lay then the centre of the protractor, as before, on the point C; make a mark, as *d*, againſt the number of degrees, cut at C, viz. 246° 30′: draw the indefinite line C *d*, and thereon ſet off the third diſtance, viz. 7 chains 82 links; which terminating, e. gr. at D, draw the full line C D, for the third ſide.

Proceed now on the fourth angle D; and, laying the centre of the protractor over the point D, againſt 325°, the degree cut by the needle, make a mark *e*; draw the occult line D *e*, and thereon ſet off the diſtance 6 chains 96 links; which terminating in E, draw D E for the fourth line: and proceed to the fifth angle, viz. E.

Here the degrees, cut by the needle, being 12° 24′ (which is leſs than a ſemicircle) the centre of the protractor muſt be laid on the point E, and the diameter on the meridian, with the ſemicircular limb turned upwards. In this ſituation make a mark as before, againſt the number of degrees, viz. 12° 24′, cut by the needle at E; draw the line E *f*, on which ſet off the fifth diſtance, viz. 9 chains 71 links; which extending from E to F, draw the full line E F, for the fifth ſide of the incloſure.

After the ſame manner proceed orderly to the angles F, G, H, and K; then placing the protractor, making marks againſt the reſpective degrees, drawing indefinite lines, and ſetting off the reſpective diſtances, as above, you will have the *plot* of the whole incloſure, A B C, &c. Such is the general method of *plotting* from this inſtrument; but it muſt be obſerved, that, in this proceſs, the ſtationary lines, i. e. the lines wherein the circumferentor is placed to take the angles, and wherein the chain is run to meaſure the diſtances, are, properly, the lines here *plotted*. When, therefore, in ſurveying, the ſtationary lines are at any diſtance from the fence or boundaries of the field, &c. off-ſets are taken, i. e. the diſtance of the fence from the ſtationary line is meaſured at each ſtation; and even at intermediate places, if there prove any conſiderable bends in the fence.

In *plotting*, therefore, the ſtationary lines being laid down, as above, the off-ſets muſt be laid down from them; i. e. perpendiculars of the proper lengths muſt be let fall at the proper places from the ſtationary lines. The extremes of which perpendiculars, being connected by lines, give the *plot* deſired.

If, inſtead of going round the field, the angles and diſtances have been all taken from one ſtation, the proceſs of *plotting* is obvious, from the example above; all here required, being to protract, after the manner already deſcribed, the ſeveral angles and diſtances, taken from the ſame ſtationary point in the field; from the ſame point or centre on the paper. The extremities of the lines thus determined, being then connected by lines, will give the *plot* required.

If the field has been ſurveyed from two ſtations, the ſtationary lines are to be firſt *plotted*, as above; then the angles and diſtances taken from each, to be laid down from each reſpectively.

PLOTTING, *the method of, where the angles are taken by the theodolite*, i. e. *by back-ſight and fore-ſight line* (it is called) is ſomewhat different. To prepare the angles for *plotting*, the quantity of each muſt firſt be found, by ſubtracting the degrees of the fore-ſight and back-ſight from each other: the remainder is then the angle to be protracted. The uſe of parallel lines is here excluded; and inſtead of laying the protractor conſtantly on, or parallel to meridians, its direction is varied at every angle. The practice is thus:

Suppoſe the former incloſure to have been ſurveyed with the theodolite, after the manner of back-ſight and fore-ſight; and ſuppoſe the quantity of each angle to be found by ſubtraction.

An indefinite line is drawn at random, as A K, *fig.* 43; and on this the meaſured diſtance, e. gr. 8 chains, 72 links, is ſet off, as in the former example: if now the quantity of the angle A have been found 140°, the diameter of the protractor is to be laid on the line A K, with the centre over A; and againſt the number of degrees, viz. 140, a mark made, an indeterminate line drawn through it, and the diſtances of the line A B laid down from the ſcale thereupon.

Thus we gain the point B; upon which laying the centre of the protractor, the diameter along the line A B, the angle B is protracted, by making a mark againſt its number of degrees, drawing an occult line, and ſetting off the diſtance B C, as before.

Then proceed to C, laying the diameter of the protractor on B C, the centre on C protracts the angle C, and draw the line C D: thus, proceeding orderly to all the angles and ſides, you will have the *plot* of the whole incloſure A B C, &c. as before.

PLOTTING *ſcale*, a mathematical inſtrument uſually of box wood, ſometimes of braſs, ivory, or ſilver, and either a foot, or half a foot long, and about an inch and a half broad.

It is denominated from its uſe in PLOTTING of grounds, &c.

On one ſide of the inſtrument (repreſented *Tab.* II. *Survey. fig.* 44.) are ſeven ſeveral ſcales, or lines, divided into equal parts. The firſt diviſion of the firſt ſcale is ſubdivided into ten equal parts, to which is prefixed the number 10, ſignifying that ten of thoſe ſubdiviſions make an inch; or that the diviſions of that ſcale are decimals of inches.

The firſt diviſion of the ſecond ſcale is likewiſe ſubdivided into 10, to which is prefixed the number 16, denoting that ſixteen of thoſe ſubdiviſions make an inch. The firſt diviſion of the third ſcale is ſubdivided in like manner into 10, to which is prefixed the number 20. To that of the fourth ſcale is prefixed the number 24; to that of the fifth, 32; that of the ſixth, 40; and that of the ſeventh, 48; denoting the number of ſubdiviſions equal to an inch, in each, reſpectively.

The two laſt ſcales are broken off before the end, to give room for two lines of chords, marked by the letters C C.

On the back-ſide of the inſtrument is a diagonal ſcale, the firſt of whoſe diviſions, which is an inch long, if the ſcale be a foot, and half an inch, if half a foot, is ſubdivided, diagonally, into 100 equal parts; and at the other end of the ſcale is another diagonal ſubdiviſion, of half the length of the former, into the ſame number of parts; viz. 100.

Next the ſcales, is a line divided into hundredth parts of a foot, numbered 10, 20, 30, &c. and a line of inches ſubdivided into tenths, marked 1, 2, 3, *&c.*

PLOTTING *ſcale, uſe of the.* 1. *Any diſtances being meaſured with the chain, to lay it down on the paper.* Suppoſe the diſtance to be 6 chains, 50 links. Draw an indefinite line; ſet one foot of the compaſſes at figure 6 on the ſcale, e. gr. the ſcale of 20 in an inch, and extend the other to five of the ſubdiviſions, for the 50 links: this diſtance, being tranſferred to the line, will exhibit the 6 chains 50 links, required.

If it be deſired to have 6 chains 50 links, take up more or leſs ſpace, take them off from a greater or leſſer ſcale, i. e. from a ſcale that has more or fewer diviſions in an inch.

To find the chains and links contained in a right line, as that juſt drawn, according to any ſcale, e. gr. that of 20 in an inch. Take the length of the line in the compaſſes, and, applying it to the given ſcale, you will find it extend from the number 6 of the great diviſions to five of the ſmall ones; hence the given line contains 6 chains 50 links.

PLOTTING-*table*, in *Surveying*, is uſed for a plain *table*, as improved by Mr. Leighton, who has obviated a good many inconveniencies attending the uſe of the common plain *table*. See Phil. Tranſ. N° 361. ſect. 1.

PLOTUS, in *Ornithology*, a genus of the *anſeres*, in the Linnæan ſyſtem: its characters are, that the beak is ſtreit, ſharp, and denticulated; the face covered, and the feet palmated, with the toes joined. Of this genus there is only one ſpecies, which is the ANHINGA of Marcgrave.

PLOVER, *golden*, or *green*, *pluvialis*, in *Ornithology*, the CHARADRIUS *pluvialis* of Linnæus; an elegant ſpecies, which is often found on our moors and heaths, in the winter time, in ſmall flocks. Its weight is nine ounces, its length eleven inches and breadth twenty-four; the bill is ſhort and black; the feathers on the head, back, and coverts of the wings, are black, beautifully ſpotted on each ſide with light yellowiſh green; the breaſt brown, marked with greeniſh oblong ſtrokes; the belly white, the middle feathers of the tail barred with black and yellowiſh green, the reſt with black and brown, and the legs black. Mr. Pennant has obſerved ſome variety in theſe birds, probably owing to age or ſex; ſome having black bellies, others with a mixture of black and white, others with bluiſh legs, and ſome with a ſmall claw in the place of the hind toe. This bird, which lays four eggs, pointed at the leſſer end and of a dirty white colour, irregularly marked with black ſpots, breeds on ſeveral of our unfrequented mountains: it makes a ſhrill whiſtling noiſe, and may be enticed within ſhot by a ſkilful imitator of the note. Pennant.

PLOVER, *horned*. See LAPWING.

PLOVER, *leſſer*, CHARADRIUS *minutillus* of Linnæus. See DOTTEREL.

PLOVER, *long-legged*. See HIMANTOPUS.

PLOVER, *Norfolk*, or *greater*. See OEDICNEMUS, and *Stone* CURLEW.

PLOVER, *ringed*. See *Sea*-LARK, and *Tab. Birds*, N° 45.

PLOVER-*ſtone*, in *Lithology*, a name uſed in ſome parts of England for the GODWIT, or *ægocephalus* of authors.

PLOUGH, or PLOW, in *Agriculture*, a popular machine for the breaking up of ground; conſiſting of a train or carriage with two large irons, the one pointed, the other edged; ſerving to cut and open the land, and draw furrows therein. The parts of the PLOUGH are, the *plough-beam*, the *handle*, *tail*, *ſtilts*, *holes* or *mortiſes*, *neck* or *ſhare-beam*, *earth-board*, *mould-board*, *breaſt-board*, *furrow-board*, *ſtretch-board*, &c. the *ſheath*, *ſhare-iron*, *coulter*, *plough-pin*, and *cellar-links*, *plough pillar*, and *boſſers*, and ſometimes *wheels*.

The advantage of digging with the ſpade, or ſuch other inſtrument, very naturally led men to the invention of the *plough*, as a much more expeditious way of doing the ſame thing; that is, cutting and breaking the earth into ſmall pieces; but in this the ſpade has the advantage of the common *plough*, as it goes deeper, and divides the earth more minutely; but the improvement of the common *plough* into the four-coultered one ſhews, that it is eaſy to make the *plough* perform this office as much better, as it uſually does it worſe than the ſpade.

The *plough* deſcribed by Virgil had no coulter; and at this time the *plough* in Italy and the ſouth of France, have none; and the *plough* in Greece, and in the eaſtern nations in general, are of the ſame kind. Neither is it indeed poſſible to uſe a coulter in ſuch a *plough*; becauſe the ſhare does not cut the bottom of the furrow horizontally, but obliquely: in going one way it turns off the furrow to the right hand, but in coming back it turns it off to the left; therefore, if it had a coulter, it muſt be on the wrong ſide every other furrow.

It is a great miſtake in thoſe who ſay that Virgil's *plough* had two earth-boards, for it had really none at all; but the ſhare itſelf always going obliquely, ſerved inſtead of an earth-board; and the two ears, which were the corners of a piece of wood lying under the ſhare, did the office of ground-wreſts.

This faſhion of the *plough* continues to this day in thoſe countries; and in Languedoc this ſort of *plough* performs tolerably well when the ground is fine, and makes a ſhift to break up light land. This is the ſort of land that is common in the Eaſt; and the arable lands about Rome being never ſuffered to be fallow ſo long as to come to turf: this *plough* ſucceeds very well in ſuch places, but it would be wholly impoſſible to turn up what in England we call ſtrong land with it.

The Engliſh *plough* is therefore different from theſe, as the ſoil is different. Our *plough*, where well made, cut off the furrow at the bottom horizontally; and therefore, it being as thick on the land ſide as on the furrow ſide, the *plough* cannot break it off from the whole land at ſuch a thickneſs (being ſix times greater than what the eaſtern *plough* have to break off), and for this purpoſe it muſt have, of neceſſity, a coulter to cut it off: by this means the furrow is turned perfectly whole, and no part of the turf of it is broken; and if it lie long without new turning, the graſs from the edges will ſpread, and form a new turf on the other ſide, which was the bottom of the furrow before the turning, but is now become the ſurface of the earth, and will ſoon become greener with graſs than it was before *ploughing*.

If the ſoil be ſhallow, it may be broken up with a narrow furrow, which will the ſooner be brought into tilth; but if it be a deep ſoil, the furrows muſt be proportionably enlarged, or elſe a great part of the good mould will be left unmoved, and ſo be loſt. The deeper the land is, the worſe it is broke by one coulter; that is, it is broke into larger furrows, and it requires ſuch repeated labour to conquer this, that often the beſt land will ſcarce pay the tillage.

This gives an opportunity to ſervants to cheat their maſters. They *plough* ſuch deep land with a ſmall furrow, and ſhallow, to the end that the turf and furrows may be broken the ſooner, and the ſuperficial part made fine. They pretend the *plough* will go deeper the next time; but this is never the caſe.

This ſort of land muſt not be *ploughed* the ſecond time in wet weather; for this will cauſe the weeds to multiply, and the earth will be formed into thick and heavy clods where trodden: and in dry weather the reſiſtance of the untouched earth below, and the ſlight preſſure of the *plough* above, will always be reaſons why the *plough* will enter no deeper the ſecond time than it did the firſt.

Another way to conquer a ſtrong turf, is to plough it up firſt with a breaſt-*plough*, very thin; and when the ſward is rotten, then it is to be *ploughed* to the proper depth: but this method is liable to great objections; it is very troubleſome and expenſive, and, if the turf be pared off in the winter, or early in the ſpring, it is a chance but the rains come on, and ſet it to growing faſter than before: if, on the other hand, it be pared later in the year, though the turf be thoroughly killed by the ſucceeding dry weather, yet the time is loſt, and the farmer loſes the ſowing ſeaſon for wheat, which is the proper corn for ſuch ſtrong land. Tull.

The contrivance and ſtructure of *ploughs* are various, according to the fancy of the maker, or the ſoil and uſes to which they are applied; ſo that it would be endleſs to give a particular deſcription of all: but that this work may not be thought eſſentially defective in this particular, we ſhall here ſubjoin a brief account of ſeveral kinds of *ploughs* that have fallen under our notice, and that have been recommended by the advantages attending their ſtructure.

The common *dray* or *draw* PLOUGH is well known: this is made without either wheel or foot, of an eaſy draught, and beſt in winter for miry clays, where the land is ſoft: but in ſummer and eſpecially in hard ſoil it is inconvenient, becauſe its point will be continually riſing out of the ground.

In the *double* PLOUGH, one *plough* is fixed to the ſide of another, ſo that by means of four horſes and two men, a double furrow is *ploughed* one by the ſide of the other.

There is another kind of *double plough* whereby two furrows are *ploughed* at once, one under another, by which the earth is ſtirred up to the depth of twelve or fourteen inches, which in many caſes is of great benefit.

This purpoſe is well anſwered by the *double* PLOUGH invented by Mr. Randal, (ſee *Tab. Agriculture, fig.* 7.) which, by parting the ſhare point to the middle of the interval left by the horſe-hoe, throws the mould off each ſide of it, at the ſame time, towards the rows, and earths them up to what degree the ploughman pleaſes: and alſo by the *double lifting* PLOUGH, (*fig.* 8.) which paſſes into all the trenches made by the *double plough*, and by means of the irons, running up on each ſide of the *plough*, will lift up the mould, and throw it upon the old ridges; ſo that the ground, thus *ploughed*, will lie in deep trenches and high ridges.

The *double wheeled* PLOUGH has of late years become univerſally uſed in many counties, and is found much preferable to the *ploughs* they uſed before; there is an objection

objection to it indeed, in regard to some stiff and miry lands, in which the wheels become clogged up, and cannot turn. This, however, is easily remedied by twisting thumb ropes of straw about the iron circle and spokes of the wheels; these spreading as they turn, and as the circle twist bears upon the ground, throw off the dirt, and never clog. The two principal parts of this *plough* are the head and the tail: the *plough*-head contains the two wheels A, B (*fig. 6.*) and their axis, or spindle of iron, passing through the box C, and turning round both in it and in the wheels. There are fixed perpendicularly in this box, two crow-staves D, D, which are flat and narrow boards, each having in it two rows of holes, whereby to raise or sink the beam of the *plough*, by pinning up or down the pillow E, to increase or diminish the depth of the furrow. Behind are the gallows F, through which the crow-staves pass at the top by mortises, into which they are pinned; and to these are fastened what are called the wilds, G, with links and crooks of iron, by which the whole *plough* is drawn in the working. From the box to the centre of the beam there is carried an iron-chain, consisting of four, five, or more long links, and called the tow-chain, H: this fastens the *plough*-tail to the *plough*-head. It is fixed to an iron collar, I, fastened in the beam at one end, and the other passes through a hole in the middle of the box, and is pinned in by the flake K. From the same iron-collar to which the tow-chain is fixed, there is another chain fastened, called the bridle-chain L: this runs above the beam, as the tow-chain does below it, and is composed of smaller and more numerous links. At the up-end, as the tow-chain enters the box of the *plough*, this bridle-chain is fixed to the top of what is called the flake of the *plough*; this is a perpendicular stick, carried up parallel with the left crow-staff, and pretty near it, and fastened to it by a wyth or rope, M, or by the end of the bridle-chain itself, when that is long enough. This flake is also fastened in its lower part, under the gallows, to the same crow-staff, by another wyth or piece of rope.

These are the parts of which the head-part of the *plough* is composed. The *plough*-tail consists of the beam, N, carried from the head to the very extremity, and serving as the support and base of all the rest. A little below the collar, to which the tow-chain and bridle-chain are fastened, this beam is pierced with a large hole, which lets through the coulter, O: this is a long and narrow piece, terminating in an edge, and reaching just to the share, P; and it is fixed immoveable in its place by means of a wedge which is driven into the hole of the beam with it: the office of this coulter is to cut the earth as it is thrown up by the share. Behind these, the same beam is pierced with two more holes, one very near its end: these give passages to two oblong pieces, called the fore-sheat Q and hinder-sheat R, by which the *plough*-share is supported in its place. To the top of the hinder-sheat there is fastened a short handle, S, by a wooden pin. Parallel to the hinder-sheat there runs up a piece of wood of much the same form, called the drock, T; and to this is fastened another horizontal piece, called the ground-swill, V: these are all on the right hand side of the *plough*, and parallel with the fore-sheat. There runs another piece, of much the same form with it, on the right hand; and the bottom of this is the earth-board, whose fore-part, W is seen before the sheat. The long handle, X, of this whose fore-part appears before the sheat, which reaches as far as that of the sheat, is fastened to the drock by a pin at *a*, the other end of which goes into the beam. Near the lower end of the fore-sheat, there are two flat pieces of iron, called the double retch, *z*, which pass from the two sides of it up to the beam; and, being let through it, are fastened to the upper part by screws and nuts at *b* and *c*. These keep the sheat in its place.

PLOUGH, *draining*, or *trenching*, is an instrument used to cut out the trenches, drains, and carriages in meadow and pasture-ground. It is also used for cutting the sides of turf even, which are to be laid down again either in the same, or in some other places.

It consists of a long handle, with a knob or button at the end, and at the other end it turns upward like the foot of a *plough*, to slide in the ground. In this part is placed a coulter, of the length proportioned to the depth to be cut, and with a sharp edge; this has two wheels to make it run easy, and does a great deal of business in a very little time.

The *trenching-plough* used about Caxton, in Cambridgeshire, is larger than ordinary, and has two coulters, one before the other, which, bending inwards, cut each side of the trench. The mould-board is longer than common, in order to cast the turf a great way off from the trench. It cuts a trench a foot wide at bottom, a foot and a half at top, and a foot deep, and is drawn with twenty horses. The importance of draining wet land induced the Society of Arts, &c. to propose a premium of fifty guineas for the best *plough* or machine, of the simplest construction, that should, with the least force, cut a new drain or trench one foot in perpendicular depth, one foot eight inches wide at top, and ten inches at the bottom, sloping equally on each side, the contents of which were also to be thrown equally on each side.

This premium was adjudged to Mr. Cuthbert Clarke, who invented the *double* mould-board *drain-plough*, represented *Tab.* II. *Agriculture, fig.* 10. which answered exceeding well in meadow ground, but could not be drawn in a stiff clay with the force of eight horses.

A, B, and C are the three coulters; D, E, F, the nuts and screws that fasten the coulters to the beams; G, H, I a wheel or roller, which prevents the *plough* from sinking too deep into the earth; this roller is divided into three parts by circular pieces of iron, which project beyond it, and cut the turf into three parts; the coulters follow in the same track, and finish that part of the work. K, K, are the centres on which the roller turns; L, L, the nuts and screws which fasten the iron arbor in which the pivots of the roller turn to the beams; the arbors are kept in their places by means of the two iron braces *f*, *f*. M is a large iron hook, to which the tow-chain, N, by which the *plough* is drawn, is fastened: O is the head of the *plough*, into which the beams are mortised; P, Q, R are the three beams; S is a shoe of iron, the whole part from S to A being of that metal, and into which the hoof of the *plough* is inserted; T is a shelf on which the mould rises after it is cut by the coulter and fore-part of the share, till it is thrown out of the trench by the mould-boards V, V; W, W is a band of iron, which fastens the hinder part of the *plough* to the main or middle beam; X is the head of a tenon, which fastens the mould-boards and hoof of the *plough* to the main-beam; Z, Z are the two handles, like those of a common *plough*, kept secure, and in their proper position by the board *a b*; *c*, *d*, represent the surface of the ground when the *plough* is at work; so that all the parts below that dotted line are under the ground when the drain is cutting: *f e g* is the angle which the coulters make with a line drawn parallel to the horizontal plane, and is nearly equal to 45°: though by being so large, the *plough* tends too much to get into the earth; and, therefore, when the soil is stiff and a great force is required to draw the *plough*, it cannot be properly held by the handles, even by the force of six men, without turning over. This inconvenience might be removed by diminishing the angle *f e g* to about 33°. Mr. Clarke constructed another improved *plough* of this kind, but the premium of the society was assigned to Mr. Knowles, whose *plough* cut a trench of one foot one inch in depth, twenty inches broad at top, and ten at bottom, laying the earth and turf on each side of the trench in the most exact manner.

Mr. Clarke's *single mould-board drain-plough* is represented *fig.* 11. Its construction is very similar to that already described: A is the regulating wheel, which, by the radius F, may be so adjusted as to adapt the *plough* for cuts of various depths. H, H are two coulters fastened to the wings of the share, and screwed into the bar G; they are so extended as to make the designed breadth at top, and equally sloping on each side. In whatever way the cut is made, the contents are forced up the inclined plane C, which is supported by the heel D, as in the other *plough*; and the mould-board B turns the furrow clear of the drain. This *plough* requires only four horses. Clarke's Theory and Practice of Husbandry, &c. p. 332, &c.

PLOUGH, *drill*, is an instrument contrived for sowing corn in drills or rows, according to the method of the new husbandry.

The first inventions of this kind were the *drill-plough* of Mr. Worlidge, and the sembrador of Lucatello; but neither of these or any other of the kind answered in practice, till Mr. Tull contrived his *drill-plough*; furnished with shares, hoppers, and a harrow, so disposed, that the furrows are formed, the seed dropped into them, and covered at the same time. This curious machine is, from its nature and extensive use, so complicated, that it would lead us beyond our proper limits to give such a minute description of it, as would be sufficient to afford our readers an adequate and just idea of it. Such a description illustrated by various figures, together with the inventor's latest improvements, may be found in his Horse-hoeing Husbandry, chap. 21, 22, and Appendix. See DRILL.

Mr. Clarke, whose name has been already mentioned, has invented a *drill-plough*, (see *fig.* 12.) I I are a pair of shafts; J, L is a bar, which strengthens the hinges of the shafts; E, E, E are three mortises to receive the three coulters; A represents the shape of the coulter, the bulb at the end of which makes the groove or furrow for the seeds; B, B, B are oval holes to receive the piece

N, which conveys the seeds down to the furrows made by the coulters; *a*, *a*, *a*, are three flues or damsels, like those of a corn mill, to receive the seeds from the three hoppers R, R, R, which are placed about eight or nine inches above the board, containing the holes B, B, B, but parallel to it, and supported by the frame C, which frame is supported by seven pillars, such as *q*. The hoppers and their flues being thus suspended, and the flues pinned to a flat bar as represented by B, B, B, and held to their station by an easy spring, they are jogged by the call or square piece of wood fixed upon the spindle, passing through the trundle O: this trundle is turned by the cog wheel H, which is turned by the axle-tree *Z Z* of the two wheels G G: *g* is the bridge for supporting the spindle and trundle. When the seed, jogged by the call, is made to trickle out, a person takes hold of the handles P P, and directs the whole machine, so that the seeds will be covered in by the harles *d*, *d*, *d*; which turn upon a pin or hinge at the fore end, and are loaded at the hind end with lead or any other heavy substance, as represented by the balls over *d*, *d*, *d*, to make the feet sink in the soil. This instrument may be made to shift its drills at pleasure, or to drill always at one distance. Clarke ubi supra.

For the method of constructing *drill-ploughs*, invented by M. de Chateauvieux and Du Hamel, see Farmer's Dict. art. DRILL-*plough*.

Mr. Randall, Mr. Craik, and Mr. T. Hope, have likewise constructed *drill-ploughs*.

The *four-coulered* PLOUGH of Mr. Tull, (*see fig.* 13) is different in some respects from the *double-wheeled plough* already described, though in general founded upon it.

Its beam is ten feet four inches long, whereas that of the common *plough* is but eight. The beam is straight in the common *plough*, but in this it is straight only from *a* to *b*, and thence arched: so that the line let down perpendicularly from the corner at *a*, to the even furface on which the *plough* ſtands, would be 11½ inches; and if another line were let down from the turning of the beam at *b* to the ſame furface, it would be one foot eight inches and a half: and a third line let down to the furface from the bottom of the beam at that part which bears upon the pillow, will ſhew the beam to be two feet ten inches high in that part. At the diſtance of three feet two inches from the end of the beam *a*, at the *plough*-tail, the firſt coulter, or that next the ſhare, is let through; and at thirteen inches from this, a ſecond coulter is let through: a third at the ſame diſtance from that; and, finally, the fourth at the ſame diſtance from the third, that is, thirteen inches: and from *a* to *b* is ſeven feet.

The crookedneſs of the upper part of the beam of this *plough* is contrived to avoid the too great length of the three foremoſt coulters, which would be too much, if the beam was ſtraight all the way; and they would be apt to bend and be diſplaced, unleſs they were very heavy and clumſy. Aſh is the beſt wood to make the beam of, it being ſufficiently ſtrong, and yet light.

The ſheat in this *plough* is to be ſeven inches broad. The fixing of the ſhare in this, as well as in the common *plough*, is the niceſt part, and requires the utmoſt art of the maker; for the well-going of the *plough* wholly depends upon the placing this. Suppoſing the axis of the beam, and the left ſide of the ſhare, to be both horizontal, they muſt never be ſet parallel to each other; for if they are, the tail of the ſhare bearing againſt the trench as much as the point, would cauſe the point to incline to the right hand, and it would be carried out of the ground into the furrow. If the point of the ſhare ſhould be ſet ſo, that its ſide ſhould make an angle on the right ſide of the axis of the beam, this inconvenience would be much greater; and if its point ſhould incline much to the left, and make too large an angle on that ſide with the axis of the beam, the *plough* would run quite to the left hand; and if the holder, to prevent its running quite out of the ground, turns the upper part of his *plough* towards the left hand, the pin of the ſhare will riſe up, and cut the furrow diagonally, leaving it half *unfurrowed*. To avoid this and ſeveral other inconveniencies, the ſtraight ſide of the ſhare muſt make an angle upon the left ſide of the beam; but that muſt be ſo very acute a one, that the tail of the ſhare may only preſs leſs againſt the ſide of the trench than the point does.

This angle is ſhewn by the pricked lines at the bottom of *fig.* 9, where *e f* is ſuppoſed to be the axis of the beam let down to the ſurface, and *g f* parallel to the left ſide of the ſhare: and it is the ſubtenſe *e g* that determines the inclination which the point of the ſhare muſt have towards the left hand. This ſubtenſe, ſays Mr. Tull, at the fore-end of an eight feet beam, ſhould never be more than one inch and a half, and whether the beam be long or ſhort, the ſubtenſe muſt be the ſame.

The great thing to be taken care of, is the placing the four coulters; which muſt be ſo ſet, that the four imaginary places deſcribed by their four edges, as the *plough* moves forward, may be all parallel to each other, or very nearly ſo; for if any one of them ſhould be very much inclined to, or ſhould recede much from either of the other, then they would not enter the ground together. In order to place them thus, the beam muſt be carefully pierced in a proper manner. The ſecond coulter-hole muſt be two inches and a half more on the right hand than the firſt, the third muſt be as much more to the right of the ſecond, and the fourth the ſame meaſure to the right hand of the third; and this two inches and a half muſt be carefully meaſured from the centre of one hole to the centre of the other. Each of theſe holes is a mortiſe of an inch and quarter wide, and is three inches and a half long at the top, and three inches at the bottom. The two oppoſite ſides of this hole are parallel to the top and bottom, but the back is oblique, and determine the obliquity of the ſtanding of the coulter, which is wedged tight up to the poſt.

The COULTER is two feet eight inches long, before it is worn; the handle takes up ſixteen inches of this length, and is allowed thus long, that the coulter may be driven down as a point wears away.

As to the wheels, the left hand wheel is twenty inches diameter, and that on the right hand two feet three inches, and the diſtance at which they are ſet from each other is two feet 5½ inches. Tull's Horſe-hoeing Huſband. p. 294, ſeq.

PLOUGH, *hoe*, an inſtrument adapted to the new HUSBANDRY, and to the operation of HOEING, for deſtroying weeds, keeping plants clean, and ſtirring the ground. See *Horſe*-HOE.

The *bar-plough* invented by Mr. Tull, is repreſented in *fig.* 14. A is the beam and *plough*-tail; being much the ſame with that of the common *plough*, *fig.* 9. The ſhare from its tail to the fore-part of its ſocket is two feet one inch long, and from thence to the end of the point ten ½ inches. B is the plank, two feet ſeven ½ inches long, two ½ inches thick, and nine inches broad. C, D are the nuts of the two ſcrew-pins, which hold up the beam to the plank: E is the nut of the draw-pin, which pin has a crook underneath, to which one of the links of the ſhort chain of the whipper is faſtened, for drawing the *plough*: F, G are the two limbers, ſcrewed on to the plank by four ſcrews and nuts, and having their inferior ſurface parallel to the plank, and to the upper ſurface of the fore-end of the beam: theſe limbers bend outwards from each other all the way, till they come within about a foot of the chain; and the diſtance of their fore-ends is two feet eight inches: they are to be made ſtrong and ſtiff, and of ſuch a length, that there may be room for the horſe before the bar, H, which holds them at their proper diſtance: I is the whipper: K, L are its *neſtches*, to which the traces, both of the thiller and of the horſe next before him, are faſtened.

This *plough* is made to go deeper or ſhallower by the chain of the limbers. In hoeing near the young plants, the firſt or ſecond time, the earth is prevented from running over to the left ſide of the *plough*, and burying them, by nailing a very thin ſquare piece of board to the ſheat with one corner bearing at or below *a*, and its other lower corner bearing on the back of the coulter on its left ſide at *b*, its upper corner reaching to *c* or higher: its fore end is tied on to the coulter by a leathern thong paſſing through a hole very near the end of the board. The lower edge of the board muſt come no lower than the pricked line *a b*; which at *b*, is juſt even with the ſurface of the ground, before it is raiſed by the ſhare. For a farther account of the ſtructure and uſe of this *plough*, ſee Tull, ubi ſupra, chap. 23.

PLOUGH, *paring*, is an inſtrument uſed in ſeveral parts of England, for paring off the ſurface of the ground, in order to its being burnt.

Mr. Bradley has given the following deſcription of a very ſimple inſtrument of this kind: from A to A (*fig.* 15.) is the *plough*-beam, about ſeven feet long, mortiſed and pinioned into the block B, which is of clean timber without knots. C, C are the theaths or ſtandards, made flat on the inſide, to clole equally with the paring plate, and faſtened to it with a bolt and key on each ſide, as at D. E is the paring plate of iron laid with ſteel, about four inches wide, and from twelve to eighteen inches long. This plate muſt be made to cut on the ſides, which are bolted to the ſtandards, as well as at the bottom part. F, F are two iron braces, to keep the ſtandards from giving way: theſe ſtandards muſt be mortiſed near their outſides, and through the block. G, G are the *plough* handles, which muſt be fixed ſlope-ways between the beam and the ſtandards. The pin-holes in the beam, the uſe of which is to make this *plough* cut more or leſs deep, by fixing the wheels nearer to or farther from

the paring plate, ſhould not be above two inches aſunder.

PLOUGH, *Rotheram*, or *paring*, is a *plough* of very ſimple conſtruction, and eaſily worked. The left or land ſide of this *plough* is repreſented *fig.* 16. A B is the beam, C D the ſhank, E F D the main handle, F R the ſmaller handle, G H the coulter, K I the ſock or ſhare, N P the bridle, O the fly-hand, and M L a piece of wood in place of a head. The whole of this *plough* ſhould be made of aſh or elm; the irons ſhould be ſteeled and well-tempered; and that part of the *plough* which is under ground in rolling, ſhould be covered with plates of iron. The difference between this and the common *plough* ſeems to conſiſt in the bridle at the end of the beam, by which the *ploughman* can give the *plough* more or leſs land by notches at N, or make it cut deeper or ſhallower by the holes at P; in the coulter or ſhare, which are to made and ſet as to cut off the new furrow without tearing; and in the mould-board, which is ſo ſhaped at firſt to raiſe a little, and then gradually turn over the new cut furrow with very little reſiſtance. But the greateſt advantage attending it in its being ſo eaſy of draught, that it will do double the work of any common *plough*. Mr. Clarke has alſo conſtructed a *plough*, which he ſays, may be worked with the leaſt force poſſible. Clarke, *ubi ſupra*, p. 347.

For an account of the improvements made in wheeled *ploughs* by Meſſrs. de Chateauvieux and Du Hamel, we muſt refer the reader to the Farmer's Dictionary, art. PLOUGH.

PLOUGH, *the ſingle-wheel*, is lighter than moſt other wheel-*ploughs*, and may be uſed almoſt in any kind of ground; though in Suſſex they have a *plough* of this kind, wide in the breech, and of heavy draught.

PLOUGH, *Spaniſh*, varies much in its make from our common *plows*. It is a kind of ſamicircle pitched on one end, with the convex ſide turned to the ploughman; and the concave ſide (a little inclined) to the horſe. Its tail is in a right line with the ſhare. With this *plough* and one horſe the Spaniards *plow* two or three acres of their light ground in a day. See *fig.* 17.

PLOUGH, among *Book-binders*, is a tool wherewith they cut the leaves of books ſmooth. See BOOK-BINDING.

PLOUGH, or *plow*, in *Navigation*, an ancient mathematical inſtrument made of box or pear-tree, and uſed to take the height of the ſun, or ſtars, in order to find the latitude.

It admits of the degrees to be very large, and has been much eſteemed by many artiſts; though now generally diſuſed amongſt us.

PLOUGH-*bote*, in our *Old Writers*, a right of tenants to take wood to repair *plough*s, carts, and harrows, and for making rakes, forks, &c.

PLOUGH, *gallows of a*. See GALLOWS.

PLOUGH-*land*, a name given by the farmers to the foremoſt half of the *plough*, or that part containing the two wheels and their ſpindle, the box, the crow-ſtaves, the pillow, the wilds, the tow-chain, and bridle-chain, and the ſhake; all which, ſee under their ſeveral heads, and under the article PLOUGH.

PLOUGH-*land*, *carucata terræ*, in our *Ancient Cuſtoms*. See CARUCATE.

PLOUGH-ALMS, a duty anciently of a penny, paid to the church for every *plough-land*, or hide of land.

Dequalibet carucata juxta inter Paſcha & Pentecoſten unum denarium, qui dicitur plou-almes. Monaſt. Ang.

PLOUGH-MONDAY, the next Monday after Twelfth-day. The ploughmen, in the north-country, on this day, draw a *plough* from door to door, and beg *plough* money for drink.

PLOUGH, *handles of a*, the name given by Farmers, to the two pieces of the *plough* faſtened to the earth-board, and to the heeſt, and ſerving the ploughman to reſt his force upon in the guiding of the *plough*. When they are conſiderably long, the *plough* is always guided the better, and the land is better tilled; but the lazy ploughmen are apt to cut them off ſhorter, that by bearing their whole weight upon them, they may, in a manner, ride, inſtead of walking. If they ſhould ride, in this manner, on the long handles, they would tilt up the end of the beam, and raiſe the *plough* out of the ground.

PLOUGH-*irons*, a name given by the farmers to that part of a *plough* which contains the beam, the coulter, or coulters, the ſhare, the throat and under-throat, the earth-board and handles, as alſo the ſtork, the ground-wriſts, and the retches: all which ſee under their ſeveral heads, and under the article PLOUGH.

PLOUGHING, or PLOWING, one of the principal operations in agriculture, performed with the *plough*.

Ploughing is principally either that of *lays*, or of *fallows*.

PLOUGHING *of lays*, is the firſt cutting up of graſs-ground for corn; to which ſafe the Engliſh writers on agriculture always ſuppoſe, that the land is to be ſometimes followed; and they recommend to plough as deep at firſt as the nature of the ſoil will allow; directing alſo to turn the earth upſide down, that the ſward or turf may be ſooner rotten. On the rich lands in Scotland they purſue a method the reverſe of this: they commonly ſow after one *ploughing* of graſs-ground, and plough as ſhallow and narrow as poſſible, and let the turf as exactly as poſſible upon its edge. In this way it may be expected, that after ſeed, the turf will be in ſtaving in ſuch a condition as to be eaſily broken by the harrows, and fit for being ſown with corn, or to be ſummer fallowed, and ſown with wheat. With reſpect to their barren lands, they purſue the Engliſh method, *ploughing* deep and turning the turf over on its back. There is another method propoſed for opening up graſs-ground, and that is by trench-*ploughing*. This manner of *ploughing* is performed by one plough following another in the ſame track. The plough that goes firſt turns over the ſward or turf, and the ſecond turns up ſome inches of ſoil upon it. By this method there is ſufficient nouriſhment provided for the crop, and the ſward is rotten before the next ſeaſon.

PLOUGHING *of fallows*, called *after-following*, is a preparing of land by *ploughing*, long before it be *ploughed* for ſeed. This is a conſiderable benefit to all lands, few of which will bear above two or three crops ſucceſſively without ſuch reſpite. Hence lands uſe to hire their tenants to do it once in three years. When this is done twice, it is called *twi-following*; when thrice, *tri-following*, &c.

The firſt is as ſoon as the huſbandman has done ſowing his corn; and this is to be very ſhallow, well turned, and clapped cloſe together. The ſecond is in June, when they go to the full depth. The third, about the beginning of Auguſt. If it riſe full of clods, they harrow it down; but then they ſoon ſtrick-*fize*, or *plough* it up again into ridges.

In Staffordſhire, beſides the three ſummer fallowings, they uſually give their land a winter fallowing. Pliny commends the *ploughing* of lands four times; and ſo does Virgil:

Illa ſeges demum votis reſpondet avaris
Agricolæ, bis quæ ſolem, bis frigora paſſa —Georg. lib. i.

This is an ancient part of huſbandry; Xenophon, Pindar, and Virgil recommended it:

Alterno idem tempore, ceſſare novalis,
Et ſegnem patiere ſitu durescere campum. —Georg. lib. i.

The great end of *ploughing* is to break and pulverize the ſoil as much as poſſible, for the deſtruction of weeds, the more eaſy ſpreading of the roots of plants, and their better nouriſhment. This operation ſhould therefore be often repeated, and by ſuch ploughs as have two or four coulters; the furrow ſhould not be made too broad, and care ſhould be taken that it be made ſufficiently deep. See PLOUGH, and HUSBANDRY.

If between each *ploughing* of the land a harrow with long teeth is made uſe of to tear and break the clods, it will be of great ſervice; eſpecially if the land is ſtrong: for the more it is ſtirred by different inſtruments, the better will the parts be ſeparated and pulverized. The common method, as practiſed by the farmers when they fallow their land, is far from anſwering their intention, for they *plough* up the ground, leaving it in great clods for ſome months, and frequently during this time, thiſtles and all bad weeds are ſuffered to grow upon the land, and exhauſt the goodneſs of it; and perhaps juſt before the ſeeds are ſown, they give it two more *ploughings*. This is what the farmers call good huſbandry: but inſtead of this method they ſhould labour the ground often with the plough, a harrow, and heavy roller, to break and ſeparate the parts, and never ſuffer any weeds to grow upon the land during its lying fallow, they would find their account in it; firſt by the growth and increaſe of their crops, and afterward by a ſaving in the weeding; for if no weeds are ſuffered to grow to ſhed their ſeeds, during the time of fallowing the land, there will but few come up when the ground is ſown.

Ploughing in ridges is very proper for removing wetneſs, in which caſe every furrow becomes a drain, and alſo for enlarging the ſurface of the ſoil, expoſed to the air, and employed in vegetation. In order to obtain theſe purpoſes, the ridges ſhould be narrow; though ſoils in different ſituations will require being laid out in different kinds of ridges: they ought alſo to be ſtraight in their directions, and equal to one another in ſize, each ridge being alſo equally broad in all its parts. See RIDGES.

There are three different ways of *ploughing* ridges, viz. gathering, caſting, and cleaving.

Gathering keeps the crown and furrows of the ridge in the ſame place in which they were before. The plough begins in the crown, and ploughs out the ridge, turning

the earth towards the crown: by this method of *ploughing* the earth on each side is turned upon the crown, and thrown up out of the furrows, so that the ridge is raised. Casting likewise keeps the crowns and furrows in the same place; the ridges are ploughed in pairs, and they are kept of the same height in the crown, and one of the furrows made a little higher, and the other a little lower than before; the earth being taken out of one furrow and thrown into the other.

Cleaving is the reverse of gathering: the plough enters the furrow on the right side of the ridge, turns to the furrow on the left side, and ploughs out the ridge, turning the earth from the crown towards the furrow. In this case the furrows are made higher and the crown lower.

There is another method of *ploughing* called *ribbing*, which is performed by making furrows about two feet distant from each other; one half of the surface is untouched by the plough, and the other half, which the plough turns up in making the furrows, is thrown on the top of what remains fast. This kind of *ploughing* is seldom practised, but in the beginning of winter, and upon land to be sown with barley, after two more clean *ploughings*. It is much condemned by the modern improvers of agriculture, though in some cases it has its use.

Boaring is another kind of *ploughing*, performed by throwing the earth of two furrows towards each other upon some fast land; this is an improvement of ribbing, and better serves the same purposes.

PLOUGHMAN, in *Husbandry*, the person who guides the PLOUGH, in the operation of tilling or TILLAGE.

PLOUGHMAN'S *spikenard*, the English name of a genus of plants called by the botanists *conyza*; it is likewise called by us FLEA-*bane*.

PLUG, a large wooden peg, wherewith to stop the bottom of a cistern, cask, pipe, or the like.

PLUGS, in *Shipping*, are certain pieces of timber, formed like the frustum of a cone, and used to stop the hause-holes, and the breaches made in the body of a ship by cannon-balls; the former of which are called *hause-plugs*, and the latter *shot-plugs*, which are formed of various sizes, in proportion to the holes made by the different size of shot which may penetrate the ship's sides or bottom in battle: accordingly they are always ready for this purpose.

PLUKENETIA, in *Botany*, the name of a genus of plants described by Plumier, and called by this name in honour of Plukenet, the great English botanist. In the Linnæan system it belongs to the class of *monœcia adelphia*.

The characters are these: it produces male and female flowers on the same plants; the male flowers have no cup, but are composed of four expanded petals of an oval figure, eight stamina, and four bearded nectaria; the female flowers have no cup, and the four petals in these are disposed as in the male; the germen of the pistillum is square; the style is slender, very long, and crooked; the stigma is peltated and divided into four parts; the segments are obtuse and flat, and each has a remarkable spot in the centre; the fruit is a depressed square capsule, hollowed at all the angles; it contains four bivalve cells; the seeds are single, roundish, and compressed, and bluntly pointed at one end.

Linnæus observes, that this fructification is very singular; and is very desirous, that some person should examine carefully the growing plant, since Plumier, who was not over curious about the nicer parts of the fructification of plants, may have in some sort misrepresented this. There is only one species.

PLUM-*tree*, *prunus*, in *Botany*, a genus of the *icosandria monogynia* class. Its characters are these: the flower hath a bell-shaped empalement, cut into five points; it hath five large roundish petals, which are inserted in the empalement, and from twenty to thirty stamina, which are near as long as the petals, and are also inserted in the empalement, terminated by twin summits; it has a roundish germen, supporting a slender style, crowned by an orbicular stigma; the germen afterwards turns to a roundish fruit, inclosing a nut of the same form. Miller reckons thirty-three, and Linnæus fourteen species.

All the sorts of *plums* are propagated by budding or grafting them upon the stocks of the muscle-*plum*, the white pear-*plum*, the St. Julian, or the bonum magnum. See INOCULATION.

Budding is much more proper than grafting for these trees, as they are apt to throw out a great deal of gum from the wound: and the trees should be no more than one year's growth from the bud, when they are transplanted; for if they are more they seldom succeed well, being very subject to canker; and if they escape that, they usually produce only two or three luxuriant branches. The whole management of planting and pruning them is the same with that of peaches. See PEACH.

If the walls against which they are planted are low, they should be set thirty feet asunder; if they are higher, then not less than twenty-four feet.

Plums should have a subsiding soil, for they seldom succeed well either in a too moist or too dry one; and, when planted against walls, should have an east or a south-east aspect. If they have one at full south, they are apt to shrivel up, and grow mealy.

Plums in general succeed very well with proper care on espaliers; they will also bear very well as standards, but the fruit will not be so well tasted. *Plums* do not only produce their fruit on the last year's wood, but also on spurs that come out of wood many years old. It is a common error to be too free with the knife in the winter-pruning, cutting off the extremities of all the branches; the consequence of which is, that there is too great a quantity of young shoots produced, and the fruit is small and poor.

The safest method in the management of these trees is to lay in their shoots horizontally, as they are produced, at equal distances, in proportion to the length of their leaves; and where there is not a sufficient quantity of branches to fill up the vacancies of the tree, there the shoots may be pinched in the beginning of May, which causes them to produce some lateral branches to supply those places; and during the growing season, all foreright shoots should be displaced, and such as are to remain must be regularly trained in to the wall or espalier. Miller.

All the species of *plums* have within their fruit a hard stone, within which there is contained a soft and tender kernel: this kernel contains the seminal plant, from which would be produced another tree of the same kind, if it were set in the ground; and it is very natural to suppose, that the only use of the thick stone or husk of this, was to preserve its tender substance from rotting too soon in the earth, and to give it a proper time for developing its parts, to preserve its natural oilyness during that time, and to furnish from its own substance a proper nourishment to the growing plant; for observation shews, that it finally breaks into a very fine powder.

There has not been found any species of *plum*, which had not its kernel contained in a stony coat of this kind, from whatever grafts they have been propagated; nor is there any art known by which the kernel of this sort of fruit can, while growing, be deprived of its coat.

Mr. Marchand, however, in the year 1735, shewed, before the Academy of Sciences at Paris, certain *plums*, whose kernels had no stone or shell round them; and found that they grew upon a tree which never had produced any others, and which had been known to produce such for twenty years. The kernel in these was covered with a reddish skin, which was rough to the touch; and, within that, with another which was thinner and white. The kernel had nothing particular in it, except that it carried on one side of its outer surface, and that always in the same place, a little stony prominence, more or less dented on its convex part: this is usually a twelfth of an inch broad, and two thirds of an inch long, and has no other appearance but that of a distempered part of the kernel, only that all the kernels have it.

The thick wrinkled skin which surrounds the kernel, seems in this case to supply the place of the stone or hard shell; and in this also it resembles it, that the pulp of the fruit parts easily and readily from it; and the hard oblong body, which is placed on one side of the kernel, is by no means proper for this purpose. Mem. Acad. Scienc. Par. 1735.

For the method of destroying insects in the *plum*-tree, see PEACH-*tree*.

PLUM, *American*, *black cocoa*, or *maiden*, *cherry-bottomed*, in *Botany*, a genus of the *icosandria digynia* class. Its characters are these: the empalement of the flower is of one leaf, divided into five parts, almost to the middle; the flower has five petals and ten stamina, five of which are longer than the petals, the other shorter; in the centre is situated an oval germen which becomes an oval fleshy berry, including a nut with five longitudinal furrows, and five valves. Linnæus mentions one, and Miller two species, which are natives of the warm parts of America.

PLUM, *hog*. See GUAIAVA.

PLUM, *Jamaica*, or *hog*, *spondias*, in *Botany*, a genus of the *decandria pentagynia* class. Its characters are these: the flower has five oblong spear-shaped petals, and a small permanent coloured empalement, with ten scaly obtuse nectariums, situated between the petals; and ten bristly stamina shorter than the petals, with oblong summits; the oblong germen, which is immersed in the receptacle, supports five short parallel styles, joined in a five-cornered column, crowned by a simple stigma; and afterward becomes an oblong fleshy berry, including a hard oblong nut, covered with fibres, having five cells.

The

The fruit of this sort is esteemed by some of the inhabitants of the islands in the West Indies; but as the flesh is very thin, so a great number of the *plums* will afford but little meat: however, the wild hogs are very fond of them, and it is their principal food during the season of their ripening. Linnæus enumerates two species, one of which is the *mombin*, and the other the *myrobalanus*.

PLUM, *indian date, pistumin, persimon*, or *pitchumon, diospyros*, in *Botany*, a genus of the *polygamia dioecia* class. Its characters are these: it hath hermaphrodite and male flowers on separate plants; the hermaphrodite flowers have a large, obtuse, permanent empalement, divided into four parts; the flower has one pitcher-shaped petal, cut at the brim into four segments, and eight short briftly ſtamina, firmly joined to the empalement; in the centre is ſituated a roundiſh germen, ſupporting a ſingle quadriſid ſtyle, crowned by an obtuſe bifid ſtigma; the germen becomes a large globular berry, with cells, each including one oblong, compreſſed, hard ſeed; the male flowers have the ſame calyx and flower, with eight ſhort ſtamina, but have no germen. There are two ſpecies.

PLUMAGE, the feathers, or covering of birds. For the mechaniſm wherein, ſee FEATHER.

PLUMAGE, in *Falconry*, is particularly underſtood of the feathers under a hawk's wing.

The falconers alſo give their hawks parcels of ſmall feathers to make them caſt; and theſe they call *plumage*.

PLUMB, or PLUM, in matters of ſpicery. See CURRANTS and RAISINS.

PLUMB-LINE, a term among artificers for a PERPENDICULAR *line*.

It is thus called, becauſe uſually deſcribed by means of a plumbet.

PLUMBAGO, in *Metallurgy*, a metalline recrement, ſeparated in the purification of gold or ſilver with lead, and ſticking to the ſides of the furnace.

This is otherwiſe called *molybdæna*; and has the ſame virtue with litharge.

PLUMBAGO ſeems alſo to have been uſed, among the *Ancients*, for *black* LEAD, uſed in making pencils for deſigning, &c.

Pomet adds, that *plumbago* was alſo the ſea-lead, *plumbum marinum*, of the ancients; who, he notes, took black lead for a production of the ſea, not a mineral, as it really is: but this is ſcarce credible.

PLUMBAGO, in *Botany*. See LEAD-*wort*.

PLUMBAGO, in the *Hiſtory of the Gems*, a word uſed by the Roman authors to expreſs a blemiſh common to their worſe kinds, and greatly debaſing their value. It was a ſort of bluiſh or blackiſh deadneſs in the ſtone, which mixed itſelf with the other colour, be that what it would, and rendered it dull and dead. The emerald was of all the gems the moſt ſubject to this fault; and, in this caſe, its fine green colour was always rendered cloudy and bluiſh; and in ſome lights the ſtone appeared of a dusky greyiſh blue, with no green at all in it. The Bactrian emeralds, which were in great eſteem with the ancients, were often ſubject to this imperfection; and thoſe of Cyprus, taken out of the copper-mines, though ſubject to many other imperfections, were uſually quite free from this.

PLUMBAGO, in *Mineralogy*, a name given by many authors to a ſort of foſſil, having very much the appearance of a lead-ore, but not ſuch in reality.

It is called alſo GALENA, BLINDE, and *mock-lead*. It is uſually of a plated texture, and dark blackiſh blue colour, like the lead-ores; but on trial it yields no metal.

PLUMBATÆ, among the *Romans*, a kind of ſcourge, the thongs of which were armed with leads.

PLUMBATÆ likewiſe ſignified leaden balls, uſed by ſoldiers to annoy the enemy with; whence the ſoldiers were called *mamubarbuli*.

PLUMBERY, formed of *plumbum*, *lead*, the art of caſting, preparing, and working LEAD; and of uſing it in buildings, &c.

The lead uſed in *plumbery* is furniſhed from the lead-works in large ingots, or blocks, called pigs of lead, ordinarily weighing about a hundred pounds a-piece.

As this metal melts very eaſily, it is eaſy to caſt figures hereof, of any kind, by running it into moulds of braſs, clay, plaiſter, &c. But the chief article in *plumbery*, is the ſheets, and pipes of lead. They are theſe which make the baſis of the plumber's work in building; the process of theſe, therefore, we ſhall give a deſcription of.

Method of making large ſheets of lead. The lead deſtined for this uſe is melted in a large caldron or furnace, uſually built with free-ſtone and earth, fortified on the outſide with a maſſive of ſhards and plaiſter. At the bottom hereof is a place ſunk lower than the reſt, wherein is diſpoſed an iron pot, or pan, to receive what may remain of the metal after the ſheet is run. The furnace is ſo raiſed above the area of the floor, as that the iron pot juſt reſts thereon.

To uſe the furnace, they heat it with wood laid within it; that done, they throw in the lead at random with the burning-coals, to melt.

Near the furnace is the table or mould, whereon the lead is to be caſt. This conſiſts of large pieces of wood, well jointed, and bound with bars of iron at the ends. Around it runs a frame, conſiſting of a ledge or border of wood, two or three inches thick, and one or two high from the table, called the *ſhorps*. The ordinary width of the tables is from three to four feet; and their length from eighteen to twenty feet.

This table is covered with fine ſand, prepared by moiſtening it with a watering pot, then working it with a ſtick; and at laſt, to render it ſmooth and even, beating it flat with a mallet, and planing it with a flip of braſs, or wood.

Over the table is a ſtrike or rake of wood, which bears and plays on the edges of the frame, by means of a notch cut in either end thereof: and is ſo placed, as that between it and the ſand is a ſpace proportionable to the intended thickneſs of the ſheet. The uſe of this ſtrike is to drive the matter, while yet liquid, to the extremity of the mould.

At top of the table is a triangular iron peel or ſhovel, bearing, before, on the edge of the table *itſelf*, and behind, on a treſſle ſomewhat lower than the table. Its uſe is in conveying the metal into the mould; and the deſign of its oblique diſpoſition is, that it may by that means be able to retain the metal, and keep it from running off at the fore-ſide, where it has no ledge. Some of theſe peels are big enough to hold fifteen or ſixteen hundred weight of lead, and even more.

Things being thus diſpoſed, with a large iron ladle they take out the melted lead, coals and all, out of the furnace; and with this, mixed as it is, they fill the iron peel. When full, they take out the coals, and clear the lead with another iron ſpoon, pierced after the manner of a ſcummer.

This done, they hoiſt up the lower part of the peel by its handle; upon which the liquid matter running off, and ſpreading itſelf on the mould, the plumber conducts and drives it to the extremity of the table, by means of the ſtrike, which the workman paſſes along the ledges, and thus renders the ſheet of an equal thickneſs.

The ſheets thus caſt, there remains nothing but to edge them. i. e. to planiſh the edges on both ſides, in order to render them ſmooth and ſtrait.

Method of caſting thin ſheets of lead. The table or mould here uſed is of a length or breadth at diſcretion, only ledged on one ſide. Inſtead of ſand, they cover it with a piece of woollen ſtuff, nailed down at the two ends, to keep it tight; and over this they lay a very fine linen cloth. The feet of the table are uneven, ſo that it does not ſtand horizontal, but moderately inclined.

Great regard is, in this proceſs, had to the lead while melting, that it have the juſt degree of heat, ſo as it may run well, yet not burn the linen. This they judge of by a piece of paper; for if the paper take fire in the liquid lead, it is too hot; and if it be not ſhrunk and ſcorched a little, it is not hot enough.

Being then in its juſt degree, they have a ſtrike, but different from that deſcribed in the former article; as ſerving both for peel and ſtrike; both to contain and to conduct the liquid lead. It is, in effect, a wooden caſe without any bottom, only cloſed on three ſides. It is pretty high behind, but the two ſides, like two acute angles, ſtill diminiſh to the tip, from the place where they are joined to the third or middle piece, where they are of the ſame height therewith: viz. ſeven or eight inches high. The width of the middle makes that of the ſtrike, which again makes that of the ſheet to be caſt.

The ſtrike is placed at top of the table, which is before covered in that part, with a paſteboard, that ſerves as a bottom to the caſe, and prevents the linen from being burnt while the liquid is pouring in. The ſtrike is ſo diſpoſed on the table, as that the higheſt part looks to the lower end of the table, and the two ſloping ſides to the higher end.

The ſtrike is now filled with lead, according to the quantity to be uſed; which done, two men, one at each ſide the table, let the ſtrike deſcend down the table, or elſe draw it down with a velocity greater or leſs, as the ſheet is to be more or leſs thick; the thickneſs of the ſheet ſtill depending on the promptitude wherewith the ſtrike ſlides down the inclining mould.

The fine ſmooth ſheets of lead, thus made, are ſometimes uſed between the joints of large ſtones in great buildings, &c.

Method of caſting pipes, without ſoldering. To make theſe pipes, they have a kind of furnace, conſiſting of a large

iron pot or caldron, supported on a pretty high iron stand. The caldron is encompassed with a massive of bricks and loam; only leaving a mouth or passage for the conveyance of wood underneath, and for lighting the fire; and another little aperture behind, to serve as a vent-hole. In this furnace they melt the lead, after first heating it with a fire underneath: to forward the fusion, they also put in burning faggots along with the metal. The metal is afterwards skimmed, and laded off with the instruments mentioned above. Near the furnace is a bench furnished at one end with a little mill, with arms or levers to turn it with. A strong girt, armed with an iron hook at one extremity, is fastened by the other to the axis of the mill, around which it turns when in motion. On this bench the moulds of the pipes are placed horizontally, and the mill and the girt serve to draw out the iron core, after the pipe is cast.

The moulds of these tubes are of brass, and consist of two pieces, which open and shut by means of hooks and hinges: their inward caliber, or diameter, is according to the size of the pipe to be made, and their length is usually two feet and a half. In the middle is placed a core, or round piece of brass or iron, somewhat longer than the mould, and of the thickness of the inner diameter of the pipe. This core is passed through two copper rundles, one at each end of the mould, which they serve to centre; and to these is joined a little copper tube about two inches long, and of the thickness the leaden pipe is intended to be of. By means of these tubes the core is retained in the middle of the cavity of the mould. The core being in the mould, with the rundles at its two ends, and the lead melted in the furnace, they take it up in a ladle, and pour it into the mould, by a little aperture at one end, made in form of a funnel.

When the mould is full, and the metal cold, they pass the hook of the girt into a hole at the end of the core; and turning the mill with the hand, draw out the core. They then open the mould, and take out the pipe.

If they desire to have the pipe lengthened, they put one end thereof in the lower end of the mould, and pass the end of the core into it; then shut the mould again, and apply its rundle and tube as before. The pipe just cast serving for rundle, &c. at the other end.

Things thus replaced, they pour in fresh metal into the mould, thus repeating the operation, till they have got a pipe of the length required.

Pipes made of sheet lead soldered. For these the *plumbers* have wooden cylinders or rollers, of the length and thickness required; and on these they form their pipes, by wrapping the sheet around them; soldering up the edges all along in this manner. After grating the lead well with a grater, they rub resin over the part thus grated; they then pour on it some solder melted in a ladle, or else melt it with a hot soldering iron, smearing those parts where they would not have the solder catch, with chalk, or the soil of the hand.

The solder which the *plumbers* use, is a mixture of two pounds of lead with one of tin. See SOLDER.

PLUMBING, among *Miners*, a term used to express the using a mine dial, in order to know the exact place of the work where to sink down an air-shaft, or to bring an adit to the work, or to know which way the load inclines when any flexure happens in it.

It is performed in this manner: a skilful person with an assistant, and with pen, ink, and paper, and a long line and a sun-dial, after his guess of the place above ground, descends into the adit or work, and there fastens one end of the line to some fixed thing in it; then the inclined needle is let to rest, and the exact point where it rests is marked with a pen: he then goes on farther in the line still fastened, and at the next flexure of the adit he makes a mark on the line by a knot or otherwise; and then setting down the dial again, he there likewise notes down that point at which the needle stands in this second position. In this manner he proceeds from turning to turning, marking down the points, and marking the line till he comes to the intended place; this done, he ascends, and begins to work on the surface of the earth what he did in the adit, bringing the first knot in the line to such a place where the mark of the place of the needle will again answer its pointing, and continues this till he comes to the desired place above ground, which is certain to be perpendicularly over the part of the mine into which the air-shaft is to be sunk.

PLUMBUM. See LEAD.

PLUMBUM *cornutum*, called also *Saturnus cornutus*, in *Chemistry*, is a metallic salt, formed by the precipitation of lead from its solution in nitrous acid with the marine acid, and all the neutral salts which contain it. It is thus called from its resemblance to the LUNA *cornea*. This salt may be made by other methods, and particularly by disengaging the volatile alkali from sal ammoniac by lead. In this way Mr. Margraaf makes the *plumbum cornutum*, which he employs in the preparation of PHOSPHORUS. See LEAD.

PLUMBUM *igneum*. See *Butter* of LEAD.

PLUME, a set or bunch of stitch feathers, pulled out of the tail and wings, and made up to serve for ornament in funerals, &c.

PLUME, formed of *pluma*, *feather*, in *Falconry*, is the general colour or mixture of the feathers of a hawk, which shews her constitution.

When a hawk forms her pens, and diminishes it of its feathers, she is said to *plume* her.

PLUME, or PLUMULE, in *Botany*, a little member of the grain or seed of a plant; being that which in the growth of the plant becomes the stem or trunk thereof. See SEED, and SPERM.

The *plume* is formed in a cavity formed in the lobes on purpose for its reception. It is almost of the same colour with the radicle, or little root, on the hams whereof it is fastened.

The *plume* is the first part that appears out of the earth, as, in effect, it is the part that first appears out of the membrane, or cover of the seed; there being a hole over-against it in the membrane, through which it makes its escape.

It is the appearance of the *plume* without the cavity of the grain, that makes what we call the *bud* or *germ* of a plant.

The *plume* is so called, because consisting of several pieces bound together in manner of a feather. In corn, the *plume* is that, which, after the ravicle is first forth, shoots out towards the smaller end of the seed; whence some call it the *acrospire*.

PLUME-*alum*, *plumose plumbosum*. See ALLUM.

PLUMERIA, in *Botany*. See *Red* JASMINE.

PLUMMER'S *Pills*. This medicine is composed of the sulphur auratum antimonii and cinnabar, commonly in equal parts, eight of each three grains; but this may be varied occasionally, according to the physician's direction. These two powders must be well levigated together, by which the bright red colour of the sulphur is changed into a dusky brown; afterwards, add two drams of the extract of liquorice; and so much gum arabic, as sufficient quantity of the mucilage of gum arabic, may be made into pills. We refer to the learned Essays of *Edinburgh* for the dose, regimen to be observed, and effects of this medicine; as also for the manner of preparing the sulphur of antimony according to Angelus Sala, which is said to be preferable to the common method. See Med. Ess. Edinb. abridg. vol. i. p. 205. vol. ii. p. 435.

This medicine has been found greatly beneficial in cutaneous eruptions, and is said to have completed a cure after salivation has failed, in venereal infections, and in gleets remaining after the cure of a gonorrhœa. It operates by carrying off the excrements of distempers by insensible perspiration or sweat. It has also been found successful in obstinate glandular swellings; two or three pills of an ordinary size may be taken night and morning, the patient keeping moderately warm, and drinking after each dose a draught of the decoction of the woods, or of sarsaparilla.

PLUMMET, PLUMB-RULE, or PLUMB-LINE, an instrument used by masons, carpenters, &c. to draw perpendiculars; in order to judge whether walls, &c. be upright, planes horizontal, and the like.

It is thus called from a piece of lead, *plumbum*, fastened to the end of a thread or cord, which usually constitutes this instrument.

Sometimes the string descends along a ruler of wood or metal ruled perpendicularly on another; in which case it becomes a level.

At sea a *plummet* is used by the pilot to sound the depth of the water.

PLUMOSE *antennæ*, in *Natural History*, a term used to express the *antennæ*, or horns of certain moths and butterflies, which are formed in the manner of feathers, being composed of a stem and fibres issuing on each side from it: these are jointed and moveable any way; and even the small fibres, at their sides, are jointed at their bottom, and are moveable, but they move all together. See PETTINE.

PLUNDER, in *Sea-Language*, a name given to the effects of the officers or crew of a prize, which are pillaged by the captors.

PLUNGE, in the *Manege*. See EXTRAVAGANT.

PLUNGER, in *Mechanics*, a solid brass cylinder used as a FORCER in *forcing* PUMPS.

PLURAL, *plurale*, in *Grammar*, a particular inflexion of nouns and verbs, whereby they come to express a plurality or number of things.

The Latins, English, &c. have only two numbers, *singular*

sular and *plural*; the Greeks and Hebrews have three, *singular*, *dual*, and *plural*.

In Latin, &c. both nouns and verbs have usually diſtinct terminations to their different numbers; in Engliſh, nouns ſubſtantives uſually become *plural* by the addition of *s* or *es* to the ſingular.

Nouns adjective are the ſame in both numbers; and in verbs, the number is diſtinguiſhed by that of the pronoun.

PLURALITY, *pluralitas*, a diſcrete quantity, conſiſting of two, or a greater number.

A plurality of worlds is a thing which Mr. Huygens has endeavoured to prove in his Coſmotheoros. And the ſame is likewiſe contended for in a very pretty treatiſe of M. Fontenelle under that title.

See the chief argument for a *plurality* of worlds under HEAVEN, PLANET, and EARTH.

The greateſt abſurdity in the pagan theology, is the *plurality of gods*.

PLURALITY *of benefices, or livings*, is where the ſame clerk is poſſeſſed of two or more ſpiritual preferments, with cure of ſouls. See BENEFICE.

Plurality of benefices is a thing too much tolerated in the church, but never approved of.

It was the frailneſs of ſome beneficed that firſt gave occaſion to *pluralities*; for an eccleſiaſtic, not being able to ſubſiſt on a ſingle one, was allowed to hold two; and at length the number increaſed without bounds.

The abuſe was endeavoured to be remedied at the council of Lateran, under Alexander III. and Innocent III. in the year 1215, when the holding more than one benefice was expreſſly forbid by a canon, under the penalty of deprivation; but the ſame canon granting the pope a power to diſpenſe with it in favour of perſons of diſtinguiſhed merit, there were ſo many found a title to this merit, that the prohibition became uſeleſs.

Pluralities were alſo reſtrained by ſtatute 21 Hen. VIII. cap. 13. which enacts, that if any perſon, having one benefice with cure of ſouls, of the yearly value of 8*l.* or above (in the king's books), accept any other with cure of ſouls, the firſt benefice ſhall be adjudged in law to be void, &c. though the ſame ſtatute provides for diſpenſation in certain caſes. See CHAPLAIN.

In order to procure a diſpenſation, the preſentee muſt obtain of the biſhop, in whoſe dioceſe the livings are, two certificates of the values in the king's books, and the reputed values and diſtance of ſuch livings; one certificate for the archbiſhop, and the other for the lord chancellor. And if the livings lie in two dioceſes, then two certificates of the ſame kind are to be obtained from each biſhop. He muſt alſo exhibit to the archbiſhop his preſentation to the ſecond living; and bring with him two papers of teſtimonials from the neighbouring clergy concerning his behaviour and converſation, one for the archbiſhop, and the other for the lord chancellor; and he muſt alſo exhibit to the archbiſhop his letters of orders of deacon and prieſt, and a certificate of his having taken the degree of maſter of arts at the leaſt, in one of the univerſities of this realm, under the hand of the regiſter of ſuch univerſity. And in caſe he be no doctor or bachelor of divinity, nor doctor of law, nor bachelor of canon law, he is to procure a qualification of a CHAPLAIN, which is to be duly regiſtered in the faculty office, in order to be tendered to the archbiſhop, according to the ſtatute. And if he hath taken any of the aforeſaid degrees, which the ſtatute allows as qualifications, he is to procure a certificate thereof as already mentioned, and to exhibit the ſame to the archbiſhop; after which his diſpenſation is made out at the faculty office, where he gives ſecurity according to the direction of the canon. Afterwards he muſt repair to the lord chancellor, for confirmation under the broad ſeal; and then he is to apply to the biſhop of the dioceſe where the living lies, for his admiſſion and inſtitution. By the ſeveral ſtamp acts, for every ſkin, or paper, or parchment, &c. on which any diſpenſation to hold two eccleſiaſtical dignities or benefices, or a dignity and a benefice, ſhall be engroſſed or written, there ſhall be paid a treble forty ſhilling ſtamp duty.

We have alſo a regulation in regard to *pluralities*, but it is often diſpenſed with; for, by the faculty of diſpenſation, a pluraliſt is required, in that benefice from which he ſhall happen to be moſt abſent, to preach thirteen ſermons every year, and to exerciſe hoſpitality for two months yearly.

In Germany the pope grants diſpenſations for poſſeſſing a *plurality of benefices*, on pretence that the eccleſiaſtical princes there need large revenues to beat up againſt the proteſtant powers.

PLURIES, a writ that iſſues in the third place after two former writs have been diſobeyed; for firſt goes out the original writ or *capias*, which, if it has no effect, then iſſues the *alias*; and if that alſo fails, then the *pluries*. Old Nat. Br. 33.

It is uſed in proceedings to OUTLAWRY, and in great diverſity of caſes. Tabl. Reg. Writs.

PLUS, in *Algebra*, a term commonly uſed for *major*, or *magis*, *more*; denoted by the CHARACTER +.

Thus 4 + 10 = 14, is read, four, *plus*, or more, 10, is equal to 14.

PLUSH, in *Commerce*, &c. a kind of ſtuff having a ſort of velvet nap or ſhag on one ſide; compoſed regularly of a woof of a ſingle woollen thread, and a double warp, the one wool, of two threads twiſted, the other goats or camels hair; though there are alſo ſome *plushes* entirely worſted, and others compoſed wholly of hair.

Plush is manufactured like velvet, on a loom with three treadles. Two of theſe ſeparate and depreſs the woollen-warp, and the third raiſes the hair-warp; upon which the workman throwing the ſhuttle, paſſes the woof between the woollen and hair-warps; and afterwards laying a braſs broach, or needle, under that of the hair, he cuts it thereon with a knife deſtined for that uſe, conducting the knife on the broach, which is made a little hollow, all its length; and thus gives the ſurface of the *plush* an appearance of velvet.

Some aſcribe the invention of *plush* to the Engliſh; others ſay it was firſt made in Holland, and particularly at Haerlem. Be this as it will, it is certain, the French are the people who make the moſt of it; there being ſeveral very conſiderable *plush* manufactures at Amiens, Abbeville, and Compeigne.

There are other kinds of *plush*, all of ſilk; ſome of which have a pretty long knap on one ſide, and ſome on both.

PLUSH, among *Botaniſts*, is a name given to the middle of *roſes*, *anemonies*, &c. called alſo *thrum*, or *thrummy heads*; by others, *hairy heads*, *buttons*, *boſs*, *tuft*, or *wart*. This is properly the STAMINA of the flower.

PLUTEI, in the Roman *Art of War*, were engines contrived for the defence of ſoldiers, conſiſting of the ſame materials with the VINEÆ, but of a different figure; being ſhaped like an arched ſort of waggon, and having three wheels, ſo conveniently placed, that the machines would move either way with equal eaſe.

PLUTO, in *Mythology*, the ſon of Saturn and Rhea, and ſovereign of the empire of darkneſs. Statius calls him the black Jupiter; and he is repreſented by the poets as holding his ſceptre in his hand, with a veil over his head, which, as well as his complexion, ſhould be dark and terrible. He is ſometimes called by the name of Dis.

PLUTUS, in *Mythology*, the god of riches, reckoned amongſt the number of infernal deities, becauſe riches are derived from the bowels of the earth. Heſiod makes him to be a deſcendant of Ceres and Jaſon in the iſle of Crete, probably becauſe theſe two perſons applied themſelves to agriculture, which is the means of obtaining the moſt ſubſtantial riches. *Plutus* had a ſtatue at Athens, placed in the temple of Minerva, where the public treaſures were depoſited; at Thebes, in the temple of Fortune, this goddeſs holds *Plutus* in her arms as an infant, nouriſhed by her; and at Athens *Plutus* is in the arms of the ſtatue of Peace, as the ſymbol of riches, which give peace.

PLUVIAL, *pluviale*, anciently ſignified a hood or cloak; which eccleſiaſtics, chiefly religious, wore in the country, to ſhelter themſelves from the rain; by the Latins called *pluviales cucullæ*.

The word is now uſed, in the Romiſh church, for a large hood worn by the chanter and ſubdeacon, at maſs and veſpers, &c. It covers the whole man, and is fixed before with two claſps.

PLUVIALIS, in *Ornithology*. See PLOVER.

PLUVIALIS *major*, in *Ornithology*, a name given by ſome authors to the LIMOSA, a bird in ſome reſpects reſembling our reſtſnark, but larger and longer legged.

This bird is alſo called the *glottis* and *totanus*.

PLUVIALIS *ſecunda*, in *Ornithology*, a name given by many to the common green *wood-pecker*, the *picus viridis* of authors, called alſo in Engliſh the *rain-fowl*, from an obſervation of its always being moſt clamorous when rain is coming on.

PLUVIUS, in *Antiquity*, an attribute of JUPITER; implying him the author of rain; q. d. he that ſends rain.

Among the baſſo relievos of the Antonine column, in the place where the miracle of the thundering legion is repreſented, we ſee a flying man in the air, his arms ſpread out, and with a very long beard, which ſeems to diſſolve into rain. The learned take this to be a repreſentation of Jupiter Pluvius.

PLYERS, in *Fortification*, denote a kind of balance uſed in raiſing or letting down a *draw-bridge*. They conſiſt of two timber levers, about twice the length of the bridge they fall, joined together by other timbers framed

in the form of a St. Andrew's cross, which serves as a counterpoise. They are supported by two upright jambs, on which they swing; and the bridge is raised or let down by means of chains joining the ends of the *pipes* and bridge.

PLYING, in *Sea-Language*, is the art of making, or endeavouring to make, a progress against the direction of the wind.

Plying is also used by ferrymen to denote their waiting for a fare.

PLYMOUTH *marble*, among our *Artificers*, a term used for a sort of *marble* dug in great plenty about Plymouth, and in some parts of Devonshire, where it lies in very thick strata, and whence it is brought in large quantities to us; and when wrought looks little less beautiful than some of the Italian *marble*.

It is very hard and firm, and of a beautiful texture; its ground is a bluish white, and its variegations are principally a pale red, and in smaller quantities brown and yellow; these lie in very orderly beds, and often there is a very agreeable glow of a faint red diffused through the whole substance. It is remarkably even in its whole structure, and is therefore capable of a more than ordinarily elegant polish.

PLYNTERIA, Πλυντηρια, in *Antiquity*, a festival in honour of Aglaurus, the daughter of king Cecrops, or rather of Minerva, who had from that lady the name of Aglaurus.

For the ceremonies observed at this solemnity, see Potter, Archæol. Græc. lib. ii. cap. 20. tom. 1. p. 425.

PNEUMA, Πνευμα, in Hippocrates, sometimes imports spirit, air, or vapour, and frequently it signifies the breath, that is, the air drawn in by inspiration, and expelled during expiration. But *pneuma*, by the above quoted author, is often used to express a difficult, short, and laborious respiration.

PNEUMATICS, *pneumatice*, called also PNEUMATOLOGY and PNEUMATOSOPHY, the doctrine and contemplation of spirits, and spiritual substances.

The word is formed of the Greek πνευμα, *spiritus*, *breath*; whence, from the different acceptations of that word either as an incorporeal substance, or as air, there arise two sorts of *pneumatics*.

PNEUMATICS, in the *Schools*, is frequently used for the doctrine of spirits: as God, angels, and the human soul. See SPIRIT.

In this sense *pneumatics* coincide with what we otherwise call METAPHYSICS.

PNEUMATICS is more commonly used, among us, for the doctrine of the air; or that part of natural philosophy which treats of the nature, properties, and effects of the air.

Some make *pneumatics* a branch of mechanics; because it considers the air in motion, with the effects thereof. It is certainly a sister of hydrostatics; the one considering air in the same manner that the other does water. Wolfius, in lieu of *pneumatics*, uses the word *aerometry*, q. d. the art of *measuring the air*.

The doctrine and laws of *pneumatics* will be found under AIR, ATMOSPHERE, ELASTICITY, GRAVITY, COMPRESSION, CONDENSATION, RAREFACTION, EXPANSION, &c.

PNEUMATIC *engines*, *machines* or *utensils* PNEUMATICA, denotes the AIR-PUMP.

PNEUMATOCELE, Πνευματοκηλη, formed from πνευμα, *wind*, and κηλη, *tumor*, in *Medicine*, a flatulent or windy HERNIA; or a tumor of the membranes of the scrotum or navel, proceeding from pent up vapours, and attended with a tensive pain.

Sometimes one of the testes only is thus inflated, sometimes both, and sometimes likewise the scrotum.

This *hernia* is of all others the lightest, and least dangerous. Mr Pott objects to the propriety of the appellation *pneumatocele*, or *wind-rupture*, and maintains that there is no hernia produced by mere wind. The two diseases, he says, which in new-born children and infants are taken for and called wind-ruptures, are, a rumor produced by a small quantity of fluid remaining in the lower part of the tunica vaginalis, after its communication above with the cavity of the belly is closed; and a true, but small, *intestinal* HERNIA. Chirurgical Works, vol. ii. p. 422.

It is cured by discutients internally, and fomentations and cataplasms externally.

PNEUMATODES, a word used by Hippocrates to express a person who fetches his breath short and quick; and sometimes for one who has his belly or ilia much distended by flatulencies. *Pneumatias* is also used in the same double sense.

PNEUMATOMACHI, Πνευματομαχοι, ancient heretics, so called, because they opposed the divinity of the Holy Spirit, placing him in the number of creatures.

PNEUMATOMPHALOS, a word used by Hippocrates to express a person who has a windy or flatulent rupture of the navel.

PNEUMATOSIS, Πνευματωσις, a term which some authors use for the generation or formation of animal spirits in the brain.

PNEUMONANTHE, in *Botany*, a name given by many botanical writers to a species of GENTIANA, called also by some the *italian* violet.

PNEUMONICS, Πνευμονικα, medicines proper in diseases of the lungs, in which respiration is affected.

The word is formed from the Greek πνευμων, *lungs*, or πνευμα, *spiritus*, *breath*.

Of this number are sulphur, lung-wort, hyssop, groundivy, and coltsfoot; they are used in phthises, asthmas, peripneumonies, pleurisies, &c.

PNIGITIS *terra*, in the *Materia Medica of the Ancients*, a name given at different periods of time to two different species of earth; the *terra pnigitis* of Dioscorides and Pliny being a grey marle, and the *pnigitis* of Galen a black clay.

The last of these is a very valuable astringent, and is found in many parts of this kingdom, particularly in the neighbourhood of London, and well deserves to be introduced into the practice of physic.

PNIGMOS, from πνιγω, *I suffocate*, in *Medicine*, any kind of suffocation, from whatever cause; it is very often used to express that of hysteric kind in women.

PNIX, a word used by physicians to express the suffocation from hysteric fits, or any other cause.

POA, in *Botany*, the name of a genus of plants of the grass kind, belonging to the class and order of *triandria digynia*; the characters of which are, that the calyx is a glume composed of two valves, containing several flowers disposed in a two-rowed oval, or oblong spike; the valves oval and pointed, but without awns; the flower is composed of two oval and pointed valves; these are hollowed, compressed, a little longer than the valves of the cup, and without beards or awns; the stamina are three capillary filaments; the antheræ are split at their ends; the germen of the pistillum is roundish; the styles are two, reflex and hairy; the stigmata are hairy also; the flower adheres closely to the seed, and does not open to let it out; the seed is single, oblong, and pointed at both ends, and somewhat flatted. There are twenty-five species enumerated by Linnæus. See GRASS.

POAKE-*root*, in Virginia, is used to denote the solanum bacciferum. The Indians use it for a purge, though commonly deemed a poison. Phil. Trans. N° 454. § 1.

POCATSJETTI, H. M. in *Botany*, the name of a small shrub which grows in Malabar. The leaves powdered, and sprinkled upon ulcers, repress luxuriant and fungous flesh; and taken internally, they excite a sweat, and diminish the paroxysm of an intermitting fever.

Of the bark and root, powdered, and mixed with oil, an unguent is made, said to be good for the itch, and other cutaneous disorders.

POCCOON, in *Botany*. See PUCCOON.

POCHARD, in *Ornithology*, the name of a species of wild-duck, called by some the *penelope* and *rutila*, and by many in English the red-headed *widgeon*.

It is larger than the common *widgeon*, and is shorter and thicker bodied.

POCK. See POX.

POCK-*wood*. See GUAIACUM.

POCKET-*sheriffs*, in *Law*, sheriffs nominated by the sole authority of the crown. See SHERIFF.

POCKET *of wool*, is half a sack. See SACK *of wool*.

The *pocket* contains usually twenty-five hundred weight of wool.

POCKET *instruments*, in *Surgery*, are such as a surgeon ought always to have in readiness, and may conveniently carry about him in a proper case: these are two lancets of different sizes; the one proper to open abscesses, the other smaller, for bleeding; a pair of straight scissars, useful on many occasions; a pair of crooked scissars, proper to be used in dividing fistulæ, and in several other cases; a pair of forceps with teeth at one end, to remove dressings, and upon occasion to extract splinters or thorns; these are also serviceable to the surgeon in his anatomical exercises; they are commonly made of steel, but those of silver are much neater; a razor; a straight incision knife; a crooked incision knife; a strait double-edged incision knife; a probe with one end broad and thin, proper for discovering a fissure in the cranium, and for many other uses; and the other end rounded, to examine the depth and situation of wounds and ulcers. The neatest probes are made of silver, though they are frequently made also of steel, ivory, or whalebone; a grooved probe or director, to direct the edge of the knife or scissars in opening sinuses or fistulæ, that by this means the subjacent vessels, nerves, and tendons, may remain unhurt. The upper end of this instrument, sometimes is ornamented,

and serves only for a handle; sometimes it is made in form of a spoon, to contain powder to sprinkle upon wounds or ulcers; sometimes also this is made forked at the end, to divide the frænum of the tongue; a spatula to depress the tongue, in order to examine the state of the tonsilæ, uvula, and fauces, when they are affected with any disorders: it is also used to suspend the tongue when the frænum is to be divided; for which purpose it is to be made with a fissure at its extremity, and should therefore rather be made of silver than of any other metal. Besides these, there should be an ordinary spatula for spreading plasters, ointments, and cataplasms; and sometimes by means of their fulcated extremity they are of service in raising up fractured bones of the cranium; several needles must also be kept here, some straight, and others crooked, for the stitching up of wounds, taking up of arteries, and many other uses. Heister's Surg. p. 12.

POCKET *medicines*. See MEDICINE.

POCO *allegro*, in the *Italian Musick*, is not so fast as *allegro*.

POCO *largo*, intimates to play or sing a little slow. See LARGO.

POCO *meno allegro*, is used to signify that the part it is joined to should be played or sung in a little less gay manner than *allegro* requires.

POCO *presto*, serves to let us know that we ought to sing or play that part to which it is annexed, not quite so quick as *presto* requires it should.

POCUMMA, in *Botany*, a name given by the people of Guinea to a species of plant which they use as an astringent. Their manner of taking it is very singular; for they put the leaves among their dough, and bake them into a mass with the bread, and then eat the whole together in their food. Phil. Trans. N° 232.

POD, among *Botanists*, a species of *pericarpium*, consisting of two valves, which open from the base to the point, and are separated by a membranaceous partition, from which the seeds hang by a kind of funiculus umbilicalis. It is in plain language the shell or husk of any kind of pulse. See PERICARPIUM, and SILIQUA.

PODAGRA, ποδαγρα, thus called from ποὺς, *pes*, and ἄγρα, *captura*, *seizure*, in *Medicine*, the gout in the feet.

PODAGRA *dentium*, sometimes, though with impropriety enough, is used for the TOOTH-*ache*.

PODAGRA *lini*, in *Botany*, a name given by some of the later Greek writers to *cuscuta*, or *dodder*, when found growing on the linum of flax. The Latins have called this *epithymum*, as they do the dodder growing on thyme *epithymum*; the earlier Greeks called this *linozostes*. Where this dodder takes root in a field of flax, it generally occupies many plants; and where it twines round them it causes protuberances and swellings, and has therefore been resembled to the gout on that plant.

PODAGRARIA, in *Botany*, a name given by many authors to the less wild *angelica*, called also *herba Gerardi*.

PODARIA, in the *History of Insects*, a classical name comprehending all such insects as have limbs, but no wings. Hill. See APTERA.

Of this class there are two subdivisions. 1. Such *aptera podaria* as have oblong bodies with numerous legs, or more than six pair: these are the *oniscus*, or gally-worm; the *scolopendra*, or *centipes*; and the *onisci*, or wood-louse. 2. The *aptera podaria* with shorter bodies, and less numerous legs, or fewer than six pair. This subdivision contains numerous genera, as the pediculi, the podura, or puceron, the prediculi of various kinds, the monoculi, the acari, the aranei, the scorpio, and a great many others. See GALLY-*worm*, SCOLOPENDRA, &c.

PODERIS, ποδηρης, from ποὺς, *pes*, and ἀειρω, *apto*, in *Antiquity*, a robe hanging down to the feet; but it is chiefly used to express a linen garment, a surplice, a shirt. The Jewish priests were covered with this kind of long surplices, during the time of their attendance in the temple; and this was the proper habit of their order.

PODESTA, or POTESTA, a magistrate, or officer of justice and policy, in a free city.

The name is originally Italian, *podesta*; and is chiefly applied to certain magistrates of Venice and Genoa, whose function is to administer justice in those republics.

The *podesta* in Venice corresponds to the prætor in ancient Rome, though appeals lie from his decisions to the new auditors, or the new civil quaranty. See QUARANTIA.

PODEX, in *Anatomy*, &c. the same with ANUS, or *fundament*.

POINCETS, in *Ornithology*, a name given by many to the several kinds of *colymbi*, or *divers*, as they are also called in English *web-feeted*; from their legs being placed very backward on their bodies, by which means they have great advantages in swimming and diving.

PODISMUS, ποδισμος, among the Greeks, a certain space, or number of feet laid out by surveyors; it was the same with what the Romans called PEDATURA.

PODIUM; in the *Theatre of the ancients*, the wall that separated the ORCHESTRA from the SCENE. Mem. de l'Acad. vol. i. p. 190.

PODOMETER, or PEDOMETER. See PEDOMETER.

PODONIPTÆ, formed from πους, ποδος, *foot*, and νιπτω, *I wash*, a name given to some of the rigid ANABAPTISTS, who enjoin it as an obligation upon the members of their community to wash one another's feet, in compliance with the example of Christ.

PODOPHYLLUM. See DUCK's *foot*.

PODURA, in *Natural History*, a genus of the *aptera* insects. Its characters are, that it has six feet formed for running; that it has two octonous eyes, a bifurcated inflexed tail, formed for leaping, and long setaceous antennæ. There are fourteen species. See PUCERON.

PŒANOPSIA, παιανοψια, in *Antiquity*, a name sometimes given to the festival PYANEPSIA.

POEM, *poema*, ποιημα, a composition in verse, of a due length and measure.

POEMS, *carmina*, are of various kinds; some denominated from the persons who first invented, or most used them; as the *Archilochian*, *Sapphic*, &c. Others from their composition, as the *monocolon*, consisting of one kind of verse; *dicolon*, of two; and *tricolon*, of three kinds. Others from their entireness or deficiency; as *brachycatalectic*, which in every verse wants two syllables; *catalectic*, which wants one; *acatalectus*, none; and *hypercatalectus*, which has a syllable too much, which, if cut off at the beginning of the next verse, the verse is said to be *hypermeter*. See ACATALECTIC, &c. Others are denominated from the subject matter; as the *apobaterion*, *epibaterion*, *epinicion*, *epithalamium*, *genethliac*, *propemptic*, *elegiac*, *satiric*, *epicedion*, *epitaph*, *threnne* or *lamentation*, *encomiastic*, *panegyric*, *satiric*, *lyric*, *pastoral*, &c. Others from the manner of narration; as *exegetic*, which relates a thing under the author's own person, *dramatic*, and *epic*. See each under its proper head, EPIC, DRAMA, &c. To these may be added, odes, eclogues, and idyllums.

To this head must also be referred several other poetical compositions of a less serious kind, which the idly-labouring vein of little poets has produced into the world, and which, though frequently admired by persons of a low taste, are justly ranked by Mr. Addison in the class of false wit. Such are the acrostic enigma, anagram, tecto, chronogram, proteus, echo, &c.

POENITENTES, in the church of Rome, a designation given to heretics, who being admonished by the ecclesiastical judge, have abjured their errors, and given sufficient satisfaction to the bishop or inquisition. Confiscation of goods is a punishment common to all heretics; but if they confess and abjure of their own accord, without being formally prosecuted, this part of their punishment is usually remitted. See INQUISITION.

POEROU, in *Natural History*, a name given at Otaheite in the South Seas to the *bombyx tiliaceus* of Linnæus, of the bark of which they make matting, coarse cloth, and ropes and lines from the thickness of an inch to the size of a small packthread. Hawkesworth's Voyages, vol. ii. p. 217.

POESY, *poesis*. See POETRY.

The word is formed from the Greek ποιησις, of ποιεω, *facio*, *fabricor*, *fingo*, *I make*, *I frame*, *I invent*.

Hence alchemy, or the art of making gold, was anciently called *poesy*, *chrysopoesy*, &c.

POET, *poeta*, an author who composes poems, or discourses in verse.

Cicero relates it as a saying of Democritus and Plato, that there could be no good *poet sine afflatu furoris*, *without a tincture of madness*; and Aristotle calls *poets* expressly, *maniosi*, *maniacs*, *madmen*.

M. Spanheim tells us, that the Arab authors are more poetically given than those of any other people: and adds, that there are more verses among the Arabians than among all the other nations of the world put together.

The Greek word ποιητης, *poet*, signifies *author*, from ποιεω, *facio*, *I make*; whence the *poets* were anciently also called *vatides*.

By a law of the emperor Philip, inserted in the Code, lib. x. tom. iii. *poets* are expressly excluded from the immunities granted the professors of all other sciences.

Homer, Virgil, Milton, and Tasso, are the chief, almost the only epic *poets*. Sophocles, Euripides, Shakspeare, Otway, Corneille, and Racine, are the best tragic *poets*. Aristophanes, Menander, Plautus, Terence, Fletcher, Johnson, Moliere, &c. the chief comic *poets*. Horace, Cowley, Matherbe, and Rousseau, excelled as lyric *poets*. And Juvenal, Persius, Regnier, Boileau, Dryden, and Oldham, as Latine *poets*.

POET,

POET, *laureat.* See LAUREAT.

POETS, *provençal.* See PROVENÇAL, and TROUBADOURS.

POETICAL, whatever is something that relates to poetry or poets. In this sense we say, a *poetical* genius, a *poetical* phrase, *poetical* licences, *poetical* fury, &c.

Most languages have their *poetical* words, which are never used on other occasions. These prove of great advantage to the poets, who are hereby enabled to raise the style and diction into the *poetical* character, with the greater ease. The French often lament the want of a set of such words in their language, for want whereof, their poetry appears in a too familiar garb, not sufficiently distinguished from the common language. It is too reserved, not being allowed any boldness, or flights, but what might pass in prose. To this, in good measure, is attributed the little success their authors have met with in the epic way.

POETICAL *justice* is chiefly used in respect of the drama, to denote a distribution of rewards and punishments to the several persons, at the catastrophe or close of the piece, answerable to the several characters they have appeared in. See CHARACTER.

Whatever difficulties and distresses the virtuous and innocent may labour under, and how prosperously soever it may go with the wicked, in the course of the piece; the poet usually takes care to give each of them their due before he parts with them. But it is controverted whether this piece of justice be indispensable, and whether it may not be allowed to leave virtue oppressed, and vice flourishing.

POETICAL *licence.* See LICENCE.

POETICAL *numbers.* See NUMBERS.

POETICAL *rising and setting.* See RISING, and SETTING.

The ancient poets, referring the rising, &c. of the stars to that of the sun, make three kinds of rising and setting, viz. COSMICAL, ACRONICAL, and HELIACAL.

POETICS, *poetice, ars poetica*, the doctrine of poetry, or the laws and rules of conducting pieces or compositions of poetry. Aristotle's *Poetics* is a work infinitely valued; and M. Dacier's comment thereon is one of his best pieces we have. Horace, Vieta, Vossius, and Scaliger, have likewise published *Poetics* in Latin; the duke of Buckingham in English; and Menardiere, Hedelin, and Despreaux, in French.

POETRY, *poesis*, the art of composing poems, or pieces in verse.

The word is formed from the Greek ποιέω, of ποιῶ, *facio, I make.*

If a verse be considered as a mere series of just six feet following one after another in the same line, *poetry* and versification will appear two very different things; but Rossu, in his idea of verse, includes cadence, peculiar constructions, arrangements, and expressions, unknown in common discourse; and, above all, a certain noble, bold, elevated, and metaphorical turn and manner of diction. These, he observes, are so essential to *poetry*, that without them the most exact arrangement of long and short syllables makes little else but a kind of measured prose; whereas these, in a discourse that has no poetical feet or measures, do yet give it the poetical character, and make it a kind of *unmeasured poetry.*

The rules of *poetry* and versifying are taught by art, and acquired by study; but this force and elevation of thought, which Horace calls *something divine*, and which alone makes the *poetry* of any value, must be derived from nature; or, according to Aristotle, from some happy transports, to which that author gives the name of madness: ἔστιν ἡ ποίησις οὐκ ἀνδρὸς σοφοῦ, ἀλλ' ἐνθουσιαστικοῦ. But there must be conceived a just solid judgment, to direct and govern this fury of the poet's imagination.

Hence the critic concludes, that *the end* of *poetry* is to please; *its cause*, either the excellence of the poet's genius, or a poetical fury, and transport of the soul, manageable by the judgment; *its matter*, long and short syllables, and feet composed hereof, with words furnished by grammar; and *its form*, the arrangement of all these things in just and agreeable verse, expressing the thoughts and sentiments of the author after the manner already mentioned.

But, after all, how narrow are these bounds, if we consider *poetry* in the light wherein the works of Homer and Virgil leave it? What is here laid down pretends to no praise, which a mere translator may not rise to, and which the war of Catiline might not merit, if turned out of the prose of Sallust. It is with reason, therefore, that we distinguish the *low* and *simple*, from the *greater poetry*; by giving the former the title of *versification*; and that we make *poetry* and *versification* two distinct arts: in effect, there is not more difference between grammar and rhetoric, than between the art of making verses, and that of inventing poems.

The *greater poetry*, then, consists principally in fiction, or the invention of fables; in the expressing of things by allegories and metaphors; and in the inventing of actions, under which the truths which the poet has to teach may be agreeably disguised.

In this view, scarce any poems retain the nature and essence of the grand *poetry*, but the *epopæa*, *tragedy*, and comedy; the rest, be they elegies, satires, songs, or what they will, come under the name of *versification*.

The ancient eloquence, it is observed, was full of mysteries and allegories. The truth was by them usually disguised under those ingenious inventions, called μῦθοι, *fables*, q. d. *words*; as if there were as much difference between these fabulous discourses of the learned, and the common language, as between the speech peculiar to man and the voice of brutes.

At first fables were chiefly used in treating of the divine nature, after the manner they then conceived of it: this occasioned the first poets to be called *divines*, and *poetry* the *language of the gods.* The divine attributes they separated into a number of persons; because the weakness of the human mind could not conceive so much power, and so much action, in a simplicity so strict and indivisible as that of God.

Nor could they speak of the operation of this almighty cause, without speaking likewise of its effect. They therefore added physics to their theology, handling both after the same manner, without quitting their veils or allegories.

Now man being the most considerable of all the works of the Deity, and there being nothing so proper for poets, or of such general use to mankind as such a subject, they therefore added ethics to the former, and treated the doctrine of manners in the same way as they had done divinity and physiology: and hence arose the *epopœia*, or epic poem.

The epic poets have done, with regard to morality, just the contrary of what the divine poets did for their theology. As the too great diversity of divine actions and perfections, so little proportionate to our understanding, occasioned the latter to divide the single idea of the simple essence of God into several persons under different names, as Jupiter, Juno, Neptune, &c. so, on the contrary, the nature of moral philosophy, which never gives any rules for particular things, occasioned the epic poets to unite in one single idea, in the same person, and even in a single action, whatever of the like kind occurs in different persons, and different actions.

Thus, says Aristotle, *poetry* teaches moral philosophy, not by reciting historically what Alcibiades has done or suffered, but proposing what such a person, whom the poet calls by any name he pleases, would necessarily or probably have done or said on the like occasion. It is in this manner that *poetry* represents either the unhappy consequences of designs ill concerted, of wicked actions, &c. or the reward of good actions, and pleasure reaped from a design laid in virtue, and conducted by prudence.

Thus, according to our critic, the poetical actions and persons are all feigned, allegorical, and universal, not historical and singular. This is likewise the sentiment of Horace; who adds, that poets reach morality as well as philosophy; but the preference herein he gives to Homer. This advantage of the poets over mere philosophers arises hence, that all *poetry* is an imitation. Now imitation is a thing extremely natural; and hence this manner of proposing things becomes better fitted to engage the auditors. Again, imitation is an instruction given by examples; and examples are the more proper to persuade, because they prove the thing possible. In effect, imitation is so much the nature of *poetry*, that, Aristotle tells us, it is to this the art owes its rise.

But the poets, by becoming philosophers, did not cease to be divines; on the contrary, the morality they taught, obliged them frequently to introduce the Deity in their works; and the share he had in each action, obliged the poet to make it grand, important, and conducted by the persons of kings and princes.

Add to this, that it likewise obliged the poet to think and speak after a manner elevated above the common pitch of men, and to use phrases equal, in some measure, to the divine persons he introduced; and to this purpose served the poetical, figurative language, and the majesty of heroic verse.

To convey their truths to the best advantage, and adapt them to the particular purposes they were intended for, poets found out various forms. Hence the epopœia and drama.

Epic *poetry* is more for the habits and manners than the passions; these fall rise all at once, and their violence is but of a short duration; but the habitudes are cooler and more gentle, and rise and fall more slowly.

The epic action, therefore, could not be restrained to a day or two, as that of the drama; a longer and a fuller space was required for this than for tragedy, which is

only

only for the paſſions. And hence aroſe a ſtill greater difference between tragedy and the epopœia.

For the tragic violence required a ſtronger and more lively repreſentation than the epic; and accordingly it conſiſts wholly in the action, the poet never ſpeaking, as he does in the epopœia, where there are no actors.

POETRY, *the laws of epic and dramatic*, ſee under EPIC, CHARACTER, INVOCATION, DRAMATIC, THEATRE, TRAGEDY, COMEDY, ACT, SCENE, and SENTIMENT.

For the lower ſorts of POETRY, ſee ODE, SONG, EPIGRAM, ELEGY, SATIRE, &c.

For the hiſtory of Engliſh *poets*, we refer the reader to Mr. Warton's learned, comprehenſive, and accurate work on this ſubject.

POET's *caſſia*, or *poet's roſemary*, in *Botany*, *aforis*, a genus of the *decacia decandria* claſs. Its characters are theſe: it is male and female in different plants, and the empalement of the flower is of one leaf, which is divided into three acute ſegments; the flower has no petals, but thoſe on the male plants have three ſhort ſtamina; the female have a germen, which changes to a globular berry, having a ſingle ſeed. There is but one ſpecies, a native of the ſouthern parts of Europe.

The whole plant being aſtringent, it is likely to be of efficacy in fluxes of the belly, and other diſorders of that kind. Ray.

POGGE, the *cataphractus cottus* of Linnæus, in *Ichthyology*, the name of a ſmall ſea-fiſh very common on moſt of the Britiſh coaſts, and ſeldom more than five inches and a half in length; the head is large, bony, and very rugged; the end of the noſe is armed with four ſharp upright ſpines; on the throat are a number of ſhort white beards; the teeth are very ſmall, ſituated in the jaws; the body is octagonal, and covered with a number of ſtrong bony cruſts, divided into ſeveral compartments; the ends of which project into a ſharp point, and form ſeveral echinated lines along the back and ſides, from the head to the tail; the firſt dorſal fin conſiſts of ſix ſpiny rays; the ſecond is placed juſt behind the firſt, and conſiſts of ſeven ſoft rays; the pectoral fins are broad and rounded, and are compoſed of fifteen rays. See *Tab.* IV. *of Fiſh*, N° 37.

There is an American *cataphractus*, much reſembling this, but having three angles on the hinder part of its head, one on each ſide, and the third in the middle; and its upper chap ſlightly, and its mouth a little prominent; its head is covered with a brown and bony helmet; and its back, ſides, and tail, with ſcales of the ſame colour, engraven with ſmall parallel lines, and of a rhomboidal figure; its belly is covered with a thin limber ſkin.

POGO, a name by which the inhabitants of the Philippine iſlands call their *quail*: it is very like our common quail, but ſmaller.

POINCIANA, in *Botany*. See BARBADOES *flower-fence*.

POINSON, in the *Manege*, is a little point or piece of ſharp-pointed iron, fixed in a wooden handle, which the cavalier holds in his right-hand when he means to prick a leaping horſe in the croupe, or beyond the end of the ſaddle, in order to make him yerk out behind.

POINT, derived from *punctum*, which is formed from *pungere*, *to prick*, is a term in various *arts*.

POINTS, *in Engliſh Antiquity*, were a neceſſary article in the dreſs, at leaſt of men; and mention of them frequently occurs in the antient comedies and other old books.

They were pieces of ſtring about eight inches in length, conſiſting of three ſtrands of cotton yarn, of various colours twiſted together, and tagged at both ends with bits of tin-plate: their uſe was to tie together the garments worn on different parts of the body; particularly the breeches or hoſe, as they were called: hence the phraſe, *to untruſs a point*. With the leathern doublet or jerkin, buttons were introduced, which in time rendered *points* uſeleſs. Theſe points continued to be given on Aſcenſion-day to boys that perambulated the pariſhes, together with willow wands, as a kind of honorary rewards, though diſtinguiſhed only by the name of tags, and become uſeleſs.

POINT, in *Architecture*, *Arches of the third point*, and *arches of the fourth point*. See ARCHES.

POINT, *gauge*. See GAUGE.

POINT, in *Aſtronomy*, is a term applied to certain parts or places marked in the heavens, and diſtinguiſhed by proper epithets.

The four grand *points* or diviſions of the horizon, viz. the *eaſt*, *weſt*, *north*, and *ſouth*, are called the *cardinal points*. See CARDINAL: ſee alſo EAST, WEST, &c.

The zenith and nadir are the *vertical points*.

The *points* wherein the orbits of the planets cut the plane of the ecliptic, are called the *nodes*.

The *points* wherein the equator and ecliptic interſect, are called the *equinoctial points*. Particularly that, whence the ſun aſcends towards the north pole, is called the *vernal point*.

And that, by which he deſcends to the ſouth pole, the *autumnal point*.

The *points* of the ecliptic, where the ſun's aſcent above the equator, and deſcent below it, terminate, are called the *ſolſtitial points*. Particularly the former of them the *ſolſtitial* or *ſummer point*; the latter, the *brumal* or *winter point*.

POINTS, in *Electricity*, are thoſe acute terminations of bodies which facilitate the paſſage of the electrical fluid *from* or *to* ſuch bodies.

Mr. Jallabert was, probably, the firſt perſon who obſerved that a body, pointed at one end and round at the other, produced different appearances upon the ſame body, according as the pointed or round end was preſented to it. But Dr. Franklin firſt obſerved and evinced the entire effect of pointed bodies, both in drawing and throwing off electricity at greater diſtances than other bodies could do it; though he candidly acknowledges, that the power of points to throw off the electric fire was communicated to him by his friend Mr. Thomas Hopkinſon. Dr. Franklin electrified an iron ſhot, three or four inches in diameter, and obſerved, that it would not attract a thread, when the point of a needle, communicating with the earth, was preſented to it; but he found it impoſſible to electrify an iron ſhot, when a ſharp needle lay upon it. He alſo obſerved, that a piece of leaf gold, ſuſpended between two plates (ſee *Experiments in* ELECTRICITY, *Exp.* 7.) always removed farther from that plate to which its ſharpened point was preſented; and that, if one of the *points* was very blunt and the other very ſharp, it would be ſuſpended in the air by its blunt end, though no electrified plate was held below it.

This remarkable property, poſſeſſed by pointed bodies, of gradually and ſilently receiving or throwing off the electric fluid has been evinced by a variety of familiar experiments. Thus, if one hand be applied to the outſide coating of a large jar fully charged, and the point of a needle, held in the other, be directed towards the knob of the jar, and moved gradually near it, till the point of the needle touches the knob or ball, the jar will be entirely diſcharged, ſo as to give no ſhock at all, or a ſhock ſcarce ſenſible.

In this caſe the point of the needle has gradually and ſilently drawn away the ſuper-abundant electricity from the electrified jar.

Farther, if the knob of a braſs rod be held at ſuch a diſtance from the prime conductor, that ſparks may eaſily eſcape from the latter to the former whilſt the machine is in motion; and when this is the caſe, if the point of a needle be preſented, though at twice the diſtance of the rod from the conductor, no more ſparks will be ſeen paſſing to the rod: when the needle is removed, the ſparks will be ſeen, but upon preſenting it again they will diſappear, ſo that the point of the needle draws off ſilently almoſt all the fluid, which is thrown by the cylinder or globe of the machine upon the prime conductor. This experiment may be varied, by fixing the needle upon the prime conductor with the point upward; and then, though the knob of a diſcharging rod or the knuckle of the finger be brought very near the prime conductor, and the excitation be very ſtrong, no ſpark will be perceived, or if there be any, it will be exceedingly ſmall.

The influence of *points* is alſo evinced in the amuſing experiment, commonly called the electrical horſe-race. See *Experiments in* ELECTRICITY, *Exp.* 12.

Again, if a ſmall lock of cotton be ſuſpended from the prime conductor by a thread and electrified, its filaments will repel one another, and extend themſelves towards the neareſt conductor; but if the finger or the knob of a rod be preſented to it, it will move toward the finger or knob, and endeavour to touch it: at the ſame time let a pointed needle be preſented with the other hand to the cotton a little above the end of the finger, and it will ſhrink upwards and move towards the prime conductor; but upon removing the needle, the cotton will return towards the finger; on preſenting the needle again, it will ſhrink; and hence it is inferred, that the point of the needle draws off the electric fluid from the cotton, ſo that it is capable of being attracted by the prime conductor, an effect which the finger or blunt end of the wire could not produce. See THUNDER-*houſe*.

The late Mr. Heely exhibited the efficacy of pointed bodies by ſuſpending a large bladder, well blown and covered with gold, ſilver, or braſs leaf, by means of gum water, at the end of a ſilken thread ſix or ſeven feet long, hanging from the ceiling of a room, and electriſying the bladder by giving it a ſtrong ſpark with the knob of a charged bottle: he then preſented to it the knob of a wire, which cauſed the bladder to move towards the knob, and when nearly in contact to give it a ſpark, and thus to diſcharge its electricity. By giving the bladder another

ſpark, and preſenting to it the point of a needle, the bladder was not attracted by the point but rather receded from it, eſpecially if the needle was ſuddenly preſented towards it. But experiments evincing the efficacy of pointed bodies for ſilently receiving or throwing off the electric fluid, may be infinitely diverſified according to the fancy or convenience of the electrician; and in a work of this kind it is needleſs to enumerate them.

In connection with this ſubject it may be proper to remember, that, in caſe of *points* throwing off or receiving electricity, a current of air is ſenſible at an electrified point, which is always in the direction of a point, whether the electricity be poſitive or negative. This fact has been ſufficiently aſcertained by many electricians, and particularly by Dr. Prieſtley and ſig. Beccaria: the explication of it will be ſubjoined in the ſequel of this article.

Dr. Prieſtley contrived to exhibit the influence of this current on the flame of a candle, preſented to a pointed wire, electrified negatively as well as poſitively. The blaſt was ſo ſtrong (and in both caſes alike) as to lay bare the greateſt part of the wick, the flame being driven from the point; and the effect was the ſame, whether the electric fluid iſſued out of the point or entered into it. He diverſified this experiment in a variety of ways, by placing the flame between two *points*, variouſly circumſtanced in their connection with the prime conductor, electrified poſitively and the floor; with the rubber and the floor; with the rubber and the conductor, &c. He alſo tried the force of this current upon paper vanes, ſtuck into the ſides of a cork, which by means of a needle was ſuſpended on a magnet: theſe vanes he held two or three inches from the point of a wire, communicating with the outſide coating of a jar placed upon an electrical ſtand, and he obſerved, that whenever he took a ſpark from the wire communicating with the inſide, the vanes were ſtrongly blown upon and made to turn, as if the current of air had flowed from the point; in which caſe, according to Dr. Franklin's theory, the electric fluid was entering it. If they were made to turn the contrary way, the current ſoon ſtopped them, and never failed to bring them back and make them move as before. This experiment was varied, and vanes were prepared of thin pieces of braſs, which are conductors, and the effect was ſimilar to that of the former. Dr. Prieſtley alſo found, as Mr. Wilſon had before obſerved, that the vanes would not turn in vacuo, nor in a cloſe unexhauſted receiver where the air had no free circulation. In much the ſame manner, Beccaria exhibited to ſenſe the influence of the wind or current of air driven from *points*. See *Exp.* 11. under *Experiments in* ELECTRICITY.

POINTS, *theory of*. Dr. Franklin endeavoured to account for the efficacy of *points*, by ſuppoſing that the baſe on which the electric fluid at the point of an electrified body reſted being ſmall, the attraction by which the fluid was held to the body was ſlight; and that, for the ſame reaſon, the reſiſtance to the entrance of the fluid was proportionably weaker in that place than where the ſurface was flat: but he was not ſatisfied with this hypotheſis. The facility with which pointed bodies receive or diſcharge the electric fluid may, perhaps, be more ſatisfactorily explained by conſidering, that the electric fluid ſuper-induced upon an inſulated body, is confined upon that body by the ſurrounding air, and that electricity, by being continually communicated to the air, which is never a perfect electric, is gradually diſſipated: whence it follows, that as a greater or leſs quantity of air is contiguous to a given quantity of electrified ſurface, that ſurface will loſe its electricity more ſuddenly or more ſlowly. Thus, as the point of a needle, ſuppoſed to be connected with an electrified prime conductor, is ſurrounded by the air, the electricity will be diſſipated more eaſily from that than from any other part of the prime conductor of the ſame dimenſions, but expoſed to a leſs quantity of air. Beſides, the air about the point may be more eaſily moved in conſequence of the electrical repulſion than at any other part of the ſurface of the prime conductor; and new air, i. e. unelectrified air paſſes more frequently by it, which taking always part of the electricity of that body, further promotes its diſſipation. When the pointed body is negatively electrified, it acquires the electric fluid through the point more eaſily than through any other part of its ſurface; becauſe the point preſenting the leaſt ſurface to the greateſt quantity of air receives a proportionably greater quantity of the electric fluid.

Lord Mahon, in his Principles of Electricity, 1779. explains the influence of *points* in a different manner: he firſt premiſes, that electric atmoſpheres are conſtituted of the particles of air ſurrounding the electrified body: if, e. g. the body be poſitively electrified, he maintains that it will depoſit, upon all the particles of air that ſurround it, and come ſucceſſively in contact with it, a proportional part of its ſuperabundant electricity; ſo that they will become likewiſe poſitively electrified, and form a poſitively electrified atmoſphere. The ſame reaſoning is applied, *mutatis mutandis*, to negatively electrified bodies, and their negative atmoſpheres.

From this principle, and the obſervation that the denſity of an electrical atmoſphere diminiſhes, in a certain ratio, as the diſtance from the electrified body increaſes, as well as from other conſiderations, his lordſhip undertakes to aſſign the cauſe why an electrified body, to which a projecting point is fixed, parts with or receives electricity more readily than a ſmooth cylinder or globular body: becauſe the ſuperabundant electricity of the body, ſuppoſing it to be poſitively electrified, which, in all caſes, tends to quit it, will, when a point is fixed to it, meet with leſs reſiſtance to its eſcape; as the point projects beyond the denſe part of the electrical atmoſphere of the body into the rarer, and, conſequently, more unreſiſting part of that atmoſphere. But the eſcape of the electric matter from any part of a ſmooth cylindrical body, poſitively electrified, is prevented or impeded; becauſe every part of its ſurface is in contact with the denſeſt part of its own ſtrongly reſiſting electric atmoſphere. The ſurface too of the point being extremely ſmall, the leſs will be the reſiſtance oppoſed to the eſcape of the ſuperabundant electricity of the body into that rare part of its electrical atmoſphere into which the point projects. Beſides other illuſtrations of this principle he produces the inſtance of a pointed wire, placed between two round or prominent metallic bodies, with its point on a level with their ſurface. In this ſituation, when preſented to an electrified body, it acts no longer as a point, or only in a very ſmall degree; becauſe the denſe part of the electrical atmoſphere of the two round bodies flows or is extended over it.

As for the current of air iſſuing from the *points* of bodies electrified *plus* or *minus*, Dr. Prieſtley obſerves, that it is not more difficult to be accounted for on Dr. Franklin's hypotheſis of poſitive and negative electricity, than any other caſe of electrical repulſion. The particles of the atmoſphere, near the *points* of electrified bodies, having, by their means become poſſeſſed of more or leſs than their natural ſhare of the electric fluid, muſt retire to places where they can diſcharge or repleniſh themſelves as occaſion may require. If it be aſked why the particles of the atmoſphere do not, in the ſame manner, recede from all the parts of the electrified body, as well as from the *points*; it is anſwered, that as the preſſure of the atmoſphere will prevent a vacuum, and as electrical attraction and repulſion are moſt powerful at the *points* of bodies, on account of the eaſier entrance or exit of the fluid at the *points* (upon whatever principle that effect depends) the electrified atmoſphere, whether negative or poſitive, muſt fly off at the *points* preferably to any other places, and the weight of the atmoſphere will force the air of the neighbouring places upon the flatter parts of the electrified conductor, notwithſtanding the real endeavour it may have to recede from it. Hiſt. of Elect. vol. ii. p. 191, 8vo. edit. 1775.

Beccaria accounts for this phenomenon by obſerving, that *points*, annexed to electrified bodies or preſented to them, throw into the contiguous air, or draw from it the electrified fire with ſuch a force, that in both caſes they repel from themſelves the air, either loaded with part of the fire with which they ſuperabound, or deprived of its own fire, if theſe bodies were themſelves in a ſtate of negative electricity: and theſe *points*, while they drive away the air next to them, throw into or draw from the air, which laterally ſucceeds the electrical fire; and they do this in ſuch a divided manner, that little light or noiſe is produced, but with ſuch rapidity, that a great quantity of fire is really diſcharged in a ſmall ſpace of time. He accordingly diſtinguiſhes between that tickling ſenſation, which the electrical fire excites in us, when the face or hand is immerſed into the atmoſphere of an electrified body, and the current of air above mentioned. The exceſſive fire, he ſays, which actuates this atmoſphere drives the natural fire from the contiguous air to the face, &c. and this fire in paſſing into the ſkin, produces the ſenſation of tickling: but if the body near which we ſtand be negatively electrified, the fire within the ſkin flows to the external ſurface of it, and thus the ſame kind of feeling is produced, whether the fire iſſues out of the body or paſſes into it. But the electric wind is a real current of air, driven from a point either annexed or preſented to a body ſtrongly electrified, and with ſuch rapidity, that the direction of it cannot be diſcerned either with the naked eye or with the aſſiſtance of any glaſs. Artificial Electricity, 1776, p. 332, &c.

POINTS, *application of the doctrine of*. There is not a more important fact in the hiſtory of electricity than the uſe to which the diſcovery of the efficacy of pointed bodies was applied.

Dr. Franklin, having aſcertained the ſameneſs of electri-

city and lightning, was immediately led to propose a cheap and eafy method of fecuring buildings from the damage of lightning, by fixing a pointed metalline rod higher than any part of the building, and communicating with the ground or with the neareft water. See *Pointed Metallic* CONDUCTORS.

This contrivance was actually executed in a variety of cafes, and has proved an excellent preferrative: fome few inftances, however, having occurred, in which buildings provided with fuch conductors have been ftruck and damaged, a controverfy has arifen with regard to their expedience and utility. In this controverfy Mr. Wilfon has taken the lead, and with him Dr. Mufgrave and fome few other electricians have concurred in their oppofition to elevated and pointed conductors. They allledge, that every point, as fuch, follicits the lightning, and thus contributes not only to increafe the quantity of every actual difcharge, but alfo frequently to occafion a difcharge where it might not otherwife have happened: whereas, they fay, if inftead of pointed conductors, thofe with blunted terminations were ufed, they would as effectually anfwer the purpofe of conveying away the lightning fafely, without the fame tendency to increafe or invite it. Accordingly, Mr. Wilfon, in a letter to the Marquis of Rockingham (Phil. Tranf. vol. lix. art. 44.) expreffes his opinion, that, in order to prevent lightning from doing mifchief to high buildings, large magazines, &c. the feveral buildings fhould remain as they are at the top, that is, without having any metal above them, either pointed or not, by way of a conductor; but that on the infide of the higheft part of fuch a building, and within a foot or two of the top, it may be proper to fix a rounded bar of metal, and to continue it down along the fide of the wall to any kind of moifture in the ground.

On the other hand it is urged by the advocates for pointed conductors, that *points*, inftead of increafing an actual difcharge, prevent a difcharge where it would otherwife happen, and that blunted conductors tend to invite the clouds charged with lightning. And it feems to be a certain fact, that though a fharp point will draw off a charge of electricity filently at a much greater diftance than a knob, yet a knob will be ftruck with a full explofion or fhock, the charge being the fame in both cafes, at a greater diftance than a fharp point.

The efficacy of pointed bodies for preventing a ftroke of lightning is ingeniouffy explained by Dr. Franklin in the following manner: an eye, he fays, fo fituated as to view horizontally the underfide of a thunder-cloud, will fee it very ragged, with a number of feparate fragments or fmall clouds one under another; the loweft fometimes not far from the earth. Thefe, as fo many ftepping-ftones, aflift in conducting a ftroke between a cloud and a building. To reprefent thefe by an experiment, he directs us to take two or three locks of fine loofe cotton, and connect one of them with the prime conductor by a fine thread of two inches, another to that, and a third to the fecond, by like threads, which may be fpun out of the fame cotton. He then bids us to turn the globe, and fays we ftall fee thefe locks extending themfelves towards the table, as the lower fmall clouds do towards the earth, but that, on preferting a fharp point, erect under the loweft, it will fhrink up to the fecond, the fecond up to the firft, and all together to the prime conductor, where they will continue as long as the point continues under them. May not, he adds, in like manner, the fmall electrified clouds, whofe equilibrium with the earth is foon reftored by the point, rife up to the main body, and by that means occafion fo large a vacancy, as that the grand cloud cannot ftrike in that place. Letters, p. 121, &c. Mr. Henly, with a view of determining the queftion, whether *points* or knobs are to be preferred for the terminations of conductors made feveral experiments, two or three of which it may not be improper to recite. Having placed two of Mr. Canton's ELECTROMETERS, A and B, (*Tab.* V. *Electricity, fig.* 35.) infulated, upon ftands of fealing wax about feven inches afunder, and at far from the end of a prime conductor, eighteen inches long, and 1¼ inch in diameter, with a ball at each end, 2¼ inches in diameter, the diameter of the electrical globe being nine inches; on the top of the box A, he placed a wire, projecting three inches from the end of it, and terminated by a ball ¾ of an inch in diameter: on the top of the box B, he placed a fharp-pointed wire, projecting alfo three inches from its end. After giving the winch five or fix turns, the balls hanging from the box A, were repelled to the diftance of one inch from each other, but thofe hanging from the box B, feparated full two inches. Then touching the prime conductor with a finger, the balls at A clofed, while thofe at B remained a full inch afunder: hence he infers, that a fharp point is much better adapted to draw off lightning than a knob of ¾ of an inch in diameter.

In another experiment, he infulated three of his largeft jars, containing together about fixteen fquare feet of coated furface; from the bottom of thefe jars projected a wire terminated in a ball ¾ of an inch in diameter; and at the diftance of 1¾ inch from it, he placed the infulated ball C (*fig.* 36.) on which he brought down the charge of the three jars by his difcharging rod, which leaped from thence to the ball in contact with the jars, and difcharged them by a loud and full explofion: but the fame thing did not happen when he removed the infulated ball only one-eighth of an inch farther from the other. He then removed the wire which was terminated by the ball, and placed in its ftead another of the fame length and diameter, but very nicely tapered to a point; then placing the infulated ball C one inch from the point, he brought down the charge of the three jars as before, which flew upon the point and melted it a little; the jars were difcharged with a loud and full explofion. But having removed the ball C to the diftance of 1¾ inch from the point, the charge did not ftrike it, though much of it was prefently drawn off filently by the point, as appeared by the falling of the index of the electrometer. Whence it feems probable, that a conductor terminated by a ball of three-fourths of an inch in diameter, would be in danger of a ftroke from a highly electrified cloud, at a much greater diftance than another with a fharp termination. He alfo varied this experiment by placing the large copper ball C, at fuch a diftance from that in contact with the jar, that on bringing down the charge by his difcharging rod, it feemed to remain almoft undiminifhed, though the rod was kept in contact with the prime conductor a full minute. Then, repeating the experiment with a point inftead of a knob, the charge was in a great meafure prefently drawn off filently.

In another experiment, he fufpended a large bullock's bladder gilded with leaf copper by a filken ftring, at one end of an arm of wood, placed horizontally, and turning freely upon the point of a needle; the bladder was balanced by a leaden weight, (*fig.* 37.) In this fituation he gave the bladder a ftrong fpark from the knob of a charged bottle, when, preferting towards it a brafs rod, terminated by a ball, two inches in diameter, he obferved that the bladder would come towards it at the diftance of three inches; and when it had got within one inch of it, it would throw off its electricity in a full and ftrong fpark, nearly, if not quite as large as that which it had received. But giving it another ftrong fpark, and preferting towards it a pointed wire, he could never perceive that it attended to that, and when it was brought nearly into contact with the bladder, there was no fpark at all, fcarce any fenfible quantity of electricity remaining in it. This experiment was frequently repeated with the fame refult. Phil. Tranf. vol. lxiv. part. ii. art. 18. See THUNDER-*Houfe*.

It has been univerfally allowed, that in cafes where the quantity of electricity with which thunder-clouds are charged is fmall, or when they move flowly in their paffage to and over a building, pointed conductors, which draw off the electrical fluid filently, within the diftance at which rounded ends will explode, will gradually exhauft them, and thus contribute to prevent a ftroke and preferve the buildings to which they are annexed.

But it has been faid by thofe that are averfe to the ufe of fuch conductors, that if clouds of great extent and highly electrified, fhould be driven with great velocity directly over them, or if a cloud hanging directly over buildings to which they are annexed, fuddenly receives a charge by explofion from another cloud at a diftance, fo as to enable it inftantly to ftrike into the earth, thefe pointed conductors muft take the explofion; on account of their fuperior readinefs to admit electricity at a much greater diftance than thofe that are blunted, and in proportion to the difference of that ftriking diftance, do mifchief inftead of good: and, therefore, they add, that conductors terminated by fharp *points* are fometimes advantageous, and at other times prejudicial; and that, as the purpofe for which conductors are fixed upon buildings is not to protect them from one particular fort of clouds only, but if poffible, from all, it cannot be advifeable to ufe that kind of conductors, which, if they diminifh danger on the one hand, will increafe it on the other. Befides, it is pleaded, that if fharp-pointed conductors are attended with any the fmalleft degree of danger, that danger muft be conliderably augmented by carrying them high up into the air, by fixing them upon every angle of a building, and making them project in every direction. Such is the reafoning of Dr. Mufgrave, for which we muft refer to his paper in the Phil. Tranf. vol. lxviii. part ii. art. 36.

Mr. Wilfon, diffenting from the report of a committee of the Royal Society, appointed to infpect the damage done by lightning to the houfe of the board of ordnance, at Purfleet, in 1777, was led to juftify his diffent, and

to disparage the use of pointed and elevated conductors, by constructing a magnificent apparatus, with which he might produce effects similar to those that had happened in the case referred to the consideration and decision of the committee.

With this view he prepared a model of the board-house at Purfleet, resembling it as nearly as poſſible in every eſſential appendage, and furniſhed with conductors of different lengths and terminations. As no apparatus ſufficiently large for repreſenting a thunder-cloud, could conveniently be put in motion, he contrived to accompliſh the ſame end by moving the model of the building, with a velocity anſwering to that of the cloud, which he ſtates, at a moderate computation, to be about four or five miles an hour. In order to conſtruct a proper ſubſtitute for the cloud, he joined together the beſt rims of one hundred and twenty drums, making the ſurfaces formed by the ſeveral junctures even with cloth paſted down, and covering them with tin-foil. Theſe drums formed a cylinder above one hundred and fifty-five feet in length, and above ſixteen inches in diameter. The whole cylinder was made in four ſeparate parts, three of which could eaſily be made to communicate or not with each other; the fourth conſiſting of eight braſs drums, was reſerved for a different purpoſe. The great cylinder, conſiſting of the three parts, and containing five hundred and ninety-two ſquare feet, was ſuſpended about five or ſix feet from the floor by ſilk lines, one end of it hanging over the middle of the long frame on which the model was propoſed to move, and the other being joined occaſionally to the end of a wire four thouſand eight hundred feet long, that was ſuſpended through the whole ſpace of the room; the remote end of this wire hooked on occaſionally to the end of the braſs drums, which made a ſeparate cylinder about ten feet in length, and which was ſuſpended by ſilk lines about ſix feet from the floor, in ſuch a manner that the fartheſt end thereof from the wire was within nine or ten feet from the great cylinder. The long wire with the great cylinder and braſs drums made the whole of the ſubſtitute for a thunder-cloud, when they were properly charged. This apparatus was charged by a machine with one glaſs cylinder, about ten or eleven feet from its neareſt end. The whole of the apparatus was diſpoſed in the great room of the Pantheon; and was applied to uſe in no leſs than fifty different experiments.

It is impoſſible within the limits of this article to do juſtice to Mr. Wilſon's experiments, or to the inferences which he deduces from them. It will be ſufficient to obſerve in general, that moſt of his experiments, in which the model of the houſe, with pointed or blunted conductors annexed to it at the ſame or different heights, and made to move ſwiftly under his large artificial cloud, were intended to ſhew, that conductors with points are ſtruck at a greater diſtance, and with a higher elevation than thoſe with blunt or rounded terminations: and from all his experiments made with pointed and rounded conductors (provided the circumſtances be the ſame in both) he infers, that the rounded ones are much the ſafer of the two; whether the lightning proceeds from one or more clouds; that thoſe are ſtill more ſafe which (inſtead of being, as Dr. Franklin recommends, ten feet high) are very little, if at all, above the higheſt part of the building itſelf; and that this ſafety ariſes from the greater reſiſtance exerted at the larger ſurface. For a farther account of the apparatus, experiments, and reaſoning of Mr. Wilſon, the reader, deſirous of more particular information, is referred to the Phil. Tranſ. vol. lxviii. part i. art. 15.

The committee of the Royal Society, compoſed of nine of the moſt diſtinguiſhed electricians in this kingdom, to whom the conſideration of the moſt effectual method of ſecuring the powder-magazines at Purfleet, againſt the effects of lightning, was referred, expreſs their united opinion, that elevated rods, conſtructed and diſpoſed in the manner which they direct, are preferable to low conductors terminated in rounded ends, knobs, or balls of metal, and that the experiments and reaſons made and alledged to the contrary by Mr. Wilſon, are inconcluſive.

Mr. Nairne, in order to obviate the objections of Mr. Wilſon and others, and to vindicate the preference generally given to elevated and pointed conductors, conſtructed a much more ſimple apparatus than that of Mr. Wilſon, with which he made twenty-ſeven well-deſigned and well-conducted experiments, which ſeem to prove the point as far as it is poſſible to be proved by our artificial electrical apparatus. Of theſe, as the ſubject is of importance, it will be proper to give ſome account. His apparatus and manner are repreſented in *fig.* 38. A is a glaſs cylinder eighteen inches in diameter, B a conductor of wood, covered with tin-foil, ſix feet long, and one foot in diameter, and intended to repreſent a cloud, and D a braſs rod on a ſtand communicating with the earth, to one end of which other rods, terminated with balls of a different ſize or a point might be ſcrewed, and deſigned to repreſent a conductor to a houſe. A braſs ball, four inches in diameter, being ſcrewed on to the end of the rod D, was ſtruck by the ball C, at the end of the charged conductor to the diſtance of ſeventeen inches and four-tenths, and ſometimes to nineteen, and even to twenty inches: a ball, one inch in diameter, received ſtrokes to the diſtance of about two inches, which were ſucceeded by a hiſſing noiſe, and a continued light on the ball, till the diſtance was about ten inches; after which the ſtrokes were renewed and continued to the diſtance of 14½ inches, and occaſionally to 16½ inches: a ball of ½ of an inch diameter, in the ſame circumſtances, was ſtruck to the diſtance of half an inch, and continued luminous till it was removed beyond the ſtriking diſtance as far as thirty-three inches. Inſtead of the ball, a wire about 33 inches long, terminating in a point, was ſubſtituted in its ſtead, but no ſtrokes happened, though the point was almoſt in contact with the ball C; at the diſtance of half a tenth of an inch, the point received a ſtream of fire; beyond that diſtance, it was luminous, and ſo continued whilſt it was gradually removed to the diſtance of ſix feet.

In another experiment, the ball of four inches in diameter, with a hole through it, was uſed; through the hole a wire projected ⅛ of an inch beyond the ſurface of the ball, and directly pointing to the ball C; but neither the ball nor point were ſtruck at any diſtance; the point was luminous at the diſtance of thirty inches: when the point of the wire was made even with the ſurface of the ball, it was ſtruck to the diſtance of 17½ inches. Having ſcrewed a hollow braſs ball 33 inches in diameter, with a hole through it, to a braſs hollow ſtem, and paſſed a wire through it with its pointed end projecting one inch beyond the ſurface of the ball; this apparatus was placed on a ſtand communicating by metal with the earth, at the diſtance of five feet from the conductor or artificial cloud, and directly oppoſite to its ſides; in this caſe the ſtriking diſtance from the ball C to the ball of four inches diameter on the rod D, was 16½ inches: when the point of the wire, paſſing through the ball and ſtem, was made to project nine inches beyond it, the ſtriking diſtance only 6½ inches. In order to diſcover how far a point or differently ſized balls, with ſmall ſeparations in the metallic communication with the earth, would act to carry off the electric fire of the artificial cloud, Mr. Nairne fixed a ſcrew to each end of a ſtick of ſealing-wax, and, having paſted a ſlip of tin-foil over its ſurface, and made a ſeparation of the tin-foil of about ⅛ of an inch, ſcrewed the pointed wire into one end, and the other end of the wax to the braſs rod, where the ball with the point projecting from it was placed in the laſt experiment. The ſtand, being placed directly oppoſite to the ſide of the artificial cloud, was removed to the diſtance at which the light between the ſeparation of the tin-foil no longer became viſible, which was above ſeven feet. When a ball of ⅛ of an inch was put in the place of the point, the light was viſible at the diſtance of four feet ſix inches, but with a ball of three inches diameter, only at two feet. He took another ſtick of wax, 1½ inch in diameter, and about ten inches long, and, having paſted on it round pieces of tin-foil half an inch in diameter, at about half an inch diſtance from each other, ſcrewed one end of it to the receiving rod, *fig.* 39, the pointed wire being ſcrewed into the other end. All the ſeparations of the tin-foil, except two, were connected by a piece of braſs laid on the wax, and the point of the wire was placed nearly in contact with the ball: in theſe circumſtances the fire of the charged conductor ſtruck into the point, and continued to ſtrike till it was gradually removed to the diſtance of 1¼ inch beyond which diſtance it would not ſtrike, but the point continued luminous to the diſtance of three feet. When the connecting braſs piece was removed, the point was not ſtruck till it was removed to the diſtance of 4½ inches; it continued to be ſtruck to the diſtance of ten inches, after which it was not luminous, except when the artificial cloud diſcharged its electric fire into the air, by a diverging pencil from the ball C.

From the experiments above recited, we may infer, that the artificial cloud ſtrikes at diſtances greater, as the termination of the conductor is more blunted; that the ſtriking diſtance is leſs as the end of the conductor tends more to a point; and that when the end of a conductor is pointed, the point is not ſtruck at any diſtance, but continues luminous to a certain diſtance, carrying off ſilently the electricity of the artificial cloud. We may alſo infer the utility of a pointed rod, even if it projects but a ſmall diſtance above the higheſt part of a building; that a point within the ſurface of a ball does not prevent

the ball being ſtruck; that the more elevated our pointed conductors are, the greater is the chance of preſerving buildings from the effects of lightning; that a conductor terminating in a point acts at a much greater diſtance than one terminating with a ball, in carrying off the electric fire; that the reaſon why the artificial cloud ſtrikes to the *point*, is the ſeparation or diſcontinuance of the metallic part of the conductor; that it ſtrikes farther to the *point* as the number of ſeparations is increaſed; and that, if the metallic communication with the moiſt earth be completed, the charged cloud will not ſtrike to the *point*.

Another part of Mr. Nairne's apparatus (ſee *fig.* 40.) is a moveable artificial cloud, conſiſting of a hollow tube of wood, with a ball at each end, about ſix feet in length; from the ends are ſuſpended hollow wooden cylinders E, E, which, together with the balls and tube, are covered with tin-foil; the axis of the tube reſts on two ſemicircular hollows in a piece of braſs fixed on a glaſs pillar I, round which axis it eaſily moves, and is brought to a horizontal poſition by means of two moveable pieces F, F. Having put this moveable cloud into an horizontal poſition, and the braſs on which the axis reſted into contact with the end of the artificial cloud B, under each of the hollow cylinders E, E, Mr. Nairne placed ſtands G, G, having a good metallic communication with the earth, one of which was furniſhed with a pointed wire, and the other with a braſs ball, three inches in diameter. Each of theſe was placed twelve inches from the bottom of its correſponding cylinder; and when the clouds were charged, the point became luminous, and the moveable cloud remained in a horizontal poſition; but when the operation of charging the two clouds was diſcontinued, it was immediately found, that the *point* had drawn off almoſt all the electric fire. When the clouds were again charged, and the ſtand with the ball removed, the *point* was luminous, and the moveable cloud remained horizontal, not being attracted to the *point*, which carried off the electric fire. But when the clouds were charged, the ſtand with the ball reſtored, and that with the pointed wire removed, the end over the ball was attracted down till it came to its ſtriking diſtance, where it diſcharged its electricity on the ball in a ſtrong ſpark. It then receded a little, and being charged, approached the ball as before, and diſcharged its electricity at once, and thus continued ſtriking and receding as long as the two clouds were charged. When the pointed wire was replaced, it became luminous, the ſtriking ceaſed, and the moveable cloud returned to its horizontal poſition. The effect was the ſame, when the pointed wire was placed on the ſame ſide with the ball. The concluſions from theſe experiments are obvious. From other experiments, in which the moveable artificial cloud was made to repreſent a cloud in its natural ſtate receiving electric fire from a charged cloud, it was found, that the *point* deprived it of its electric fire which it received from the charged one ſo faſt, that the artificial cloud could keep conſtantly ſtriking to the other end, without repelling it from it; but that, when the ball was placed in the room of the *point*, inſtead of the artificial cloud continuing to ſtrike to the other end, without repelling that end, it now firſt attracted and charged it with electricity, then immediately repelled it; and being attracted by the ball under the other end, it moved down with an increaſing velocity, till it came within its ſtriking diſtance, when it diſcharged its electricity on the ball with a loud and ſtrong ſpark, and ſo continued alternately receiving and diſcharging its electric fire on the ball, according to the known laws of electricity. In another experiment it was found, that, though the moveable artificial cloud was in great motion, receiving and diſcharging its electric fire on the ball, on taking away the ball, and putting the *point* in its place, the artificial ſtorm immediately ceaſed. When the cloud is fixed at a certain diſtance between the artificial cloud and the *point*, the fixed cloud, at the inſtant it receives the electric ſpark, directly diſcharges it again on the *point*; but without any other alteration, beſides making the cloud moveable on its axis, the diſtances being the ſame, the end of the cloud then recedes from the *point*, and will not ſtrike to it; and this caſe is much more agreeable to nature than the other, becauſe clouds are not fixed but floating bodies.

In order to obſerve the effects of rods terminating with balls of different ſizes, or terminating with a *point*, moving ſwiftly under the artificial cloud, Mr. Nairne made uſe of the apparatus repreſented in *fig.* 41. in which H is a hollow tube of wood, covered with tin-foil, with a heavy weight faſtened to one end of the tube, ſuſpended by an axis, about three inches above the weight, between two wooden pillars: in this wooden tube there was a moveable braſs rod, by means of which a ball, or *point*, fixed on it, might be raiſed to any required height. To the under part of the artificial cloud, at K, was fixed a ball of $\frac{1}{4}$ths of an inch in diameter; and then the apparatus was placed under it with a *point*, the ſwinging rod being held down to the floor, as in *fig.* 42. and the *point* covered; the artificial cloud was then charged, and the ſwinging rod with the *point* being let go, paſſed ſwiftly and very near to the ball under the artificial cloud at K. This was repeated ſeveral times, till the greateſt ſtriking diſtance to the *point* was found, which was generally $1\frac{1}{2}$th of an inch. Inſtead of the *point*, a ball $\frac{1}{4}$ths of an inch in diameter was applied in the ſame manner, and the ſtriking diſtance was generally found to be $2\frac{1}{2}$ inches. When a ball of $1\frac{1}{4}$ths of an inch was uſed, the ſtriking diſtance was generally fifteen inches. Here we may obſerve, that the ſingular diſappearance and re-appearance of the ſparks, on gradually removing the ſmall conductor from the prime conductor, already mentioned, occurred likewiſe in the two firſt of the caſes juſt recited; but when the large ball was uſed, it was ſtruck uninterruptedly till it was removed to the diſtance of ſixteen inches. From theſe laſt experiments it appears, that the *point* is ſtruck by means of a ſwift motion, but that the ball of $\frac{1}{4}$ths of an inch was ſtruck farther than the *point*, and the larger ball at a much greater diſtance than either, even with the ſwifteſt motion. Upon the whole, Mr. Nairne ſeems to be juſtified in preferring elevated pointed conductors; next to them thoſe that are pointed, though they project but a little diſtance above the higheſt part of a building; and after them thoſe terminating in a ball, and placed even with the higheſt part of a building. For a farther account of theſe curious and uſeful experiments, and the author's remarks on thoſe of Mr. Wilſon, the reader is referred to Phil. Tranſ. vol. lxviii. part ii. art. 37.

POINT, in *Geometry*, according to Euclid, is a quantity which has no parts, or which is indiviſible.

Wolfius defines it, that which terminates itſelf on every ſide; or which has no terms or boundaries diſtinct from itſelf.

This is what we otherwiſe call the *mathematical point*, and is only conceived by the imagination; yet it is in this that all magnitude begins and ends, the flux or motion of the *point* generating a line, that of a line a ſurface, &c.

Hence ſome define a *point* to be the inceptive of magnitude.

Hobbes defines a *point* to be a body whoſe magnitude is not conſidered. But his falſe notions of a *point*, line, and ſurface, have led him into many errors. Monſieur de Crouzas alſo has ſuppoſed a line to be compoſed of *points*, in his Geometry and comment on the Analyſe des Infiniment petits. This ſuppoſition only tends to confound learners. See Jo. Bernoulli Oper. vol. iv. p. 161, ſeq.

A line can only cut another line in a *point*. Any three *points* being given out of a right line, a circle, or part of a circle, may be drawn, that ſhall paſs through them all. To *draw a parallel line, a perpendicular, a tangent*, &c. *to a given point*, are popular problems in geometry. See PERPENDICULAR, PARALLEL, TANGENT, &c.

POINT, *conjugate*, in *Geometry*, is uſed for that *point* into which the *conjugate* oval, belonging to ſome kind of curves, vaniſhes. Maclaur. Algebr. p. 308.

POINTS, *proportion of mathematical*. It is a current maxim, that all infinites, whether infinitely great, or infinitely ſmall, are equal; yet is the maxim falſe in both caſes. Dr. Halley ſhews ſeveral infinite quantities, which are in a finite proportion to each other; and ſome infinitely greater than others. See INFINITE *quantities*.

The like the hon. Mr. Roberts ſhews of infinitely ſmall quantities, viz. *mathematical points*.

He demonſtrates, for inſtance, that the *points* of contact between circles and their tangents, are in a ſubduplicate proportion to the diameters of the circles; that the *point* of contact between a ſphere and a plane is infinitely greater than that between a circle and a tangent; and that the *points* of contact in ſpheres of different magnitudes are to each other as the diameters of the ſpheres.

POINT *of contrary flexure*, in the *Higher Geometry*. See *Point of* INFLECTION, and RETROGRADATION *of curves*.

POINT *of reflexion*, in *Geometry*, is commonly uſed inſtead of *point of* RETROGRADATION, or retrogreſſion.

POINT, in *Grammar*, is a character uſed to mark the diviſions of diſcourſe.

The *point proper* is what we otherwiſe call a *full ſtop*, or period, and ſerves to denote the ſenſe complete, and the period ended. See PAUSE.

Two points uſually mark the middle of a period, and ſhew a conſtruction complete, and the ſenſe to be perfect; yet intimating ſomething to come after it: this we call a COLON.

A *point* with a comma, called a SEMICOLON, marks a sense less complete than the colon; though authors seem to use them indifferently; nor are grammarians agreed about their precise difference.

The COMMA, or virgula, marks a subdivision of a member of a period. To these *points* Dr. Ward adds the SEMI-PERIOD.

Besides these primary *points* which distinguish *sentences*, there are others which Dr. Ward calls *notæ affectuum*, and which Dr. Lowth says, denote a different modulation of the voice in correspondence with the sense: such are *A point of interrogation*, ?, which marks something to be pronounced in a higher tone, as intimating a question asked. *A point of admiration, or exclamation* !, which marks a sudden surprise and wondering; and a PARENTHESIS.

The interrogation and exclamation *points* are indeterminate as to their quantity or time, and may be equivalent in that respect to a semicolon, a colon, or a period, as the sense requires. They mark an elevation of the voice.

The parenthesis, which incloses in the body of a sentence a member inserted into it, which is neither necessary to the sense, nor at all affects the construction, marks a moderate depression of the voice, with a pause greater than a comma.

Our *points* and accents were entirely unknown to the ancients. In the ancient Greek manuscripts, the whole discourse seems written with the same stroke of the pen; the words and letters being joined throughout.

In after-times, *points* were invented, and added at the top of the letters, to shew when the sense was finished. Hence the grammarians, coming to retouch the old manuscripts, thought fit to add the *points* and accents. Salmasius affirms, that he has even observed plainly where they have been added, by the difference of hands. See PUNCTUATION.

POINTS, or *vowel* POINTS, in the *Hebrew Learning*, are certain characters, which, in the writings of that language, serve to mark the vowels.

The antiquity of the *points* in the Hebrew tongue makes the subject of a celebrated controversy among the learned; some maintaining their origin to be the same with that of the Hebrew language; and others affecting them to have been first introduced by Ezra, after the Babylonish captivity, when he compiled the canon, transcribed the books into the present Chaldee character, and restored the purity of the Hebrew text.

Others will have them invented by the doctors of the school of Tiberias, usually called the Masorites, about five hundred years after Christ. The rabbin Elias Levita was the first who started this question, in the beginning of the fifteenth century; and maintained them to have been an invention of the Masorites, for the ease of those who were to learn the Hebrew tongue.

This sentiment was espoused by Capellus, to whom also adhered Luther, Calvin, Calvinson, Scaliger, Masclef, Erpenius, Mercer, Morinus, Drusius, Le Clerc, Walton, Hare, Bentley, Newton, Sharpe, &c. who are all opposers of the antiquity of vowel *points*. To these we might add several of the Jews, particularly Aben Ezra, who lived in the twelfth century; and almost all the learned men of the Romish persuasion. Buxtorf attacked Capellus violently on this article, and gained a great number of divines on his side, who took the alarm, imagining it a grievous wound to the holy text, to allow the vowel *points* to have been added by the Masorites, and not to have been found in the ancient text; because, without these, it is very difficult to fix the certain reading thereof. Yet, in the Samaritan text, there is no *point* or vowel, nor in many of the most ancient Hebrew manuscripts.

Those who maintain that the Hebrew *points* were not invented by the Masorites, alledge, that there is no mention in any Jewish writer of such an alteration, as the introduction of the *points*, being made in the Hebrew Bible; that all the annotations or notes of the Masorites upon the vowels, relate to the irregularity of them, which could not have been occasioned by themselves, but must have existed in the copies that were before them; that express mention of the *points* or vowels occurs in books more ancient than the Talmud, viz. Babir and Zoar, the first said to be written a little before our Saviour's time, and the second about a century later. However, these books are justly rejected by others as spurious. Prideaux says, that many particulars occur in their books, which prove that they must have been written above a thousand years after the pretended time of their composition; and farther it is pleaded, that the *points* were in use in our Saviour's time, from Matt. v. 18. whence it appears, that the tittles or *points* at that time belonged to the law. But Capel understands by the *tittles*, not the *points*, but the cornelie or flourishes made about the Hebrew consonants.

Those who are of opinion that the *points* are coeval with the consonants, argue, that it is impossible to pronounce the language without vowels, and also to teach it, unless the vowels were expressed; that if the vowels are of human and late invention, the authority of the holy Scriptures will be weakened, and the sacred text left to an arbitrary and uncertain reading and interpretation. But to this objection it is replied, that ה, ו, י, and ע, originally served for vowels. Nevertheless, this answer seems insufficient; because there are many words in which these letters do not occur; and it is argued, from the nature and structure of the Hebrew language, and its dialects, in which the radicals or primitive words are formed by triads, compoſed by the conjunction of different consonants or letters, that some other letters muſt neceſſarily belong to the language. However, it is certain, that the matres lectionis, as the above letters are called, have been sometimes omitted; for they are more frequent in some of the older manuscripts than in the later, or in the printed text.

The arguments against the antiquity of the Hebrew *points*, tending to prove that they were added by the Masorites, are deduced from grammar, testimony, and history. The grammatical arguments are principally founded in the Keri and Cheibh. The Keriith, it is agreed, began to be collected a little before the completion of the Talmud, probably by the Masorites; and it is observed, that they are various lections merely of the consonants, and not of the vowel *points*; and that there are certain irregularities in the punctuation, both with respect to whole words, and the parts of words, which shew that the *points* were not in the copies, from whence the Keri and Cheibh were made.

The testimony which furnishes the second class of arguments, is either express or tacit. Of the first sort is the testimony of Aben Ezra, R. David Kimchi, R. Jehuda Levita, and R. Elias Levita, who deny the antiquity of the vowel *points*. The tacit testimony is derived from the copies of the law, which are kept and read in the synagogues, or from the cabalistic interpretation, or from passages of the Talmud. Those copies of the law, called Sepher-torah, read every Sabbath, and reckoned the most sacred, are constantly written without *points*; to which we may add, that in many manuscripts, examined by Dr. Kennicott, and those some of the oldest and best, either there are no *points* at all, or they are evidently a later addition. The cabalistic interpretations relate to the consonants, and none of them to the vowels. When the Talmud was compoſed, the *points* were not affixed to the text, because there are several disputes concerning the sense of the passages of the law, which could not have been disputed, if there had been *points* besides, the vowels are never mentioned, when the fairest opportunity occurred for mentioning them, if they had been in being.

The arguments from history are drawn from the Chaldee paraphrases of Jonathan and Onkelos, the Greek versions of Aquila, Symmachus, and Theodotion, and especially that of the Septuagint; whence it is argued, that the copy from which these were translated was without *points*; as several words are translated in a different sense from that which the *points* would determine them to mean. Those who wish to see a compendious abstract of the arguments for and against the antiquity of *points*, and of the state of this controversy, may consult Jennings's Jewish Antiq. vol. ii. p. 344. &c.

Dr. Prideaux has an hypothesis peculiar to himself: he apprehends that the *points* were added by more ancient Masorites than those of the school of Tiberias, from after Ezra, when the Hebrew ceased to be a living language, but that they were not in common use, nor taught in the theological schools, till after the compilation of the Talmud. Conn. part i. book v. vol. i. p. 5—520. ed. 10.

POINTS, in *Heraldry*, are divisions of the escutcheon into several squares, sometimes to the number of 9, sometimes to 13; some whereof are of one colour or metal, the others of another; called also *equipolent points*.

There is also another, and that more frequent division of the escutcheon into *points*, which have several names and values, according to their several places.

There are nine principal points in an escutcheon, as marked in *Tab. Herald. fig.* 38. and described under ESCUTCHEON.

Columbiere makes the *points*, and their situations, symbolical. As the several bearings in an escutcheon are by many types representing the commendable actions of the person they are given to; so the escutcheon itself represents the body of the man that performed them; and the *points* or parts signified by these letters, the principal parts of his body. Thus, A, B, C, represent the head, in which the three great faculties reside; D, the neck, where ornaments are chiefly borne; E, the heart, &c.

POINT is also the name of an ordinary, something like the pile,

pile, rising frequently from the bottom of the escutcheon to the top, very narrow, and only taking up two-thirds of the *point* of the escutcheon.

When the *point* arises from the base, it is peculiarly called *point-in-point*.

POINT *couverted* is when it descends from the chief downwards; possessing two thirds of the chief, but diminishing as it approaches the *point* of the escutcheon, though without touching it.

POINT *in bend, or point in bar*, is when the *point* is placed transverse, in the situation of a bend or bar.

When it comes from the sides of the escutcheon, it is also called a *point dexter* or *sinister*, according to its situation.

The *point dexter* is commonly reputed an abatement due to a braggadocio. *Point-champain* is due for killing a prisoner after quarter demanded. *Point-in-point*, a diminution belonging to a coward. *Point-plane*, an abatement belonging to a lyar, &c. See DIMINUTION.

POINT is also used in heraldry for the lowest part of the escutcheon, which usually terminates in a *point*.

POINT-*champain*. See CHAMPAIN.

In the French arms, the fleur-de-lys are two in chief, and one in *point*.

POINT, in the *Manege*. A horse is said to make a *point*, when in working upon volts, he does not observe the round regularly, but pulling a little out of his ordinary ground, makes a sort of angle or *point* by his circular tread. This fault is prevented by hastening the hand. See HASTE.

POINT is also used to denote the toes of a row of a saddle.

POINT, in the *Manufactories*, is a general term used for all kinds of laces wrought with the needle.

Such are *point de Venice, point de France, point de Genoa*, &c. which are distinguished by the particular œconomy and arrangement of their *points*.

POINT is sometimes also used for lace woven with bobbins, as *English point, point de Malines, point de Haure*, &c.

POINT is also an iron or steel instrument, used, with some variety, in several arts.

Engravers, etchers, cutters in wood, stone-cutters, &c. use *points* to trace their designs on the copper, wood, stone, &c.

Statuaries, &c. have likewise *points* in manner of little chissels, used in the first forming or sketching out their work.

Turners work or fashion their common works between two *points* fastened to the puppets. Lapidaries have also iron *points*, to the ends whereof are fastened pieces of diamonds, serving to pierce the precious stones.

POINT, in *Music*, is a mark or note anciently used to distinguish the tones.

Hence we still call it simple *counter-point*, when a note of the bass answers precisely to that of the treble; and figurative *counter-point*, when a note is syncopated, and one of the parts makes several inflexions of the voice or tone, while the other only makes one.

We still use a *point* to raise the value of a note, and prolong its time by one half; e gr. a *point*, added to a semibreve, makes it, instead of two minims, equal to three.

POINT, in *Navigation* and *Geography*. *Points of the horizon*, or *of the compass*, are certain *points*, formed by the intersections of the horizon with vertical circles.

The number of these *points*, therefore, is really the same with that of the *points* conceived in the horizon, i. e. infinite; though, in practice, we only distinguish thirty-two of them.

Some use *point* for the intersection of a vertical circle with a circle parallel to the horizon; and even some, for the segment of a vertical, intercepted between the meridian and horizon, or a circle parallel thereto.

The *points* are shewn by right lines drawn from a *point* assumed in a horizontal plane.

A *point of the compass* is popularly taken for a 32d part of the whole; or for an arch of 11 degrees 15 minutes; half of which, viz. 5° 37′ 30″, is called a *half point*; and half of that, or 2° 48′ 45″, a *quarter point*.

These *points of the compass* are divided into CARDINAL and COLLATERAL.

POINT, in *Optics*. The *point* of *concourse*, or *concurrence*, is that, wherein converging rays meet, more usually called the FOCUS.

POINT *of dispersion*. See DISPERSION.

POINT *of incidence*. See INCIDENCE.

POINT *of reflection*. See REFLECTION.

POINT *of refraction*. See REFLECTION.

POINT, *radiant*. See RADIANT.

POINT, in *Perspective*, is a term used for various parts or places, with regard to the perspective plane. Such are the

POINT *of sight, or of the eye*; this is a *point* F on a plane HI (*Tab. Perspect. fig.* 12. N° 1.) marked out by a right line OF, drawn from the eye, perpendicular to the plane. This is also called the *principal point*.

This *point* is in the intersection of the horizontal and vertical planes.

Some authors call this the *principal point*; and give the name *point of sight*, or *vision*, to the *point* wherein the eye is actually placed, and where all the rays terminate; as O. See PERSPECTIVE, and POINT *of view*.

POINT *of distance* is a *point*, v. gr. P or Q, in the horizontal line PQ, at the same distance from the principal *point* F, as the eye O is from the same. See PERSPECTIVE.

POINT, *third*, is a *point* taken at discretion in the line of distance, wherein all the diagonals drawn from the divisions of the geometrical plane concur.

POINT, *objective*, a *point* on a geometrical plane, whose representation is required on the perspective plane.

POINT, *accidental*. See ACCIDENTAL.

POINT, *visual*. See VISUAL.

POINT *of view*, with regard to *Building, Painting*, &c. is a *point* at a certain distance from a building, or other object, wherein the eye has the most advantageous view or prospect of the same.

This *point* is usually at a distance equal to the height of the building. For an instance: to consider with judgment the whole of the famous church of the invalids at Paris, we must not stand at above three hundred and forty feet distance from it, which is nearly its height. To be able to judge of the ordonnance of its façade or frontispiece, and the regularity of its order, the eye should only be as far off as the frontispiece is high; viz. a hundred feet.

But to examine the correctness of its profiles, and the spirit of its ornaments, the eye should only be distant the height of the Dorie order, which is about forty feet; if it be nearer, the parts, being too much shortened, will appear out of proportion.

A vague or indeterminate *point* has a different effect from the *point of view*; in that, in looking at a building from an indeterminate *point*, the eye can only form an idea of the magnitude of its mass, by comparing it with other buildings adjacent to it.

POINT, *punctum*, in *Physics*, is the smallest or least sensible object of sight, marked with a pen, point of a compass, or the like.

This is what we popularly call a *physical point*, which, in reality, has parts, though those parts are not here regarded. Of such *points* does all physical magnitude consist.

This *physical point* coincides with what Mr. Locke calls the *point sensible*, and which he defines to be the least particle of matter, or space, we can discern. He adds, that, to the sharpest eye, this is seldom less than thirty seconds of a circle, whereof the eye is the centre.

POINT, in *Poetry*, denotes a brisk lively turn or conceit, usually found or expected at the turn of an epigram.

POINT, among *Seamen*, is also used for a cape, or headland, jutting out into the sea.

They say, two *points* of land are *one in another*, when they are so in a right line against each other, as that the innermost is hindered from being seen by the outermost.

POINTS are also used to denote short flat pieces of braided cordage, tapering from the middle towards each end, and used to reef the courses and top-sails of a ship.

POINT-BLANK, in *Gunnery*, denotes the shot of a gun levelled horizontally, without either mounting or sinking the muzzle of the piece.

In shooting *point-blank*, the shot or bullet is supposed to go directly forward, in a straight line, to the mark; and not to move in a curve, as bombs and highly elevated random shots do.

When a piece stands upon a level plane, and is laid level, the distance between the piece and the *point* where the shot touches the ground first, is called the *point-blank* range of that piece; but as the same piece ranges more or less, according to a greater or less charge, the *point-blank* range is taken from that of a piece loaded with such a charge as is used commonly in action. It is, therefore, necessary that these ranges of all pieces should be known, since the gunner judges from thence what elevation he is to give to his pieces when he is either farther from or nearer to the object to be fired at; and this he can do pretty nearly by sight, after considerable practice. See *Pointing of a* GUN.

POINTED *arrow*. See CROWN.

POINTED *roof*. See ROOF.

Scots POINTED, among *Heralds*, is that which has the extremities turned off into *points* by strait lines. Columbiere calls it *aiguisé*, q. d. *sharpened*.

POINTERS, in *Ship-Building*, are pillars in an oblique position, from the floor-rider heads on each side, pointing

ing or meeting each other at the middle of the gun-deck beams.

POINTING, *punctuation*, in *Grammar*. See PUNCTUATION.

POINTING, among *Seamen*, the marking on the chart in what point or place the veſſel is.

All the difficulty in *pointing* a chart ariſes from our ignorance of the longitude. The pilot eaſily finds the latitude, by taking the height of the pole; but, for the LONGITUDE, there is no coming at it, but by computation, which is always uncertain.

POINTING is a ſea-term, denoting the operation of tapering the end of a rope, and weaving a ſort of mat or cloſe texture about the diminiſhed part of it, ſo as to thruſt it more eaſily through any hole, and prevent it from being readily unwitted. This operation is applied to the reef-line, and to the cable, for the purpoſe of ſplicing it, and that it may more eaſily paſs, when ſpliced, through the hauſe-holes.

POINTING, in *War*, the levelling or directing a cannon, or mortar-piece, ſo as to play againſt any certain point. See *Pointing of a* GUN, and *Gunner's* QUADRANT.

POISE. See CHANTEPOTTE, WATERPOISE, &c.

POISON, in *Medicine*, a malignant quality in ſome animal, vegetable, or mineral body, which renders it hurtful, and even fatal, to thoſe who take it even in a ſmall quantity.

The word is derived from the Latin *potio*, *draught*; and was anciently uſed in an innocent ſenſe. See POTION.

Some define *poiſon* to be any thing taken inwardly, whoſe properties are contrary to thoſe of food, or to what they ſhould be, in order to nutrition.

However, this vague and uncertain ſenſe of the word introduces great confuſion into the writings of thoſe who thus uſe it.

Poiſons are of various kinds, and operate in various manners; ſome by diſſolving the blood, others by coagulating it, and others by corroding and deſtroying the ſolid parts. Some attack equally all the parts; ſome only a particular one. Thus, the lupus marinus is an enemy to the lungs, canthariſes to the bladder, &c.

Some things, again, which prove *poiſon* to man, ſerve for food to other animals. Thus, mandragora and henbane feed hogs, though they kill man; and thus that deadly *poiſon* hemlock is wholeſome for goats, buſtards, and, as Galen ſays, for ſtarlings too. The caſſavi plant, Sir Hans Sloane tells us, *poiſon* unprepared; but prepared, is the common bread of the Weſt-Indies, particularly in Jamaica, and the better parts; and is uſed to victual ſhips. Nay, what is more, ſome *poiſons* are not only food, but even phyſic to other animals. In the Philoſ. Tranſact. we have an inſtance of a horſe troubled with a farcy, which could not be cured by the moſt famed remedies, which yet cured himſelf in a ſhort time, by feeding greedily on hemlock. Fontanus alſo tells us of a woman, who eat hemlock for ſome time, to procure ſleep, and with very good effect, though repeated doſes of opium had no operation.

Dr. Tane. Robinſon, in a letter to Mr. Ray, gives an account of ſeveral poiſonous plants, which, if truly corrected, or exactly *doſed*, he ſays, may prove the moſt powerful remedies known. Thus the helleborus, incorporated with a ſapo, or with alcali falts alone, are ſucceſsful in epilepſies, vertigoes, palſies, lethargies, and mania: doſe from 9j to 3ß. The roots of cicuta, aſarum, and napellus, in agues, and periodical pains; doſe 3j to 3ß. The hyoſcyamus in hæmorrhages, violent heats, and inflammations; doſe 3j to 3ß. The ſemen ſtramonii is a good anodyne, uſeful in vigilias, rheumatiſms, hyſteric caſes, &c. doſe 9j to 3ß. Elaterium, ſoldanella, and gratiola, are alſo good in hydropic caſes. Opium, corrected, loſes its narcotic quality, and is ſafely given, in great doſes, in convulſive caſes, fluxes, catarrhs, &c.

Poiſons are diſtinguiſhed by ſome authors by ſeveral names, according to the different time and manner of their taking effect.

Some are called *venena terminata*. Theſe are ſuch *poiſons* as perform their fatal office, according to the opinion of the world, at certain ſtated or determinate periods of time; thus, according to the quantity given, or the nature of the ſpecies of *poiſon*, a man muſt be killed by it at the pleaſure of the giver, either in an hour, a day, a week, a month, many months, or years; the *poiſon* in this laſt caſe operating like a chronical diſeaſe, and carrying off the patient by a very tedious train of ſymptoms.

Others are called *venena temporanea*, *temporary poiſons*. Theſe will kill a man by degrees, every minute of his life growing worſe and worſe, from the time of taking them to the final period; but this is not at any ſtated or certain time.

Others are called *deliquaria venena*. Theſe are ſuch as kill without being taken internally, and are rarely fatal if rubbed upon the ſkin, put into gloves, or the like.

As to the firſt of theſe kinds, it is very much to be doubted whether there be in nature any ſuch thing as a *venenum terminatum*, or a *poiſon* which ſhall kill at the fixed time at which the giver pleaſes; ſince all the known *poiſons* are only relatively ſuch, and depend for their effect on the peculiar ſtate of the body: the different conſtitutions of men muſt therefore vary the period of time at which death muſt happen from the taking of the ſame doſe. At leaſt, if it be poſſible to contrive a terminatory *poiſon*, it muſt require the ſkill of the ableſt phyſician to prepare it, ſince he muſt at once know the true ſtate of the perſon's body who is to take it, and the exact power of the *poiſon*, in its ſeveral doſes, on other bodies.

Much, therefore, is required in the phyſician who is to cure a perſon who has ſwallowed *poiſon*; ſince the nature of the medicine, and the true knowledge of the ſtate of the patient's body, are both neceſſary, in order to know what ſymptoms to expect and guard againſt.

Of the number of thoſe *poiſons* which take a long time to kill, and that different, according to their doſe and the habit of the perſon, are the venom of the toad and of the mad dog, whether the ſaliva be communicated immediately to the blood by a wound, or ſwallowed with food or with the ſpittle. The *poiſon* of the tarantula is alſo of this number; and to theſe may be added, that of the ſmall pox, meaſles, and other diſeaſes of that kind, which is evidently long dormant in the body, till certain peculiar occaſions and accidents call it forth to appear in its proper form. The *poiſon* of the hectic fever is alſo by ſome referred to this, it being accounted an alkaline virus, mixed with a viſcid matter. The *poiſon* of the French pox, *lues venerea*, is alſo of this kind, and is eſteemed highly acrid and alkaline. The *poiſons* of cantharides, the acid ones of nitre, ſalt, vitriol, ſulphur; the ſolutions or cryſtals of gold, ſilver, and the other metals; and the precipitates of mercury, and the very fatal common *arſenic*. To theſe are added many others, and among them ſome which act merely mechanically, by their numerous ſharp points and edges; ſuch as the powder of diamonds, glaſs, and the like: and to this claſs belong many of the deliquatory *poiſons*.

Of the temporaneous *poiſons* many are taken under the common denominations of food and drink, and ſeem at firſt to be of no injury; but by degrees they impair the conſtitution, and bring on diſeaſes and death. Coffee, tea, and all the ſpirituous liquors are accounted of this kind.

We may perhaps aſcribe the prodigious multiplicity of *poiſons*, and that equally numerous tribe of antidotes created of by the ancients, to the love of the marvellous: however, it cannot be denied, that ſome things are very ſuddenly and ſtrangely deſtructive to animal life, and that in very ſmall quantities. Among the reſt, there is a *poiſon* made uſe of by the Indians, ſome of which was ſent over to the Royal Society by M. de la Condamine: Dr. Brocklesby has given us ſome accounts of its effects on cats, dogs, and birds, who were ſoon killed by it, only by ſprinkling a few drops of the ſolution of this *poiſon* on wounds made by a lancet. The doctor gave alſo two drachms of ſugar to a bird, and ſhortly afterwards poured a little of the ſolution into its mouth; but two drops had ſcarce touched its tongue, before the creature was convulſed, and could with difficulty be laid down before all motion was taken away.

Hence it appears, that ſugar is no ſpecific againſt this *poiſon*, even when only taken at the mouth. Phil. Tranſ. N° 482. ſect. 12.

This *poiſon*, which ſeems to be of a very ſubtile and dangerous nature, is extracted by fire from divers plants, eſpecially from thoſe which the French call *lianes*. The Indians in various places of South America prepare this *poiſon*, and make uſe of it for the killing of wild beaſts, in this manner:

Thoſe ſavages are very dexterous at making long trunks, which are the moſt common weapon uſed by them in hunting. To theſe trunks or tubes they fit little arrows made of palm-tree, on which they put a little toll of cotton exactly fitting the bore of the tube. They ſhoot theſe with their breath, and ſeldom miſs the mark. They dip the points of theſe little arrows, as well as of thoſe of their bows, in this *poiſon*, which is ſo active, that in leſs than a minute, eſpecially when freſh, it kills certain animals from which the arrow has drawn blood.

Though a very ſmall drop of this *poiſon*, conveyed into the blood by puncture, is ſometimes ſufficient to kill a man, or at leaſt to cauſe great diſturbance in the animal œconomy, it is quite otherwiſe when taken in at the mouth; for then it does no ſort of miſchief. See Phil. Tranſ. loc. cit. See MACASSAR *Poiſon*, and GREGO.

The negroes uſe a *poiſon* of an extraordinary nature. The doſe is very ſmall, and it hath no ill taſte ſo that, mixed with meat or drink, it is not perceivable. It raiſes divers ſymptoms, and the effects are various, according to the

the dose is large or small. It kills sometimes in a very few hours, sometimes, it is said, in some months, and at others in some years. The symptoms are according to the quantity given; if great, it causes evacuations upwards and downwards; of excrements first, then of humours, and lastly of blood, with fainting fits and sweatings. Death follows in six or seven hours. The negroes turn white. Phil. Trans. N° 262. p. 3.

The antidote to this *poison* is the root of the sensible weed, as it is commonly called, or *herba sensitiva*, in decoction.

Physicians distinguish three kinds of *poisons*.

Poisons, *animal*, which are those drawn from animals by the bite or sting; as, the viper, scorpion, lepus marinus, &c.

The theory of the effects, operations, &c. of *animal poisons*, is very accurately and mechanically delivered by Dr. Mead, in those remarkable cases, the bites of a viper, tarantula, and mad dog. See his doctrine under Tarantula, Viper, and Hydrophobia. See also Madness *from the bite of enraged animals*, and *Rattle* Snake.

Poisons, *vegetable*, as aconite, cicuta or hemlock, hellebore, napellus, &c. which are generally of a narcotic or stupefying quality.

With regard to the operation of vegetable *poisons*, it is observed that, besides heat and pain, they commonly occasion some degree of giddiness, and often a kind of stupidity or folly. See Opiate and Opium.

The persons who have taken these *poisons* must be treated in the same manner as for the mineral or corrosive. Dr. Mead, besides vomits, in this case, recommends acid medicines with fixed salts. He says, that he has often given salts of wormwood mixed with juice of lemon, in repeated doses, with great success.

It has been a general complaint, and indeed too just a one, that the qualities of plants are much less studied than their external appearances; and the best modern authors have contented themselves with nicely characterising plants according to their flowers and seeds, and ascertaining the proper names to each, without at all enquiring how they might be beneficial or hurtful to mankind; or distinguishing whether they were fafe medicines or deftructive *poisons*. Nor, indeed, is the inveftigating the virtues of plants, yet unfhed as medicines, any eafy talk; fince neither chemical analyfes, nor experiments on brutes, nor even the tafte and fmell, and other fenfible qualities of plants, can ever certainly aflure us what effects they will have on the human body.

Chemical analyfes alter the fubftance too much to give any certain knowledge; and the effects things have on one animal are no aflurance of what they will do to another, as is familiar to us in a thoufand inftances. Bitter almonds, and many other things, wholly harmlefs to us, kill birds; and goats will eat the tithymals, to give them an appetite when they want it, while thofe very plants are fatal to fifhes, and very dangerous to man. The fenfible qualities as often deceive us, of which we might give many inftances; and what fome have obferved of the botanical characters of plants, telling us their virtues, or that all of the fame clafs poffefs the fame qualities, is the moft erroneous, and, if trufted to, might prove the moft fatal of all opinions; fince the known *poifons*, hemlock, phellandrium, and water-dropwort, with the *poifonous* juice, are all umbelliferous plants, and consequently of the fame family with fennel and angelica.

Nothing can, indeed, aflure us with any degree of certainty of the virtues of plants, but experiments made on ourfelves; but few are to be found who with fo well to the public, as to venture their own lives for its fervice: and perhaps the honeft Geiner is the only man who ever entried thefe attempts to any degree, and he unhappily died a martyr to them, perifhing by the dofe he took of the fcorpion-rooted doronicum; the very root which has of late with us been fo fatal, by being accidentally mixed with our gentian.

What we learn of the vegetable *poifons* muft therefore be either by the confequences of the rafh prefcriptions or miftakes of ignorant pretenders to medicine, or by the misfortune of thofe who have unwarily eaten them.

We have accounts in the Memoirs of the Academy of Sciences of Paris, of many things of this kind. An apothecary, a very honeft man, but of no knowledge in botany, had made his extract of black hellebore from the roots of chriftophoriana, or bane-berries, a plant always accounted a *poifon*, and a fingle berry of which is capable of killing feveral animals; yet fo far had the fire diveiled the roots of their poifonous qualities, that twelve grains of this given as extract of hellebore, proved of no ill effect. Mem. Acad. Scienc. Par. 1739.

Another apothecary having learned, that hermodactyls were the roots of a fpecies of colchicum, dried the roots of the common colchicum, and fold them in its place; yet there is no knowledge of any ill effects from them.

The enquiry into things of this kind has its ufe, which is very important; fince *poifons* often differ only in dofe from medicines, and many of the vegetables efteemed *poifonous*, may perhaps be found ufeful remedies, with proper management and in proper quantities.

The laurel-leaves are well known to afford a *poifonous* water in diftillation, yet it is as well known that they have been long ufed in cookery, to give a tafte like that of bitter almonds to creams, &c. and that without any ill effect. The rofe-bay, or oleander, is well known to be a *poifon* to goats, yet is taken by countrymen of ftrong and robuft habits as a purge, and that with very good fuccefs. Nay, opium, one of the greateft of all medicines, if it had firft been difcovered by perfons taking overdofes of it, and dying by it, as they naturally muft have done, might very naturally have been recorded to us as a very fatal *poifon*.

The plumbago, or dentillaria of Rondeletius, is fo violent a cauftic, that a poor girl who once anointed herfelf with it, to cure her of the itch, was faid alive by it; yet this properly managed, and inftead of evils, has proved one of the greateft of all remedies for cancers.

The fhrub ufed in dying, and called by the French *redoul*, by fome authors *orfeille*, and by others the myrtle-leaved *rhus*, is generally known in the world only as a drug ufeful in the dreffing of leather; but Pliny, and fome other old writers, have given it the character of an ufeful external medicine, and a remedy againft *poifon*, yet with all this inattention of the moderns, and all the praifes of the ancients, this plant is truly a very terrible *poifon*. The grown cattle refufe to feed upon it, but the young lambs and kids often eat of it in thofe parts of Europe where it is common; and if they eat the full-grown leaves, they are killed by it; if the young fhoots only, which is more ufually the cafe, they are then only affected with fpafms and a fort of drunkennefs, of which, after a few hours, they recover. Nor is this fingular in the *poifonous* plant, fince it is well known, that many plants, of very improper kinds for food, are yet eaten in their young fhoots: and Linnæus has recorded it of the Lapianders, that they even eat the young fhoots of the *poifonous* blue aconite, or wolf-bane; and even in France they eat the firft fhoots of the clematis, or flammula refens, the full grown leaves of which are of fo acrid a nature, that they ferve the beggars to eat ulcers in their arms and legs, to give them a pretended title to charity.

The *redoul* is not only a *poifon* to animals, but its fatal effects have been feen on the human fpecies. A girl in France, where it is very common, gathering its fruit among black-berries, eat of them, and died epileptic, in fpite of all the aflifance that could be given to her: and another inftance is given from the Hotel Dieu at Paris, where an unhappy traveller, a robuft man, was brought in epileptic, and died fo; though the caufe was not known, except by a vomit which was given him bringing up fome of the berries of this pernicious plant, and fome more of them having been found in his ftomach when diffected. Mem. Acad. Scienc. Par. 1739.

Poisons, *mineral*, as arfenic, corrofive fublimate, ceruffe, orpiment, realgal, &c. which are commonly of an acrid or corrofive quality.

As to *mineral poifons*, they all bear fo much analogy to that made of quickfilver in the common fublimate, that their operation will be eafily conceived, from what is laid down under the heads Mercury, and Sublimate.

They are all more or lefs dangerous, as their falts receive a greater or lefs force from the metallic particles; and hence, as the moft virulent may be mitigated, by breaking the points of the faline cryftals, fo the moft innocent minerals may become corrofive, by combining them with falts, as is feen in the preparations of filver, antimony, iron, &c.

As to the effect of arfenic, to which that of every other fpecies of corrofive *poifon* is fimilary it is obferved, that the perfon who has taken it, foon perceives a burning heat, and a violent pricking pain in his ftomach and bowels, with an intolerable thirft, and an inclination to vomit. The tongue and throat feel rough and dry, and, without proper help, the patient is foon feized with great anxiety, hiccoping, faintings, and coldnefs of the extremities. Thefe are fucceeded by black vomits, fetid ftools, with a mortification of the ftomach and inteftines, which are the immediate fore-runners of death.

When thefe fymptoms firft appear, the patient fhould drink large quantities of new milk and fallad oil, till he vomits, or warm water with oil; or fat broths; or freth butter melted or mixed with the milk or water: thefe are to be drank as long as the inclination to vomit continues; nor is it fafe to leave off drinking as long as one particle of the *poifon* remains in the ftomach. If thefe liquids do

hot produce vomiting, half a dram or two ſcruples of the powder of ipecacuanha may be given, or a few ſpoonfuls of the oxymel, or vinegar of ſquills, may be mixed with the water which is drank. Or if other methods fail, half a dram of white vitriol, or five or ſix grains of emetic tartar muſt be adminiſtered. If tormenting pains are felt in the lower belly, and there be reaſon to apprehend that the *poiſon* has got down to the inteſtines, clyſters of milk and oil muſt be thrown up; and the patient muſt drink emollient decoctions of barley, oatmeal, marſhmallows, and ſuch like. He muſt likewiſe take an infuſion of ſenna and manna, a ſolution of Glauber's ſalts, or ſome other purgative. After the *poiſon* has been evacuated, the diet for ſome time ſhould be cooling and healing, ſuch as milk, broth, gruel, light puddings, and ſpoon-meats of eaſy digeſtion, and the drink ſhould be barley-water, linſeed-tea, or infuſions of any of the mild mucilaginous vegetables; but all fleſh, and ſtrong liquors ſhould be avoided. Buchan's Dom. Med. p. 515. ed. 5th.

It has been remarked under LIVER *of ſulphur*, that M. Navier recommends it as an antidote againſt certain metallic *poiſons*. This has been long and ſucceſsfully applied by others; and in the ſixth volume of the Edinburgh Medical Commentaries, there is a paper, in which alkaline ſalts are recommended on the ſame principle.

Dr. Houlton obſerves, that in all caſes of *poiſon*, it is prudent immediately to give a ſolution of an alkali, followed by a vomit. If the *poiſon* be corroſive ſublimate, an alkali, either fixed or volatile, will decompoſe it, and precipitate the metal in a form nearly inſenſitive. It will have a ſimilar effect on the ſugar of lead, emetic tartar, or any metallic ſalt. If the *poiſon* be arſenic, Neumann obſerves, that alkalis will very plentifully diſſolve it: and, therefore, the vomit will ſucceed the better to diſcharge it. If the *poiſon* be of the vegetable claſs, an alkali can be of no diſſervice, nor interfere with the other means of remedying by evacuation, nor by the ſubſequent uſe of acids, ſo much inſiſted upon by Triſtot, as counteracting the effects of narcotics; becauſe acids, adminiſtered with alkaline ſalts, are pronounced, by Dr. Mead and others, to be attended with great ſucceſs in this caſe. This writer, therefore, directs, when ſymptoms of *poiſon* appear, to mix a tea-ſpoonful of any of the following ingredients: ſalt of tartar, ſalt of wormwood, pearl-aſh, pot-aſh, ſpirit of hartſhorn, or ſal-volatile, with half a pint of water; and of this let one half be given to the patient immediately, and the other ſoon after. It will ſometimes give relief, and the vomiting will ſoon ceaſe. The vomiting, however, is to be promoted by warm water, ipecacuanha, &c. and after each vomiting, a doſe of this ſolution of ſalt of tartar ſhould be given, and repeated every two or three hours, if the pain of the ſtomach returns. It ſhould be continued too, in ſmall doſes, for ſome time after the ſymptoms diſappear. A little wood-aſhes, mixed with boiling water, ſuffered to ſtand, and pouring off the water, or filtering it through linen, will anſwer the ſame purpoſe.

The general remedies againſt *poiſons* are known by the name of *antidotes*, *alexipharmics*, and *alexiterials*.

The following rules ſhould be ſtrictly obſerved with regard to every kind of *poiſon*: that when any poiſonous ſubſtance has been taken into the ſtomach, it ought, as ſoon as poſſible, to be diſcharged by vomits, clyſters, and purges; and when *poiſon* has been received into the body by a wound, that it be expelled by medicines which promote the different ſecretions, eſpecially thoſe of ſweat, urine, and inſenſible perſpiration; to which may be joined antiſpaſmodics, or ſuch medicines as take off tenſion and irritation, the chief of which are opium, muſk, camphor, and aſſafœtida.

POISON-*aſh*. See POISON-*wood*.

POISON-*berry*, a ſpecies of the CESTRUM.

POISON-*buſh*, *toll-vendlus*, in *Botany*. Its characters are theſe: the flower has an empalement of one leaf, indented in three parts; it has one petal, which is ſhaped like a flipper, of a thick fleſhy conſiſtence; under the upper part of the flower are ſituated ten ſtamina, which are incloſed in the receptacle of the flower; they are ſlender and terminated by globular ſummits; in the centre is ſituated a roundiſh three-cornered germen, ſupporting three biffid ſtyles crowned by oblong ſtigmas; the germen becomes a roundiſh capſule, having three cells, each containing an oval ſeed. There are two ſpecies, natives of the Weſt Indies, abounding with an acrid milky juice, which will raiſe bliſters on the fleſh, and, it is ſaid, when mixed with the blood, becomes a deadly *poiſon*; and it is uſed for applying to the points of armour, and the edge of ſwords. Linnæus has joined this genus to the *euphorbia*, or SPURGE.

POISON, *Macaſſar*. See MACASSAR *Poiſon*.

POISON, *Indian*. See GECCO.

POISON-*tree*, or POISON-*wood*, *toxicodendron*, in *Botany*. Its characters are theſe: the male flowers are upon different plants from the female; they have a ſmall empalement, cut into five points at the brim, but have no petals; they have five ſhort ſtamina, terminated by roundiſh ſummits; the female flowers have empalements and petals like the male; they have no ſtamina, but in the centre is ſituated a roundiſh germen, ſupporting three ſmall ſtyles, crowned with globular ſtigmas; the germen afterwards turns to a berry, with one or two cells, incloſing one ſeed in each. Miller enumerates nine ſpecies. Linnæus has joined theſe plants to his genus of RHUS, for the characters of which ſee SUMACH.

The moſt common American kind of this tree, is the aſh-leaved one; it grows in marſhy places, and is called by the common people marſh-ſumach, and is the RHUS *vernix* of Linnæus; its leaves reſemble thoſe of the common ſumach, which are very well known to reſemble aſh-leaves in their pinnated ſtructure. It grows to about four inches in diameter, and to twenty feet, or upward, in height, in thoſe countries where it grows naturally. It ſpreads much at the root, and where one has been at any time cut down, there are always ſeen a great number of young ones growing from its ſtump. It is of very quick growth, but is not durable. The infuſe of the wood is yellow, and contains a whitiſh yellow juice, which comes out between the bark and wood, is as glutinous as turpentine, and has a tuſeous ſmell; the wood itſelf has a very ſtrong and diſagreeable ſmell, but the juice ſtinks like carrion.

This tree poiſons two ways; by handling of it, and by the ſmell. The ſcent of it when cut down in the woods has poiſoned many people, and many more have ſuffered by it while burning in their fires. People with only handling it have been made blind for ſeveral days, and perſons who ſit near a fire when it is burning are often ſwelled and chucked up in all parts of the body in a terrible manner. It is very remarkable that the effect of this *poiſon* ſeems confined to ſome few perſons, and that one may handle it ever ſo long, and even chew it without hurt, while another is poiſoned by only touching it; and a whole company ſitting by a fire where it is burning, ſhall often all eſcape except one or two, who will be ſwelled with it. The *poiſon* of this tree is never mortal, but goes off of itſelf in a few days; and the people who ſuffer by it generally carry its effects off the ſooner, by uſing ſallad oil and cream to the parts. The firſt notice the perſon has of being affected by it, is by feeling a violent itching in the ſkin; this provokes ſcratching and rubbing; and in conſequence of this the part inflames and ſwells. Sometimes a perſon's whole body is ſwelled and poiſoned in this manner, and ſometimes only a particular part, as the legs; and in this caſe, they often diſcharge a conſiderable quantity of water, and then grow well.

People who have been poiſoned by handling it, aſſirm that it is ſo much colder to the touch than other wood, that it may be diſtinguiſhed by this in the dark; when it is burning ſome people are ſo affected by it as to ſwoon away, others yawn and ſeem uneaſy, while the reſt feel nothing of it.

The fruit of this tree is a white roundiſh dry berry, growing in cluſters. Phil. Tranſ. N° 367. p. 144. Prof Kalm's Travels in North America.

For the uſe of this juice in ſtaining linen. See LINEN.

POISON, *counter*. See COUNTER *poiſon*.

To POISON *a piece*, among *Gunners*, is the ſame as to clog and nail it up. See NAILING.

POISONING, in *Law*, the crime of adminiſtering poiſon to a perſon, whereby he dies.

This, by 22 Hen. VIII. cap. 9. was made a ſort of treaſon; and the puniſhment doomed for it was, to be put alive into a caldron of water, and boiled to death. But this act was repealed by 1 Edw. VI. cap. 12.

At preſent, it is only murder, or felony without benefit of clergy, if the party dies of the poiſon within a year and a day.

POISONOUS *waters*. See WATER.

POKE, or PORK *phyſic*. See *American* NIGHTSHADE.

POLA, in *Ichthyology*, the name of a flat fiſh, ſomething reſembling the ſoal, but ſhorter and ſmaller; commonly called CYNOGLOSSUS and *linguatula*.

It is caught in the Mediterranean, and ſold in Rome and Venice for the table.

POLACRE, in *Naval Language*, a ſhip with three maſts, uſually navigated in the Levant, and other parts of the Mediterranean. Theſe veſſels are generally furniſhed with ſquare ſails upon the main-maſt, and lateen ſails upon the fore-maſt and mizen-maſt. Some of them, however, carry ſquare ſails upon all the three maſts, particularly thoſe of Provence, in France. Each of their maſts is commonly formed of one piece, ſo that they have neither top-maſt nor top-gallant-maſt; neither have they

any

any horſes to their yards, becauſe the men ſtand upon the top-ſail-yard to looſe or furl the top-gallant ſail, and on the lower yard to reef, looſe, or furl the top-ſail, whoſe yard is ſufficiently lowered down for that purpoſe. Falconer.

POLAEDRASTYLA, in *Natural Hiſtory*, the name of a genus of cryſtals. The word is derived from the Greek πολυς, *many*, εδρα, *face*, and στυλος, *a column*; the privative particle α, *un*, and ενωσις, *a reſolution*; and expreſſes a cryſtal compoſed of many planes, and having no column.

The bodies of this genus are cryſtals compoſed of two octangular pyramids, joined baſe to baſe, and conſequently the whole body conſiſting of fifteen planes. Of this genus there are only two known ſpecies: 1. A brown kind with ſhort pyramids, found in conſiderable plenty in Virginia, on the ſides of hills; and 2. A colourleſs one, with longer pyramids. This has yet been found only in one place, which is the great mine at Goſſalaer, in Saxony, and there uſually lies at great depths. Hill's Hiſt. of Foſſils, p. 171.

POLAR, ſomething that relates to the poles of the world. In this ſenſe we ſay, *polar* virtue, *polar* tendency, &c. See POLARITY.

POLAR, or *white-bear*, in *Zoology*, a ſpecies of BEAR, with a long head and neck, ſhort round ears, end of the noſe black, large teeth, hair long, ſoft, white, and tinged in ſome parts with yellow, and limbs of great ſize and ſtrength. This animal, which grows to a great ſize, ſo that the ſkins of ſome are thirteen feet long, is confined to the coldeſt part of the globe; being unknown, except on the ſhores of Hudſon's-bay, Greenland, and Spitzbergen. In ſummer the white bears make their reſidence on iſlands of ice; they ſwim with great agility for ſix or ſeven leagues, and are excellent divers. Their winter retreats are in dens under the ſnow or the fixed ice of the frozen ſea. Their food is fiſh, ſeals, and the carcaſes of whales, and human bodies, which they will greedily diſinter; and they are ſo fond of human blood, that they will attack companies of armed men, and even board ſmall veſſels. On land they live on birds and their eggs. They bring two young at a time, and their mutual attachment is ſo ſtrong, that they would die ſooner than deſert one another. Their greateſt enemy is the *morſe*. The fleſh is white, and ſaid to taſte like mutton; the fat is melted for train oil, and that of the feet uſed in medicine: but the liver is very unwholeſome. Pennant's Hiſt. of Quad. vol. ii. p. 288. See *Tab. Quadrupeds*, N° 4.

POLAR *circles*. See *Polar* CIRCLES.

POLAR *dials* are thoſe, whoſe planes are parallel to ſome great circle paſſing through the poles, or to ſome one of the hour-circles; ſo that the pole is neither elevated above, nor depreſſed below the plane.

Such dial, therefore, can have no centre, and conſequently its ſtyle, ſub-ſtyle, and hour-lines, are parallel.

This, therefore, will be an horizontal dial to thoſe who live under the equator or line.

POLAR *dial, to conſtruct a*. See DIAL.

POLAR *projection* is a repreſentation of the earth, or heavens, projected on the plane of one of the *polar* circles.

POLARITY, the quality of a thing conſidered as having poles.

By heating an iron bar, and letting it cool in a vertical poſture, it acquires a *polarity*. The lower end becomes the north pole, the upper the ſouth.

Iron bars acquire a *polarity*, by being kept a long time in an erect poſture, even without heating. Thus, the bars of windows, &c. are frequently found to have poles. Nay, a rod of iron acquires a *polarity*, by the mere holding it erect; the lower end, in that caſe, attracting the ſouth end of a magnetic needle, and the upper, the north end. But theſe poles are mutable, and ſhift with the ſituation of the rod. See MAGNET.

Some modern writers, particularly Dr. Higgins, in his Philoſophical Eſſay concerning Light, have maintained the *polarity* of the parts of matter, or that their ſimple attractions are more forcible in one direction, or axis of each atom, than in any other.

POLE, POLUS, Πολος, formed from πωλεω, *to turn*, in *Aſtronomy*, one of the extremities of the axis, whereon the ſphere revolves.

Theſe two points, each 90 degrees diſtant from the equator, are called, by way of eminence, the *poles of the world*.

Wolfius defines the *poles*, thoſe points on the ſurface of the ſphere, through which the axis paſſes; ſuch are the points I and K (*Tab. Aſtron. fig.* 21.) whereof that viſible to us, or raiſed above our horizon, I, is called the *arctic* or *north pole*; and its oppoſite, K, the *antarctic* or *ſouth pole*.

POLE, in *Geography*, is the extremity of the earth's axis, or one of the points on the ſurface of our globe, through which the axis paſſes. See EARTH.

Such are the points P, Q (*Tab. Geog. fig.* 7.) whereof that elevated above our horizon is called the *arctic* or *north pole*; and its oppoſite, Q, the *antarctic* or *ſouth pole*.

Dr. Halley ſhews, that the ſolſtitial day, under the *pole*, is as hot as under the equinoctial, when the ſun is in the zenith; in regard, all the twenty-four hours of that day under the *pole*, the ſun-beams are inclined to the horizon in an angle of 23½ degrees; whereas, under the equinoctial, though the ſun becomes vertical, yet he ſhines no more than twelve hours, and is abſent twelve hours. Beſides, that, for three hours eight minutes of the twelve hours which he is above the horizon there, he is not ſo much elevated as under the *pole*. See HEAT, *in Geography*.

The *altitude* or ELEVATION *of the pole*, is an arch of the meridian intercepted between the *pole* and the horizon. To find this elevation is a very popular problem in aſtronomy, geography, and navigation; this and the latitude of the place being always the ſame.

POLE, *to obſerve the altitude of the*. With a quadrant obſerve both the greateſt and leaſt meridian altitude of the *pole*-ſtar.

Subtract the leaſt from the greateſt, and divide the difference by two; the quotient is the ſtar's diſtance from the pole; which, added to the leſſer altitude found, gives the elevation of the *pole* required. See LATITUDE.

Thus M Coupler, the younger, at Liſbon, in 1697, in the end of September, obſerved the greateſt meridian altitude 41° 5′ 40″. The ſmalleſt 36° 28′ 0″, the difference whereof is 4° 37′ 40″; one half whereof, 2° 18′ 50″, added to the leſs, gives 38° 46′ 50″, the altitude of the *pole* of Liſbon.

The altitude of the *pole*, together with the meridian line, being the baſis of all aſtronomical obſervations; to determine it with the greateſt accuracy, the meridian altitudes muſt be corrected from the doctrine of refractions, hereafter to be delivered.

By means hereof, M. Coupler, ſubtracting 1′ 25″ in the propoſed example, leaves the corrected altitude 38° 45′ 25″.

Hence, 1. The altitude of the *pole* being ſubtracted from 90°, leaves the *altitude of the equator*.

2. If the greateſt meridian altitude of this ſtar exceed the altitude of the equator, the latter, ſubtracted from the former, leaves the declination of the ſtar northward; if the altitude of the ſtar be leſs than that of the equator, the former, ſubtracted from the latter, leaves the ſtar's declination ſouthward.

Dr. Hooke, and ſome others, imagined the height of the *pole*, and the poſition of the circles in the heavens, in reſpect of thoſe on the earth, to be changed from what they anciently were. But M. Caſſini thinks there is no ground for ſuch a ſurmiſe; but that all the difference we now find in the latitudes of places, &c. in reſpect of the ancient accounts, ariſes from the inaccuracies of the ancient obſervations.

Indeed, it is no wonder they ſhould err in their obſervations, conſidering what inſtruments they uſed. He adds, it is probable there may be ſome variation in the height of the *pole*; but, he thinks, this never exceeds two minutes; and that even this will vaniſh, after it is arrived to its higheſt difference.

POLE, in *Sphereſ*, is a point equally diſtant from every part of the circumference of a greater circle of the ſphere; as the centre is in a plain figure.

Or, *pole* is a point 90° diſtant from the plane of a circle, and, in a line paſſing perpendicularly through the centre, called the axis.

The zenith and nadir are the *poles* of the horizon. The *poles* of the equator are the ſame with thoſe of the ſphere or globe.

POLES of the ecliptic are two points on the ſurface of the ſphere, 23° 30′ diſtant from the *poles* of the world, and 90° diſtant from every part of the ECLIPTIC.

POLES, in *Magnetics*, are two points in a load-ſtone, correſponding to the *poles* of the world; the one pointing to the north, the other to the ſouth.

If the ſtone be broken in ever ſo many pieces, each fragment will have its two *poles*. If a magnet be biſected by a line perpendicular to the axis; the two points, before joined, will become oppoſite *poles*, one in each ſegment.

To touch a needle, &c. that part intended for the north end is touched with the ſouth *pole* of the magnet, and that intended for the ſouth end with the north *pole*.

A piece of iron acquires a polarity, by only holding it upright; but its *poles* are not fixed, but ſhift, and are inverted as the iron is. A fixed north *pole* may be made all the ways a fixed ſouth *pole* is made; but not *vice verſâ*: and whatever way we get a fixed ſouth *pole*, it is always weaker than a fixed north *pole* got the ſame way. Fire deſtroys all fixed *poles*; but it ſtrengthens the mutable ones.

The end of a rod being heated, and left to cool north-ward,

ward, Dr. Gilbert says, becomes a fixed north *pole*; if southward, a fixed south *pole*: yet this doth not hold in all cases. If the end be cooled, held downward, or to the nadir, it acquires somewhat more magnetism than if cooled horizontally towards the north; but the best way is to cool it a little inclined to the north. Repeated ignitions do not avail to this purpose any more than a single one.

Dr. Power says, that if we hold a rod northwards, and hammer the north end in that position, it will become a fixed north *pole*; and contrarily, if you hammer the south end. What is said of hammering, is to be likewise understood of filing, grinding, sawing; nay, a gentle rubbing, provided it be continued long, will produce *poles*.

The more heavy the blows are, *exteris paribus*, the magnetism will be the stronger. A few hard blows do as much as many.

Old drills and punches have all fixed north *poles*, because almost constantly used downwards. New drills have either mutable *poles*, or weak north *poles*. Drilling with such a one southward horizontally, it is a chance if you produce a fixed south-*pole*, much less if you drill south downwards; but if you drill south upwards, you always make a fixed south *pole*.

A weak fixed *pole* may degenerate into a mutable one in a day, nay, in a few minutes, by holding it in a position contrary to its *pole*. The load-stone itself will not make a fixed *pole* in any iron. It is required the iron have a length, if it be thick.

Mr. Ballard tells us, that in six or seven drills made before his face, the bit of each became a north *pole*, merely by hardening. See MAGNET, and MAGNETISM.

POLES, *under bare*, in *Sea Language*, denotes the situation of a ship at sea, when all her sails are furled, particularly in a tempest.

POLE *of a glass*, in *Optics*, is the thickest part of a convex, or the thinnest of a concave glass.

If the glass be truly ground, the *pole* will be exactly in the middle of its surface.

This is sometimes also called the *vertex* of the glass.

POLE, in *Surveying*, is a measure containing sixteen feet and a half; called also PERCH, and sometimes *rod*.

POLE-*axe*, is a sort of hatchet nearly resembling a BATTLE-axe, having a handle about fifteen inches in length, and being furnished with a sharp point, or claw, bending downwards from the back of its head; the blade of which is formed like that of any other hatchet. It is principally employed to cut away and destroy the rigging of an adversary who endeavours to board. *Pole-axes* are also said to have been successfully used on some occasions in boarding an enemy, whose sides were above those of the boarder. This is executed by detaching several gangs to enter at different parts of the ship's length, at which time the *pole-axes* are forcibly driven into her side, one above another, so as to form a sort of scaling-ladders. Falconer.

POLE-*cat*, *mustela putorius* of Linnæus, in *Zoology*, the name by which authors call a creature of the weasel-kind, but larger than the common weasel, and remarkable for its stinking smell. It is also called *fitchet*.

The whole circumference of the face is white, at the extremity of the angles of the mouth there begins a broad line of a yellowish hue, which surrounds the head, and is white in several parts; its long hairs are black, its short ones yellowish; and the throat, the feet, and the tail, are blacker than any other part of the body; the upper jaw stands out a little beyond the lower; the ears are broad and short, and are fringed, as it were with white; its stink is occasioned by an extremely foetid matter, secreted by two glands, which it has in common with all the creatures of this kind, within the anus.

It feeds on flesh, frequently stealing hens and other poultry, and sometimes contenting itself with their eggs.

In winter it frequents houses, and will rob the dairy of the milk. It commonly burrows in the ground, forming a retreat about two yards in length, terminating under the roots of some large tree; and sometimes forms its lodgment in barns and under hay-ricks. It brings five or six young at a time. The skin of this animal is dressed with the hair on, and used as other furs for tippets, &c. and is sent abroad to line cloaths. It inhabits most parts of Europe. Ray and Pennant. See *Tab.* IV. *Quadr.* N° 48.

POLE-*cat*, *American*, or *striated*, called *skunk*, in *Zoology*, is the *viverra putorius* of Linnæus, with rounded ears; head, neck, belly, legs, and tail, black; the back and sides marked with five parallel white lines; one on the top of the back, the others on each side; the second extends some way up the tail, which is long and bushy towards the end. This animal, which is about the size of the European *pole-cat*, inhabits North America; when attacked, it bristles up its hair, and flings its body into a round form: its vapour is horrid. Pennant.

POLE-*mast*. See MAST.

POLE-STAR, or POLAR-STAR, is a star of the second magnitude, the last in the tail of URSA minor, or the Little Bear.

The nearness of this star to the *pole*, whence it happens that it never sets, renders it of vast service in navigation, &c. for determining the meridian line, the elevation of the *pole*, and consequently the latitude of the place, &c.

POLE *of a wheel-carriage*. See PERCH.

POLEIN, in our *Ancient Customs*, a sort of shoe, sharp or picked at the point.

This fashion was first taken up in the time of King William Rufus; the picks being made so long, that they were tied up to the knees, with silver or golden chains.

They were forbidden by stat. an. 4 Edw. IV. cap. 7. *Tunc statuit civibus, tunc insuit vestibus, tunc usus intervenus cum arcuatis ocultis inventus est.* Malmesb. in Will. II.

POLEMARCHUS, Πολέμαρχος, among the Athenians, a magistrate who had all the strangers and sojourners in Athens under his care, over whom he had the same authority that the archon had over the citizens.

It was the duty of the *polemarchus* to offer a solemn sacrifice to Enyalius, said by some to be the same with Mars, but by others to have been only one of his attendants, and another to Diana, surnamed Αγροτέρα, in honour of the famous patriot Harmodius. It was also the business of the *polemarchus* to take care that the children of those who had lost their lives in their country's service, should have a competent maintenance out of the public treasury. Potter.

POLEMICAL, Πολεμικὸς, *from* πόλεμος, *war, battle*, an epithet applied to books of controversy, especially those in divinity.

Scaliger's exercitations against Cardan make a pure *polemical* book.

Hence also we say, *polemical divinity*, for controversial, &c.

POLEMONIUM, in *Botany*. See *Greek* VALERIAN.

POLEMOSCOPE, in *Optics*, an oblique kind of perspective glass, contrived for the seeing of objects that do not lie directly before the eye.

It was invented by Hevelius, in 1637, who gave it this name, from the Greek πόλεμος, *battle*; because it may be of use in war, in engagements, duels, &c. for discovering what the enemy is doing, whilst the spectator lies hid behind any obstacle.

Something of this kind, are those now known among us under the name of ogling-glasses, or OPERA-glasses, through which one sees a person, in appearing to look at another.

POLEMOSCOPE, *construction of the*. Any telescope will be a *polemoscope*, if the tube be but crooked, like a rectangular siphon A B D M (*Tab.* V. *Optics, fig.* 90.) and between the object-glass A B and the first eye-glass G H, (if there be several) be placed a plain mirror, in such manner as that the mirror is inclined to the horizon at an angle of 45°, and its reflected image found in the focus of the eye-glass G H.

For, by this means, objects, situate over-against the lens A B, will appear the same as if the mirror K were away, and the object-glass, with the objects, were directly opposite to the eye-glasses.

If it be desired to look in at O, not at M, another plain mirror N must be added.

POLETA, in our *Ancient Law Books*, signifies the half of the foot. *Tres octavas fendaturæ de pede asterisci sive postes.* Matt. Par. anno 1215.

POLETÆ, Πωλῆται, among the Athenians, ten magistrates, who, together with three that had the care of the money allowed for shews, had the power of letting out the tribute-money, and other public revenues, and selling confiscated estates; all which bargains were ratified in the name of their president. Besides this, it was their office to convict such as had not paid the tribute called *Metoicia*, and sell them by auction. Potter.

POLEY-*grass*, in the Linnæan system of *Botany*, is a species of LYTHRUM.

Mountain POLEY, or POLEY *mountain*, *polium*, in *Botany*. Its characters are these: the empalement of the flower is permanent and of one leaf, cut into five acute segments; the flower is of the lip kind; it hath one petal, with a short tube; the stamina occupy the place of the upper lip, and the lower lip is cut into five segments; it hath four awl-shaped stamina, which are terminated by small summits; and a germen divided into four parts, supporting a slender style, crowned by two narrow stigmas; the germen afterwards becomes four naked seeds, inclosed in the empalement. Miller enumerates fifteen species. Linnæus has joined this genus to the TEUCRIUM.

These plants may be disposed in a garden, so as to afford pleasure, by mixing them with marum, mastich, and several other aromatic plants, upon the sloping sides of banks

banks, which are expoſed to the ſun; or upon little hillocks raiſed in a ſheltered ſituation; where, by the diverſity of their hoary branches, being of various ſhapes, they will make a pretty appearance, and in ſuch places they will reſiſt the cold much better than when they are planted in a good ſoil. They may be propagated by ſeeds, which muſt be procured from the countries where they naturally grow, ſown on a bed of freſh light earth in the ſpring. About the middle of July the plants may be removed, and part of them planted on a warm border of dry rubbiſhy ſoil, where they are to be ſhaded from the ſun, watered till they have taken root, and kept clear of weeds. The other part may be planted in ſmall pots filled with freſh, light, undunged earth, and placed in the ſhade till they have taken root; they may then be removed into an open ſituation, and remain there till the beginning of November, when they ſhould be placed under a common frame.

They may alſo be propagated by cuttings or ſlips, which ſhould be planted the beginning of April, juſt before they ſhoot, upon a border expoſed to the eaſt; and if the ſeaſon proves dry, they muſt be watered and ſhaded until they have taken root; afterward they will require no other care but to keep them clean from weeds, and at Michaelmas the plants ſhould be removed where they are deſigned to remain; but it will be proper to put a plant of each ſort into pots, that they may be ſheltered in winter, to preſerve the kinds. Miller.

Several ſpecies and varieties of *polium*, erect and procumbent, with white, yellow, and purpliſh flowers, have been received in the ſhops. But the *poley-mountain* of Candy has been commonly underſtood as the officinal ſort, which is procured dry from the iſland Candy; and the *poley-mountain* of Montpelier is allowed to be of the ſame quality. The leaves and tops have a moderately ſtrong aromatic ſmell, and a disagreeable bitter taſte; they are recommended as corroborants, aperients, and antiſpaſmodics; but are at preſent ſcarcely otherwiſe made uſe of than as an ingredient in mithridate and theriaca. *Lewis.*

POLONIA, in *Botany*, a name by which ſome authors have called the coco-nut tree, or *palma Indica nucifera* of other writers.

POLIA *litharges*, a term uſed by Dioſcorides to expreſs the white litharge, which we call litharge of ſilver.

The proper ſenſe of the word *polios*, is hoary, or grey, and it very well expreſſes the colour of this ſubſtance; but the commentators have not been ſatisfied with this obvious meaning, but have made it *pelion*, and ſome of them *ſtibium*. See LITHARGE.

POLIANTHES, in *Botany*, a genus of the *hexandria monogynia* claſs. Its characters are, that the corolla is funnel-ſhaped, incurvated, and equal; the filaments are inſerted in the chaps of the corolla, and the germen in the baſe of it. There is only one ſpecies.

POLICY, or POLITY, Πολιτεια, the laws, orders, and regulations, preſcribed for the conduct and government of ſtates and communities.

The word is of Greek original, being derived from the Greek πολις, *civitas*, *city*, or *ſtate*.

In the general, *policy* is uſed in oppoſition to barbariſm. Different ſtates have different kinds of *policy*: thus the *policy* of Athens differed from that of Sparta.

Loyſeau obſerves, that *policy* properly ſignifies the courſe and adminiſtration of juſtice in a city. The direction of the *policy* of London is in the hands of the lord mayor.

At Paris they have a *chamber of policy*, where people are verbally accuſed for contraventions of *policy*.

Some divide *policy* into two parts, *œconomy*, that relating to affairs of merchandize; and *aſtynomy*, that concerning the civil and judiciary government of the citizens. Some add a third branch, viz. what relates to the ECCLESIASTICAL government.

Richard Hooker has a fine treatiſe of the laws of eccleſiaſtical *policy*.

In much the ſame ſenſe is uſed the modern term *police*, or *police*. œconomy, to denote the due regulation and domeſtic order of the kingdom; whereby the individuals of the ſtate, like members of a well governed family, are bound to conform their general behaviour to the rules of propriety, good neighbourhood, and good manners; and to be decent, inoffenſive, and inſenſible, in their reſpective ſtations. The claſs of crimes againſt the public *police* of a country comprehends thoſe which amount to FELONY, as clandeſtine MARRIAGES, BIGAMY, and POLYGAMY; thoſe of idle ſoldiers and MARINERS, wandering about the realm, and GYPSIES; and others, whoſe puniſhment is ſhort of death, as common BARRATORS, INSOLENCE, LUXURY, GAMING, and the deſtroying of GAME.

POLICY *of inſurance*, or *aſſurance of ſhips*, is a contract or convention, whereby a perſon takes upon himſelf the riſks of a ſea-voyage; obliging himſelf to make good the loſſes and damages that may befall the veſſel, its equipage, tackle, victualling, lading, &c. either from tempeſts, ſhipwrecks, *pirates*, fire, war, reprizals, &c. in part or in whole, in conſideration of a certain ſum of ſeven, eight, or ten per cent. more or leſs, according to the riſk run; which ſum is paid down to the aſſurer by the aſſuree, upon his ſigning the *policy*.

There are ſome aſſurances for the going, ſome for the returning, and ſome for both, or for a limited time; though ſome maintain, that the time ought never to be limited, in that the contract thereby becomes uſurary.

The *policy* is to contain the name and dwelling of the perſon aſſured; his quality, whether as proprietor, or agent; the effects, the name of the veſſel, and of the maſter; thoſe of the place where the goods are to be loaden or unloaden; the port whence, and whither; as alſo the time, the riſks, and the conditions.

If the veſſels or merchandizes aſſured be loſt, the aſſuree muſt notify the ſame by an act in form; declaring he ſurrenders the whole to the aſſurer, on his paying the ſums aſſured in the time expreſſed.

The origin of theſe aſſurances is aſcribed to the Jews, at the time they were expelled France, in 1182; who are ſaid to have uſed this as a means to facilitate the tranſporting of their effects. The term *policy* is Spaniſh, and comes from *poliça*, *cedula*, but the practice comes from the Italians and the Lombards; who, again, derived it originally from the Latin *polliciturio*, *promiſe*. Some ſay the merchants of Marſeilles were the firſt who ſet on foot this kind of commerce.

Anciently *policies* were given by word of mouth, called *policies of credit*; it being ſuppoſed the aſſurer would enter them in his ledger: but of late, that benefit is become leſs frequent among traders, they have been made conſtantly in writing. For the hiſtory and practice of inſuring ſhips, ſee INSURANCE.

POLICY *of inſurance*, or *aſſurance of houſes*, is an inſtrument formed on the model of that for veſſels; whereby a perſon, or community of perſons, take on themſelves the riſks and damages that may befall houſes, their furniture, in whole, or in part, &c. from fire, on conſideration of a certain ſum, or ſums, to be paid by the aſſurer, according to the terms of the agreement.

The inſurance from fire is now a popular ſpecies of commerce; and we have a number of ſocieties erected into corporations for that purpoſe. See INSURANCE.

POLICY *of inſurance of lives*, is an inſtrument whereby a ſociety of perſons, erected into a corporation, &c. oblige themſelves to pay a certain ſum of money, e. gr. a hundred pounds, upon the death of a perſon whoſe life they aſſure, in conſideration of a ſum of money, e. gr. one guinea paid quarterly to the aſſurers, during the life of the ſaid perſon aſſured.

The *policy* is under the ſeal of the office, and entitles the perſon in whoſe favour it is granted, to make good his claim, according to the tenor of the articles, or by-laws, of the ſociety. See ASSURANCES *on lives*.

POLICY, *officers of*. See OFFICES.

POLICY, in *Letter Founding*, is ſometimes uſed for a rule that regulates the number of letters of each kind in a complete font; i. e. to determine how many, in proportion to the whole ſet, there are to be of each particular kind.

For inſtance, in a font of an hundred thouſand characters, there are to be five thouſand for *e*, a thouſand for *a*, three thouſand for *m*, thirty only for *k*, as many, or a little more, for *z*, *y*, and *w*; and in proportion for the other letters, the great and ſmall capitals, the initial letters, points, commas, double letters, &c. See *Letter* FOUNDERY.

POLIDE, formed of πολις, *city*, and denoting the patroneſs of a town or city, in *Mythology*, an epithet given to Minerva, under which title ſhe had two temples; one at Erythræa, in Achaia, and another at Tegea, in Arcadia.

POLIEA, Πολιεα, in *Antiquity*, a ſolemnity of Thebes in honour of Apollo, ſurnamed Πολιος, i. e. *grey*, becauſe he was repreſented in this city (contrary to the practice of all other places) with grey hairs. Potter.

POLIEUS, formed of πολις, *city*, and denoting the protector of a city, in *Mythology*, a name under which JUPITER had a temple in the citadel of Athens.

POLIIFOLIUM, in *Botany*, the name of a genus of plants deſcribed by Buxbaum, the characters of which are theſe: the flowers are monopetalous, of the bell-faſhioned globoſe kind; the ſeed-veſſel is divided into five parts, and contains a number of roundiſh ſeeds; the leaves are like thoſe of the poley-mountain, whence the name; the flowers reſemble thoſe of the arbutus, or ſtrawberry-tree; and the fruit that of the ciſtus.

The plant has been known among authors before, though ill named, and confounded with other genera; Ray has

called it *ſedum arbuti ſhore*. It properly belongs to the plants of the ſhrub-kind, with dry fruits, and ought to be placed after the chamærhododendron, in the regular arrangements of plants.

Beſide the common kind of this, there is an African one, the leaves of which are ſhorter and rounder than thoſe of this ſpecies, and which may be called the ſhort-leaved African ſhrub *poliſolium*. The *poliſolia* in the Linnæan ſyſtem are ſpecies of ANDROMEDA.

POLIOPTRUM, in *Optics*. See POLYOPTRON.

POLIOPUS, in *Ornithology*, a name given by Aldrovand, and ſome other authors, to the GRISETTA, a ſmall bird of the moor-hen kind.

POLISH *coins, meaſures*, &c. See COIN, MONEY, MEASURE, &c.

POLISHER, an inſtrument, called alſo a burniſher, uſed for poliſhing and burniſhing gold, ſilver, and other metals, when gilt or ſilvered; and matters of other kinds proper to take a poliſh.

The *poliſher* is different in the different arts and manufactories. The gilders uſe an iron *poliſher*, to prepare their metals before gilding; and the blood-ſtone, to give them the bright poliſh after gilding.

The *poliſher* uſed by the makers of ſpurs, bits, &c. is part iron, part ſteel, and part wood. The inſtrument conſiſts of an iron bar, with a wooden handle at one end, and a hook at the other, to faſten it to another piece of wood held in the vice, while the operator is at work. In the middle of the bow, withinſide, is what they properly call the *poliſher*; which is a triangular piece of ſteel, with a tail, whereby it is rivetted to the bow. What the cutlers call their *poliſhers* are a kind of wooden wheels, for grinding, made of walnut-tree, an inch thick, and of a diameter at pleaſure. They are turned by the great wheel; and it is on theſe they poliſh and ſmooth their works, with emery and putty.

The *poliſhers* uſed in the manufacture of glaſs are very different from all theſe. They conſiſt of two pieces of wood; the one flat, covered with old hat; the other long, and half round, is faſtened on the former, whoſe edge it exceeds, on both ſides, by ſome inches; which ſerve the workman to take hold of, and to work it backwards and forwards by.

The *poliſhers* uſed by ſpectacle makers are pieces of wood a foot long, ſeven or eight inches broad, and an inch and a half thick, covered with old caſtor-hat, whereon they poliſh the ſhell and horn-frames their ſpectacle glaſſes are to be fet in.

POLISHING, the art of giving a gloſs or luſtre to a thing; particularly a precious ſtone, marble, glaſs, a mirror, or the like.

POLISHING *of gimſets, ſimſes*, &c. ſucceeds the grinding thereof.

The *poliſhing* of a mirror is the laſt preparation given it, with emery or putty.

For an account of the methods recommended by various authors for *poliſhing* glaſs and metals in the conſtruction of teleſcopes, &c. ſee GRINDING.

For the *poliſhing* of diamonds, &c. ſee LAPIDARY.

POLISHING *copper plates*. See COPPER *plates*.

POLISHING *of ſhells*. See SHELLS.

POLISHING, *water*. See JAPANNING.

POLITICAL, πολιτικὸς, formed from πόλις, *city*, ſomething that relates to policy, or civil government.

In this ſenſe we ſay *political* intereſts, *political* views, *political* diſcourſes, &c.

POLITICAL *arithmetic* is the application of arithmetical calculations to *political* uſes and ſubjects; as the public revenues, number of people, extent and value of lands, taxes, trade, commerce, manufactures, or whatever relates to the power, ſtrength, riches, &c. of any nation or commonwealth; or, as Davenant conciſely defines it, the art of reaſoning by figures, upon things relating to government.

The chief authors who have attempted calculations of this kind are, Sir William Petty, Major Graunt, Dr. Halley, Dr. Davenant, and Mr. King; and the principal points ſettled by them are as follow.

According to Sir William Petty's computations, though the land of Holland and Zealand be not above 1,000,000 acres, nor that of France leſs than 8,000,000, yet the former are near a third part as rich and ſtrong as the latter. That the rents of lands in Holland are to thoſe in France, as 7 or 8 to 1. That the people of Amſterdam are two-thirds of thoſe of Paris or London; which, according to him, do not differ above a 20th part from one another. That the value of the ſhipping of Europe is about two millions of tons, whereof the Engliſh have 500,000, the Dutch 900,000, the French 100,000; the Hamburghers, Danes, Swedes, and Dantzickers, have 950,000; and Spain, Portugal, Italy, &c. about as much. That the value of goods then exported yearly from France into all parts, was quadruple of that exported into England alone; and conſequently, in all, about 5,000,000*l.* What was then exported out of Holland into England, was worth 300,000*l.* and what was exported thence into all the world, 18,000,000*l.* That the money yearly raiſed by the French king, in time of peace, is about 6½ millions ſterling; and that the monies raiſed in Holland and Zealand are about 24,000,000*l.* and in all the provinces together about 30,000,000*l.* That the people in England are about 6,000,000; and their expences, at 3*l.* per annum a head, 42,000,000*l.* or 800,000*l.* a week. That the rent of the lands is about eight millions, and the intereſts and profits of the perſonal eſtates as much. The rent of houſes in England 4,000,000*l.* That the profits of the labour of all the people is 26,000,000*l.* yearly. That in Ireland the people amount to about 1,200,000. That the corn ſpent in England, at 5*s.* the buſhel for wheat, and 2*s.* 6*d.* for barley, amounts to ten millions per annum. That the navy of England (then) required 36,000 men to man it, and other trade and ſhipping about 48,000. That in France, to manage the whole ſhipping trade, there were at that time required but 1500 men. That the whole people of France are about thirteen millions and a half; and thoſe of England, Scotland, and Ireland, together, about nine millions and a half. That, in the three kingdoms, are about 20,000 churchmen; and in France above 250,000. That in the dominions of England are above 40,000 ſeamen, and in France not above 12,000. That in England, Scotland, and Ireland, and all other dominions depending thereon, there was then about 60,000 tun of ſhipping, which is worth about four millions and a half in money. That the ſea-line round England, Scotland, and Ireland, and the adjacent iſles, is about 7,800 miles. That in the whole world are about three hundred and fifty millions of people; whereof thoſe with whom the Engliſh and Dutch have any commerce, are not above eighty millions. That the value of commodities annually traded for in the whole, is not above 45,000,000*l.* That the manufactures exported out of England amounted to about 5,000,000*l.* per annum. Lead, tin, and coals, to 500,000*l.* per annum. That the value of the French commodities (then) brought into England, did not exceed 1,200,000*l.* per annum. That the whole rath of England, in current money, was then about 6,000,000*l.* ſterling. See Sir W. Petty's *Political* Arithmetic, p. 74, &c.

Dr. Davenant gives ſome good reaſons why many of Sir Wm. Petty's numbers are not to be entirely depended upon; and, therefore, advances others of his own, founded on the obſervations of Mr. Greg. King.

Some of the particulars are, that the land of England is 39 millions of acres. That the number of people, according to his account, is about 5,500,000 ſouls, increaſing about 9000 every year, allowances being made for plagues, wars, ſhipping, and the plantations. The people in London he reckons at 530,000; thoſe in the other cities and market-towns in England, 870,000; and thoſe in the villages and hamlets, at 4,100,000. The yearly rent of the land he accounts to be 10,000,000*l.* That of the houſes and buildings 2,000,000*l.* per annum. The produce of all kinds of grain he reckons to be worth 9,075,000*l.* in a year moderately plentiful. The rent of the cornlands, annually, 2,200,000*l.* and their net produce above 9,000,000*l.* The rent of the paſture, meadows, woods, foreſts, commons, heaths, &c. 7,000,000*l.* The annual produce by cattle, in butter, cheeſe, and milk, he thinks is about 2,500,000*l.* The value of the wool yearly ſhorn, about 2,000,000*l.* Of horſes yearly bred, about 250,000*l.* Of the fleſh yearly ſpent as food, about 3,350,000*l.* Of the tallow and hides, about 600,000*l.* Of the hay yearly conſumed by horſes, about 1,300,000*l.* Of the hay conſumed by other cattle, 1,000,000*l.* Of the timber yearly felled for building, 500,000*l.* Of the wood yearly ſpent in firing, &c. about 500,000*l.* The land of England, to its inhabitants, is now about 7¼ acres per head. The value of the wheat, rye, and barley, neceſſary for the ſuſtenance of England, amounts to at leaſt 6,000,000*l.* ſterling, per annum. The value of the woollen manufacture made here is about 8,000,000*l.* per annum; and our exports of all kinds of the woollen manufacture amount to above 2,000,000*l.* per annum. The annual income of England, on which the whole people live and ſubſiſt, and out of which taxes of all kinds are paid, is ſtated at about 43,000,000*l.* that of France, 81,000,000*l.* and that of Holland, 18,250,000*l.* See Davenant's Eſſay upon the probable methods of making a people gainers in the balance of trade, &c. in his Works, vol. vi.

Major Graunt, in his obſervations on the bills of mortality, computes, that there are 39,000 ſquare miles of land in England. That in England and Wales there are 4,600,000 ſouls. That the people of London are about 640,000

640,000; being one fourteenth part of the people of England. That in England and Wales are about 10,000 parithes. That there are 25,000,000 of acres in England and Wales; viz. about four acres to every head. That but 64 out of 100 of the children born are living at 6 years old. That but 40 of 100 are alive at 16 years end. That but 25 of 100 at 26 years end. That but 16 at 36 years end. That but 10 out of 100 at 46 years end. That but 6 out of 100 at 56 years end. That but 3 out of 100 at 66 years end. And that but 1 out of 100 at 76 years end. And that London doubles itself in about 64 years.

Sir William Petty, in his difcourfe about duplicate proportion, farther tells us, that it is found by experience, that there are more perfons living between 26 and 26, than of any other age: and, laying down that as a fuppofition, he infers, that the fquare roots of every number of men's ages under 16 (whofe root is 4), fhew the proportion of the probability of fuch perfons reaching the age of 70 years.

Thus, it is 4 times more likely, that one of 16 years of age lives to be 70, than that a child of one year old does. It is thrice as probable, that one of 9 years lives to be 70, as that a new-born child does, &c. That the odds is 5 to 4, that one of 25 dies before one of 16 years. That it is 6 to 5 (ftill as the fquare roots of the ages) that one of 36 years old dies before one but of 25 years of age; and fo on, according to any declining age, to 70, compared with a number between 4 and 5, which is the root of 21, the law age.

Dr. Halley has made a very exact eftimate of the degrees of the mortality of mankind, from a curious table of the births and burials, at the city of Breflaw, the capital of Silefia; with an attempt to afcertain the price of annuities upon lives. From a table which he has calculated thence, publifhed in the Philofophical Tranfactions, he derives the following ufes.

1. To find in any multitude, or body, of people, the proportion of men able to bear arms; which he reckons from 18 to 56 years old, and accounts about $\frac{1}{4}$ of the whole. 2. To fhew the different degrees of mortality, or rather vitality, in all ages; by which means he finds the odds there is, that any perfon of any age doth not die in a year's time, or before he attains fuch an age. 3. To fhew in what number of years it is an even lay, that fuch a perfon fhall die; and finds, for inftance, that is an even lay, that a man of thirty years of age lives between twenty-feven and twenty-eight years. 4. To regulate the price of infurance upon lives. 5. And the valuation of annuities upon lives. 6. How to value two or three lives after the fame manner.

From the whole he makes two very good obfervations: 1. How juftly we ufe to complain of the fhortnefs of our lives; for that it appears, that one half of thofe that are born do not live above feventeen years.

2. That the growth and increafe of mankind is not fo much ftinted by any thing in the nature of the fpecies, as it is from the curious difficulty moft people make of venturing on the ftate of marriage; and, therefore, that celibacy ought to be every way difcouraged by all wife governments; and thofe who have numerous families of children ought to be countenanced and encouraged by good laws, fuch as the *jus trium liberorum*, &c. among the Romans.

According to Mr. Kerfeboom's computation, the inhabitants of Holland and Weft Friezeland, in the year 1738, amounted to 980,000. He has given us a table of the particulars, exhibiting the number of people of all ages, living at the fame time, from their birth to extreme old age. This table having the chances of mortality within the ages mentioned, he calls the table of contingency of life and death.

This table is calculated upon three principles. 1. On correct obfervations upon the tables of affignable annuities in Holland, which have been kept there for above 125 years; wherein the ages of the perfons dying are truly entered. 2. Upon a fuppofition that there are yearly born in the two provinces 28,000 living children. 3. That the whole number of inhabitants, in any country, is to the number of births as 35 to 1.

From this table it appears, 1. That more than half the number of people in the two provinces are above 27 years old. 2. That by the obfervations made in England, out of 35 children born, 18 of them are boys, and 17 girls: the inhabitants of Holland and Weft Friezeland confift of 504,000 males, and 476,000 females, the fum of which is 980,000.

Here follows the table of contingency of life and death.

Of above 90 years old		500
Of 90 to 86 incl.		2500
85	81	6500
80	76	13000
75	71	20300
70	66	27300
65	61	34300
60	56	40800
55	51	47000
50	46	53000
45	41	57800
40	36	62500
35	31	67600
30	27	58400
		491500 fum above 27 years old
Of 26	21	94300
20	16	83400
15	11	87200
10	6	91800
5 to birth		131800
		488500 fum under 27 years old
		491500
		488500
		980000 fum of all the inhabitants

Mr. Kerfeboom obferves, from the affignable annuities for lives before mentioned, that females, one with another, live about three or four years longer than the fame number of males.

He alfo thinks there is no reafon to differ from the proportions affigned by Mr. King (in Davenant's Eflays) of the ftate and condition of the inhabitants of England; which is, that for every 100,000 inhabitants there are,

Married men and women	34500
Widowers	1500
Widows	4500
Unmarried youth and children	45000
Servants	10500
Travellers, ftrangers, &c.	4000
	100000

If this propofition be admitted, then the number of each fort in Holland and Weft Friezeland, will be as in the following table:

In the two provinces of Holl. and Weft. Fr.		Amfter.
Married men and women	338100	86136
Widowers	14700	4218
Widows	44100	13858
Unmarried youth and children	441000	93990
Servants	102900	28718
Travellers, ftrangers, &c.	39200	12160
Total	980000	241000

The mortality of the feveral quarters of the year.

Spring to fummer	307 dead.
Summer to the autumnal equinox	286
Autumn to winter	287
Winter to fpring	286

The mortality of the different months of the year obferved for 31 years, one with another.

Dead in	
January	102
February	88
March	95
April	77
May	112
June	100
July	92
Auguft	95
September	99
October	93
November	95
December	99

Hence it appears, that April is the leaft, and May the moft fatal month in the year; their proportion of mortality being nearly as 2 to 3; and that of the four feafons of the year, moft deaths happen in the fpring; that is, from the vernal equinox to the fummer foltice.

Mr. Kerfeboom adds, that thefe provinces may raife

220,000 men able to bear arms, and several other curious observations.

His book is entitled, Verhandeling tot een proeve, om te weeten de probable Menigte des Volks in de Provincie van Holland en Westfriesland. Hague, 1738. 4to.

Dr. Brakenridge has given an estimate of the number of people in England, which he has formed from the number of houses and the quantity of bread consumed. According to the former principle, he states the number of houses throughout England and Wales at 911,310, and allows six persons, at an average, to a house, and thence computes the number of people to be about 6,257,418, or six millions, all ages included. From a survey of the window-lights, after the year 1750, the number of houses charged to that tax in England and Wales appears to have been 690,000; to which adding 200,000 cottages that pay nothing, the whole number appears to be 890,000; and the number of people, allowing six to a house, 5,340,000. Upon the latter principle, he estimates the number of quarters of wheat consumed at home to be 2,010,100; and allowing the quantity of a quarter for three persons in a year, or seven ounces a day for each person, he concludes, that the number of people is 6,978,300, or about six millions. Of this number, according to Dr. Halley's rule, he supposes that there may be about fifteen hundred thousand men able to carry arms. The country, he supposes, is capable of supporting one-half more inhabitants, or nine millions; for, admitting Mr. Templeman's survey, England contains 49,450 square miles, that is, 31,648,000 acres, of which 25,300,000 acres are proper to be cultivated; and allowing three acres, well manured, for the maintenance of one person, there will be maintenance in England for 8,430,000 people; to which the produce of fishing being added, it will enable the country to support nine millions. In Ireland, according to Mr. Templeman, there are 17,536,000 acres, of which, says Dr. Brakenridge, 12,000,000 are capable of cultivation; and allowing four acres, at an average, to each person, and the number of inhabitants to be (at much too low an estimate) one million, Ireland could maintain two millions more people than it has now. In Scotland, containing a million and a half of people, and 17,728,000 acres of land, of which the good acres are 11,000,000, allowing five acres for each person, he supposes there may be provision for 2,200,000 people, or for 700,000 more than there are at present. Hence he infers, that in both the British isles, properly cultivated, there is a provision for six millions of inhabitants beyond the number now supported in them. Extending his survey to the whole globe, he supposes the whole surface to be to the quantity of land as 8 to 3, i. e. as 197,810,550, to 74,181,331 square miles; out of which, deducting one-third for waste ground, there will be 49,454,887 square miles, or 31,651,129,680 good acres. And stating the whole number of inhabitants on the globe to be 4,000,000,000 there will be 79 good acres to each person. Phil. Transf. vols xlix. art. 45. art. 113.

For an account of the calculations of Dr. Price, a late well known and excellent writer on this subject, and farther particulars relating to the number of births and burials, the proportion of males and females, &c. see EXPECTATION *of life*, MARRIAGE, MORTALITY, &c.

POLITICAL *criticism*. See CRITICISM.

POLITICAL *liberty*. See LIBERTY.

POLITICS, *politice, μαστικη*, from πολις, *civitas, state*, the first part of œconomy, or ETHICS, consisting of the governing and regulating of states, for the maintenance of the public safety, order, tranquility, and good morals.

Lord Bacon divides *politics* into three parts, with regard to the three grand ends thereof, or the three offices incumbent on those who have the administration; viz. the *preservation* of the state; the *happiness* and *flourishing* of the state; and the *enlargement* of its bounds.

The two first parts, he observes, are well handled by several authors; but about the third there is a deep silence. He ranks this, therefore, among the number of the *deficienta*, and gives us a specimen of an essay to supply it.

We have several systems of *politics* by Aristotle, Machiavel, Doria, Lipsius, &c. in which last there is nothing but particles and conjunctions of the author's own; the body of the book being all quotations.

POLITICS, *academy of*. See ACADEMY.

POLITY, or POLICY. See POLICY.

POLIUM, *poley*, in *Botany*. See *Mountain* POLEY.

POLL, a term used in ancient writings for the head.

The word is, doubtless, formed from *pole*; this part being, as it were, the pole of the microcosm.

Hence, to *poll* is to enter down the names of persons who give their votes, or voices, at an election.

POLL, *deed*. See DEED.

POLLACK, in *Ichthyology*, a name which we give to two different fish of the asellus or gadus kind, with the different epithets of *rawe* and *whiting*. The *raw-pollack* is the same species that in some parts of England is called the cole-fish, and is the asellus niger of authors. The other is called the *whiting-pollack*, and is the *asellus ruffescens* of Willeghby and others; and the *gadus pollachius* of Linnæus.

Both these fishes are, according to the new Artedian system, of the genus of the gadi; and as the names taken from their colours, black and green, are very little expressive, the colours being not perfect, permanent, or entire, Artedi has devised others for them, by which they may be distinguished at sight from one another. The *raw-pollack*, or cole-fish, he distinguishes by the name of the *gadus* with three fins on the back, with no beard at the mouth, with the lower jaw longer than the upper, and the lateral line straight. The other, or *whiting-pollack*, he distinguishes by the name of the *gadus* with three fins on the back, with no beard, with the lower jaw longer than the upper, and the lateral line crooked. These two kinds of *pollack* are by these names not only distinguished from one another, but from all the other species of the same genus, as the cod-fish, &c.

The whiting *pollack* is common on many of our rocky coasts, and numbers of them are seen in summer sporting on the surface of the water, which are often taken with a goose's feather fixed to the hook. They do not grow to a large size, and are a good fish for the table.

POLLARD, among *Hunters*, a dag, or male deer, which has cast its horns.

POLLARD, or POLLENDER, in *Agriculture*, is applied to such trees as have been frequently polled, or lopped; by which they are contradistinguished from timber-trees.

POLLARD is a name given by some historians to a sort of base money current at one time in Ireland, and called more usually CROCARD.

These were coins of France, and other nations, which passed in Ireland as pennies, though really not worth quite half so much. They were made of copper, with a very small admixture of silver.

It was in the reign of Edward I. appointed lord of that kingdom in the life-time of his father Henry III. that the use of false and counterfeit money of this kind was so extremely common in Ireland. While his father reigned in England this prince never extended his power so far as to set up any mint, or coin any money in Ireland; but at his accession to the crown he found his treasury empty, and the current coin of his kingdoms in a very bad condition; his absence of near two years after his father's death having so encouraged the clippers and coiners of money, that little but clipped or counterfeit money of the kingdom was to be met with; and five or six different sorts of base and mixed money had been imported privately, and uttered in England and Ireland as pennies, though they were not half the value of the penny sterling.

These were the *crocards* and *pollards*, called also *mitres limmers, rosaries*, and by the like names, according to the things marked in the impressions. To remedy this evil, and restore the current coin of the kingdom to its ancient purity and value, this prince established a certain standard; and as the base money was an admixture of a very small quantity of silver, with a great deal of copper, he ordered that there should be in every pound of money weighing twelve ounces, eleven ounces and two penny weight and a quarter of pure silver, and only fourteen pence halfpenny farthing alloy.

The said pound to weigh twenty shillings and three pence in account; the ounce twenty pence, and the penny twenty-four grains and a half. According to this regulation, the money of Ireland was also ordered to be made, and a new kind of money was struck there in the year 1279, under Stephen de Fulbourn, bishop of Waterford, and lord deputy of Ireland. The pieces coined at this time in Ireland were groats, or four-pennies, halfpence, and farthings; and as these were the same in value, as to weight, with the English coins, they would go equally in England and Ireland; and in the twenty-ninth year of the reign of the same prince, that is, in 1300, the *crocards, pollards*, and other base money, were decried; and it was made death, with confiscation of goods, to import any of them.

By this means the circulation of the base and mixed money was in a great measure stopped, and four new furnaces were erected in the mint of Dublin, to supply the great demand that there was for good money; and Alexander Norman de Lime was appointed master of the coiners. This was a beginning of good money in Ireland; and in the year 1304, there were sent over from England twenty-four stamps for coining of money there, viz. three piles with six crosses, for pennies; three piles with six crosses, for halfpence; and two piles with four

troſſes, for farthings. In the old way of coining with the hammer, before the mill and ſcrew were invented; two kinds of punchions were in uſe, the one called the croſs, whereupon was engraved the head of the prince; and this was ſo called, becauſe anciently a croſs was the figure ſtruck on this ſide of coins inſtead of the head of the prince: the other, called the pile, contained the arms, or ſome other figure, to be ſtruck with an inſcription on the back, or reverſe of the coins. The pennies and halfpence ſtruck in this king's reign, have the king's head in a triangle full-faced. The beſt preſerved of them, found at this time, weigh twenty-two grains the penny; and the halfpence from ten grains to ten and a half. The farthings are ſo ſcarce, that it is very rare to meet with one in the collections of the moſt curious. Simon's Hiſt. of Iriſh Coins, p. 15.

POLLARD, in *Ichthyology*, a local name for the young and ſmall fiſh of the coie-fiſh, or *rawling*-POLLACK kind. It is uſed in Cornwall, &c.

POLLEN, in *Botany*. See FARINA *fecundans*.

POLLEN *thuris*, in the *Materia Medica*, a term uſed by the Latin writers to expreſs the *manna thuris*, or *manna libanotis*, of the Greeks, but that very improperly; for the word *pollen thuris* properly ſignifies the frankincenſe reduced to a powder; but this was not what the ancient Greeks called *manna thuris*, but the ſmall fragments which were broken off from the large pieces, in the gathering or packing up.

The *manna* uſed in medicine by the Greeks and Arabians was not formed into large flakes, as ours is; but was compoſed of ſmall fragments or grains, and therefore they called by the ſame name the ſmall granum or fragments alſo of other things: it was thus that the broken frankincenſe was called *manna thuris*.

This cuſtom of the times of ſaving all the fragments of this drug, made them collect even what was in ſo ſmall pieces as to reſemble powder; but this, though mixed with the reſt, was not properly the *manna thuris*. This gave occaſion to the adulterating this commodity, and Dioſcorides tells us, that even in his time they had learned the trick of putting the powder of the reſin of the pine tree among it; and this growing worſe and worſe, they at laſt diſcarded it, and would-purchaſe only the fragments without the powder. Theſe fragments they called *thus minutum*, to diſtinguiſh them from what was then called *manna thuris*, though improperly, and which was the adulterated maſs of reſin and fragments of olibanum.

POLLEX, in *Anatomy*, denotes either the thumb, or great toe, according as either manus, or pedis, is added to it.

POLLICIPES, the *toe-ſhell*, in *Natural Hiſtory*, the name of a genus of ſhells, the characters of which are theſe: they are multivalve flat ſhells, of a triangular figure, each being compoſed of ſeveral laminæ, which end in a ſharp point. They ſtand upon pedicles, and are furniſhed with a great number of hairs. We have only one known ſpecies of this genus, and this always found in large cluſters. *See Tab. of Shells*, N° 27.

POLLICIS *abductor*. See ABDUCTOR.

POLLICIS *adductor*. See ABDUCTOR.

Extenſor POLLICIS *brevis*, and *longus*. See EXTENSOR.

Flexor POLLICIS *brevis*, and *longus*. See FLEXOR.

POLLINCTORES, among the *Ancients*, an appellation given to thoſe who waſhed and anointed the dead.

POLLINCTURA, a word uſed by ſome authors to expreſs the embalming dead bodies.

POLLING, in *Gardening*, the operation of diſperſing the worm-caſts all over the walks, with long aſh-poles: this, beſides deſtroying worm-caſts, is very beneficial to the graſs of the walks. See GRASS-*walks*.

POLLUCTUM, among the Romans, a feaſt kept in honour of Jupiter Dapalis, Hercules, &c. at which ſacrifices were offered to the gods.

POLL-MONEY, or capitation, a tax impoſed by authority of parliament, on the perſon, or head, either on all indifferently, or according to ſome known mark of diſtinction; as quality, calling, &c.

Thus, by the ſtatute 18 Car. II. every ſubject in the kingdom was aſſeſſed by the *head*, or *poll*, according to his degree; every duke 100*l.* marquis 80*l.* baronet 30*l.* knight 20*l.* eſquire 10*l.* &c. and every ſingle private perſon 12*d.*

This was no new tax, as appears by former acts of parliament; particularly that anno 1380, where, *quilibet tam conjugatus quam ſolutus, utriuſque ſexus, pro capite ſuo ſolvere cogebatur*. Walſing.

Camden, in his Remains of Coins, ſays, there was anciently a perſonal tribute, called *capitatio*, or *poll-ſilver*, impoſed on the *poll*, or perſon, of every one; on women from the age of 12 years, and on men from 14.

POLLUTION, *pollutio*, the act of profaning a temple, or other holy place.

The Romaniſts hold a church to be polluted by the effuſion of blood, or of ſeed, therein; and require its being conſecrated anew.

The Jews were held polluted by the touching of a dead body, or of the menſes of women; and were to be purified in form. See the laws hereof in Leviticus.

The Indians are ſo ſuperſtitious on the head of *pollution*, that they break all the veſſels which thoſe of another religion have drank out of, or even only touched; and drain all the water out of a pond a ſtranger has bathed in.

POLLUTION, or *Self*-POLLUTION, is alſo uſed for the abuſing or defiling of one's own body, by means of laſcivious frictions and titillations, raiſed by art, to produce emiſſion.

We read in Scripture, that Onan, and, as ſome critics alſo think, Er, were ſeverely puniſhed for having polluted themſelves by ſpilling their ſeed on the ground; whence the crime has been denominated, by ſome, ONANIA.

Of *pollutions*, ſome are *voluntary*, others *involuntary*, and *nocturnal*.

POLLUTION, *pollutio nocturna*, in *Medicine*, the name of a diſeaſe, which conſiſts in an involuntary emiſſion of the ſeed in the night, in time of ſleep. This, in different perſons, is very different in degree; ſome being affected with it only once in a week, a fortnight, three weeks, or even a month, and others being ſubject to it almoſt every night.

The perſons moſt ſubject to this are young men of a ſanguineous temperament, and who feed high, and lead a ſedentary life. When this happens to a perſon but once in a fortnight, or a month, it is of no great conſequence; but when it happens almoſt every night, it greatly injures the health; the patients look pale and ſickly. In ſome the eyes become weak and inflamed; ſometimes they are affected with violent deflusions, and uſually, at laſt, are circled round with a livid appearance of the ſkin.

The diſtemper is to be cured rather by a change of life than by medicines. When it has taken its riſe from high diet and a ſedentary life, a coarſer food, and the uſe of exerciſe, will generally cure it; but if any medicines are to be given, nitre alone will do more than almoſt all the reſt. This may be taken in large doſes, a ſcruple at a time, with very little liquid with it, and muſt be continued for ſome time at night going to reſt. The root of the water-lily is greatly recommended by ſome in this caſe; and by others, the ſeeds of the agnus caſtus; but it is very doubtful, whether they have either of them any effect.

Perſons ſubject to this diſeaſe muſt never take any ſtimulating purges, and muſt avoid, as much as poſſible, all violent paſſions of the mind; and though exerciſe is recommended in moderation, yet if this be too violent, it will rather increaſe the diſorder than do any thing towards its cure.

The Romiſh church puts up prayers in the cloſe of the evening office, to be preſerved from nocturnal *pollutions*.

POLLUX, in *Aſtronomy*, the hind twin, or the poſterior part of the conſtellation GEMINI.

POLLUX is alſo a fixed ſtar of the ſecond magnitude, in the conſtellation GEMINI, or the Twins.

POLLUX is alſo uſed in *Mezzotinto*. See CASTOR.

POLLUX, in *Mythology*, the name of a demi-god, ſuppoſed to be the ſon of Jupiter and Leda, who had a temple in the city of Terapnæ, in Laconia, where was alſo a ſacred fountain, called Polydoces, or the fountain of *Pollux*.

POLPHOS, a word uſed by ſome authors to expreſs a bulb or bulbous root.

POLPOCH, in *Zoology*, a ſpecies of ſerpent ſaid to be found in Jucatan, a country bordering upon New Spain. It can bite with the mouth, and ſting with the tail.

POLTROON, or POLTROON, a coward, or daſtard, wanting courage to perform any thing great or noble.

The word we borrow from the French, who, according to Salmaſius, derive it *a pollice truncato*; becauſe, anciently, thoſe who would avoid going to the wars, cut off their thumbs.

But Menage, with more probability, derives it from the Italian *poltrone*, and that from *poltra*, a *bed*; becauſe timorous, puſillanimous people uſually take pleaſure in lying a-bed. He adds, that the Italian *poltra*, is again derived from the German *peltzer*, a *pillow*, or *cuſhion*.

Others chooſe to derive the word from the Italian *poltre*, *colt*; becauſe of that creature's readineſs to run away.

POLTROON, in *Falconry*, is a name given to a bird of prey when the nails and talons of his hind toes are cut off, wherein his chief force and armour lies; in order to intimidate him, and prevent his ſoaring at great game.

POLVERINE, the calcined aſhes of a plant; a ſubſtance of the nature of our pot-aſhes, or pearl-aſhes.

It is brought from the Levant and Syria; but in the glass trade, though it be of the nature of the other ashes they use, it is always to be preferred to any other. The barilla, or pot-ashes of Spain, yield more pure salt than the *polverine* of the Levant, but the glass made with it has always some tinge of bluishness: that made with the *polverine* is ever perfectly white, and this is the substance that ought always to be used for the finest crystal. See GLASS.

POLYACOUSTICS, compounded of πολυς, *much*, and ακουω, *I hear*, instruments contrived to multiply sounds; as multiplying-glasses, or polyscopes, do the images of objects. See PHONICS.

POLYADELPHIA, in *Botany*, the eighteenth class of plants, whose stamina are formed into three or more separate bodies, comprehending four orders, viz. *pentandria*, *dodecandria*, *icosandria*, and *polyandria*, having respectively, five, twelve, and twenty, and many in each set or body. See FRUCTIFICATION, and ORDER.

POLYANDRIA, in *Botany*, the thirteenth class of plants with hermaphrodite flowers, and a large number of stamina, or male parts, in each; comprehending seven orders, viz. *monogynia*, *digynia*, *trigynia*, *tetragynia*, *pentagynia*, *hexagynia*, and *polygynia*, distinguished by having one, and three styles. See FRUCTIFICATION, and ORDER.

POLYANTHEA, a collection of common-places in alphabetical order; of great service to orators, preachers, &c. of the lower class.

The word is formed from the Greek πολυς, *much*, and ανθος, *flower*; and is much of the same significancy with *anthology*, or *florilege*.

The first author of the *polyanthea* was Dominic Nanni de Mirabellio, whose labour has been improved on by Barth. Amantius, and Frans. Torsius; and since these, by Jos. Langius, under the title of *Polyanthea nova*, 1613.

POLYANTHEMUM, in *Botany*, a name given by some authors to the water-crowfoot, from its great number of flowers.

POLYANTHUS, or POLYANTHIUM, compounded of πολυς, *much*, and ανθος, *flower*, a garden flower, of the PRIMROSE kind. The word is also used, in general, to denote a plant which bears or produces several or many flowers.

POLYCARPON, in *Botany*, a genus of the *triandria trigynia* class: its characters are, that the calyx is five-leaved, the petals are five in number, small and ovated; and the fruit is a single-celled, three valved capsule. There is one species.

POLYCEPHALON, πολυκεφαλον, in *Antiquity*, a kind of pottery, for the nature and origin of which see Mem. de l'Acad. Roy. des Inscrip. vol. xiv.

POLYCOMBUS, in *Botany*, a name given by Neophytus and others to the common KNOT-*grass*, more usually called *polygonum*.

The name *polycombus* is formed of the Greek πολυς, *many*, and κωμος, *a joint*; and as it is usually applicable to this, and all the other jointed plants, it is used by some for the name of the several species of equisetum, or horsetail, as the word *polygonum* is.

Neophytus describes one species of this, which he says is called *ereon*, from its growing in mountainous places. This, he says, looks like a young reed, and has several joints in the main stalk, which are received into one another as to many cups or boxes: he adds, that the leaves are like those of the pine-tree. What he calls the leaves, are probably the tender branches; and then this description will agree very well with our great marsh horsetail, which grows in wet places in mountainous countries, and about the springs in our hills. This is the horsetail to which the greatest virtues are attributed by this author; but the whole account of the hippuris, polygonum, and equisetum, is so confused, that there is little to be learnt from what the ancients say of them, without repeating the trials of their virtues.

POLYCHREST, πολυχρηστος, compounded of πολυς, *much*, and χρηστος, *useful*, in *Pharmacy*, a medicine that serves for many uses, or that cures many diseases.

POLYCHRESTY, *sal*. See SAL-*Polychrest*.

POLYENEMUM, in *Botany*, a genus of the *triandria monogynia* class: its characters are, that the calyx is three-leaved; the petals are five, and calciform; and the fruit contains a single seed almost naked. There is one species.

POLYCROTA, in the *Naval Architecture of the Ancients*, a word used to express such of their gallies as had three, four, five, or more tiers of rowers, seated at different heights; they were distinguished by this term from the *monocrotæ*, or those which had only single rows of oars. The number of rows of rowers in the *polycrotæ* gallies has given occasion to some to suppose those vessels of such a height from the water as is scarce credible; we have, however, no warrant for this, but the commentators have given occasion to the opinion, from their not having been able to stow the rowers in less room, and have measured the height of the vessel by their own skill in this sort of architecture, not by that of the people who built them. Meibomius has found a way to take off a great deal from the imaginary height of these gallies. He has two inventions to answer this purpose: by the first of them, he shews how the lateral rowers may be so placed, that he who sits behind another may move his hands and oar under the seat of the rower who sits next before him; by which means three lateral rowers, which, according to Scaliger's way of reckoning, would require thirteen feet and a half, will be placed in the height of seven feet and a half.

By the second invention, he finds out a place in the vessel for almost half the number of rowers; forasmuch as on the sides of the aforesaid rowers, he places others in the middle of the ship, upon transtra or transverse seats, which he imagines thrust out their oars under the seats of the lateral rowers; by this contrivance he has gained no less than nine feet in the height of a quinquiremis. The different series of rowers were called by different names; the *thalamiæ* were those who sat in the lowest row; the *zygia* were those who sat in the *transtra*, or cross seats; and the *thranitæ* those who sat uppermost of all in the vessel.

The most surprising account of a *polycrot* vessel among the ancients, is that said to have been built by Philopater, of forty tiers of rowers. The next to this is that of Ptolemy Philadelphus, which is said to have had thirty tiers; and in these there sat more than three thousand rowers. It has been disputed by many, whether such immense vessels as these were ever built, or ever could be used, if built. The monstrous height they have been calculated to be of, according to the schemes of the generality of commentators, has rendered it incredible that there were ever any such; but Meibomius has found out such convenient ways of placing the rowers in them, and has taken off so great a part of this imaginary height necessary in them, that he is clearly of opinion, that there were such vessels actually built and used.

The triremis, according to the computation of this author, contained two hundred men; of which one hundred and eighty were rowers, and the rest were mariners: so that the Athenian fleet, of which Conon was commander, consisting of one hundred and eighty triremes, had in it six and thirty thousand men. The quinquiremis of these times contained four hundred and twenty men, three hundred of whom were rowers, and the rest soldiers; so that there are three stupendous things to be observed in regard to the Roman fleet at Messina and the Carthaginian at Lilybæum: one is, that the former consisted of three hundred and thirty and the latter of three hundred and fifty vessels, most of which were quinqueremes, which, according to the most accurate computation, were a hundred and fifty feet long; the number of men they contained was, in the Roman, one hundred and thirty thousand, and, in the Carthaginian, one hundred and fifty thousand. The apparatus and provisions necessary for such a numerous host, are wonderful in these early days of shipping, and the accounts would be doubted, were they not given by one of the best of historians, Polybius, who wonders, as indeed he very well may, at such an amazing equipage for its service at such a time.

POLYEDRON. See POLYHEDRON.

POLYEIDÆ *lapides*, the name of a sort of troches or pastils greatly used among the ancients. They consisted of storax, four drachms; myrrh and aloes, of each five drachms; pomegranate-peel, and bull's gall, of each six drachms: all which were rubbed to fine powder, and made into troches with the bull's gall, mixed with a sufficient quantity of the most austere wine.

POLYGALA, *milkwort*, in *Botany*. See MILK-*wort*.

POLYGAMIA, in *Botany*, the twenty-third class of plants, comprehending three orders, viz. *monoecia*, or such plants as have the polygamy on the same plant, *dioecia*, having the polygamy on two distinct plants, and *trioecia*, having the polygamy on three distinct plants. See FRUCTIFICATION and ORDER.

POLYGAMY, Πολυγαμια, formed from πολυς, *multus*; and γαμος, *vir*, *wife*; a plurality of wives, or husbands, held by the same man, or woman, at the same time.

Polygamy is prohibited among Christians; but it was allowed among the Jews; as it is still among the Mahometans; and under all the religions that have obtained in Asia. In the kingdoms of Boutan and Thibet, *polygamy* is at this time almost general; one wife frequently serving all the males of a whole family, without being the cause of any uncommon dissensions or jealousy among them. Major Grauat observes, that themales and females brought into the world are nearly on a balance, only abating for a little excess on the side of the males, to make up for the

extraordinary

extraordinary expence thereof in war, and at sea: whence it evidently follows, that nature only intends one wife, or one husband, for the same person; since, if they have more, some others must go without any at all. See MARRIAGE.

Hence he concludes, that the Christian law, which prohibits *polygamy*, is more agreeable to the law of nature than the Mahometan's and we may add, than the Jewish law, which tolerated *polygamy*.

Dr. Percival, Phil. Trans. vol. lxvi. part i. p. 165, has very justly observed, that the practice is brutal, destructive to friendship and moral sentiment, inconsistent with one great end of marriage, the education of children, and subverting of the natural rights of more than half of the species besides, it is injurious to population, and, therefore, can never be countenanced or allowed in a well regulated state; for, though the number of females in the world may considerably exceed the number of males, yet there are more men capable of propagating their species than women capable of bearing children; and it is a well known fact, that Armenia, in which a plurality of wives is not allowed, abounds more with inhabitants than any other province of the Turkish empire.

Yet Selden has proved, in his Uxor Hebraica, that plurality of wives was allowed of, not only among the Hebrews, but also among all other nations, and in all ages. It is true, the ancient Romans were more severe in their morals, and never practised it, though it was not forbid among them: and Mark Antony is mentioned as the first who took the liberty of having two wives.

From that time it became pretty frequent in the empire, till the reigns of Theodosius, Honorius, and Arcadius, who first prohibited it by express law in 393. After this the emperor Valentinian, by an edict, permitted all the subjects of the empire, if they pleased, to marry several wives: nor does it appear, from the ecclesiastical history of those times, that the bishops made any opposition to this introduction of *polygamy*. In effect, there are some even among the Christian casuists, who do not look on *polygamy* as in itself criminal. Junius observes, that the prohibition of *polygamy* is a positive law; but from which a man may be exempted by sovereign necessity. Baillet adds, that the example of the patriarchs is a very powerful argument in favour of *polygamy*.

It has been much disputed among the doctors of the civil law, whether *polygamy* be adultery. In the Roman law it is called STUPRUM, and punished as such, that is, in some cases, capitally. But a smaller punishment is more consistent with the Jewish law, wherein the prohibition of adultery is perpetual, but that of *polygamy* temporary only. See Selden, lib. i. cap. 9. de Uxore Hebraica.

In Germany, Holland, and Spain, this offence is differently punished. By a constitution of Charles V. it was a capital crime. By the laws of ancient and modern Sweden, it is punished with death. In Scotland it is punished as perjury.

In England it is enacted by statute 1 Jac. I. cap. 11. that, if any person, being married, do afterwards marry again, the former husband or wife being alive, it is felony, but within the benefit of clergy. The first wife in this case shall not be admitted as an evidence against her husband, because she is in the true wife; but the second may, for she is indeed no wife at all; and so *vice versâ*, of a second husband. This act makes an exception to five cases, in which such second marriage, though in the three first is void, is, however, no felony. 1. Where either party hath been continually abroad for seven years, whether the party in England had notice of the other's being living or no. 2. Where either of the parties hath been absent from the other seven years, within this kingdom, and the remaining party hath had no notice of the other's being alive within that time. 3. Where there is a divorce or separation *a mensâ et thoro* by sentence in the ecclesiastical court. 4. Where the first marriage is declared absolutely void by any such sentence, and the parties loosed *a vinculo*. Or, 5. Where either of the parties was under the age of consent at the time of the first marriage; for in such case the first marriage was voidable by the disagreement of either party, which this second marriage very clearly amounts to. But if at the age of consent the parties had agreed to the marriage, which completes the contract, and is, indeed, the real marriage, and afterwards one of them should marry again, judge Blackstone apprehends that such second marriage would be within the reason and penalties of the act. Comment. book iv. p. 164.

Bernardus Ochinus, general of the order of Capuchins, and afterwards a protestant, published about the middle of the sixteenth century, Dialogues in favour of *polygamy*, which were answered by Theodore Beza. And about the conclusion of the last century we had at London an artful treatise published in behalf of a plurality of wives, under the title of Polygamia Triumphatrix: the author whereof assumes the name of Theophilus Alethens; but his true name was Lyserus: he was a native of Saxony. It has been answered by several.

In the year 1780, the rev. Mr. Madan published a treatise, artfully vindicating and strongly recommending *polygamy*, under the title of Thelyphthora; or a Treatise on Female Ruin, in its Causes, Effects, Consequences, Prevention, and Remedy, &c. Marriage, according to this writer, simply and wholly consists in the act of personal union, or *actus carnis*. Adultery, he says, is never used in the sacred writings but to denote the defilement of a betrothed or married woman, and to this sense he restricts the use of the term; so that a married man, in his opinion, is no adulterer, if his commerce with the sex be confined to single women, who are under no obligations by espousals or marriage to other men: but, on the other hand, the woman who should dare to have even but once an intrigue with any other man besides her husband, (let him have as many wives as Solomon), would, *ipso facto*, be an adulteress, and ought, together with her gallant, to be punished with immediate death. This, he boldly says, is the law of God: and on this foundation he limits the privilege of *polygamy* to the man; in support of which he refers to the polygamous connections of the patriarchs and saints of the Old Testament, and infers the lawfulness of their practice from the blessings which attended it, and the laws which were instituted to regulate and superintend it. He contends for the lawfulness of Christians having, like the ancient Jews, more wives than one; and labours much to reconcile the genius of the evangelical dispensation to an arrangement of this sort. With this view he asserts, that there is not one text in the New Testament that even hints at the criminality of a polygamous connection; and he would infer from St. Paul's direction, that bishops and deacons should have but one wife, that it was lawful for laymen to have more. Christ, he says, was not the giver of a new law; but the business of marriage, *polygamy*, &c. had been settled before his appearance in the world, by an authority which could not be revoked. Besides, this writer not only thinks *polygamy* lawful in a religious, but advantageous in a civil light, and highly politic in a domestic view.

In defence of his notion of marriage, which, according to his account of it, consists in the union of man and woman as one body, the effects of which in the sight of God no outward forms or ceremonies of man's invention can add to or detract from, he grounds his principal argument on the Hebrew words made use of in Gen. ii. 24. to express the primitive institution of marriage, viz. דבק באשתו rendered by the LXX προσκολληθήσεται πρὸς τὴν γυναῖκα αὐτοῦ, which translation is adopted by the evangelist (Matt. xix. 5.) with the omission only of the superfluous preposition (πρὸς) after the verb. Our translation he says—"shall cleave to his wife" doth not convey the idea of the Hebrew, which is literally, as Montanus renders the words, "shall be joined or cemented *in* his woman, and they shall become (i. e. by this union) one flesh." But on this criticism, it is well remarked, that both the Hebrew and Greek terms mean simply and literally attachment or adherence; and are evidently made use of in the sacred writings to express the whole scope of conjugal fidelity and duty, though he would restrain them to the grossest part of it. See Deut. ix. 4. Joshua xxiii. 8. *Acts* v. 36.

With respect to the Mosaic law, for which Mr. Madan is a warm advocate, it was certainly a local and temporary institution, adapted to the ends for which it was appointed, and admirably calculated, in its relation to marriage, to maintain and perpetuate the separation of the Jewish people from the Gentiles. In attempting to depreciate the outward forms of marriage, this writer would make his readers believe, that because none are explicitly described, therefore none existed: and, consequently, that they are the superfluous ordinances of human policy. But it is evident, from comparing Ruth iv. 10, 13. with Tobit vii. 13, 14. and from the case of Dinah, related Gen. ch. xxxiv. that some forms were deemed essential to an honourable alliance by the patriarchs and saints under the Old Testament, exclusive of the carnal knowledge of each other's persons. It is also evident in the case of the woman of Samaria, whose connection with a man not her husband, is mentioned in John iv. that something besides cohabitation is necessary to constitute marriage in the sight of God.

Having stated his notion of marriage, he urges, in defence of *polygamy*, that notwithstanding the seventh commandment, it was allowed by God himself, who made laws for the regulation of it, wrought miracles in support of it by making the barren woman fruitful, and declared the issue legitimate to all intents and purposes. God's allowance of *polygamy* is argued from Exod. xxi. 10. and particularly from Deut. xxi. 15. which, he says, amounts to a demonstration. This passage, however, at the utmost, only

presupposes that the practice might have existence among so hard-hearted and fickle a people as the Jews; and therefore wisely provides against some of its more unjust and pernicious consequences; such as tended to affect the rights and privileges of heirship. Laws enacted to regulate it cannot be fairly urged in proof of its lawfulness on the author's own hypothesis; because laws were also made to regulate divorce, which Mr. Madan condemns as absolutely unlawful, except in cases of adultery. Besides, it is more probable, that the "hated wife" had been divorced by a bill of divorcement, than that she was retained by her husband: and moreover, it is not certain that the two wives, so far from living with the same husband at the same time, might not be dead: for the words may be rendered thus "if there *should have been* to a man two wives, &c." The words expressing the original institution of marriage, Gen. ii. 24. compared with Matt. xix. 4, 5, 8. afford insuperable objections against Mr. Madan's doctrine of *polygamy*. See also Lev. xviii. 18. 1 Cor. vii. 2, &c.

If we appeal on this subject, from the authority of scripture to the writings of some of the earliest fathers in the Christian church, there is not to be found the faintest trace of any thing resembling a testimony to the lawfulness of *polygamy*: on the contrary, many passages occur, in which the practice of it is strongly and explicitly condemned. See Justin Martyr's Dial. with Trypho the Jew, Greek edit. by Thrirby, fol. p. 330, 423, 372. Clemens Alexandrin. Stromat. lib. iv. p. 312, 335, 336. edit. Heinsii, &c. Log. Bat. fol. 1616.

We shall close this article with the words of an excellent anonymous writer, to whose critique on Mr. Madan's work we are indebted for the above remarks: "in a word, when we *reflect*, that the primitive institution of marriage limited it to one man and one woman; that this institution was adhered to by Noah and his sons, amidst the degeneracy of the age in which they lived, and in spite of the example of *polygamy*, which the accursed race of Cain had introduced; when we consider how very few, (comparatively speaking) the examples of this practice were among the faithful; how much it brought its own punishment with it; and how dubious and equivocal those passages are in which it appears to have the sanction of divine approbation; when to these reflections we add another, respecting the limited views and temporary nature of the more ancient dispensations and institutions of religion—how often the imperfections, and even vices of the patriarchs, and people of God, in old time, are recorded, without any express notification of their criminality—how much is said to be commanded, which our reverence for the holiness of God and his law, will only suffer us to suppose, were, for wise ends, permitted—how frequently the messengers of God adapted themselves to the genius of the people to whom they were sent, and the circumstances of the times in which they lived;—above all, when we consider the purity, equity, and benevolence of the Christian law; the explicit declarations of our Lord, and his apostle St. Paul, respecting the institution of marriage, its design and limitation;—when we reflect too, on the testimony of the most ancient fathers, who could not possibly be ignorant of the general and common practice of the apostolic church; and, finally, when to these considerations we add those which are founded on justice to the female sex, and all the regulations of domestic economy and national policy, we must wholly condemn the revival of *polygamy*; and thus bear our honest testimony against the leading design of this dangerous and ill-advised publication." Monthly Review, vol. xliii. p. 338.

POLYGAMY is also used in the *Canon Law*, for a plurality of wives, though only had successively, or one at a time; in the Romish church this disqualifies a man for the episcopate. See BIGAMY.

POLYGLOTT, *Hexaglottum*, thus called from πολυς, and γλωττα, *tongue*, *language*, among *Divines* and *Critics*, chiefly denotes a Bible printed in several languages.

The first *Polyglott* Bible is that of cardinal Ximenes, printed in 1515, at Alcala de Henares; and commonly called the *Bible of Complutum*, or the *Complutensian Bible*; and contained in six volumes.

It contains the Hebrew text, the Chaldee paraphrase on the Pentateuch, the Greek version of the LXX. and the ancient Latin version.

In this *Polyglott* there is no other Latin version from the Hebrew, besides this last; but there is added another literal one from the Greek Septuagint. The Greek text of the New Testament is here printed, without accents, to bring it nearer to the original of the apostles, or, at least, to the most ancient copies; wherein there are no accents found.

At the end is added an apparatus of grammars, dictionaries, and indices, or tables. The chief author, Ximenes de Cisneros, cardinal, and archbishop of Toledo, in his dedication to pope Leo X. observes, that it was necessary to give the holy Scriptures in their originals, there being no translation, how good soever, that can render them perfectly.

The second *Polyglott*, called the *Bible regia*, is that of Philip II. printed by Plantin, at Antwerp, in 1571, in eight volumes, with a better paper and letter than the former, and the care of the edition imposed on Arias Montanus.

In this, besides every thing in the Bible of Complutum, there are added, the Chaldee paraphrases on the rest of the Old Testament, besides the Pentateuch, with a Latin translation of those paraphrases. In this *Polyglott* is likewise a very literal Latin version of the Hebrew text; for the use of those who have a mind to learn the Hebrew language.

As to the New Testament, beside the Greek and Latin of the Bible of Alcala, in this edition there is added an ancient Syriac version, both in Syriac and Hebrew characters, with points, to facilitate the reading thereof to those accustomed to read Hebrew. To the Syriac is likewise added a Latin one, composed by Guy le Fevre, who had the care of the Syriac version of the New Testament.

Lastly, in the *Polyglott* of Antwerp, is added a more copious apparatus of grammars, dictionaries, &c. than in that of Complutum; with several little treatises, judged necessary for clearing up the more difficult passages in the text.

The third *Polyglott* is that of M. le Jay, printed at Paris in 1645, in ten volumes, which has this advantage over that of Philip II. that it has the Syriac and Arabic versions of the Old Testament, with Latin interpretations. In the Pentateuch it has likewise the Hebrew and Samaritan text; and the Samaritan version in Samaritan characters.

As to the New Testament, beside every thing in the *Polyglott* of Antwerp, here is added an Arabic translation, with a Latin interpretation. But here are wanting the apparatus, and the grammars and dictionaries, which are both in the former *Polyglotts*; which renders this great work very imperfect.

The fourth *Polyglott* is that of London, printed in 1657, in six volumes, called Walton's *Polyglott*, from the author of the edition, Dr. Brian Walton, afterwards bishop of Winchester.

This is, indeed, less magnificent than that of M. le Jay, with regard both to the size of the paper, and the beauty of the characters; but is, in all other respects, preferable; being both much more ample and more commodious.

In this the Vulgate is printed according to the revised and corrected edition of Clement VIII. which is not done in that of Paris, where the Vulgate is printed as it stands in that of Antwerp, before that correction.

This likewise contains an interlineary Latin version of the Hebrew text; whereas the Paris edition has no other Latin version from the Hebrew beside the common Vulgate: again, the Greek Septuagint printed in the *Polyglott*, is not the same with that printed in the Bible of Complutum, which was retained in the editions of Antwerp and Paris, but the Greek text of the edition of Rome. To which are added the various readings of another very ancient Greek copy, called the *Alexandrian*, because brought from Alexandria.

The Latin version of the Greek of the Septuagint, is that published by Flaminius Nobilius, by authority of pope Sixtus V. Add, that in this *Polyglott* are found some parts of the Bible in the Ethiopic and Persian; nothing whereof appears in any of the rest.

Lastly, this edition has the advantage of preliminary discourses, called *prolegomena*, on the texts, both of the originals and versions; with a volume of various readings of all the different editions.

Dr. Edmund Castell, Arabic professor at Cambridge, in 1669, published a Lexicon Heptaglotton, for the use of Walton's *Polyglott*, in two volumes, folio. See the Preface to this *Polyglott*.

To the number of the *Polyglotts* may likewise be added, the two Pentateuchs, printed by the Jews of Constantinople, in four languages; but all in Hebrew characters. In one of these Pentateuchs, printed in 1553, is found the Hebrew text, in large characters; on one side, wherein is the Chaldee paraphrase of Onkelos, in middling characters; and, on the other side, a paraphrase in the Persian, composed by a Jew, one Jacob de Tous, so called from the city where he lived. Beside these three columns, the Arabic paraphrase of Saadias Gaon is printed in small characters, at the top of the page; and at bottom is added the commentary of Rasch.

The other *Polyglott* was printed at Constantinople in 1547, in

in three columns like the former. The Hebrew text of the law is in the middle, a translation into the vulgar Greek on one side, and a Spanish translation on the other. These versions are both in Hebrew characters, with points to determine the pronunciation. At the top of the page is added the Chaldee paraphraſe of Onkelos, and at the bottom the commentaries of Raſchi.

To all theſe may be added, as a ſeventh *Polyglott*, the Pſalter publiſhed by Aug. Juſtinian, a Dominican, and biſhop of Nebio, at Genoa, 1516, containing the Hebrew, Greek, Arabic, and Chaldee, with Latin interpretations, and gloſſes.

There are alſo various other editions of the Bible, either in whole, or in part, which might be ranged under the article of *Polyglotta*; though they are not ſo denominated. Such are the *Hexapla*, and *Octapla*, of Origen.

And the Bible of Hutter, printed at Hamburgh in Hebrew, Chaldee, Greek, Latin, German, Saxon, Italian, French, Sclavonic, Daniſh, &c.

POLYGLOTTA *avis*, in *Ornithology*, the name of a bird deſcribed by Nieremberg, and which he ſays, he ſaw and heard, with admiration, ſinging in all tones. It is of the ſize of our ſtarling.

Its back is brown, and its breaſt and belly white; and near the neck and tail it is variegated with ſpots and ſtreaks of white; its head has a ſtreak of white, which repreſents a ſort of crown of ſilver; it is mightily eſteemed, and kept in cages by the Spaniards, as infinitely ſuperior to all other birds in melody; it feeds on almoſt any thing that is given it, and is moſt fond of the warmer climates; but endures the more temperate ones without harm. Ray.

The polyglotta of Linnæus is a ſpecies of the TURDUS. See MOCK-*bird*.

POLYGON, Πολυγωνος, formed from πολυς, *many*, and γωνια, *angle*, in Geometry, a multilateral figure, or a figure whoſe perimeter conſiſts of more than four ſides and angles.

If the ſides and angles be equal, the figure is called a *regular polygon*. For *ſimilar polygons*, ſee SIMILAR.

Polygons are diſtinguiſhed according to the number of their ſides. Thoſe of five ſides are called *pentagons*; thoſe of ſix, *hexagons*; thoſe of ſeven, *heptagons*; thoſe of eight, *octagons*, &c. The particular properties, &c. of each whereof, ſee under its proper article, PENTAGON, HEXAGON, &c.

POLYGONS, *general properties of*. Euclid demonſtrates theſe which follow: 1. That every *polygon* may be divided into as many triangles as it hath ſides.

This is done by aſſuming a point, as F (*Tab. Geom. fig.* 8.) any where within the *polygon*, and thence drawing lines to every angle, F *a*, F *b*, F *c*, F *d*, &c.

2. The angles of any *polygon*, taken together, make twice as many right ones, abating four, as the figure hath ſides. Thus, if the *polygon* hath five ſides, the double of that is 10; whence ſubtracting 4, there remains 6 right ones.

3. Every *polygon*, circumſcribed about a circle, is equal to a rectangled triangle, one of whoſe legs is the radius of the circle, and the other the perimeter or ſum of all the ſides of the *polygon*.

Hence, every regular *polygon* is equal to a rectangled triangle, one of whoſe legs is the perimeter of the *polygon*; and the other, a perpendicular drawn from the centre to one of the ſides of the *polygon*.

Hence alſo, every *polygon*, circumſcribed about a circle, is bigger than it; and every *polygon*, inſcribed, is leſs than the circle. The ſame, likewiſe, appears hence, that the thing containing is ever greater than the thing contained. Hence, again, the perimeter of every *polygon*, circumſcribed about a circle, is greater than the circumference of that circle; and the perimeter of every *polygon* inſcribed, leſs: whence it follows, that a circle is equal to a right-angled triangle, whoſe baſe is the circumference of the circle, and its height the radius; ſince this triangle is leſs than any *polygon* circumſcribed, and greater than any inſcribed.

Nothing, therefore, is wanting to the quadrature of the circle, but to find a right line equal to the circumference of a circle.

POLYGON, *to find the area of a regular*. Multiply a ſide of the *polygon*, as A D, by half the number of the ſides, e. gr. the ſide of a pentagon by 2½. Again, multiply the product by a perpendicular let fall from the centre of the circumſcribing circle to the ſide A B; the product is the area required.

Thus, ſuppoſe A B 343 and half the number of ſides 2½; the product of ſemiperimeter is 1715. Suppoſing then the perpendicular F H 491; the product of theſe two 8015, is the area of the pentagon required.

POLYGON, *to find the area of an irregular*, or *trapezium*. Reſolve it into triangles; find the ſeveral areas of the ſeveral triangles, ſee TRIANGLE. The ſum of theſe is the area of the *polygon* required.

POLYGON, *to find the ſum of all the angles in any*. Multiply the number of ſides by 180°: from the product ſubtract 360; the remainder is the ſum required.

Thus in a pentagon, 180, being multiplied by 5, gives 900; whence ſubtracting 360, there remain 540; the ſum of the angles of a pentagon.

Hence, if the ſum found, be divided by the number of ſides, the quotient will be the angle of a regular *polygon*.

Or, the ſum of the angles is more ſpeedily found thus: multiply 180 by a number leſs by two than the number of ſides of the *polygon*: the product is the quantity of the angles required: thus, in a pentagon, 180 being multiplied by 3, a number leſs by two than that of its ſides, the product is 540, the quantity of angles as before.

The following table exhibits the ſums of the angles in all rectilineal figures, from a triangle to a dodecagon; and is of good uſe both for the deſcribing of regular figures, and for proving, whether or no the quantity of angles have been truly taken with an inſtrument.

Num. Sides.	Sum. Ang.	Ang. of Reg. fig.	Ang. at the centre	Num. Sides.	Sum. Ang.	Ang. of Reg. fig.	Ang. at the centre
III.	180°	60°	120°	VIII.	1080°	135°	45°
IV.	360	90	90	IX.	1260	140	40
V.	540	108	72	X.	1440	144	36
VI.	720	120	60	XI.	1620	147 16′ 22″	32 43′ 38″
VII.	900	128 34′ 51″	51 25′ 43″	XII.	1800	150	30

This table is formed by dividing 360, the degrees in a circumference, by the number of the ſides in each *polygon*; and the quotients are the angles at the centres; the angle at the centre ſubtracted from 180° leaves the angle at the circumference; and the ſum of the angles is had by doubling the number of ſides, ſubtracting 4 from the product, and multiplying the remainder by 90.

POLYGON, *to inſcribe a regular, in a circle*. Divide 360 by the number of ſides in the *polygon* required, to find the quantity of the angle E F D. Set off the angle at the centre, and apply the chord thereof, E D, to the periphery, as often as it will go. Thus will the *polygon* be inſcribed in the circle.

The reſolution of this problem, though it be mechanical, yet is not to be deſpiſed, becauſe both eaſy and univerſal. Euclid, indeed, gives us the conſtruction of the pentagon, decagon, and quindecagon; and other authors give us thoſe of the heptagon, enneagon, and hendecagon; but they are far from geometrical *ſtrictneſs*.

Renaldinus lays down a catholic rule for the deſcribing of all *polygons*, which many other geometricians have borrowed from him; but Wagnerus and Wolfius have both demonſtrated the falſity thereof.

POLYGON, *about a regular, to circumſcribe a circle*; or, *to circumſcribe a regular* POLYGON *about a circle*. Biſect two of the angles of the given *polygon* A and E, by the right lines A F and E F, concurring in F; and from the point of concourſe with the radius E F deſcribe a circle.

To circumſcribe a *polygon*, &c. divide 360 by the number of ſides required, to find F *a*; which ſet off from the centre F, and draw the line *a d*; on this conſtruct the *polygon*, as in the following problem. See CIRCUMSCRIBING.

POLYGON, *on a given line* E D *to deſcribe any given regular*. Find an angle of the *polygon* in the table; and in E let off an angle equal to it, drawing E A = E D. Through the three points, A E D, deſcribe a circle. In this apply the given right line as often as it will go. Thus will the required figure be deſcribed.

POLYGON, *to inſcribe to circumſcribe a regular, trigonometrically*. Find the ſine of the arc produced by dividing the ſemiperiphery 180 by the number of ſides of the *polygon*: the double of this is the chord of the double arc; and therefore the ſide A E to be inſcribed in the circle. If then the radius of a circle, wherein, e. gr. a pentagon is to be inſcribed, be given in any certain meaſure, e. gr. 345, the ſide of the pentagon is found in the ſame meaſure by the rule of three thus: as radius 1000 is to 1176 ſo is 3450 to 4057, the ſide of the pentagon. With the given radius, therefore, deſcribe a circle; and therein ſet off the ſide of the *polygon* as often as it will go: thus will a *polygon* be inſcribed in the circle.

To ſave the trouble of finding the ratio of the ſide of the *polygon* to radius, by the canon of lines; we ſhall add a table expreſſing the ſides of *polygons* in ſuch parts whereof radius contains 100000000. In practice, as many figures are cut off from the right hand, as the circumſtances of the caſe render needleſs.

Numb. Sides.	Quantity Side.	Numb. Sides.	Quantity Side.
III.	173205080	VIII.	76536768
IV.	141421356	IX.	68404028
V.	117557050	X.	61803399
VI.	100000000	XI.	56341950
VII.	86776748	XII.	51763809

POLYGON, *to describe a regular, on a given right line, and to circumscribe a circle about a given polygon, trigonometrically.* Taking the ratio of the side to the radius out of the table, find the radius in the same measure wherein the side is given. For the side and radius being had, a *polygon* may be described by the last problem. And if with the interval of the radius, arcs be struck from the two extremes of the given line, the point of intersection will be the centre of the circumscribing circle.

POLYGON, in *Fortification*, denotes the figure or perimeter of a fortress, or fortified place. See FORTIFICATION.

POLYGON, *exterior*, is a right line drawn from the vertex or point of a bastion, to the vertex or point of the next adjacent bastion. Such is the line CF: *Tab. fortif. fig.* 1.

POLYGON, *interior*, is a right line drawn from the centre of one bastion to the centre of another. Such is the line GH.

POLYGONS, *line of*, is a line on the French sectors, containing the homologous sides of the first nine regular *polygons* inscribed in the same circle, i. e. from an equilateral triangle to a dodecagon. See SECTOR.

POLYGONAL *column.* See COLUMN.

POLYGONAL *number*, in *Algebra*, is the sum of a rank of numbers in arithmetical progression, beginning from unity: thus called, because the units, of which it consists, may be so disposed as to represent a figure of several equal sides and angles.

Polygonal numbers are divided, with respect to the common difference in the series whence they proceed, or whose sums they are, into *triangular*, which are those whose difference of terms is 1; *quadrangular* or *square*, where it is 2; *pentagonal*, where 3; *hexagonal*, where 4; *heptagonal*, where 5; *octagonal*, where 6, *&c.*

They have their names from the geometrical figure, into which points corresponding to their units may be disposed; e. gr. three points, corresponding to the three units of a triangular number, may be disposed into a triangle; and four of the rest.

The genesis of the several kinds of *polygonal* numbers from the several arithmetical progressions, may be conceived from the following examples:

Arithmetical progression	1.	2.	3.	4.	5.	6.	7.	8
Triangular numbers	1.	3.	6.	10.	15.	21.	28.	36
Arithmetical progression	1.	3.	5.	7.	9.	11.	13.	15
Square numbers	1.	4.	9.	16.	25.	36.	49.	64
Arithmetical progression	1.	4.	7.	10.	13.	16.	19.	22
Pentagonal numbers	1.	5.	12.	22.	35.	51.	70.	92
Arithmetical progression	1.	5.	9.	13.	17.	21.	25.	29
Hexagonal numbers	1.	6.	15.	28.	45.	66.	91.	120

POLYGONAL *number, side of*, is the number of terms of the arithmetical progression that compose it: and the number of angles is that which shews how many angles that figure has, whence the *polygonal* number takes its name.

The number of angles, therefore, in triangular numbers, is 3; in tetragonal 4, in pentagonal 5, &c. Consequently the number of angles exceeds the common difference of terms, by two.

To find a POLYGONAL *number, the side and number of its angles being given.* The canon is thus: the *polygonal* number is the semi-difference of the factums of the square of the side into the number of angles diminished by two units; and of the side itself into the number of angles diminished by four units.

The sums of *polygonal* numbers collected in the same manner as the *polygonal* numbers themselves are, out of arithmetical progressions, are called *pyramidal numbers*.

POLYGONATUM, in *Botany*. See LILY *of the Valley*.

POLYGONOIDES *of Dillenius*, in *Botany*. See CORRIGIOLA.

POLYGONOIDES, in *Botany*. See CALLIGONUM.

POLYGONUM, in *Botany*. See KNOT-*grass*.

POLYGRAM, in *Geometry*, a figure consisting of many lines.

POLYGRAPHY, POLYGRAPHIS, or POLYGRAPHICE, formed from πολυς, *multum*, and γραφω, *scripturo*, *writing*, the art of writing in various unusual manners or ciphers; as also the art of deciphering the same.

The word is usually confounded with STEGANOGRAPHY, and CRYPTOGRAPHY.

The ancients seem to have been very little acquainted with this art; nor is there any mark of their having gone beyond the Lacedæmonian SCYTALE.

Trithemius, Porta, Vigenere, and father Niceron, have written on the subject of *polygraphy*, or CIPHERS.

POLYHEDRON, or POLYEDRON, Πολυεδρον, formed from πολυς, *multus*, and εδρα, *sedes*, in *Geometry*, a body comprehended under many rectilinear sides or planes.

If the sides of the *polyhedron* be regular *polygons*, all similar and equal; the *polyhedron* becomes a regular body, and may be inscribed in a sphere; that is, a sphere may be drawn round it, so that its surface shall touch all the solid angles of the body.

POLYHEDRON, *gnomonic*, is a stone with several faces, whereon are projected various kinds of dials. See DIAL. Of this kind that in the Privy-garden, London, now gone to ruin, was anciently the finest in the world.

POLYHEDRON, or POLYSCOPE, in *Optics*, is a glass or lens, consisting of several plain surfaces, disposed into a convex form; popularly called a MULTIPLYING-*glass*. The phenomena of the *polyhedron* are as follow: 1. If several rays, as E F, A B, C D (*Tab. V. Optics, fig.* 91.) fall parallel on the surface of a *polyhedron*, they will continue parallel after refraction.

If then the *polyhedron* be supposed regular, I H, H I, I M, will be as tangents cutting the spherical convex lens in F, B, and D; consequently, rays falling on the points of contact, intersect the axis. Wherefore, since the rest are parallel to these, they will also mutually intersect each other in G.

Hence, if the eye be placed where parallel rays decussate, rays of the same object will be propagated to it still parallel from the several sides of the glass. Wherefore, since the crystalline humour, by its convexity, unites parallel rays, the rays will be united in as many different points of the retina, *a*, *b*, *c*, as the glass has sides.

Consequently, the eye, through a *polyhedron*, sees the object repeated as many times as there are sides. And hence, since rays coming from remote objects are parallel, a remote object is seen as often repeated through a *polyhedron*, as that has sides.

2. If rays A B, A C, A D (*fig.* 92.) proceeding from a radiant point A, fall on several sides of a regular *polyhedron*; after refraction they will decussate in G, and proceed on a little diverging.

Hence, if the eye be placed where the rays coming from the several planes decussate, the rays will be propagated to it from the several planes a little diverging; i. e. as if they proceeded from different points. But since the crystalline humour, by its convexity, collects rays from several points into the same point; the rays will be united in as many different points of the retina, *a*, *b*, *c*, as the glass has sides; consequently, the eye, being placed in the focus G, will see even a near object repeated as often through the *polyhedron*, as that has sides.

Thus may the images of objects be multiplied in a camera obscura, by placing a *polyhedron* at its aperture, and adding a convex lens at a due distance from it. And it makes a very pleasant appearance, if a prism be applied so that the coloured rays of the sun refracted therefrom be received on the *polyhedron*: for by this means they will be thrown on a paper or wall near at hand in little round specks, much exceeding the brightness of any precious stones; and in the focus of the *polyhedron* where the rays decussate (for in this experiment they are received on the convex side) will be a star of surprising lustre.

If images be painted in water-colours in the areolæ or little squares of a *polyedron*, and the glass applied to the aperture of a camera obscura; the sun's rays, passing through it, will carry with them the images thereof, and project them on the opposite wall.

This artifice bears a resemblance to that other, whereby an image on paper is projected on the camera; viz. by wetting the paper with oil, and straining it tight in a frame; then applying it to the aperture of the camera obscura, so that the rays of a candle may pass through it upon the *polyhedron*.

To make an anamorphosis, or deformed image, which through a POLYHEDRON, *or* multiplying-glass, *shall appear regular and beautiful.* At one end of a horizontal table erect another at right angles, whereon a figure may be designed; and on the other erect another, to serve as a fulcrum or support, moveable on the horizontal one. To the fulcrum apply a plano-convex *polyedron*, consisting, e. gr. of twenty-four plain triangles; let the *polyhedron* be fitted in a draw-tube, whereof that end towards the eye to have only a very small aperture, and a little farther off than the focus. Remove the fulcrum from the other perpendicular table, till it be out of the distance of the focus; and that more, as the image is to be greater. Before the little aperture place a lamp; and trace the luminous areolæ projected from the sides of the *polyhedron*, with a black lead pencil, on the vertical plane, or a paper applied thereon.

In the several areolæ, design the several parts of an image, in such a manner as that, when joined together, they may make one whole, looking afresh every now and then through the tube to guide, correct, &c. the colours, and to see that the several parts match aptly together.

The intermediate space fill up with any figures or designs at pleasure, contriving it so, as that to the naked eye the whole may exhibit some appearance very different from that intended to appear through the *polyhedron*.

The

The eye, now looking through the little aperture of the tube, will see the several parts and members dispersed among the areolæ to exhibit one continued image, all the intermediate ones disappearing. See ANAMORPHOSIS.

POLYHEDROUS *figure*, in *Geometry*, a solid contained under, or consisting of many sides. See POLYEDRON.

POLYHISTOR is used for a person of great and various erudition. See POLYMATHY.

POLYHYMNIA, in *Mythology*, one of the nine MUSES, distinguished among authors and poets by holding some stringed instrument of music in her hands, and by marking out what the sings with her hand.

POLYMATHY, POLYMATHIA, Πολυμαθία, from πολὺς, *multum*, and μανθάνω, *disco*, *I learn*, the knowledge of many arts and sciences; or an acquaintance with a great number of different subjects.

Lipsius, Scaliger, Kircher, Petavius, Grotius, Salmasius, Leibnitz, &c. were famous for *polymathy*. Among the ancients, such as were eminent this way were called *polyhistores*.

Polymathy is frequently little more than a confused heap of useless erudition, occasionally detailed, either pertinently or impertinently, for parade. The genuine *polymathy* is an extensive erudition, or a knowledge of a great number of things, well digested, and applied to the purpose, and never but where they are necessary.

POLYMNIA, in *Botany*, a genus of the *Syngenesia polygamia æqualis* class: its characters are, that the receptacle is chaffy, and that there is no down; the exterior calyx is composed of five leaves, and the interior of ten, with small concave leaves. There are four species.

POLYMORPHOUS, variously shaped, an epithet often given to the os sphenoides.

POLYMYTHY, POLYMYTHIA, in *Poetry*, denotes a multiplicity of fables, in an epic or dramatic poem; in lieu of an unity, or a single one.

Polymythia is a great fault. It consists in joining a number of distinct actions or fables into one complex body. Such a work Bossu compares to the batrachomyomachia, or one of the fables of *Æsop*: and such would be the idea of a Thebaid, an Heracleid, an Achilleid, or the like poems, which should comprehend all the actions of those heroes compared with the Iliad or Æneid.

POLYNEMUS, *four-cleft*, in *Ichthyology*, a genus of the *abdominales*: its characters are, that the head is compressed and squamous; the beak is very obtuse and prominent; the gills consist of five or seven rays; and there are several distinct processes or appendages placed with the pectoral fins. There are three species, one of which is the parasite-fish of Edwards.

POLYNOMIAL, or *multinomial root*, in *Mathematics*. See MULTINOMIAL, and ROOT.

To raise a *polynomial* to any given power, may be done by its base Newton's BINOMIAL theorem. Among other methods of demonstrating this, we have one by Signor Castillioni in the Philosophical Transactions, N° 464.

POLYOPTRUM, formed from πολὺς, *much*, *many*, and ὀπτικὸν, *I see*, in *Optics*, a glass through which objects appear multiplied, but diminished.

The *polyoptrum* differs both in structure and phenomena from the common multiplying-glasses called *polyscopes*.

POLYOPTRUM, *construction of the*. In a glass, plain on both sides, AB (*Tab.* V. *Optics*, *fig.* 93.) and about three fingers thick, cut out spherical segments, scarce a fifth part of a digit in diameter.

If then the glass be removed from the eye, till you can take in all the cavities at *one* view, you will see the same object, as if through so many several concave glasses, as there are cavities, and all extending small.

Fit this, as an object-glass, in a tube ABCD, whose aperture AB is equal to the diameter of the glass, and the other CD is equal to that of an eye-glass, e. gr. about a finger's breadth. The length of the tube AC is to be accommodated to the object and eye-glass, by trial. In CD fit a convex eye-glass, or in lieu thereof a meniscus having the distance of its principal focus a little larger than the length of the tube; to that the point from which the rays diverge after refraction in the object-glass, may be in the focus. If then the eye be applied near to the eye-glass, a single object will be seen repeated as often as there are cavities in the object-glass, but still diminished.

POLYOSTEON, a name given by authors to that part of the foot which contains of a great many bones.

POLYPE, or POLYPUS, in *Zoology*, a small fresh water insect, belonging to the genus of HYDRA, in the class of *worms*, and order of *zoophyta*, in the Linnæan system; which, when cut into a number of separate pieces, becomes in a day or two so many distinct and separate animals; each piece having the surprising property of producing a head and tail, and the other organs necessary for life, and all the animal functions. *See Tab. of Microscopical Objects*, *fig.* 1.

The first discovery of this animal was owing to M. Leeuwenhoek, who, in the year 1703, presented to the Royal Society of London, a description of it, and an account of its uncommon way of propagating its young: but the discovery of its amazing property of reproducing the several organs from its various pieces, was not made till the year 1740, by M. Trembley, at the Hague. See Martyn's Abr. Phil. Trans. vol. ii. p. 17, &c.

The production of its young is, indeed, different from the common course of nature in other animals: for the young one issues from the side of its parent, in form of a small pimple or protuberance, which, lengthening and enlarging every hour, becomes, in about two days, a perfect animal, and drops from off its parent to shift for itself; but before it does this, it has often another growing from its side; and sometimes a third from it, even before the first is separated from its parent.

M. Trembley observes, that there is no distinguished place in the body of the *polypes*, by which the young are brought forth. He has seen some of them that have produced young ones from all the exterior parts of their bodies.

They breed quicker in hot than in cold weather; and what is very extraordinary is, that there never has yet been discovered among them any distinction of sex, or appearance of copulation; every individual of the whole species being prolific, and that so much if kept separate, as if suffered to live among others.

If the method of this little animal's producing its young be very amazing, its reproduction of the several parts, when cut off, is much more so. The discovery of this was perfectly accidental; for M. Trembley, who had often met with the creature in the winter, and from its fixed residence in one place, and some other observations, not being able to determine whether it were an animal or a vegetable, made the trial by cutting it asunder, when, to his amazement, he found, that in a few days each of those pieces was become a perfect animal, the head part having shot forth a tail, and the tail a head.

A thousand other trials, by cutting the animal in different manners, first by M. Trembley, and afterwards, at his request, by Mons. Reaumur, and Bernard de Jussieu, at Paris, and Mrs. Folkes, Mr. Baker, and the other naturalists in England, were the result of this; and all succeeded in the same manner by those who repeated them.

It is not easy to say what is the size of this creature; for it can contract or extend its body at pleasure from the length of an inch or more, and the thickness of a hog's bristle, to the shortness of a single line, with a proportionable increase of thickness. Its body is round and tubular, at one end of which is the head, surrounded with six, eight, ten, or more arms, with which it catches its prey; and at the other, the anus and tail, by which it fixes itself to any thing it pleases.

There have been many different species of it discovered, the most elegant of which, the *polype à panache*, or plumed *polype*, of Mr. Trembley, seems much to resemble the wheel-animal (so called from having the appearance of two wheels in its head) which Mr. Leeuwenhoek discovered, living in a tooth or cafe, and affixed to the roots of duck-weed.

All the species are found in clear and slowly running waters, adhering by the tail to sticks, stones, and water-plants, and live on small insects. They are easily kept alive a long time in glasses, often changing the water, keeping the glasses clean, and feeding them with a small red worm, common in the mud of the Thames, or with other small insects.

The creature has its name from the Greek πολὺς, *many* and πὸυς, *a foot*, signifying an animal with many feet; but a more apposite one might easily have been invented, since it has in reality no feet at all. What were originally taken for feet, are what have since been called its horns, and of late more properly its arms, their office being to catch its prey.

This animal, represented in the plate of *Microscopical Objects*, &c. above referred to, is, first, of a worm-shaped figure, and of the same kind of tender substance with the horns of a common snail; is adhered by one end, like a sucker, to water-plants and other substances; the other end, which is the head, is surrounded by many arms or feelers, placed like rays round a centre; this centre is its mouth; and with these tender arms, which are capable of great extension, it seizes minute worms, and various kinds of water insects, and brings them to its mouth; and often swallows bodies larger than itself; having a surprising property of extending its mouth wider, in proportion, than any other animal. After its food is digested in its stomach, it returns the remains of the

animals upon which it feeds through its mouth again, having no other observable emunctory. In a few days there appear small knobs or *pupillæ* on its sides: as these increase in length, little fibres are seen rising out of the circumference of their heads, as in the parent animal; which fibres they soon begin to use for the purpose of procuring nourishment, &c. When these are arrived at mature size, they send out other young ones on their sides in the same manner; so that the animal branches out into a numerous offspring, growing out of one common parent, and united together and disposed in the manner represented in the plate. Each of these provides nourishment not only for itself, but for the whole society; an increase of the bulk of one *polype* by its feeding, tending to an increase in the rest. Thus a *polype* of the fresh-water kind becomes like a plant branched out, or compound of many bodies, each of which has this singular characteristic, that if one of them be cut in two in the middle, the separated part becomes a complete animal, and soon adhering to some fixed base, like the parent from which it was separated, produces a circle of arms; a mouth is formed in the centre; it increases in bulk, emits a numerous progeny, and is, in every respect, as perfect an animal as that from which it was severed.

The several strange properties recorded of this animal, though very surprising, are, however, none of them peculiar to it alone. The Surinam toad is well known to produce its young not in the ordinary way, but in cells upon its back. Mr. Sherwood has very lately discovered the small eels in four paste to be each, without exception, full of living young ones. And as to the most amazing of all its properties, the reproduction of its parts, we know the crab and lobster, if a leg be broken off, always produce a new one: and M. Bonet, M. Lyonet, Monsieur Reaumur, and Mr. Folkes, have all found, on experiment, that several earth and water worms have the same property, some of them even when cut into thirty pieces. The *urtica marina*, or sea-nettle, has been also found to have the same: and the sea star-fish, of which the *polype* is truly a species, though it had long escaped the searches of the naturalists, was always well known by the fishermen to have it also. See REPRODUCTION.

POLYPE, *cluster*, the name of a species of small insect of the *polype* kind, called by the French naturalists *polype en bouquet*.

There is found on several of the water-plants, and on other substances, as sticks, boards, and the like, accidentally fallen into the water, a whitish substance that at first sight appears to be only a sort of mouldiness; but if the bodies on which this is found be put into a vessel of clear water, and the matter examined with a magnifying glass, it is soon seen that this whitish substance is really a vast number of small animals, which are almost continually in motion. When this is brought before the microscope, the form and structure of the creatures are very evidently distinguished, and they are found to be minute roundish creatures, severally affixed to the end of a sort of stem or tail; and many of the stems are so interwoven and united together, that they form *clusters*, which have occasioned the name of a *cluster-polype* to be given to the animal, though in itself it is really and properly single from the beginning. There are several species of *polype* of this minute kind, that *cluster* themselves in this manner together; and according to these and other circumstances, the *clusters* are found larger or smaller, and more or less complex.

The smaller *clusters* should always be chosen for observation, as in the larger the bodies of the several animals that compose them are apt to hide and obscure one another; but the most beautiful and accurate of all observations is to be formed when they are single, as they are sometimes found; and this is the only opportunity of seeing distinctly in what manner the *clusters* are formed. One of these single animals is not in length above the two hundred and fortieth part of an inch, and is of a shape nearly resembling that of a bell: the anterior part of the generally appears open when it presents itself properly; and the posterior part is fixed to the stem or pedicle, by the other extremity of which the creature fastens itself to any solid body that it meets with. The body is of a brownish colour, except at the smaller end, which as well as the tail is whitish and transparent; and when the anterior part is open, there may always be perceived about its edges a very lively motion; and when the creature presents itself in a better manner, there may be seen on either side of the edges of the anterior part, somewhat resembling the wheels of a mill, continually moving with great velocity.

These creatures are able to contract their bodies, and often do it very suddenly, especially if any thing disturb the substance on which they are fixed: when they are thus contracted, the edges of their anterior parts are drawn just into their bodies; and when the fright is over, it is a very agreeable sight to behold these edges turning out again, and putting themselves in motion as before. If the edges of the anterior parts of the bodies of these animals be strictly observed while in motion, the water about them will be found to be full of extremely minute round bodies, which are brought together by means of that motion, and serve the creature for its food: these may be often seen going down into the cavities of the body of the *polype*, and that very suddenly, as if forcibly driven down; and when swallowed too voraciously, are often thrown up again. These observations are best made when a small *cluster* of the *polypes* are examined together.

If these *polypes* are kept some time in the rain water, they by degrees lose their brown colour, and become white and transparent throughout, except that a few spots, of a dusky colour, remain in their bodies; but if, after this, they are removed into other water of the same kind with the first, but newly taken out of the ditch, they in a little time recover their brown colour. When they become white, they plainly appear to be in a sickly condition, and cease to multiply; but when they have fresh water and recover their colour, they immediately begin to multiply again.

These creatures are not absolutely and immoveably fixed to the bodies on which they are placed, but they can at pleasure quit them and swim about: in this swimming state they are always found single and not in *clusters*; and they do not then appear in the same form as when they are fixed and open at the anterior ends. When they have swam about as long as they please, they either return to their *clusters* from which they separated themselves, or affix each singly to any thing they meet with: and this is a circumstance that merits to be carefully watched, because it is by means of this that we see in what manner the creature multiplies itself, and the *clusters* are formed.

As soon as a single animal of this kind is fixed to a stick, a stone, or any other substance, it begins to lengthen its stem or tail, which, though very short while swimming, and when first fixed, very soon becomes of its prisline length while in the *cluster*; and after this the creature begins immediately to multiply by the most amazing means in the world, that is, by splitting itself to pieces lengthways. The first motion towards this operation is the drawing in the lips or edges; this is soon done, and the body then loses its bell-like shape, and becomes round; the motion which was before perceived at the edges ceases, and there is only a slight undulation to be seen within the body; after which the anterior part of the body becomes flat and broad, and the whole body shortens in proportion; and soon after this the whole body gradually splits itself regularly into two, from the centre of the anterior part to the centre of the hinder end, where it joins the tail or pedicle, and there soon appear two round and perfect bodies joined to that pedicle which before supported only one. The anterior parts of the two bodies soon begin to open, and gradually shew their edges, which perform the same motion the single one did before. The motion is at first very slow, but it grows quicker by degrees as they open; and when they are perfectly expanded, it is as quick as it was in the original single body: it is at this time that the two bodies may be esteemed quite perfect. They are at first indeed less than the original *polype*, from which they were formed, but they grow to the same size in a very little time: the whole operation of dividing itself, takes up the creature about an hour; but to form a true idea of the manner in which it is performed, there must be many observations made, and the creatures must be examined in all views and lights while about it.

The lips of these *polypes*, when closely examined, appear to be composed of four or five transparent bands, all of which have an undulatory motion. And when the newly divided *polype* is but flow in its motions, it is easy to discover that what afterwards appear to be like the wheels of a mill, are, in reality, only four or five oblong bodies, resembling a sort of fingers which alternately bend down, and extend themselves every instant. These are fastened to the bands of the lips on each side of the mouth; and when they are put into swift motion in the time of the full growth and vigour of the animal, they are not to be distinguished, as to form, nor can their motion be otherwise discovered than by its effects, which makes it resemble the quick turning of a wheel.

When the separation of the body of a single *polype* of this kind is complete, one fora two regular and perfect bodies adhering side by side to the same pedicle, but soon after each of the new formed bodies begins to throw a pedicle of its own; these grow in a days time to a moderate

length, and unite at their bottoms to the end of what what was the original fingle peſtiele of the body while but one; they grow to this in the manner of the branches growing to the trunk of a tree.

Twenty-four hours after the ſeparation of the original body into two, theſe two begin to ſeparate themſelves in the ſame manner, each into two again; and theſe, after a like time, again ſeparate: each of theſe ſeparated animals has its own tail formed in a like period of time with the firſt; and the conſequence is, that the firſt ſeparation producing two, the ſecond gives four, the third eight, and ſo the fifth ſixty-four, the ſeventh one hundred and twenty-eight, and ſo on; by which means a ſingle animal, in a very few days, forms out of itſelf, an immenſe *cluſter*, each animal of which is perfect in itſelf, and independent of all the reſt, and can, when it pleaſes, ſwim away and form a new *cluſter*. They will multiply as faſt in glaſs jars, as in their native free ſtate in the waters, and *cluſters* of them, begun near one another, will often join in ſuch a manner as to form one complex *cluſter* of an inch diameter; from theſe ſeveral *cluſters* there detach themſelves ſingle *polypes* from time to time, which go off, and, faſtening themſelves to other bodies, become the authors of new progenies.

The original branch or ſtem of the firſt *polype* remains always in the centre of the *cluſter*; but it is of no uſe, never afterwards having any body fixed to it.

There are, beſide this ſpecies here deſcribed, four other known kinds of *polypes*, which divide themſelves in the ſame manner by ſplitting into two lengthwiſe: thoſe which come neareſt to the firſt are ſlenderer, and their ſtems are more tranſparent. They are of a bluiſh colour, when many of them are ſeen together, and their ſtems or tails very aptly reſemble ſpun glaſs. When this ſpecies is perfectly formed, the motion of its lips is leſs diſtinct than in the other; but it may be diſcovered in the ſame manner while they are newly ſeparated, and are but growing toward perfection, when it gradually becomes leſs and leſs diſtinct.

Another ſpecies of theſe *polypes* is ſmaller than the laſt, but more open at the mouth and deeper hollowed; and theſe are particularly diſtinguiſhed from all the others, by having a motion in their ſtems and branches, which all the others want. The ſtems draw themſelves up, and ſhorten all at once into the appearance of a ſpiral ſcrew, and in a moment can dart themſelves ſtraight out to their full length again. All theſe multiply very ſpeedily, but they have all enemies that deſtroy them in a very terrible manner, whole *cluſters* mating but ſingle mouthfuls. The *funnel-polypes* are nearly allied to theſe creatures. Phil. Tranſ. N° 474, vol xliii. p. 169, &c. and vol. xliv. p. 627, &c.

POLYPE, *funnel*, a name given by naturaliſts to a ſmall water-inſect, in ſome reſpects approaching to the nature of the *cluſter-POLYPE*.

The *funnel-polype* nearly reſembles a funnel, from which it has its name. It is long and hollow, and very wide at the anterior end. Theſe little animals are of three ſpecies, a green, a blue, and a white one: they are all too minute for the obſervation of the naked eye, and muſt be viewed with great caution, and in ſeveral different directions and attitudes, before their true form can be diſcovered; and their anterior end, particularly when carefully obſerved, is of a much more compound ſtructure than might at firſt be imagined; there may always be obſerved, round the edges of this part, a ſenſible motion, reſembling that of an indented wheel, or rather that of a ſcrew turned very nimbly about. Theſe, though they approach to the ſhape of the cluſter-*polypes*, and reſemble them in their having this motion about the mouths, yet never have any tendency to form cluſters, but are ever found looſe and ſingle. There are always a number of little round bodies, which ſeem to be animals of a very minute ſize, ſwimming about in the water in which theſe *polypes* live; and theſe are continually drawn into the mouths of the *polypes*, and ſerve them for food.

The manner of theſe creatures propagating themſelves is very amazing; they do it by dividing their own body into two; but this is not done longitudinally, as in the cluſter-*polypes*, nor tranſverſely, but diagonally from the edge of the head to the oppoſite edge of the tail; ſo that of the two thus formed out of one, the one has a head and no tail, the other a tail and no head; but theſe deficiencies are ſoon made up, and the head ſoon grows out of one, and the tail out of the other.

M. Trembley, in his account of this inſect, calls that of the two which has the old head, the ſuperior *polype*; that which has the old tail, the inferior. The firſt particulars obſervable in a *funnel-polype* that is going to divide, are the lips of the inferior *polype*, or thoſe tranſparent edges, that are ſo very conſpicuous in the creature when perfectly formed. Theſe new lips firſt diſcover themſelves upon the *polype* that is going to divide, from a little below the old lips to about two-thirds of the length of the *polype*, reckoning from the head: but theſe new lips are not diſpoſed in a ſtraight line, according to the length of the *polype* but run ſloping near half way round about. Theſe lips are diſtinguiſhed by their motion; but it is to be obſerved, that this motion is at firſt very ſlow, and requires an attentive eye and good glaſſes to diſcover it.

That portion of the body of the *polype* which is bounded by theſe new lips, then gathers up itſelf, and theſe lips inſenſibly draw cloſe together, and finally, they cloſe themſelves. By this means there is formed a ſwelling at the ſide of the *polype*, which is found on cloſe examination, to be the head of the new *polype*, bounded by the lips before mentioned. Before this ſwelling is become very remarkable, it is eaſy to diſcover the true *polypes* that are forming themſelves; and, after this, when the ſwelling is greatly increaſed, theſe two diſtinct animals will be found joined to one another only by a very ſmall part of their bodies. The ſuperior *polype*, in this caſe, no longer adheres to the inferior one but by its poſterior extremity, which is ſtill fixed on one ſide of the inferior one. The ſuperior one then begins to make motions, which tend to the ſeparating itſelf from its fellow; and theſe ſoon finiſh the work, and he becomes perfectly diſengaged, and ſwims away whither he pleaſes, and ſoon fixes on ſome other place. The inferior *polype* remains fixed in the place where both were before, and becomes a perfect animal; and the ſuperior one, after taking a tour in the water, ſometimes returns to the old place, and fixes himſelf by the tail to the body of the inferior one. All theſe animals are extremely minute, and are not to be ſeen diſtinctly, much leſs are their operations obſerved without the help of glaſſes; and as there is no taking them out of the water to bring them before the microſcope in the common way, without abſolutely deſtroying them, M. Trembley, who has obſerved them with more accuracy than perhaps any other perſon ever did, has contrived to view them in a glaſs veſſel, in their own water, by bringing them ſo near the ſides of the glaſſes, that the microſcope glaſſes are able to reach them properly from the outſide. The ſubſtances on which they are fixed, are to be brought cloſe to the edges of the veſſel, by means of a ſet of quills framed properly together; and the microſcope glaſſes to be ſupported on a moveable arm made for that purpoſe. Phil. Tranſ. N° 474. vol xliii. p. 180, &c. and vol. xliv. p. 627, &c.

POLYPE, *marine*, is different in form from the freſh water POLYPE already deſcribed, but is nouriſhed, increaſes, and may be propagated after the ſame manner: Mr. Ellis having often found, in his inquiries, that ſmall pieces cut off from the living parent, in order to view the ſeveral parts more accurately, ſoon gave indications that they contained not only the principles of life, but likewiſe the faculty of increaſing and multiplying into a numerous iſſue. It has been lately diſcovered and ſufficiently proved by Peyſſonel, Ellis, Juſſieu, Reaumur, Donati, &c. that many of thoſe ſubſtances, which had formerly been conſidered by naturaliſts as marine vegetables or ſea-plants, are in reality animal productions; and that they are formed by *polypes* of different ſhapes and ſizes, for their habitation, defence, and propagation. To this claſs may be referred the CORALS, CORALLINES, KERATOPHYTA, ESCHARA, SPONGES, and ALCYONIUM: nor is it improbable that the more compact bodies, known by the common appellations of ſtar-ſtones, brain-ſtone, petrified fungi, and the like, brought from various parts of the Eaſt and Weſt Indies, are of the ſame origin: to this purpoſe Mr. Ellis obſerves, that the ocean, in all the warmer latitudes near the ſhore, and wherever it is poſſible to obſerve, abounds ſo much with animal life, that no inanimate body can long remain unoccupied by ſome ſpecies. In thoſe regions the ſhips' bottoms are ſoon covered with the habitations of thouſands of animals: rocks, ſtones, and every thing liſeleſs, are covered with them inſtantly: and even the branches of living vegetables that hang into the water, are immediately loaded with the ſpawn of different animals, ſhell fiſh of various kinds. And ſhell fiſh themſelves, when they become impotent and old, are the baſis of new colonies of animals, from whoſe attacks they can no longer defend themſelves. For a farther account of this ſyſtem, ſee CORAL, and CORALLINES.

POLYPE, *vor.* See VER-*polype*.

POLYPETALOUS, from πολυς, *multum*, and πεταλον, *petalum*, in *Botany*, a flower conſiſting of ſeveral petals, or leaves.

The corollæ of flowers conſiſt either of a ſingle continued petalon, whence they are called *monopetalous*; or of ſeveral diſtinct pieces, whence they are named *polypetalous*.

Polypetalous flowers are either *regular* or *irregular*.

POLYPETALOUS *flowers, regular*, according to some botanists, are either those consisting of two pieces, as the cucumis flower; or of four, thence called *cruciform-flowers*, as the flower of the clote-tree; or of five, usually *umbelliferous*, as fennel; or of six, as the white lily, thence called the *lily-kind*.

Those exceeding this number, in any quantity, equal or unequal, form a new class of *polypetalous* flowers; among which are also ranked all those whose fruits differ to from the rest, that the rules of genera require that they be distinguished from them.

Such is the flower of the water-plantain, which though it has only three leaves, yet, by the relation of its seed with that of the ranunculus, is ranged in this last class.

Such also is the flower of tormentil; which, by reason of the difference of its fruit from the silique or filicule of the cross-flowers, cannot be ranged among them.

Such also is the pink, which, though consisting of five pieces, yet is excluded the class of umbelliferous plants, because its fruit is not divided into two parts. Such, lastly, are the flowers of some ranunculuses, house-leek, and anemonies; which, though they have six petals, yet never produce fruits divided into three lodges, as those of the lily-kind; and therefore cannot belong to their class.

POLYPETALOUS *flowers, irregular*, are so called from the odd figure and disposition of their petals, what number of them soever they have.

Such are those two pieces resembling two chaps, as in fumitory; or those of five pieces resembling butterflies: these last are common to all leguminous plants.

POLYPHEMUS, in *Astrology*, the most celebrated and the most terrible of the CYCLOPES, who were deemed to be the sons of Neptune.

POLYPODES, a word used by some as the name for the MILLEPEDES.

POLYPODITES, a name given by the ancients to a wine impregnated with polypody, and sometimes for the juice of millepedes, expressed with wine.

POLYPODY, in *Botany*. See *POLYPODY*.

POLYPODY, *polypodium*, in *Botany*, a genus of the *cryptogamia filices* class. Its characters are these: it is distinguished from the other plants of the fern tribe by the fructification being in roundish spots, distributed on the under surface of the leaf. Miller.

There are many species of this plant. Tournefort enumerates twenty-six; Miller two; and Linnæus sixty-four.

The *polypodies* are not branched, but consist of single leaves, divided almost to the middle rib into oblong jags or segments.

The word is formed from the Greek πολυς, and πους, *foot*, in regard the root of the plant clings to walls and trees, by a great number of little fibres like claws.

The common *polypody*, with wing-pointed leaves having oblong obtuse lobes, which are somewhat sawed, and a scaly root, is the kind used in medicine; it is usually found about the roots of old trees, in woods, and by hollow road sides: and is green all seasons of the *year*.

There is a vulgar opinion, that such of it as grows upon the stump of an oak, thence called *oak-polypody*, is preferable to what grows on any other tree; but there is no foundation for this.

The root is the part used in medicine; it is a gentle cathartic, and has been recommended in disorders arising from obstructions of the liver and spleen. It is by many esteemed an excellent medicine in scorbutic and hypochondriac complaints. The country people take it in infusion alone, but physicians usually prescribe it in compound decoctions and medicated ales. It has also been made an ingredient in many of the purging electuaries in the old dispensatories.

However, though it has been supposed to be aperient, resolvent, and expectorant, and formerly ranked among the purgatives, its operation is so weak, a decoction of an ounce or two scarcely moving the belly, that it has been long expunged from the latter class, and the present practice very little regards it in any intention.

POLYPOSIA, a term used by the ancients to express a copious drinking of wine.

POLYPREMUM, *Cuckoo-flax*, in *Botany*, a genus of the *tetrandria monogynia* class: its characters are, that it has a four-leaved calyx; a rotated corolla divided into four segments, with heart-shaped lobes; and that the fruit is a compressed emarginated capsule, with two cells. There is only one species.

POLYPTOTON, ΠΟΛΥΠΤΩΤΟΝ, in *Rhetoric*, a figure wherein the same words are repeated in different cases, genders, or numbers, i. e. with different terminations.

Such is that of Cicero, pro Arch. *Sed plori sunt omnes, flere, plorare fortissimum, vereri, plena exemplorum vetustas.* So Virg. Æn. lib. ix. v. 28.

Linora litteribus contraria, fluctibus undas
Imprecor, arma armis pugnæque cruentæ.

POLYPUS, the *polypus* in *Zoology*. See POLYPE.

POLYPUS, in *Natural History*, a name given by some of the earlier writers to the thin-shelled nautilus, or nautilus papyraceus. The body and arms of this creature somewhat resemble those of the polypus; it was supposed to be a species of polypus inclosed in a shell, which it could quit occasionally, and go on shore to feed.

POLYPUS, NOSE, or *NARES*, in *Surgery*, a fleshy tumor or excrescence arising from the inside of the nostrils, prejudicial to respiration and speech; called also by way of distinction, *polypus narium*.

This *polypus* arises by several roots from the os cribriforme, and hangs down, sometimes as low as the lips, growing likewise backwards, so as to stop the hole of the palate, whereby the air and pituita descend out of the nose down into the throat; and by this means strangling the patient. It has its name from the resemblance it bears to the fish *polypus*, called the *four-footed*, or *many feet*. Some derive the name from the resemblance its substance bears to that of the *polypus*; and others, from the resemblance in many roots bear to the many feet of that fish.

If it have no roots, or only one continued root, it is called a SARCOMA, which is only a beginning *polypus*.

Polypuses are chiefly found in scrophulous or cancerous constitutions, along with venereal cases, ulcers, ozænas, &c. Caustics, emollient fomentations, extirpation, and deficcative powders, and lotions, are the usual remedies. M. Le Dran cured a *polypus* of the nose, which he could not extract wholly, in the following manner, which may be practised for destroying all such excrescences. He introduced one end of a large seton, put on the point of the fore-finger of the left hand, into the patient's mouth, till he brought it behind the velum pendulum; then filling a pair of thin crooked forceps into the affected nostril, he catched hold of the seton, after covering what was to be introduced into the nose with a suppurant medicine. While he drew the cord, he endeavoured to preserve the velum pendulum from being hurt, by introducing his finger into the mouth, and supporting the cord upon it. He continued the suppurant till he was sensible, by the patient's breathing freely through the nostril, that the remains of the *polypus* was destroyed, and then he injected deficatives to cauterize the ulcer. Le Dran, tom. i. obs. 6. sp. Med. Ed. Edinb.

POLYPUS is also used for a morbid excrescence in the heart, consisting of a tough concretion of grumous blood lodged therein. Malpighi gives a very accurate description of this *polypus*. In the right ventricle of the heart, he observes, it is usually larger, and of a paler colour, like pimita, with reddish or blackish streaks; in the left ventricle it is smaller, blacker, and denser. He adds, that it seems to have a sort of organism, and appears like a congeries of pellicles stretched over one another, which form a kind of nervous compages.

Polypuses are often found upon opening the bodies of persons dying apoplectic; and are doubtless frequently the occasion of sudden death. They are seldom discovered till they have dispatched the patient.

It is, however, a dispute among physicians, whether *polypuses* be produced any considerable time before, or always immediately after death? Mr. Gould has an express discourse in the Philosophical Transactions to evince the former.

POLYPUS *of the lungs*. In the Philosophical Transactions, Dr. Robert Clarke gives us a very odd instance of a patient who coughed up, at times, several hundred *polypuses of the lungs*.

They seemed to have some organization, and were all perfectly alive. The patient said, though they had no life, he had frequently pressed a slimy matter out of the body of them.

Dr. Lister observes, that such *polypuses* are formed in the remotest and deepest branches of the aspera arteria, whence they are very difficult to get up. The patient above mentioned never brought them up till after a continued coughing of half a day and night.

He adds, that they are nothing but viscous excretions of the small glands, hard baked in those parts where form they receive. M. Buillieres observes, they are frequently mistaken for pieces of the blood-vessels or lungs.

Though Kerkringius, and others, have endeavoured to explode the notion of the formation of true *polypi* in the heart and blood-vessels, yet Malpighi, Bartholine, Tulpius, Pecklin, and others, have given us incontestible instances of the existence of true *polypi* in the heart, in the strictest sense; and we have three unquestionable evidences of the like nature, in Philos. Transact. N° 464. sect. 6.

POLYPYRENEOUS *fruits*, in *Botany*, are such as contain several kernels or seeds.

They are thus called from the Greek πολυς, *multi*, and σπερμα, *kernel*, or *berry*.

POLYSACTINODOS, in *Natural History*, a name given by Linkius, and some other authors, to those ſtar-fiſh whoſe body is divided into more than five rays, that being the more uſual and general number.

POLYSCHIDES *ſucus*, a ſea-plant, called in Engliſh *ſea-hanger*. It is one of the largeſt ſea-plants we know, growing often to ten feet or more in length. Its root is not flat in the manner of moſt of the other ſea-plants, but is compoſed of ſeveral little hooks, all which lay faſt hold of the ſtone on which it grows: theſe, in ſome meaſure, reſemble the tendrils of the vine, and are ſomewhat broad and flatted at the end, where they are faſtened to the ſtone, though round elſewhere, and are about half an inch long: theſe hooks grow from a broad flatiſh part at the bottom of the ſtalk, which is often four or five inches in diameter, and is uſually hollow, being compoſed only of two membranes conſiderably tough and firm, with a cavity between them; from the centre of this riſes the ſtalk, which is often twiſted and undulated at the edges; from the top of this ſtalk grows the leaf, which is divided into eight or ten ſegments; each of which is often again divided into two. Theſe ſegments are very long; and as the plant floats in the water, give it much of the appearance of a broad piece of leather cut into ſeveral thongs; theſe all terminate in ſharp points, and their colour is a brownish green. The aideſt eye cannot diſtinguiſh the leaſt nerve or fibre, either in the ſtalk or leaf of this plant; but on great numbers of theſe plants, that curious enquirer, M. Reaumur, found flowers of the ſame kind with thoſe which he originally diſcovered on the common ferns; they are compoſed of ſlender filaments, not exceeding the twentieth part of an inch in length; and theſe were the more eaſy to be overlooked, as they are of the ſame colour with the leaves of the plant. Thoſe plants on which M. Reaumur found theſe flowers, were not, however, entirely covered with them, but they ſtood at about a twelfth of an inch diſtance from one another. It was in the month of July that M. Reaumur examined this plant; and at that time there were no ſeeds diſcoverable upon it; but doubtleſs at a proper ſeaſon, and with proper care in the obſerver, they will hereafter be diſcovered as plainly in this as in many other of the ſea-plants, uſually ſuppoſed by authors to have wanted them. Mem. Acad. Par. 1712.

POLYSCOPE, a multiplying-glaſs, i. e. a glaſs which repreſents one object to the eye as if it were many; called alſo POLYHEDRON.

POLYSPASTON, πολυσπαστον, from πολυς, and σπαω, *trahe, I draw*, q. d. that may be drawn many ways, in *Mechanics*, a machine ſo denominated by Vitruvius, conſiſting of an aſſemblage of ſeveral pullies, uſed for raiſing of heavy weights in a little time.

The multiplication of pullies in the *polyſpaſton* is to very good purpoſe; it being demonſtrated in mechanics, that the force required to ſuſtain a weight by means of a *polyſpaſton*, is to the weight itſelf as unity to the number of ropes, or of the pullies, thoſe roper or pullies being ſuppoſed parallel to each other. See PULLEY.

Hence, the number of pullies, and the power, being given, the weight that will be ſuſtained thereby is eaſily found; viz. by multiplying the power by the weight. E. gr. Suppoſe the power 50 pounds, and the number of pullies 5, the weight they will balance is 250 pounds.

In like manner, the number of pullies being given, together with the weight ſuſtained, the power is found by dividing the weight by the number of pullies: thus, if the weight be 900 pounds, and the number of pullies 6, the power will be 150 pounds.

Doctules obſerves, that it is found by experience, that a moderate man, ſtanding barely on the ground, will lift 150 pounds; whence the ſame man, by means of a *polyſpaſton* conſiſting of 6 pullies, will be able to ſuſtain 900 pounds.

The power of the pullies will be ſtill exceedingly increaſed by joining ſeveral *polyſpaſtons*.

To find the number of pullies a *polyſpaſton* is to conſiſt of, to raiſe a given weight by a given power. Divide the weight by the power; the quotient is the number required. Suppoſe, e. gr. the weight 600 pounds, and the power 150; the pullies will be 4; whoſe diameters are to be all equal, ſuppoſing two of them upper, and two lower, moveable on the ſame common axes.

POLYSPERMOUS, πολυσπερμος, formed from πολυς, and σπερμα, *ſeed*, in *Botany*, is applied to ſuch plants as have more than four ſeeds ſucceeding each flower, without any certain order or number.

Theſe Mr. Ray makes a diſtinct kind of herbs, calling them *herbæ ſemine multi polyſperme*; where, by *ſemine multi*, are meant ſuch ſeeds as do not put off ſpontaneouſly the integuments or coverings which they either have, or appear to have, but fall off whole from the mother-plant.

Polyſpermous herbs are ſubdivided into, 1. Such as have a calyx or perianthium, conſiſting either, firſt, of *three leaves*, and the flower tripetalous, as the plantago aquatica, and the ſagittaria, both water-plants: or the flower polypetalous, and the calyx falling with it; as the chelidonium minus: or remaining after the flower is dropped; as in the hepatica nobilis. Secondly, of *five leaves*, in ſome deciduous, with the flower, as in the ranunculus; in others perennial, as in the helleborus niger ſeruleaceus; or annual, as in the flos Adonis. Thirdly, of *eight leaves*, as the malva and alcea. Fourthly, of *ten leaves*, as the caryophyllus, ſtigaria, pentaphyllum, tormentilla, argentina, althæa, and pentaphylloides.

2. Such as have no calyx or perianthium; as the clematitis, filipendula, ulmaria, anemone, nemorum, pulſatilla, &c.

POLYSTYLE *columnade*. See COLONNADE.

POLYSYLLABICAL *nihmes*, thoſe which repeat many ſyllables or words. See ECHO.

POLYSYLLABLE, πολυσυλλαβος, from πολυς, *much*, and συλλαβη, *ſyllable*, in *Grammar*, a word conſiſting of more than three ſyllables.

Stuckford refers the origin of *polyſyllables* in language to the confuſion of Babel; obſerving, that the languages which moſt probably aroſe about this time do remarkably differ from the moſt ancient Hebrew in words of a greater length than that of the original Hebrew words. The Chaldæan, Syrian, Egyptian, and Arabian languages, he ſays, afford inſtances of this kind, as well as the more modern tongues. Com. of the Sacred and Prophane Hiſt. vol. i. p. 136, &c.

POLYSYNDETON, πολυσυνδετον, in *Rhetoric*, a figure conſiſting in the union of the ſeveral parts of a ſentence by proper particles.

Such is, *Me pro cæteris & cæſi, & obſervat, & obligat.*

In oppoſition to this ſtands ASSYNDETON.

This figure adds a weight and gravity to an expreſſion, and makes what is ſaid to appear with an air of ſolemnity; and by retarding the courſe of the ſentence, gives the mind an opportunity to conſider and reflect upon every part diſtinctly. We often meet with this figure in Demoſthenes, which very well ſuits the gravity of his ſtyle. Thus he encourages the Athenians to proſecute the war againſt king Philip of Macedon, from this conſideration, that now *they had ſhips, and men, and money, and ſtores, and all other things, which might contribute to the ſtrength of the city, in greater number and plenty than in former times.* Philipp. iii.

POLYTHALAMIUM, in *Natural Hiſtory*, a name by which ſome authors have called the TURBI *marini concamerati*, a ſort of ſea-ſhell found frequently foſſile, with other ſhells, in Sweden, and brought over to us in the ſtones uſed for pavements, but not known in its recent ſtate.

It is of the ſame general ſtructure with the cornu ammonis, and thick nautilus, being compoſed of ſeveral cells or cavities, communicating with one another by means of a ſiphunculus or pipe; but it is uſually ſtraight, though ſometimes its end is twiſted exactly in the manner of the cornu ammonis.

POLYTHALAMIUS, in *Natural Hiſtory*, a term invented by Breynius, to expreſs a claſs of ſhells, the character of which is, that they are hollow ſhelly bodies, either ſtraight or regularly twiſted into a ſpiral form, always wide at the mouth, and growing narrower to the other extremity; they are divided within into ſeveral cells or chambers, which are called *thalami*, each ſeparated from the other by a diaphragm, or partition of ſhelly matter. The upper or largeſt chamber contains the body of the animal; but all the others are perforated by a ſiphunculus, which gives them communication one with another, and which runs from the mouth to the very apex, growing ſlenderer all the way.

Of this claſs he diſtinguiſhes four genera, the orthoceras, lituus, ammonites, and nautilus. The two laſt of theſe, he obſerves, have been long well known to the world; the two firſt he gives as new, and of his own diſcovery.

Of the orthoceratites, which are ſtones call in the ſhells of the orthoceros, there are at preſent diſtinguiſhed nine kinds: theſe differ from one another principally in the poſition of the ſiphunculus, or in their external form; the cone which they deſcribe running quicker or more gradually to a point; or, finally, by the thalami or chambers being wider or narrower.

POLYTHEISM, from πολυς, *much*, and θεος, *deus*, the doctrine or belief of a plurality of gods. See GOD, IDOLATRY, and JUPITER.

POLYTHRIX, the *hair-ſtone*, a name given by ſome wri-

ters

ters to those German agates which have received into their mass, while yet soft, either the branches of the conferva, or other capillary water-plants, or else have thin streaks of a ferrier matter frequent in them, and running in the form of hairs. See AGATE.

POLYTRICHUM, *golden maiden-hair*, in *Botany*, the name of a genus of mosses in the class of *cryptogamia*, the characters of which are these: the stalks are not much branched, and the capsules have calyptræ to cover them till mature; this calyptra is always hairy, and in many of the species is composed merely of long hairs, ranged lengthways together, without any membrane. The others have membranaceous calyptræ, but covered with erect hairs; the leaves of these kinds are rigid, and have a membranaceous appendage, by which they touch the stalks and surround them; those of the others are softer, and have not this appendage. The base of the pedicle which supports the head, is also in these surrounded by a sort of tube, round which there stand a number of membranaceous leaves; this is more visible in the larger than in the smaller species. The capsules in some of these mosses are square, in others they are roundish; and the square ones have usually an apophysis, by which they are joined to the pedicle, which the round ones never have, or at least very seldom. See *Tab.* XIV. *of Botany*, N° 12.

The *polytrichum* of the first order are those which have square capsules, which are joined to the pedicles by a round apophysis: of these there are three species.

The second order of the *polytrichum* comprehends those which have round capsules, and usually want the apophysis, by which the others are joined to the stalk. There are nine species of this kind. Dillen. Hist. Muse. p. 430. Linnæus enumerates three species.

Old writers are very full of the praises of this plant for its virtues in making the hair grow thick; but this seems to have been an opinion taken upon no better reason than the likeness of the stalks of the plant to hairs. They make a decoction of it in some parts of Germany, and wash the head carefully with it in the increase of the moon; but there is no great reason for supposing this liquor does any thing more than warm water would do. See ADIANTUM *aureum*.

POLYTROPHEROS, a name given by the Greeks to coarse bread, from its conveying much more nourishment to the body than the finer kind; which they called, by way of distinction, *oligotrophoteros*.

POLYZONOS, in *Natural History*, a name given by the ancients to a species of onyx, which had a dark or blackish ground, with a great number of white zones.

POMA, in the *Writings of the Old Greek Physicians*, a word which has given the commentators a great deal of trouble rightly to explain.

Brassavolus says, that it means all sorts of shelly or crustaceous coverings of fishes, but this is an absolute error; for even the medical authors do not extend its sense so far as that. The Greeks called all shells by the name *ostraca*, and this author attributing a different virtue to the whole shell of the purpura, sufficiently speaks this *poma* to have been but a part of it.

The Arabian writers were sensible of this, and rendered it by the words *asfor althoth*, which signify fragments like nails. Serapio calls it *mukatha*, which signifies a morsel or piece of any thing cut from a solid body. The original sense in which the Greeks used the word *poma*, was to express the thing that closed the mouth of any vessel with a long and narrow neck. The Latins expressed this by the word *operculum*, and sometimes, as in Sulpicius Severus, by the word *umbo*.

The ancients also used the word *poma* to express the lid or covering of a well, or of any hole. Now the purpuræ buccinæ, and all these other shells which the Greeks have called *strombides*, may in some sort be compared to narrow and deep vessels, and they have all of them a sort of *poma*; or, as the Latins have expressed it, an *operculum*, to stop the mouth of the shell, and prevent the ingress or egress of any thing at the creature's pleasure. This *operculum* being what Aristotle has called *epiclasmma*, is certainly also what Dioscorides means by the word *poma*; Aristotle has been very express in his description of it, and says that the tongue lies under it, and that all the *strombidæ* shells gave it. The *onyx Indicus*, therefore, was only the *poma*, or *operculum* of an Indian *strombida* shell, of the buccinum or purpura kind, and was of a sweet smell, and thence had the term *aromaticus*, or *odoratus*. The name *onyx* is easily accounted for, as the *poma* of every shell of this kind is flat and thin, and does not unapily resemble the human nail.

POMADA, an exercise of vaulting the wooden horse, by laying one hand over the pommel of the saddle.

POMATIA, in *Natural History*, the name of a large species of garden-snail, so called from its feeding on apples and other fruit. It is originally a native of Italy, but is become of late years so familiar with us in England, as if a native with us. It is a noble remedy in consumptive decays; and a person of distinction in England having occasion to take great numbers, had several large parcels brought carefully alive from Italy, and turned loose in his garden, where they multiplied to such a degree, that the neighbouring woods and hedges soon became full of them, and they have since been propagated in many other places.

The *pomatia* is much larger than our common snail, and of a paler colour: it is of a roundish figure, and has five spires or twists at the head: these are placed very close, and its mouth is large and almost circular, and has no duplicature or fold surrounding it, but is as thin as the rest of the shell.

POMATUM, or POMADO, a composition of apples, with lard and rose-water; used by way of unguent on many occasions, particularly for diseases of the skin, pimples, scurfs, &c. and to soften the hands, render the skin smooth, the complexion fresh, &c.

Pomatums are occasionally made with jessamine, orange, jonquils, tuberoses, &c. i. e. they are perfumed with the odours of those flowers.

The best is said to be that prepared of kid's grease, pippins, an orange sliced, with a glass of rose-water; and half a glass of white-wine, boiled and strained, and at last sprinkled with oil of sweet almonds.

Dr. Quincy observes, that the apple is of no significance at all in the recipe; and that the common *pomatum* sold in the shops is only lard beat into a cream, with rose-water, and scented with lemons, thyme, or the like.

The *pomatum* of the London Dispensatory is formed by beating tried, or purified lard with rose-water, in the proportion of three ounces of the water to two pounds of the lard, till they are well mixed; then melting it over a gentle fire, and after it has stood for a little while, that the watery part may settle, pouring off the lard, and incessantly stirring and beating it about till it grows cold, so as to reduce it into a light yielding mass; and afterwards adding so much essence of lemons as will be sufficient to give a grateful smell. Some scent it with oil of rhodium; and previously digest the lard for ten days with common water, renewing the water every day, a process which does not appear to be of much use. These ointments may be tinged of a fine red colour, for lip-salves, by a proper addition of alkanet root. The faculty of Paris directs, for this purpose, twenty-four parts of the white *pomatum*, eight of ox's marrow, and eight of white wax, cut in small pieces, to be melted together by the heat of a water-bath; one part, i. e. one fortieth of the whole mass, of powdered alkanet root to be added; the mixture stirred at times till it appears tinged of a deep red colour, and then strained through a linen cloth. Lewis.

POME, among *Gardeners*. To *pome*, is to grow or knit into a round head, somewhat like an apple.

Thus, they say, a *cabbage begins to pome*, &c. They sometimes use the term, *to cabbage*, in the same sense.

POMEGRANATE-*tree*, *punica*, in *Botany*, a genus of the *icosandria monogynia* class. Its characters are these: the empalement of the flower is bell-shaped, coloured, and cut into five parts at the top; the flower has five roundish, erect, spreading petals, which are inserted in the empalement, and a great number of slender stamina, which are also inserted in the empalement, terminated by oblong summits; the germen is situated under the flower, supporting a single style, crowned by a headed stigma; it afterward becomes a large almost globular fruit, crowned by the empalement; the fruit is divided into several cells by membranous partitions, which are filled with roundish succulent seeds. There are two species, including several varieties.

These plants grow naturally in Spain, Portugal, Italy, and Mauritania. There are also many of them in the West Indies, but they are supposed to have been transplanted there from Europe. They are so much improved there, as to be much preferable to any in Europe, the fruit being larger and finer flavoured.

The balaustia of the shops is the empalement of the flower of the double flowering *pomegranate*. Miller.

It is denominated from the abundance of its grains or kernels; q. d. *pomum granatum*, a *kernelled apple*; or from the country where it was anciently produced, viz. Granada.

The trees never grow high; their branches are a little prickly; their leaves are long and narrow; the flowers are of a deep red, and pentapetalous, set in bell-shaped cups of the same colour; and their fruit, which is composed of a great number of red angular grains, sometimes sweet, sometimes sour, and sometimes vinous, according to the quality of the tree, are all inclosed in little di-

finest cells, and covered, in common, with a thick brownish rind. Over this grows a kind of covering, of the same nature with the rind, formed of a production of the calyx.

In the general, *pomegranates* are not only agreeable to the taste, but good for the stomach, and of considerable use in medicine. Of the kernels are made syrups and conserves; and the peel or rind, which is called *malicorium*, is moderately astringent, and is an ingredient in several remedies and ptisans, for dysenteries, diarrhœas, hemorrhoids, hæmorrhages, and relaxations of the gums. The ancients used the rind as the moderns do sumach, in the preparation of leather.

The rind ought always to be dried, after the grains are taken out; that dried without scooping always tastes mouldy, and being more likely to increase distempers than cure them.

As to the conserve, there is but little of the true sort; it being very difficult to make. That which ordinarily passes for it is only sugar melted down, to which they give the colour, and sharp taste, with cochineal, cream of tartar, and alum.

POMELS, in *Heraldry*, are green roundles; so called by the English heralds, who express different coloured roundles by different names.

The French, who content themselves to denote the different colour of the roundles, call the *pomeis*, *fourmeaux cert*.

POMERIUM, in *Antiquity*. See POMŒRIUM.

POMIFEROUS, *apple-bearing*, in *Botany*, a name given to those plants which have the large fruit, covered with a thick hard rind; by which they are distinguished from the baccíferous, which have only a thin skin over the fruit.

The *pomiferous* kind have a naked monopetalous flower, divided into five partitions, and growing on the top of the succeeding fruit. They are divided into

1. *Coperulate*, or those creeping along the ground, &c. by means of tendrils; as the cucurbita, melo, cucumis, cepo, ballaimina, anguria, and crocyntha.

2. Without *cupreoli*, or *tendrils*, as the cucurbita elypeata, or melo cepo clypeiformis.

POMIGLION is a name given by foamen to the CANNON, or hindmost kind of a cannon. See GUN.

POME, or POMMETTE, in *Heraldry*. A *cross pomme*, or *pommette*, called also *trophy*, is a cross with a ball or knob, like an apple, at each end.

POMMEL, or POMMEL, in the *Manege*, a piece of brass, or other matter, at top, and in the middle, of the saddle-bow, to which are fastened the holsters, stirrup-leathers, &c.

POMMEL is also a round ball of silver, steel, or the like, fixed at the end of the guard and grasp of a sword; to serve, in some measure, as a counterpoise.

Baluze observes, that there are still extant charters and privileges granted by Charlemagne, which were sealed with the *pommel* of his sword, which, ordinarily, he promises to defend with the same sword.

POMMETTE. See POME.

POMŒRIUM, among the Romans. Authors are not agreed as to particular circumstances relating to the *pomœrium*: some will have it to be a piece of ground without the walls; others a space within them; and others again think it was both within and without. But which ever of these is true, the *pomœrium* was a place esteemed sacred, and kept free from houses and every other kind of obstruction. Hist. Acad. Inscr. vol. ii. p. 91, seq.

POMONA, in *Mythology*, an amiable nymph, for whose favour the deities of the fields were competitors. The name was originally appropriated to some person who had merited divine honours by the culture of fruit-trees, and especially of apple-trees. This nymph is represented as sitting on a large basket full of fruit, holding a number of apples in her left hand, and in the right a nosegay of flowers. At Rome she had a temple and altars. Her priest was called *Flamen Pomonalis*, and sacrifices were offered to her for the preservation of the fruits of the earth.

POMPEION, Πομπειον, in *Antiquity*, a stately edifice at Athens, in which were kept the sacred utensils made use of at festivals, and all things necessary for the solemn processions prepared. It stood at the entrance of the old city, which looked towards Phalerum, and was adorned with many statues of the Athenian heroes.

The word *pompeion* is derived from πομπευω, *cum pompa incedo*, and was likewise used for any utensil employed on these occasions.

POMPEY's *pillar*. See PILLAR.

POMPHOLYX, Πομφολυξ, literally denoting a *bubble or string on water*, in *Pharmacy*, a sort of metalline flowers, being a white, light, and friable substance, found adhering to the lid or cover of the crucibles or furnaces, wherein zinc or its ore are melted with other metals.

It is esteemed detersive and deliccative, though only applied externally.

The apothecaries sometimes call it *nix*, or *nihil album*, and sometimes *white tutty*, in regard of its resemblance to TUTTY in virtue.

POMPILUS, in *Ichthyology*, the name of a sea-fish, in the Linnæan system a species of the COBYPHENA, remarkable for following the ridders of ships to vast distances. It has no scales; it has a very broad line from the gills to the tail, under which are a number of dotted transverse lines, reaching to the belly, above the line on the side; the back is spotted with different colours; the mouth is moderately large, but the teeth very small; its forehead, between the eyes, is of a gold colour, and it has four fins, two at the gills, and two on the belly, and beside these, one long one running all the length of the back, and another answering it from the anus to the tail; its tail is not forked.

PAMPILUS is also used by some authors for the nautilus, as well as the papyraceous and the cameretted kind.

POMPION, in *Botany*. See PUMPKIN.

POMPONA, a name given by the Spaniards in America to a sort of *vanilla*, the pods of which are shorter and thicker than those of the common kind, and of a stronger smell, though less agreeable. The pulpy matter also in these pods is more liquid than that in the common kind, and the seeds much larger, being as big as those of mustard. This is never brought to market alone; but the Indians who gather it, cunningly mix it among the right kind, but this should be taken care of by the buyer, since this kind is very prejudicial, occasioning violent head-aches in men, and in women vapours and disorders of the womb.

It is not yet certainly known whether this be the fruit of a different species of the *vanilla* plant, or whether it be only different from the common in size, or in the place of growth of the plant.

POMUM, *apple*, a well known fruit. See APPLE-*tree*.

POMUM, *apple*, in *Botany*, is a fleshy or pulpy PERICARPIUM without valves containing a capsule.

POMUM *Adami*, in *Anatomy*, a prominence in the forepart of the throat. See ADAM'S *apple*.

POND, in *Geography*, a little lake, which neither receives nor emits its waters into any river.

POND, *fish*. See FISH-*pond*.

POND-*weed*, *potamogeton*, in *Botany*, a genus of plants of the *tetrandria tetragynia* class, the characters of which are these: the flower has no calyx or cup, but is composed of four obtuse, roundish, hollow, and open petals, which fall off before the ripening of the seeds; the filaments are four plane, obtuse, and very short filamentæ; the antheræ are double and short; the pistillum has four germina, which are all oval and pointed; these have no style, but obtuse stigmata; there is no other fruit than four seeds succeeding each flower; these are of a roundish, but flatted figure, gibbose, and pointed. Linnæus enumerates twelve species.

POND *weed*, *water*. See PEPLIDARIA.

POND *weed*, *triglit headed*. See ZANNICHELLIA.

PONDERATE, in our *Ancient Customs*, a method of curing sick children, by weighing them at the tomb of some saint; counterpoising or balancing the scale with money, wheat-bread, or any other thing the parents were willing to offer to God, his saints, or the church.

But a sum of money was always to make part of the counterbalance. By this means the cure was effected. *Ad sepulchrum sancti, summa se ponderabat.*

PONDUS, *weight*. See WEIGHT.

PONDUS, in *Ancient Records*, denotes a duty paid to the king, according to the weight of merchandizes.

PONDUS *regis*, the Rainland weight anciently appointed by the king; being that which we now call *troy-weight*. See STANDARD and TROY-WEIGHT.

Ad PONDUS *emunas*. See AD.

PONDUS, *temperamentum ad*. See TEMPERAMENTUM.

PONE, a writ, whereby a cause depending in the county, or other inferior court, is removed to the common pleas, or sometimes to the king's bench.

PONE *per vadium*, is a writ commanding the sheriff to take surety of one for his appearance at a day assigned.

PONENDUM *in ballivam*, in *Law*, a writ commanding that a prisoner be *bailed*, in cases bailable.

PONENDUM *billam et exceptiones*, a writ by which bailiffs are required to put their seals to *exceptions* exhibited by the defendant against the plaintiff's evidence, verdict, or other proceedings before them, according to stat. Westmin. 2.

PONENDIS *in assisis*, a writ granted by the statute of Westmin. 2. cap. 38. which statute shews what persons sheriffs ought to impanel upon *assises* and juries, and what not.

PONGA, in *Botany*, H. M. *Arbor minor foliosa in Malabaria*. D. Commelin *totius Brasiliæ* Piso *similis*,

a tall evergreen tree growing in Malabar, and bearing no observable flowers; the fruit adheres to the branches in the same manner as that of the jaca; and hence the Portuguese call the tree the wild jaca; the calyces are echinated, first green, and afterward reddish, and contain multitudes of roundish, oblong, acuminated, and reddish seeds.

A cataplasm prepared of the green fruit of the tree bruised, being applied to tumors, promoter their suppuration. Of the bark and root, boiled in water, is prepared a fomentation for inflammatous tumors of the legs; an endemic disease among the Indians, and called by the Portuguese pedo St. Thome, which preserves them from an inflammation. Raii H. P.

PONGO, in *Zoology*, a name given in Purchas's Pilgrims to the ORANG-outang.

PONIARD, formed from the French *poignard*, and that from *poignis*, *hand-ful*, a little pointed dagger, very sharp-edged; borne in the hand, or at the girdle, or hid in the pocket.

The *poniard* was anciently in very great use; but is now in good measure set aside, except among ASSASSINS.

Sword and *poniard* were the ancient arms of duellists; and are said to continue still to among the Spaniards.

The practice of sword and *poniard* still makes a part of the exercise taught by the masters of defence.

PONS *varoli*, or *cerebelli*, or PONS *cerebri*, in *Anatomy*, the upper part of a duct in the third ventricle of the brain, situate in the cerebellum, and leading to the infundibulum. *See Tab. Anat. (Osteol.) fig. 5. litt. g g.*

It is thus called from its discoverer, Varolius, a Italian physician, who flourished in the university of Padua about the year 1572.

PONTAGE, *pontagium*, a contribution towards the maintenance, repairing, and rebuilding, of BRIDGES.

This was anciently one of the three general national charges, whence no person of any degree whatever was exempted.

The three things called *trinoda necessitas*, whence, Ingulphus tells us, *nulle possunt lauari*, were, the expedition to the wars, the building of castles, and the building and repairing of bridges. Mr. Selden, in his notes on Eadmerus, observes, that *ne eandem episcopi, abbates, & monachi, immunes erant.* And Matt. Paris adds, anno 1244, that in all grants of privileges to the monasteries, those three things were always excepted, for the public good, and that the people might be better able to resist any enemy.

PONTAGE is also a due anciently belonging to the lord of the fee, for persons or merchandizes, that pass over rivers, bridges, &c. called in the later Latin *pontagium*, or *pontuagium*, pontage.

PONTAGIA, a term used by Paracelsus, and his followers, to express a mixing saline substances with those which are bitter or typtic.

PONTEE, in the *Glass Trade*, an iron instrument used to fix the GLASS at the bottom, for the more convenient fashioning the neck of it.

PONTEE-*rods*, in *Glass Making*, is the iron whereon the under servants place the irons from the upper workmen, when they have knocked off the broken pieces of glass.

PONTEDERIA, in *Botany*, a genus of the *hexandria monogynia* class. Its charathers are these: the flowers are included in an oblong sheath, which opens on one side; it hath six petals, which are divided; the three upper are erect, and form a kind of lip; the three under are reflexed; it hath six stamina, which are inserted to the petals; the three which are longest are fastened to the mouth of the tube; the other are inserted in the base; they are terminated by prostrate summits; under the petals is situated an oblong germen, supporting a single style, which declines, and is crowned by a single stigma; the germen afterward turns to a soft fruit, divided into six cells, each containing several small roundish seeds. There are two species. Miller.

The characters, according to Linnæus, are, that the flower has a single petal, divided into six parts, forming a double lip; three of the stamina are inserted in the apex, and three in the tube; and the fruit is a three-celled capsule. He enumerates three species.

PONTIBUS *reparandis*, a writ, directed to the sheriff, commanding him to charge one or more person to repair a bridge, to whom it belongs.

PONTICA *gemma*, a name given by the ancients to a stone of the AGATE kind, with a white ground and red and black spots, irregularly placed, and making a beautiful variegation in it. This seems to have been the same stone which some of the moderns have called the *small-pox stone*, from its spots resembling the eruptions in that disease. The ancients mention several kinds of it, as they were spotted with various colours.

PONTICA *vina*, a term used to express acid, feculent, and tartarous wines.

PONTICUM *mel*, a name given to a sort of poisonous honey.

PONTICUS *mus*, in *Zoology*, the name of a creature described by the ancients, and supposed to be the same with our SQUIRREL.

PONTIFEX, *pontifex, high-priest*, a person who has the superintendance and direction of divine worship; as the offering of sacrifices, and other religious solemnities.

The Romans had a college of *pontifs*, and over those a sovereign *pontif*, or *pontifex maximus*, instituted by Numa; whose function it was to prescribe the ceremonies with which each god was to be worshipped, compose the rituals, direct the Vestals, regulate the calendar, and settle the several games, and assist at them; and for a good while to perform the business of augury; till on some superstitious occasions he was prohibited intermeddling therewith.

He consecrated the statues of the gods, before they were put up in the temples; conducted the dedications of the temples; offered sacrifices; blessed the figures of some of JOVE's thunderbolts, to preserve the people from harms; and compiled their statutes.

The Jews too had their *pontif*, or high-priest; and among the Romanists, the pope is still styled the *sovereign pontif*.

Authors differ about the origin of the word *pontifex*. Some derive it from *posse facere*, that is, from the authority the *pontifs* had to sacrifice; others, as Varro, from *pons*, because they built the Sublician bridge, that they might go and offer sacrifice on the other side of the Tiber.

PONTIFICAL, *Pontificale*, a book of the rites and ceremonies belonging to pontifs, bishops, popes, &c. See RITUAL, and CEREMONIALE.

PONTIFICAL *college*, in *Roman Antiquity*, consisted of those who had the principal direction of the affairs of religion, who settled religious disputes, regulated the worship and ceremonies, and explained the mysteries of religion. This college, at the time of its first institution by Numa, was composed of four priests selected from the patricians, to whom were afterwards added four others from the plebeians. Sylla the dictator increased their number to fifteen, of whom eight were superior, and seven subordinate; and the chief among them assumed the title of PONTIFEX *maximus*.

PONTIFICALIA, the robes and ornaments wherein a bishop performs divine service.

PONTIFICATE, *pontificatus*, the state or dignity of a pontif, or high-priest.

Cæsar reformed the CALENDAR in the time of his *pontificate*.

PONTIFICATE is more peculiarly used in modern writers for the reign of a pope.

The concordat was passed in the *pontificate* of Leo X.

There was a *pontificate* that only lasted twenty-four hours.

PONTLEVIS, in the *Manege*, a disorderly rebelling action of a horse, in disobedience to his rider; in which he rears up several times, and rises to upon his hind legs, that he is in danger of coming over. It is cured by clapping spurs smartly to him, as the fore-feet are returning to the ground.

PONTOON, in *Naval Language*, denotes a low flat vessel, resembling a lighter or barge of burthen, and furnished with cranes, capstens, tackles, and other machinery, necessary for careening ships of all sizes. These are very common in the principal ports of the Mediterranean, but rarely used in the northern parts of Europe. Falconer.

PONTOON, or PONTON, in *War*, denotes a kind of flat-bottomed boat, whose carcass of wood is lined within and without with tin. The French *pontons*, and those of most other powers, are covered on the outside with strong copper-plates, without any inside lining; and these have the advantage of iron's, because copper is much stronger than tin, and is not damaged by rust. Our *pontons* are twenty-one feet long, nearly five feet broad, and two feet 1½ inch deep within.

PONTOON-*bridge* is made of *pontons* slipped into the water, and placed about five or six feet asunder; each fastened with an anchor, when the river has a strong current, or to a strong rope, that passes across the river, and runs through the rings of the *pontons*. Each boat has an anchor, cable, hawser, and chests. The hawsers are about five or six inches square, and twenty-one feet long. The chests are boards joined together by wooden bars, about three feet broad, and twelve feet long. The hawsers are laid across the *pontons* at some distance from one another, and the chests upon them joined close. When several of these are thus connected, they form one firm, uniform bridge, by means of which a train of artillery, cavalry, infantry,

infantry, &c. may paſs over a river, arm of the ſea, &c. If *pontoons*, &c. are wanting, bridges are formed of empty casks or barrels, that ſupport baulks and planks. Cæſar and Aulus Gellius both mention *pontons*; but theirs were no more than a kind of ſquare flat veſſels, proper for the carrying over of horſe, &c. Ours, however, take their names from them: thoſe authors call them *pontones*, of *pons*.

POUTOON-*carriage* is made with two wheels only, and two long ſide-pieces, whoſe fore-ends are ſupported by a limber; and ſerves to carry the *pontoon*, boards, croſs-timbers, anchors, and every thing elſe neceſſary *for* making a bridge.

PONT-VOLANT, *flying-bridge*, a kind of bridge uſed in ſieges; made of two ſmall bridges laid over one another, and ſo contrived by means of cords and pullies placed along the ſides of the under-bridge, that the upper may be puſhed forwards, till it join the place where it is deſigned to be fixed; the whole length of both not to be above five fathom, leſt they ſhould break with the weight of the men. *See* BRIDGE.

POOD denotes a weight in Ruſſia, equal to forty of their pounds; and amounting to 35½ or 36 Engliſh pounds avoirdupoiſe.

POOL is properly a reſervoir of water, ſupplied with ſprings, and diſcharging the overplus by ſluices, defenders, weirs, and other cauſeways.

POOL, *mill.* See MILL.

POOL, *wharf.* See WHARF.

POOL-*finch*, in *Ornithology*, a name given in many parts of England to the red-ſhank.

POOP, in *Sea Language*, denotes the hind-part of a ſhip, or that wherein the helm is fixed; called alſo STERN. The *French* frequently call it *queue*, *tail*, becauſe the rudder here applied ſerves the ſame purpoſes in a ſhip as the tail does to fiſhes. The *poop* is divided into three or four ſtories, which all together form the *poop* caſtle, or hind-caſtle, the outſide of which is richly adorned with balconies, galleries, trophies, the arms of the prince, &c.

To have the wind in *poop*, in *Sea-phraſe*, is to have it behind, or favourable.

POOP, *puppis*, *puna*, denotes more particularly the higheſt or uppermoſt part of a ſhip's hull a-ſtern. See *Tab. Ship. fig.* 2. *lit.* P. See DECK.

POOP-*royal* is a ſhort deck or plat-form, placed over the aſtmoſt part of the *poop* in the largeſt of the *French* and *Spaniſh* men of war, and ſerving as a cabin for their maſters and pilots. This is uſually called the top-gallant-*poop* by our ſhip-wrights.

POOPING, in *Sea Language*, denotes the ſhock of a high and heavy ſea upon the ſtern or quarter of a ſhip, when ſhe ſcuds before the wind in a tempeſt. This circumſtance is extremely dangerous to the veſſel, which is thereby expoſed to the riſk of having her whole ſtern beat inwards, by which ſhe would be immediately laid open to the entrance of the ſea, and, of courſe, foundered, or torn to pieces.

POOR, *pauper*. A *poor* perſon, in a legal ſenſe, is one who is a burden to and charge upon a parith.

Formerly, the maintenance of the *poor* was chiefly an eccleſiaſtical concern; and a fourth part of the tithes in every parith was ſet apart for that purpoſe. Afterwards, when the tithes of many parithes were appropriated to the monaſteries, theſe ſocieties were the principal reſource of the *poor*, who were farther relieved by voluntary contributions. Judge Blackſtone obſerves, that till the ſtatute 26 Hen. VIII. cap. 28. he finds no compulſory method for providing for the *poor*; but upon the total diſſolution of the monaſteries, abundance of ſtatutes were made in the reign of king Henry VIII. Edw. VI. and Elizabeth, for this purpoſe. At length, by ſtat. 43 Eliz. *cap.* 2. OVERSEERS of the *poor* were appointed in every parith.

POOR-*rate*. By the 14 Eliz. cap. 5. power was given to the juſtices to lay a general aſſeſſment; and this hath continued ever ſince. For by 43 Eliz. cap. 2. the church-wardens and overſeers of the *poor* of every parith, or the greater part of them (with the conſent of two juſtices, one of whom is of the quorum, dwelling in or near the parith), are empowered to raiſe weekly, or otherwiſe, by taxation of every inhabitant, parſon, vicar, and other, and of every occupier of lands, houſes, &c. materials for employing the *poor*, and competent ſums for their relief. Notice ſhall be given in church of every ſuch rate the next Sunday after it is allowed, which may be inſpected by every inhabitant, paying 12. and copies of it granted on demand, 6*d.* being paid for every twenty-four names; and a churchwarden or overſeer refuſing, ſhall forfeit 20*s.* to the party aggrieved. The rate is to be levied by diſtreſs on thoſe who refuſe to pay it; and appeals againſt it are allowed. 17 Geo. II. cap. 2. cap. 38. See OVERSEERS.

If the juſtices find, that the inhabitants of any parith are not able to levy among themſelves ſufficient ſums for the purpoſes ſpecified in the act, they may aſſeſs any other parith within the hundred; and if the hundred be unable to grant neceſſary relief, they may rate and aſſeſs any parith in the county. 43 Eliz. cap. 2. Concerning the obligation of parents and children, ſee PARENT and CHILD.

In order to compel huſbands and parents to maintain their own families, the law hath provided, that all perſons running away out of their parithes, and leaving their families upon the parith, ſhall be deemed and ſuffer as incorrigible rogues. 7 Jac. cap. 4. And if a perſon merely threatens to run away and leave his wife and children upon the parith, he ſhall, upon conviction, before one juſtice by confeſſion, or oath of one witneſs, be committed to the houſe of correction, for any time not exceeding one month. 17 Geo. II. cap. 5. For the farther maintenance of the *poor*, there are many fines and forfeitures payable to their uſe; as for ſwearing, drunkenneſs, deſtroying the game, &c. And alſo parts of waſtes, woods, and paſtures, may be incloſed for the growth and preſervation of timber and underwood for their relief. See WOOD-*land*.

POOR, *ſettlement and removal of the*. The firſt rudiments of parith ſettlements ſeem to be the ſtatutes 12 Ric. II. cap. 7. & 19 Hen. VIII. cap. 12. which direct the *poor* to abide in the cities or towns where they were born, or ſuch wherein they had dwelt for three years, a term afterwards (viz. by 39 Eliz. cap. 4.) confined, in the caſe of vagabonds, to one year only. But after the Reſtoration, by 13 & 14 Car. II. cap. 12. a legal ſettlement was declared to be gained by birth; or by inhabitancy, apprenticeſhip, or ſervice for forty days; within which period all intruders were made removeable from any parith by two juſtices of the peace, unleſs they ſettled in a tenement of the yearly value of 10*l.* The frauds, naturally conſequent upon this proviſion, which gave a ſettlement by ſo ſhort a reſidence, produced the ſtatute 1 Jac. II. cap. 17. which directed notice in writing to be delivered to the parith-officers, before a ſettlement could be gained by ſuch reſidence. Subſequent proviſions allowed other circumſtances of notoriety to be equal to ſuch notice given; and thoſe circumſtances have from time to time been altered, enlarged, or reſtrained, whenever the experience of new inconveniences, ariſing daily from new regulations, ſuggeſted the neceſſity of a remedy. And the doctrine of certificates was invented, by way of counterpoiſe, to reſtrain a man and his family from acquiring a new ſettlement by any length of reſidence whatever, unleſs in two particular excepted caſes; which makes parithes very cautious of giving ſuch certificates, and of courſe confines the *poor* at home, where frequently no adequate employment can be had. The law of ſettlements may be, therefore, now reduced to the following general heads; or a ſettlement in a parith may be acquired, 1. By *birth*; for wherever a child is firſt known to be, that is always *prima facie* the place of ſettlement, until ſome other can be ſhewn. This is alſo always the place of ſettlement of a baſtard child; for a baſtard having in the eye of the law no father, cannot be referred to *his* ſettlement, as other children may. However, this rule admits of ſeveral exceptions; as in the caſe of a baſtard born in a place by colluſion; after the order of removal is made out; in removing; after the removal, and before the appeal; in a ſtate of vagrancy; in a priſon; in a lying-in hoſpital; and under a certificate. But with regard to legitimate children, though the place of birth be *prima facie* the ſettlement, yet it is not concluſively ſo; for there are, 2. Settlements by *parentage*, being the ſettlement of one's father or mother; all children being really ſettled in the parith where their parents are ſettled, until they get a new ſettlement for themſelves. A new ſettlement may be acquired ſeveral ways; as, 3. By *marriage*: for a woman, marrying a man that is ſettled in another parith, changes her own; the law not permitting the ſeparation of huſband and wife. But if the man has no ſettlement, her's is ſuſpended during his life, if he remains in England, and is able to maintain her; but in his abſence, or after his death, or during (perhaps) his inability, ſhe may be removed to her old ſettlement. The other methods of acquiring ſettlements in any parith are all reducible to this one, of *forty days reſidence* therein; but this forty days reſidence (which is conſtrued to be lodging or lying there) muſt not be by fraud, or ſtealth, or in any clandeſtine manner, but accompanied with one or other of the following concomitant circumſtances. The next method, therefore, of gaining a ſettlement is, 4. By forty days reſidence and *notice*. For if a ſtranger comes into a parith, and delivers notice in writing of his place of abode, and number of his family, to one of the overſeers (which

muſt

must be read in the church and registered), and resides there unmolested for forty days after such notice, he is legally settled thereby. 13 & 14 Car. II. cap. 12. 1 Jac. II. cap. 17. 3 & 4 W. & M. cap. 11. But there are also other circumstances equivalent to such notice: therefore, 5. *Renting* for a year a tenement of the yearly value of 10*l.* and residing forty days in the parish, gains a settlement without notice. 13 & 14 Car. II. cap. 12. 6. Being charged to and paying the public *taxes* and levies of the parish, excepting those for scavengers, highways, house, and windows. 9 Geo. I. cap. 7. 21 Geo. II. cap. 10. 18 Geo. III. cap. 26. And, 7. Executing, when legally appointed, any public parochial *office* for a whole year in the parish, as churchwarden, &c. are both of them equivalent to notice, and gain a settlement, if connected with a residence of forty days. 3 & 4 W. & M. cap. 11. 8. Being *hired* for a year, when unmarried and childless, and *serving* a year in the same service; and, 9. Being bound an *apprentice* for seven years, give the servant and apprentice a settlement without notice, in that place wherein they serve the last forty days. 3 & 4 W. & M. cap. 11. 8 & 9 W. III. cap. 10. 31 Geo. II. cap. 11. 10. Lastly, the having an *estate* of one's own, and residing thereon forty days, however small the value may be, in case it be acquired by act of law, or of a third person, as by descent, gift, devise, &c. is a sufficient settlement; but if a man acquire it by his own act, as by purchase (in its popular sense, in consideration of money paid), then, unless the consideration advanced, *bona fide*, be 30*l.* it is no settlement for any longer time than the person shall inhabit thereon. 9 Geo. I. cap. 7. All persons, not so settled, may be removed to their own parishes on complaint of the overseers, by two justices of the peace, if they shall adjudge them likely to become chargeable to the parish into which they have intruded; unless they are in a way of getting a legal settlement, as by having hired a house of 10*l.* per annum, or living in an annual service; for then they are not removeable. And in all other cases, if the parish to which they belong will grant them a certificate, acknowledging them to be their parishioners, they cannot be removed, because likely to become chargeable, but only when they become actually chargeable. But such certificated persons can gain no settlement by any of the means above mentioned, unless by renting a tenement of 10*l.* per annum, or by serving an annual office in the parish, being legally placed therein: neither can an apprentice or servant to such certificated person gain a settlement by such their service. 8 & 9 W. III. cap. 30. 12 Ann. cap. 18. These are the general heads of the laws relating to the *poor*, which, by the resolutions of the courts of justice thereon, within a century past, are branched into a great variety. And yet notwithstanding the pains that have been taken about them, they still remain very imperfect, and inadequate to the purposes for which they are designed. Blackst. Comm. book i. p. 360, &c. For a variety of cases and arguments relating to the settlement, removal, &c. of the *poor*, see Burn's Justice, art. *Poor*.

POOR, or POWER, in *Ichthyology*, a name given by the people of Cornwall to a species of bearded gadus. This is the GADUS *minutus* of Linnæus, and is the only species of cod-fish with three dorsal fins that is found in the Mediterranean sea. It is taken in great quantities near Marseilles, and esteemed good, but incapable of being salted or dried. Its length is little more than six inches.

POOR *man's pepper*, in *Botany*. See DITTANDER.

POOSPANSCUM, in *Natural History*, the name of a peculiar species of fossil in the East Indies. It is of the nature of the blende, or mock-lead, with us; but it is not formed into so large flakes, but more resembles the steel-grained lead ores. It is found in the beds of rivers, and when calcined, it is used with the juices of certain herbs, for ulcers and other cutaneous disorders. Before calcination it is also used by the women to make their hair of a fine glossy black colour, which it performs very neatly.

POPÆ, among the Romans, were such persons as attended the sacrifices, whose business it was to provide victims, and to kill them after they had knocked them down. They were half naked, their shoulders, arms, and upper parts of their bodies being uncovered as far as their navels, and the rest covered to the mid-leg with a linen apron, or the skins of the sacrifices; and they wore crowns of laurel upon their heads. See SACRIFICE.

POPE, *papa*, i. e. *universal father*, the bishop of Rome; being the head or patriarch of the Roman catholic church. Father le Cointe, in his Annals, observes, from St. Jerom, St. Cyprian, St. Gregory, St. Augustine, and Sidonius Apollinaris, that the title *pope* was anciently given to all bishops. Accordingly we find, that in the eighth general council held at Constantinople, in the year 869, which was composed of three hundred bishops, all the patriarchs were there called *popes*.

Bishops were also addressed under the term *bishops*, and *beatitude*; and their churches were called *episcopal sees*. He adds, that it was only in the eleventh century, that Gregory VII. first appointed, in a synod held at Rome, that the title *pope* should be restrained to the bishop of Rome, as a particular distinction and prerogative.

It is one of the maxims of Gregory, contained in a famous piece, entitled Dictatus *Papæ*, that there is no name in the world but his, i. e. as some understand it, he alone is to be styled *pope*; and F. Paul observes, that the name of *pope*, formerly common to all bishops, was appropriated by Gregory VII. to the Roman pontif.

In the council of the Lateran, held under Innocent III. the *pope* was declared *ordinary of ordinaries*.

The power of the *pope* has advanced by slow degrees to that plenitude in which it has been exercised in later times. It appears, that towards the end of the third century, the bishop of Rome, in common with those of Antioch and Alexandria, had a kind of pre-eminence over all others, because they were considered as rulers of primitive and apostolic churches. However, this pre-eminence implied no superior power and authority, infringing on the rights and liberties of other bishops, but merely a power of convening councils, of presiding in them, of collecting voices, and such other things as were essential to the order of those assemblies; a power similar to that which Cyprian, bishop of Carthage, possessed in the African churches. About the close of the fourth century, the bishop of Rome surpassed all his brethren in the magnificence and splendor of the church over which he presided; in the riches of his revenue and possessions; in the number and variety of his ministers; in his credit with the people, and in his sumptuous and splendid manner of living. Nevertheless it is certain, that at this time the bishops of that city had not acquired the pre-eminence of power and jurisdiction in the church, which they afterwards enjoyed. Differences in religion were ultimately decided, and ecclesiastical laws were enacted either by the emperor or by councils; nor does it appear, that any of the bishops acknowledged, that they derived their authority from the permission and appointment of the bishop of Rome, or that they were exempt bishops by the favour of the apostolic see. But in this century we may trace, in the imprudence of the emperors, the dexterity of the Roman prelates themselves, and the inconsiderate zeal and precipitate judgment of certain bishops, several of those steps by which they afterwards ascended to the summit of ecclesiastical power and despotism. The law of Valentinian in 372, which empowered the bishop of Rome to examine and judge other bishops, that religious disputes might not be decided by profane and secular judges, approved and confirmed in a council at Rome in 378, proved very favourable to the ambition and advancement of the Roman pontif; and his votaries have likewise laid great stress on the fourth canon of the council held at Sardis, in 347, which prohibited the election of a successor to a bishop deposed by neighbouring prelates, before the bishop of Rome had examined the cause, and pronounced sentence: but the authority of this council has been generally considered as extremely dubious, and its decrees have been regarded by many as altogether fictitious and spurious. In the fifth century a variety of circumstances united in augmenting the power and authority of the bishop of Rome; though he had not, as yet, assumed the dignity of supreme law-giver and judge of the whole Christian church. The bishops of Alexandria and Antioch, unable to make head against the lordly prelate of Constantinople, fled often to the Roman pontif for succour; and the inferior order of bishops used the same method, when their rights were invaded by those prelates. The protection afforded them by the Roman pontif was the means of extending his dominion in the East, and of imperceptibly establishing his supremacy. In the West its increase was owing to other causes: the declining power, and the supine indolence of the emperors, left the authority of the bishop who presided in their imperial city almost without control. The incursions, moreover, and triumphs of the barbarians contributed to its advancement; for the kings, who penetrated into the empire, when they perceived the subjection of the multitude to the bishops, and the dependence of the bishops upon the Roman pontif, resolved to reconcile this ghostly ruler to their interests, by loading him with various kinds of honours and benefits. However, the Africans could not be prevailed upon, by threats or promises, to submit the decision of their controversies, and the determination of their causes, to the Roman tribunal. Although the Roman pontifs artfully availed themselves of every circumstance

cumſtance that could contribute to their obtaining univerſal dominion, yet it is certain, that towards the cloſe of the ſixth century, the emperors and the nations in general were far from being diſpoſed to bear with patience the yoke of ſervitude, which the ſee of Rome was arrogantly impoſing upon the Chriſtian church. The Gothic princes ſet bounds to the power of the biſhop of Rome in Italy, permitted none to be raiſed to the pontificate without their approbation, and reſerved to themſelves the right of judging concerning the legality of every new election. They enacted ſpiritual laws, called the religious orders before their tribunals, and ſummoned councils by their regal authority.

In the beginning of the ſeventh century, or about the year 606, Boniface III. as Baronius relates, engaged the emperor Phocas to take from the biſhop of Conſtantinople the title of œcumenical or univerſal biſhop, and to confer it upon the Roman pontifs; and thus, as it is ſaid, introduced the papal ſupremacy. But the ambitious views of the biſhops of Rome were ſtill vigorouſly oppoſed, not only by ſeveral emperors and princes, but alſo by whole nations; and the civil magiſtrate retained his influence in religious matters, and the Roman pontifs were obliged to acknowledge their ſubordination to the regal authority. No event ſeems to have been more favourable to their ambitious views than the part they took in the eighth century, in promoting the advancement of the traitor Pepin to the throne of Childeric III. in anointing and crowning him as king of France. This proved an abundant ſource of opulence and credit to the church, and to its aſpiring miniſters; for Pepin, having obtained two victories over Aiſtulphus, king of the Lombards, in 754 and 755, compelled him to deliver up to the ſee of Rome the exarchate of Ravenna, Pentapolis, and all the cities, caſtles, and territories, which he had ſeized in the Roman dukedom. And thus the biſhop of Rome was raiſed to the rank of a temporal prince. The grant of Pepin was afterwards confirmed by his ſon Charlemagne, who alſo ceded to the Roman pontifs ſeveral cities and provinces in Italy, which were not contained in his father's grant; reſerving to himſelf the ſupreme dominion. It is ſaid that a pretended grant of Conſtantine the Great was made uſe of both by Adrian I. and Leo III. in order to perſuade Charlemagne to this donation. At this time the power of the *pope* was ſubordinate to that of the emperors, and confined within very narrow limits. The right of election was veſted in the emperor, and his approbation was neceſſary to the conſecration of the biſhops of Rome. However, their authority and affluence greatly increaſed from the time of Lewis the Meek, and more eſpecially from the acceſſion of Charles the Bald to the imperial throne. Their power was augmented in a very conſiderable degree by the diviſions and troubles that aroſe in the empire towards the cloſe of the ninth century: the emperors were diveſted of their eccleſiaſtical authority, the power of the biſhops was greatly diminiſhed, and even the authority of both provincial and general councils began to decline. The Roman pontifs availed themſelves of various circumſtances that occurred at this time to promote an opinion, that the biſhop of Rome was conſtituted by Jeſus Chriſt ſupreme legiſlator and judge of the church univerſal; and that, therefore, the biſhops derived all their authority from the Roman pontif, and that the councils could not determine any thing without his permiſſion and conſent. They had alſo recourſe to forged memorials, acts of councils, and epiſtles, in order to eſtabliſh their claims to ſupremacy. The moſt notorious forgeries of this kind were the DECRETAL epiſtles, compiled by an obſcure writer, but aſcribed, in order to give them credit, to Iſidore, biſhop of Seville. In the tenth century a novel doctrine was propagated by ſome mercenary and intereſted prelates, who publicly maintained, that the Roman pontifs were not only biſhops of Rome, but of the whole world; and that their authority, though divine in its origin, was conveyed to them by St. Peter, the prince of the apoſtles. The CRUSADES of the eleventh century very much contributed to the augmentation of the influence and authority of the Roman pontifs; ſo that towards the cloſe of this century they ſeem to have attained the zenith of their dominion. From the time of Leo IX. the *popes* employed every method, which the moſt artful ambition could ſuggeſt, to render their dominion both deſpotic and univerſal. They not only aſpired to the character of ſupreme legiſlators in the church, to an unlimited juriſdiction over all ſynods and councils, whether general or provincial, to the ſole diſtribution of all eccleſiaſtical honours and benefices, as divinely authoriſed and appointed for that purpoſe, but they carried their inſolent pretenſions ſo far as to give themſelves out for lords of the univerſe, arbiters of the fate of kingdoms and empires, and ſupreme rulers over the kings and princes of the earth. Gregory VII. ſeems to have exceeded all his predeceſſors in the luſt of dominion, as well as in the ſucceſs which attended his endeavours to obtain it. He conſidered the Roman pontif, under the character of Chriſt's vicegerent, as the king of kings, and the whole univerſe as his rightful domain. Accordingly, with an arrogance hardly to be paralleled, he claimed tribute from France, Saxony, Spain, England, the moſt powerful of the German princes, Hungary, Denmark, Poland, &c. ſoliciting them to do homage to the Roman ſee, to make a ſolemn grant of their kingdoms and territories to the prince of the apoſtles, and to hold them under the juriſdiction of his vicar at Rome, as fiefs of the apoſtolic ſee. If the ſucceſs of this pontif had been anſwerable to the extent of his inſolent views, all the kingdoms of Europe would have been this day tributary to the Roman ſee, and its princes the ſoldiers or vaſſals of St. Peter, in the perſon of his pretended vicar upon earth. Many of his attempts, however, were crowned with a favourable iſſue, and from the time of his pontificate the face of Europe underwent a conſiderable change, and the prerogatives of the emperors, and other ſovereign princes, were neceſſarily diminiſhed. In Italy his ſucceſs was the moſt remarkable; for he prevailed upon Mathilda, the daughter of Boniface, duke of Tuſcany, to ſettle all her poſſeſſions in Italy and elſewhere upon the church of Rome; and though the Roman pontifs have not been able to preſerve the whole inheritance, thus granted to them, they ſtill remain in the poſſeſſion of a conſiderable part of it. See ECCLESIASTICAL *ſtate*.

The monſtrous power of erecting new kingdoms, which had been claimed by the pontifs from the time of Gregory VII. was not only aſſumed, but exerciſed alſo by Alexander III. in a remarkable inſtance; for in the year 1179 he conferred the title of king, with the enſigns of royalty, upon Alphonſo I. duke of Portugal, who, under the pontificate of Lucius II. had rendered his province tributary to the Roman ſee. In the thirteenth century the ſame ambitious ſpirit governed the councils and proceedings of ſucceeding pontifs; and they were induſtrious in inculcating the maxim, that the biſhop of Rome is the ſupreme lord of the univerſe, and that neither princes nor biſhops, civil governors nor eccleſiaſtical rulers, have any lawful power in church or ſtate, that is not derived from them. In conſequence of this arrogant pretenſion, they not only claimed the right of diſpoſing of eccleſiaſtical benefices, but of conferring civil dominion, and of dethroning kings and emperors, according to their good pleaſure. They alſo aſſumed to themſelves the power of diſpoſing of the various offices of the church, and of creating and depoſing biſhops, abbots, and canons, according to their fancy. Inſtances of theſe practices occur in the pontificates of Innocent III. Honorius III. Gregory IX. and of ſeveral of their ſucceſſors. And Boniface VIII. maintained in the moſt expreſs and impudent terms, that the univerſal church was under the dominion of the pontifs, and that princes and lay patrons, councils and chapters, had no more power in ſpiritual things than what they derived from Chriſt's vicar upon earth. Under Innocent III. and Nicolas IV. the poſſeſſions and revenues of the Roman ſee received very conſiderable augmentation, partly by the events of war, and partly by the munificence of kings and emperors; and arrived at that high degree of grandeur and opulence, which it yet maintains even in our times. The former of theſe pontifs followed the ſteps of Gregory VII. and not only uſurped the deſpotic government of the church, but claimed alſo the empire of the world, and thought of nothing leſs than ſubjecting the kings and princes of the earth to his lordly ſceptre. In Aſia and Europe he diſpoſed of crowns and ſceptres with the moſt wanton ambition. The Roman pontifs derived great advantages in the exerciſe of their dominion from the attachment and zeal of the ſeveral orders of MENDICANTS. In the fourteenth century the papal authority diminiſhed by reaſon of the continued reſidence of the *popes* in France; and in the fifteenth century, by the ſchiſm which happened in the papacy, the dawnings of the reformation, and a variety of other concurring cauſes. In the councils of Conſtance, held in 1414, and of Baſil, opened in 1431, the power of the Roman pontifs was declared to be inferior and ſubordinate to that of general councils, and the papal impoſitions, called expectatives, reſervations, and proviſions, were entirely annulled. The reviſal of learning, and the progreſs of the reformation in the ſucceeding century, contributed very much to the abridgment of the papal authority; not only by withdrawing ſeveral provinces from the yoke of papal tyranny, but by producing a change in the ſentiments of many kings and princes, and ſovereign ſtates, who adhered to the religion of Rome, with reſpect to the claims and

pretensions of its bishop. Besides, it is necessary to observe, that the authority of the *pope* is circumscribed by various limits in the different countries where his spiritual jurisdiction is acknowledged; and that in all his decisions relating to the government of the church, he previously consults the cardinals, who form his privy-council; and in matters relating to religious doctrine, he is obliged to ask the advice of eminent divines; and that matters of different degrees of moment are referred to the conduct of certain colleges, called CONGREGATIONS. It is well known, that when the authority of the *pope* declined in Europe, he fought to extend the limits of his spiritual dominion to other parts of the globe, and for this purpose deputed missionaries to gain profelytes. And a new order was formed, that became afterwards so famous, under the appellation of JESUITS, in order to preserve those parts of the papal dominions that remained yet entire, and to augment them by new acceſſions. The fate of this fraternity is well known; and many circumſtances ſeem to concur in different countries, hitherto devoted to the ſee of Rome, that are likely to reduce within very narrow limits the ſpiritual juriſdiction and dominion of the *pope*.

The *pope* is choſen by the cardinals out of their own body.

In the firſt ages of the church, the people and the prieſts, and ſometimes only the prieſts, elected the *pope*, according to the plurality of voices. The emperors afterwards claimed the right of confirming the election. In the eighth century, *pope* Adrian I. in a council of biſhops aſſembled at Rome, conferred upon Charlemagne and his ſucceſſors the right of election; and they referred to themſelves the privilege of approving the perſon that was elected by the prieſts and people; nor was the conſecration of the elected pontif valid, unleſs performed in the preſence of the emperor's ambaſſadors. The election, however, after undergoing many revolutions as to the form of it, is now referred to the CARDINALS in CONCLAVE.

The ſee of the *pope* is at Rome, whence he iſſues out his orders, called *briefs* and *bulls*, throughout the catholic world.

Hiſtory mentions a *popeſs*, Joan. The reality hereof has been oppoſed and defended by many learned men. The tradition might poſſibly take its riſe from the weakneſs of *pope* John VIII. in reſtoring Photius to his communion, and owning him as true patriarch; for he hence got the appellation of woman; as that prince called *king Mary* did, by leaving himſelf to be governed by queen Mary his wife.

M. Spanheim, profeſſor of theology at Leyden, has lately written very amply on the ſubject; and ſhews it to be a queſtion *de facto*, ſcarce determinable at this time of day.

POPE, in *Ornithology*, a name by which the people in many parts of England call the *anas oſtrica clypeis*. See PUFFIN.

POPEDOM, or PAPARY, in *Eccleſiaſtical Hiſtory*, denotes the office and juriſdiction of the POPE.

POPERY, in *Eccleſiaſtical Hiſtory*, comprehends the religious doctrines and practices adopted and maintained by the church of Rome. The following ſummary, extracted chiefly from the decrees of the council of Trent, continued under Paul III. Julius III. and Pius IV. from the year 1545 to 1563, by ſucceſſive ſeſſions, and the creed of pope Pius IV. ſubjoined to it, and bearing date November 1564, may not be unacceptable to the reader. One of the fundamental tenets, ſtrenuouſly maintained by popiſh writers, is the infallibility of the church of Rome; though they are not agreed, whether this privilege belongs to the pope, or a general council, or to both united; but they pretend that an infallible living judge is abſolutely neceſſary to determine controverſies, and to ſecure peace in the Chriſtian church. However proteſtants alledge, that the claim of infallibility in any church is not juſtified by the authority of Scripture; much leſs does it pertain to the church of Rome; and that it is inconſiſtent with the nature of religion, and the perſonal obligations of its profeſſors; and that it has proved ineffectual to the end for which it is ſuppoſed to be granted, ſince popes and councils have diſagreed in matters of importance, and they have been incapable, with the advantage of this pretended infallibility, of maintaining union and peace. See INFALLIBLE.

Another eſſential article of the popiſh creed is the ſupremacy of the pope, or his ſovereign power over the univerſal church. On this ſubject it is maintained, that every Chriſtian, under pain of damnation, is bound to be ſubject to the pope; that no appeals may be made from him; and that he alone is the ſupreme judge of all perſons, in all eccleſiaſtical cauſes, but that he himſelf can be judged by no man. To this purpoſe they aſſert, that the church of Rome is the catholic church; the mother and miſtreſs of all churches; that the pope is the vicar of Chriſt, ſucceſſor of St. Peter, and the ſupreme paſtor over all the world. And they likewiſe aſſert his dominion over temporal princes; pretending that he may over-rule what they command; excommunicate and depoſe them, if they contradict his commands; and abſolve their ſubjects from allegiance, and exempt the clergy from their juriſdiction.

This exorbitant power hath been challenged by the pope for many ſucceſſive ages, and in ſeveral inſtances actually exerciſed. Thus Gregory VII. excommunicated the emperor Henry IV. and gave away his kingdoms to Rudolphus, duke of Sweden. Gregory IX. excommunicated the emperor Frederick II. and abſolved his ſubjects from their oath of allegiance. Pope Paul III. excommunicated and depoſed Henry VIII. king of England, and commanded all his ſubjects, under a curſe, to withdraw their obedience from him. Pope Pius V. and Gregory XIII. damned and depoſed queen Elizabeth, and abſolved her ſubjects from their allegiance. And this practice has been warranted by the decrees of the third Lateran council under pope Alexander III. and by the fourth Lateran council under pope Innocent III. though it is contrary to the expreſs language of Scripture, to the doctrine and conduct of the apoſtles and primitive fathers, and to the confeſſions and practice of the ancient biſhops of Rome, and altogether inconſiſtent with the rights of government and the welfare of ſociety.

Farther, the doctrine of the ſeven ſacraments is a peculiar and diſtinguiſhing doctrine of the church of Rome: theſe are baptiſm, confirmation, the euchariſt, penance, extreme unction, orders, and matrimony. The council of Trent (ſeſſ. 7. can. 1.) pronounces an anathema on thoſe who ſay, that the ſacraments are more or fewer than ſeven, or that any one of the above number is not truly and properly a ſacrament. And yet it does not appear that they amounted to this number before the twelfth century, when Hugo de St. Victore, and Peter Lombard, about the year 1144, taught, that there were ſeven ſacraments. The council of Florence, held in 1438, was the firſt council that determined this number. Theſe ſacraments confer grace, according to the decree of the council of Trent (ſeſſ. 7. can. 8.) *ex opere operato*, or by the mere adminiſtration of them: three of them, *viz.* baptiſm, confirmation, and orders, are ſaid (can. 9.) to impreſs an indelible character, ſo that they cannot be repeated without ſacrilege; and the efficacy of every ſacrament depends on the intention of the prieſt by whom it is adminiſtered (can. 11.) Pope Pius expreſly enjoins, that all theſe ſacraments ſhould be adminiſtered according to the received and approved rites of the catholic church. With regard to the euchariſt in particular, we may here obſerve, that the church of Rome holds the doctrine of TRANSUBSTANTIATION; the neceſſity of paying divine worſhip to the conſecrated bread, or HOST; the propitiatory ſacrifice of the MASS, according to their ideas of which Chriſt is truly and properly put to death in a ſacrifice, as often as the prieſt ſays maſs; and *ſolitary* MASS, in which the prieſt alone, who conſecrates, communicates; and allows COMMUNION only in one kind, viz. the bread, to the laity. Seſſ. 14.

The doctrine of MERITS is another diſtinguiſhing tenet of *popery*; with regard to which the council of Trent has expreſly decreed (ſeſſ. 6. can. 32.) that the good works of juſtified perſons are truly meritorious; deſerving not only an increaſe of grace, but eternal life, and an increaſe of glory; and it has anathematized all who deny this doctrine. Of the ſame kind is the doctrine of ſatisfactions; which ſuppoſes that penitents may truly ſatisfy, by the afflictions they endure under the diſpenſations of Providence, or by voluntary penances to which they ſubmit, for the temporal penalties of ſin, to which they are ſubject, even after the remiſſion of their eternal puniſhment. Seſſ. 6. can. 30. & ſeſſ. 14. can. 8. & 9. In this connection we may mention the popiſh diſtinction of venial and mortal ſins: the greateſt evils ariſing from the former are the temporary pains of purgatory; but no man, it is ſaid, can obtain the pardon of the latter without confeſſion to a prieſt, and performing the penances which he impoſes.

The council of Trent (ſeſſ. 14. can. 1.) has expreſly decreed, that every one is accurſed, who ſhall affirm, that PENANCE is not truly and properly a ſacrament inſtituted by Chriſt in the univerſal church, for reconciling thoſe Chriſtians to the divine majeſty, who have fallen into ſin after baptiſm; and this ſacrament, it is declared, conſiſts of two parts, the matter and the form; the matter is the act of the penitent, including contrition, confeſſion, and ſatisfaction; the form of it is the act of abſo-

fession on the part of the priest. Accordingly it is enjoined, that it is the duty of every man, who hath fallen after baptism, to confess his sins once a year, at least, to a priest; that this confession is to be secret, for public confession is neither commanded nor expedient; and that it must be exact and particular, including every kind and act of sin, with all the circumstances attending it. When the penitent has so done, the priest pronounces an absolution, which is not conditional or declarative only, but absolute and judicial. This secret, or auricular CONFESSION, was first decreed and established in the fourth council of Lateran, under Innocent III. in 1215 (cap. 21). And the decree of this council was afterwards confirmed and enlarged in the council of Florence, and in that of Trent, which ordains, that confession was instituted by Christ; that by the law of God it is necessary to salvation; and that it has been always practised in the Christian church. As for the penances imposed on the penitent, by way of satisfaction, they have been commonly the repetition of certain forms of devotion, as PATER-NOSTERS, or AVE-MARIAS, the payment of stipulated sums, pilgrimages, fasts, or various species of corporal discipline. But the most formidable penance in the estimation of many, who have belonged to the Romish communion, has been the temporary pains of PURGATORY. But under all the penalties which are inflicted or threatened in the Romish church, it has provided relief by its INDULGENCES, and prayers or masses for the dead; performed professedly for relieving and rescuing the souls that are detained in purgatory. Sess. 25.

Another article that has been long authoritatively enjoined and observed in the church of Rome, is the celibacy of her clergy. This was first enjoined at Rome by Gregory VII. about the year 1074, and established in England by Anselm, archbishop of Canterbury, about the year 1105; though his predecessor Lanfranc had imposed it upon the prebendaries and clergy that lived in towns. And though the council of Trent was repeatedly petitioned by several princes and states to abolish this restraint, the obligation of celibacy was rather established than relaxed by this council; for they decreed, that marriage contracted after a vow of continence is neither lawful nor valid; and thus deprived the church of the possibility of ever restoring marriage to the clergy. For if marriage, after a vow, be in itself unlawful, the greatest authority upon earth cannot dispense with it, nor permit marriage to the clergy, who have already vowed continence. Sess. 24. can. 9. See CELIBATE.

To the doctrines and practices above recited may be farther added the worship of IMAGES; to justify which, the papists often leave the second commandment out of their catechisms (see DECALOGUE); the invocation of saints and angels, with respect to which the council of Trent decreed, that all bishops and pastors, who have the cure of souls, do diligently instruct their flocks, that it is good and profitable humbly to pray unto the saints, and to have recourse to their prayers, help, and aid; for which practice no scripture command or example, nor any testimony within the first three hundred years after Christ, can be pleaded: the worship of sacred RELICS, by which they understand not only the bodies and parts of the bodies of the saints, but any of those things that appertained to them, and which they touched; and the celebration of divine service in an unknown tongue, to which purpose the council of Trent hath denounced an anathema on any one who shall say, that mass ought to be celebrated only in the vulgar tongue. Sess. 25, and sess. 22. can. 9. Though the council of Lateran under Innocent III. in 1215 (can. 9.) had expressly decreed, that, because in many parts, within the same city and diocese, there are many people of different manners and rites mixed together, but of one faith, the bishops of such cities or dioceses should provide fit men for celebrating divine offices, according to the diversity of tongues and rites, and for administering the sacraments.

We shall only add, that the church of Rome maintains, that unwritten traditions ought to be added to the holy Scriptures, in order to supply their defect, and regarded as of equal authority; that the books of the APOCRYPHA are canonical scripture; that the vulgate edition of the Bible is to be deemed as authentic; and that the Scriptures are to be received and interpreted according to that sense which the holy mother church, to whom it belongs to judge of the true sense, hath held, and doth hold, and according to the unanimous consent of the fathers. Sess. 4. See INDEX.

Such are the principal and distinguishing doctrines of *popery*, most of which have received the sanction of the council of Trent; and that of the creed of pope PIUS IV. which is received, professed, and sworn to by every one, who enters into holy orders in the church of Rome; and at the close of this creed, we are told, that the faith contained in it is to absolutely and indispensably necessary, that no man can be saved without it. Harduin's Concil. tom. x. p. 1—211.

Many of the doctrines of *popery* were relaxed, and very favourably interpreted by M. de Meaux, bishop of Condom, in his Exposition of the Doctrine of the Catholic Church, first printed in the year 1671; but this edition, which was charged with perverting, in endeavouring to palliate the doctrine of the church, was censured by the doctors of the Sorbonne, and actually suppressed: nor does it appear that they ever testified their approbation in the usual form, of subsequent and altered editions. See the examination of this work by archbishop Wake, in the Preservative against *Popery*, vol. iii. p. 3—112.

POPERY, *declaration against*. See DECLARATION.

POPERY, *laws against*. See PAPISTS, MASS-*books*, PARENTS, and PRÆMUNIRE.

POPLAR, *populus*, in *Botany*, a genus of the *dioecia octandria* class. Its characters are these: the male and female flowers grow upon separate trees; the male flowers, or catkins, have one oblong, loose, cylindrical empalement, which is imbricated; under each scale, which is oblong, plain, and cut on the border, is situated a single flower, without any petal, having a nectarium of one leaf, turbinated at the bottom, and tubulous at the top; and eight stamina, terminated by large four-cornered summits; the female flowers are in catkins like the male, but have no stamina; they have an oval acute pointed germen, with scarce any style, crowned by a four-pointed stigma; the germen afterward becomes an oval capsule, with two cells, including many oval seeds, having hairy down. Linnæus reckons five, and Miller seven species.

The *poplar*, whether black or white, may be easily propagated, either by layers, cuttings, or suckers, of which the white kind always produces a great many from the root. The best season for the transplanting these suckers is in October, when the leaves begin to decay; and they should be removed into a nursery for two or three years, at the end of which time they will have got strength enough to be transplanted into the places where they are to remain.

When they are to be propagated by cuttings, it is best to do that in February, cutting off truncheons two or three feet long; which being thrust down a foot and a half deep in the ground, will take root very quickly, and if the soil be moist, will grow to a considerable size in a very few years.

The black *poplar* is not so easily raised from these large truncheons, but should be planted in cuttings, of about a foot and a half long, planting them a foot deep in the ground. This will grow on almost any soil; but does much better on a moist one than on any other. They are the fittest of all trees for raising a shade quickly, as they will grow fourteen feet in height sometimes in one season, and in four or five years will be large trees. Miller. See ARBRE-*tree*, and TACAMAHACCA.

POPLAR-*galls*. The black *poplar* is famous among naturalists for producing a sort of *galls*, or protuberances, of various shapes and sizes, on its leaves and branches, which have been usually mistaken for the lodgments of worms hatched from the eggs of an ichneumous fly; but they are in reality produced by the operation of a viviparous insect, called the PUCERON, for the bringing up of its offspring.

These *galls* are of the bladder-kind, being usually thinned over, and more or less hollow within, not woody, as those of the oak, &c. They proceed from different parts of the plant, some from the pedicles of the leaves, and many from the young shoots; they are very various in figure, some being roundish, others oblong, others crooked and contorted in various directions, and some of them are in the figure of horns, like those of the turpentine-tree, and of the same origin.

POPLES, in *Anatomy*, the inner part of the juncture where by the thigh-bone is articulated with the tibia; popularly called the *ham*.

POPLICANI, POPLICANI, or PUBLICANI, a name given in the West to the Manichees; or rather to a particular branch thereof, called in the East PAULICIANS.

POPLIFUGIA, in *Antiquity*. See FUGALIA.

POPLITÆUS, or SUB-POPLITÆUS, a muscle which arises from the external and inferior protuberance of the thigh-bone, and passing over the joint obliquely, is inserted into the superior and internal part of the tibia. It is fixed above, by a strong narrow tendon, to the outer edge of the inner condyle of the os femoris, and to the neighbouring posterior ligament of the joint; from thence it runs obliquely downward, under the inner condyle of the os femoris; its flat and pretty thick fleshy body increasing gradually in breadth, till it is fixed in the backside of the head of the tibia all the way to the oblique line observable

ferrable on that ſide. It aſſiſts in bending of the leg, and turns it inwards. See *Tab. Anat. [Myol.] fig. 7. n. 27. 27. 27.* See LEG.

POPLITEA, in *Anatomy*, is a name given to the third vein of the leg.

It ariſes from the heel, where it is formed out of ſeveral branches coming both from the heel and ankle.

It lies pretty deep in the fleſh; and, aſcending up to the ham, terminates in the crural vein.

POPPY, *papaver*, in *Botany*, a genus of the *polyandria monogynia* claſs. Its characters are theſe: the empalement of the flower is oval, indented, and compoſed of two almoſt oval, concave, obtuſe leaves, which fall off; the flower has four large roundiſh petals, which ſpread open, with a great number of hair-like ſtamina, terminated by oblong, compreſſed, erect ſummits; in the centre is placed a large, roundiſh germen, having no ſtyle, but crowned by a plain, radiated, target-ſhaped ſtigma; the germen afterward becomes a large capſule, crowned by the plain ſtigma, having one cell, opening in many places at the top under the crown, and is filled with ſmall ſeeds. There are nine ſpecies, including a great number of varieties.

We have many ſpecies of this plant cultivated in gardens for the beauty of the flowers. They are all eaſily propagated by ſowing the ſeeds in September. When the young plants come up, they are to be cleared from weeds, and thinned to a proper diſtance by pulling ſome up where they ſtand too thick; for they never thrive well if they are tranſplanted. They are to be left, according to their ſizes, at the diſtance of a foot and a half for the larger, and about half this ſpace for the leſs.

They are very ſhowy flowers, and make a ſplendid appearance in gardens; but they are of ſhort duration, and of an offenſive ſmell, which makes them leſs valued at preſent than they have been.

Some ſow theſe plants in ſpring, but it is not ſo well; becauſe they then have not time to get ſtrength before autumn, when they are to flower; and for that reaſon thoſe ſown in ſpring uſually flower weakly. Miller.

Thoſe moſt uſed for medicinal purpoſes, are the white, *papaver hortenſe ſemine albo*; and black, *papaver hortenſe ſemine nigro*. The heads of theſe plants are of ſingular virtue to promote ſleep, aſſuage pain, &c. They ſtop diarrhœas, hæmorrhages, &c.

Of the juice of the white *poppy*, which is the largeſt, is prepared the OPIUM ſold in the ſhops; (for the method of cultivating which at Babar, ſee London Med. Obſ. vol. v. p. 317, &c.) and of the juice of the leaves, MECONIUM.

A decoction of *poppy* heads in water, ſtrongly preſſed out, depurated by ſettling, then clarified with white of eggs, and inſpiſſated, yields an extract amounting to one-fifth or one-ſixth the weight of the heads. It is ſaid that two grains of this preparation are equivalent to one grain of opium, and that the extract is not liable to produce a naufea or giddineſs which generally follow the uſe of pure opium. See Mr. Arnot's method of preparing it, &c. in the Edinb. Medical Eſſays, vol. v. art. 11.

The common wild red *poppy*, or *papaver erraticum*, is one of the moſt troubleſome and miſchievous weeds the farmers are plagued with among their corn, and it is the moſt difficult to thoroughly deſtroy of almoſt any other. Its ſeed will lie a long time in land unplough'd, without ever ſhooting; but they will be ſure to grow with the firſt crop of corn. Mr. Tull gives an inſtance of the ſeeds of this plant being buried four and twenty years in a field of ſaint-foin, and at the end of that time, the land being ploughed for wheat, they all grew up among the corn, though they had lain dormant ſo long before.

The only part made uſe of is the flowers, which yield on expreſſion a deep red juice, imparting the ſame colour to watery liquors, and a brighter though paler red to rectified ſpirit; and the colouring matter, on the admixture of alkaline liquors, is obſerved to change into a dark purple, and not into a green, like that of clove-gilly-flowers, red roſes, and other bright red flowers. A ſtrong infuſion of them is prepared in the ſhops, by pouring four pints and a half of boiling water upon four pounds of the freſh leaves, ſtirring them over the fire till the flowers are all immerged, and ſetting them by to ſteep for a night. This infuſion, preſſed out and depurated by ſettling, is reduced, by a proper addition of ſugar, into a deep red ſyrup. It has been the general opinion of authors, that the narcotic quality of the *red poppy* lay in its flowers; but Mr. Boulduc, in his courſe of experiments for the finding out an European plant which ſhould yield us a juice of the nature of the opium of the Eaſt, without its bad effects, found that the virtue of this plant, which is very great, lay much more in the heads than the flowers; and from four ounces of theſe heads, while freſh and green, he obtained five drachms of a ſolid extract, of the nature of opium, two, three, or four grains of which were a full doſe, and which poſſeſſed the virtues of opium, and might be given with great ſucceſs and ſafety in obſtinate coughs and other ſuch caſes. Hiſt. Acad. Par. 1712.

POPPY, *horned*. See CELANDINE.

The yellow horned *poppy*, called by authors *papaver corniculatum luteum*, is one of thoſe vegetable poiſons of our own growth, which may be very miſchievous by their not being generally known or ſuſpected to be ſo. We have an account of the ſtrange effects of this plant in the Philoſophical Tranſactions, in an inſtance of a family in Cornwall, who eat of a pye made of the roots of this inſtead of thoſe of eryngo, or ſea-holly, which it is the cuſtom of the poorer people there to make into a coarſe ſort of a pye for their food. See Phil. Tranſ. N° 242.

POPPY, *prickly, argemone*, in *Botany*, a genus of the *polyandria monogynia* claſs. Its characters are theſe: the flower hath a three-leaved empalement, and ſix roundiſh petals, which ſpread open, and are larger than the empalement; and in the centre is ſituated an oval five-cornered germen, which is attended by a great number of ſtamina; it becomes an oval ſeed-veſſel, having five angles and cells, filled with ſmall rough ſeeds. Miller mentions only one ſpecies, which is an annual plant, very common in moſt parts of the Weſt Indies, called by the Spaniards *ſpec. ad inferos*, or the devil's fig. There is no great beauty or uſe in this plant among us. Linnæus enumerates three ſpecies.

POPPY, *ſpotted*, a ſpecies of the *cucubalus*, or *berry-bearing* CHICK-WEED. This ſtands in the catalogue of medicinal plants under the title *lichen album*. See LICH.

POPPY-*ſeeds*. The *poppy-ſeed* is of a more delicious taſte than ſweet almonds; it is oily and farinaceous. Dr. Alſton ſays, he has eaten large quantities of the black as well as the white ſeed, and never found it inſalubrious or noxious. See Med. Eſſ. Edinb. vol. v. art. 12.

If emulſions of *poppy-ſeeds* have been found ſerviceable in coughs, catarrhs, heat of urine, and other like diſorders, their virtue is to be aſcribed not to an anodyne, but an emollient quality.

Theſe ſeeds are uſed in food in ſome places, as is their expreſſed oil, which is as wholeſome as olive-oil. Vide Matthiol. p. 476. Geoffr. Mat. Med. vol. ii. p. 313.

The qualities and uſes of this *oil*, with regard to painting, are much the ſame as thoſe of NUT-*oil*; only when it is perfectly good, it is more clear and limpid, and will dry better than the beſt oil of that kind.

POPPY, *ſyrup of*. See MECONIUM.

POPPY, *water*. See WATER.

POPULAGO, in *Botany*. See *Marſh* MARYGOLD.

POPULAR, *popularis*, ſomething that relates to the common people.

The Roman nobility was diſtinguiſhed into two factions; the *optimates*, who adhered ſtrenuouſly to the miniſtry, the ſenate, &c. in oppoſition to the people; and the *populares*, who favoured the rights and pretenſions of the people, in oppoſition to the nobleſſe.

POPULAR *action*. See ACTION.

POPULAR *diſeaſes* are ſuch as become common, and run through the body of the people; called alſo *endemii* and *epidemical* DISEASES.

Hippocrates has written expreſly, De Morbis *Popularibus*.

POPULAR *errors*, are ſuch as people imbibe from one another, by cuſtom, education, and tradition, without having conſidered the reaſon or foundations thereof.

POPULARIA, among the Romans, were ſtreets or places where the people ſat and beheld the games and horſe races.

POPULATION, the ſtate of a country with reſpect to the number of people. See on this ſubject EXPECTATION *of life*, MARRIAGE, MORTALITY, and POLITICAL *arithmetic*.

POPULEUM, or POPULNEUM, in *Pharmacy*, an ungnent prepared of the buds of black poplar, violet leaves, navelwort, and lard bruiſed and macerated; to which are added bramble-tops, leaves of black poppies, mandragors, henbane, nightſhade, lettuce, and burdock, boiled in roſe-water, and ſtrained. It was formerly much uſed as a cooler, in burns, ſcalds, and all ſorts of inflammations, and alſo to aſſuage arthritic pains; but it is now almoſt entirely diſregarded.

POPULICANI. See POPLICANI.

POPULNEUM. See POPULEUM.

POPULUS, in *Botany*. See POPLAR.

PORBEAGLE, in *Ichthyology*, a ſmall ſpecies of SHARK, found on the coaſt of Cornwall; the noſe is long, ſlender towards the end, and ſharp-pointed; the mouth placed far beneath; the body thick and deep, but extremely ſlender juſt at the letting on of the tail; the firſt back-fin is placed almoſt in the middle, the other pretty near the tail; the belly is very deep; the ventral and anal fins are very ſmall; the tail is bifurcated, the upper fork being a little longer than the other. Pennant.

PORCELAIN,

PORCELAIN, or PURCELAIN, a fine ſort of earthen-ware, chiefly manufactured in China, and thence alſo called *china*, or *china-ware*; but brought into Europe from other parts of the Eaſt, eſpecially Japan, Siam, Surat, and Perſia.

The Chineſe call it *tſe-ki*. The word *porcelain* is but little known there; except among a few workmen and merchants; and ſeems derived from the Portugueſe, *porcelana, a cup*.

Scaliger and Cardan, though generally of contrary ſentiments, are yet agreed, that what the Romans called *vaſa murrhina, murrina* and *murrea*, which were firſt ſeen at Rome in Pompey's triumph, and afterwards became ſo very precious, were the *porcelain* of our times.

This may be true: but if the opinion be only founded on Pliny's deſcription of thoſe veſſels, one would rather take them to have been made of a kind of precious ſtones, of a whitiſh colour, but variouſly veined and variegated, found in ſome parts of Parthia.

Oriens murrhina mittit, &c. Plin. Hiſt. Nat. lib. xxxvii. cap. 2. See MURRHINE.

Be this as it will, it is certain, that both Cardan and Scaliger are miſtaken when they tell us, that *porcelain* is made of eggs and ſea-ſhells, beaten ſmall, and buried under-ground for eighty or one hundred years. The account we ſhall here give will put that matter out of all queſtion.

It is not known who was the inventor of *porcelain*; the Chineſe annals, which commonly contain every thing in any reſpect memorable, are perfectly ſilent about it; nor do we know much more of the time of its invention: only it is certain it muſt have been before the beginning of the fifth century, the annals of Feou-leam relating that from the ſecond year of the reign of the emperor Tam, about the year of Chriſt 442, the workers in *porcelain* of that province had alone furniſhed the emperors with it.

Porcelain is now made chiefly, ſome ſay wholly, at Kingtetching, a large town in the province of Kyangſi.

There is ſome indeed made in the provinces of Kanton and Fokyen; but it is of little account, being far inferior in beauty and value to the *porcelain* of Kingtetching. That of Fokyen is perfectly white, without either gloſs or painting. Attempts have been made to remove the manufacture from Kingtetching to Pekin, and other places, but in vain; the *porcelain* made in the new manufactories never coming up to that of the old: ſo that Kingtetching has the honour of ſupplying the greateſt part of the world with this commodity. F. du Halde aſſures us, that even the Japaneſe come to China for it.

There is a current opinion among the Chineſe themſelves, that the *porcelain*-ware of former times was greatly ſuperior to that which they make at preſent; and that the burying china in the earth for a long time, adds to its beauty; but all this is founded on error. The truth is, that our merchants beat down the price of the ware, and thereby compel them to make a worſe kind in general; but they are able to do as fine things now as ever. What gave birth to the opinion, that burying *porcelain*-ware made it good, was, that finer pieces than ordinary are ſometimes found buried. Theſe are all precious vaſes, which the poſſeſſors buried by way of ſecurity in the times of civil war; and it is no wonder, that there are none but of the fineſt kind found buried on theſe occaſions.

PORCELAIN, *manufacture of*. *Porcelain* makes a very curious article in commerce, and not leſs ſo in natural hiſtory. Its manufacture for a long time paſſed as a myſtery in Europe; and that in ſpite of all the endeavours of the Jeſuit miſſionaries to penetrate into the ſecret. The veil, however, was at length drawn: and in a letter of F. d'Entrecolles to F. Orry, from Jauchew, dated September 1, 1712, and publiſhed in French, the whole proceſs is deſcribed in all its circumſtances; with an extract whereof we ſhall here gratify the curious reader. In the manufacture of *porcelain* there are four principal things to be conſidered, viz. the matter it is made of; the art of forming the veſſels, and other works; the colours wherewith it is painted; and, laſtly, the baking or giving it the proper degree of fire. Each of which will make the ſubject of a ſeparate article.

PORCELAIN, *materials of*. There are two kinds of earths, and as many kinds of oils, or varniſhes, uſed in the compoſition of *porcelain*. The firſt earth, called KAOLIN, is intermixed with glittering corpuſcles; the ſecond, called PETUNSE, or PETUNTSE, is a plain white, but exceedingly fine, and ſoft to the touch. They are both found in quarries twenty or thirty leagues from Kingtetching; and hither theſe earths, or rather ſtones, are brought in a number of little barks, inceſſantly paſſing up and down the river Jaotcheou, for that purpoſe. The petunſes are brought in form of bricks; having been ſo cut out of the quarries, where they are naturally pieces of a very hard rock. The white of the beſt petunſe is to border a little on green.

The firſt preparation of theſe bricks is, to break and pound them, firſt into a coarſe powder with iron mallets, then in mortars with peſtles that have ſtone heads, armed with iron, and wrought either with the hand, or with mills.

When the powder is rendered almoſt impalpable, they throw it in a large urn full of water, ſtirring it briſkly about with an iron inſtrument. After the water has reſted a little while, they ſkim off from the top a white ſubſtance formed there, of the thickneſs of four or five fingers, and diſpoſe this ſcum or cream in another veſſel of water. They then ſtir again the water of the firſt urn, and again ſkim it, and thus alternately, till there remain nothing but the gravel of the petunſes at bottom; which they lay aſreſh under the mill, for a new powder.

As to the ſecond urn, wherein are put the ſkimmings of the firſt, when the water is well ſettled, and become quite clear, they pour it off; and with the ſediment, collected at bottom in form of a paſte, fill a kind of moulds: whence, when almoſt dry, they take it out, and cut it into ſquare pieces, which are what they properly call ſquare *petunſes*; reſerving them to be mixed with the kaolin in the proportion hereafter aſſigned.

Theſe ſquares are ſold by the hundred, but it is very rare to meet with them unfalſified; the workmen, who, like the reſt of the Chineſe are arrant knaves in their dealings, uſually mixing refuſe along with them; ſo that they are commonly obliged to purify them before they can be employed.

The *kaolin*, which is the other earth uſed in *porcelain*, is much ſofter than the petunſe, when dug out of the quarry; yet is it this, which by its mixture with the other, gives the ſtrength and firmneſs to the work. F. d'Entrecolles obſerves, that ſome Engliſh or Dutch, having procured ſome petunſes to be bought privately; upon their attempting to make *porcelain* at their return into their own country, could not ſucceed for want of taking kaolin along with it: which the Chineſe being apprized of, ſaid, humorouſly, "That the Europeans were won-"derful people, to go about to make a body, whoſe fleſh "was to ſuſtain itſelf without bones."

The mountains whence the kaolin is dug, are covered without-ſide with a reddiſh earth. The mines are deep, and the matter is found in glebes or clods. The author is of opinion, that the white earth of Malta is not much different from the kaolin, except that it wants the ſilvered particles. The preparation of kaolin is the ſame with that of the petunſes, except that the matter being leſs hard, leſs labour is required. The oil or varniſh, which makes the third ingredient in *porcelain*, is a whitiſh liquid ſubſtance: this is drawn from the hard ſtone, whereof the petunſes are formed; that which is the whiteſt, and whoſe ſtains are the greeneſt, being always choſen for this purpoſe.

The manner of preparing the oil is thus: the petunſes, being waſhed, undergo the ſame preparations as for making the ſquares; excepting that the matter of the ſecond urn is not put in moulds, but the fineſt part of it taken to compoſe the oil. To a hundred pounds of this matter they caſt a mineral ſtone, called *ſhekau*, or *kekao*, reſembling our alum: this ſtone is firſt heated red hot, and thus reduced in a mortar into an impalpable powder; and ſerves to give the oil a conſiſtence; which, however, is ſtill to be kept liquid.

The oil of lime makes the fourth ingredient; the preparation whereof is much more tedious and circumſtantial. They firſt diſſolve large pieces of quick lime, and reduce it to a powder, by ſprinkling water on it; on this powder they lay a couch of dry fern, and on the fern another of the ſlacked lime, and thus alternately, till they have got a moderate pile; which done, they ſet fire to the fern: the whole being conſumed, they divide the aſhes that remain on new couches of dry fern; ſetting them on fire as before. And this they repeat five or ſix times ſucceſſively, or even more; the oil being ſtill the better, as the aſhes are oftener burnt.

In the annals of Feou-leam it is ſaid, that inſtead of fern they anciently uſed the wood of a kind of medlar-tree; and that it was this gave the ancient *porcelains* that admirable hue, which the moderns cannot come up to for want of that wood. But this is become ſcarce in the country, and is no longer uſed. It is certain, however, the quality of the fern and lime contribute very much to the goodneſs of the oil.

A quantity of theſe aſhes of fern and lime is now thrown into an urn full of water: and to a hundred pounds of aſhes is added a pound of ſhekau, which diſſolves therein. The reſt being performed after the ſame manner as in preparing the earth of the petunſes, the ſediment found

at the bottom of the second urn, and which is to be kept liquid, is what they call the *oil of lime*; which the Chinese esteem as the soul of the former oil, and which gives the *porcelain* all its lustre.

This oil is easily sophisticated by adding water to increase the quantity; adding at the same time proportionably of the same stuff to maintain the consistence. Ten measures of oil of petunse usually go to one of lime. To have the mixture just, the two oils should be equally thick.

PORCELAIN *vessels, forming of.* The first thing is, to purify the petunse and kaolin; which, *for* the first, is done after the manner already described in preparing the squares. For the second, as its softness makes it dissolve easily, it is sufficient, without breaking it, to plunge it in an urn full of water in an open basket. The dregs that remain are perfectly useless, and are emptied out of the work-house when a quantity is got together.

The work-houses are properly vast yards walled round, with sheds and other conveniencies for the workmen to work under; as well as other buildings for them to live in. It is almost inconceivable what number of persons are employed in these works; there being scarce a piece of *porcelain* but passes through above twenty hands, before it comes to the painter's work-house; and above sixty before it be brought to perfection.

To make a just mixture of petunse and kaolin, regard must be had to the fineness of the *porcelain* to be made; for the finer *porcelains*, they use equal quantities; four parts of kaolin to six of petunse, for moderate ones; and never less than one of kaolin to three of petunse, for the coarsest.

The hardest part of the work is the kneading and tewing the two earths together; which is done in a kind of large basons, or pits, well paved, and cemented, wherein the workmen trample continually with their feet, relieving one another, till the mass be well mixed, grow hard, and become of the consistence required to be used by the potter.

The earth, when taken out of the basons, is kneaded a second time, but piece-meal, and with the hands, on large slates for the purpose; and on this preparation, in effect, it is, that the perfection of the work depends; the least heterogeneous body remaining in the matter, or the least vacuity that may be found in it, being enough to spoil the whole. The smallest grain of sand, nay, sometimes a single hair, shall make the *porcelain* crack, splinter, run, or warp.

The *porcelain* is fashioned or formed either with the wheel, like our earthen ware, or in moulds. See POTTERY. Smooth pieces, as cups, urns, dishes, &c. are made with the wheel. The reli, i. e. such as are in relievo, as figures of men, animals, &c. are formed in moulds, but finished with the chissel.

The large pieces are made at two operations: one half of the piece is raised on the wheel by three or four workmen, who hold it till it have acquired its figure; which done, they apply it to the other half, which has been formed in the same manner; uniting the two with *porcelain earth*, made liquid by adding water to it, and polishing the juncture with a kind of iron spatula.

After the same manner it is that they join the several pieces of *porcelain* formed in moulds, or by the hand; and after the same manner they add handles, &c. to the cups, and other works formed with the wheel.

The moulds are made after the manner of those of our sculptors; viz. of divers pieces, which severally give their respective figure to the several parts of the model to be represented; and which are afterwards united to form a mould for an entire figure. The earth they are made of is yellow and fat, dug out of its proper quarries, whereof there are abundance about Kingtetching. It is kneaded like potters earth, and when sufficiently mellow, fine, and moderately dry, beating it stoutly, they form it into moulds, according to the works required, either by hand, or on the wheel. These moulds are sold very dear, but they last a long time.

All the works made in moulds are finished by the hand, with several instruments proper to dig, smooth, polish, and to touch up the strokes that escape the mould; so that it is rather a work of sculpture than of pottery. There are some works wherein relievos are added, ready made, as dragons, flowers, &c. others that have impressions in creux; which last are engraven with a kind of puncheons. In the general, all *porcelain* works are to be sheltered from the cold, their natural humidity making them liable to break when they dry unequally.

To conceive the number of hands each piece of *porcelain* passes through before it is perfect, we shall close this article with what F. d'Entrecolles instances of a common tea-cup, before it be fit for the painter. The cup begins with the potter, who has the management of the wheel, where it acquires its form, height, and diameter. This operator has only three farthings sterling for a plate furnished with twenty-six cups: accordingly, they go out of his hands exceedingly imperfect, especially towards the foot, which are only informed lumps of earth, to be afterwards cut with a chissel, when the cup is dry. When it comes from the wheel, the cup is received by a second workman, who fits it to its base. A third takes it immediately from him, and applies it on a mould to bring it to its true form. This mould is on a kind of lathe. A fourth workman polishes the cup with a chissel, especially about the edges; and brings it to the thinness necessary to make it transparent: in doing which, he moistens it from time to time, left its dryness should make it break. When of its proper thickness, another workman turns it gently on a mould, to smooth its inside; taking a deal of care it be done equably, left any cavity be formed, or it warp. Other workmen add some ornaments in relievo; others, impressions in creux; others, only handles; as the quality of the cup requires. At last, they round and hollow the foot on the inside with the chissel; which is the function of a particular artist, who does nothing else.

This multiplicity of workmen is so far from retarding the work, that it is found, by experience, to go on the faster for it; as well as to be the better done; each workman, by a continual attention to the same thing, becoming very dextrous at it: besides saving the time of changing instruments, &c.

PORCELAIN, *painting of.* The Chinese painters, especially those that meddle with human figures, our author observes, are all bad workmen: he adds, that the defect is scarce any where so sensible as in the whapey, or *porcelain* painters, among whom, setting aside flowers and landschapes, which are sometimes tolerable, the greatest masters are not to be compared to ordinary apprentices among the Europeans, for the beauty and justness of design. But it is otherwise with the colours these whapey use; which are so exceedingly lively and brilliant, that there are but little hopes our workmen should ever come to vie with them.

The painting work is distributed among a great number of workmen, in the same laboratory: to one it belongs to form the coloured circle about the edges of the *porcelain*; another traces out flowers, which another paints: this is for waters and mountains alone; that for birds and other animals; and a third for human figures. There are *porcelains* made of all colours: both with regard to the grounds, and to the representations thereon. As to the colour of landschapes, &c. some are simple; such are all blues, which are those most usually seen in Europe; others are mixed up of several tints; and others, again, are heightened with gold.

The Chinese, for a great many ages, used only white *porcelain*. The first colour they employed was blue, and after that they came into the use of all the rest. Their ancient blues was prepared by themselves from a kind of lapis lazuli; but we now supply them with the smalt so much cheaper, that it is no longer worth their while to make it themselves. They used to prepare this only by giving a gentle calcination to the stone, and then beating it to powder, and grinding it to the utmost fineness in morrars of unglazed *porcelain*-ware, with pestles of the same.

The fine deep blue of the old *porcelain*-ware of China, is much valued by the curious; and it is much lamented, that the same colour is not used at this time. The art seems at present to be lost; but perhaps it might be recovered by trials.

It is certain that the Chinese have cobalt among them, and very probably they used a blue colour prepared from this, before they had any commerce with us: notwithstanding all the conjectures about their materials for colouring, this seems the most probable substance; and there is a way of preparing a colour from this, much superior to that now in use, which we call smalt.

Cobalt is a mineral containing arsenic and a blue vitrifiable earth. The common way of preparing smalt is, by roasting this cobalt in a reverberatory fire. This disposes it to vitrify, and drives off the arsenic it contains in fumes, which collected at the top, form true flowers of arsenic. It is very certain, however, from experiments, that if this arsenic could be preserved in the cobalt, the smalt would be of a much finer colour; for there are some kinds of cobalt which yield smalt without previous roasting; and as the arsenic is in a great measure contained in these, the smalts are much finer coloured.

Arsenic added to smalt, while in fusion, greatly exalts its colour also; and there is a way of procuring smalt from cobalt without fire, only by dissolving it in an acid, and precipitating that solution with oil of tartar. The smalt thus precipitated to the bottom, is of a much finer colour than any prepared by fire; but it is much more expensive, and prepared in less quantity. It is very pos-

sible

ſible that the Chineſe might have the art of making this kind of ſmalt before they knew us, and that to this was owing the fine blue of their *porcelain* ware: but when we trafficked with them, and they purchaſed ſmalt ſo much cheaper of us than they could make it themſelves, they naturally diſcontinued the manufacture of their own finer kind, without conſidering how greatly inferior the colour was which the other yielded. If this be the caſe, it will be eaſy to revive this art, and the adding the true old china blue to our European manufactures, in imitation of *porcelain*, may give them a value which they have not at preſent.

The red, which the Chineſe uſe, is made of our green vitriol, or common copperas, which they call *tſo-fan*. They put about a pound of this into a crucible; and lute on this another crucible inverted: this laſt has a hole cut in the top, which they keep covered or open at pleaſure. They ſet this crucible in a furnace of bricks, ſo contrived, as to throw all the flame upon the lower veſſel, in the way of our chemiſts reverberatory furnaces. They make a large fire of charcoal all round it, and obſerve the hole at the top; for ſo long as there aſcend thick black fumes through that, the matter is not ſufficiently calcined. They watch the going off of this fume, and when there appears in the place of it a fine and thin cloud, they take away the crucible, the matter being then ſufficiently burnt. They try this, however, by taking a little out, and examining the colour; if it is not ſufficiently red, they let it remain longer in the fire. When they find that it is of a good colour, they take away the fire, and leave the veſſels to cool; this done they find a cake of red matter at the bottom of the crucible, and a quantity of a finer powder about its ſides. They keep theſe ſeparate, the latter being the pureſt, the leaſt, and the brighteſt colour.

One pound of copperas affords about four ounces of this colour, and this is the red which they manage in different ſhades, and vary ſo much. See *Blown*-RED.

The Chineſe have alſo a white colour, which they uſe in their figures painted on the China: the ware itſelf is naturally white, and the varniſh, or oil of ſtone, is a great addition to its whiteneſs all over. But they have yet a way of making a much brighter and finer white than theſe, as may be ſeen in moſt of the fine China-ware where there is any white in the figures. This white is made in the following manner: they collect on the ſhores of their rivers a ſort of flint or agate, which is of a whitiſh hue, without veins, and tolerably tranſparent. It approaches very much to the nature of cryſtal, and probably cryſtal may be found to ſupply its place with us. They calcine this ſtone to a white powder, and to every ounce of this, when ground in their porcelain mortars to an impalpable fineneſs, they add two ounces of ceruſs in fine powder: this they mix with the varniſh, and lay on in the common way of other colours. This white mixture ſerves not only for the coloring white, but it is the baſis of ſeveral other of thoſe beautiful colours which we ſee on the China-ware, and which our manufacturers have been often perplexed what to make of. Their green colour is made of copper rulled with acid; and their fine deep violet colour is made of this green, by adding to it a due proportion of this white. It is not to be ſuppoſed that this effect is produced according to the common laws of mixing colours among our painters, for then the white and green would only make a paler green. But copper being a metal that as well gives a fine blue as a fine green, according to the nature of the ſubſtances it is mixed with, the white in this caſe alters the very nature of the green, and converts it into that fine and deep violet blue, which we may draw from copper by means of any of the volatile alkalis, ſuch as ſpirit of ſal ammoniac, ſpirit of hartſhorn, ſpirit of urine, or any the like liquor. The workmen know how to bring this blue to any degree, by putting in different proportions of the two colours. There is not any admixture of them, that will not produce a blue of ſome kind; but always the more of the green colour is uſed, the deeper the blue will be, and the leſs the paler. The yellow is made by an admixture of ſeveral drachms of this white, and three drachms of copperas or more, if they deſire the colour to be deeper.

Moſt of theſe colours are mixed up with gum water, for application; with little *ſalt-petre*, ſometimes ceruſs or copperas, but more uſually copperas alone, being firſt diſſolved in the water. Indeed for *porcelains* that are to be quite red, the colour is uſually applied with oil; i. e. with the common oil of the *porcelain*, or another made of the white ſtints.

Theſe colours are laid on upon the veſſels when they have been once baked, but they do not appear till the ſecond baking is over in their proper ſhades or tinges, and ſometimes ſcarce at all.

The black China called *ombam*, is much eſteemed in the Eaſt, and particularly when it is ornamented with gold; this colour looking better with that ornament than any other. The black is always laid on when the *porcelain* is firſt dried, and is prepared by mixing three ounces of the fine deep blue with ſeven ounces of that fine varniſh, which they call *oil of ſtone*. This admixture gives a fine deep black: but the proportion is varied, as the colour is deſigned to be more or leſs deep. When the colour is thoroughly dry, the veſſels are baked, and when this is done the gold is laid on, and the whole is baked again in a particular furnace made for this purpoſe.

The *gold* on this ware is never laid on alone, but managed in the following manner: they grind it in water to a fine powder, and leave it to dry in the ſhade; they then mix with every ten grains of gold one grain of ceruſs, and incorporating the whole with gum-water, they lay it on in the manner of other colours. See GILDING *of China-ware*.

If they would have the black degenerate into blue, they need only add leſs of the blue, and a little of the ceruſs and agate white before deſcribed. They have two peculiar ways of applying the red, beſide the common one, both which require a nice workman, and make the ware come very dear. They call one of theſe *ſalt red*, and the other *blown* RED, which is very rare and of great price.

There is likewiſe a kind of marbled *porcelain*, called by the Chineſe, who are very fond of it, *tſou ware*.

It is generally plain white, ſometimes blue, and has exactly the appearance of a piece of China which had been firſt broken, and then had all the pieces cemented in their places again, and covered with the original varniſh. The manner of preparing it is eaſy, and might be imitated with us. Inſtead of the common varniſh of the China-ware, which is made of what they call oil of ſtone and oil of fern mixed together, they cover this with a ſimple thing made only of a ſort of coarſe agates calcined to a white powder, and ſeparated from the groſſer parts by means of water, after long grinding in mortars. When the powder has been thus prepared, it is left moiſt, or in form of a ſort of cream, with the laſt water that is ſuffered to remain in it, and this is uſed as the varniſh. Our cryſtal would ſerve fully as well as theſe coarſe agates, and the method of preparation is perfectly eaſy.

The occaſion of the ſingular appearance of this ſort of porcelain is, that the varniſh never ſpreads evenly, but runs into ridges and veins. Theſe often run naturally into a ſort of moſaic-work, which can ſcarce be taken for the effect of chance. If the marbled China be deſired blue, they firſt give it a general coat of this colour, by dipping the veſſel into a blue varniſh; and when this is thoroughly dry, they add another coat of this agate-oil. See PARTY-*Colour*.

There are ſeveral other kinds of *porcelains*, but they are ſuch as are rather for curioſity than uſe: the pretticſt are the magic *porcelains*, whoſe colours only appear when filled with water, or ſome other clear liquor. Theſe are made double: the outſide is white, and all laid out in compartments; the inſide is a ſolid cup, of coloured *porcelain*; though the cup is ſometimes of glaſs, which has a better effect than *porcelain*.

The Chineſe called this ſort of china-ware *kiaſſin*, that is to ſay, the concealed blue china.

The art is now in a great meaſure loſt; but there may be ſome gueſs made as to the manner in which it might be done at this time. The veſſels which are to be made in this manner, muſt be very thin: the colour muſt be laid on in the form of fiſh or other animals or figures, on the inſide, after the veſſel has been once baked. After this colour has had time to dry, the inſide of the veſſel muſt have a ſecond coat of the ſame earth, or ſtone-ware, of which the veſſel is made; and over this a varniſh of the common kind. The conſequence of this will be, that the figures of the fiſh, in a very ſtrong colour, will be buried between two coats of the ware, which together form a complete veſſel. The outſide is then to be ground down almoſt to the figures, and when they begin to appear, a new coat of the varniſh muſt be laid over this. The figures will then be obſcure, and ſcarce, if at all perceivable; but on filling the veſſel with water, the tranſparence of the ſides will be taken off, and the liquor will make a ſort of foil behind, which will throw out the figures of the fiſh. This might be done in any ware tolerably clear and tranſparent. The *porcelain* of China would ſucceed better with it; but the pains and nicety required are too great, and all the attempts lately made by them have miſcarried.

The Chineſe make a great variety of figures on the ſurfaces of the vaſes of white china-ware, and there is one kind of this greatly in eſteem among them, in which there are flowers and other figures; yet the ſurface is quite

quite smooth, and the substance extremely thin. The manner of making it is this; they first form the vessel of the finest materials, as thin as they can; then, when they have polished it, inside and out, at the wheel, they put into it a stamp of its own shape, but cut with all these figures: they press this down so firmly on the yet moist vessel, that the impression is received in a very perfect manner; and if the shape of the vessel be at all hurt, they take it to the wheel again to restore it. They then finish it with the knife and scissars; and when they have made it as perfect as can be, they cover it with the fine white varnish within and without. This fills up all the cavities of the impression, and gives a perfectly smooth and even surface; yet the thickness of this varnish in the traces of the figures gives it a different white, and the whole figures are as finely and accurately seen, as if painted on the outside. This is an artifice that might easily be brought to bear among us, and several of our finer wares would make a pretty figure with it.

There are many things practised by the Chinese in their colouring and forming the several kinds of *porcelain*, which may be well brought into use among us, and give a new value to our own wares, even though we should never arrive at their art of making the thing itself. One kind of colouring easily introduced among us, would be what they call *hoan tan hoan*. This produces vessels of great beauty and price, and is done in this manner. The matter, of which the vessels are made, for this purpose, need not be fine; they usually take any of the common vessels baked, without having been varnished, and consequently simply white, and without lustre. When these are intended to be of one simple colour, they need only be plunged into a liquid varnish or oil, as the workmen there call it, coloured with such ingredients as will strike the most lively tinges: but if it is to be coloured in compartments, as is usually the custom with this sort of china, it is to be done by the pencil. The usual way is to paint these in pannels, one green, another blue, and so on, and they make a very agreeable appearance. These requires no more to this, than the laying on the colours tolerably thick with a large pencil; but if the pictures of animals, and plants are to be given, they are to be done with the most permanent colours, and the vessel being again well baked, becomes very beautiful.

The Chinese, who are deceivers in every thing, find the way of cheating very much in regard to this sort of china-ware. They paint the flowers of plants, and some parts of the birds, &c. in very bright colours, after the vessel has been baked. Vermilion is a fine colour, which they often add on this occasion; but they cannot use this before the baking, because it would be destroyed by the fire. These colours which are laid on afterwards cannot last, but soon rub off in the wiping, or using the things; the others last for ever; for they are laid on with the greatest heat of all, the vessels being put into the same furnaces to lay on these, as the other things are baked in for the first time.

Salt-petre, and powder of flints, are generally the things added to the colours thus laid on, to make them penetrate, and run properly. Thus for the fine deep violet colour, which makes the greatest figure of all others on this ware, they mix together equal quantities of the fine ware, the powder of flints and salt-petre, all first powdered separately till perfectly fine; this is tempered with water, and then laid on with the pencil, and though it looks rough at first, it comes out of the furnace of as beautiful a glossy hue as any thing can be conceived. The yellow is made by mixing together three ounces of cerusse, and three ounces of powdered flints, and adding three, four, or more drachms of the red copperas, till the whole is of the proper degree of colour. The white is composed only of powder of flints and cerusse, with a small admixture of the salt-petre, or it will succeed tolerably well without. These are all the particulars necessary to be observed for the making a sort of *porcelain* of great beauty, in which the nature of the ware itself is not concerned; so that it seems easy to imitate it with any of our own wares. Obs. sur les Coutumes de l'Asie, p. 730, &c.

The several kinds of *porcelain* above mentioned, being quite painted, with their several colours, and all the colours dry, are to be polished, to prepare them to receive the oil or varnish; which is done with a pencil of very fine feathers, moistened with water, and pulled lightly over, to take off even the smallest inequalities.

The oiling or varnishing is the last preparation of the *porcelain*, before it be carried to the oven: this is applied more or less thick, and seldomer or oftener repeated, according to the quality of the work. For thin fine *porcelain*, they give two very thin couches; to others one; but that one equivalent to the other two. There is a deal of art in applying the varnish, both that it be done equally, and not in too great quantity. The couches on the inside are given by aspertion, i. e. by calling in as much varnish as is necessary: those on the outside, by immersion, or by plunging the pieces in a vessel of oil.

It must be observed, that the foot is not yet formed, but continues in a mere mass, till the work has been varnished: it is or length finished on the wheel, and when hollowed, a little circle is painted in it, and sometimes a Chinese character. This painting being dry, the foot is varnished, and the work now carried to the oven to be baked.

The varnish they lay on is so thick, that it often hides the colours, till the baking afterwards brings them out again: this is the case with the fine deep blues; we see none on the best china: it is all laid under the coat of white, and the vessel appears plain, till it has passed through the fire again; but then the colour appears deeper than when at first laid on. See HOAICHI.

The china varnishes have been always famous; the manner of making which is said to be as follows: take crude varnish sixty ounces; common water, the same quantity: mix them well together till the water disappears; afterwards put this into a wooden vessel five or six palms long, and two or three broad; mix them together with a wooden spatula, for a while day in the summer's sun, for two days if in winter, and afterwards keep it in an earthen vessel, covered with a bladder. The water will not separate again: this is called *the sun varnish*.

The oil of wood, called by the Portuguese *oracle da pao*, is made in the following manner: take twenty ounces of that oil, which they call oil of wood; and ten drachms of the oil of the fruit; boil these a little together, and the oil will look yellow: then let it cool, and add to it five drachms of quick lime powdered. To make the first grounds called *camisera*, take swine's blood and quick lime powdered, of each an equal quantity; spread this mixture upon the wood, and when it is dry, smooth it with pumice-stones.

To make the black varnish: take of the varnish prepared in the sun sixty ounces; stone black alum (supposed to be a sort of copperas) dissolved in a little water, three drachms; and seventy drachms of lamp oil, called by the Portuguese *azeite de Cangilon*. These things are all to be mixed together in a wooden vessel, putting the lamp-oil in at wine, and stirring the whole together with a wooden spatula.

The pitch-coloured varnish is made in the following manner: take oil of wood, crude, forty drachms, called *da pao*; of the lamp oil, called *da Cumka* crude, forty drachms; mix them together in the sun in a wooden vessel, in the same manner as the common varnish and water are ordered to be mixed in the first process.

To make the red varnish: take ten drachms of cinnabar, twenty drachms of prepared varnish, and a little lamp-oil; mix them all together.

To make the yellow varnish: take of the yellow colour ten drachms, prepared varnish thirty drachms, a little lamp-oil; mix all together.

To make a varnish of a musk colour: take of the red varnish ten drachms, and of the black varnish four drachms; mix them well together. Philos. Transact. N° 261. p. 524.

These are the accounts sent to the great duke of Tuscany by the Jesuits in China: Dr. William Sherard communicated them to the Royal Society; and to render the accounts useful to the world, he presented with them the several substances mentioned; these are deposited in the museum of the society, and may serve as instructions to all who are curious in this art.

The Chinese have of late years discovered a new kind of varnish for their ware: they call this *tshirwen*, that is to say, the brownish gold varnish; it is of the colour of the brown images, or of what we call coffee colour. The novelty of this has made it much esteemed: it is made in the manner of all their other varnishes, by dissolving the finer part of an earthy substance in water. The substance which they make it of is a common yellow earth: this they dissolve in water, and letting the coarse parts settle, they pour off the yet thick liquor, and what afterwards subsides from this is the pure and fine part, which they keep in form of a soft pulse, or thick cream. They use this only to the thinnest and most delicate *porcelain* ware.

The manner of using it is this: they mix a quantity of this fine sediment with so much water as renders it thin and liquid, like the common varnish: this and the common kind are to be used together, so that care must be taken that they are nicely of the same degree of thickness: this the workmen try by dipping a petunse or brick of their earth into both, and seeing which comes out most covered, that which lies on the thickest, is to be diluted with more water, or the other to be heightened with more of the earth, to bring them to the same standard.

They

They are both judged to be sufficiently liquid when they enter the pores of the petunse. They then mix some of the *oil of* FERN ashes and lime, along with the brown varnish, and add as much of this mixture to the common varnish as they find upon trial will give such a colour as is required. The common proportion for the brown colour most esteemed at present, is two pints of the brown varnish to eight pints of the common; and to four pints of this mixture they add one pint of the varnish, or oil of fern. It might puzzle a stranger to their terms, to understand what these people meant by oil; but it is a word with them in use for any thing liquid, and they call all their varnishes so, though made of the powders of earths and stones mixed with water. They apply this varnish to the vessels by dipping them into it, and so completely covering them inside and out before they put them into the oven; and the baking gives a great brightness to the colour. This is the nicest part of the whole manufacture of the *porcelain*, and other wares of that kind. The varnishes used by the Chinese are two; the one they call *oil of stones*, the other *oil of fern*; which see. They mix these together, and with great caution and delicacy apply them to the vessels all over equally, with a steady hand and a fine pencil.

PORCELAIN, *baking or melting of.* There are two kinds of ovens used in baking *porcelain*; large ones, for works that are only used to come to the fire once, which is the common way; and small ones, for such as require a double baking.

The large ones are two Chinese fathoms deep, and almost four wide. They are formed of a mixture of three earths; one whereof, yellow and common, makes the *kaolin*; the two others are scarcer, and dug out of deep mines, wherein people can only work in winter. One of them, called *kaotou*, is a very strong stiff earth; the other *youtou*, oily.

The sides and roof of the ovens are so thick, that one may lay the hand on them, when the fire is at its height, without danger of burning. At the top of the dome, which is in form of a tunnel, is a large aperture, to give vent to the flames and smoke, which mount up incessantly, as soon as fire is once set to the oven: beside the principal aperture, there are four or five small ones around; which, by being opened and shut, serve to augment or diminish the heat: like the holes in the chemists furnaces, called *registers*. The hearth, which takes up the whole breadth of the oven, is placed in front, precisely against the opening of the door, and is two or three feet deep, and two broad; people passing over it on a plank, to go into the furnace to range the *porcelain*. As soon as the fire is lighted, the door is walled up, only leaving an aperture for the conveyance of wood. Lastly, the bottom of the oven is covered with sand, wherein part of the first *porcelain* cases are buried. The oven itself is usually placed at the extremity of a long, narrow vestibule, which serves in lieu of bellows; the cold air and wind being thus driven directly in the face of each oven.

Each piece of *porcelain* of any note, is disposed, in the furnace, in its peculiar, separate case, or coffin. Indeed, as to tea-dishes, &c. the same case serves for several. The cases are all of the same matter with the oven; they have no lids, but serve each other mutually; the bottom of a second case sitting into the aperture of the first; and thus successively to the top of each column. Each coffin, which is usually of a cylindrical form, that the fire may communicate itself more equably to the *porcelains* inclosed, has, at bottom, a little lay of very fine sand, covered over with dust of kaolin, that the sand may not stick to the work; and care is taken, that the *porcelain* may not touch the sides of the case. In the larger cases, which hold the small pieces, they leave the middle vacant, in regard *porcelains* placed there would want the necessary heat. Each of these little pieces is mounted on a little massive of earth, of the thickness of two crowns, covered with powder of kaolin.

P. d'Entrecolles observes, that the *porcelains* are put in cases, to prevent any diminution of lustre from the too violent effect of a naked fire; adding, that it is owing to those thick veils, that the beauty, or, as he calls it, the complexion of the *porcelains*, is not tanned by the heat of the fire.

As fast as the cases are filled, a workman ranges them in the cavity of the furnace; forming them into piles, or columns, whereof those in the middle are, at least, seven feet high: the two cases at the bottom of each column are left empty, because being partly sunk in the sand, the fire has the less effect on them; and, for the same reason, the uppermost one is left empty. In this manner is the whole cavity of the oven filled with columns, excepting that part precisely under the grand aperture. In ranging the cases, they observe always to place the finest piles of *porcelain* in the centre, the coarsest at the bottom, and those that are high-coloured, and consist of as much petunse as kaolin, and wherein the worst oil is used, at the mouth.

These piles are all placed very near one another, and are bound together at top, at bottom, and in the middle, by pieces of earth, in such manner as that the flame may have a free passage among them, and insinuate equally on all sides: in which a great part of the workman's art lies, and on which the perfection of the *porcelain* much depends. Another thing to be observed is, that an oven must never be set altogether with new collins; but half one, half the other: the old ones at the bottoms and tops of the pile, and the new ones in the middle. Indeed it were better to have them all burnt in an oven apart, before they come to be used for *porcelain*, as was anciently done. The cases, our author observes, are brought ready prepared, from a large village on the river, a league distant from Kingtetching. Before they are burnt, they are yellow; and afterwards of a dark red.

When the oven is filled, they wall up the door, only leaving a little aperture for the throwing in of little pieces of wood, a foot long, but very slender, to keep up the fire: it is then heated, by degrees, for the space of a day and night; after which, two men, who relieve one another, continue to throw in wood, without any intermission. To know when the *porcelain* is baked enough, they open one of the lesser holes of the oven, and, with a pair of tongs, take off the lid of one of the piles. If the fire appears very brisk and clear, and the piles equally inflamed, and especially if the colours of the *porcelain* that is uncovered, dart forth a noble lustre: the coction is sufficient, they discontinue the fire, and wall up what remained of the door of the furnace.

If the oven be only filled with small *porcelain*, they take them out twelve or fifteen hours after the fire is extinct: if it be filled with larger, they defer opening it for two or three days. In this the modern practice differs from the ancient; wherein the door was not opened till after ten days for the large pieces, and five for the small ones. One thing very surprising, and almost inconceivable, P. d'Entrecolles observes, is, that there are never found any ashes on the hearth of the oven, what quantity of wood soever is consumed. He adds another thing, which with him passes for equally strange, that the workmen employed about the furnaces, flake their thirst by continually drinking hot tea, with salt dissolved in it.

The Chinese make another kind of *porcelain*, which they paint and bake twice; and for this second baking they have a kind of little ovens on purpose. These ovens, when very small, are made of iron; or otherwise of a kind of bricks an inch thick, a foot high, and half a foot broad, made of the same earth with the *porcelain cases*. The biggest of these ovens do not exceed five feet in height, and three in diameter; and being made much in form of bee-hives, the bricks are arched a little, to form the cavity the better. The hearth is of earth half a foot high, formed of two or three ranges of bricks; and on this massive is the oven built. Around the oven at the distance of about half a foot, is raised a shell of common bricks, joined to the oven itself by a kind of arcboutant of earth, which serves to strengthen it. They usually build four or five of these ovens at equal distances from each other. At the bottom of the shell are holes to give air to the fire when lighted: at top is an aperture, which they cover up with a piece of the baked earth, when the *porcelains* are laid in the oven.

The *porcelains*, here, are not inclosed in coffins, as in the common ovens; the oven itself serving that purpose, and being so exactly closed, that they receive no other impression of the fire, but that of the heat of the charcoal disposed in the hearth, at the bottom of the oven, as well as at top of the vault, and in the interval between the oven and the shell, or brick-wall.

To prepare the *porcelains* for a second baking, they must have had their varnish in the common manner, and have passed the great oven: in this state they are painted with various colours, after which, without giving them any new varnish, they are ranged in piles in the little oven; setting the little ones over the larger, in form of pyramids. The Chinese are very artful in their disposition of these, arranging them in the most compact manner, and putting the little ones within the great ones; but great care is also necessary, that the vessels do not touch one another in the parts where they are painted, for the consequence of that would be the spoiling of both vessels, as the colours would run together. The bottom of one vessel may generally be placed on the bottom of another, though both are painted, because the rims are not painted, and they keep the painted parts from touching one another. High and narrow vessels, such as chocolate-cups, and the like, are very troublesome on this occasion. The method the

Chinese workmen take with them, is this: they place a range of them, so as to cover the whole bottom of the furnace, and they cover this with a thin bed of broken china-ware, over which they place another row of the cups, and so on to the top, where they lay on no covering: they never bake any thing else with these cups, when they are of this kind of twice-baked *porcelain*.

This second baking is sometimes intended to preserve the lustre of the colours the better, and at the same time to give them a kind of relievo; but, more usually its design is to hide defective places, by covering them over with colours; but the artifice is easily found out, by passing the hand over them.

When the workman judges his *porcelains* enough baked, he takes off the piece that covers the aperture; takes out the charcoal; and, when the oven is cold, the *porcelain* is so too.

How beautiful soever the modern *porcelain* may be, the taste for antiquity, which reigns in China, as well as in Europe, gives the ancient *porcelain* a value far above that of the modern.

It must be owned, the ancient seems finer as to the matter, more perfect as to the baking, and of a more pleasant cast, both as to the white of the ground, and the other colours; yet, it is certain, the most able and discerning may be deceived herein: and there are workmen who make it their business to counterfeit the ancient *porcelain*, called *kutong*, in the modern.

The matter of the false kutong is a softish yellowish earth, found near Kingtetching. There is nothing particular in the first part of the process, except that they are made thicker, and that they are varnished with an oil drawn from the yellow-stone, mixed with the common oil, which gives them a kind of sea-green hue. When taken out of the oven they throw it into a fatty broth, made of capons, &c. in which they boil it a second time; they then bury it in the filthiest sink they can find, for a month or six weeks, or more, according as they would give it the greater appearance of antiquity. Besides their thickness, and their colour, these false antiques resemble the true ones in this, that they do not resound when struck, nor even give the least buz, when held to the ear.

Notwithstanding the vast quantity of *porcelain* made in almost all the provinces of the empire of China, they still continue very dear, though not near so dear as anciently. The Chinese annals tell us of times wherein a single urn cost ninety or a hundred crowns on the spot. What chiefly occasions the extraordinary price of this commodity, especially in Europe, is, beside the great profits of the merchant in Europe, and their factors in China, that it rarely happens an oven succeeds throughout; that it is frequently quite spoiled, so that, upon opening it, in lieu of fine *porcelains*, is found a hard unformed mass, into which both the *porcelains*, and their coffins, are converted, either by excess of heat, or some ill qualities in the matter.

Another reason of the dearness of *porcelain* is, that the ingredients it is made of, and the wood wherewith it is burnt, grow more and more scarce. One may add a third reason for the excessive price of *porcelain* to the Europeans; and it is this: that most of those sent to Europe are formed on new models, frequently very capricious, and difficult to succeed in; which yet, for the smallest defects are turned on the manufacturer's hands: and he, not being able to dispose of them to the Chinese, because not to their taste, nor to their use, is forced to charge the *porcelain* he delivers the higher, to pay himself for those refused.

The art of making *porcelain* is one of those in which Europe has been excelled by oriental nations. However, earthen wares have been made, for several years past, in different parts of Europe, so like the oriental, that they have acquired the name of *porcelain*. The first European *porcelains* are said to have been made in Saxony and in France; and afterwards in England, Germany, and Italy; all of which differed from those of Japan and China, but each possessing its peculiar character. The first person, who seems to have made this manufacture the object of scientific attention, was M. Reaumur; and he communicated his researches in two Memoirs to the Academy of Sciences, in 1727 and 1729. Having broken pieces of the Japanese, Saxon, and French *porcelains*, he examined the difference of their grains or internal structure. The grain of the Japanese *porcelain* appeared to him to be fine, close, compact, moderately smooth, and somewhat shining. The grain of the Saxon *porcelain* was found to be still more compact, not granulous, smooth, and shining like enamel. And the *porcelain* of St. Cloud had a grain much less close and fine than that of Japan, shining little or not at all, and resembling the grain of sugar. In order to determine their difference still further, he exposed them to a violent heat; and found that the Japanese *porcelain* was unaltered by the fire, and all the European *porcelains* were melted. This essential difference suggested to him the most just and regular idea, that has yet been formed of the *porcelain* or china-ware, viz. that it is a half vitrified substance or manufacture, in a middle state between the common baked earthen ware of our vulgar manufactures, and true glass. This is the essential and distinctive character of *porcelain*, and it is only by considering it in this light, that we are to hope to arrive at the perfect art of imitating it in Europe. The determining the due degree of heat for the baking the china-ware, and the finding out the proper time it should remain in that heat, are two very essential points in the manufacture of this elegant ware. Perhaps our English attempts to imitate it would be brought nearer the perfection we are aiming at, by a just regard to these particulars, than by many other less material articles, about which we seem more solicitous.

This attempt is to be made on these principles in two different manners: the one by finding some appropriated matter on which fire acts with more than ordinary strength in the time of its passing from the common baked state of earthen ware into that of glass. The other is, to compose a paste of two substances reduced to powder, the one of which shall be of force to resist a very violent fire, so as not to become vitrified in it; and the other, a matter very easily vitrifiable.

In the first case, the matter is to be taken out of the fire at the time when it is imperfectly vitrified; and in the other, the compound mass is to remain in the furnace till the one substance, which is the more easily vitrifiable, is truly vitrified; and being then taken out, the whole will be what *porcelain* is, a substance in part vitrified, but not wholly so.

The first method is that by which the European *porcelain* has generally been made, and though that of St. Cloud, and some other places, has been very beautiful, yet it is always easy to distinguish even the finest of it from the china-ware, and the nature of the two substances appears evidently different: these owing all their beauty to their near approach to vitrification, are made to endure a long and violent fire, and are taken from it at a time when a very little longer continuance would have made them perfect glass: on the contrary, the china-ware being made of a paste, part of which is made of a substance in itself scarce possible to be vitrified, bears the fire in a yet much more intense degree than ours, and is in no danger of running wholly into glass from it.

The two substances used by the Chinese are well known by the names of *petunse* and *kaolin*, and on examining these it appears very evident, that we have in Europe the very same substances, or at least substances of the very same nature, and capable of being wrought into a *porcelain* equally beautiful and fine. Mem. Acad. Scienc. Par. 1739. See KAOLIN and PETUNTSE.

These are the two different semi-vitrifications, on one or other of which all the European manufactures have hitherto been founded; and it is easy from the knowledge of these principles to determine, on breaking a piece of the china of any of our manufactures, by which of the two processes it is made. If it is made by seizing the half-vitrified mass of a substance which would soon after have been wholly vitrified, then the putting it in a crucible, into an equal degree of fire, will soon turn it wholly into glass. This is the case of most of our European *porcelains*; but if it be made of two ingredients, the one of which is not vitrifiable, or at least not by such fires, then the matter will melt, but will not vitrify: this is the case with the Chinese *porcelain*, which if kept in fusion a long time, yet when cold is china-ware still; so that this is evidently made of two such different ingredients.

Besides these methods, there is yet another, of late invention, which makes a very beautiful china; and which, if it does not afford vessels equal to those of China, yet will afford them nearly approaching to these, and at a considerably smaller price. This method consists in reducing glass to china. See GLASS-*porcelain*.

The author of the Chemical Dictionary observes, that M. Reaumur has erroneously confounded the Saxon *porcelain* with the other fusible *porcelains* in Europe. For though it contains, as every *porcelain* does, particularly that of China and Japan, a feible substance, which has been completely fused in the operation of baking, and to which it owes its density and internal lustre; yet it contains also a large quantity of a substance absolutely unfusible, from which it receives its admirable whiteness, its firmness and solidity, during the baking, supplying the place of the oriental kaolin, and contracting its dimensions in a considerable degree, while it incorporates with the fusible substance. He has actually found, that this *porcelain* cannot be fused, unless by a fire capable also

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of melting the beſt Japaneſe *porcelain*. And he obſerves, that it is ſuperior to the oriental in the ſmoothneſs, luſtre, and leſs granulous appearance of its internal ſurface. The manufacture of Saxony has been long eſtabliſhed: and that at Meiſſen, a few miles from Dreſden, has produced *porcelains* painted and enamelled in ſuch perfection, that they have been reckoned more beautiful and ſold at a higher price than even thoſe of China.

The invention is ſaid to have been owing to an alchemiſt, called Botticher, who, being confined in the caſtle of Konigſtein by the king of Poland, on a ſuſpicion of being maſter of the philoſopher's ſtone, had leiſure ſufficient, not indeed to make gold, but to invent a ware, which by the excellence and value of it conſiderably enriches the country. He died in 1719, but it ſeems that he only invented the white ſort; the art of making brown and blue *porcelain* not having been diſcovered till the year 1722.

Porcelain is alſo made at Vienna, Frankendal, and lately in the neighbourhood of Berlin: all which are made of the ſame kind of materials with thoſe of Saxony. In Italy there are alſo manufactures of *porcelain*, at Naples and Florence. In France they have had manufactures of this kind for many years: *porcelain* was made at St. Cloud, and in the ſuburb of St. Antoine at Paris, before M. de Reaumur's publication; but though beautiful, it was of the vitreous and fuſible kind. Since that time, conſiderable manufactures of it have been eſtabliſhed at Chantilly, Villeroi, and Orleans, the *porcelains* of which have a diſtinguiſhed merit: but thoſe produced in the king's manufactory at Sevres, are ſaid to do greateſt honour to France, on account of their ſhining, white, beautiful glazing, and coloured grounds.

M. Guettard, who has lately publiſhed an account of his diſcoveries in the Memoirs of the Academy of Sciences for the year 1765, ſeems to have been one of the firſt, who, ſince M. Reaumur, found in France a kaolin and petunſe of the ſame nature as the Chineſe; the former is a white argillaceous earth filled with mica; the latter a hard quartroſe ſtone. The count de Lauraguais has alſo ſo far ſucceeded in his attempts in this way, that ſome pieces, preſented by him in 1766, to the Academy of Sciences, were declared to reſemble the *porcelains* of China and Japan in ſolidity, grain, and unfuſibility, more than any other that had been made in that country, though it wants the whiteneſs and luſtre obſervable in the ancient Japaneſe *porcelain*.

We have alſo had for many years, ſeveral manufactures of *porcelain* in England; that of Cheliea is ſcarce inferior to thoſe of Saxony and France; but being calculated more for ornament than uſe, it is dear and of no very general advantage. The *porcelains* that are produced in our other manufactories are ſold at a much cheaper rate than any that is imported; but, except that of Worceſter, they all wear brown, and are ſubject to crack, eſpecially in the glazing, by boiling water: the Worceſter *porcelain* has a good body hardly inferior to that of eaſtern china; it is equally tough, and its glazing never cracks or ſcales off.

With reſpect to the method of manufacturing *porcelain*, it may be obſerved, that the baſis of that which is fuſible and vitreous, and which may be called falſe *porcelain*, is a FRIT; formed of a mixture of ſand or of powdered flints, with ſalts capable of diſpoſing them to fuſion, and of giving them a great whiteneſs by means of a ſufficient heat.

This frit is mixed with as much of a white tenacious earth of an argillaceous or marly nature, as is ſufficient to make it capable of being worked upon the wheel: the whole mixture is well ground in a mill, and made into a paſte, which is formed either upon the wheel or in moulds, into the various pieces required. Each of theſe pieces, when dry, is put into a caſe made of earthen ware; which cafes, called by the Engliſh potters SEGGARS, are to be ranged in piles one upon another, in a furnace or kiln, which is to be filled with them to the roof. The furnaces are chambers or cavities of various forms and ſizes, and are ſo diſpoſed, that the fire-place is on the outſide oppoſite to one or more openings, which communicate within the furnace. The furnace is gradually heated by increaſing the fire till the *porcelain* is baked, or has acquired its proper hardneſs and tranſparency, which is known by taking out and examining pieces, placed for that purpoſe in cafes which have lateral openings. When the *porcelain* is ſufficiently baked and gradually cooled, it reſembles white marble, not having a ſhining ſurface, which it is to acquire by the operation of glazing. This muſt be adapted to the nature of the *porcelain*, i. e. to the hardneſs and denſity of the ware, the ingredients of compoſition, &c. The ſeveral glazings are prepared by previouſly fuſing together all the ſubſtances of which they conſiſt, ſo as to form vitreous maſſes, which are to be ground by a mill into a fine powder, and this powder is to be mixed with a ſufficient quantity of water or other liquor, ſo that the mixture may have the conſiſtence of cream. The pieces of *porcelain* are to be covered with a thin ſtratum of this matter, and when very dry to be put into the furnace as before, and continued there till the glazing be well fuſed; which requires a leſs fire than baking the paſte. And thus the pieces of *porcelain* that are to remain white are finiſhed. The glazing uſed by the Chineſe is ſaid to be formed of the oil of petuntſe and the oil of lime, deſcribed in the preceding part of this article: that uſed in a conſiderable manufactory of *porcelain* in our own country, is formed of twenty pounds of the fineſt white ſand or calcined flints, eighteen pounds of red-lead, ten pounds of pearl-aſhes, and four pounds of common ſalt decrepitated. The two firſt ingredients, being well levigated together, are mixed with the two latter, and the compound fuſed to vitrification. It is then to be reduced in a flint, agate, or porphyry mortar to an impalpable powder, which is tempered with water to the proper conſiſtence for painting.

The colours applied to *porcelain* are the ſame as thoſe uſed for ENAMEL painting, and conſiſt of metallic calces bruiſed and incorporated with a very fuſible glaſs. Crocus of iron affords a red colour; Caſſius's precipitate of GOLD makes the purple and violet; copper calcined by acids and precipitated by an alkali, gives a fine green; zaffre makes the blue; earths ſlightly ferruginous, produce a yellow, and, laſtly, brown and black colours are produced by calcined iron, together with a deep blue of zaffre. Theſe colours, ground with gum water or oil of ſpike, are to be employed for the painting of the *porcelain* with deſigns of flowers and other figures.

For GILDING, a powder or calx of gold is to be applied in the ſame manner as the coloured enamels. The painted and gilded *porcelains* are to be expoſed to a fire capable of fuſing the glaſs with which the metallic colours are mixed; by which means they are made to adhere, and acquire a gloſs equal to that of the GLASS. The ſhining appearance of the gold is produced by burniſhing with a blood-ſtone.

Dr. Lewis (Com. Phil. Techn. p. 627.) obſerves, that glaſs of lead and glaſs of antimony make a gold-coloured glazing for *porcelain* and earthen-ware. The fineſt gold glazing is ſaid to be made with an addition of ſilver. A glaſs of lead is prepared by melting minium or litharge with a third or fourth part of its weight of powdered flint. This yellow glaſs, reduced into fine powder, is either ſprinkled on the *porcelain* made red hot, or mixed with beer, or other glutinous liquids to a due conſiſtence, and applied with a pencil: the ware is then placed in the furnace, under a muffle, till the glaſs begins to melt, which is known by its gliſtening; after which, while warm from the fire, it is moiſtened with a diluted ſolution of ſilver, and baked again. Or, the powdered glaſs of lead is moiſtened with the ſilver ſolution, then melted, and the glazing of the ware finiſhed in one proceſs, by applying on it this compound glaſs. After the baking, the glazed veſſels, while ſtill red hot, are held over the ſmoke of burning ſtraw, &c.

The operations for the unfuſible *porcelain*, and alſo for ſuch as are of the nature of ſtone-ware, are ſomewhat more ſimple. The ſand and ſtones which enter into their compoſition are to be ground in a mill: the earths or clays are to be waſhed; the materials are to be well mixed and formed into a paſte; the pieces are firſt rudely formed upon a potter's wheel; and when dry or half dry, they are turned again upon the wheel, and their form is made more perfect; they are then placed in the furnace, not to bake them, but only to apply a ſufficient heat to give them ſuch a ſolidity that they may be handled without breaking, and may receive the glazing. As the pieces of *porcelain* after this ſlight heat are very dry, they imbibe water readily. This diſpoſition aſſiſts the application of the glazing. The vitrifiable or vitrified matter of this glazing, which has been previouſly ground in a mill, is to be mixed with ſuch a quantity of water, that the liquor ſhall have the conſiſtence of milk. The pieces of *porcelain* are haſtily dipt in this liquor, the water of which they imbibe, and thus on their ſurface is left an uniform covering of the glazing materials. This covering, which ought to be very thin, will very ſoon become ſo dry, that it cannot ſtick to the fingers when the pieces are handled.

The pieces of this *porcelain* are then put into the furnace to be perfectly baked. The heat is to be raiſed to ſuch a height, that all within the furnace ſhall be white, and the caſes ſhall be undiſtinguiſhable from the flame. When, by taking out ſmall pieces, the *porcelain* is known to be ſufficiently baked, the fire is diſcontinued, and the furnace cooled. If the baking has been well performed, the pieces of *porcelain* will be found by this ſingle operation

to be rendered compact, sonorous, close-grained, moderately glossy, and covered externally with a fine glazing. The painting and gilding of this *porcelain* are to be executed in a manner similar to that already described. Chemical Dict. art. *Porcelain*. See POTTERY, and DELF-*ware*.

PORCELAIN-*shell*, *porcellana*, or *concha veneris*, in *Natural History*, the name of a genus of shell fish, the characters of which are these: they are of the univalve kind, and have for their mouth a long and narrow slit, dentated on each side, and of a conglobated, oblong, gibbose, or umbonated form.

These shells are classed in the Linnæan system under the genus of CYPRÆA, including forty-four species, whose characters are, that the animal is a slug; the shell univalve, fish-oval, and blunt at each end; and the aperture of the length of the shell longitudinal, linear, and toothed.

This genus of shells originally had the name of *porcellana* and *concha veneria* from the resemblance of its mouth to the *pudendum muliebre*, called by some of the Roman writers, *porculus* and *porcellus*, and always alluded to under the word *Venus*. We have of late so far misunderstood the name as to suppose it derived of the word *porcelain*, from an imagination, that the Chinese *porcelain*-ware was made of it. Gesner has fallen into the opinion, and Aldrovand seems to have been mistaken in regard to its other name, *concha veneria*, supposing it so called because of its beauty, and therefore sacred to Venus. Rondeletius calls it the *remora Mutiani*; and the murex of the same author. Aldrovand. de Test. l. 3. p. 352. Gesner, Rondelet. de Test. l. 2. p. 102.

These shells are current in several parts of Asia, Africa, and America, as money; and they have been prescribed, pulverized, in medicine. See CONCHA *Veneris*.

The name *concha veneria* may be apt to create confusion, because there is another shell of a very different kind, a bivalve, called CONCHA *Veneris*. This genus is therefore much better distinguished by the name *porcellana*. There is a prodigious difference among the species of this genus; some are heavy, others very light; some have the mouth placed in a longitudinal, others in a transverse direction.

The gibbous *porcelain* is a very remarkable species, as is also the egg-*porcelain*, which has two buttons at the extremities; and the egg-*porcelain* called the *navel* is not less remarkable than these: this has, instead of a button, a long beak at each end.

The mouth of the *porcelain* must be narrow and oblong; this is the great characteristic, and is usually dentated either on both sides or on one.

The species of *porcelain* are so numerous, that it may be proper, in the enumeration of them, to arrange them under some regular heads. See *Tab. of Shells*, N° 16.

Some *porcellanæ* are conglobated, and thick; of these the cabinets of the curious afford us sixteen species.

Some again are thick and of a pyriform figure; of these we have twenty-one; and others are gibbous, of which we have five species. Hist. Nat. Exclusa. p. 308.

PORCELLIONES, in the *Materia Medica*, a name given by some to the MILLEPEDES.

PORCELLO, in the *Glass Trade*, the instrument with which the workmen, after having made the opening for the bowl of a drinking glass or other such vessel, with his paliage, widens and renders it more capacious at pleasure.

PORCELLUS *Gallicinnus*, in *Medicine*, the name of a disease to which the people of Hungary and Poland are very subject.

It is a hard tumor of the belly, attended with wind and violent pains. It it truly an infarction of the SPLEEN, and is to be cured by aperitives. Philos. Transact. N° 243.

PORCELLUS *Indicus*, in *Zoology*, a name given by authors to the animal called with us the GUINEA *pig*.

PORCH, *atrium*, a kind of vestibule, supported by columns, much often at the entrance of the ancient temples, halls, churches, &c.

In the ancient architecture, a *porch* was a vestibule, or a disposition of insulated columns, usually crowned with a pediment, forming a covert place before the principal door of a temple, or court of justice. Such is that before the door of St. Paul's, Covent-garden, the work of Inigo Jones.

When it had four columns in front, it was called a *tetrastyle*; when six, *hexastyle*; when eight, *octostyle*; when ten, *decastyle*, &c. Vitruvius calls it *pronaos*; Pollux, *propylæum*; when finer than ordinary, the ancients call it, also, *prospylæum*.

PORCO a name by which some authors have called the fish more usually known by the name of *capriscus*, supposed to be the *porcus* of Pliny. See GOAT-*fish*.

PORCUPINE, *hystrix*, in the Linnæan system of *Zoology*, a distinct genus of animals of the order of *glires*, the characters of which are, that the creatures of it have two cutting teeth in each jaw, eight grinders, and the body covered with long, hard, and sharp quills; to which Mr. Pennant adds, that the upper lip is divided. Linnæus enumerates four species.

The *crested porcupine* is so called from a long crest on the top of the head, reclining backwards, formed of stiff bristles; between the quills, which are sharp at the ends, and varied with black and white, there are a few hairs; the head, belly, and legs are covered with strong bristles, terminated with soft hair of a dusky colour; the whiskers are long; the ears like the human; the toes are four before, and five behind; the tail short, and covered with quills. This animal inhabits India, Tartary, Persia, and all parts of Africa; it is found wild in Italy, and brought into the markets at Rome, where it is eat; but it is not originally a native of Europe. It is a harmless animal, lives on vegetables, sleeps by day, and feeds by night; and when angry runs its nose into a corner, erects its spines, and makes a snorting noise. These animals produce a BEZOAR. Pennant. See *Tab.* IV. *Quadrupeds*, N° 49.

PORCUPINE, the *American*, or *Brasilian*, the *hystrix petasensis* of Linnæus, called also *cuandu*, and by Hernandez *tlopotzatzin*, has a short blunt nose, long white whiskers, beneath the nose a bed of small spines, and the top of the head, back, side, and base of the tail covered with spines, about three inches long, white, and barred near their points with black, between which the skin is naked: on the breast, belly, and lower part of the legs, it has dark-brown bristles; its feet are divided into four toes with very long claws; the tail is eight inches long, tapering towards the end, and for the last ten inches almost naked. This species inhabits Mexico and Brasil.

It climbs trees, but slowly and with difficulty, for want of a heel or hinder toe. It usually twists its tail about a bough to keep it safe from falling. It makes a grunting like that of a hog. It feeds on poultry, and its flesh is very well tasted. See *Tab.* IV. *Quadrupeds*, N° 50. Ray and Pennant.

PORCUPINE, the *Canada*, or *hystrix dorsata* of Linnæus, has short ears hid in the fur; the head, body, legs, and upper part of the tail are covered with soft, long, dark brown hair; the upper parts of the head, back, body, and tail are furnished with many sharp strong quills, hid in the hair; the under-side of the tail is white; the fore feet have four toes, and the hind feet five, armed with long claws; the body in form resembles that of the beaver, but is not half as large; the tail is about six inches long. This animal inhabits North America, as high as Hudson's-bay, nells under the roots of large trees, and climbs the boughs; it feeds on wild fruits and barks of trees. The Indians esteem its flesh wholesome and agreeable; and use the quills for ornaments. See *Tab.* IV. *Quadrupeds*, N° 51.

The *long-tailed porcupine*, or *hystrix macroura* of Linnæus, called by Seba *porcus occidentalis*, has long whiskers, bare naked ears, large bright eyes, a short thick body, covered with long stiff hairs as sharp as needles, of different colours, according to the incidence of the light upon them; feet divided into five toes, the tail as long as the body, with a thick tuft at the end, and the bristles appearing as if they were jointed, transparent, and of a silvery hue. This species inhabites the islands of the Indian Archipelago, and lives in the forests. Pennant.

PORCUPINE-*fish*, *hystrix*, in *Ichthyology*, a species of *ostracion*, in the Artedian system, but of the *diodon*, belonging to the class of *amphibia nantes*, according to the Linnæan distribution. Its usual size is between twelve and twenty inches in length; it is very thick, and covered, instead of scales, with a whitish cutaneous skin, every way beset with strong sharp thorns, the bases of each of which has two other smaller ones buried under the skin; the opening of the mouth is very large, with rough tagged lips, and two broad bones in the place of teeth, one placed above, and the other below, both which are arched and a little prominent, as is also the whole mouth; the eyes are large, the eye-lids elevated, and armed with four thorns, which are from one to three inches in length; the sides having the longest, and their length gradually shortening towards the back and belly; the belly is white, and the back brown, sported with black, as are also the sides. This species is found near the Cape of Good Hope. Chil. Exot. lib. vi. cap. 21. See *Tab.* IV. *Fish*, N° 38.

PORCUS *muricatus*, in *Zoology*. See PORCUPINE.

PORCUS *fluviatilis*, in *Ichthyology*, a name given by the old Latin authors to the fish we at this time call the CERNUA and *aurata*, and in English the RUFFE.

PORCUS *Guinnæus*, in *Zoology*, the name of the Guinea HOG. This creature is of the same shape and make with our

hog, and of a reddish tawny colour; its head, however, is somewhat more depressed than in our kind, and its ears longer, and running into narrow points; its tail is naked, but so long, that it reaches almost to its heels; its hair is all short and thining; it has no bristles on the back, but only near the rump; and on the shoulders the hair is a little longer than elsewhere. It is a tame domestic creature. Ray.

PORCUS *marinus*, or *sea-hog*, in *Ichthyology*. See PORPESSE.

PORE, formed from *πορος*, *aperture*, or *duct*, a little interstice between the particles of matter which constitute bodies; either empty, or filled with some insensible medium.

Condensation and rarefaction are only performed by closing and opening the *pores*.

The transparency of bodies is usually supposed to arise from their *pores* being directly opposite to one another. The matter of insensible perspiration is conveyed through the *pores* of the cutis.

Sir Isaac Newton shews, that bodies are much more rare and *porous* than is commonly believed: water, e. gr. is nineteen times lighter, and consequently rarer, than gold; and gold itself is so rare, as very readily, and without the least opposition, to transmit magnetic effluvia, and easily to admit quicksilver into its *pores*, and to let even water pass through it: for a concave sphere of gold hath, when filled with water, and soldered up, upon prelling with a great force, let the water squeeze through it, and stand all over its outside, in multitudes of small drops like dew, without bursting or cracking the gold. See COMPRESSION.

Whence it may be concluded, that gold has more *pores* than solid parts; and, by consequence, that water hath above forty times more *pores* than parts.

The MAGNET transmits its virtues, without any diminution or alteration, through all cold bodies that are not magnetic: as gold, silver, brass, glass, water, &c.

The rays of light, let them be either bodies actually coming to us from the sun, or only motions or impressions upon the medium, move in right lines, and are hardly ever, unless by great chance, reflected back again in the same line, after their impingence upon objects; and yet we see, that light is transmitted to the greatest distances through pellucid bodies, and that in right lines.

Now how bodies should have *pores* sufficient for these effects, may be difficult to conceive, but not impossible: for Sir Isaac shews, that the colours of all bodies arise from their particles being of such a determinate size, or magnitude. Wherefore, if we conceive those particles to be so disposed, as that there is as much porosity as there is of matter; and, in like manner, those particles to be composed of others much less, and that have as much interspersed vacuity, or space, as their quantity of matter amounts to; and so on, till we come to solid particles without *pores*: then, if in any body there be (for instance) three of these sizes of particles, and that the last be of the solid, or least sort; that body will have seven times as much vacuity as solid matter: if four such degrees and the last be least, and solid, that body will have fifteen times as much porosity as solidity; if five such degrees, it will have thirty-one times as much space as solidity; and if six degrees, then it will have sixty-three times as much vacuity as solid matter.

And perhaps, in the wonderful conformation and fabric of natural bodies, there may be other proportions of space to matter, which are to us wholly unknown; whence it is possible there may be yet farther great quantities of interspersed vacuity.

PORES, in *Anatomy*, are certain permeable spaces, between the parts of the skin, whereby we sweat, or perspire, &c. See *Tab. Anat. Myol. fig.* 8. *lit.* d d. *fig.* 9. *lit.* a a, and e.

The *pores* are most remarkable in the hands and feet. By viewing the palm of the hand with a moderate glass, after washing it well, we perceive innumerable little ridges of equal size and distance, running parallel to each other, especially on the tips and joints of the fingers, &c. where they are regularly disposed into spherical triangles, and ellipses.

On these ridges stand the *pores*, in even rows, big enough to be seen by a good eye without a glass; but with one, every *pore* looks like a little fountain; and the sweat may be seen to stand therein, clear as rock water; and as often as it is wiped off, it springs up again.

The *pores* are placed on the ridges, not in the furrows between them; that they might be less liable to be stopped by compression: for the same reason, the *pores* of the hands and feet are larger than the rest; those parts being more used, and pressed, than the rest; and hence, again, there are no ridges on other parts.

These *pores* serve as a convenient outlet for the more noxious parts of the blood, which, by the continual use of the hands and feet, are plentifully brought into them; whence, in hypochondriac and hysteric people, there is a continual burning in the palms and soles.

In the stoppage or constriction of the *pores* of the skin, that disease which we popularly call a *cold*, is commonly supposed to consist; though Dr. Keill maintains a quite contrary opinion, in a dissertation at the end of his Medicina Statica Britannica.

In the Philosophical Transactions we have an instance of a student near Leyden much addicted to astronomy, who spending many nights in star-gazing, had, by the nocturnal wet and cold, so obstructed the *pores* of his skin, that little or nothing exhaled from his body: as appeared hence, that the shirt he had worn five or six weeks was then as white as if it had only been worn one day. In the mean while, a water was collected under the skin, whereof he was afterwards cured.

PORE, *biliary*. See BILIARY *ports*.

PORELLA, in *Botany*, the name of a genus of mosses, the characters of which are these: the capsules contain a powder like those of the other mosses: and they have neither operculum, calyptra, nor pedicle; and their manner of shedding their powder is not by separating into two parts, like those of the polago and lycopodium, but by opening into several holes on all sides. See *Tab.* XV. of *Botany*, N° 17.

Of this genus of mosses there is only one known species; this is called by Dillenius, the plainly pinnated *porella*, and grows in wet places in Virginia, Pensylvania, Maryland, and other parts of North-America.

PORFILIGON, a word used by some of the chemical writers to express the squamæ martis, or the scales of iron which fly off in the smith's hammering of it.

PORISM, PORISMA, in *Geometry*, a theorem, or proposition, so easily demonstrated, that it is almost self-evident.

The word is formed from the Greek *πορισμος*, *perviso*, a thing easy to penetrate or conceive, and which opens the way to something more difficult.

Such, e. gr. is this; that a chord is wholly within the circle.

Porisme stands opposed to *aporisme*, which denotes a proposition so difficult, as to be almost impossible to be demonstrated. Such as the quadrature of the circle is now, and as the squaring of any assigned portion of Hippocrates's lunes formerly was.

The *porisme* coincides nearly with the LEMMA, or assumption.

PORISM, PORISMA, in *Mathematics*, a general theorem, or canon, deduced from a geometrical locus, and serving for the solution of other general and difficult problems. Proclus derives the word from the Greek *πορος*, *I abstract*, and concludes from something already done and demonstrated: and, accordingly, defines *porisma*, a theorem drawn occasionally from some other theorem already demonstrated. In which sense it coincides with what we otherwise call corollary.

The *porisms* of Euclid were contained in three books, and consisted of a curious collection of many things which related to the analysis of the more difficult and general problems: nothing remains in the works of the ancient geometers concerning this subject besides what Pappus has preserved in a very imperfect and obscure state in his mathematical collections.

A *porism*, he says, is that in which something was proposed to be investigated. Dr. Simson, of Glasgow, has made an attempt to restore some of them in a posthumous treatise concerning *Porisms*, printed in Latin. See also Phil. Trans. abr. vol. vi. part i. p. 76.

PORISTIC *method*, in *Mathematics*, is that which determines when, by what means, and how many different ways, a problem may be solved.

POROCELE, a word used by chirurgical writers for a callous hernia.

POROMPHALON, a word used by Hippocrates to express a callous concretion, or a sort of tophus formed in the region of the navel.

POROPHYLLUM, in *Botany*. See *Foreign* COLTSFOOT.

POROTICKS, a term used by the ancients for such medicines as would consume calluses.

PORPESSE, an English name given indiscriminately to two different fishes, the phocæna and the DOLPHIN.

Artedi, who has been very careful in bringing together the synonyms of authors, tells us, that this is properly the English name only of that species of the dolphin, the characters of which, according to his system, is, that the body is almost of a conic form, the back broad, and the body subacute. This species is the phocæna of Aristotle, the tursio or tursio of Pliny and Rondeletius, and the *delphinus phocæna* of Linnæus. Schonevelde calls it the small northern or oriental *delphin*, and the Swedes the *marsvin*.

fix is ranked among the cetaceous kind, and is the smallest fish of that tribe; the *porpesse*, properly so called, seldom exceeding five feet in length, in which it differs from the dolphin, a fish very often confounded with it, but which is frequently seen of ten or twelve feet in length. The snout of the dolphin is also much larger than that of the *porpesse*, which is another thing that may serve to determine their difference.

The *porpesse*, or *phocæna*, is of a roundish, not flat body, growing gradually smaller toward the tail; and just at the root of the tail it is a little flatted; its nose is long and pointed, and furnished with strong muscles, by means of which it is able to turn up the mud and sand, to seek after small animals; its skin is smooth, and but thin; its back is of a dusky bluish hue, almost black in some of the fish, and from the middle of the sides downwards, it is whitish; it has no gills, nor any aperture in the place of them; but in the middle of the upper part of its head, before the brain, it has a pipe or spiracle, in form of a half moon, through which this sort of fishes draws in their breath, and spouts out the water; this pipe terminates outwardly in one hole, but it is within divided into two parts by a bony septum, so as to represent two nostrils; but at its lower end it again becomes one hole, and opens into the mouth by a common orifice furnished with a very strong sphincter muscle, by means of which it may be shut and opened at pleasure; above this sphincter, the sides of the pipes are lined with a glandulous flesh, from which, when pressed, a glutinous liquor is forced out of certain little holes in it into the inside of the pipe; above the nostrils is a strong valve or membrane, which serves to stop the pipe at pleasure, and prevent any water from getting into it, but when the fish requires it within; within the fistula are six blind holes, having no outlet, four tending towards the snout, two placed above the valve, which stops the nostrils, and two beneath it; and two tending towards the brain, having a long and narrow cavity, which seems intended for the use of smelling, though, on opening the brain, no such olfactory nerves, or processus mamillares, as other animals are furnished with for this purpose, are to be found; its eyes are small; its auditory passages extremely minute, if any; its teeth, which are forty-eight in each jaw, also small; it has two fins on the breast, and one on the back, which are cartilaginous and flexible, not sharp or prickly as the ancients have represented them; and its tail is slightly forked, thus forming the figure of a crescent, and placed horizontally, like those of the cetaceous kind, not vertically, as in other fishes. The great contrivance of nature in this position of the tail in these fishes is, that it may supply the place of the hinder pair of belly-fins in other fish, those of the cetaceous kind having none such. These fins in other fish serve to balance the body, and keep it under water, and answer also in many respects to the hinder legs of a quadruped; and hence we see, that those fish which have long bodies, and have not this hinder pair of fins, nor the horizontal tail, cannot suspend themselves quietly in the water, but are forced to keep grovelling at the bottom. This is the case of eels, and all other fish of that kind; the use of respiration being as necessary to the *porpesse* as to quadrupeds, and its wanting this pair of hinder fins, so poise or elevate itself with, nature has abundantly provided against the mischiefs that would attend that defect, by giving it this transverse tail, by a sudden jerk of which it can in a moment throw itself up to the surface from the deep water. The whale, and all the cetaceous fishes requiring the use of respiration, have also this manner of raising their unwieldy bodies allotted them by nature, instead of the hinder pair of fins, which must have been inconveniently large to be capable of this office. Its lungs and heart are like those of quadrupeds. The *porpesse* has no gall-bladder, and thence authors have concluded that it has no gall; but this is too hasty a conclusion; for there is a duct which arises in the liver, and has a great many branches, and which, tending downwards, joins itself to the pancreatic duct; and these two, so united together, form a canal, or common duct, about four or five lines long, before they discharge their contents into the duodenum; from whence it appears that the *porpesse* has always a discharge of bile into the duodenum, though it is thin and diluted, and such as, in other animals, is usually called *hepatic bile*. The brain is large, and resembles that of man; and probably it has been an observation of this that has given occasion to the opinion of this animal having so great a share of wit and understanding, that has given rise to the story of Herodotus, that Arion was carried to shore on the back of one; and that of Pliny the Elder, of one of these fish so fond of a certain boy, that he used to carry him daily from Baiæ to Puteoli, across the sea to school, and wait to carry him back again at a certain time. Pliny the Younger gives us also a story of this kind in his Epistles. The tongue is flat, pectinated at the edges, and fattened down to the bottom of the mouth.

The blood of the *porpesse* is as warm to the touch as that of quadrupeds, and the blubber, or fat, which lies in great quantity under the skin, covering the muscular flesh of the back and sides, is to keep up the natural heat, and prevent the cold of the sea-water from chilling the circulating fluid. This blubber yields a great quantity of excellent oil.

The food of the fish seems to be speck, its living at the bottom of the water; for the common matter found in its stomach is the remains of fish that live in or on the bottom. The young *porpesses* are generally found to feed on the ammodyte, or sand-eels, and sea-worms.

This fish is common in all parts of the sea that washes these islands; but they are most numerous at the time when fish of passage appear, as mackarel, herrings, and salmon, which they *pursue* up the bays with the same eagerness as a pack of dogs does a hare. Its flesh is greasy, and now not valued; though it was a royal dish in the reign of Henry VIII. and continued in vogue in the reign of Elizabeth. Phil. Trans. N° 74 and 76. Lit. abr. vol. ii. p. 839, &c.

We have from Dr. Lister an account of the tooth of this creature, after death, giving an enormous wound. The accident happened to the doctor himself, and he relates it in Phil. Trans. N° 134. Abridg. vol. ii. p. 842.

PORPHYRIANA *ædes*. See AREIUS.

PORPHYRIANS, in *Ecclesiastical History*, an opprobrious name given to the Arians, by an edict of Constantine, at the council of Nice, in 325. Cap. 36. apud Hard. Concil. tom. i. p. 446.

That prince, publishing an edict against Arius and his writings, declares, that as Arius had imitated Porphyry in composing books against religion, he deserved to be noted with his infamy; and that, as Porphyry is become *the reproach* of posterity, and his writings suppressed, so he wills, that Arius and his followers be called *Porphyrians*, &c.

PORPHYRIO, in *Ornithology*, the name of a bird figured and described by all the natural historians from one another, but which, it seems, none of them ever saw; and there is some room to doubt whether there be in nature any such bird. According to the accounts we have of it, it appears to be one of the gallinula or moor-hen kind, and is all over of a fine deep blue, only the middle of the tail is at the extremity of a greyish white; its legs and feet are of a fine shining purple. There have been fame fabulous things related of it, as having five toes on each foot, and the like; but if there be any such creature, it seems to be a moor-hen of these remarkable colours. In the Linnæan system this is a species of *fulica*, or COOT.

PORPHYRIO *Americanus*, in *Ornithology*, a name by which some have called the QUACHILTO, a very beautiful species of Brasilian moor-hen.

PORPHYROGENITUS, in *Antiquity*, an appellation given to the children of the Eastern emperors; implying as much as *born in purple*.

Cedrenus will have the word to signify, *born in the purple palace*, or the *palace of porphyry*, a palace so called in Constantinople, wherein the empresses used to lie in. Others derive the appellation hence, that the imperial children, as soon as born, were wrapped in purple; others from this, that the chamber wherein they were born was hung with purple hangings.

This term is sometimes found on the medals of the lower empire, struck at Constantinople.

PORPHYRY, *porphyrites*, in *Natural History*, &c. a precious kind of stone, or marble, of a brownish-red colour, frequently interspersed with white spots; anciently brought from Egypt, and exceeding all other marbles in hardness.

It is used as the name of a genus of fossils, generally, but improperly, added to the marbles. These are stones of a plain uniform mass, and compact texture, like flint, spotted or veined, with separate concretions of quartz imbedded in all directions; giving fire with steel, not fermenting with acids, very slowly and difficultly calcining in a strong fire, and fusible.

Wallerius makes the *porphyry* a species of jasper. Pott classes the *porphyries* and jaspers under distinct genera. It is certain that the basis of the *porphyry* is of a compact, uniform substance, approaching nearly to that of the jasper; but in many properties they are different. The *porphyries* are always found in strata, the jaspers only in nodules: the former have always detached quartzose concretions imbedded in them; the latter are uniform, and never have concretions of a different nature.

Of this genus Dr. Hill enumerates three known species.

1. The purple kind, commonly known by the name of *porphyry*,

porphyry, among the workmen. 2. The hard red-lead-coloured kind, variegated with black, white, and green. And, 3. The very hard flesh-coloured one, variegated with white, green, and black.

The *purple porphyry* is a substance which has been well known, and highly esteemed, in all ages of the world. It has its name from the Greek πορφυρα, *purple*, as that remarkable colour always afforded a very obvious distinction for it, from the other kinds. It is of an extreme firm and compact structure, remarkably heavy, and of a fine strong purple, variegated more or less with pale red, and white, and with a small number of little, and generally disregarded, black flaky specks. Its purple is of all degrees, from the deep tinge of the violet to a pure claret colour; and its variegations are usually disposed in small spots, commonly small and disunited, but sometimes running into one another, and making large blotches. It is very difficultly cut, because of its very great hardness; but is capable of a very fine polish. It is found in great quantities in Egypt; and we find was had thence also in very early times. It serves us for stones for the apothecaries and colourmen, to grind or levigate their powders on, and on any other occasion where great hardness is required.

The *red-coloured porphyry* is also an extremely beautiful and valuable substance, but is hitherto unknown among our lapidaries. It has the hardness, and all the other characters of the purple *porphyry*, and greatly exceeds it in the variety of its colours. It is found in great plenty in the island of Minores, but has never yet been regarded as a stone worth importing into England.

The *flesh-coloured porphyry*. This is another very little known, but extremely beautiful stone; it is of an irregular, but very compact and firm texture, and of a pale flesh-colour, often approaching to white, and variegated with black, green, and white, in large blotches, from half an inch to an inch broad. It is found in immense flints in Arabia Petræa, and in Upper Egypt, and in detached nodules is common to almost all parts of the world. Germany abounds with them; and we have of them in many parts of England and Ireland. They are found in many places on our shores, and in some parts of Devonshire far from the sea. Hill's Hist. of Foss. p. 404 to 408.

Mr. Da Costa mentions two or three other species of green *porphyry* of different hues and variegations; and Fitzosmond takes notice of two exquisitely fine columns of black *porphyry* in a church at Rome; and black *porphyry* is also mentioned by Wallerius.

There are three famous *porphyry* pillars, or OBELISKS, in Egypt; one near Cairo, and the other two at Alexandria. The French call them *aiguilles*, the English *Cleopatra's needles*.

The art of cutting *porphyry*, practised among the ancients, seems lost. In effect, it is hard to conceive what kind of tools they must have used for the fashioning of those huge columns, and other *porphyry* works found in some of the antique buildings in Rome.

One of the most considerable pieces, now remaining entire, is a tomb of Constantia, daughter of the emperor Constantine, in the church of St. Agnes without the walls; ordinarily called *the tomb of Bacchus*, because of several boys represented herein, playing among the vine-leaves. Add to this Apollo's, and the busts of twelve emperors, all in *porphyry*, in the palace of the Thuilleries.

Some of the ancient pieces appear to have been wrought with the chissel, others with the saw, others with wheels, and others ground down by degrees with emery. Yet the modern tools will scarce touch *porphyry*: it should seem, therefore, and Dr. Lister, Phil. Transf. N° 203, or Lowth. Abr. vol. ii. p. 560, adopts this opinion, that the ancients had the secret of tempering steel better than we; not, as some incline to think, that they had the art of softening the *porphyry*; though it is probable that time and air have contributed to increase its hardness.

Mr. Addison tells us, he saw a workman at Rome employed in the cutting of *porphyry*; but his advances were exceedingly slow, and almost insensible.

All the way the Italian sculptors have to work the pieces of old *porphyry* columns still remaining (for the *porphyry* quarries are long since lost), is with a brass saw without any teeth. With this, together with emery and water, they rub and wear the stone with infinite patience.

Yet have many excellent persons endeavoured to retrieve the ancient art, particularly Leon Baptista Alberti; who, searching for the *necessary materials for temper*, says, he found goats blood the best of any; yet even this availed but little; for in working with chissels tempered herein, sparks of fire came much more plentifully than pieces of the stone. By means hereof, the sculptors were able to make a flat or oval form; but could never attain to any thing like a figure.

It is true, in 1555, Cosmo de Medicis is said to have distilled a water from certain herbs, wherewith his sculptor, Francesco Tadda, gave his tools such an admirable hardness and temper, as that he performed some fine works with them; particularly our Saviour's head in demi-relievo, and Cosmo's head, and his duchess's. Even the very hair, and beard, how difficult soever, are here well conducted; and there is nothing of the kind better in all the works of the ancients: but the secret seems to have died with him.

The French have lately found another method of cutting *porphyry*, viz. with an iron saw without teeth, and *grez*, a kind of freestone pulverized, and water. The authors of this invention pretend, they could form the whole contour of a column hereby, had they matter to work on.

Others have proposed a method of hardening tools, so as to make them proper to cut *porphyry*, by steeping them in the juice of the plant called *beat's breech*, or *hank-urine*. Birch's Hist. R. S. vol. i. p. 238. vol. iii. p. 73, &c.

Mr. Boyle tells us, that he caused *porphyry* to be cut by means of emery, steel saws, and water. He observes, that in his time, the workmen in England were ignorant of the manner of working upon *porphyry*, and that none of them would undertake to cut or polish it. See Works abr. vol. i. p. 111.

Mr. Da Costa conjectures, that the method used by the ancients in cutting and engraving *porphyry* was very simple, and performed without the aid of any scientific means that are now lost. He supposes that, by unwearied diligence, and with numbers of common tools at great expence, they rudely hewed or broke the stone into the intended figure, and by continued application reduced those rude figures into more regular designs; and that they completed the work by polishing it with great labour, by the aid of particular hard sands found in the country of Egypt. And he supposes, not without reason, that, in the *porphyry* quarries, there were layers of grit, or loose disunited particles, analogous to the *porphyry*, which they carefully sought for, and used for this work. Nat. Hist. of Fossils, p. 283.

POWDERY-*shell*, in *Natural History*, a name given by authors to a species of sea-shell of the PURPURA kind, with a short clavicle and beak.

PORPITES, the *boar button-stone*, in *Natural History*, a name given by authors to a small species of fossil coral; which is usually of a rounded figure considerably flatted, and striated from the centre every way to the circumference. These are of different sizes, and of different colours, as greyish, whitish, brownish, or bluish, and are usually found immersed in stone. See *Tab. of Fossils, Class 7.*

PORRACEOUS, formed from *porrum*, *leek*, in *Medicine*, a term applied to the bile, fæces, &c. when their colour is green, approaching that of a leek.

PORRETANI, a religious sect, the followers of Gilbert de la Porree, bishop of Poictiers, condemned by Eugenius III. in the council of Rheims, held in 1147, for admitting a physical distinction between God and his attributes; or, as Matthæus says, for having written too curiously on the subject of the Trinity: as to his real sentiments we are not well acquainted with them.

However, he gave occasion for those suspicions, by maintaining that this proposition, *Deus est bonitas*, is not true, unless reduced to this, *Deus est bonus*. And there are some passages noted by St. Bernard, who wrote warmly against him, wherein he seems to admit a real distinction between the nature of God and his attributes. The *Porretani* are let in opposition to the *Nominals*.

PORRUM, in *Botany*. See LEEK.

PORT, *haven*, or *harbour*, a commodious place situate on the sea-coast, or at the mouth of a river, with depth of water sufficient for ships of burden, and convenient bottom for anchorage; where vessels lie by, to load or unload; screened from the wind, and safe from any enterprize of enemies; either by the disposition of the place, or by means of a mole, or dike, or the like, with a chain and light-house.

Ports are either *natural* or *artificial*.

PORTS, *natural*, are those which Providence seems to have formed for the communication of commerce: or, where the natural figure of the land forming them, is such as contributes to the safety of the shipping therein, by sheltering the vessels from the fury of the sea; and this happens in various ways; such as a shoal lying off the harbour's entrance, which breaks the waves, and thereby keeps the water still within; or by the points of land, forming the harbour's mouth, stretching themselves so far into the sea, and coming so near to one another, that the surges are broke at their entrance; or by a narrow inlet that runs into the land for a considerable way, and where the shores near the entrance, receiving the shock of the waves,

waves, render the upper *parts* smooth enough to anchor in; of which kind are navigable rivers: or by a large deep bay, wherein islands, or other obſtructions, contribute to render a *port* ſecure for the riding of ſhips at anchor, &c.

The properties of a good harbour are, a ſufficient depth of water for large ſhips to enter at any time, whether the tide be in or out, good offing, and an eaſy acceſs out of all dangers from the winds, and good anchoring ground; free entrance, without rock or ſand-bank; the entrance not too wide, to be eaſily barred and defended upon occaſion, and yet of ſufficient extent to admit the entrance or departure of large ſhips without difficulty; not ſubject to overflow, and where ſhips may lie cloſe to the quays; where the veſſels are ſheltered from all winds by the high mountains ſurrounding the harbour, and from whence there is an extended view of the *ſea*; that the ſhipping therein be out of all danger, either from being ſet on fire, bombarded, or cannonaded from ſea by the ſhips of an enemy; that it be furniſhed with a good light-houſe, and have variety of proper rings, ports, mourings, &c. in order to remove or ſecure the veſſels contained therein; and laſtly, that it have plenty of wood, and other materials for fixing, beſides hemp, iron, mariners, &c.

PORT, *artificial*, are thoſe formed with piers, moles, or projections into the ſea; and when the moles or piers can be brought ſo cloſe as to be ſhut up by ſluices or gates, the harbour is then called a *baſon*; but the inner part of a harbour, where the ſhips rule in ſtill water, is uſually called the *baſon*.

All artificial *ports* of this kind are eaſily fortified by building on the moles or piers either batteries, redoubts, or forts, which command the entrance into the harbour. But the method of fortifying harbours, and alſo ROADS, in general depends on a variety of circumſtances peculiar to each. See *Marine* FORTIFICATION, PORT, and ROAD.

The Engliſh coaſts are exceedingly thin of *ports*. France has the advantage of all other countries in the number and excellence of *ports*; that of Breſt is the fineſt natural *port* in the world, as that of Dunkirk was lately the ſtrongeſt artificial one.

The ſtatutes 1 Eliz. cap. 11. & 13 & 14 Car. II. cap. 11. § 14. enable the crown by commiſſion to aſcertain the limits of *ports* and havens, and to aſſign proper wharfs and quays in each *port*, for the excluſive landing and lading of merchandize.

PORT, *bar*, PORT *de barre*, are ſuch as can only be entered with the tide; as that of Gaa.

PORT, *cloſe*, are thoſe within the body of a city; as thoſe of Rhodes, of Venice, Amſterdam, Rochelle, Bayonne, and St. John de Luz.

PORT, *free*, in *Commerce*, a *port* open and free for merchants of all nations to load and unload their veſſels in, without paying any duties or cuſtoms.

Such are the *ports* of Genoa and Leghorn.

PORT, *free*, is alſo uſed for a total exemption and franchiſe which any ſet of merchants enjoy, for goods imported into a ſtate, or thoſe of the growth of the country exported.

Such was the privilege the Engliſh enjoyed for ſeveral years after their diſcovery of the *port* of Archangel; and which was taken from them on account of the regicide in 1648.

PORTS, *cinque*. See CINQUE *ports*.

PORT is alſo ſometimes uſed for the BURDEN of a ſhip.

The capacity of a veſſel is eſtimated in tons; each whereof may contain about two thouſand pounds weight of ſea-water. When we ſay, a veſſel is of the *port* or burden of a thouſand tons, it is not meant, as ſome imagine, that it bears ſo many caſks full of merchandize; but that the ſea-water, which would be contained in the ſpace which the capacity of the veſſel poſſeſſes in the ſea, weighs a thouſand tons, which, at the rate of two thouſand pounds each, is as much as to ſay, it bears a burden of two millions weight.

For the method of eſtimating this, ſee BURDEN.

PORT is alſo uſed for the palace of the grand ſignior, or emperor of the Turks.

PORT is alſo uſed for a ſtrong wine brought from Oporto, or Port-a-Port in Portugal; whence its name. See WINE.

PORT *of the voice*, in *Muſic*, the facility and habit of making the ſhakes, paſſages, and diminutions, wherein the beauty of a ſong, or piece of muſic, conſiſts; and which the Italians comprehend under the terms *trilli, groppi, ſpezzati*.

PORT, among *Sailors*, denotes the larboard, or left ſide of the ſhip.

To port a helm is to put the helm on the left ſide of the ſhip, that the ſhip may go to the right, or ſtarboard.

The ſhip heels to port denotes that ſhe inclines or ſtoops to the larboard ſide.

Top the yard to port is the order to make the larboard extremity of a yard higher than the other.

PORTS *of a ſhip*. See PORT-HOLES.

PORTA, or *Vena* PORTÆ, in *Anatomy*, a very conſiderable vein, employed in bringing the blood from ſeveral parts, by an infinite number of branches, which it is divided into, to the liver, through the whole ſubſtance whereof it is diſſeminated. See *Tab. Anat. Angeiol. fig. 4. lit. a. (Splanch.) fig. 5. lit. i.*

The *vena portæ* is formed of two large veins; the meſenteric and ſplenic; which are again formed of ſeveral other minuter veins coming from the ſtomach, inteſtines, ſpleen, epiploon, &c.

The ancients gave it the name *portæ*, as imagining it to bring the chyle, by its meſenteric branch, from the inteſtines to the liver; but ſome of the moderns have found another uſe for it.

It is remarkable of the *portæ*, that, after the manner of the arteries, it ſhoots itſelf from a trunk into branches; and, being at laſt loſt in capillaries, it delivers the blood into the cava, by which it is immediately re-conveyed to the heart.

The *portæ* is formed out of the concurrence of divers veins, which, meeting together, make one of the moſt conſiderable venous trunks of the body, as to its bulk; though, contrary to the courſe of other veins, it runs not far in a trunk, but is, as before obſerved, ſoon diſtributed again, by ramifications, into the liver.

The vein is vulgarly divided into *branches without the liver*, and *branches within*, and a *trunk intermediate*; but this diviſion is not very clear, the *branches*, as they are called, without the liver, not being ſo properly branches as roots; which have, by anatomiſts, been dignified with diſtinct names from the parts whence they come.

The veins which conſpire towards the formation of this trunk, which having been deſcribed in their proper places, or being to be deſcribed there, we ſhall not here enlarge upon, are, from the placenta uterina, in a fœtus, the vena umbilicalis; from the gall-bladder, the cyſtica gemellæ; from the upper part of the ſtomach, the pylorica, or gaſtrica dextra, which goes to the trunk; the gaſtrica major, and minor ſiniſtra, from the ſtomach (of which the major is formed out of the coronaria ventriculi); the epiploïca ſiniſtra and poſtica, from the omentum; the vas, or vaſa brevia, from the ſtomach; the ſplenica, from the ſpleen: all which join to form the *ſinus*, or *ſpinic branch of the* porta.

The *right*, or *meſenteric branch*, conſiſts of the gaſtrica and epiploïca dextra, from the ſtomach and omentum; the duodena, from the duodenum and jejunum; the hæmorrhoidalis interna, from the inteſtinum rectum and colon; the meſaraica, from the meſentery.

By means of all theſe veſſels, the *portæ* receives the blood from moſt of the viſcera of the abdomen; and, after the coaleſcence of its branches, enters the liver in a trunk, immediately under the ſurface whereof, having firſt formed a kind of ſinus, it is divided into two principal branches, and thoſe again into five, which ſcatter innumerable ramifications through the whole ſubſtance of the liver.

The *vena portæ*, according to the deſcription of M. Whitlow, may be conſidered as made up of two large veins, joined almoſt end-wiſe by their trunks, from each of which branches proceed in oppoſite directions. One of theſe trunks adheres to the liver, and is ramified by that viſcus, its branches accompanying the whole diſtribution of the hepatic artery. The other trunk is without the liver, and ſends its branches to the viſcera. The firſt portion of this vein may be called *vena portæ hepatica* ſuperior or minor, the trunk of which is commonly known by the name of *ſinus venæ portarum*. From this ſinus proceed five principal branches, which are ſpread in ramifications through the whole ſubſtance of the liver; the extremities of theſe branches end in the pulpy friable corpuſcles, which ſeem to be thick villous ſurfaces, in which the bile is ſecreted; and it is immediately collected in the ſame number of extremities of another kind of veſſels, uniting by numerous ramifications, called *ductus biliarii*, into one trunk, denominated *ductus hepaticus*.

The other portion, called *vena portæ inferior*, or *ventralis*, is ſituated under the lower or concave ſide of the liver, and joined by an anaſtomoſis to the ſinus of the *vena portæ ſuperior*, between the middle and right extremity of that ſinus; from thence it runs down obliquely from right to left under the trunk of the arteria hepatica, bending behind the beginning of the duodenum, and under the head of the pancreas, its length being about five fingers breadth; at the head of the pancreas it loſes its name, and terminates in three large principal branches, viz. the vena ſplenica, or meſaraica major, the ſplenica, and

and the hæmorrhoidalis interna, or meſaraica minor. Winſlow's Anat. vol. ii. p. 54. 160.

The true uſe of this vein, hitherto unknown, Dr. Keill thinks he has diſcovered; he ſays it is this: the bile, ſays he, being to be mixed with the chyle, as it comes out of the ſtomach into the duodenum, could no where be ſo conveniently ſecerned from the blood, as where the liver is placed; but if all the branches of the coeliac artery carried all the blood to the liver, from whence the gall was to be ſeparated, it is evident, conſidering the nearneſs of the liver to the heart, and the inteſtine motion of the blood, that ſo viſcid a ſecretion as the gall is, could never have been formed.

Nature, therefore, is forced to alter her conſtant method of ſending the blood to all parts of the body by arteries: ſhe here forms a vein, by which ſhe ſends the blood from the branches of the meſenteric and coeliac arteries to the liver.

By this means the blood is brought a great way about, before it arrives at the liver; ſo that its celerity being diminiſhed, all the corpuſcles that are to form the gall, may have time to attract one another, and unite before they come to their ſecerning veſſel. Keill's Anim. Secret. p. 76, &c. See LIVER and BILE.

PORTABLE, ſomething eaſy of carriage.

PORTABLE *barometer*. See BAROMETER.

PORTAIL, in *Architecture*, the face or frontiſpiece of a church, viewed on the ſide wherein is the great door.

Portail is alſo uſed for the great door, or gate itſelf of a palace, caſtle, &c.

PORTAL, in *Architecture*, a term uſed for a little ſquare corner of a room, cut off from the reſt of the room, by the wainſcot; frequent in the ancient buildings, but now diſuſed.

The word ſeems a diminutive of the French *porte*, *door*, *gate*, it being through this that they entered into the room.

PORTAL is ſometimes alſo uſed for a little gate, *portella*; where there are two gates of a different bigneſs. See GATE.

PORTAL is ſometimes alſo uſed for a kind of arch of joiner's work before a door.

PORTAMENTO, in *Italian Muſic*, ſignifies the conduct of the voice, which is ſaid to be good, when it is neither maſal nor guttural.

PORTATE, in *Heraldry*. A *croſs* PORTATE is a croſs which does not ſtand upright, as croſſes generally do, but lies athwart the eſcutcheon, in bend, as if it were carried on a man's ſhoulder. See CROSS.

Columbiere tells us, it is by ſome called *porté*, that is, *carried*; becauſe, when our Saviour went to ſuffer death, he was obliged to carry his croſs, which is always thus repreſented ſloping, and inclined after this manner.

PORT-CRAION, a *pencil-caſe*, an inſtrument ſerving to include a PENCIL, and occaſionally alſo uſed as a handle for holding it.

It is uſually four or five inches long, and contrived ſo that the pencil may be ſlid up and down it by means of a ſpring and button. Its outſide is filed into eight ſides or faces, wherein are drawn the ſector lines; its inſide is round; ſometimes it is made round or cylindrical both without-ſide and within, and has its length divided into inches and parts of inches.

PORTCULLICE, called alſo HERSE and HARNAIS, in *Fortification*, an aſſemblage of ſeveral great pieces of wood laid or joined acroſs one another, like a harrow, and each pointed at the bottom with iron.

Theſe formerly uſed to be hung over the gateways of fortified places, to be ready to let down in caſe of a ſurpize, when the enemy ſhould come ſo quick, as not to allow time to ſhut the gates.

But, now-a-days, the ORGUES are more generally uſed, as being found to anſwer the purpoſe better.

PORT-DIEU, among the French, a pariſh-prieſt, whoſe buſineſs is to carry the viaticum, or ſacrament, to ſick people.

PORTEGLO, in the *Glaſs Trade*, the inſtrument with which the founder, or contator, ſcums the GLASS while melting.

PORTER, in the *Circuit of Juſtices*, is an officer who carries a verge, or white rod, before the juſtice in eyre; ſo called *à portando virgam*.

PORTER *of the door of the parliament houſe* is a neceſſary office belonging to that court; who enjoys the privileges accordingly.

PORTER, *groom*. See GROOM-*porter*.

PORTER, in the *Manege*, ſignifies to direct or puſh on a horſe at pleaſure; whether forwards, or upon turns, &c.

PORTER is alſo a kind of malt liquor, which differs from ALE and pale beer, in its being made with high dried malt.

PORTERAGE, a kind of duty paid at the cuſtom-houſe to thoſe who attend the water ſide, and belong to the package-office. *Theſe porters* have tables ſet up, aſcertaining their dues for landing of ſtranger's goods, and for ſhipping out the ſame.

PORT-FIRE, a paper tube, about ten inches long, filled with a compoſition of meal-powder, ſulphur, and ſalt-petre, rammed moderately hard; uſed to fire guns and mortars inſtead of match.

Theſe *port-fires* are diſtinguiſhed into wet and dry: the compoſition of wet *port-fires* is four parts of ſalt-petre, one of ſulphur, and four of meaſled powder; when the compoſition is well mixed and paſſed through a ſieve, it is moiſtened with a little linſeed-oil, and well rubbed with the hands till the oil is thoroughly mixed with the other ingredients.

The compoſition of dry *port-fire* is four parts of ſalt-petre, one of ſulphur, two of meaſled powder, and one of antimony. Theſe compoſitions are drove into ſmall paper caſes, and ſo kept till they are uſed.

PORT-GLAIVE, *ſword-bearer*, an order of knights in Poland, called by the Latins *enſiferi*.

It was confirmed by pope Innocent III. and by him ſent into Livonia to defend the preachers of the Goſpel againſt the infidels at the firſt converſion of that country. Being too weak to effect that buſineſs, they united themſelves with the Teutonic or Marian knights, by the pope's authority; and, inſtead of knights of the ſword, were called *knights of the croſs*. They ſeparated again under Univinus, their great maſter, anno 1441; or, according to others, in 1525. The Teutonic knights being then diſpoſſeſſed of Pruſſia, the *Port-glaives*, going into Luther's opinions, ſoon dwindled away; for in the year 1557 they fell out with the biſhop of Riga, of the houſe of Brandenburg, becauſe he would not embrace their notions; and he, to ſecure his own eſtate, put Riga into the hands of the Polanders.

Afterwards, the knights, having had moſt of Livonia taken from them by the Muſcovites, put themſelves under the protection of Sigiſmund Auguſtus, king of Poland, anno 1559; but William of Furſtenburg, their great-maſter, being betrayed by his own mercenaries into the hands of the Muſcovites, Gothard Keiſler, his ſucceſſor, followed the example of Albert, the great-maſter of Pruſſia, tranſacted with the aforeſaid Sigiſmund for the whole eſtate, which he ſurrendered to his own uſe in the caſtle of Riga, together with his croſs, the ſeal of the order, the charters and grants of the ſeveral popes and emperors, which concerned the ſame; as alſo the keys of the city and caſtle of Riga, the office of great-maſter, the rights of coinage, and all the powers and privileges appertaining to it; receiving back again from Radzivil, the king's commiſſioner, the dukedom of Courland to him and his heirs for ever.

PORT-GREVE, or PORTGRAVE, was anciently the principal magiſtrate in ports, and other maritime towns.

The word is formed from the Saxon *port*, a *port*, or other town, and *gerefa*, a *governor*. It is ſometimes alſo written *port-reve*.

Camden obſerves, that the chief magiſtrate of London was anciently called *port-reve*; inſtead of whom, Richard I. ordered two bailiffs; and ſoon afterwards king John granted them a MAYOR for their yearly magiſtrate.

The charter of William the Conqueror to the city of London runs thus: "William king, greets William biſhop, and Godfrey *port-reve*, and all the burgeſs "within London, French and Engliſh. I grant you, "that I will that ye be all your law-worth that ye were "in Edward's day the king. And I will that each child "be his fader's eyer, and I will not ſuffer that any man "you any wrong's breed, and God you keepe."

PORT-HOLES, or PORTS, in a *Ship*, are the embraſures, or holes, in the ſides of a ſhip of war, in which the artillery is ranged in batteries upon the decks above and below.

The *ports* are formed of a ſufficient extent to point and fire the cannon, without injuring the ſhip's ſide by the recoil; and accordingly the ſhipwrights cut them in proportion to the ſize of the cannon. The lower and upper edges of the *ports* are always parallel to the deck, ſo that the guns, when levelled in their carriages, are all equally high above the lower extremity of the *ports*, which is called the *port-ſills*.

Large ſhips have three rows of *port-holes*, or batteries; each uſually conſiſting of fifteen *port-holes*.

In ſtorms, they uſe to ſhut up the *port-holes*, to prevent the water's driving through them.

In Engliſh, Dutch, and French ſhips, their valves or caſements, called *port-lids*, are faſtened by hinges at top of the apertures; in Spaniſh veſſels aſide of them.

PORTICO, in *Architecture*, a kind of gallery on the ground, or a piazza encompaſſed with arches ſupported by columns,

lumns, where people walk under covert. See *Tab. Architecture, fig.* &c.

The roof is usually vaulted, sometimes flat. The ancients called it *tectum*.

Though the word *portico* be derived from *porta, ostium, door*, yet it is applied to any disposition of columns which form a gallery, without any immediate relation to doors or gates.

The most celebrated *porticos* of antiquity were those of Solomon's temple, which formed the atrium or court, and encompassed the sanctuary; that of Athens, built for the people to divert themselves in, and wherein the philosophers held their disputes and conversations; which occasioned the disciples of Zeno to be called *stoics*, from the Greek στοα, *porticus*; and that of Pompey at Rome, raised merely for magnificence, consisting of several rows of columns supporting a platform of vast extent; a draught whereof Serlio gives us in his antique buildings.

Among the modern *porticos*, the most celebrated is the piazza of St. Peter of the Vatican. That of Covent Garden, London, the work of Inigo Jones, is also much admired.

PORTIO, *portion*, a part or division of any thing.

PORTION, in the *Canon Law*, is that allowance, or proportion, which a vicar ordinarily has out of a rectory, or impropriation; be it certain or uncertain.

PORTIO *dura*, and *mollis*, in *Anatomy*, a partition of the fifth pair of nerves of the brain; which, before its egress out of the dura mater, is apparently divided into two branches; the one pretty tough and firm, called *portio dura*; the other soft and lax, called *portio mollis*. See *Seventh pair of* NERVES.

PORTIONER, *portionarius*. Where a parsonage is served sometimes by two, sometimes by three ministers, alternately; as Bromyard, Burford, &c. in Shropshire; the vicars or incumbents are called *portioners*; because they have but their portion or proportion of tythes, or profits of the living.

PORTISCULUS, among the Romans, an officer who had the direction of the rowers in a galley. He was otherwise called FAUSARIUS and HORTATOR *remigum*.

PORTUS *piscis*, in *Ichthyology*, a name given by some to a fish called by others the *mugil alter*, or black MULLET. It is a very scarce fish, much resembling the common mullet in shape, but all over of a fine black, and having several lines of a deeper black than the rest, running longitudinally from the gills to the tail; it has a very wide mouth, and has seven or eight prickles on the back, separate from one another, and joined into a fin by a membrane in the usual way; these are placed immediately before the back-fin.

PORTLAND *stone*, *saxum arenarium Portlandicum* of Da Costa, and *plusterium habet, albidum, laxum*, of Hill, is an alkaline sand stone, of a dull whitish colour, heavy, moderately hard, of a somewhat flat texture, and is composed of a large roundish grit, cemented together by an earthy spar, and intermixed with numerous glittering spangles of pure spar; the grit splits in the cutting of the stone, so that it is capable of being brought to a surface very smooth and equal; it will not strike fire with a steel, and burns to a slight ashen hue. There are vast quarries of it in the island of *Portland* in Devonshire, whence its name. It is brought from thence in large quantities to London, and much used in building. This, and all similar sorts of stone, that are composed of granules, and are not of a laminated texture, will cut and rive in any direction, as well in a perpendicular, or in a diagonal, as horizontally and parallel to the site of the strata. For this reason they have obtained the name of FREE-*stone*. Da Costa's Fossils, p. 125.

This stone is very soft when it comes out of the quarry, works very easily, and becomes in time very hard. The piers and arches at Westminster bridge are built with it.

Duke of PORTLAND's *powder for the gout and rheumatism*. See GOUT.

PORTLANDIA, in *Botany*, a genus of the *pentandria monogynia* class. Its characters are, that the corolla is funnel-shaped, the anthers longitudinal, and the capsule pentagonous, bilocular, bivalvular, polyspermous, and crowned with a five-leaved calyx. There are two species.

PORT-LAST, in a *Ship*, denotes the GUN-*wale*. See *Tab. Ship. fig.* 2. n. 19.

When a yard is down on the deck, they say, the *yard is down a port-sell*.

PORTMANNIMOTE, in *Old Records*, the PORT-MEN's court, held in any city or town.

PORT-MANTEAU, a piece of joiners work, fastened to the wall, in a wardrobe, armury, &c. proper for the hanging on of cloaks, hats, &c.

PORT-MANTEAD is also used for a cloak-bag, of cloth, leather, or the like, wherein the cloak and other habiliments of travellers are disposed, and laid on the horse's crupper.

PORT-MANTEAU is also an officer under the king of France, whereof there are twelve; their business is to keep the king's hat, gloves, cane, sword, &c. to take them from him, and to bring them to him again when wanted.

The dauphin has also his *port-manteau*. Answerable to these are the cardinals camerlingues, or rail-bearers.

The Romish bishops have also their *port-croise, port-mitre*, &c. i. e. crozier-bearers, mitre-bearers, &c.

PORT-MEN, the twelve burgesses of Ipswich; thus called in the stat. 13 Eliz.

Camden adds, that the name was common to the inhabitants of all the CINQUE-*ports*.

PORTMOTE, formed from the Saxon *port, port, and gemot, conventus, meeting*, q. d. *portigmot*, signifies a court kept in port or haven towns; as Swanimote in the forest. It is sometimes also called the *portmote court*.

Portmotes are also held in some inland towns, as at Knolle in Cheshire.

PORT-NAILS, in a *Ship*, such as are used to fasten the hinges to the ports.

PORTOISE, aboard a *Ship*, is the same with *port-sell*, or the *gun-wale*; and as they say, *the yard is down a portlast*, when it lies down on the deck; so for a ship *to ride a portish*, is to ride with her *yard a port-sell*, or brought down to the deck.

PORTORARIUM, in *Anatomy*, a name given by some authors to the PYLORUS.

PORTRAIT, POURTRAIT, or POURTRAITURE, in *Painting*, the representation of a person, and especially of a face, done from the life.

In this sense we say, *portrait-painting*, in opposition to history-painting, where all resemblance of person is disregarded.

Portraits are usually painted in oil-colours, sometimes in water; sometimes in miniature, with crayons, pens, pastels, &c.

It was said of a great painter, who never succeeded in the likeness (Sir Peter Lely, if we mistake not) that he made a great many fine pictures, but all poor *portraits*.

PORT-RAFT. See RAFT.

PORT-ROPES, in a *Ship*, those which serve to haul up the ports of the ordnance.

PORT-ROYAL, a term that makes a considerable figure in the republic of learning. Its origin is this:

Philip Augustus, wandering from his company in hunting, near Chevreuse, westward of Paris, found a little chapel, where he put up, expecting that some of his attendants might meet him. This happening accordingly, he gave the place the name of the *King's port, Port du roy*, or *Port-royal*; and, to give thanks for his deliverance, he resolved to erect a monastery there.

Odo, bishop of Paris, apprised of his intention, prevented him; and, with the concurrence of Mathilda, wife of Matth. Montmorenci, first lord of Marly, built a nunnery in 1204, filling it with Cistercians, who continued under the jurisdiction of the general of that order till the year 1627, when they were removed to a house given them in the Fauxbourg St. Jaques, at Paris.

In 1647, they quitted the habit of Cistercians, and embraced the institution of the perpetual adoration of the sacrament. The same year the archbishop of Paris allowed them to remand some of their religious to their former abbey, and to re-establish the same.

Some time after, the formulary of Alexander VII. being appointed to be subscribed throughout the kingdom, the religious of *Port-royal* in the city figured it; those remitted to the former abbey complied it extremely, and, at last, only signed it with great restrictions.

Still persisting in the same sentiments, the king finding no way to reduce them but by dispersing them, that was executed in 1709, and the revenues given to the other monastery.

Upon this evacuation, several ecclesiastics, and others, who had the like sentiments with regard to the subscription as the religious, retired to *Port-royal*, and had apartments there; and there published several books, both on the subject of this dispute, and other topics; whence all that adhered to that party took the name of *Port-royalists*; and their books, *books of Port-royal*.

Hence we say, the *writers of Port-royal*; Mellieurs *de Port-royal*, the translations *of Port-royal*, the Greek and Latin methods *of Port-royal*, which are grammars of those languages.

PORT-SALE, a public sale of goods to the highest bidder. *Port-sale*, in the stat. 27 Henry VIII. cap. 7. denotes the sale of fish presently upon its arrival in the port or haven.

PORT-SOKEN, or PORT-SOKA, the suburbs of a city, or a place within the liberties and jurisdiction thereof.

The word is formed from the Saxon *port*, *city*, and *soca*, *jurisdiction*.

jurisdictionem. Concessi, quod nullus de civitate, vel portsoka *suo capiat*, &c. Somn. Gavelkind.

PORTUGALLICA *terra, earth of Portugal*, in the *Materia Medica*, the name of a fine aſtringent bole, dug in great plenty in the northern parts of Portugal, and eſteemed a remedy againſt poiſons and venomous bites, and good in malignant fevers. Whatever may be its virtues of this kind, it is manifeſtly an aſtringent of the very firſt claſs, and is uſed with great ſucceſs in fluxes of all kinds. It is well known in ſome parts of the world, beſide the kingdom where it is produced; but is not known in the Engliſh ſhops; the cheapneſs of our ſophiſticated bole armeniac having excluded this whole valuable claſs of medicines from our practice.

The characters by which the *Portugueſe earth* is known from the other red boles, are theſe: it is of a cloſe, compact, and regular texture, conſiderably heavy, and of a fine florid red, of a ſmooth and ſhining ſurface, eaſily breaking between the fingers, and a little ſtaining the hands. It adheres firmly to the tongue, melts freely and readily in the mouth, and has a ſtrongly aſtringent taſte, but leaves a little grittineſs between the teeth. It does not ferment with acids, and ſuffers ſcarce any change of colour in the fire.

The Portugueſe and Spaniards make an earthen ware of this BOLE, which they call *luvares*; it is of a fine red colour, very ſmooth and poliſhed, though it is never glazed, being only dried. They uſe it to filtre, cleanſe, and cool the water. It is alſo ſometimes made into a cake, and ſtamped with a roſe.

PORTUGUESE *man of war*, in *Natural Hiſtory*, a name which the ſeamen give to the *holothuria phyſalis* of Linnæus. It conſiſts of a ſmall bladder, about ſeven inches long, very much reſembling the air-bladder of fiſhes, from the bottom of which deſcend a number of ſtrings, of a bright blue and red, ſome of them three or four feet in length, which, upon being touched, ſting like a nettle, but with much more force. On the top of the bladder is a membrane, which is uſed as a ſail, and turned ſo as to receive the wind which way ſoever it blows. This membrane is marked in fine pink-coloured veins, and the animal is in every reſpect an object exquiſitely curious and beautiful.

PORTUGUESE *coins*. See COINS.

PORTUGUESE *meaſure*. See MEASURE.

PORTUS, *quinque*. See QUINQUE *portus*, and CINQUE *ports*.

PORT-VENT, in an organ, is a wooden pipe, well cloſed, which ſerves to convey the wind from the bellows to the ſound-board of the ORGAN.

PORTULACA, in *Botany*. See PURSLANE.

PORTUMNALIA, among the Romans, a feſtival in honour of Portumnus, who was ſuppoſed to preſide over ports and havens, celebrated on the ſeventeenth of Auguſt.

PORUS *biliarius*. See BILIARIUS *porus*, and DUCTUS *communis*.

PORUS, in *Natural Hiſtory*, a name given by authors to a peculiar kind of foſſil coral, of which there are many different ſpecies; theſe are all of a beautifully laminated ſtructure, and ſeem allied to the myceritæ or fungitæ; they are ſeldom found looſe, but uſually bedded in hard marble, and with their pores filled up with ſparry or mineral matter. See *Tab. of Foſſ. Claſs* 7.

PORUS is alſo the name of the TOPHUS.

PORUS *arenaceus*, in *Natural Hiſtory*, a name given by authors to a ſpecies of marine ſubſtance, found among the rocks in the coral fiſheries, and in other places. It grows at different depths, and ſeems to adhere to the rocks by a ſimple baſe, having no root, nor any thing in the place of one. It is branched in ſuch a manner, that with the help of a little imagination it has been forced into the reſemblance of a ſtag's horn; its height is about an inch and a half, often leſs when newly taken out of the ſea; it is of a fine ſnow-white colour, but when it has lain ſome time to dry, it becomes of a duſky yellow; it is very thin, perfectly tranſparent, and ſeems compoſed of ſeveral fine membranes. When examined by the microſcope, an admirable ſtructure is diſcovered in it; the whole being compoſed of a membranous matter, in which are an infinite number of holes, and all theſe arranged into regular lines.

Count Marſigli has diſtinguiſhed this, which is the common kind of *porus cervinus*, or buck's horn *porus*, by the name of *minor*, in order to prevent its being confounded with another leſs common kind, which Ferrante Imperato has deſcribed under the name of *porus cervinus*.

This larger kind is found alſo growing on the rocks in the coral fiſheries, but it always is found at great depths, never near the ſurface, as the other often is. It grows to the rock by a ſmall baſe, and from thence riſes to a ſhort trunk, which ſpreads itſelf out into ſeveral flat branches, divided every where into two, as thoſe of moſt of the ſea-fuciuſes are; and theſe are ſo expanded as to form, what people imagine, a reſemblance of a ſtag's horn. This grows to a little more than two inches in height, and is of a beautiful pale yellow, or ſtraw colour, even while growing, and looks glaſſy and ſhining, as if covered with a thin coat of varniſh. It is as thin as the fineſt paper; and when viewed by the microſcope, is found to be of a particular texture. It is ſometimes found growing to the ſhells of ſea-fuſſiles; but of thoſe only which live in great depths of water. Count Marſigli has given elegant figures both of this and the ſmaller kind, not only in their natural ſtate, but as they appear to the microſcope.

POSCA, the name of a mixture of vinegar and water, which was the common drink of the Roman ſoldiers.

POSCENIUM, or POSTCENIUM, among the Romans, the back part of the theatre, where the actors retired to undreſs themſelves. Danet. in voc.

POSCENIUM was ſometimes uſed to ſignify a lady's dreſſing-room, where the paint and waſhes were kept and uſed, and where men were not allowed admittance. See PARACENIUM.

POSE, in *Heraldry*, denotes a lion, horſe, or other beaſt, ſtanding ſtill, with all four feet on the ground; to denote thereby that it is not in a moving poſture.

POSIDIA, Ποσιδια, in *Antiquity*, a feſtival in honour of Neptune, called Ποσειδων.

POSIDIUM, Ποσιδιων, in *Chronology*, the ſeventh month of the Athenian year. It conſiſted of thirty days, and anſwered to the latter part of our December, and the beginning of January.

It had this name from the feſtival Poſidonia celebrated in it.

POSIDONIA, Ποσειδωνια, in *Antiquity*, the ſame with POSIDIA.

POSIQUIT, in *Natural Hiſtory*, a name given by the people of the Philippine iſlands to a ſmall bird very common among them, and approaching to the nature of the Canary bird, but ſmaller, and wanting its harmonious voice.

POSITI, among the Romans, an appellation given to the dead when placed at the door with their feet outwards, till the time of their interment.

POSITION, in *Phyſics, fate*, or *ſituation*; an affection of place, which expreſſes the manner of any body's being therein.

POSITION, in *Architecture*, denotes the ſituation of a building, with regard to the points of the horizon.

Vitruvius directs the *poſition* of a building to be ſuch, as that the four corners point directly to the four winds.

POSITION, in *Aſtronomy*. The *poſition* of the ſphere is either right, parallel, or oblique; whence ariſe the inequality of our days, difference of ſeaſons, &c.

POSITION, *circles of*. See CIRCLES.

POSITION, in *Dancing*, the manner of diſpoſing the feet, with regard to each other.

There are four regular *poſitions*: the firſt is, when the feet are joined in a line parallel to the ſhoulders: the ſecond, when the heels, are perpendicularly under the ſhoulders; and of conſequence, the width of the ſhoulders apart: the third, when one foot is before the other, in ſuch manner, as that the heel is in the cavity formed by the rotula and carpus of the foot: the fourth, when one foot is the width of the ſhoulders apart from the other, the heel ſtill anſwering to the cavity above mentioned, which is the only regular manner of waltzing.

POSITION, in *Arithmetic*, a rule, ſo called, for *ſuppoſition*.

The rule of *falſe poſition*, or of *falſehood*, conſiſts in calculating on ſeveral falſe numbers, taken at random, as if they were the true ones; and, from the differences found therein, determining the number ſought.

Poſition is either *ſingle* or *double*.

POSITION, *ſingle*, is, when there happens in the propoſition ſome partition of numbers into parts proportional; in which caſe, the queſtion may be reſolved, at one operation, by this rule; imagine a number at pleaſure, and work therewith according to the tenor of the queſtion, as if it were the true number: and what proportion there is between the falſe concluſion and the falſe *poſition*, ſuch proportion the given number has to the number ſought.

Therefore the number found by argumentation ſhall be the firſt term of the rule of three; the number ſuppoſed, the ſecond term; and the given number, the third.

E. g. A ſchool-maſter being aſked how many ſcholars he had, replied, if he had as many more, half as many, and one fourth as many, he would have but one leſs than 100; how many had he? Suppoſe the number 20: then $20+20+10+5=55$ inſtead of 99: therefore $55 : 20 :: 99 : \frac{99 \times 20}{55} = 36$ the number required.

POSITION, *double*, is when there can be no partition in the numbers to make a proportion.

In this case, therefore, you must make a supposition twice; proceeding therein according to the tenor of the question.

If neither of the supposed numbers solve the proposition, observe the error, and whether they be greater or less than the resolution requires, and mark the errors accordingly, with the signs + and —.

Multiply, contrariwise, the one *position* by the other error; and, if the errors be both too great, or both too little, subtract the one product from the other, and divide the difference of the products by the difference of the errors.

If the errors be unlike, as the one +, and the other —, add the products, and divide the sum thereof by the sum of the errors added together. For the proportion of the errors is the same with the proportion of the excesses or defects of the numbers supposed, to the numbers sought.

Ex. gr. 1. If 100*l.* be divided between A, B, and C, in such a manner, that B had three times as much as A, and C as much as A and B together, and their respective sums be required. Suppose first A's=12, B's will be =36, and C's=48, the sum of which will be 96 instead of 100, and leave an error in defect, or —4.

Suppose 2dly. A's=14, then B's=42, and C's=56, and the sum=112 instead of 100; hence we shall have an error in excess of +12. And $4\times14=56$, and $12\times12=144$, and $144+56=200$: and $\frac{200}{16}=12\frac{1}{2}$ for A's real share.

Ex. gr. 2. A party of soldiers marching, came up with a shepherd, and drove off half his flock and half a sheep; another party carried off half the remainder and half a sheep; and a third plundered him of half the remainder and half a sheep, and after all he had 20 sheep left: what was the number of the whole flock?

1st. Suppose it 21: of which the first party took $\frac{21}{2}+\frac{1}{2}=11$, the second took $\frac{10}{2}+\frac{1}{2}=5\frac{1}{2}$, the third took $\frac{4\frac{1}{2}}{2}+\frac{1}{2}=2\frac{1}{2}$; so that the remainder was $2\frac{1}{2}$ instead of 20, which gives an error in defect, or — 18$\frac{1}{2}$.

2dly. Suppose the number 23: then $\frac{23}{2}+\frac{1}{2}=12; \frac{11}{2}+\frac{1}{2}=6; \frac{5}{2}+\frac{1}{2}=3$; and the remainder will be 2 instead of 20, and leave an error in defect or — 18. Then $18\times21=378$, and $18\frac{1}{2}\times23=419\frac{1}{2}$; and $419\frac{1}{2}-378=41\frac{1}{2}$ which divided by 1 gives a quotient 167 for the true number.

POSITION, in *Geometry*, is a term sometimes used in contradistinction to *magnitude*. Thus, a line is said to be *given in position*, *position data*, when its situation, bearing, or direction, with regard to some other line is given: on the contrary, a line is given in magnitude, when its length is given, but not its situation.

Sir Isaac Newton shews how to find a point, from which three lines, perpendicularly let fall to three other lines *given in position*, have any given ratio, &c.

POSITION, in *Grammar*. See QUANTITY.

POSITION, is also used for a THESIS or proposition maintained in the schools.

POSITION, *traitorous*. See TRAYTOROUS.

POSITION, *pedis*, in *Music*, is used for the putting down the hand in beating time. See THESIS.

POSITIONAL *Ideal*. See ARTICULATED *Ideal*.

POSITIVE, a term of relation sometimes opposed to *negative*.

Thus we say, the commandments are some of them *positive*, others *negative*.

POSITIVE *quantity*, in *Algebra*. See QUANTITIES.

POSITIVE is also used in opposition to *relative*, or *arbitrary*.

Thus we say, beauty is no positive thing, but depends on the different tastes of the people.

POSITIVE is also used in opposition to *natural*.

Thus we say, a thing is of *positive* right, meaning, it is founded on a law which depends absolutely on the authority of him who made it.

The prohibition of eating certain beasts, under the old law, was of *positive* right; the command to honour father and mother, of natural right.

POSITIVE *degree*, in *Grammar*, is the adjective in its simple signification, without any comparison.

Or, *positive degree*, is that termination of an adjective, which expresses its subject simply and absolutely, without comparing it with any other.

Thus, *good*, *brave*, *fair*, *pulcher*, &c. are in the *positive degree*: better, fairer, &c. in the comparative.

POSITIVE *theology*. See THEOLOGY.

POSITIVE, in *Music*, denotes the little organ usually behind, or at the foot of the organ-ll, played with the same wind, and the same bellows, and consisting of the same number of piper with the large one, though those much smaller, and in a certain proportion. See ORGAN.

In the organs of the Jesuits, the *positive* is in the grand body.

POSITIVE *laws*. See LEVITE.

POSITIVE *proof*, in *Law*. See EVIDENCE.

POSSE *comitatus*, POWER *of the county*, a phrase in law, signifying the aid and attendance of all knights, gentlemen, yeomen, labourers, servants, apprentices, villains, and other persons, above the age of fifteen years, within the county; because all above that age are bound to have harness, by the statute of Winchester: only women, ecclesiastical persons, and such as are decrepid and infirm, are excused.

All persons under the degree of a peer are bound to attend upon warning of the sheriff or justices, under pain of fine and imprisonment, to defend the county against the king's enemies when they come into the land, as well as for keeping the peace and pursuing felons.

It is also used where a riot is committed, a possession kept upon a forcible entry, or any force of rescue used, contrary to the command of the king's writ, or in opposition to the execution of justice. Stat. 2 Hen. V.

POSSESSIO *fratris*, in *Law*, is where a man hath a son and a daughter by one woman or *venter*, and a son by another *venter*, and dies; if the first son enters and dies without issue, the daughter shall have the land as heir to her brother, although the second son by the second *venter* is heir to the father: but if the eldest son dies without issue, not having made an actual entry and claim, the younger brother by the second wife, as heir to the father, shall enjoy the estate, and not the sister. 1 Inst. 11, 15.

POSSESSIONEM, *habere facias*, in *Law*. See HABERE.

POSSESSION, POSSESSIO, *in Law*, *quasi pedis positio*, an action whereby we hold or occupy any thing, either *de jure*, or *de facto*.

POSSESSION *defacto*, is when there is an actual and effectual enjoyment of the thing. See *De Facto*.

POSSESSION *de jure*, or in *Law*, is the TITLE a man has to enjoy a thing, though it be sometimes usurped, and in the actual *possession* of another.

This right of *possession* is of two sorts; an apparent right of *possession*, which may be defeated by proving a better; and an actual right of *possession*, which will stand the test against all opponents. Thus if the dissessor, or other wrong doer, who having obtained the *possession* by either fraud or force, hath only a bare or naked *possession*, without any shadow of right, dies possessed of the land whereof he so became seized by his own unlawful act, and the same descends to his heir; by the common law the heir hath obtained an apparent right, though the actual right of *possession* resides in the person dissessed; and it shall not be lawful for the person dissessed to devest this apparent right by mere entry or other act of his own, but only by an action at law. For until the contrary be proved by legal demonstration, the law will presume the right to reside in the heir, whose ancestor died seised, rather than in one who has no such presumptive evidence to urge in his own behalf. But if he, who has the actual right of *possession*, puts in his claim, and brings his action within a reasonable time, and can prove by what unlawful means the ancestor became seised, he will then by sentence of law recover that *possession*, to which he hath join actual right. Yet, if he omits to bring this his possessory action within a competent time, his adversary may imperceptibly gain an actual right of *possession*, in consequence of the other's negligence. And by this and certain other means, the party kept out of *possession* may have nothing left in him but the mere *right of property*, without either *possession*, or even the right of *possession*. Thus, if a dissessor turns me out of *possession* of my land, he thereby gains a mere naked *possession*, and I still retain the right of *possession* and right of property. If the dissessor dies, and the land descend to his son, the son gains an apparent right of *possession*; but I still retain the actual right both of *possession* and property. If I acquiesce for thirty years without bringing any action to recover *possession* of the lands, the son gains the actual right of *possession*, and I retain nothing but the mere right of *property*. And even this right of property will fail, or at least it will be without a remedy, unless I pursue it within the space of sixty years. Blackst. Comm. book ii. p. 196, &c.

POSSESSION, *property in*. See PROPERTY.

POSSESSION, *unity of*, makes what the civilians call consolidation. See UNITY.

By the French laws, a *possession* of three years, in matters personal, begets a right; and in real claims, a *possession* of ten years, among persons living near the premises, and twenty years among those that live elsewhere.

POSSESSION, *annual*, is the USUCAPTIO, which gives a right to moveables; a triennial and peaceable *poſſeſſion* of a benefice is ſufficient to maintain it, provided it be founded on a plauſible title.

POSSESSION is ſometimes alſo uſed for the act of taking *poſſeſſion*, which is performed with certain formalities, whereby a perſon is juſtified to be in the enjoyment of any thing.

Anciently, upon buying an eſtate, *poſſeſſion* was taken with much ceremony: in ſome places, by a ſtick, a branch, or a ſtraw, put into the hands of the buyer by the ſeller. See INVESTITURE.

POSSESSION *of a benefice*, in ſome cuſtoms, is taken by entering the church, kneeling down, kiſſing the altar, and ringing the bell. See INDUCTION.

In ſome caſes, *poſſeſſion* is taken by the ſight of the ſtreple.

POSSESSION is alſo uſed for the ſtate of a perſon ſaid to be *poſſeſſed* by the devil. See DEMONIAC, and DEMONIACAL *Poſſeſſion*.

POSSESSION, in *Mining*, is the right to a mere of ground, which the miners enjoy, by having ſtones upon that ground; and it is taken generally for the ſtones themſelves, for the ſtones give *poſſeſſion*.

POSSESSIVE *pronoun*, in *Grammar*. See PRONOUN.

POSSESSORY *actions*, in *Law*, are thoſe which ſerve only to regain that poſſeſſion, whereof the demandant, (that is, he who ſues for the land) or his anceſtors have been unjuſtly deprived by the tenant or poſſeſſor of the freehold, or thoſe under whom he claimed. Theſe are the writs of ENTRY and ASSISE.

POSSET, *beer*. See ZYTHOGALA.

POSSIBILITAS, POSSIBILITY, in our *Old Law-Books*, is ſometimes uſed for a thing done wilfully or wittingly.

In which ſenſe it ſtands oppoſed to *impoſſibilitas*, a thing done againſt the will. *Si autem tenens impoſſet, videtur veram cauſ. &* impoſſibilitatis *accidere, ut ea falſa.* Leg. Alfred. Again, *Si quis aget* impoſſibiliter, *non ſit omnino ſenile ut à tantummodo feuati.* Leg. Canut. cap. 6.

POSSIBILITY, in *Law*, is uſed in the ſame ſenſe with contingency, or for that which may or may not happen: with reſpect to *poſſibilities* it is obſerved, that though they may be releaſed, or deviſed by will, or may paſs to the heir or executor, yet they cannot be aſſigned to a ſtranger, unleſs coupled with ſome preſent intereſt.

POSSIBILITY, POSSIBILITAS, denotes a non-repugnance to exiſting in a thing that does not any way exiſt. See POSSIBLE.

This non-repugnance to exiſting is no other than the producibility of any thing; which conſiſts in this, that there are ſufficient cauſes actually exiſting, or at leaſt poſſible, whereby the thing may be produced, or be brought to exiſt; principally as there is a God, an almighty cauſe.

So that *poſſibility* does not imply any thing in the thing poſſible, but it is a mere extrinſic denomination taken from the power of the cauſe, and principally of God.

In effect, if a creatable thing had any intrinſic *poſſibility*, it would follow, that ſuch a thing muſt exiſt even without the cauſe.

And yet we may allow an intrinſic *poſſibility* of a thing, if by *poſſibility* we do not underſtand its producibility, or its non-repugnance to exiſt; but only the non-repugnance of the attributes contained in its idea. But ſuch *poſſibility* is merely logical.

POSSIBLE, POSSIBILE, *is* ſometimes oppoſed to real exiſtence, and underſtood, in the ſchools, of a thing, which, though it does not actually exiſt, yet may exiſt; *as*, a new ſtar, another world, &c. which are particularly ſaid to be *phyſically poſſible*.

It is alſo oppoſed to *impoſſible*. In which ſenſe it is applicable to any thing that does not contradict itſelf, or involves contradictory predicates; whether it actually exiſt or not, as a man, ſire, &c. Theſe are alſo ſaid to *be logically poſſible*.

It is a great point of controverſy among the ſchool-philoſophers, whether and how far things may be ſaid to have entity, while only in a ſtate of *poſſibles*?

Poſſibles are ordinarily conceived to be threefold; *future*, *potential*, and *mere poſſible*.

POSSIBLE, *future*, is that whoſe production is decreed and aſcertained; viz. the intention of all thoſe events fixed by the immutable decree, or the immutable will, of the Almighty.

POSSIBLE, *potential*, is that which is contained, or lies hid, in its cauſes: as the tree in the ſeed, the fruit in the tree, &c.

POSSIBLE, *mere*, is that which might exiſt, though it never ſhall.

Others diſtinguiſh *poſſibles* into *metaphyſical*, *phyſical*, and *ethical*.

POSSIBLE, *metaphyſical*, is that which may, at leaſt, be brought to being by ſome ſupernatural and divine power; as the reſurrection of the dead.

In which ſenſe the word is oppoſed to an *impoſſible*, even as it reſpects God himſelf; as a crooked ſtraightneſs, a ſquare circle, an infinitely perfect creature, a mortal God.

POSSIBLE, *phyſical*, is that which may be affected by a natural power; in oppoſition to ſuch things as cannot be produced by any finite power; as, to reſtore the dead, &c.

POSSIBLE, *ethical*, is that which may be done by prudent perſons, uſing all the proper means they have for the ſame. Again, it is uſed for any thing done according to right reaſon, and conſiſtently with the laws.

POSSIBILITY *of iſſue extinct*. See TAIL.

POSSUM, in *Zoology*. See OPOSSUM.

POST, in the *Military Art*, is any ſpot of ground capable of lodging ſoldiers.

The word is formed from the Latin *poſitus*, *placed*; ſome derive it from *poteſtas*, *power*.

A *poſt* denotes any ground or place, fortified or not, where a body of men may make a ſtand, and fortify themſelves, or remain in condition to fight an enemy.

A ſpot of ground ſeized by a party, to ſecure the front of an army, and to cover the *poſts* that are behind, is called an *advanced poſt*.

The advance-guard, or the right of the two lines of an army, &c. is called the *poſt of honour*, and is always given to the eldeſt regiments.

A centinel placed before the colours, and at the door of the commanding officer, is ſaid to be in a *poſt* of honour.

POST, in *Building*, large pieces of timber, placed upright in houſes, &c.

The corner *poſts* are called the *principal* or *facing poſts*; the *poſts* framed between principal *poſts* for ſtrengthening the roof of a houſe, are called the *queen poſts*.

An excellent method to preſerve *poſts* from rotting, is to burn the outſide of the ends that are to be ſet in the ground, to a coal.

POST, *crown*. See CROWN-POST.

POST, alſo denotes the diſpatch a courier or letter-carrier makes by changing horſes from time to time.

The name is borrowed hence, that the horſes are *poſts*, placed, poſted, or diſpoſed, from diſtance to diſtance.

The word is alſo applied to the perſon himſelf; the houſes where he takes up, and lays down his charge; and the ſtages, or diſtances between houſe and houſe. Hence the phraſes, *poſt-boy*, *poſt-horſe*, *poſt-houſe*, &c.

We find mention made of *poſt-horſes* in the Theodoſian Code, *de curſu publico*; but theſe were very different from the preſent eſtabliſhment, and were only public horſes firſt appointed by Trajan; till whoſe time, the meſſengers uſed any horſes that came in their way.

Lewis Hornigk has an expreſs treatiſe on *poſts*, wherein he makes four kinds; viz. on *haſtiludes*, in *chariots*, in *boats*, and on *foot*: which laſt kind is in uſe in Italy, Turkey, and Peru: but in 1540, the Turks began to eſtabliſh regular *poſts* like thoſe of Chriſtian countries.

Herodotus aſcribes the origin of *poſts* to Cyrus, or Xerxes, but the *poſts* inſtituted by thoſe princes were no more than couriers.

In effect, *poſts* on the preſent footing are but a modern invention; though ſome go back as high as Charlemagne. It is certain it was the policy, or rather the diſſidence of Louis XI. of France that they owed their riſe to; that uneaſy prince firſt ſettled them by an ordonnance of the 19th of June 1464, to be the ſooner, and the more ſurely advertiſed of what paſſed in his own kingdom, and in the neighbouring ſtates.

But theſe *poſts* were only for the particular uſe of the court; for the author of the Life of the Duke d'Epernon ſays, that the packet or letter-office was not ſet up in France anno 1619.

From France the inſtitution propagated itſelf, by degrees, through the ſeveral other parts of Europe. In Germany, Hornigk obſerves, *poſts* were firſt ſettled by the count de Taxis at his own expence; in acknowledgment whereof, the emperor Matthias, in 1616, gave him, in fief, the charge of *poſt-maſter* under him and his ſucceſſors.

In England, *poſts* were firſt eſtabliſhed by act of parliament 12 Car. II. anno 1660, which enabled the king to ſettle a *poſt-office*, and appoint a governor: though there had been *poſts* in England from the time of Charles I. and probably ſomewhat earlier. For by 2 and 3 Edw. VI. cap. 3. A.D. 1548, the rate of *poſt-horſes*, is fixed at one penny per mile. And in the twenty-fifth year of queen Elizabeth, anno 1581, we find mention of the office of chief *poſt*-maſter of England: and in 1631, of the office of *poſt*-maſter for foreign parts, which office we alſo learn from the Feeders, tom. xii. fol. 385. had been firſt created by king James.

However, till king Charles I's eſtabliſhment by proclamation of the *poſts*, anno 1635, there ſeem to have been but few regular *poſt*-carriages in England. In 1656, the

protector and his parliament erected a new general *poſt*-office, under regulations ſimilar to thoſe which were adopted after the Reſtoration. The privilege of franking letters, claimed by members of parliament, was coeval with the eſtabliſhment of the *poſt*-office in 1660. See *Franck Letters*.

At this time it appears, that the revenue of poſtage brought in 21,500*l.* whereas in 1653, the poſtage of England, Scotland, and Ireland, was farmed at 10,000*l.* yearly. By 15 Car. II. cap. 14. the revenue of the general *poſt*-office was ſettled on the duke of York and his heirs male; and by 1 Jac. II. cap. 12. it was enacted by parliament, that this revenue, amounting at that time to 65,000*l.* per annum, ſhould belong to the king and his ſucceſſors; whence it was made a part of the king's private eſtate for ever, and not to be accounted for to parliament, as other public revenues are. In 1699, the net revenue of the *poſt*-office is ſaid to have been 90,504*l.* 10*s.* 6*d.* By the tenth act of the ninth year of queen Anne, the former laws for eſtabliſhing the *poſt*-offices in both kindoms of England and Scotland were repealed; and one general *poſt*-office, and alſo one general *poſt*-maſter, was appointed for the united kingdoms: and by this act the poſtage of letters was increaſed by one-third. It appears alſo from this act, that the groſs amount of the revenue for one year, ending at Michaelmas, 1710, was 111,461*l.* 17*s.* 10*d.* and on a medium of three years, viz. 1708, 1709, 1710, the net income, according to Dr. D'Avenant, was 56,664*l.* 19*s.* 10½*d.* but according to the report of the commiſſioners of the equivalent (anno 1718), to the houſe of commons, the medium then amounted to 62,000*l.* for England, and 2000*l.* for Scotland. On a medium of four years, viz. 1711, 1712, 1713, 1714, the net revenue was 90,233*l.* The net annual produce of the *poſt*-office at Michaelmas 1722, was 98,010*l.* 8*s.* at which time the groſs amount is ſtated to have been 101,804*l.* 11*s.* 8*d.* the deduction for frank covers, 33,397*l.* 12*s.* 9*d.* and the expence of management 7,396*l.* 11*s.* 5*d.* In 1744, the groſs amount of the inland and foreign offices was 235,492*l.* and in 1764, it was 231,048*l.* The act of the ninth of Anne, eſtabliſhing the rates of poſtage, was ſo far repealed by 5 Geo. III. cap. 35. and other regulations occur in 6 Geo. cap. 21. 26 Geo. II. cap. 13. 5 Geo. III. cap. 25. and 7 Geo. III. cap. 50.

The Engliſh *poſt*-office is now managed by two *poſt*-maſters general, with an annual ſalary of 2000*l.* a year each, who have under them many other officers of their own appointing. Theſe are all ſworn, and give ſecurity for their faithful diſcharge, &c. as the ſecretary, whoſe ſalary is 200*l.* a year, clerk to the *poſt*-maſter general, ſeven clerks to the ſecretary, receiver-general with a ſalary of 300*l.* a year, his two clerks, accomptant-general whoſe ſalary is 300*l.* a year, his deputy and three clerks, the two inſpectors of the miſs-ſent and dead letters, ſolicitor to the *poſt*-office at 200*l.* a year, reſident ſurveyor at 300*l.* a year, comptroller of the inland office at 200*l.* a year and his deputy, comptroller of the bye-nights, and clerk of the ſame, court-*poſt* at 2*l.* a day, ſix clerks of the roads and their ſix aſſiſtants, thirty ſorters at 5*l.* a-year each, two junior ſorters, two facers, two window-men, inſpector of franks and aſſiſtant, inſpector of franks on the bye-days, inſpector of the letter-carriers, ſeventy-nine letter-carriers at 11*s.* a week, and ſixteen ſupernumeraries, deliverer of the letters to the houſe of commons at 6*s.* 8*d.* a day, mail-maker with an annual ſalary of 150*l.* and eight meſſengers.

The officers of the bye-letter office are the comptroller and reſident ſurveyor at 300*l.* a-year, his two clerks, collector at 200*l.* a year, his clerk, accomptant at 200*l.* a year, his clerk, inſpector of the miſs-ſent and dead-letters, two ſurveyors at 300*l.* a year each, and one at 220*l.* a year, and an office-keeper, with an appointment of 50*l.* a year. For the foreign office there are a comptroller with an annual ſalary of 150*l.* his deputy, and ſix clerks, ſecretary, meſſenger, ten letter-carriers at 11*s.* a week, manager of the packet-boats at the Briſſ, at 120*l.* a year, agents at Dover and Harwich, at 150*l.* a year each, agent at Falmouth, at 120*l.* a year, another at Liſbon, and two deputy *poſt*-maſters general and ſecretary at New-York.

On this grand office depend one hundred and eighty-two *poſt* maſters in England and Scotland, who keep regular offices in their ſeveral ſtages, and ſub-*poſt*-maſters in their branches.

A daily *poſt* is eſtabliſhed (Sunday excepted) to and from this office, and moſt of the principal towns in England, and places in their reſpective diſtricts. A mail is diſpatched from London to Edinburgh, and from Edinburgh to London, every day, Wedneſday and Sunday excepted. Letters to all parts of Europe are diſpatched from London, every Tueſday and Friday, except thoſe to Portugal, which are forwarded by the Liſbon mails on Tueſday only. For this purpoſe, there are ſix packet-boats at Dover, which ſail every Wedneſday and Saturday for Oſtend and Calais; and four between Harwich and Helvoetſluys, which ſail from Harwich, every Wedneſday and Saturday, and from Helvoetſluys on the ſame days: and five between Falmouth and Liſbon, which ſail from Falmouth on Saturday, but the time of their ſailing from Liſbon is uncertain. There are alſo ſix packet-boats between Falmouth, and the iſland of Madeira, and the Weſt Indies, for which a mail is made up at London the firſt Wedneſday in every month, and the packet ſails from Falmouth on the Saturday following. There are likewiſe five packet boats, which ſail daily, between Holy-head and Dublin.

The rates of poſtage are as follow: for every ſingle letter, not exceeding one whole *poſt*-ſtage from the office where the letter may be put in 1*d.* double-letter 2*d.* treble 3*d.* an ounce 4*d.* and ſo in proportion for every packet. Above one *poſt*-ſtage, and not exceeding two, a ſingle-letter 2*d.* and others in proportion. Above two *poſt*-ſtages, and not exceeding eighty miles from the general *poſt*-office, a ſingle letter, 3*d.* &c. in the ſame proportion. Above eighty miles, a ſingle letter, 4*d.* double 8*d.* and an ounce 1*s.* 4*d.* &c.

In like manner, there are different rates appointed to and from foreign parts, according to the diſtance and difficulty of conveyance. And all maſters of ſhips bringing letters from abroad, ſhall deliver the ſame (except in the caſe of quarantine) at the *poſt*-office, before they break bulk; for which the *poſt*-maſter ſhall receive 1*d.* extraordinary for each letter. 9 Ann. cap. 10. 5 Geo. III. cap. 25.

Letters from London to any part of Holland, France, or Flanders, (or to the town of Geneva in Switzerland, through France,) pay no foreign poſtage. The poſtage of a ſingle letter from any part of Holland, France, or Flanders to London is 1*od.* between London and any part of Spain or Portugal, through France, or by Liſbon, 18*d.* between London and any part of Italy, Sicily, Turkey, Switzerland, and Minorca, through France, except to Geneva, 15*d.* and between London and any part of Italy, Sicily, Turkey, Germany, Switzerland, Denmark, Sweden, Ruſſia, and all parts of the North, through Holland or Flanders, 12*d.*

Bills of exchange, and writs, or other proceedings at law, written on the ſame piece of paper with a letter, ſhall pay as ſo many diſtinct letters. 6 Geo. cap. 21. 26 Geo. II. cap. 13. But merchants accounts not exceeding one ſheet, bills of exchange, invoices, bills of lading, (ſent or brought over ſea, 6 Geo. cap. 21), ſhall be allowed without rate in the price of letters. 9 Ann. cap. 10. But patterns or ſamples of goods, or pieces of any thing, though not paper, incloſed in a letter, or affixed to it, if under an ounce weight, ſhall pay as a double letter. 26 Geo. II. cap. 13. None but the *poſt*-maſter ſhall convey letters, on pain of 5*l.* for every offence, and 100*l.* a week beſides; except letters carried gratis by carriers or ſhip-maſters with goods, inſtruments out of any court, and letters ſent by friends, or a ſpecial meſſenger; and to or from the two univerſities. 9 Ann. cap. 10. No letters or packets ſhall be exempted from poſtage, except ſuch as ſhall be ſent from or to the king's and ſuch, not exceeding the weight of two ounces, as ſhall be ſent during the ſitting of parliament, or within forty days before or after any ſummons or prorogation, which ſhall be ſigned, on the outſide thereof, by any member, and whereof the whole ſuperſcription ſhall be written by him; or directed to any member of either houſe of parliament at any of the places of his uſual reſidence, or at the place where he ſhall be at the time of the delivery thereof, or at the houſe of parliament, or the lobby of either houſe: or to the officers of the treaſury, admiralty, war-office, general *poſt*-office, ſecretaries of ſtate, *poſt*-maſter-general of the forces, clerk of the parliaments, clerk of the houſe of commons, or upon his majeſty's ſervice, indorſed by the proper officer. This reſtriction ſhall not extend to printed votes or proceedings in parliament, or printed news-papers, ſent without cover, or in covers open at the ſides, ſigned on the outſide by any member of parliament, or directed to a member at any place whereof he ſhall have given notice to the *poſt*-maſter-general.

Clerks in the offices of the ſecretaries of ſtate, and *poſt*-office, licenſed by the ſaid ſecretaries or *poſt*-maſter-general, are allowed to frank votes and news-papers, ſent without covers, or in covers open at the ſides. But if any paper or other thing be incloſed in ſuch printed paper, or any writing be therein, except the ſuperſcription, the whole ſhall be charged with poſtage.

Forging of franks, embezzling money for letters *poſt*-paid, or deſtroying the letters, ſtealing bills or other ſecurities for money out of letters, and robbing the mail, are, ſeverally felony. Any *poſt*-boy quitting the mail between

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one ſtage and another, or ſuffering any perſon to ride on the horſe or carriage, or loitering on the road, ſo as not to convey the mail after the rate of ſix miles an hour at leaſt, ſhall, on conviction, be ſent to the houſe of correction, and kept to hard labour, not more than a month, nor leſs than fourteen days. And if he ſhall, by himſelf, or in concurrence with others, unlawfully collect any letters, convey them, or cauſe them to be conveyed, on conviction he ſhall forfeit for every letter or packet 10*l.* to the informer; or be committed to hard labour, not exceeding two months nor leſs than one. 4 Geo. III. cap. 24. 5 Geo. III. cap. 25.

The *poſt*-maſters are allowed to charge 3*d.* a mile for each horſe riding *poſt*, and 4*d.* a mile for the perſon riding as guide. No *poſt*-maſter is allowed to intermeddle in elections for members of parliament on pain of 100*l.* 9 Ann. cap. 10.

The Great Mogul performs part of his poſtage by pigeons, kept in ſeveral places, for the conveyance of letters on extraordinary occaſions. They will carry them from one end of that vaſt empire to another. The ſame vehicles have been uſed by the Dutch in ſieges. And at this day, Tavernier obſerves, the conſul of Alexandretta ſends news daily to Aleppo, in five hours time, by means of pigeons; though thoſe two places are three days journey on horſeback apart.

POST, *penny*, a *poſt* eſtabliſhed for the benefit of London, and the parts adjacent; whereby any letter or parcel, not exceeding four ounces weight, unleſs it be paſſing to or from the general *poſt*-office, is ſpeedily and ſafely conveyed to all parts within the bills of mortality, to moſt towns and villages within ten miles of London, for one penny each packet, letter, &c. upon putting in the ſame, and alſo a penny upon the delivery of ſuch as are directed to any place beyond the cities of London and Weſtminſter, the borough of Southwark or ſuburbs, and within the diſtrict of the penny-*poſt* delivery. 9 Ann. cap. 10. 4 Geo. II. cap. 33.

The uſeful conveyance of letters and parcels by the *penny-poſt* was firſt ſet up in London and its ſuburbs, in or about the year 1683, by a private undertaker, to whoſe aſſigns government allowed a yearly penſion of 200*l.* a year for life, in lieu of the revenue ariſing from it. But the firſt mention of the *penny-poſt* in the ſtatute-book occurs in the ninth of queen Anne.

By 3 Geo. III. cap. 25. the *poſt*-maſter-general and his deputies may appoint a *penny-poſt* office in any city or town, or places adjacent, where they ſhall judge convenient, and charge therein the ſame rates as within the limits of the *poſt*-office in London.

This office is managed by a comptroller, whoſe ſalary is 300*l.* a year, his clerk, a collector, and deputy, an accomptant, five ſorters at 15*s.* per week, eight ſub-ſorters at 10*s.* per week, and near ſeventy meſſengers at 8*s.* per week. There are five principal offices from which letters are forwarded at certain hours.

POST, *writ of entry in*, in *Law*. See ENTRY.

POSTS, in *Sculpture*, &c. denote ornaments formed after the manner of rolls, or wreathings; thus called, becauſe they ſeem to run after one another.

Some are ſimple; others enriched, or flouriſhed.

POST, *after*, is alſo a Latin propoſition, uſed in compoſition with ſeveral Engliſh words, and generally implying a relation of *poſteriority*.

POST-*bill*, *bond*, in *Commerce*. See NOTE.

POST-BOOK. See BOOK.

POST-COMMUNION, a prayer which the prieſt recites after the COMMUNION.

POST-DATE. See DATE.

POST-DIEM, a fee, by way of penalty, on a ſheriff, for his neglect in returning a writ after the day aſſigned.

For this the uſual breviate has *four pence*; whereas he has nothing if he be returned at the day.

POST-DISSEISIN, a writ given by the ſtatute of Weſtminſter, for him who having recovered lands or tenements, by præcipe quod reddat, upon default of reddition, is again diſſeiſed by the former diſſeiſor: upon which he ſhall recover damages, and the party ſuffer imprisonment.

POSTEA, in *Law*, a return or certificate of the proceedings by niſi prius in the court of common-pleas, after a VERDICT; and there afterwards recorded.

POSTERIOR, a term of relation, implying ſomething behind, or that comes after another. In which ſenſe it is uſed in oppoſition to *prior* and *anterior*.

POSTERIOR *pons*, in *Anatomy*, a name given by many authors to a muſcle more generally known at this time by the name of the ERECTOR.

POSTERIOR, *ramus*. See RAMUS.

POSTERIORITY, in *Law*, a term of compariſon, and relation to ſeniority, oppoſite to *priority*.

A man holding lands or tenements of two lords, holds of his anceſtor lord by *priority*, and of his latter lord by *poſteriority*.

POSTERN, or SALLY-PORT, in *Fortification*, a ſmall gate, uſually made in the angle of the flank of a baſtion, or in that of the curtin, or near the eſtillon, deſcending into the ditch; whereby the garriſon can march in and out, unperceived by the enemy, either to relieve the works, or to make private ſallies, &c. See SALLY-*port*, and *Tab.* VII. *Fortification, fig.* 41. *xx*.

The word is alſo uſed in the general for any private or back-door. *Poſtibus habere* poſtenum *in eam curiæ partem inhibetur, ſed noviter ſit ingreſſus*, &c. Fleta.

POST-FACTO, *ex*. See EX *poſt facto*.

POST-FINE, a duty belonging to the king for a fine formerly acknowledged before him, in his court; paid by the cognizee after the fine is fully paſſed, and all things touching the ſame are accomplished.

The rate is ſo much, and half ſo much, as was paid to the king for the *pre-fine*; or 10*s.* for every five marks of land, i. e. three twentieths of the impoſed annual value; and is collected by the ſheriff of the county where the land lies, and to be anſwered by him into the exchequer.

POST-*horſes*. By 20 Geo. III. cap. 51, repealing 19 Geo. III. cap. 51. ſeveral duties are charged upon horſes and carriages travelling *poſt*, under the management of the commiſſioners of the ſtamp-duties. Every *poſt*-maſter, innkeeper, or other perſon, who lets horſes for travelling *poſt*, by the mile, or from ſtage to ſtage, or who, being a perſon uſually letting horſes to hire, lets to hire for a day, or any leſs period of time, any horſe for drawing a carriage uſed in travelling *poſt*, ſhall pay 5*s.* for an annual licence, which ſhall be only for one horſe, marked with the words, *Licenſed to let poſt-horſes*; under a penalty of 5*l.* Moreover, for every horſe hired by the mile or ſtage, to be uſed in travelling *poſt*, there ſhall be charged a duty of one penny for every mile; and for every horſe hired for a day or leſs time, one penny a mile, if the diſtance be aſcertained; or if the diſtance be not aſcertained, the ſum of 1*s.* 6*d.* for each horſe; and ſuch duty to be paid by the hirer of the horſe to the perſon who is licenſed to let; delivering a ſtamp-office ticket ſpecifying the day of the month, and the number of miles for which the horſe or horſes are hired, or the manner in which they are hired, under the penalty of 10*l.* and the charge of the duty.

This ticket ſhall be delivered to the keeper of the firſt turnpike-gate through which the traveller paſſes, for which an exchange ticket ſhall be returned, which ſhall be ſhewn at every other turnpike; and every gate-keeper ſhall bring the tickets received by him to the collectors of thoſe duties, on pain of 5*s.* for each ticket.

Licenſed perſons ſhall, at the time of receiving their firſt licence, give bond to the king of 50*l.* that they will redeliver, when required, their ſtamp-office tickets, with a correſponding faithful account, under the penalty of being refuſed a licence for the future. Thoſe who reſide in London or Weſtminſter, ſhall deliver their account on the firſt Tueſday or Wedneſday in every month, and thoſe within five miles, or within the bills, ſhall ſurrender their account on the firſt Thurſday or Friday in every month, or at ſuch times as the commiſſioners appoint; and within eight days pay the ſum due thereon, under penalty of 10*l.* and double the amount of the money due. Thoſe not reſiding within the bills ſhall deliver their account for the week, ending on the Saturday preceding, under the ſame penalty, at the times and places mentioned in the licence firſt granted, and in the receipt given by the collector, to perſons authoriſed by three commiſſioners, and pay the money due; and all licenſed perſons ſhall be allowed 3*d.* in the pound, out of the monies paid by them: and any fraud ſhall incur a forfeiture of 20*l.* Forging a ticket incurs a forfeiture of 50*l.*

Perſons keeping diligences and coaches for conveying paſſengers, not exceeding four, ſhall pay annually 5*l.* for a licence, indemnifying only one carriage; or forfeit 5*l.* for each time ſuch carriage is uſed without a licence. They ſhall alſo give 20*l.* bond faithfully to account and pay: and mark on the outſide pannel of each door, their chriſtian and ſurnames, mentioning the place from which they ſet out, and to which they are going. And every ſuch diligence ſhall be charged with the duty of a half penny for every mile the ſame ſhall travel, to be paid by the owner on the firſt Monday in every month, under a penalty of 5*l.*

POSTHUMUS, or POSTHUMOUS, compoſed of *poſt*, and *humus*, *ground*, a child born after the death of his father, or taken out of the body of a dead mother.

By 10 and 11 Will. III. cap. 16. it is enacted, that *poſthumous* children ſhall be capable of taking in REMAINDER, in

in the same manner as if they had been born in their father's life time; that is, the remainder is allowed to vest in them, while yet in their mother's womb.

Among the Romans, *postumus* was also used for a child born after the making of a testament, which occasioned the testator to alter it.

POSTHUMOUS is also applied figuratively to the works of an author that were not published till after his death, or interment.

POSTICUM, in *Architecture*, the postern gate or back-door of any fabric.

POSTICUS *penna*, *serratus* POSTICUS, *tibialis* POSTICUS. See PERONAUS, SERRATUS, TIBIALIS.

POSTIL, POSTILLA, a name anciently given to a note, or remark, written in the margin of the Bible; afterwards also to a note written in any other book posterior to the text.

Trivet in his Chronicle, speaking of Steph. Langton, archbishop of Canterbury, says, *Super Bibliam postillas fecit, &c. eam per capitula, quibus nunc utuntur moderni, distinxit*: that Alexander, bishop of Chester, *super pentateuchum postillas scripsit*. Knighton, another of our historians, speaking of one Hugo, a Dominican and cardinal, says, *Totam Bibliam postillavit*.

POSTING, among *Merchants*, the putting an account forward from one book to another; particularly, from the journal or waste book into the ledger.

POSTIQUE, formed from the Italian *posticcio*, *added* &c. in *Architecture*, &c. an ornament of sculpture is said to be *postique*, when it is superadded after the work itself is done.

A table of marble, or other matter, is also said to be *postique* when it is incrustated in a decoration of architecture, &c.

POSTLIMINIUM, POSTLIMINY, among the Romans, the return of one who had gone to sojourn elsewhere, or had been banished, or been taken by the enemy, to his own country and state.

It was thus called, according to Aul. Gellius, from *post*, *after*, and *limen*, *threshold*; q. d. a return to the same bounds, or threshold. Though others, after Ammi. Marcellinus, will have it so denominated, because persons were restored into the house through a hole in the wall, *post limen*, not by going over the threshold, which was esteemed ominous.

POSTLIMINIUM was also a law, or action, whereby one recovered an inheritance, or other matter, that had been lost, from a stranger or enemy.

POSTMAN, in the *Courts of Exchequer*. See PRECEDENCE.

POST NATI, in *Our Statutes*, is particularly used for such persons as were born in Scotland, after the accession of king James I. to the crown of England.

7 Jac. I. it was by all the judges solemnly adjudged, that such persons were no aliens in England; as, on the contrary, the *antenati*, or those born in Scotland before that accession, were aliens here in respect to the time of their birth.

POST-NATUS is also used by Bracton, Fleta, Glanville, &c. for the second son, as distinguished from the eldest. Thus in Brompton, lib. ii. *Eli confundunt in quibusdam partibus, quod* POST-natus *præferetur primogenito*.

POST-office. See POST, *supra*.

POSTOMIS, among the *Ancients*, a barnacle or iron instrument fixed on the nose, or put into the mouth of a horse to make him quiet.

POSTPONING, the putting any thing after, or behind another, with regard either to the order of time or place.

Sometimes it is taken in an ill part; as when we say, the bookbinder has *postponed* a sheet, &c. out of a book.

POSTSCENIUM, in the *Ancient Theatres*. See PARASCENIUM.

POSTSCRIPT, an after-thought, or article added to a letter, or memoir; containing something learnt or recollected after the subscription or conclusion of the piece.

It is usually marked thus, P.S. The Spectator observes, that a woman's mind is ever better learnt from her P.S. than her letter.

POST-PREDICAMENTS, in *Logic*, are certain general affections, or properties arising from a comparison of predicaments with each other; or modes following the predicaments, and often belonging to many.

Such, according to Aristotle, are *opposition*, *prius*, *simul*, *motus*, and *habere*; the three first of which are in all *predicaments*.

POST-TERM, or POST-TERMINUM, a fee, or penalty, taken by the cursus brevium of the court of common pleas, for the return of a writ, not only after the day, but after the term or time in which such writs are returnable: for which the cursus brevium has twenty pence.

POSTULATE, POSTULATUM, in *Mathematics*, a clear, evident proposition; wherein it is affirmed, or denied, that something may, or may not be done. See PROPOSITION.

A thing immediately deduced from the consideration of one single definition, if it expresses something to agree or disagree to another, is called an *axiom*. If it affirm, that something may or may not be done, it is called a *postulate*.

Thus, e. gr. from the genesis of a circle, it is evident, that all right lines drawn from the centre to the circumference, are equal; since they only represent one and the same line, in a different situation: this proposition, therefore, is esteemed an axiom. See AXIOM.

But, since it is evident from the same definition, that a circle may be described with any interval, and from any point, this is accounted a *postulate*.

Axioms and *postulata*, therefore, according to some, seem to have nearly the same relation to each other that theorems and problems have. Axioms being considered as indemonstrable theoretical truths, and *postulata* as indemonstrable practical truths.

But others will have it, that axioms, or common notions are primitive, and common to all things partaking of the nature of quantity, and which therefore may become the objects of mathematical science, such as number, time, extension, weight, motion, &c. and that *postulata* relate particularly to magnitudes strictly so called, or to things having local extension, such as lines, surfaces, and solids; so that in this sense of the word *postulatum*, Euclid, besides axioms, or those principles which are common to all kinds of quantity, has assumed certain *postulata* to be granted him, peculiar to extensive magnitude. Hence several of the principles assumed in his elements, and ranked among the axioms by the moderns, are by Proclus ranked among the *postulata*; which has induced Dr. Wallis to judge, that the last of the two senses given to the term *postulatum* is most agreeable to the meaning of the ancient geometers. And these who contend for this sense of the word, add, that Euclid, in *postulating* to draw a right line from one point to another, does not mean that any man can actually do this, but only that it may be conceived as possible. So that *postulata* are axioms no less than the other principles assumed in the elements of geometry, but axioms relating to a particular subject, and not common to all. Wallis's Oper. vol. i. p. 667. 668. See PRINCIPLE.

POSTULATION, POSTULATIO, in the *Common Law*, the nomination of a person to a dignity in the church, to which, by the canons, he cannot be elected; as, for want of age, of birth, because already possessed of a benefice incompatible therewith, or for the like impediment.

Thus the formal election of such a person being false, they are obliged to proceed by way of *postulation*; that is, the chapter beseeches the person to whom the confirmation of the election belongs, to approve of it, though it be not canonical. See ELECTION.

The person to whom the supplication is made by the protestants in Germany, is the emperor; by the papists, the pope.

Wicquefort observes, that when a part of the chapter elects, and another *postulates*, the number of *postulants* must be twice as great as that of the electors, to bring the matter to a *postulation*.

POSTURES *of the body*. The continued unnatural *postures* of the body, are the occasion of many very unhappy effects in the human frame: crookedness in shape is very frequently the consequence of them.

And it is no uncommon thing to see school-boys, who are forced to be continually bending to write upon their knee, or upon a low form, very terribly afflicted by means of the compression which that unnatural and continued *posture* has given the lower part of the breast and the viscera contained in the epigastrium; and particularly those unhappy youths, who, from being short-sighted, are exposed to a greater degree of stooping than the rest, have been found terribly afflicted with disorders of the breast and of the lower belly.

On applying for relief in these complaints, the physician usually forgets to enquire into the cause, and hearing nothing of the continued bending *postures* of the body, which is the occasion of all the disorders, the medicines he gives prove ineffectual with some, and with others greatly heighten the disorder.

But when the prescriber will be at the pains of informing himself of the cause in these cases, and forbid the continuance of the *postures*, which has been the sole occasion of them; nature alone will often make the cure, or if not alone, yet very often with this caution the methods will prove successful, which were ineffectual, or even hurtful without it.

POSTURE, in *Painting* and *Sculpture*, the situation of a

figure with regard to the eye, and of the several principal members thereof with regard to one another, whereby its action is expressed.

A good part of the painter's art consists in adjusting the *postures*; in giving the most agreeable *postures* to his figures; in accommodating them to the characters of the respective figures, and the part each has in the action; and in conducting and pursuing them throughout.

Postures are either *natural*, or *artificial*.

POSTURES, *natural*, are such as nature seems to have had a view to in the mechanism of the body; or rather, such as the ordinary actions and occasions of life lead us to exhibit while young, and the joints, muscles, ligaments, &c. are flexible.

POSTURES, *artificial*, are those which some extraordinary views or occasions lead us to exhibit. Such, e. gr. are those of our *balance* and *posture-masters*.

A painter would be strangely puzzled with the figure of Clark (a famous *posture-master* of Pall-mall), in a history-piece. This man, we are told in the Philos. Trans. had such an absolute command of his muscles, &c. that he could disjoint almost his whole body; so that he imposed on that great surgeon Mullens, who looked on him to be in such a miserable condition, he would not undertake his cure. Though a well-made man, he would appear with all the deformities imaginable; hunch-backed, pot-bellied, sharp-breasted, &c. He disjointed his arms, shoulders, legs, and thighs; and rendered himself such an object of pity, that he has frequently extorted money, in quality of a cripple, from the same company he had the minute before been in, in quality of a companion. He would make his hips stand a considerable way out from his loins; and so high as to invade the place of his back. Yet his face was the most changeable part about him, and shewed more *postures* than all the rest.

POT, in our *Old Writers*, a head-piece of war. It is mentioned stat. 13 Car. II. cap. 6.

POTS, *fire*. See FIRE-*pots*.

POTS, *glass*. See GLASS-*pots*.

POT, *hutch*. See HUTCH *pot*.

POT, *white*. See WHITE.

POTABLE, *potabilis*, somewhat that may be taken, or swallowed, by way of drink.

The chemists talk much of *potable* gold, *aurum potabile*. See AURUM, and GOLD.

POT-ASHES are properly the lixivious ashes of certain vegetables, used in the making of glass and soap.

Such are the ashes of the herb kali, called also salt-wort, glass-weed, &c. from its great use in glass-making.

Pot-ashes are also called *cineres clavellati*, and make the basis of salt of tartar, and most of the lixivial salts, as our chemists sometimes manage them for elegancy.

The English and Dutch make a considerable commerce of *pot-ashes*, which they bring from about the Black sea; using great quantities thereof in the preparation of their cloths, &c. those ashes being found excellent for scouring.

POT-ASHES is also a denomination popularly applied to all kinds of wood ashes bought in all parts of the country, and mixed together, for the making of green-glass: or more generally it denotes an alkaline salt, of that kind called the vegetable alkali, obtained from moist vegetables by burning or incineration.

The art of reducing vegetables to this state is a very valuable one; the soap-maker, fuller, scourer, dyer, and glass-man, as well as the chemist and apothecary, depending greatly on it in many particulars.

The authors who are farther to be consulted in this case, are Glauber, in his Prosperity of Germany; but the chemical foundation of the whole appears in Boerhaave's chemistry, and the papers of Stahl on this subject.

The most common method of making *pot-ash* is by burning large piles of wood, lixiviating the ashes by boiling in copper-vessels, decanting the lixivium when clear, and boiling it in other copper-vessels or *pots*, till the liquor be evaporated, and a reddish solid salt obtained, called black *pot-ash*, which by calcination in ovens with a heat not intense enough to fuse it, is dephlogisticated and rendered white. If any of it has been fused, it will have a greenish blue colour.

Another method of preparing *pot-ash*, and which may be conveniently used in a large manufactory of it, is described by Kunckel. The ashes of wood are put into a large tub, near the bottom of which is inserted a cock; and to prevent the ashes from filling up the cock, the bottom is covered with straw and pieces of small wood. Water is to be poured on the ashes, and the next day is to be let off through the cock into another vessel. The ashes may again be elixated with more water till all the salt be dissolved. The weaker leys are to be poured on fresh parcels of ashes till they can receive no more salt. The ley is then to be evaporated in an iron pan, and the brown salt is to be dephlogisticated by calcination in a furnace or oven with a heat not intense enough to fuse it. Some persons soak straw in the ley obtained by lixiviating wood-ashes with water, and by drying and burning this straw they obtain a salt without the trouble of boiling the ley. But as *pot-ash* is made, in various ways, of different materials, there appear to be different kinds of it possessing different qualities.

This salt has been made in New England in considerable quantities from rotten wood. What gave the occasion of knowing it, was, that a white oak in that province decayed, and a third part of its substance became rotten. This rotten part was tried to burn, and was found to turn almost wholly into a fine alkali salt, or *pot-ash*, much stronger than that which is made in the usual way. What was most observable in the making of this salt was, that while the wood was burning, it would melt of itself, and run down into hard lumps of salt; and this, none of the wood of the same tree, which was found, would do, but only the rotten part: and what was most rotten of all, yielded the greatest quantity of salt; and that the most readily: whereas all the common alkali salts of wood, made by incineration, are blackish at first; and a lixivium made of them, although often filtered, will still be of a brown colour, occasioned by some of the charcoal of the wood so closely united to the salt as not to be easily separated from it. This alkali made from rotten wood was very white, even before solution; and the lixivium made with it was not at all tinged with brown, but clear, like pure water, only a very small quantity of ashes subsided to the bottom. The lixivium was easily decanted from this, without the trouble of filtration; and, when evaporated to a dryness, left the salt perfectly fine and pure. In the making this salt, as the fire grows more intense, the wood is seen to run together into great lumps, and bubble with a hissing noise.

The weight of the *pot-ash*, prepared in the common way, is very inconsiderable, in proportion to the wood used; but in this, the salt nearly equals the whole weight of the wood.

In the common way of making the *pot-ash*, the salt is never distinguished by the eye among the ashes, nor even causes them to run into lumps; but in this case the salt always runs into large lumps, and is as easily distinguished from the rest of the ashes, though white, as salt of tartar of the purest kind would be.

It is very certain, that rotten wood in many places has been found, on trial, to yield much less salt than found wood; but the found wood of this tree being tried, was found to yield no more salt than other wood, and consequently much less than the rotten part of it. On examining this tree on the spot, it was thought by good judges, that it had been at some distance of time struck with lightning, it being evidently torn from the top to the bottom: on that side where the decayed part separated from the found, there had been a channel of about five inches wide all the way down; but this was closed over by succeeding bark, and shewed no trace of the accident, till on examining underneath, where the tree was found black for such a space, and the bark not of a piece with the rest.

From this it may be conjectured, that the wood, having been for so long a time, as till the growth of this bark, exposed to the wind and weather, naturally became rotten from the wet it received; and that the lightning having penetrated the wood, had so altered and disposed the parts and pores of it, that they attracted and retained the nitrous salts of the air in great abundance, even as salt of tartar, and other the like salts do; which, as Glauber observes, will be reduced, in continuance of time, to an absolute nitrous salt, and the quantity also considerably increased.

The parts of this rotten wood were of a very different structure from those of ordinary wood in this condition; and though the lightning had not calcined it into a salt, yet it had, as appears, sufficiently altered it to give that tendency to imbibe, and a power to retain the nitrous particles from the air, as well as the alkalies of vegetables perfectly calcined will do.

If it should be objected, that nitre alone will not calcine into an alkali, it is easily answered, that nitre with charcoal will; and the remaining wood might very well serve as charcoal in this process. Phil. Trans. N° 366, p. 121.

Some sort of *pot-ashes* have been found to contain a large quantity of sea-salt, which is probably mixed with them by the makers; not only as it is much cheaper, but as it makes them whiter, and more easily run into large masses. Med. Ed. Edinb. Abr. vol. i. p. 165. Not.

The French have two kinds of *pot-ash*, the produce of their own manufactures; the method of making which M. du Fay, of the Academy at Paris, describes in the following manner.

The first, which is the common or coarser kind, is made

of the beech or elm; the firſt of which trees they always find to yield the largeſt quantity.

They cut down the largeſt and moſt full-grown trees, and cut them into pieces of ten or twelve feet long, they lay them together in form of a pile, and burn them to aſhes in the open air. They gather up the aſhes, and make a very ſtrong lixivium of them in water; into this liquor they throw pieces of old rotten and ſpungy wood, which is, from its texture, capable of imbibing a great quantity of humidity: they uſe ſo many of theſe pieces as are ſufficient to ſoak up the whole quantity of their lixivium. When this is done, they dig a ſquare pit in the earth; over which they lay ſome iron bars to ſuſtain a quantity of dry wood, to ſerve as fuel. When they have laid together a ſufficient quantity of this, they pile upon it the rotten billets which have imbibed the lixivium; and when the dry wood underneath is ſet on fire, and heats the top of the pile, the lixivium loſes its water by the heat, and the ſalt contained in it is ſeen running down through the fire, in form of a ſhower: this is received in the pit made on purpoſe for it. When all is melted out of the billets at firſt laid on, they bring others, which the fire acts upon in the ſame manner; and ſo on, till the whole pit is filled with *pot-aſh*.

When this is done, they remove the fire as quickly as they can; and with rakes clear the ſurface of the *pot-aſh* as well as they can from pieces of charcoal and aſhes which have fallen into it: but, with all their care, they are not able to prevent a great deal, both of coals, and aſhes, remaining in it; as is eaſy to conceive from the manner of the proceſs. The ſalt after this forms one ſolid cake or maſs, and this they dig up out of the pit while it is yet hot; and barrel it up for fear of its receiving damage from the humidity of the air, which it is very ready to imbibe. This is the French *pot-aſh* of the common or coarſe kind.

The finer or purer kind is made of the ſame wood with the other, and the proceſs is conducted in the ſame manner, ſo far as to the making of the lixivium; but when this is prepared, inſtead of ſoaking it up with rotten wood, they pour it off into an iron caldron of a large ſize, and evaporate it, ſtill adding more lixivium as the former boils away, till they have employed all they have made; they then continue the fire till the whole humidity is evaporated: they then take the dry maſs of ſalt out of the bottom of the veſſel, and put it into a furnace made with a cloſe arched top; by means of which the flame is reverberated from all parts upon the ſalt. They here give it ſo much fire as ſerves to calcine it to a whiteneſs, and then the whole operation is finiſhed.

It is ſeldom, however, quite white: but uſually retains ſomewhat of the colour it had before its calcination. This the workmen ſay is owing to the nature of the wood the aſhes were made from. They ſay that thoſe trees which grow on the tops of high hills, yield a *pot-aſh* of a pale blue colour; and thoſe which grow in wet marſhy places, yield a reddiſh ſalt. Trees which have ſtood in other ſoils and ſituations, they ſay, yield a white *pot-aſh*; but they obſerve, that none yield it in ſo large a quantity as thoſe which grow on the tops of mountains. Mem. Acad. Par. 1727.

In France, and other countries where they make wine, they prepare a kind of *pot-aſh* in an eaſy manner from the lees of their wine.

In ſome parts of Germany, *pot-aſh* is prepared from the ſame wood of which charcoal is made. A number of tubes, made of plate iron, or of copper or braſs, are ſo diſpoſed in the pile of wood intended to be burnt into charcoal, that the water, acid, and oil, which are obtained in the ordinary method of diſtilling wood, ſhall, when ſeparated from the wood by fire, paſs through theſe tubes into buckets placed to receive theſe liquors. The oil is then to be ſeparated from the acid liquor, which is afterwards to be boiled in copper or iron veſſels, and the reſiduum dried and calcined. By this calcination, the acid ſalt is alkalized.

Some years ago Mr. Stephens, encouraged by the Society of Arts, &c. and by a parliamentary grant of 3000*l.* eſtabliſhed a manufacture of *pot-aſh* in North America, which produced ſuch as was ſo perfectly good as to anſwer in bleaching, and other uſes, the purpoſes of PEARL-*aſh*, and which, at the ſame time, afforded a very large produce.

But the very great degree of heat, which his proceſs required, occaſioned the deſtruction of a very expenſive apparatus; and other circumſtances concurred to diſappoint the hopes and check the ſpirit of the proprietors. The manufacture was, however, afterwards undertaken and proſecuted by others.

Mr. Stephens's proceſs was as follows: pieces of timber, about eight feet long, were laid lengthways in heaps, containing from three to ten of them, upon dry ground, and the vacancies between them filled with ſmaller wood. The ſooner the timber is burnt after felling, he ſays, the better. In order to ſet fire to the heaps, he directs to lay embers on the bottom logs at each end; and for burning the brush and loppings with other ſmaller woods, to lay them lengthways on the ground, top to top, and as cloſe as a faggot, with the larger woods upon them, till the heap is full four feet high: the length of the brush ſet againſt each other making the breadth of the heap.

As to the choice of the timber, old hollow trees, if not dead, are beſt; pine, cypreſs, and cedar, are to be totally rejected. As ſoon as the pile is burnt down, he directs to rake ſuch aſhes as lie round the outſide towards the middle, without adding any freſh fuel or throwing on any brands. In this ſtate the aſhes are to lie without ſtirring, till you can juſt bear your hand in them: then carry them to a houſe, or under a ſhed, on a plank floor raiſed a little from the earth, and well jointed; there wet them, till they are brought nearly to the conſiſtence of mortar in the firſt mixture of lime and ſand, and ram them in a heap, in which they muſt lie full twenty days, or even ſome months if it be thought proper; obſerving to be more ſparing of water in winter, and ramming them cloſer, and ſometimes wetting the top that it may never become quite dry.

Wood may alſo be burnt in a kiln, and then it muſt be cut into ſuch lengths, as beſt ſuit the kiln and the mode of carriage. The mouth of the aſh-hole muſt be cloſe ſtopped, by daubing the joints of the lid with loam, or throwing a bunk of ſand or earth againſt it: keep the bed of the kiln filled with wood up to the ſurface, and let it burn inceſſantly, till the aſhes riſe within ſix or eight inches of the grate. Draw them out whilſt red hot, and in that ſtate ſprinkle them with ley, from four to ſix caracts weight, till they are made damp; then ram them as before in a heap by themſelves.

N. B. The caract weight is obtained by weighing a ſmall phial which holds about four ounces, filling it with water, and then weighing it; and dividing the weight of water into equal parts; and a caract is $\frac{1}{144}$ of the whole.

The aſhes thus prepared are to be put in vats or ſteepers with a falſe latticed bottom; firſt putting coarſe wheat or rye ſtraw about a foot thick on the lattice or grating; on which put aſhes to within four or five inches of the top, ramming them all the way up, eſpecially at the ſides, with a ſmall light rammer, as tight as poſſible, without burſting the vat. Form on the top of the ſteeper, a hollow baſon in the aſhes, four or five inches deep, leaving the aſhes four or five inches thick on the ſides; keep this baſon conſtantly filled with ſoft water in one ſteeper, till the aſhes will imbibe no more, which will be in twenty-four hours or more, according as it is rammed; then turn the cock and let off what ſhall be ſoaked through into the receiver or lower chamber of the ſteeper, and no more. Follow that ſteeper with freſh water on the ſame aſhes, for ſeveral other runnings, which will come off in a few days, till the liquor has neither ſmell nor taſte; then heave out the aſhes, and charge the ſteeper afreſh. Upon drawing off the firſt running from one ſteeper, fill another with aſhes as before, and put into its hollow at the top the ley ſo firſt run off, and the ſmaller or half leys alſo, till full, and draw off as before. If this weighs eighteen caracts or more, pump it into a ciſtern, as fit for uſe; if it be ſhort of that, paſs it on as half ley to a third ſteeper, and through freſh aſhes till it becomes ſtrong enough. The ley muſt be conveyed from the ciſtern into a veſſel, in which with every gallon of proof-ley mix three ounces of fine light wood aſhes, and to the ley that is $\frac{1}{2}$ over proof, put ſix ounces of aſhes; and if $\frac{3}{4}$ over proof, twelve ounces; increaſing or leſſening according to the ſtrength of the ley.

For evaporating the ley, and melting the ſalt, heat a furnace, conſtructed of mortar, made of loam, with an arch eighteen inches thick, and a floor laid with tiles on a layer of ſand an inch thick, with neat joints, till you bring it very near a white heat, of which the ſide doors being red hot is a mark. This will take forty-eight hours, or more, if the furnace be quite cold. Then through the cock of the veſſel, containing the ley, paſs the mixture by a funnel into the furnace; ſo as not to reach much beyond the middle of the floor, before it changes from dark to bright red, letting the heat prevail towards front or back as you ſee neceſſary. When the maſs begins to gather about the flues or in heaps, run in no more till the furnace is cleared by driving the fire backward. In an hour or leſs there will iſſue out a red hot ſtream of melted ſalt, which is *pot-aſh*; to be broken to pieces as ſoon as cold, and packed in tight, cloſe caſks; being in no reſpect inferior to the beſt foreign aſh whatever. See Mr. Stephens's Method and plain Proceſs for

making

making *Pot-aſh* equal, if not ſuperior to the beſt Foreign *Pot-aſh*. 410.

The method of making the beſt Ruſſia *pot-aſhes*, as it is deſcribed by ſir Peter Warren, is as follows: the beſt woods for this purpoſe are oak, aſh, poplar, hiccory, elm, hazle, and beech; which muſt be cut from November to February, ſplit and ſtacked to dry. After twelve months in warm open weather, it muſt be burnt on a brick hearth by a ſlow fire in a kiln or cloſe place; the aſhes muſt be ſifted though two ſieves, one finer than the other, and then put up in brick troughs or wooden backs, covered with rain or river water, and remain well waſhed and incorporated five months. Brick furnaces, ſhaped like baker's ovens, muſt be heated with a ſtrong fire of oak or aſh, burning night and day; the prepared aſhes muſt be gradually thrown on the fire, when they will run into metal like lead; nor muſt the fire go out till the furnace is almoſt filled with *pot-aſhes*. The aſhes muſt then be broken to be taken out, but the larger the pieces the better: they muſt be preſerved from the air in tight caſks, the large pieces by themſelves, and the duſt by itſelf.

In Sweden they purſue the following proceſs: the wood they uſe is beech or elder, of which they take the old and decaying trees, cutting them in pieces, and piling theſe in a heap, in order to burn them to aſhes, upon the ground, by a ſlow fire. They carefully ſeparate theſe aſhes from the dirt or coals in them, which they call raking them; after which they collect them in baſkets of bark, to carry them to a hut built in the woods for this purpoſe. Having made a part of theſe aſhes in the ſame manner as mortar is commonly made, they lay a row of green pine or fir-logs on the ground, which they plaiſter over with this paſte of aſhes; over this they lay another layer of the ſame ſtraight logs of wood, across the others, which they plaiſter over with aſhes in the ſame manner: thus they continue to erect a pile of theſe logs of wood by layer upon layer, and plaiſtering each with their paſte of aſhes, till they are all expended; when their pile is often as high as a houſe. This pile they ſet on fire with dry wood, and burn it as vehemently as they can; increaſing the fire from time to time, till the aſhes begin to be red hot, and run in the fire. Then they overſet their pile with poles, as quick as they can; and while the aſhes are ſtill hot and melting, they beat and clap them with large round flexible ſticks made on purpoſe, ſo as to incruſt the logs of wood with the aſhes, by which the aſhes concrete into a ſolid maſs as hard as ſtone, provided that the operation has been rightly performed. This operation they call *walla*, i. e. *dreſſing*. At laſt they ſcrape off the ſalt thus prepared, with iron inſtruments, and ſell it for *pot-aſh*, which is of a bluiſh dark colour, not unlike the ſcoriæ of iron, with a pure greeniſh white ſalt appearing here and there in it.

Such is the account of this manufacture, contained in an academical diſſertation upon this ſubject at Aboe, in Sweden, and communicated by Dr. Linnæus to Dr. Mitchell; who obſerves, that all the *pot-aſh* we have from Ruſſia, Sweden, and Dantzick, is exactly like what is here deſcribed, and ſeems to be made in this manner. Of theſe the Ruſſian is the beſt, on account of the greater quantity of ſalt contained in it; which he ſuppoſes to be partly owing to the ſuperior quality of their wood, and to their making the paſte of aſhes with ley, inſtead of water. Phil. Tranſ. vol. xlv. art. 11. p. 541.

The Ruſſia *pot-aſh* is dark coloured, hard, not eaſily deliquefcible, and contains (as Dr. Lewis ſays) more than half its weight of an earth inſoluble in water.

Scheffer, in the Sweditſh Memoirs for 1750, ſays, that from 100 lb. of Ruſſian *pot-aſh* he obtained 92½ lb. of alkaline ſalt, and 7½ lb. of neutral ſalts. Dr. Home found that Ruſſian *pot-aſh* contained a conſiderable quantity of quick lime.

From experiments made by Brandt (Mem. Swed. 1749), and from the preference given to it by ſoap-boilers, it appears to be more cauſtic, and more powerfully to diſſolve oils, than purer *pot-aſh* rendered cauſtic by quick-lime. The neutral ſalts found in this *pot-aſh* are chiefly vitriolated tartar, and ſea-ſalt, with which latter ſalt it is frequently adulterated to increaſe its weight.

Although very conſiderable quantities of *pot-aſh* (to the amount, it is ſaid, of no leſs than one hundred and fifty thouſand pounds worth), are annually imported into this kingdom from Ruſſia, Spain, &c. we have ſome manufactures of it in our own country, and if the art of making it were properly purſued, we might have many more. The method commonly practiſed by the Engliſh manufacturers is ſaid to be as follows: with the aſhes of fern, or wood of any kind, they make a ley: for this purpoſe they have ſeveral vats, containing from four to eight ſcore buſhels of wood aſhes, with under-becks; into theſe they tread down the aſhes, and lay on a ſufficient quantity of water to run through the aſhes into the under-beck. The liquor running from the firſt is laid on a ſecond vat, which is one-third ſtronger than the firſt; and the liquor of the ſecond is laid on the third vat, which is alſo one-third ſtronger than the ſecond. When it has thus run through the third vat, the ley, as the liquor is then called, is ſuppoſed to be ſtrong enough for burning; but the ſtrength is proved by weighing it in ſmall quantities. It is then reduced into what is called *pot-aſh* by burning it with ſtraw. To do this, they place a tub full of this ley near a clean hearth of a chimney, in which they dip a handful of looſe ſtraw, ſo as to take up a quantity of ley with it. The ſtraw thus impregnated with ley they carry as quick as they can, to hold it over a blazing fire in their hearth, which conſumes their ſtraw to aſhes, and at the ſame time evaporates the water from the ſalt of the ley. Over the blaze of the firſt parcel of ſtraw they burn another dipt in ley in the ſame manner. This they continue to do till their ley is wholly expended. By this means the coals and aſhes of the ſtraw and ſalts of the ley, are left on the hearth, and concrete together into a hard ſolid cake of a greyiſh black colour, which they ſcrape off, and ſell for *pot-aſh*.

To make that kind of *pot-aſh*, which is called ſolid or hard, the ley muſt be made as before deſcribed; and then burnt, it is ſaid, with peas or bean ſtraw only. But to make what is called light or combyaſhes, the ley ſhould be ſtronger, and barley, wheat, and clover ſtraw mixed with a little peas ſtraw are preferred. The ſalt thus made is full of the coal of the ſtraw, is not ſo ſtrong or ſo ſharp and corroſive as that of the foreign *pot-aſh*, that is calcined in an open fire; on theſe and other accounts, it is unfit for ſome purpoſes, and not above half the value of the foreign. However, after the ley, in the above proceſs, has run through the vats a third time, they are emptied, and the aſhes, which are called *pot-aſh* muck, make excellent manure for ſome kinds of ſoil, particularly cold and the looſe wood-cock ſoil: and with this view the manufacture of *pot-aſh* is principally undertaken in ſome parts of the kingdom.

In the North of England they have a different method of reducing their KELP to *pot-aſh*, which they uſe for making alum. For this purpoſe they collect the ſea-weeds, dry them in the ſun, and burn them in a kiln, conſtructed of the ſtones found on the ſea-ſhore in a cylindrical form, and about two feet or leſs in diameter. In this they firſt burn a ſmall parcel of the kelp, and before it is reduced to aſhes they throw on more, till the kiln is full, or their materials are expended. This is ſaid to reduce the aſhes to a hard and ſolid cake, by the heat of the kiln and quantity of ſalt in the ſubſtance employed, which makes what is commonly called kelp-aſhes.

From the nature and qualities of *pot-aſh*, as well as from the different proceſſes uſed in the manufacture of it, it is inferred, that the difficulty in making it properly is, firſt, to reduce the materials to cinders and aſhes, and at the ſame time to preſerve their volatile, ſulphureous, and exhalable acid parts, that are totally deſtroyed in ſuch a degree of heat; and, ſecondly, to calcine theſe aſhes ſtill farther, ſo as to flux their ſalts, and vitrify their terreſtrial parts, and at the ſame time to keep them ſeparate from each other, or prevent their running into an indiſſoluble glaſs. To give *pot-aſh* ſome of theſe properties ſeems plainly to require a degree of heat that will totally deprive it of others. The moſt likely way by which it may acquire all theſe properties is that of Sweden already deſcribed.

There is a kind of *pot-aſh*, commonly called *barilla*, or BARILLA, imported from Spain, where it is manufactured from a plant of the ſame name, called by ſome botaniſts *ſoldet Neapolitana, ſtore candido*, by Bauhine *kali vulgare*, but by M. Juſſieu, *kali Hiſpanicum, ſupinum, unnuum, ſedi folio brevidus*, or *Alicant glaſs-wort*. This, he ſays, makes the beſt ſoap, the fineſt glaſs, and is the beſt of any for bleaching. With us it is chiefly or only uſed for making hard ſoap; and the manufacturers ſay it ſpoils their ſoft ſoap by making it curdle; which is a known effect of ſea-ſalt, ſo that the barilla is probably adulterated with ſea-weeds, which contain ſuch a ſalt. A ſcheme has been lately in agitation for eſtabliſhing a manufacture of this ſubſtance from ſalt.

There is another kind of *pot-aſh*, called ROCHETTA, which is ſaid to be preferable to the barilla, eſpecially for making of glaſs. This is produced from the firſt and ſecond kinds of *kali* deſcribed by Proſper Alpinus, in his accounts of the plants of Egypt; the firſt of which is the above mentioned ſcoide that grows in Italy and all over the Levant, and the other is peculiar to Egypt. See on this ſubject Phil. Tranſ. vol. xlv. art. 11. p. 541, 563.

As to the origin of that fixed vegetable alkali, called *pot-ash*, it is disputed whether it exists ready formed in vegetables previously to their combustion, by which it is obtained, but which only disengages substances which envelope and disguise it; or whether vegetables contain only the materials proper for its formation, which consequently takes place in the act of burning, and whether it be, properly speaking, produced by fire.

The author of the Chemical Dictionary, art. ALKALI, *fixed vegetable*, says, that the reasons for and against these two opinions are so strong on both sides, that there are grounds to believe both of them to be true; or, that the fixed alkali, obtained after burning a vegetable, did partly exist ready formed in that vegetable before it was burnt, and that the other part was produced by the very act of combustion. The alkali prepared by the incineration of vegetable substances, and by lixiviating and evaporating to dryness is far from possessing that degree of purity, which is always requisite in exact chemical experiments. It is almost always altered, 1. by some remaining inflammable principle, from which it may be purified either by calcination or applying to it a body on which it cannot act, and which has a stronger affinity than itself with this inflammable matter; 2. by a portion of super-abundant earth, which may be easily separated from it by diving it once or twice, by solutions and filtrations; 3. by the mixture of different saline matters, which can be separated by no chemical process but crystallization; 4. by mixture with iron, for purifying it from which no practical method is known. See Chem. Dict. ubi supra.

We cannot close this article without recommending to the notice of the public a curious discovery, and a discovery capable of being applied to very considerable and extensive advantage, of a new and cheap method of procuring *pot-ash*: the discovery was made by Josiah Birch, esq. and is now communicated with observations, in the Phil. Trans. vol. lxx. part 2. art. 22. by Dr. Percival, well known for his attention to every improvement in useful science. The agriculture society at Manchester, has long recommended the making of reservoirs for the water which flows from dunghills in farm-yards, and applying this water as a manure; of which notice has been already taken under the article of MANURING *of land*.

Mr. Birch, who carries on an extensive manufactory near Manchester, and bleaches his own yarn, was induced to try whether the dunghill water might not be converted into *pot-ashes*. He accordingly evaporated a large quantity of it, and burnt the residuum in an oven; the event so far answered his expectations, that he has ever since continued to prepare these ashes, and to employ them in the operation of bucking: and with a liberality which betokens true greatness of mind, he has now made this lucrative discovery public.

The process is extremely simple, and may be easily understood by viewing *Tab.* II. *Miscellany, fig.* 31. in which N° 1 represents the dunghill; 2. a sough or drain round it; 3, a reservoir for the dunghill water; 4, a well communicating with the reservoir, in which a pump is fixed, to convey it to N° 5, which is a pan, in which the water is boiled to the consistence of treacle, and afterwards burnt in an oven. The pan is made of iron plates, turned up a little at the edges. To these are screwed planks of wood, in order to make it above twenty inches deep. From a quantity of muck-water equal to twenty-four wine pipes full, the quantity of ashes made was 9 cwt. 1 qr. 12 lb. valued at two guineas per hundred; in the manufacture of which, allowing for every expence attending it, there is a clear profit of 15*l.* 4*s.* deducting a trifle for the wear of the pan and oven. Dr. Percival suggests, that this profit, considerable as it is, may admit of increase by future improvements: for in spring and summer seasons, the evaporation might be carried on without the aid of fire, by conveying the dunghill-water from the reservoir through proper sluices into shallow troughs or ponds, of such extent as to afford a sufficient surface for the action of the sun and wind. These might be covered in rainy weather with awnings of canvas, painted on the outside black, and white on the inside; the former with a view to absorb, the latter to reflect, the rays of light.

From the experiments of Dr. Percival, it appears, that this *pot-ash* is of a greyish white appearance, deliquesces a little in moist air; but if kept in a dry room, near the fire, acquires a powdery surface. It is hard, and of a spongy texture when broken, with many small crystals in its substance. The colour of its internal part is flinty and variegated. To the taste it is acrid, saline, and sulphurous. It emits no smell of volatile alkali, either in a solid form, dissolved, or when added to lime-water; neither does it communicate the sapphire colour to a solution of blue vitriol. Silver is quickly tinged black by it, a proof that it contains much phlogiston. Ten grains of this *pot-ash* required eleven drops of the weak *spirit* of vitriol to saturate them. The like quantity of salt of tartar required, of the same acid, twenty-four drops: a strong effervescence occurred in both mixtures; from the former a sulphureous vapour was exhaled. A tea-spoonful of the syrup of violets, diluted with an ounce of water, was changed into a bright green colour by five grains of the salt of tartar; but ten grains of this *pot-ash* were necessary to produce the same hue, in a similar mixture. Half an ounce of the *pot-ash* dissolved entirely in half a pint of hot water; but when the liquor was cold, a large purple sediment subsided to the bottom: and it was found that this sediment amounted to about two-thirds of the whole quantity of ashes used.

The same ingenious writer concludes with observing, that this *pot-ash* is a true fixed vegetable alkali, produced by putrefaction; that the quantity of alkali contained in it may be estimated at one-third of its weight, whereas the white Muscovy ashes are said to yield only one-eighth part; that no quick-lime appears to be contained in this *pot-ash*, for a solution of it, poured from its sediment, remained clear, though long exposed to the air: that it would be worth trying, whether the large purple sediment, which subsides when this *pot-ash* is lixiviated, might not be applied to the manufacture of *Prussian* blue, as used in the manner recommended by Macquer for INDIGO wood and silks; and that this manufacture will furnish the farmer for top-dressing for his garden and land, of great fertilizing powers.

Dr. Watson (the present bishop of Landaff) suggests, that the investigation of a method of extracting its alkaline part from rock salt, would be a most serviceable discovery. We have inexhaustible mines of rock salt in this country, which, (he observes) the proprietors can afford at ten shillings a ton. A ton of rock salt contains about half a ton of mineral alkali, which is for most purposes far preferable to *pot-ash*. To those who have leisure to attempt such a discovery, he gives the following hint: whether the alkaline part of rock salt may not be obtained by calcining it in conjunction with charcoal in open fires? His reason for this conjecture is founded upon the following experiment: upon burning sea-wrack to a black coal, and stopping the process at that point, he has obtained great plenty of common salt, but no mineral alkali from the black ashes; though we are certain, that when the black ashes are thoroughly calcined, or reduced to white ashes, mineral alkali may be obtained from them. This makes it probable, that the common salt contained in the black ashes of sea-wrack is decomposed, and changed into a mineral alkali, during the burning of the black ashes. There are reasons to suppose, that the cinder of pit-coal would answer the purpose better than charcoal. Chem. Ess. vol. i. p. 136, &c.

POTAMOGETON, in *Botany*. See POND-*weed*.

POTAMOPITYS, in *Botany*, a name given by Buxbaum to a new genus of plants, somewhat resembling the *linnopence* in its general external appearance; but greatly differing from that plant in its flower and fruit.

The stalk is about four inches high, and is made up of several joints, fixed in the manner of so many cups one into another; the leaves stand in form of a star, eight, or thereabout, at every joint: these are narrow at the lower part of the plant; but toward the top, they are broader, and stand fewer at a joint, sometimes only two; the flowers grow out of the axe of the leaves, and are white and composed of four petals, disposed in form of a cross: they stand in a four-leaved cup, and have no pedicle; the pistil occupies the centre of the flower, and is surrounded by four stamina; the seed-vessel is round, divided into four cells, and filled with slender and funated seeds. It flowers in May, and is common in the marshy grounds in Thrace, near the Bosphorus. Act. Petrop. vol. i. p. 243.

POTATOES, the English name of the tuberose rooted, esculent LYCOPERSICON or *solanum* of botanical writers.

The English name seems evidently formed from *batatas*, the Indian name of the same plant.

This plant is said to have been first introduced into our country from America, about the year 1623; and the cultivation and use of it have been very general for forty or fifty years past. Of this there are two varieties, one with a red, and the other a white root: what whole roots are red has purplish flowers, but the white root has white flowers: these are supposed to be only accidental variations, and not distinct species.

The most advantageous way of propagating *potatoes* is the planting them at large distances, and digging or horse-hoeing the ground several times between them.

Mr. Tull gives an example of this, in which the hoeing succeeded much better than dung, and without the expence of it.

A piece

A piece of ground was planted with *potatoes*, the greater part of it in the common way; but in one part, worse than the reſt, they had been ſet at a yard diſtance every way. The reſt of the ground was dunged; this poor part had no dung, but was ploughed deep at ſeveral times four different ways, ſo that the ground was ſtirred and broken thoroughly every where about the *potatoes*. The conſequence was, that though no dung was uſed here, and though the plants appeared much weaker than in the dung part, yet the crop was greatly better than that of the other part of the field. The roots here were all large, and in the other parts of the field, where the dung had been uſed without ploughing, they were ſo ſmall, that the crop was ſcarce worth taking up.

This is one of many inſtances of the no great uſe of dunging land, without properly ſtirring it up; and ſerves to prove, what the crops of corn and every thing elſe confirm upon trial, that the ſtirring the earth ſufficiently, without any farther trouble, will anſwer better without any other manure, than all the manure in the world without it.

The common way of planting *potatoes* is, either to plant the ſmall roots or offsets entire, or to cut the larger roots into pieces, preſerving a bud or eye to each: but Mr. Miller recommends to make choice of the faireſt roots for this purpoſe, and to allow them a larger ſpace of ground, both between the rows, and alſo between one plant and another in the rows.

The ſoil in which *potatoes* are found to thrive beſt, is a light ſandy loam, not too dry nor too moiſt; which ſhould be well ploughed two or three times, and the deeper it is ploughed, the better will the roots thrive. In the ſpring, juſt before the laſt ploughing, a good quantity of rotten dung ſhould be ſpread on the ground, which ſhould be ploughed in the beginning of March, if the ſeaſon be mild, or towards the latter end of the month, if there be probability of froſt. In the laſt ploughing the ground ſhould be laid even, and then the furrows ſhould be drawn at three feet diſtance from each other, and about ſeven or eight inches deep. In the bottom of this furrow the roots ſhould be laid at about a foot and a half aſunder; then the furrow ſhould be covered in with the earth. About the time when the ſhoots are expected to appear above the ground, it ſhould be well harrowed over both ways, in order to break the clods, render the ſurface ſmooth, and deſtroy the young weeds. The hoe-plough may likewiſe be introduced between the rows: and this operation ſhould be repeated twice early in the ſeaſon before the ſtems of the plants begin to trail upon the ground: and a hoe may be made uſe of to ſtir the ground and deſtroy the weeds between the plants in the rows. The haulm of *potatoes* is generally killed by the firſt froſt in autumn, when the roots ſhould be taken up, and laid by in a good quantity of ſand or dry earth, under ſhelter, where they may be kept both from wet and froſt.

Here we muſt not omit to mention a new kind of *potatoe*, firſt brought from America, which John Howard, eſq. (a gentleman well known not only in our own country, but in moſt countries of Europe, for his zeal in viſiting the priſons of different nations, and promoting the great intereſts of humanity), cultivated in 1765, at Cardington, near Bedford: he firſt ſet theſe *potatoes* in hillocks about ſix feet aſunder; and the produce from each cutting was from 26 to 27 lb. many of the ſingle *potatoes* weighing four or five pounds each. In the following year he planted them in drills three feet aſunder, and three feet from each other, when their produce was from 22 to 30 lb. from each cutting, and the *potatoes* were more ſaleable for common uſe: and allowing the cuttings to weigh one ounce, the increaſe was full four hundred fold. Having thus ſucceeded in his own attempts, he promoted the propagation of this ſpecies of *potatoe* not only in his own neighbourhood, but in adjacent counties.

The increaſe of this *potatoe* exceeds that of the common ſort, at the moſt moderate and loweſt eſtimation on all ſoils, full three times, and in ſome caſes at leaſt ſix times. This ſuggeſts an obvious advantage attending the culture of this *potatoe*, viz. that farmers, who have not land naturally rich, or who cannot ſpare much manure, may yet be able to cultivate this kind, and even with greater profit than thoſe who raiſe the common kind on rich land. Beſides, as theſe *potatoes* grow cloſer together, and nearer the ſurface of the earth than thoſe of the common kind, the land may be more eaſily and effectually cleared from them, in order to make it fit for a ſucceeding crop of another kind. Hogs and cattle are likewiſe found to prefer them to the common ſort; and they are more nutritive than the others; being more ſolid and ſweet, and containing more farina or flour. They ſeem fitted, therefore, to anſwer the purpoſes of rearing, feeding, or fattening cattle and hogs. As an eſculent plant, they are alſo worthy of cultivation. When boiled thoroughly, they are equally well taſted and white with the common *potatoes*, though when under boiled, they have ſomewhat of the ſweetneſs of the Jeruſalem artichoke, and retain their reddiſh colour. When roaſted, all allow them to be preferable to the common kinds.

We ſhall only obſerve, that this kind of *potatoes* has been brought over at different times, and cultivated, though in a very ſmall degree, and more for curioſity than uſe, in different counties; particularly in Doſeſhire and Northumberland.

POTATOES, *Spaniſh*, a name given to ſeveral ſpecies of the CONVOLVULUS or bind-weed.

POTENT, or POTENCE, in *Heraldry*, a term for a kind of a croſs, whoſe ends all terminate like the head of a crutch.

This is otherwiſe called the *Jeruſalem croſs*; and is repreſented in *Pub. Il. Heraldry*, fig. 47.

He beareth *ſable*, a croſs *potent*, or, by the name of *Alyn*.

POTENT, *counter-potent*. See COUNTER-*potent*.

POTENTIA, POWER, that whereby a thing is capable *either* of acting or being acted upon. See POWER.

POTENTIA, *to exiſt in*, is uſed among ſchool-writers to denote that exiſtence which a thing has in a cauſe capable of producing it, but which has not as yet actually produced it. In which it ſtands oppoſed to exiſtence *in actu*.

POTENTIAL, *potentialis*, in the *Schools*, is uſed to denote and diſtinguiſh a kind of qualities, which are ſuppoſed to exiſt in the body *in potentia* only; by which they are capable, in ſome manner, of effecting and impreſſing on us the ideas of ſuch qualities, though not actually inherent in themſelves.

In this ſenſe we ſay, *potential heat*, *potential cold*, &c. Brandy and pepper, though cold to the touch, are *potentially* hot.

POTENTIAL *cold* is a relative term, by which we mean, that ſuch a thing is not actually cold to the touch, but in its effects and operations, if taken inwardly.

This quality is ſuppoſed to ariſe from the ſize, ſhape, &c. of the component particles of a body, which give ſome check or retardation to the blood's motion, whereby it is leſs agitated, and upon which the ſenſible parts of the body are not ſo briſkly ſtruck by it; the perception of which diminution or change of motion in the organs of feeling, is called *cold*.

Hence every thing that leſſens the blood's motion, with relation to the ſenſation before made, is cold; and every thing which increaſes it, may be called *potentially hot*.

POTENTIAL, in *Medicine*, &c. Cauteries are either actual, viz. a button of red-hot iron; or *potential*, as lime, and other cauſtic drugs.

POTENTIAL *calcination*. See CALCINATION.

POTENTIAL is alſo uſed by ſchoolmen, for ſomething that has the quality of a genus.

A *potential* whole is that which has its parts under it, as a genus has its ſpecies; to diſtinguiſh it from an *actual* whole, which has its parts in itſelf, as a body compoſed of matter and form.

Grotius, with a view to this diſtinction, uſes the phraſe, *potential parts of a ſtate*, in oppoſition to the *ſubjective parts*.

By potential, he means thoſe parts poſſeſſed of the ſovereign power; by ſubjective, thoſe ſubject thereto; which are that with regard to the ſovereign power, that ſeveral ſpecies are with regard to the genus whereof they are the ſubjective parts.

Grotius maintains, that though the ſovereign power be one and indiviſible, yet it may have ſeveral *potential* parts: for, as in the Roman empire there have been two *potential* heads, the one ruling in the Eaſt, the other in the Weſt; yet the imperial authority, all the while, ſingle and indiviſible; ſo is it poſſible, the ſubjective parts combining to give away their ſovereignty, may not give it entire, but reſerve a part of it for certain emergencies. In which caſe, the ſubjective part becomes *potential*: and thus there are two *potential* parts, and yet the ſovereignty ſingle.

POTENTIAL, in *Grammar*, gives the denomination to one of the moods of verbs.

The *potential* mood is the ſame, in form, with the ſubjunctive; but differs from it in this, that it hath always implied in it, either *poſſum*, *vim*, or *debeo*; as *regat*, that is, *regere poteſt*, *the man may aſk*.

It is ſometimes called the *permiſſive* mood, becauſe it often implies a permiſſion or conceſſion to do a thing; as *habeat*, *valeat*, *vivat*, *cum illo*. Terent.

POTENTILLA, in *Botany*, a name given by many authors to the argentina, or ſilver weed; and by ſome, with the addition of the epithet major, or the greater *potentilla*, to the ulmeria, or meadow-ſweet. See CINQUEFOIL.

POTERII *antidiſcium*. See ANTIDISCIUM.

POTERIUM, *burnet*, in *Botany*, a genus of the *monœcia polyandria*

polyandria class. Its characters are, that it hath male and female flowers in the same spike; the male flowers have a four-leaved empalement, and one petal, which is cut into four parts; these are oval, concave, and permanent, and have a great number of long hair-like stamina, terminated by roundish twin summits; the female flowers have also a four-leaved empalement, and one wheel-shaped petal, with a short tube, cut into four parts at the brim; these have no stamina, but two oblong oval germina, with two hairy styles of the length of the petal, crowned by coloured pencil-shaped stigmas; the germina afterwards become two hard seeds, inclosed in the petal of the flower. There are three species.

The first sort is the common small hairy burnet, that grows naturally upon chalky lands in many parts of England; of which there are two or three varieties. It is a perennial plant, the stalks of which rise a foot and a half high, branching out and terminated by long slender foot-stalks, sustaining, each, an oblong spike of flowers, which are of a purplish red colour, and appear in June. The seeds ripen in autumn.

This plant is propagated in gardens; the young tender leaves are put into salads, and the leaves are used for cool tankards in hot weather. It is used in medicine, and reckoned to be cordial and alexipharmic. The powder of the root is recommended against spitting of blood. Miller.

For other species of burnet, see SANGUISORBA.

POTERIUM is also used by many for the prickly pimpernell. See *Burnet* SAXIFRAGE.

POTHOS, in *Botany*, a name used by Theophrastus, and some other of the old writers, for the aquilegia, or columbine. In the Linnæan system it is a genus of the *gynandria polyandria* class. Its characters are, that it has no proper calyx, but a spatha, the spadix of which is simple and covered; it has four petals, and four stamina; and the fruit consists of dispermous berries. There are seven species.

POTINCOBA, in *Botany*, a name by which some authors call water-pepper, or the sharp arsmart.

POTION, *potio*, a liquid medicine, in the quantity of a draught, or so much as is to be taken at one time.

A *potion* only differs from a JULEP, or a MIXTURE, in the quantity; as being confined to one dose.

There are purging *potions*, emetic *potions*, diaphoretic, pectoral, cephalic, cardiac, stomachic, hysteric, vulnerary, carminative, &c. *potions*.

POTRONE, in *Botany*, a name given by the people of Burgundy to a stinking kind of fungus, found about the roots of trees. They have also extended the name much farther, and use it for a sort of touchwood, or rotten wood of the oak, and other trees common in the forests of those countries, which shines in the night, and has the same smell with that fungus.

POTTIL, in *Antiquity*. See PINARII.

POT-METAL is formed of lead mixt with copper, in the proportion of one part of lead to four of copper. This metal is harder than copper, or even brass.

POTRIMPOS, the name of an ancient Prussian idol, worshipped under oaks, and to which human sacrifices of enemies were offered. Mem. de l'Acad. de Berlin, tom. ii. p. 358.

Percunos and Piculos were idols of the same kind.

POTTERY, the art of making earthen pots and vessels; or the manufacture of earthen ware.

All kinds of *pottery* in general are made of clays or argillaceous earths; because these earths are capable of being kneaded, of easily receiving any forms, and of acquiring much solidity and hardness by exposure to the fire.

In the Mem. de l'Acad. des Scienc. de Prusse, 1749, there are some experiments, tending to prove, that the tenacity of clay is owing to some inflammable matter which is mixed with it, and which is easily consumed in the fire. But there are considerable differences in clays: some, which are of the purest kind, resist the most violent fire, without receiving any other change than a considerable hardness; others, by exposure to violent heat, acquire a hardness equal to that of flints, and a compact glassy texture, but are unfusible by the most intense fire; which qualities they owe to some fusible materials mixed with them, as sand, chalk, gypsum, or ferruginous earth, which occasion a partial but not a complete fusion. Another kind of clays is first hardened by fire, and afterwards completely fused. From these three different clays, three different kinds of *pottery* may be produced. Of the first kind are formed large pots or crucibles, used in glass-houses, &c. See CRUCIBLE.

With clays of the second kind may be made crucibles and other *potteries*, commonly called stone-ware; which, when sufficiently baked, are very sonorous, so hard as to strike fire with steel, capable of containing all liquids which the former sort, on account of their porosity, will not admit of, and resist the action of nitre, glass of lead, and other fluxes, provided that the earth of which they are formed is of good quality; but their hardness and density, which prevent their sudden expansion and contraction, by the hasty application of heat and cold, render them liable to break in all operations where they are suddenly exposed to heat or to cold. With the fusible clays may be made many kinds of vessels which are cheap, as they require little fire to bake them; for this kind of *pottery* is slightly baked, and, consequently, its texture is coarse and porous. These are generally covered with a glazing, without which water, or other liquids, would pass through their pores. Some of this *pottery*, which is carefully finished, and covered with a white enamel, is called DELFT-*ware*. Other coarser *potteries* of this kind are glazed with GLASS *of lead*, mixed with metallic calces, or fusible coloured earths, from which they receive various colours. See GLAZING.

There is also a fine kind of *pottery* made of white clays, or of such as whiten in the fire, the surface of which is vitrified by throwing into the furnace, when the ware is sufficiently baked, some common salt and salt-petre.

The French stone-ware is formed of a whitish clay, in which a good deal of fine white sandy particles is intermixed. The English stone-ware is compoled of tobacco-pipe clay, and ground flints. The use of the flints is to give strength to the ware, so that it shall preserve its form during the baking; whereas vessels made of clay alone, although unfusible by fire, and capable of acquiring, by having been exposed to an intense heat, the hardness of the best porcelain, while they are hot, are soft, sink by their weight, so as to lose the form given to them. This stone-ware is glazed by means of common salt only, without any mixture of nitre; and the glazing has not the beauty or smoothness of good vitreous glazings.

The flint, or white stone-ware, is made in Staffordshire, and other places, in the following manner. Tobacco-pipe clay, which they have from Dorsetshire, is beat much in water; by this process the finer parts of the clay remain suspended in the water, whilst the coarser sand, and other impurities, fall to the bottom. The thick liquid, consisting of water, and the finer parts of the clay, is farther purified, by being passed through hair and lawn sieves of different degrees of fineness; the clay is then sufficiently prepared to be mixed with powdered flints. They use annually in Staffordshire about five thousand tons of flint, which they have from Hull. They were formerly accustomed to grind these flints with moor-stone or granite, but of late years a large bed of CHERT (a species of flint) has been discovered near Bakewel in Derbyshire, and the Staffordshire and Yorkshire potters prefer it to moor-stone for grinding their flints; it is very hard, and, being itself of the nature of flint, the parts of it which are worn off and mixed with the flints in grinding, do not vitiate the quality of the flints-powder. When the flints have been properly calcined and ground, they are sifted in water, till the water is, as near as may be, of the same thickness as that in which the clay is suspended; then the liquid clay and flints are mixed together in various proportions, for various wares, and left to set; the mixture is then dried in a kiln, and being afterwards beaten to a proper temper, it becomes fit for being formed at the wheel into dishes, plates, bowls, &c. When this ware is to be put into the furnace to be baked, the several pieces of it are placed in cases, made of clay, called SEGGARS, which are piled upon one another in the dome of the furnace; a fire is then lighted, and when the ware is brought to a proper temper, which happens in about forty-eight hours, it is glazed by common salt. The salt is thrown into the furnace (through holes in the upper part of it), by the heat of which it is instantly converted into a thick vapour, which, circulating through the furnace, enters every seggar, through holes made in the side (the top being covered), to prevent the salt from falling upon the ware, and attaching itself to the surface of the ware, it forms that vitreous coat upon the surface, which is called its glaze. This very curious method of glazing earthen ware, by the vapour of common salt, was introduced into England from Holland; at least it was introduced from thence into Staffordshire, about eighty years ago, by two Dutchmen.

Another kind of stone-ware, called the *prince*, or *queen's ware*, is made in England, and lately much used. It is compoled of the same materials as the former, but with a less proportion of flints, as it is to be exposed to a less violent heat than the former ware; the vitreous glazing with which it is covered not being capable of sustaining such heat. Its colour is less white than that of the former,

mer, having a yellowish tinge, but the ware is preferred on account of the smoothness of its glazing, and neatness of its forms.

The stone-ware is generally made of four measures of liquid flint, and eighteen of liquid clay; the yellow ware has a greater proportion of clay in it; in some manufactories they mix twenty, and in others twenty-four measures of clay with four of flint. These proportions, if estimated by the weight of the materials, would probably give for the former ware about three hundred weight of *clay* to one hundred weight of flint, and for the latter somewhat more clay; but the proportion for both sorts of ware depends very much on the nature of the clay, which is very variable. The yellow glaze is made by mixing together in water, till it becomes as thick as cream, a hundred and twelve pounds of white lead, twenty-four pounds of ground flint, and six pounds of ground flint-glass. Some manufacturers leave out the glass, and mix only eighty pounds of white lead with twenty pounds of ground flint. The ware, before it is glazed, is baked in the fire, by which means it acquires a property of strongly imbibing moisture; it is, therefore, dipped in the liquid glaze, and suddenly taken out, the glaze is imbibed into its pores, and the ware presently becomes dry; it is then exposed a second time to the fire, by which means the glaze, which it had imbibed, is melted, and a thin glassy coat is formed upon its surface, the colour of the coat being more or less yellow, according as a greater or less proportion of lead has been used. The yellow colour, which lead gives, when vitrified with flints, may be wholly changed by very small additions of other mineral substances; e. g. the beautiful black glaze, which is fixed on one sort of the ware made at Nottingham, is composed of twenty-one parts by weight of white lead, of five of powdered flints, and of three of manganese. See GLAZING.

This kind of *pottery*, as well as the extension and application of the manufacture to a variety of curious compositions, subservient not only to the ordinary uses of life, but to the arts, antiquity, history, &c. have been lately profecuted with singular skill and success by Messrs. Wedgewood and Bentley, whose various manufactures, intended both for ornament and use, are well known. See PORCELAIN.

The wheel and lathe are the chief, almost the only, instruments used in *pottery*; the first for large works, the second for small; though, in reality, they are much the same as to the manner of using them.

The potter's *wheel* consists principally in its nut, which is a beam or axis, whose foot or pivot plays perpendicularly on a free-stone sole or bottom; from the four corners a-top of this beam, which does not exceed two feet in height, arise four iron bars, called the *spokes* of the wheel; which, forming diagonal lines with the beam, descend, and are fastened at bottom to the edges of a strong wooden circle, four feet in diameter, perfectly like the felloes of a coach-wheel; except that it has neither axis nor radii, and is only joined to the beam, which serves it as an axis, by the iron bars. The top of the nut is flat, of a circular figure, and a foot in diameter: on this is laid a piece of the clay, or earth, to be turned and fashioned.

The wheel, thus disposed, is encompassed with four sides of four different pieces of wood, fastened on a wooden frame; the hind-piece, which is that whereon the workman sits, is made a little inclining towards the wheel; on the fore-piece are placed the pieces of prepared earth: lastly, the side-pieces serve the workman to rest his foot against; and are made inclining, to give him more or less room, according to the size of the vessel to be turned. By his side is a trough of water, wherewith from time to time he wets his hands, to prevent the earth's sticking to them.

To set the wheel. The potter having prepared his clay or earth, and laid a piece of it, suitable to the work he intends, on the top of the beam, sits down; his thighs and legs much expanded, and his feet rested on the side-pieces, as is most convenient.

In this situation he turns the wheel round, till it has got the proper velocity; when, wetting his hands in the water, he bores the cavity of the vessel, continuing to widen it from the middle; and thus turns it into form, turning the wheel afresh and wetting his hands from time to time.

When the vessel is too thick, they use a flat piece of iron with a hole in the middle, and somewhat sharp on one edge, to pare off what is redundant. Lastly, when the vessel is finished, they take it off from the circular head by a wire passed underneath the vessel.

The potter's *lathe* is also a kind of wheel, but much simpler and lighter than the former. Its three chief members are an iron beam or axis, three feet and a half high, and two inches in diameter; a little wooden wheel all of a piece, an inch thick, and seven or eight in diameter, placed horizontally atop of the beam, and serving to form the vessel on; and another larger wooden wheel, all of a piece, three inches thick, and two or three feet broad, fastened to the same beam at bottom, parallel to the horizon. The beam or axis turns by a pivot at bottom, in an iron stand.

The workman gives the motion to the lathe with his feet, by *pushing* the great wheel alternately with each foot; still giving it a greater or leſſer degree of motion, as his work requires.

They work with the lathe, with the same instruments, and after the same manner, as with the wheel.

But neither the one, nor the other, serve for any more than forming the body of the vessel, &c. the feet, handles, and ornaments, if there be any, beside the mouldings, being to be made and set on by the hand: if there be any sculpture in the work, it is usually done in earthen or wooden moulds, prepared by a sculptor, unless the potter have skill enough to do it himself, which is very rare. The several productions of the potter are then baked and glazed, or varnished.

POTTERY, *for the Chinese.* See PORCELAIN.

POTTLE, an English measure, containing two quarts.

Two of these *pottles*, in the liquids, make a gallon; but in dry measure three go to a gallon.

POUCH, in the *Military Art*, is a square case or bag of leather, with a flap over it, hanging to a buff shoulder-belt of about three inches broad over the left shoulder of the infantry, used for holding cartridges. The CARTRIDGE-*boxes* within the *pouches* should be made as light as possible, with thirty-six holes in each, in order to prevent the addition of boxes to buckle round the waist, which, by blowing up, have occasioned mischief and confusion.

POUCH, *scrotum*, in *Botany*. See MAD-*wort*.

POUDER. See POWDER.

Pie POUDRE *court*. See *Pie powder* COURT.

POUDRE *des Chimistes*. See KERMES *mineral*.

POULTICE, or POULTIS, a form of medicine, called also CATAPLASM.

POULTRY. See FOWL.

POUNCE, among *Artificers*, a little heap of charcoal-duſt, inclosed in some open stuff, to be passed over holes pricked in a work, in order to mark the lines or designs thereof on a paper placed underneath; which are to be afterwards finished with a pencil, a needle, or the like.

The word is formed from the French *ponce*, *pumice-stone*; because they anciently used pumice-stone powdered for this purpose.

Pounce is much used, by embroiderers, to transfer their patterns upon their stuffs; by lace-makers, and sometimes also by engravers; and a kind made of gum SANDARACH, by writing-masters, which being rubbed on the paper, makes it less apt to imbibe the ink; it is therefore used in this manner by those who are curious in the art of the pen, by which means the writing appears more precise, sharp, and determinate.

The varnish-makers also use to dissolve it in oil of turpentine, or in linseed oil, or in spirit of wine; from which mixture is produced a kind of liquid varnish.

POUNCES, in *Falconry*, the talons or claws of a bird of prey.

POUND, *libra*, a weight of a certain proportion, much used as a standard for determining the gravities and quantities of bodies.

The word is derived from the Saxon *pund*, or *pond*, *ponder*, *weight*.

We have *two* different *pounds* in England; *the pound troy*, and *the pound avoirdupois*. See WEIGHT.

For the several POUNDS *of the several cities and countries, their proportion, reduction, division*, &c. see WEIGHT.

POUND, *Roman*. See LIBRA.

POUND also denotes an imaginary money used in accounting; containing more or less, according to the several names added to it, and the several countries it is used in.

Thus, in England, we say, a *pound sterling*; in France, a *pound*, or *livre Tournois* and *Parisis*; in Holland and Flanders, a *pound*, or *livre de gros*, &c.

The term took its rise hence; that the ancient *pound* sterling, though it only contained 240 pence, as ours does; yet each penny being equal to five of ours, the *pound* of silver weighed a *pound* troy.

The *pound* sterling, or English *pound*, contains twenty shillings, the shilling twelve pence, and the penny four farthings. Anciently there were three ways of paying a *pound* of money into the exchequer. 1. The payment of a *pound de numero*, which was just twenty shillings in tale. 2. *Ad scalam*; which was 6*d.* over and above the

20*s.* 3. *Ad pensum*; which was giving the full weight of twelve ounces.

POUND, *French*. See LIVRE and COIN.

The POUND, or *livre de gros*, of Holland, is divided into 20 shillings gros, and the shilling into 12 pence gros. It is equal to six florins, the florin valued at 24 sols Tournois; supposing the exchange on the footing of 100 pence gros for a French crown of 3 livres Tournois; so that the *pound* gros amounts to 10 shillings and 11 pence farthing sterling. The *pound* gros of Flanders and Brabant is divided like that of Holland; and like that, too, is equal to six florins; but the florin is equal to 25 sols Tournois; so that the Flanders *pound* is equal to 7 livres, 10 sols Tournois, or 11*s.* 3*d.* sterling. See COIN.

Merchants, factors, bankers, &c. use characters, or initial letters, to express the several kinds of *pounds* of account: as *L.* or *L. St. pounds* sterling; *L. G. pounds* gros; and *L.* or *lb. tun. pounds* Tournois.

POUND *nails*. See NAILS.

POUND, *parcus*, is also an inclosure, or strong place, where cattle distrained, or caught in any trespass, are put, till they are replevied, or redeemed.

The *pound* is either *overt*, or *covert* and *close*.

POUND *overt* is an open *pound*, built upon the lord's waste; and thence also called the *lord's pound*, because he provides it for the use of himself, and his tenants.

Pound overt also includes back-sides, court-yards, pasture-grounds, or any place whatever, to which the owner of beasts impounded may come to give them meat and drink, without offence or trespass.

By stat. 1 & 2 P. & M. cap. 12. no DISTRESS of cattle can be driven out of the hundred where it is taken, unless to a *pound overt* within the same shire, and within three miles of the place where it was taken. This is for the benefit of the tenants, that they may know where to find and replevy the distress. And by stat. Geo. II. cap. 19. which was made for the benefit of land-lords, any person distraining for rent may turn any part of the premises, upon which a distress is taken, into a *pound pro hac vice*, for securing of such distress. If a live distress of animals be impounded in a common *pound overt*, the owner must take notice of it at his peril; but if in any special *pound overt*, so constituted for this particular purpose, the distrainer must give notice to the owner; and in both these cases, the owner, and not the distrainer, is bound to provide the beasts with food and necessaries.

POUND *covert*, or *close*, on the contrary, is such a one as the owner cannot come to, for the said purpose, without trespass or offence; as some close house, castle, fortress, &c.

If a distress of animals be impounded in a *pound covert*, as in a stable, or the like, the land-lord or distrainer must feed and sustain them. A distress of household goods, or other dead chattels, which are liable to be stolen or damaged by weather, ought to be impounded in a *pound covert*, else the distrainer must answer for the consequences.

POUND *breach*, in *Law*. If a distress be taken, and impounded, though without just cause, the owner cannot *break* the *pound*, and take away the distress; if he doth, the party distraining may have his action, and retake the distress wherever he finds it; and for *pound breaches*, &c. a writ *de parco fracto* may be obtained, or an action on the case lies, wherein treble damages may be recovered, if the distress was taken for rent. 1 Inst. 161. 2 W. & M. cap. 5.

Also it is said, that all *pound breaches* may be enquired of in the sheriff's turn, as they are common grievances, in contempt of the authority of the law. 2 Hawk. P. C. 67.

POUND *land*, of old extent. See LIBERATA *terræ*.

POUNDAGE, a subsidy granted to the king upon all manner of merchandize imported or exported, by all merchants, natives, denizens, and aliens. This, together with that of TONNAGE, was at first granted, as the old statutes (and particularly 1 Eliz. cap. 19.) express it, for the defence of the realm, and the keeping and safe-guard of the seas, and for the intercourse of merchandize safely to come into and pass out of the same. It was at first granted, as well as that of tonnage, only for a stated term of years, as for two years in 5 Ric. II. 3; but in Henry the Fifth's time, they were granted him for life by a statute, in the third year of his reign, and again to Edward IV. for the term of his life also; since which time they were regularly granted to all his successors for life, till the reign of Charles the First; in his time they were unconstitutionally levied and taken for fifteen years without consent of parliament; but by 16 Car. I. cap. 8. the king renounced all power in the crown for levying the duty of tonnage and *poundage*, without the express consent of parliament. Upon the Restoration this duty was granted to Charles II. for life. See CUSTOMS.

It is called *poundage*, because fixed at the rate of so much per pound; viz. one shilling in every pound, or twenty shillings; and for English commodities exported by aliens, one shilling more.

POUNDER, in *Artillery*, is used to specify a certain calibre: thus, a twenty-four-*pounder*, a twelve, or a six-*pounder*, are those pieces whose balls weigh twenty-four, twelve, or six pounds. See GUNS.

POUP. See POOP.

POUR *faire proclamer, que nul infect fines ou ordures en fosses ou rivers pres citées*, &c. in *Law*, an ancient writ, directed to the mayor or bailiff of a city or town, requiring them to make proclamation, that none cast filth into the ditches or places near such city or town, to the nuisance thereof; and if any be cast there already, to remove the same. It is founded on the Statute 12 Rich. II. cap. 13. F. N. B. 176.

POUR *faire terres in fumer que tient en dower*, in *Law*, an ancient writ, whereby the king seized the land which the wife of his tenant *in capite* had for her dowry, after his decease, if he married without the king's leave; by virtue of the statute of the king's prerogative. Cap. 3. F. N. B. 174.

POURALLER. See PURLUE.

POUR-PARTIE, or POUR-PARTY, in *Law*, a term used in opposition to *pro indiviso*; denoting the share or part of an estate first held in common by parceners; which is by partition allotted to any of them.

To make *pour partie*, is to divide and sever the lands that fell to parceners; which, before partition, they held jointly, and *pro indiviso*.

POURPRE. See PURPURE.

POURPRESTURE, or PURPRESTURE, *pourprisura*, in *Law*, is defined by Glanville to be, when any thing is unjustly occupied, that properly belonged to the king; as is the case in the encroaching on his grounds, obstructing the highways, diverting public rivers from their proper course, or building any thing over the high streets of a city; and, in the general, where any thing is done to the prejudice of the king's tenements, highways, or cities.

Crompton in his Jurisd. says, *pourpresture* is properly when a man takes to himself, or encroaches any thing which he ought not; whether it be in jurisdiction, in land, or in franchise; and, generally, where any thing is done to the nuisance of the king's tenants.

Some authors divide *pourpresture* into three kinds: the first against the king, the second against the lord, the third against a neighbour.

Pourpresture against the king, Lib. Nig. in Scacc. fol. 38. is that happening through the negligence of the sheriff, or the long continuance of wars, &c. when those that have lands near the crown-lands, inclose part of them, or lay them to their own.

Pourpresture against the lord is when the tenant neglects to perform what he is bound to do for the chief lord, or deprives him of his right.

Pourpresture against a neighbour is a nuisance against a neighbour, &c. mentioned in the Monast. tom. I.

POURSUIVANT, or PURSUIVANT, from the French *poursuivre*, *to pursue*, a messenger, anciently attending the king, in his wars, or at council table, or in the exchequer, to be dispatched upon any occasion, or message: as, for the apprehension of a person suspected, or accused, &c.

Many of the nobility too had their *poursuivants*: a knight banneret was allowed a *poursuivant*, with the consent of a herald.

Upton, De Re Militari, calls the *poursuivants*, *milites linguares*; because, says he, their chief honour was in *custodia linguæ*.

He divides them into foot and horse *poursuivants*, *cursores equitantes & pedestres*.

There were also *poursuivants* particularly employed in martial causes, called

POURSUIVANTS *at arms*, a term anciently applied to gentlemen who attended the heralds, and aspired to their office; to which they could not rise, till after seven years apprenticeship passed in this quality. See HERALD.

They were entirely dependent on the heralds, and assisted at their chapter; officiating for them in preparing and affixing tournaments, and all other parts of their ministry.

They were baptized, at solemn feasts, with some gallant name; as *Jaloisour*, *Verluisant*, *Sansmentir*, &c.

Their coats of arms were different from those of the heralds, and they bore plain staves, without ornament.

Of the great number of *poursuivants* anciently on foot, there are now only four remaining; viz. *blue-mantle*, *rouge-cross*, *rouge-dragon*, and *portcullis*; who are the lowest order of officers belonging to the college of arms. Their business is, to attend with the heralds in marshalling

ling and ordering public solemnities, funerals, interviews, cavalcades, &c.

Stow, speaking of Richard the Third's end, has these words: "His body was naked to the skin, nor so much "as one cloth about him; and was trailed behind a *pour-*"*suivant* at arms, like a hog, or a calf."

POURTRAIT, or POURTRAITURE. See PORTRAIT.

POURVEYANCE, or PURVEYANCE, the providing of corn, victuals, fuel, and other necessaries, for the king's house.

By a stat. 12 Car. II. cap. 24. no person, under colour of *pourveyance*, shall take any timber, cattle, corn, or other matter, from any subject, without his free consent.

POURVEYOR, or PURVEYOR, an officer of the household, who provides and buys in corn, and other victuals, &c. for the king's house; mentioned in Magna Charta, and several statutes.

Pourveyor became a term so odious in times past, that by stat. 35 Ed. III. the heinous name *purveyor* was changed into that of *acheter*, or *buyer*. The office itself was much restrained by the stat. 12 Car. II. cap. 24.

POUSSE-*pied*, in *Natural History*, the French name for a genus of shell-fish, called by writers of other nations the COLLETIES.

POUST, an Indian name for a very poor and coarse kind of opium, made by boiling the stalks and leaves of the opium poppy in water, and then evaporating the clear liquor to the consistence of a solid extract.

POUTING, or WHITING-POUT, in *Ichthyology*, a name given to a species of *bearded* GADUS, which seldom exceeds a foot in length. It is distinguished from all others by its great depth, which is near four inches in those of the largest size; the back is much arched and carinated; the scales larger than those of the cod-fish; the mouth small; the beard short; and on each side of the jaw are seven or eight punctures; the first dorsal fin is triangular, terminating in a long fibre; the colour of the fins and tail black; and at the bottom of the pectoral fins is a black spot; the lateral line is white, broad, and crooked; the tail even at the end, and of a dusky colour; the colour of the body is white, but more obscure on the back than the belly, and tinged with yellow. It is a delicate fish. Pennant.

POWCHES, in a *Ship*. The seamen call by this name the small bulk-heads made in the hold, to stow corn, goods, or the like, that it may not shoot from one side to the other.

POWDER, or POUDER, in *Pharmacy*, a dry medicine pulverised, or prepared by being broken and reduced into almost imperceptible atoms, either in a mortar, or by chemical operations, &c.

The lighter *powders* may be mixed in any agreeable liquor, as tea, or water-gruel. The more ponderous will require a more consistent vehicle, as syrup, jelly, or honey. No *powders*, especially those of the aromatic kind, should be too much exposed to the air, and kept too long. There are *powders* of various sorts, the principal of which are mentioned in the following articles and references.

POWDER *of algaroth*. See ALGAROT, and CORNACHINE *powder*.

POWDER, *amber*, or PULVIS *e succino*, is a form of medicine prescribed in the late London Pharmacopœia, in the room of the troches of amber, or *trochisci de carabe* of former dispensatories. The composition of the *powder* is this: take prepared amber and gum arabic, of each ten drams; juice of hypocistus, balaustines, and Japan earth, of each five drams; olibanum, half an ounce; strained opium, a dram; mix all these together into a fine powder. Pemberton's Lond. Disp.

POWDER, *astringent*, is formed by pounding together alum and Japan earth, of each two drams. If the whole be divided into ten or twelve doses, one of them may be taken every hour in an immoderate flow of the menses, and other haemorrhages, or every half hour, if the haemorrhage be violent.

POWDER *of bole* is formed by pulverizing the following ingredients, viz. bole armenic, or French bole, two ounces; cinnamon, one ounce; tormentil root, and gum arabic, of each six drams; and long pepper, one dram. This warm, glutinous, astringent *powder*, is given in fluxes, and other disorders where medicines of that class are necessary, in the dose of a scruple, or half a dram. A *powder* of this kind is prescribed in the late London Pharmacopœia, instead of the confectio Fracastorii, or DIACORDIUM. If a dram of opium be added, it will make the *powder* of bole with opium, which may be taken in the same quantity as the former, but not above twice or thrice a day. Buchan.

POWDER, *bezoardic*, the name given in the late London Dispensatory to the *powder*, commonly called GASCOIGN'S *powder*. This is now ordered to be made only of crab's claws, one pound; prepared pearls and red coral, of each three ounces; and oriental bezoar, an ounce. The amber and hartshorn are left out of the composition, as improper or insufficacious ingredients; and the whole ordered to be kept also without the bezoar, and called by the name of *pulvis e cheliis cancrorum compositus*, the name by which Gascoign's *powder* used to be known.

POWDER, *carminative*, is made by reducing half an ounce of coriander seed, one dram of ginger, half a dram of nutmegs, and a dram and a half of fine sugar into a *powder*; which quantity will be sufficient for twelve doses. It is employed for expelling flatulencies arising from indigestion, particularly those to which hysteric and hypochondriac persons are so liable. It may be likewise given in small quantities to children in their food, when troubled with gripes.

POWDER, *cerussæ, pulvis e cerussa*, a medicine prescribed in the late London Pharmacopœia, in the place of the white TROCHES of Rhases or Razi. The late compositions of that medicine had been much more complex than the original receipt of that author, and the college have, therefore, retrenched the number of ingredients to them; and as the medicine is always to be powdered for use, it is now ordered to be kept in the form of *powder*. It is thus ordered to be made: take ceruse, five ounces; sarcocolla, an ounce; gum tragacanth, half an ounce; and make the whole into a fine *powder*. Pemberton.

POWDER, *compound contrayerva*. See CONTRAYERVA.

POWDER, *cornachine*. See CORNACHINE *powder*, and ALGAROT.

POWDER, *diuretic*, is made by pounding together four ounces of gum arabic, and one ounce of purified nitre. If the whole be divided into twenty-four doses, one may be taken three times a day, with considerable benefit, during the first stage of the venereal disease. Buchan.

POWDER, *emetic*. See EMETIC and IPECACUANHA.

POWDER, *Gascoign's*. See GASCOIGN'S *powder*, and *Bezoardic* POWDER.

POWDERS, *goat*, by Dr. Dover, and lord Portland. See GOUT.

POWDER, or *pulvis guttetæ*. See GUTTETÆ *pulvis*.

POWDER, *Jesuit's*. See CORTEX *Peruvianus*.

POWDER *of myrrh*, a form of medicine prescribed in the late London Dispensatory, to supply the place of the troches of myrrh. It is ordered to be made thus: take of dried leaves of rue, of dittany of Crete, of myrrh, each an ounce and a half; of asa fœtida, sagapenum, Russia castor, and opoponax, each an ounce; and beat altogether to a fine *powder*. Pemberton.

POWDER, *aromatic purging*, is formed by pounding and well mixing the best Turkey rhubarb, cinnamon, and fine sugar, of each two drams. Where flatulency is accompanied with costiveness, a tea-spoonful of this *powder* may be taken once or twice a day, according to circumstances. Buchan.

POWDER, *saline lenitive*, is prepared of soluble tartar and cream of tartar, of each one dram, and of purified nitre, half a dram. In fevers, and other inflammatory disorders, where it is necessary to keep the body gently open, one of these cooling laxative *powders* may be taken in a little gruel, and repeated occasionally. Buchan.

POWDER, *scammony*, a name given in the late London Dispensatory to the purging *powder*, commonly called the earl of Warwick's *powder*. It is, however, wholly altered here; the crystals of tartar and diaphoretic antimony being left out, and the medicine ordered to be made only of four ounces of scammony, and three ounces of burnt hartthorn, reduced together to a fine *powder*. Pemberton.

POWDER, *steel*, is made by pounding together filings of steel and loaf sugar, of each two ounces, and half an ounce of ginger. In obstructions of the menses, and other cases where steel is proper, a tea-spoonful of this *powder* may be taken twice a day. Buchan.

POWDER, *sudorific*, or *Dover's powder*. See GOUT.

POWDERS, *worm*, are formed by well mixing of tin, reduced into a fine powder, an ounce, and of Aithop's mineral, two drams. Let the whole be divided into six doses; and one of them may be taken in a little syrup, honey, or treacle, twice a day. After they have been all used, the following anthelmintic purge will be proper.

POWDER, *purging worm*, is prepared of powdered rhubarb, a scruple; and of scammony and calomel, of each five grains. Rub these together in a mortar for a dose. For children the above doses must be lessened, according to their age. If the *powder* of tin be given alone, its dose may be confiderably increased. Dr. Alston gave it to the amount of two ounces in three days, and says, when thus administered, that it proved an excellent anthelmintic. He used to purge his patients both before they took the *powder*, and afterwards.

POWDER *for the hair* is flour of wheat, or beans, well sifted and prepared, to give it an agreeable odour.

That wherein ſtarch-grounds are mixed, is much uſed. See STARCH.

POWDER, *fulminating*. See *Pulvis* FULMINANS.

POWDER, *gun*. See GUN-*powder*.

POWDER-*cart*, in *Artillery*, a two-wheel carriage, covered with an angular roof of boards; and to prevent the *powder* from being damp, a tarred canvas is put over the roof. On each ſide are lockers to hold ſhot, in proportion to the quantity of *powder*, which is generally four barrels.

POWDER-CHESTS, in the *Sea-language*, are ſmall boxes filled with gunpowder, pebbles, old nails, or ſplinters of iron, faſtened occaſionally on the decks and ſides of a ſhip, which they ſet fire to, when the ſhip is boarded by an enemy, and ſoon make all clear before them. Theſe caſes are uſually from twelve to eighteen inches in length, and about eight or ten in breadth, having their outer or upper part terminating in an edge. They are nailed to ſeveral places of the quarter, the quarter-deck, and bulk-head of the waiſt, having a train of powder, which communicates with the inner apartment of the ſhip, ſo as to be fixed at pleaſure to annoy the enemy. Falconer.

POWDER-*flaſks*, in *Artillery*, are moſt commonly made of horn, of any convenient ſize and figure, to carry *powder* for priming of cannon: this is their chief uſe in armies.

Sometimes they are ſo made as to have a meaſure for the charge of the piece at top, but this is of more uſe to gentlemen in fowling, &c. than to ſoldiers, who have the charges of their piece put into cartridges, which they bite off, and firſt prime, and then load.

POWDERS, *fixt*. See FLUXES.

POWDER *magazine*. See MAGAZINE.

POWDER *mill*. See MILL.

POWDER-*room*, in a *Ship*, that part of the hold wherein the *powder* is ſtowed. See MAGAZINE.

POWDER *of projection*. See PROJECTION.

POWDER-*tries*, in *Artillery*. See GUN-*powder*.

Mr. Thompſon has lately recommended a new and accurate method of proving *gun-powder*. For this purpoſe, when a quantity of *powder* has been provided, which, from any previous trial, is known to be of a proper degree of ſtrength to ſerve as a ſtandard for the proof of other *powder*, a given charge of it is to be fired, with a fit bullet, in a barrel ſuſpended by two pendulous rods, and the recoil is to be meaſured carefully upon a ribbon annexed to the apparatus. When this experiment has been often repeated, the mean and the extreme of the chords, if there is any difference in the recoil, may be marked upon the ribbon by black lines, and the word *proof* may be written upon the middle line; or if the recoil be uniform, the proof mark is to be made in that part of the ribbon to which it was conſtantly drawn out by the recoil in the different trials. Having thus aſcertained and marked upon the ribbon the recoil, with a known charge of ſtandard *powder*, let an equal quantity of any other *powder*, which is to be proved, be fixed in the ſame barrel, with a bullet of the ſame weight, and every other circumſtance alike; and if the ribbon is drawn out as far or farther than the proof mark, the *powder* is as good or better than the ſtandard; but if it falls ſhort of that diſtance, it is worſe than the ſtandard, and ought to be rejected. See many curious remarks and experiments on *gun-powder*, &c. by this author, in Phil. Tranſ. vol. lxx. part ii. art. 15.

POWDERINGS, in *Building*, a term ſometimes uſed for devices ſerving to fill up vacant ſpaces, in carved works; as alſo in eſcutcheons, writings, &c.

POWDERINGS, in *Heraldry*. See FURR.

POWER, *potentia*, in *Phyſics*, a natural faculty of doing or ſuffering any thing.

Mr. Locke explains the origin of our idea of *power* to the following effect: the mind being daily informed, by the ſenſes, of the alterations of the ſimple ideas of things without, and reflecting on what paſſes within itſelf, and obſerving a conſtant change of its ideas, ſometimes by the impreſſions of outward objects upon the ſenſes, and ſometimes by the determinations of its own choice; and concluding, from what it has ſo conſtantly obſerved to have been, that the like changes will for the future be made in the ſame things, by the ſame agents, and by the like ways; conſiders, in one thing, the poſſibility of having any of its ſimple ideas changed; and in another, the poſſibility of making that change; and ſo comes by that idea which we call *power*.

Thus we ſay, fire has a *power* to melt gold, and make it fluid; and gold has a *power* to be melted.

Power, thus conſidered, is twofold; viz. as able to *make*, or able to *receive*, any change; the one may be called *active*, the other *paſſive power*.

Of *paſſive power*, all ſenſible things abundantly furniſh us with ideas; nor have we of *active power* fewer inſtances; ſince whatever change is obſerved, the mind muſt ſuppoſe a *power* ſomewhere able to make that change.

Yet, if we attentively conſider it, bodies, by our ſenſes, do not afford us ſo clear and diſtinct an idea of active *power*, as we have from reflection on the operations of our minds; for all *power* relating to action, and there being but two ſorts of action, viz. thinking and motion, it may be conſidered whence we have the cleareſt ideas of the *powers* which produce thoſe actions.

Of thinking, body affords us no ideas at all; it is only from reflection that we have that: neither have we from body any idea of the beginning of motion. A body, at reſt, affords us no idea of any active *power* to move; and when it is ſet in motion itſelf, that motion is rather a paſſion than an action in it. The idea of the beginning of motion, we have only by reflection on what paſſes in ourſelves; where we find by experience, that, barely by willing it, we can move the parts of our bodies, which before were at reſt.

We find in ourſelves a *power* to begin or forbear, continue or end, ſeveral actions of our minds, and motions of our bodies, barely by a thought or preference of the mind. This *power* which the mind has, thus to order the conſideration of any idea, or the forbearing to conſider it, or to prefer the motion of any part of the body to its reſt, and *vice verſa*, in any particular inſtance, is what we call the *will*. And the actual exerciſe of that *power*, is that which we call *volition*, or *willing*.

The forbearance or performance of that action, conſequent to ſuch an order or command of the mind, is called *voluntary*; and whatſoever action is performed without ſuch a thought of the mind, is called *involuntary*.

The *power* of perception, is what we call the *underſtanding*.

Perception, which we make the act of underſtanding, is of three ſorts: the perception of ideas in our minds; the perception of the ſignification of ſigns; and the perception of the agreement or diſagreement of any diſtinct ideas.

Theſe *powers of the mind*, viz. thoſe of perceiving, and preferring, are uſually called by another name; and the ordinary way of ſpeaking is, that the *underſtanding* and *will* are two faculties or *powers* of the mind. A word proper enough, if uſed ſo as not to breed any confuſion in men's thoughts, by being ſuppoſed, as there is room to ſuſpect it has been, to expreſs ſome real beings in the ſoul, that perform thoſe actions of underſtanding and volition.

From the conſideration of the extent of the *power* of the mind over the actions of the man, which every one finds in himſelf, ariſe the ideas of LIBERTY and NECESSITY.

POWER, in *Mechanics*, denotes a force, which, being applied to a machine, tends to produce motion; whether it does actually produce it or not.

In the former caſe, it is called a *moving power*; in the latter, a *ſuſtaining power*.

If the *power* be a man, or a brute, it is called an *animate power*; if the air, water, fire, gravity, or elaſticity, an *inanimate power*.

POWER, *attractive*. See ATTRACTIVE.

POWER, *conſpiring*. See CONSPIRING.

POWER, *repelling*. See REPELLING.

POWER is alſo uſed, in *Mechanics*, for any of the ſix ſimple machines, viz. the *lever*, *balance*, *ſcrew*, *axis in peritrochio*, *wedge*, and *pulley*; which are particularly called the MECHANIC *powers*.

See alſo each *power* under its proper article, LEVER, BALANCE, &c.

POWERS, in *Pharmacy*, the reſult of a combination or union of the eſſential oils with the ſpirit of a plant; wherein, it is ſuppoſed, are contained all the principal virtues thereof; whence the name.

The *powers* of ſcabious and mullein are prepared by beating, and incorporating, the expreſſed juices of theſe plants when green, with laid, and afterwards expoſing them ſeveral days to the ſun; ſuch beating and inſolation being ſeveral times repeated at due diſtances.

POWER, in the *Feudal Juriſprudence*, a right which the lord has to reunite to his fief a dependent fee held of him, when the vaſſal has alienated it, upon reimburſing the money given for it, with the legal coſts.

The lord is to exerciſe his *power* over the fee, within a year after he has notice of the fact; otherwiſe he loſes it.

The word is alſo uſed for the right a lord has to ſeize a dependent fee, to compel the payment of all dues, ſervices, &c.

POWERS, *potentiæ*, is alſo uſed among the fathers, &c. for the ſixth order in the hierarchy of angels, reckoning from ſeraphim.

Theſe they ſuppoſe to be the ſpirits who bridle and re-

ſtrain the *power* of the devils; preſide over inferior cauſes; and prevent contrary qualities from diſturbing the œconomy of the world. See ANGEL and HIERARCHY.

POWER, in *Optics*. The *power of a glaſs* is uſed by ſome for the diſtance of the convexity from its ſolar FOCUS.

POWER, in *Arithmetic*, the produce of a number, or other quantity, multiplied into itſelf.

Thus the produce of the number 3, multiplied by itſelf, viz. 9, is the ſecond *power* of 3; the factum of 9, multiplied by 3, viz. 27, is the third *power*; and the product of 27, again multiplied by 3, viz. 81, is the fourth *power*; and ſo on to infinity. In reſpect hereof, the firſt number, 3, is called the *root*, or firſt *power*.

The ſecond *power* is called the *ſquare*; with reſpect to which, 3 is the ſquare root.

The third *power*, 27, is called the *cube*; with reſpect to which, 3 is the cube root.

The fourth *power*, 81, is called the *biquadrate*, or *quadrato-quadratum*; with reſpect to which, 3 is the biquadratic root.

The number which ſhews how often the root is multiplied into itſelf, to form the *power*, or how oft the *power* is to be divided by its root, to come at the root, is called the *exponent of the power*.

The moderns, after Deſcartes, are contented to diſtinguiſh moſt of their *powers* by the exponents; as *firſt, ſecond, third*, &c.

The particular names of the ſeveral *powers* were introduced by the Arabs, viz. *ſquare, cube, quadrato-quadratum* or *biquadrate, ſurdeſolid, ſquare of the cube, ſecond ſurdeſolid, quadrato-quadrato-quadratum, cube of the cube, ſquare of the ſurdeſolid, third ſurdeſolid*, &c.

The names given by Diophantus, followed by Vieta and Oughtred, are, the *ſide* or *root, ſquare, cube, quadrato-quadratum, quadrato-cubus, cubo-cubus, quadrato-quadrato-cubus, quadrato-cubo-cubus, cubo-cubo-cubus*, &c.

The characters wherewith the ſeveral *powers* are denoted, both in the Arabic and Carteſian notation, are as follow:

	2	4	8	16	32	64	128	256	512	1024
Arab.	R	q	c	bq	i	qc	Bf	tq	bc	fq
Carteſ.	a	a^2	a^3	a^4	a^5	a^6	a^7	a^8	a^9	a^{10}

Hence, to raiſe a quantity to a given *power* or dignity, is the ſame as to find the factum ariſing upon its being multiplied a given number of times into itſelf; e. gr. to raiſe 2 to the 3d *power*, is the ſame as to find the factum 8; whoſe factors are 2, 2, 2. This operation is called INVOLUTION.

Powers, of the ſame degree, are to one another, in the ratio of the roots, as manifold as their exponent contains units: thus, ſquares are in a duplicate ratio; cubes in a triplicate ratio; quadrato-quadrata, or fourth *powers*, in a quadruplicate ratio. See RATIO.

The *powers* of proportional quantities are alſo proportional to one another.

POWER, *arithmetical*, is uſed by Mr. Machin for compoſite numbers or quantities, whoſe factors are in arithmetical progreſſion. See Dr. Martyn's Abridg. Phil. Tranſ. vol. viii. p. 78.

Mr. Machin uſes a particular notation for quantities of this kind. The quantity expreſſed by this notation has a double index; that at the head of the root at the right hand, but ſeparated by a hook to diſtinguiſh it from the common index, denotes the number of factors; and that above, within the hook on the left hand, denotes the common difference of the factors proceeding in a decreaſing or increaſing arithmetical progreſſion.

$$\overbrace{}^{a}\Big(^{m}$$

Thus the quantity $n+a$ denotes by its index m on the right hand, that it is a compoſite quantity, conſiſting of ſo many factors as there are units in the number m; and the index a above on the left, denotes the common difference of the factors decreaſing in an arithmetical progreſſion, if it be poſitive; or increaſing, if it be negative; and ſo ſignifies, in the common notation, the common number or quantity, $n+a$, $n+a-a$, $n+a-2a$, &c.

$$\overbrace{}^{2}\Big(^{n}$$

For example, $n+5$ is $= \overline{n+5, n+3, n+1, n-1, n-3, n-5}$, conſiſting of ſix factors, whoſe common difference is 2. After the ſame manner, $\overbrace{n+4}^{2}\Big(^{5} = n+4, n+2, n, n-2, n-4$, conſiſting of five factors. According to which method, it will eaſily appear, that if $\overbrace{}^{2}\Big(^{2a+2}$, &c. be an integer, then $n+2a+1$ will be $= \overline{n+1, n-1, n-3}$, or $n-25$, continued to ſuch a number of double factors as are expreſſed by $a+1$, or half the index, which in this caſe is an even number. Thus alſo $\overbrace{}^{2}\Big(^{2a+1}_{n+2a}$ will be equal to $n, n-4, nn-10, n^3-36$, and ſo on, where there are to be ſo many double factors, as with one ſingle one n, will make up the index $2a+1$, which is an odd number.

If the common difference a be an unit, it is omitted: thus $\overline{n}\Big(^{n} = n, n-1, n-2, n-3, n-4, n-5$, containing ſix factors. So $\overline{6}\Big(^{6} = 6, 5, 4, 3, 2, 1$, and the like for others.

If the common difference a be nothing, the hook is omitted, and it becomes the ſame with the geometrical

$$\overbrace{}^{0}\Big(^{m}$$

power. Thus $n+a = n+a^m$, according to the common notation.

The learned author above quoted applies this doctrine of arithmetical *powers* to the inveſtigation of the principal rule in the method of fluxions, and its inverſe, which is, that if the ordinate $y = mz^{n-1}$, then will the area, or rather the form of the quantity for the area, be $= z^n$; or *vice verſa*, that if the area be z^n, the ordinate will be mz^{n-1}; on which occaſion he obſerves, that the ſymbol z, conſidered as a component part of the rectangle z, may bear a plain interpretation, viz. that it is the meaſure according to which the quantity z is meaſured. See FLUXION.

From a given POWER *to extract the root*, or *ſide*, is the ſame as to find a number, e. gr. 2, which, multiplied any number of times, e. gr. twice, produces the given *power*, e. gr. the 3d *power*, or 8. This operation is called EVOLUTION, and EXTRACTION *of roots*.

To multiply or divide any POWER *by another of the ſame root.*

1. For multiplication, add the exponents of the factors; the ſum is the exponent of the factum. Thus:

$$\text{Factors} \begin{cases} x^r & y^m & z^n & a^m & a^n \\ x^s & y^n & y^p & a^r & a^s \end{cases}$$

$$\text{Prod.} \quad x^{r+s} \quad y^{m+n} \quad y^{n+p} \quad a^{m+r} \quad a^{n+s}.$$

2. For diviſion ſubtract the exponent of the *power* of the diviſor, from the exponent of the dividend; the remainder is the exponent of the quotient. Thus:

$$\text{Divid.} \quad x^r \Big(x^s \quad y^{m+n} \Big(y^n \quad a^{m+r} \Big(a^m \quad a^{n+r} \Big(a^n \quad z^{n-1}$$

$$\text{Diviſ.} \quad x^s \qquad y^n \qquad a^m \qquad a^n$$

M. de la Hire gives us a very odd property common to all *powers*: M. Carre had obſerved with regard to the number 6, that all the natural cubic numbers, 8, 27, 64, 125, whoſe root is leſs than 6, being divided by 6, the remainder of the diviſion is the root itſelf; and if we go farther, 216, the cube of 6, being divided by 6, leaves no remainder; but the diviſor 6 is itſelf the root. Again, 343, the cube of 7, being divided by 6, leaves 1; which, added to the diviſor 6, makes 7 the root, &c. M. de la Hire, on conſidering this, has found that all numbers, raiſed to any *power* whatever, have diviſors, which have the ſame effect with regard thereto, that 6 has with regard to cubic numbers.

For the finding of theſe diviſors, he diſcovered the following general rule:

If the exponent of the *power* of a number be even, i. e. if the number be raiſed to the 2d, 4th, 6th *power*, &c. it muſt be divided by 2; the remainder of the diviſion, in caſe there be any, added to 2, or to a multiple of 2, gives the root of this number, correſponding to its *power*, i. e. the 2d, 6th, &c. root.

If the exponent of the *power* be an uneven number, i. e. if the number be raiſed to the 3d, 5th, 7th, &c. *power*; the double of this exponent will be the diviſor, which has the property mentioned.

Thus is it found in 6, double of 3, the exponent of the *power* of all the cubes: thus, alſo, 10 is the diviſor of all numbers raiſed to the 5th *power*, &c.

If any *power* of a quantity be divided by a greater *power* of the ſame quantity, the quotient muſt be negative. For the rule for dividing any *power* of a quantity by another *power* of the ſame, is to ſubtract the exponent of the diviſor from the exponent of the dividend, and make the difference the exponent of the quotient.

For inſtance, $\frac{a^5}{a^6} = a^{5-6} = a^{-1}$; and $\frac{a^m}{a^p} = a^{m-p}$.

Hence if p be greater than m, the exponent $m-p$ muſt be negative.

Thus if $p = m+n$, then $\frac{a^m}{a^p} = \frac{a^m}{a^{m+n}} = a^{-n}$.

It is obvious that $\frac{a}{a} = a^{1-1} = a^0$. But $\frac{a}{a} = 1$; and therefore $a^0 = 1$. In like manner $\frac{1}{a} = \frac{a^0}{a^1} = a^{-1}$; $\frac{1}{aa} = \frac{a^0}{a^2} = a^{0-2} = a^{-2}$; $\frac{1}{aaa} = a^{0-3} = a^{-3}$; ſo that the

the quantities a, 1, $\frac{1}{a}$, $\frac{1}{a^2}$, $\frac{1}{a^3}$, &c. may be expressed thus, a^1, a^0, a^{-1}, a^{-2}, a^{-3}, &c.

This change of expression is often of great use in the computation of fractions and infinite series.

When the quantity to be raised to any *power* is positive, all its *powers* must be positive. And when the radical quantity is negative, yet all its powers, whose exponents are even numbers, must be positive. For $-y = -1 \times +y$. The *power* then can only be negative, when the exponent is an odd number. Thus the *powers* of $-x$ are $-x$, $+x^2$, $-x^3$, $+x^4$, $-x^5$, &c. Those whose exponents are 2, 4, 6, &c. are positive, but those whose exponents are 1, 3, 5, 7, &c. are negative. Maclaur. Algebr. p. 33, 34.

Hence if a *power* have a negative sign, no root of it denominated by an even number, can be assigned; since no quantity multiplied into itself an even number of times can give a negative product. Thus the square root of $-a$ or of $-ax$ cannot be assigned, and is what mathematicians call an *impossible*, or an *imaginary* quantity or root. See ROOT.

Observe, that every power has as many roots, real, and imaginary, as there are units in the exponent of the *power*. This holds true of UNITY itself. Maclaur. Algebr. p. 128.

POWER, *imperfect*, in *Algebra*, is used for a *power* that has a fractional exponent; thus $a^{\frac{1}{2}}$, $a^{\frac{2}{3}}$, $a^{\frac{3}{4}}$, $a^{\frac{1}{3}}$, &c. are imperfect *powers*. Maclaur. Algebr. p. 43.

These are otherwise expressed by placing the given *power* within the radical sign $\sqrt{\ }$, and placing above the radical sign the number that denominates what kind of root is required. Thus $a^{\frac{1}{2}} = \sqrt[2]{a^1}$, $a^{\frac{2}{3}} = \sqrt[3]{a^2}$, $a^{\frac{3}{4}} = \sqrt[4]{a^3}$, $a^{\frac{1}{3}} = \sqrt[3]{a^1}$.

These imperfect *powers* are also called SURDS.

POWER, *communicable*, &c. See COMMUNICABLE.

POWER *of an hyperbola*, in *Conics*, is the square of the right line C I, or A T. (*Cob. Conics, &c.* 30.)

The power of the hyperbola is the fourth part of the square of the conjugate semiaxis; or the fifteenth part of the square of the conjugate axis. See HYPERBOLA.

POWER *of the rectory*. See POINT *examinative*.

POWTER, or *Beggish* POWTER, the name of a peculiar species of pigeon, called by Moore the *columba pulverulenta Anglica*.

It was first bred in England, and is of a mixed breed, between what is called the *horseman* and the *cropper*. It is a very beautiful species, and is valued for its length of legs and body, scantness of crop, and fineness in girth, added to the beauty of its feathers. This species is often eighteen, sometimes twenty inches long from the end of the bill to the extremity of the tail; its legs, from the upper joint of the thigh to the toe-nail, are sometimes seven inches; the crop is large and round, especially toward the beak, falling also behind, and making almost a perfect circular figure. They are either blue-pied, black-pied, red-pied, or yellow-pied; the last colour is much valued.

POWTER, *Parisian*, a species of pigeon called by Moore *columba pulverulenta Parisiensis*.

It was first bred at Paris, and thence sent to Brussels, whence it was afterwards brought into England. It resembles the English *powter*, but is short-bodied, short-legged, thick in the girth, and long-cropped. It is admired for the beauty of its feathers, which is peculiar to itself; it resembling in this a fine piece of that sort of needle-work which the ladies call the Irish stitch, being chequered with various colours in every feather, except the flight, which is white. It has generally a good deal of red intermixed with the other colours, and the more it has of this the more it is esteemed.

POWTING, *beefwing*, a name given to a mixed breed of pigeons, produced between those two kinds known by the names of the *cropper* and the *horseman*, according to the number of times that the young are bred over from the *cropper*. They are distinguished by the names of the first, second, or third breed.

These are a very agile and nimble pigeon; and by their continually flying up and down about the dove-house, are apt to bring in other fine pigeons, which cannot find their houses. They are observed to breed often, and take great care of their young ones.

POX, in *Medicine*, a disease, under which name there are several kinds; as, *small-pox*, *French-pox*, *chicken-pox pulver-pox*, &c.

POX, *small*, *variolæ*, is a contagious disease appearing on the surface of the skin, which it covers with pustules, or ulcerous eruptions, that leave eschars behind them. Or, it is a general eruption of particular pustules tending to suppuration, and attended with a fever.

Dr. Hahn endeavours to prove, that the *small-pox* was described by the old Greek physicians under the name of carbuncle.

Dr. Hahn's treatise on the antiquity of the *small-pox*, has been criticized by Dr. Werlhof, who endeavours to shew, that Dr. Hahn's quotations from the old Greek writers, concerning the carbuncle, cannot be understood of the *small-pox*, which is a disease we have no account of till the Saracens dispersed it.

The origin of this disease is uncertain: we find no mention of it before the Arab physicians. The first account we have of this disorder was wrote by Rhazes, about the end of the ninth or the beginning of the tenth century, and his description of it was so complete, that little or nothing was added to it for five hundred years after; and he used the cool method in the management of it. Rhazes says, that Aaron, an Alexandrian physician, was the first who described it; and that he writ A. D. 622.

It bears a great resemblance to the measles: so that, for the two or three first days, it is difficult to distinguish them: they both arise from an impure blood, and corrupt humours; with this difference, that, in the *small-pox*, the persian matter is more thick and viscid; in the MEASLES, more subtile, hot, and bilious: and neither of them are known to return after they have been had once.

Dulaus says, that the cause of the *small-pox* is brought into the world with us, and lies hid till it find an opportunity of bursting forth: he adds, that there is scarce one, in many thousands, that escapes it all his life.

Dr. Drake observes, that the *small-pox*, not being founded in any permanent habitual disposition, has its period within a limited time necessary for the extrusion of the peccant matter out of the pores of the skin. For the saltserum of the blood, being in this disease, by an accidental fever, thrown out in great quantities on the glands of the skin, acts much after the manner as in the lepra Arabum; but, when the blood is depurated, the scales dry, and fall off. So that he thinks it would be no great impropriety to call the *small-pox*, a temporary, critical, *lepra*.

The occasional causes of the Small-Pox may be, 1. Some alteration in the air, since they happen most frequently about the spring season, and are very frequent in summer, less so in autumn, and least of all in winter; and, both in Europe and elsewhere, are more epidemical and mortal at particular times. 2. From heat, which appears more evident than easy to explain. 3. From furfeits, as by eating any thing too chilling to the blood; as cucumbers, oranges, &c. in hot seasons; or, when the body is heated by motion, the drinking of cold liquors. 4. From too plentifully feeding. 5. From any over-heating the blood, or too suddenly cooling it after it is heated, whereby a sudden check is given to perspiration; and this more especially if the air favours such an eruption.

Children are most liable to this disease; and those whose food is unwholesome, who want proper exercise, and abound with gross humours, run the greatest hazard from it.

The *small pox* are of two kinds: the *distinct*, where the pustules stand apart; and the *confluent*, where they run into one continued cake.

Dr. Mead divides them into the simple and malignant: the simple is, when the symptoms are mild, the suppuration kindly, and at last, the pustules fall off in dry scabs: the malignant is, when the fever is great, the pustules advance but slowly, and do not suppurate well, and the other symptoms are violent.

The distinct, or *regular Small-Pox*, Sydenham observes, begins with a shuddering and chillness, which is succeeded by an intense heat, violent pain of the head and back, vomiting, drowsiness, especially in children, and sometimes convulsive fits; which is the pox to be ready to burst forth, and that they will be mild.

The eruptions are usually on the fourth day; upon which the feverish symptoms vanish, except that adults are prone to sweat.

The pustules first appear like flea bites, in the face, then the neck, breast, &c. They are at first reddish; by degrees they swell, inflaming the skin and flesh of the neighbouring parts, and then grow whitish and rough, indicating an incipient suppuration; and they likewise gradually discharge a yellow matter; the inflammation of the hands and face arriving the mean time at its height, causes the spaces between the eruptions to appear of a florid colour, like a damask rose; and the more mild the *small-pox* is, so much more will the eruption, and the intermediate spaces approach to this colour: on the eleventh day the swelling and inflammation of the face abate, and the pustules begin to scale off, and usually quite disappear on the fourteenth or fifteenth day, but the eruptions on the hands, being more obstinate, remain a day or two longer. The pustules on the face are succeeded by a scurf

scurf or scales, and these sometimes by pits or marks: for when the pustules first fall off, the skin is smooth, but those scales coming on and falling off alternately, do at length make these pits; although the distinct sort often leaves no marks behind. If this kind proves fatal, it is commonly on the fourteenth or fifteenth day.

The symptoms of the *distinct small-pox*, as enumerated by Dr. Shaw are, 1. A pain in the head, back, and scrobiculum cordis. 2. A fever, which decreases as the eruptions increase, with redness of the eyes. 3. Nausea and retchings. 4. Little reddish spots, or beginning pustules, appearing on the neck, face, breast, &c. about the third or fourth day inclusive, from the beginning of the illness. 5. Restlessness. 6. About the seventh or eighth day, other little red spots usually appear between the growing pustules. 7. The pustules, about the ninth day, are at their state; being then generally as big as a large pea, the matter in them well concocted, of a whitish colour, inclined to yellow; at which time, 8. The patient is usually light-headed and feverish. 9. About the tenth day the pustules begin to dry on the face. 10. And about the fifteenth they appear shrunk, and begin to scale off; and now the danger is esteemed to be over.

The *distinct* kind is here considered unattended with a looseness, and other symptoms, which sometimes happen in it, as well as in the other.

The *confluent*, or *foul Small-Pox* have the same symptoms with the *distinct*, only in a more violent degree, and affect the patient for several days after the pustules appear; they usually come out on the third day, not separate, as in the *distinct* kind, but spread into one another, especially those on the face; and at length appear all at first like a red bladder, and at length like one whitish pellicle, over the whole skin. After the eighth day, the pellicle becomes gradually rougher, and inclines to a brown, and not to a yellow colour, as in the distinct kind. The roughness and colour of the skin daily increase, till at length the pellicle falls off in large scales: but when the disease has been severe, it usually adheres to some parts of the face till after the twentieth day. The scales which immediately precede the pellicle, are of a very corrosive nature, and not only make larger pits than those of the distinct sort, but also much disfigure the face with scales: and the eruptions on the hands and feet are larger than those of the other parts, and diminish gradually as they approach the body.

In adults this kind is attended with a salivation; in children with a diarrhœa. The salivation frequently succeeds immediately after eruption; the diarrhœa later. The confluent kind usually kill on the eleventh day.

In both the distinct and confluent sort, the fever rages most from the beginning to the time of the eruption, after which it abates, and continues much more moderate, till the suppuration begins, which being finished, it goes off entirely. When the disease proves violent, the patient has a kind of fit towards the evening; at which time, especially, the most dangerous symptoms arise, and rage most severely.

The symptoms of the confluent kind, according to Dr. Shaw, are, 1. Violent pain in the head, back, and scrobiculum cordis. 2. Nausea and retching, with a fever, which rather increases than decreases after the eruption. 3. In children a diarrhœa, which usually precedes the eruption, and attends the distemper throughout. 4. A ptyalismus in adults, and but seldom a diarrhœa. 5. Deliria, convulsions, hoarseness, difficulty of breathing, fixedness of the eyes, and restlessness; which may also, in a lesser degree, attend the distinct sort. 6. The spots are here more red, thick, and close, than in the distinct; and the spaces between them more inflamed and swelled; purple or livid spots also often appear in these spaces; whence the *small-pox with purples*. At other times in these spaces, or on the heads of the eruptions, appear bladders full of clear water, vulgarly called the *white knee*. Lastly, these eruptions are frequently depressed in the middle, and there turn black; whence the *black small-pox*.

The eruptions often rise and sink again in the progress of the distemper. They usually first appear about the fourth or fifth day, and come to their state about the fifteenth.

Morton divides the disease into four stages: the *apparatus* or preparation, from the time of the first infection to the eruption of the pustules. The *eruption*, which comprehends three states; *eruption*, *maturation*, and *declination*, in which last the pustules are first incrustated with a scab, then wither, and dry off.

When the eruptions are very round, distinct, encompassed with a red margin, &c. they are said to be *benign*, otherwise *malignant*.

There are four degrees of malignancy, viz. when the pustules are universally confluent; particularly confluent, distinct, but very small and coherent; and distinct, with petechiæ, and miliary eruptions.

As to the prognostic signs of the Small-Pox: 1. The sooner they appear in the spring, and the more the air is disposed to favour the distemper, the more fatal they usually prove. 2. The confluent species, both in children and adults, is dangerous; and the more so, if attended with a suppression of urine, nausea, retching, delirium, purple spots, crystallines, bloody urine or stools, with a swelled belly, &c. after the eruption; but the blackness of them is not dangerous before the crisis. 3. Diarrhœas in the confluent kind are not so bad in children as in adults. 4. A ptyalismus is a regular attendant of the confluent kind in adults, from the sixth or seventh day, till after the crisis; and is so necessary, that if it stop suddenly, and return not for twenty-four hours, the patient is supposed to be in great danger. 5. A quinzy here is highly dangerous. 6. The eruptions swelling, and sinking suddenly, are bad signs. 7. The danger is not over till about the twentieth day, in the confluent species. But if the pustules be distinct, with a florid red base, few, round, plump, rise full of a thick purulent matter, first of a whitish and afterwards of a yellow colour, and grow up sharp at the top; if the sickness, vomiting, &c. go off, or remit, upon the appearance of the eruptions, and the patient be under no dreadful apprehensions; the danger is usually over about the tenth day, in the distinct kind. Convulsions attending the first symptoms of the *small-pox* in children, are said to foreshew the appearance of eruptions within twelve hours, which then generally prove distinct, and the patient does well. The *small-pox* succeeding a debauch in liquors, or happening upon an irregular course of life, is usually mortal.

A livid brown colour of the pustules is an unfavourable symptom; and also when they are small and flat, with black specks in the middle. Pustules which contain a thin watery ichor are very bad. A great number of *pox* on the face is always attended with danger. Pale urine and a violent throbbing of the arteries of the neck are signs of an approaching delirium. If the face begins to fall about the eleventh or twelfth day, and at the same time the hands and feet begin to swell, the patient generally does well; but when these do not succeed each other, there is reason to apprehend danger. When the tongue is covered with a brown crust, it is an unfavourable symptom. Cold shivering fits coming on at the height of the disease are likewise unfavourable. Grinding of the teeth, when it proceeds from an affection of the nervous system, is a bad sign; but sometimes it is occasioned by worms or a disordered stomach.

Dr. Freind, Dr. Cade, &c. recommend purging and phlebotomy after an imperfect crisis of the *small-pox*, i. e. where the fever remains after the pustules decline; many oppose it: indeed reason seems on its side; but prescription is against it. Alsaharavius, in the first stage of the *small-pox*, prescribes phlebotomy, even to a swooning, and great quantities of cold water to be drank. In the malignant *small-pox*, Dr. Lister found the blood, when cold, excessively tender and friable, so that the softest feather would easily divide its globules. Etmuller says, there is nothing to be more regarded than the breath and voice; where these are good, it is an excellent sign. He adds, that horse-dung is an admirable medicine, in that it promotes sweat, saves the throat, &c.

Dr. Hillcher recommends cutting off the hair in the *small-pox*, by which perspiration may be increased. This method was practised on the king of Spain's son Don Carlos, and on a Saxon prince with success.

Dr. Martin, of Lausanne, recommends bathing the face and body with cloths dipped in tepid water every four hours during the eruption of the *small-pox*; assuring that it has excellent good effects.

Dr. Haller tells us, that camphor assists greatly to fill the pustules of the *small-pox* of the confluent kind with petechiæ.

Dr. Lobb disapproves entirely of blood-letting in the *small-pox*, and thinks the disease may be prevented, or cured, without any eruption, and that a specific may be found: he proposes the Æthiops mineral as such, and relates some examples of the disease being, in his judgment, prevented by the timely use of it. The bishop of Cloyne seems to ascribe the same virtues to TAR-*water*.

Dr. Wintringham says, he never observed antiphlogistic medicines, which open the belly, diluting clysters, or such like, to have any bad effects in this distemper; but, on the contrary, has always seen them serviceable to young, vigorous, plethoric patients; while too bound a belly frequently at last produces a dangerous diarrhœa. He proposes in urgent cases of the confluent *small-pox*, where, from the resorption of the variolous matter, there

is great danger of increaſing the ſecondary fever, that the puſtules ſhould be all opened, and treated as ſo many ulcers.

Bloody urine is looked upon as a forerunner of death in the *ſmall-pox*; but we have inſtances of perſons recovering under ſuch ſymptoms.

To theſe general obſervations it may not be improper to add ſome farther particulars with regard to the courſe of regimen and medicine to be purſued in this diſeaſe.

During the eruptive fever, nothing more is neceſſary, in general, than to keep the patient cool and eaſy, allowing him to drink freely of diluting liquors, as balm-tea, barley-water, clear whey, &c. to eat light food, as panada, bread boiled with equal quantities of milk and water, good apples roaſted or boiled with milk, &c. and to remain undiſturbed, not confining him to bed, and frequently bathing his face and legs in lukewarm water. Warm cordials, ſudorific medicines, and every thing that tends to inflame the blood, increaſe the fever, and drive out the puſtules prematurely, are noxious, and ſhould be carefully avoided. Great regard ſhould alſo be paid to cleanlineſs and freſh air in this diſtemper.

The preſent practice has very juſtly exploded a hot regimen in the treatment of the *ſmall-pox*. When the *pox* are full, butter-milk, which is of an opening and cleanſing nature, is recommended as a very proper drink.

With regard to medicine, the diſeaſe may be conſidered in four different periods of it; viz. the fever which precedes the eruption, the eruption itſelf, the ſuppuration or maturation of the puſtules, and the ſecondary fever. Adults of a ſtrong conſtitution and plethoric habit ſometimes require bleeding, provided that a full puſſe, dry ſkin, and other urgent ſymptoms of inflammation, indicate the neceſſity of this operation: emollient clyſters may be applied, when the belly is bound; and if there be a great nauſea, the ſtomach may be cleanſed with weak chamomile tea, or lukewarm water. In this ſtate, every method ſhould be uſed, by a cool regimen, &c. to prevent too great an eruption; but after the puſtules have appeared, the ſuppuration ſhould be promoted by diluting drink, light food, and if nature flags, by generous cordials, as good wine made into negus, with an equal quantity of water, and ſharpened with the juice of orange, the jelly of currants, or the like. When the riſing of the *ſmall-pox* is prevented by the violence of the fever, a cool regimen is ſtrictly to be obſerved; and when the patient is very reſtleſs at this time, gentle opiates, ſuch as a tea ſpoonful of the ſyrup of poppies given every five or ſix hours to infants, and a table ſpoonful to adults, are neceſſary.

Suppreſſion of urine ſhould be relieved by the patient's walking across the room with his feet bare, and by frequent endeavours to paſs urine, or by occaſionally mixing with his drink a tea ſpoonful of the ſweet ſpirits of nitre. A foul mouth and throat, attended with a dry and chapped tongue, ſhould be frequently waſhed with water and honey, ſharpened with a little vinegar and currant jelly. Emollient clyſters ſhould be thrown in every ſecond or third day, during the riſing of the *ſmall-pox*, and through the whole courſe of the diſeaſe. When purple ſpots appear among the *ſmall-pox*, the Peruvian bark muſt be immediately adminiſtered. For this purpoſe two drachms of the powdered bark may be mixed in three ounces of common water, one ounce of ſimple cinnamon water, and two ounces of the ſyrup of orange or lemon; a table ſpoonful of this mixture, ſharpened with the ſpirits of vitriol, may be given to a child every hour; and three or four ſpoonfuls to an adult. The patient's drink in this caſe, ſhould be wine, or ſtrong negus acidulated with ſpirits of vitriol, vinegar, the juice of lemons, or currant-jelly, and his food conſiſt of apples roaſted or boiled, preſerved cherries, plums, and other fruits of an acid nature. The bark and acids are alſo neceſſary in the lymphatic or cryſtalline *ſmall-pox*, where the matter is thin, and not duly prepared. When the eruption ſubſides ſuddenly, before the puſtles arrive at maturity, bliſtering plaſters muſt be immediately applied to the wriſts and ankles, and the patient's ſpirits ſupported with cordials. Bleeding has ſometimes a good effect for raiſing the puſtules; and ſharp cataplaſms may be applied to the feet and hands, in order to draw the humour towards the extremities.

The moſt dangerous period of the *ſmall-pox* is the ſecondary fever; when the puſtules begin to blacken and turn on the face. The efforts of nature to relieve the patient by looſe ſtools are to be promoted; and when ſymptoms of inflammation of the breaſt appear at the acceſs of this fever, bleeding is neceſſary: but if the patient be faintiſh, the puſtules become ſuddenly pale, and there be great coldneſs of the extremities, bliſtering plaſters muſt be applied, and he ſhould be ſupported with generous cordials.

The ſecondary fever, which is chiefly, if not wholly occaſioned by the abſorption of the purulent matter, might be always leſſened, and often altogether prevented, by opening the puſtules when they begin to change of a yellow colour: and the operation may be repeated, as long as there is any conſiderable appearance of matter in them. This operation, beſides other good effects, has a tendency to prevent the pitting.

After the *ſmall-pox* are gone off, purging ſhould by no means be neglected. For very young children, an infuſion of ſenna and prunes, with a little rhubarb, may be ſweetened with courſe ſugar, and given in ſmall quantities till it operates. A child of five or ſix years of age may take eight or ten grains of fine rhubarb in powder, at night, and the ſame quantity of jalap in powder next morning; which may be worked off with freſh broth or water gruel, and repeated three or four times; at the interval of five or ſix days between each doſe. For children more advanced, and adults, the doſe muſt be increaſed in proportion to the age and conſtitution.

When impoſthumes happen after the *ſmall-pox*, they muſt be brought to ſuppuration by ripening poultices, and after they have broken, the patient muſt be purged: the Peruvian bark, and a milk diet will alſo be uſeful in this caſe.

When a cough or ſymptoms of conſumption ſucceed the *ſmall-pox*, change of air, a courſe of aſſes milk, and gentle exerciſe will be beneficial. Buchan.

The method of inoculating the *ſmall-pox*, introduced into Europe about half a century ago, has lately prevailed in a very conſiderable degree, eſpecially under the direction of Mr. Sutton and Baron Dimſdale; and thoſe who are concerned for the preſervation of their ſpecies, cannot but wiſh that it were univerſal. For an account of the hiſtory and advantages of this practice, and anſwers to the objections urged againſt it, ſee INOCULATION.

Here it may be proper to give ſome account of the proceſs itſelf. The ſpring and autumn have been uſually reckoned the moſt proper ſeaſons of the year for inoculation, becauſe they are the moſt temperate; but if any caution is neceſſary, that ſeaſon ſhould be preferred in which no inflammatory or putrid diſeaſes prevail: perſons of every age are fit ſubjects of this operation; but the moſt deſirable age is from three to five. Conſtitutional diſeaſes furniſh no ſufficient objection againſt inoculation, the habit of body having been often meliorated by it; however, acute or critical diſorders ſhould be removed before the operation is performed. The beſt previous preparation is to produce a healthy ſtate of body: it is ſeldom neceſſary to make any alteration in the diet of children, unleſs they are of a groſs habit; in which caſe, their diet ſhould be ſpare, and of a light cooling nature; and their drink whey, butter-milk, and ſuch like. Two or three mild purges may alſo be adminiſtered. But the ſucceſs of inoculators does not depend on the preparation of their patients, but on their management of them while under the diſeaſe.

There ſeems to be no difference in the effect, whether the matter for inoculation be taken from patients, who have received the diſorder in the natural or artificial way; or whether it be taken from a mild kind, or from the more virulent ſort. The method commonly uſed of communicating the infection is to make two or three ſlanting inciſions in the arm, ſo ſuperficial as not to pierce quite through the ſkin, with a lancet wet with freſh matter taken from a ripe puſtule; though the lancet dipped in the variolous matter will ſerve ſeveral days after for communicating the infection: the wounds are then cloſed up, and left without any dreſſing. If freſh matter be applied long enough to the ſkin, there is no occaſion for any wound at all. Let a bit of thread, about half an inch long, wet with the matter, be immediately applied to the arm, between the ſhoulder and elbow, and covered with a piece of the common ſticking plaſter, and kept on for eight or ten days; and it will ſeldom fail to communicate the diſeaſe. In the evening after inoculation, ſome preſcribe as much calomel mixed with a ſixteenth part of the emetic tartar as will gently move the belly, and in the morning its operation may be promoted with as much Glauber ſalts or other purging medicine as will promote three or four evacuations: they adviſe alſo the repetition of theſe every ſecond night and morning, until the ſymptoms of eruption appear. Mercury, it is ſaid, ſeems to be a ſpecific in the *ſmall-pox*, and may be given ſo freely as to affect the gums and excite a gentle ptyaliſm. When the inflammation at the puncture is too little, the doſe of calomel ſhould be increaſed, in order both to promote the inflammation there, and to accelerate the general eruption.

The progreſs of the infection is obſerved as follows: about the punctured part, a juſt progreſſive is uſually formed of the future ſtate of the diſtemper. Sometimes the

the effect of the infection is observed in a few hours after inoculation, by acute pains darting up the shoulder, when the puncture is made in the arm, a shivering through the body, a red tumor on the arm, or a small rising where the matter was applied: but, more usually, nothing is observed on the day of operation. On the second day, if the puncture is viewed with a lens, an orange-coloured stain may be seen about its edges, which seem to contract: sometimes the puncture inflames on the first or second day, and then vanishes without any farther effect; in which case, after a few days, the operation may be repeated. On the fourth or fifth day a hardness may be perceived where the puncture was made, an itching is felt there, and generally a slight inflammation is also observed. On the sixth day, there is generally a pain and stiffness felt in the axilla, which continues till the tenth or eleventh day. This is reckoned a favourable symptom. Pain in the head and limbs, with stiffness under the arms, are certain proofs that the infection hath taken place. On the seventh or eighth day the eruptive symptoms appear, such as slight remitting pains in the head and back, stiffness in the arm-pits, transient shiverings, alternate heats, &c. which continue more or less till the eruption is completed: the inflammation in the arm spreads, and little pustules are begun there, which increase in size as the disease advances. On the tenth or eleventh day an efflorescence surrounds the puncture, and sometimes extends half way round the arm: the larger this efflorescence is, the fewer, usually, are the pustules: when it accompanies the eruption, the fever and other uneasy symptoms subside, and the difficulty and danger are at an end. As soon as the eruptive symptoms are perceptible, it is advised to give a dose of calomel with the emetic tartar, and a few hours after it a dose of the Glauber salts.

Among the favourable symptoms are, an orange-coloured stain about the edges of the puncture on the second day; an itching there in two or three days; a kind of vesication, without much inflammation, on the third or fourth days; a pain and stiffness in the axilla, the sooner the better, but if on the sixth day, it is not unfavourable; the large efflorescence about the puncture on the tenth or eleventh day, or sooner; a hardness which spreads from the puncture as from a centre, and to the touch forms star-like points, and when the part inflamed on the arm rises, as it were, to an apex, with a little dry scab upon it. The less favourable symptoms are, a purplish, instead of a red coloured inflammation about the puncture, a narrow deep red circle surrounding the puncture, and when the incrustation about it becomes depressed and concave in the middle.

The constant care of inoculators is to keep their patients cool, and their bodies gently open, by which means the fever is kept low, and the eruption greatly lessened. The danger is seldom great when the pustules are few; and their number is generally in proportion to the fever which succeeds and attends the eruption. Hence the chief secret of inoculation consists in regulating the eruptive fever, which generally may be kept sufficiently low by the methods already recommended.

The regimen during the disease is in all respects the same as under the natural *small-pox*. The patient must be kept cool, his diet should be light, and his drink weak and diluting. If any bad symptoms appear, which is seldom the case, they must be treated as in the natural *small-pox*: nor is purging less necessary after the *small-pox* by inoculation than in the natural way, and ought by no means to be neglected. Buchan's Dom. Med. chap. 23. and Motherby's Med. Dict. art. *Variolæ*.

*Why the Small-*POX *scarce ever visits a person above once*, is a famous problem; long canvassed, and with little success. Dr. Drake accounts for it very plausibly from the alteration made in the skin by that disease. For the distention the glands and pores of the skin suffer therein, is so great, that they scarce ever recover their tone again, so as to be able any more to arrest the matter in its course outwards long enough, or in quantity enough, to create those ulcerous pustules which are the diagnostics of the disease. For though the same feverish disposition should arise again in the blood, yet, the passages through the skin being more open, the matter will never be stopped, so as to exhibit the appearance of the *small-pox*.

Accordingly we find, that, in persons severely afflicted with this disease, the face (which is usually the fullest, from the extraordinary obstruction the matter meets with by the great constipation of the pores) seldom returns to its former dimensions; which enlargement he accounts for from the dilatation of the areolæ of the glands and pores of the skin, not from any augmentation of the substance itself.

What confirms this hypothesis is, that nurses, &c. who attend persons sick of the *small-pox*, are frequently a little affected with it, and have, now and then, two or three eruptions: that they have no more, seems to follow from the free course of the matter though the skin. With this, too, agrees that constant observation, that people of coarse skins, in whom the pores are largest, are always more favourably treated by this distemper than others; and that it constantly leaves fine skins coarser than it found them.

This solution would seem more probable, were it not that some have so very few of these eruptions, perhaps not above twenty or thirty; which cannot fairly be allowed so far to inlarge the pores of the whole skin, as to prevent any return.

Others hold, that in a genuine eruption, the cause of the distemper is so far evacuated, as scarce to leave a possibility of a return of it; and that, if part of the original cause did remain behind, it might, when the air favours it, or when, by other accidents, it is secreted from the blood, appear in the form of eruptions, and so prove to be the measles, *chicken-pox*, &c.

It may, indeed, be objected, that the last mentioned often happen before the *small-pox*: but, whatever be the cause of the *small-pox*, the separating power must be in such a determined proportion, or it will fail to cause a regular *small-pox*; and so, acting proportionably, may produce any of the other distempers just mentioned.

To this head we may refer a question which has been agitated among physicians, viz. whether any danger would attend inoculation, supposing the patient to have had the disease before? This question has generally been answered in the negative; but Dr. Buchan inclines to think it merits farther consideration. Several cases have occurred, he says, in his practice, where the constitution seemed to suffer by the variolous matter having been introduced into the blood without producing what could properly be called the *small-pox*. This, he adds, ought at least to make practitioners careful not to communicate the poison unless where there is a prospect of exciting the disease. Neither ought they to be too solicitous in suppressing the eruption, as that seems to be the only safe way in which the virus can be discharged after it has got into the blood.

POX, *chicken*, a cutaneous disease, frequent in children, wherein the skin is covered with pustules, like those of the *small-pox*, as to figure and magnitude; and only distinguishable therefrom, in that those of the *small-pox* appear with a redness and inflammation, and those of the *chicken-pox* whiter, resembling vesiculæ full of a serous humour; which, in three days time, burst, and dry away, without any danger, and usually without any fever.

The *chicken-pox*, and *swine-pox*, seem to be the *small pox* in a less degree; though they sometimes precede, and sometimes succeed, the *small pox*. The pustules appear to be of the same kind; only in the *swine pox* they are much larger; and in the *chicken-pox*, somewhat less than in the *small-pox*. These commonly appear five or six, sometimes twenty or thirty on the face, and but very few on the body.

The patient is very little indisposed, either before, at, or after their appearance; though the sudden sinking of them often causes some disorder; but it is presently relieved by a little sack and saffron, or a dose of treacle-water.

Grown persons seldom keep within doors for either; and, upon that account, the eruptions may continue the longer, because the cold air is supposed to hinder their ripening; so that it is sometimes three weeks, or a month, before they totally disappear.

POX, *French*, a contagious disease, contracted by a poisonous humour, usually in coition; and manifesting itself in ulcers and pains. See VENEREAL *Disease*.

The French call it *mal de Naples*, the Neapolitan disease, because first observed among the soldiery at the siege of Naples, under Charles VIII. The Italians call it *mal Francese*; and we the *French disease*, because first caught by the French. The Spaniards call it *las bubas*, or *sarna des Indias*, because first brought from the West Indies.

POYNINGS' *law*, a set of statutes enacted in the 10 Hen. VII. one of which (cap. 4.) in order to restrain the power as well of the deputy as the Irish parliament, provides, 1. That before any parliament be summoned or holden, the chief governor and council of Ireland shall certify to the king, under the great seal of Ireland, the considerations and causes thereof, and the articles of the acts proposed to be passed therein. 2. That after the king, in his council of England, shall have considered, approved, or altered the said acts or any of them, and certified them back under the great seal of England, and shall have given licence to summon and hold a parliament, then the same shall be summoned and held; and therein the said acts so certified, and no other, shall be proposed, received, or rejected. But it was afterwards provided by 3 and 4 Ph.

Ph. & M. cap. 4. that any new propositions might be certified to England in the usual forms, even after the summons, and during the session of parliament. By this means, however, there was nothing left to the parliament in Ireland, but a bare negative or power of rejecting, not of proposing or altering any law. But the usage now is, that bills are often framed in either house, under the denomination of "heads for a bill or bills," and in that shape they are offered to the consideration of the lord lieutenant and privy council; who, upon such parliamentary intimation, or otherwise upon the application of private persons, receive and transmit such heads, or reject them, without any transmission to England. And with regard to *Poyning's law* in particular, it cannot be repealed or suspended, unless the bill for that purpose, before it be certified to England, be approved by both the houses. Irish stat. 11 Eliz. stat. 3. cap. 38.

It was also enacted by another of *Poynings' laws* (cap. 22). that all acts of parliament, before made in England, should be of force within the realm of Ireland. But by the same rule that no laws made in England, between king John's time and *Poynings' law*, were then binding in Ireland, it follows that no acts of the English parliament, made since the 10 Hen. VII. do now bind the people of Ireland, unless specially named or included under general words.

These laws took their name from sir Edward *Poynings*, who was lord deputy at the time when they were enacted; before which time, the original method of passing statutes in Ireland was nearly the same as in England, the chief governor holding parliaments at his pleasure, which enacted such laws as they thought proper.

With respect to the dependent state of Ireland, it was declared by 6 Geo. I. cap. 5. that the kingdom of Ireland ought to be subordinate to and dependent upon the imperial crown of Great Britain, as being inseparably united to it; and that the king's majesty, with the consent of the lords and commons of Great Britain in parliament, hath power to make laws to bind the people of Ireland. But this act was repealed in 1782; and, therefore, what kind of dependence Ireland will be expected, or will be content, to acknowledge for the future, is now (1783) a question *sub judice*.

POZZOLANA, a greyish kind of earth, used in Italy for building under water.

The best is found about Pozzuoli, Baiæ, and Cumæ, in the kingdom of Naples; from the first of which places it takes its name.

The substance itself is a pale greyish powder, composed of particles so extremely minute, as to escape the distinction even of the best glasses, and appear, when viewed by the microscope, only a loose, very fine, irregular powder. It has among it a few small spangles of talc, and being shook up in a vial of water, leaves a whitish muddiness in it, which is very long in subsiding. If wetted with salt-water, it immediately dries into a firm solid mass, like a stone. It does the same also in common water; but the mass is less firm.

The ancients were well acquainted with this substance and its properties. It is said, indeed, that on running down into the water, it becomes a hard stone, while it remains under it; but this is probably a mistake, arising from this, that the powder was continually running down the hills into the sea, and lodging on their sides in large quantities in many places; when these masses became wet with their waves, in storms or high tides, and afterwards deserted by them, they naturally hardened into so many masses of a sort of stone: and these were probably what authors have seen and described, for they never, probably, searched for these masses under water. The principal use of this powder among the ancients was in mixing with their cements for buildings sunk into the sea. It is at present well known in France and Italy, as an ingredient in that sort of plaster they call *pozzolane*.

The remarkable quality of its coalescing on its being mixed with water, is probably owing to its having in its composition a quantity of a certain earth known in almost all ages and countries for coalescing into a kind of plaster without previous burning. The ancients knew this earth by the name of *gypsum tymphaicum*; and we, by that of *calx nativa*. It is very common on the sides of hills in many parts of Italy.

Pozzolana, mixed with lime, makes the best mortar in the world. It hardens and petrifies in water: builders assure us, that it penetrates black flints, and whitens them. It is of particular service in making moles, and other buildings, in maritime places. Agricola takes it to be of an aluminous and sulphurous nature. See Vitruvius, Pliny, de Lorme, &c. who set a great value on it.

PRACTICAL *arithmetic, geometry, mathematics, music, philosophy*. See the substantives.

PRACTICE, in *Arithmetic*, PRACTICA *Italica*, or *Italian usages*, certain compendious ways of working the rule of proportion, or golden rule; especially where the first term is 1, or unity.

They were thus called from their expediting of *practice*, and business: and because first introduced by the merchants and negotiants of Italy.

The most useful of these *practices* are as follow: 1. Since the use of the rule of three is to find a fourth proportional to three given numbers, divide the first and second, or the first and third, by some common number (if that can be done exactly), and work with the quotients in their stead: as in the following example:

Price of 3 lb. is 9 shil. What is the price of 7 lb?

3) 1 3
3

facit 21 shil.

Price of 14 lb. is 26 shil. What is the price of 7 lb?

7) 2 2) —
1

facit 13 shil.

2. If the first term be 1, and the second an aliquot part of a pound, shilling, or penny, divide the third by the aliquot part: the quotient is the answer.

Note, To find the aliquot part, those who cannot do it otherwise, may see the table of aliquot parts of a pound, under the article ALIQUOT.

E. gr. If one ell cost 10 shill. What cost 057 ells?

facit 1. 478 : 10*d*.

3. If the first or third number be 1, the other not exceeding large, and the middle term a compound, i. e. consisting of several denominations, it may be wrought without reduction, thus:

Price of 1 lb. is 3*l*. 8*d*. 3*q*. What is the price of 5 lb?

5

facit 18*l*. 7*d*. 3*q*.

For 4 farthings making a penny, 5 times 3 farthings make 3*d*. 3*q*. and 12 pence making 1 shilling, five times eight pence make 3*l*. 4*d*. which, with 3*d*. from the place of farthings, makes 3*l*. 7*d*. Lastly, five times 3 shillings make 15 shillings; and with the 3 shillings from the place of pence, 18*l*. The price required, therefore, is 18*l*. 7*d*. $\frac{3}{4}$.

4. If the middle term be not an aliquot, but an aliquant part, resolve the aliquant part into its aliquot parts, divide the middle term by the several aliquots; the sum of the quotients is the answer. To find the aliquot parts contained in an aliquant, see the table of aliquant parts of a pound, under the article ALIQUANT.

For an instance of this rule?

If 1 ell cost 15 shill. What cost 124 ells?

$\frac{1}{2}$	$\frac{1}{2}$) 62
$\frac{1}{4}$	31

facit. 93*l*.

5. If the first or second term be 1, and in the former case, the second or third, in the latter the first, be resolvible into factors, the whole operation may be performed in the mind, without writing down any figures; as in the following example:

Price of 1 lb. is 24 shil. What is the price of 20 lb?

4	4
6	—
	80
	6

facit 480*l*.—24*l*.

6. Where one of the given numbers is 1, we have several compendious usages, to save multiplication and division. E. gr. If 9 lb. cost 20 shil. What does 1 lb. cost?

It is obvious the sum required is had by adding to the tenth part of 20*s*. viz. 2*s*. the ninth part of the tenth: viz. 2*d*. $\frac{1}{2}$, and $\frac{2}{3}$ of a penny; the answer, therefore, is 2*s*. 2$\frac{1}{2}$*d*. and $\frac{2}{3}$.

Again, If 5 lb. cost 64 shil. What costs 1 lb?

Since 5 is half of 10, the double of the tenth part of the given price; viz. 12*s*. 9$\frac{1}{2}$*d*. and $\frac{3}{5}$. is the sum required.

Again, If 1 lb. cost 18*d*. What will 19 lb. cost?

Since 19=20—1, from the given price doubled, and increased by a cipher, viz. 360; subtract the simple 18; the remainder is 342*d*.=28*s*. 6*d*. the sum required.

7. If two terms of the same denomination differ by an unit, we have a peculiar kind of compend; which will be clear from the following examples: e. gr. If 5 lb. cost 30*s*. What will 4 lb. cost? Since the price of 4 lb. is one fifth part short of that of 5 lb. divide the given price 30, by 5; the quotient 6 being subtracted from the dividend, the remainder, viz. 24*s*. is the sum required.

Again, If 8 lb. cost 24*s*. What cost 9 lb?

Since the price of 9 lb. exceeds that of eight by one-eighth part, divide the given price 24, by 8, and add the quotient 3 to the dividend: the sum 27 is the answer.

8. Some-

8. Sometimes one may uſe ſeveral of theſe compends, or *practices*, in the ſame queſtion. E. gr. If 100lb. coſt 30s. 4d. What coſts 50 lb.

30s. 4d. / 2 — *facit* 15s. 2d.

Again, 60 lb. coſt 4l. What coſt 2520?

	6	42
½	—	—
	24	6
	7	7
	168l.	

PRACTORES, Πρακτῆρες, among the Athenians, officers appointed to receive the money due to the city from fines laid upon criminals.

PRÆ, a Latin prepoſition, literally ſignifying *before*; it is uſed in compoſition with ſeveral words in our language, to denote the relation of priority.

Of late, our writers, in Latin words anglicized, for *præ*, uſually write *pre*; reſtraining the Latin orthography to words that are ſtill Latin, or uſed as ſuch. Hence, for ſuch words beginning with *præ*, as are not found here, ſee PRE.

PRÆBIUM, a name uſed by medical authors to expreſs a doſe of any thing, or the quantity of a medicine to be exhibited at one time.

PRÆCLÆ, among the Romans, the ſame with *præclamatores*, which ſee.

PRÆCIPE, in *Law*. See PRECIPE.

PRÆCIPE *in capite*, a writ iſſuing out of the chancery, for a tenant holding of the king *in capite*; viz. in chief, as of his crown.

PRÆCLAMITATORES, among the Romans, officers that went along the ſtreets of Rome before the *flamen dialis*, to oblige all people to give over their work on public holydays; for if the *flamen* ſaw any one at work, the ſervice of the gods could not be performed.

PRÆCLAVIUM, among the Romans, was uſed to ſignify the PRÆTEXTA.

PRÆCO, among the Romans, the public crier, an office whoſe buſineſs it was in the aſſemblies of the people to call the claſſes and centuries according to their order, and to order ſilence to be kept in the temples during the time of ſacrificing.

The aſſiſtance of the *præco* or public crier, was uſed on many other occaſions, as at public ſales or auctions, funerals, games, in courts of juſtice, to publiſh things loſt, &c. See CRIER.

PRÆCOCIA *mala*, in *Botany*. See APRICOT.

PRÆCONISSUS, in *Natural Hiſtory*, the name given by Ludovicus Dolcis, and other writers of his time, to a gem famous for its imaginary virtues: it is deſcribed to have been of the nature of the ſapphire, but ſomewhat approaching to the colour of the chalcedony: this ſeems to make it the leucoſapphirus of other authors.

PRÆFECTURÆ, among the Romans. See PREFECTURES.

PRÆFERICULUM, among the Romans, a vaſe with a large prominent mouth uſed in the ſacrifices of Ops.

PRÆFICÆ, among the Romans, were mourning women hired to attend funeral ſolemnities; where they praiſed the deceaſed, made a lamentation, beat their breaſts, and diſtorted their faces, to excite others to mourn.

PRÆFINE, or *primer fine*, in *Law*, that fine which upon ſuing out the writ of covenant or levying *fines of lands*, is paid before the time is paſſed. This is a noble for every five marks of land ſued for, i. e. one tenth of the annual value. See POST-*fine*.

PRÆFURNIUM, a word uſed by chemical writers to expreſs the anterior part of a furnace, by which the coals, or fuel are put in, and the aſhes taken out.

PRÆMORSUM *felinum*, among *Botaniſts*. See LEAF.

PRÆNOTION is uſed by Lord Bacon for breaking of an endleſs ſearch, which he obſerves to be one of the principal parts of the art of memory. For when one endeavours to call any thing to mind, without ſome *previous notion* or perception of what is ſought for, the mind exerts itſelf and ſtrives in an endleſs manner: but if it hath any ſhort notion before hand, the infinity of the ſearch is preſently cut off, and the mind hunts nearer home, as in an incloſure. Thus verſe is eaſier remembered than proſe; becauſe if we ſtick at any word in a verſe, we have a *previous notion* that it is ſuch a word as muſt ſtand in a verſe. Hence alſo, order is a manifeſt help to memory; for here is *a previous notion* that the thing ſought for muſt be agreeable to order. Bacon's Works Abr. vol. ii. p. 136. and vol. ii. p. 473. See PRENOTION, and *Common* NOTIONS.

PRÆPOSITUS *ſacri cubiculi*, among the Romans, an officer who was to take care of the emperor's bed-chamber. His office was the ſame with that of our lord chamberlain, and he had the privilege of marching next to the captain of the horſe-guards.

PRÆSALTOR, among the Romans, an appellation given to the chief director of the SALII.

PRÆSEPIA, a word uſed by authors to expreſs the ſockets of the teeth.

PRÆSICIA, in *Antiquity*, thoſe parts of the intrails of ſacrifices which were cut off, and offered to the gods.

PRÆSUL, among the Romans, the name of the chief of the *ſalii* or prieſts of Mars. He was ſo called *a præſiliendo*; i. e. dancing at the head of the SALII.

PRAGMATIC *ſanction*, in the *Civil Law*, is defined, by Hottoman, a reſcript, or anſwer of the ſovereign; delivered, by advice of his council, to ſome college, order, or body of people, upon their conſulting him in ſome caſe of their community.

The word is formed from the Greek πραγμα, *negotium*, *buſineſs*. It is ſometimes alſo called abſolutely, *pragmatic*, τὸ πραγματικον.

The like anſwer given to any particular perſon, is called ſimply *reſcript*, *reſcriptum*.

The term *pragmatic ſanction* is chiefly uſed, among the modern writers, for that famous ordinance of Charles VII. of France, drawn up at Bourges, with the conſent of the moſt eminent prelates and grandees of the nation aſſembled at that place, and publiſhed in 1438, containing a regulation of eccleſiaſtical diſcipline, conformable to the canons of the council of Baſil; and ſince uſed by the Gallican church, as a barrier againſt the enterprizes and encroachments of the court of Rome.

The ſcope of the *pragmatic ſanction*, which conſiſted of twenty-three articles, was to regulate the form of elections made by the clergy, to reſtore to every church its priviledge of chuſing its biſhop, and to every monaſtery that of electing its abbot or chief; to declare the collations to belong to ordinaries, the prevention alone reſerved to eſtabliſh prebends; to aſſign a third of the benefices to graduates; and to aboliſh reſervations, annates, and other like grievances.

The *pragmatic* of St Lewis in 1268, conſiſting of ſix articles, was ſimilar to this in its chief deſign. The edict of Bourges, in 1438, was drawn up in concert with the fathers of the council of Baſil, and the articles it contains were taken from the decrees of that council; though they were admitted by the Gallican church with certain modifications, which the nature of the times and the manners of the nation rendered expedient. See this edict publiſhed at large in Hard. Concil. tom. viii. p. 1249.

Pope Pius II. obtained an abrogation of this ſanction from Louis XI. on which occaſion the court of Rome, tranſported with joy, dragged the *pragmatic* through the ſtreets, whipping it all the way, as Xerxes anciently did the Helleſpont: and the king obtained for himſelf and his ſucceſſors the title of *Moſt Chriſtian*.

But the parliament oppoſed this abrogation with a great deal of vigour, and refuſed its conſent to the laſt. Lewis alſo perceiving that he had been deluded into this meaſure by the treacherous inſinuations of Geoffry, biſhop of Arras, whom the pope had bribed with a cardinal's cap, and large promiſes of a more lucrative kind, took no ſort of pains to have it executed, but publiſhed, on the contrary, new edicts againſt the pecuniary pretenſions and extortions of the court of Rome. So that, in ſpite of all the efforts of Rome, the *ſanction* ſtill held in force, till the CONCORDAT held between pope Leo. X. and Francis I. in 1517, when the *pragmatic ſanction* was aboliſhed, and the king was inveſted with the privilege of nominating to biſhopricks and vacant benefices.

The parliament of Paris again oppoſed the innovation, and refuſed to confirm the concordat; and was not brought to give its conſent at laſt, till after repeated orders of the king; together with a ſecret reſolution taken, always to judge conformably to the tenor of the *pragmatic ſanction*.

PRAGMATICAL, PRAGMATICUS, a term ſometimes uſed in the ſame ſenſe as *practical*, *mechanical*, or *problematical*.

Stevinus, in his Hydroſtatical Elements, calls certain of his mechanical or practical experiments, which he undertakes to inſtruct his reader how to make, by the name of *pragmatical* examples; and, in the like ſenſe, is the word ſometimes uſed by other naturaliſts.

PRAM, or PRAME, a ſort of lighter uſed in Holland and the ports of the Baltic ſea, to carry the cargo of a merchant ſhip along ſide, in order to lade her, or to bring it aſhore.

PRAMNION, in *Natural Hiſtory*, the name of one of the ſemipellucid gems, ſo diſtinct from all the others as to make properly a peculiar genus of foſſils. It is called by many of the ancients *murio* or *merion*, and by our lapidaries the *black agate*.

It is a ſtone of a very great concealed beauty. Our lapi-

daries, who know it by the name of the *black agate*, are very indeterminate in the application of that name, calling not only this, but every black stone capable of a good polish by the same name, and never looking for its great character, its hidden colour. It is found in the shape of our common flints and pebbles, but seldom larger than an egg; it appears, on a slight inspection to be of a fine deep black, but held up against the sun, or the light of a candle, it discovers itself to be of a fine strong red, without the least admixture of any other colour. It is most frequently of a purplish tinge, like the amethyst, but is at times found of all the degrees of red, from the pale flower colour of the hyacinth to the deep red of the carbuncle. It is of great hardness, and capable of an elegant polish.

It is produced only in the East Indies; and we sometimes have it thence among other stones, but it is not much regarded with us. The Romans were fond of it for engraving on, as we find by *Pliny*, and by a much more undeniable proof, many of the valuable antiques being cut on it.

PRAMNOS, a name given by the ancients to a sort of austere wine, which looked of a black colour till held up against the light, and then appeared of a deep purple: it is recommended by Hippocrates in hæmorrhages.

PRASINUM *viride*, a word used by the ancients for verdigrise.

PRASION. The ancient Greek writers have expressed three very different plants by this name.

The most common signification of the word is the common *marrubium* or horehound. It is in many places used also to signify the leek, and often for that sort of marjoram which we call *origanum vulgi*, or pot-marjoram. Pliny describes this plant, and says that it was called *acutis* and *prasium*, and had the appearance of hyssop.

Hesychius tells us, that the sea-weeds of the fucus and alga kinds, the sea-oaks, and sea-wracks, are called by some of the Greek writers *prasia*; and Theophrastus in one part of his works seems to have given this name to those substances.

The ancients having used the word *prasion* in this sense, explains a passage in Galen which cannot otherwise be well understood, that is, where he calls the *empetrum marinum*, *prasiodes*, like the *prasion*.

Dioscorides had called it *sucoides*, like the sea-fucus, and he was very well understood; but Galen coming after him, and expressing his sense by the word *prasiodes*, which was supposed to signify resembling leeks, or horehound, or origanum, his readers were perplexed to find out what alliance the epithet he had chosen to use could have, either to the plant, or to the epithet of Dioscorides; but, when it is found that *prasion* signifies the same as *fucus*, the whole is very intelligible.

PRASIS, a word used by some authors to express what they call green chalk, an earth used by the painters, and known among us by the name of *terre verte*.

PRASIUM, in *Botany*. See *Shrubby Hedge* NETTLE.

PRASIUS, in *Natural History*, the name of a gem much approaching to the nature of the emerald, but of a coarser green, and wanting its hardness, and having in its green a cast of yellow.

It is the stone which the ancients called *prasites*; and when of a greater than ordinary admixture of yellow, the *chrysoprasius*, and of which the gem distinguished by later authors under the name of *smaragdoprasius*, is only one of the varieties.

The *prasius*, even in its most perfect state, is much less beautiful than most of the other gems: it is found of various sizes, and not unfrequently considerably large: it is seldom met with smaller than a pea: from that to the size of a horse bean is its more usual standard, from this to the size of a nutmeg it is more rarely found; and the larger specimens are coarser and less frequent than these. It is of various figures, but is never found in a columnar or crystal-like form; this is declaring against the sense of our dealers in gems, indeed, who frequently buy and sell columns of the shape of spar crystal, under the name of the *smaragdoprasius*; but these are all truly no other than crystals tinged to a coarse and dead green, and without any mixture of yellow; so that they are more properly *pseudosmaragdi*, or bastard emeralds, than any thing of the *prasius* kind.

PRATIQUE, or PRATIC, in *Commerce*, a negociation, or communication of commerce, which a merchant-vessel obtains in the ports it arrives in, and the countries it discovers.

The word is French, and signifies, literally, *practice*.

Hence, to obtain *pratique*, is to obtain a liberty to frequent a port, to go ashore, to buy and sell, &c.

In the European ports of the Mediterranean sea, it implies a free commercial intercourse with the inhabitants of the country, after a limited quarantine has been performed, in consequence of a voyage to Barbary or Turkey.

PRATIQUE is particularly used for a licence to traffick, granted to the master of a ship in the ports of Italy, upon a bill of health; that is, a certificate that the place whence he came is not annoyed with any infectious disease.

PRAXEANS, a sect of heretics, so called from their author Praxeas.

This heresiarch was of Asia, and lived in the second century. He was at first a disciple of Montanus, but quitted him, and soon after set up a sect of his own; teaching, that there was no plurality of persons in the Godhead; and that it was the Father himself that suffered on the cross. Which sentiment was afterwards adopted by the MONARCHICI, SABELLIANS, and PATRIPASSIANS.

PRAYER, in *Theology*, a petition put up to God, either for the obtaining some future favour, or the returning of thanks for a past one.

Divines distinguish three kinds of *prayer*:

Vocal, which is clothed in words and sounds to be uttered with the mouth.

Mental, which is only formed or conceived, in the mind, and not delivered in words.

Ejaculatory, which is a short, sudden flight, without study, order, or method.

Mystic divines, again, distinguish *prayer*, into *active* and PASSIVE.

Among us, *prayer* is most frequently considered under the divisions of preconceived and extemporary.

Under the first come all set forms, whether public or private, by which the mind is directed in the order, manner, expression, &c. of its petitions.

The second is that where the mind is left to itself, its own conduct, both as to matter, manner, words, &c.

The Romanists also prefer *prayers* to saints; the Virgin, the angel Gabriel, &c. See SAINT, OFFICE, AVE *Mary*, &c.

PRAYER, *common*. See COMMON *Prayer*.

PRAYERS *of forty hours*. See HOURS.

PREACHING, in *Theology*, the declaration, or promulgation, of the word of God, in public, by a person authorized, and in a place appointed for the purpose.

The word is derived from the Hebrew *paraseh*, *expound*, *he expounded*.

Anciently, none but bishops were allowed to *preach*; now, not only priests, but deacons, are qualified.

Bishop Wilkins has delivered the art of *preaching*, in a treatise called Ecclesiastes, or the Preacher.

The religious of the order of St. Dominic assume the quality of *preaching-brothers*, friers-predicant, or *predicants*.

PREADAMITE, *preadamite*, a denomination given to the inhabitants of the earth; conceived, by some people, to have lived before Adam.

Isaac de la Pereyra, in 1655, published a book to evince the reality of *Preadamites*; by which he gained a considerable number of proselytes to the opinion: but the answer of Demarets, professor of theology at Groningen, published the year following, put a stop to its progress; though Pereyra made a reply.

His system was this: the Jews he calls *Adamites*, and supposes them to have issued from Adam; and gives the title *Preadamites* to the Gentiles, whom he supposes to have been a long time before Adam.

But this being expressly contrary to the first words of Genesis, Pereyra had recourse to the fabulous antiquities of the Egyptians and Chaldeans, and to some of the idle rabbins; who imagined there had been another world before that described by Moses.

He was apprehended by the inquisitors in Flanders, and very roughly used, though in the service of the Dauphin. But he appealed from their sentence to Rome, whither he went in the time of Alexander VII. and where he printed a retractation of his book of *Preadamites*.

PREAMBLE, in *Law*, the beginning of an act of parliament, &c. serving, as it were, for a key to open the intent of the makers of the act, and the mischiefs intended to be prevented or remedied thereby.

PREAUDIENCE, in *Law*. See PRECEDENCE.

PREBEND, *prabenda*, the portion which a prebendary receives for his maintenance out of the estate of a cathedral, or collegiate church.

The term *prebend* is usually confounded with *canonicate*, or *canonica*; yet there is a real difference. A *prebend* is properly a right which an ecclesiastic has in a cathedral, or collegiate church, where he officiates, to receive certain ecclesiastical revenues, and to enjoy certain dues, either in money, or in kind (so called *a prabendo* q. d. *alimenta* or *stipendia*) which the church has *afforded* or *allowed* him; not *a prabendo auxilium* or *consilium ecclesiæ*); whereas *canonica* is a mere title, or spiritual quality, which a person enjoys independent of any prestation, or any temporal revenue; so that the *prebend* may subsist without the canonicate; but the canonicate is inseparable from the *prebend*.

For it is not to the *prebend* that the right of ſuffrage, and other ſpiritual rights are annexed, but to the canonicate; and when the *prebend* is joined to the canonicate, it becomes ſpiritual by virtue of the canonicate to which it is attached.

Anciently the pope created canons with a right of having place in the choir, a deliberative voice in the chapter, and an expectation of the firſt *prebend* that ſhould become vacant; but this was prohibited by the council of Trent: yet the pope ſtill confers the canonicate without any *prebend*, when he would confer a dignity in a church, for the obtaining whereof it is required the candidate be a canon.

This they call a canonicate *ad effectum*, and ſometimes a *jus ramoſum*, which is no more than an empty title, conferred purely to qualify a man for a dignity reſtrained to the capacity of canon.

In ſome churches there are *double prebends*, and in others *ſemi-prebends*.

Originally the *prebend* was only a livery, or portion of things neceſſary to life, given daily; at preſent the rents and profits of the church are divided into fixed portions, called *prebends*, which are enjoyed independently. Of common right the biſhop is patron of all the *prebends*, becauſe the poſſeſſions were derived from him. Some *prebends* are donative. At Weſtminſter, the king collates by patent, and by virtue thereof the prebendary takes poſſeſſion without inſtitution or induction; and the king at this day is patron of moſt of the great *prebends*.

In France it is one of the honorary rights of the king, on his joyful acceſſion to the crown, to nominate to the firſt *prebends* vacant by death in the cathedral and collegiate churches.

Prebends are either *ſimple*, or with *dignity*. The latter are ſuch as, beſide their *prebends*, have ſome juriſdiction annexed to them.

No perſon may hold more than one *prebend* in the ſame church; and if a prebendary accepteth of a deanry, his *prebend* is void by ceſſion, the acceptance of a deanry being underſtood to be in the ſame church. So if he is made a biſhop, the king preſents to his *prebend*.

Neither prebendaries nor canons appear to have any cure of ſouls; and therefore a *prebend* and a parochial benefice are not incompatible; nor is he who takes a title to a *prebend* thereby obliged, by 13 Eliz. cap. 12. to ſubſcribe or read the thirty-nine articles.

PREBEND, *theologeal*, or *divinity*, is a *prebend* appropriated to a doctor in *divinity*, in each cathedral and collegiate church throughout France, for preaching on Sundays, and making a public lecture thrice a week.

PREBEND, *preceptorial*, is that *prebend* whoſe revenues are deſtined for the ſupport of a preceptor or maſter, who is obliged to inſtruct the youth of the place *gratis*.

The canonicate is not here neceſſary to the *prebend*.

Pahorm. obſerves, that in the cathedral church of Chartres there are *prebends* appropriated to laymen, and for the ſubſiſtence of ſome perſons of birth and diſtinction.

PREBENDARY, *prebendarius*, an eccleſiaſtic who enjoys a PREBEND.

Prebendaries and canons of cathedral and collegiate churches have this in common, that they have each a portion of the revenues of the church for their ſubſiſtence; the one under the title of *prebends*, *prebend*; the other under the title of *canonica*, or *canonicate*; and have each places and voices in the chapter; but they differ in this, that the former receives his portion or prebend in conſideration of his officiating and ſerving in the church; but the latter without any ſuch conſideration, merely by his being received into the cathedral or college, *per inſtgnatum ſtallum in choro, & locum in capitulo*.

Prebendaries and canons are bound to preach in their turns, or provide proper ſubſtitutes. By 28 Hen. VIII. cap. 11. the profits of a *prebend*, during the vacation, ſhall go to the ſucceſſor, towards the payment of his firſt-fruits.

Golden PREBENDARY *of Hereford*, called alſo *prebendarius epiſcopi*, is one of the twenty-eight minor *prebendaries*, who has, *ex officio*, the firſt canon's place that falls.

He was anciently confeſſor of the biſhop and cathedral, and had the altarages; on which account he was called the *golden prebendary*.

PRECARIÆ, or PRECES, in our *Ancient Law-Books*, days-works, which the tenants of certain manors are bound to give their lords in harveſt-time.

Theſe in ſome places are corruptly called *blind-days*, for *bidmdays*, from the Saxon *bidden*, *to pray*.

Magna PRECARIA was a great or general reaping-day.

The lord of the manor of Harrow, in Middleſex, had, 21 Ric. II. a cuſtom, that by ſummons of his bailiff on a general reap-day, then called *magna precaria*, the tenants ſhould do one hundred ninety-nine days work for him; every tenant that had a chimney ſending a man.

PRECARIOUS, *in Commerce*, an appellation given to a kind of trade carried on between two nations at war, by the intervention of a third at peace with them both.

Thus the Engliſh hold a *precarious* commerce with the Spaniards by means of the Portugueſe; when the two former nations being at war, the third lends its veſſels, its colours, and name, to continue their trade.

PRECARIOUS, in *Juriſprudence*, is applied to a fund or ſtock, of which a perſon has not the full propriety, whereof he cannot diſpoſe abſolutely, and which is moſt of it borrowed.

PRECATORES, in *Church Hiſtory*, a ſect of heretics, who, under the pretence of praying always, refuſed to work.

PRECE *partium*, *in Law*, the continuance of a ſuit by conſent of both parties.

PRECEDENCE, PRECEDENCY, or PRECEDENCY, a place of honour which a perſon is entitled to in companies; either ſitting, or walking.

With regard to the order of *precedency*, it may be obſerved in general, that perſons of every degree of honour or dignity take place according to the ſeniority of their creation, and not of years, unleſs they are deſcended of the blood-royal; in which caſe they have place of all others of the ſame degree.

Precedency is either of *courteſy*, or *de jure*, of right.

The former is that which is due to age, to eſtate, &c. which is regulated by faſhion and civility.

The latter is ſettled by authority, and where broken in upon, gives an action at law.

Here we may obſerve, that the younger ſons of the preceding rank take place from the eldeſt ſon of the next mediate; viz. the younger ſons of dukes from the eldeſt ſons of earls; the younger ſons of earls from the eldeſt ſons of baronets. The whole chain of *precedency* is founded upon this gradation, and thus ſettled by act of parliament. 31 Hen. VIII. cap. 12. A. D. 1539. By ſubſequent alterations, all the ſons of viſcounts and barons are allowed to precede baronets; and the eldeſt ſons and daughters of baronets have place given them before the eldeſt ſons and daughters of any knights, of what degree or order ſoever, though ſuperior to that of a baronet; theſe being but temporary dignities, whereas that of baronets is hereditary; and the younger ſons of baronets are to have place next after the eldeſt ſons of knights. There are alſo ſome great officers of ſtate, who take place, although they are not noblemen, above the nobility of higher degree; and there are ſome perſons, who, on account of their dignities in the church, degrees in the univerſities, and inns of court, officers in the ſtate or army, although they are neither knights nor gentlemen born, that nevertheleſs take place among them. Thus, all colonels and field-officers, who are honourable, as alſo the maſter of the ordnance, quarter-maſter general, doctors of divinity, law, phyſic, and muſic, deans, chancellors, prebendaries, heads of colleges in univerſities, and ſerjeants at law, are, by courteſy, allowed place before ordinary eſquires. And all bachelors of divinity, law, phyſic, and muſic; maſters of arts; barriſters in the inns of courts; lieutenant-colonels, majors, captains, and other commiſſioned military officers; and various patent officers in the king's houſhold, may equal, if not precede, any gentleman that has none of theſe qualifications. In towns corporate, the inhabitants of cities are preferred to thoſe of boroughs, and thoſe who have borne magiſtracy to all others. It has been alſo determined in the earl marſhal's court of honour, that all who have been lord mayors of London, ſhall every where take place of all knights bachelors, becauſe they have been the king's lieutenants.

The point of *precedency* is thus ordered by the heralds: after the king and prince of Wales, the princes of the blood, viz. the ſons, grandſons, brothers, uncles, and nephews of the king, take place; then the great officers of the church and crown, viz. the archbiſhop of Canterbury; then the lord chancellor, or lord keeper of the great ſeal; next, the archbiſhop of York; the lord high treaſurer; the lord preſident of the privy-council; the lord privy-ſeal; next, dukes; then marquiſes, dukes eldeſt ſons, earls, marquiſes eldeſt ſons, dukes younger ſons, viſcounts, earls eldeſt ſons, marquiſes younger ſons, biſhops, barons, ſpeaker of the houſe of commons, viſcounts eldeſt ſons, earls younger ſons, barons eldeſt ſons, knights of the Garter, privy-counſellors, chancellor and under-treaſurer of the exchequer, chancellor of the duchy of Lancaſter, lord chief juſtice of the king's bench, lord chief baron of the exchequer, juſtices, and barons in the courts of law, viſcounts younger ſons, barons younger ſons, knights bannerets, baronets, knights of the Bath, field and flag officers, knights-bachelors, maſters in chancery, doctors, deans, &c. ſerjeants at law, baronets eldeſt ſons, knights of the Garter's eldeſt

ſons,

fons, knights of the Bath's eldeſt ſons, knights-bachelor's eldeſt ſons, baronets younger ſons, eſquires by creation, eſquires by office, gentlemen, citizens, burgeſſes, &c.

Note, that great officers of court, of what degree ſoever they are, take place above all other perſons who are of the ſame degree or order of nobility; viz. the maſter of the horſe, lord great chamberlain of England, lord high conſtable of England, lord marſhal of England, lord admiral of England, lord ſteward and lord chamberlain of his majeſty's houſhold. So the ſecretaries of ſtate, if peers, take place of all of that degree, except the great officers aforeſaid.

The ladies take place, or *precedency*, according to the degree of quality of their huſbands.

With regard to the *precedency* among women, we may obſerve, that women, before marriage, have *precedency* by their father; with this difference between them and the male children, that the ſame *precedency* is due to all the daughters that belongs to the eldeſt. By marriage, a woman partakes of her huſband's dignities; but none of the wife's dignities can come, by marriage, to her huſband, but are to deſcend to her next heir. If a woman has *precedency* by creation or birth, ſhe retains the ſame, though ſhe marry an inferior; but if a woman nobly born marry any nobleman, as a baron, ſhe ſhall take place according to the degree of her huſband only, though ſhe be a duke's daughter. A woman, privileged by marriage with one of noble degree, ſhall retain the privilege due to her by her huſband, though he ſhould be degraded by forfeiture, &c. The wife of the eldeſt ſon of any degree takes place of the daughters of the ſame degree, who always have place immediately after the wives of ſuch eldeſt ſons, and both of them take place of the younger ſons of the preceding degree. And this rule holds, not only in comparing degrees, but alſo families of the ſame degree amongſt themſelves. The *precedency* among women is as follows.

The queen and princeſs of Wales; princeſſes and dutcheſſes of the blood; dutcheſſes; wives of the eldeſt ſons and daughters of dukes of the blood; marchioneſſes; wives of the eldeſt ſons and daughters of dukes; counteſſes; wives of the eldeſt ſons and daughters of marquiſſes; wives of the younger ſons of dukes; viſcounteſſes; wives of the eldeſt ſons and daughters of earls; wives of the younger ſons of marquiſſes; baroneſſes; wives of the eldeſt ſons and daughters of viſcounts; wives of the younger ſons of earls; wives of the eldeſt ſons and daughters of barons; wives of the younger ſons of viſcounts; wives of the younger ſons of barons; wives of baronets; wives of the knights of the Garter; of the Bath; and of knights-bachelors; wives of the eldeſt ſons and daughters of baronets; wives of the eldeſt ſons and daughters of knights of the Garter; wives of the eldeſt ſons and daughters of knights of the Bath; wives of the eldeſt ſons and daughters of knights-bachelors; wives of the younger ſons of baronets; wives of eſquires by creation; of eſquires by office; of gentlemen; daughters of eſquires; of gentlemen; wives of citizens; of burgeſſes, &c. The wives of privy-counſellors, judges, &c. are to take the ſame place as their huſbands do.

A cuſtom has of late years prevailed of granting letters patent of *precedence* to ſuch barriſters as the crown thinks proper to honour with that mark of diſtinction; whereby they are entitled to ſuch rank and pre-audience as are aſſigned in their reſpective patents; ſometimes next after the king's attorney-general, but uſually next after his majeſty's counſel then being. Theſe, as well as the queen's attorney and ſolicitor-general, rank promiſcuouſly with the king's counſel, and together with them ſit within the bar of the reſpective courts, but receive no ſalaries, and are not ſworn; and, therefore, are at liberty to be retained in cauſes againſt the crown. The *precedence*, with regard to pre-audience in the courts, which uſually obtains among the practiſers, is as follows: the king's premier ſerjeant, ſo conſtituted by ſpecial patent; the king's ancient ſerjeant, or the eldeſt among the king's ſerjeants; the king's advocate-general; the king's attorney-general; the king's ſolicitor-general; the king's ſerjeants; the king's counſel, with the queen's attorney and ſolicitor; ſerjeants at law; the recorder of London; advocates of the civil law, and barriſters. In the court of exchequer two of the moſt experienced barriſters, called the poſtman, and the tub-man, from the places in which they ſit, have alſo a *precedence* in motions. Blackſt. Comm. book iii. p. 28.

PRECEDENT, in *Law*, frequently denotes an original, authentic inſtrument, or writing; ſerving as a form to draw others by.

Hence *precedent books*, &c. full of draughts of deeds, conveyances, &c. for attorneys.

PRECEDENT *condition*, in *Law*. See CONDITION.

PRECENTOR, *præcentor*, a dignitary in cathedral churches, popularly called the CHANTOR, or *maſter of the choir*.

The *præcentor* is ſo called, from the Latin *præ*, and *cano*; becauſe he is ſuppoſed to lead the choir, and *ſing before* the reſt.

PRECEPT, *præceptum*, in *Law*, a command in writing ſent by a chief juſtice, juſtice of peace, or other [illegible] ficer, for the bringing of a perſon, record, or other matter, before him.

PRECEPT is alſo uſed for the command, or inſtruction whereby one man ſtirs up another to commit [illegible] theft, &c. Bracton ſpeaks of three diverſities of inſtructing in murder; viz. *præcepto, conſilio, & conſortio*.

Præceptio, is the inſtigation uſed beforehand; *conſilium*, the aſſiſtance in the fact; *conſortium*, the advice given either before or after.

PRECEPT *of election in parliament*. See PARLIAMENT.

PRECEPTORIAL *to ſound*. See PREBEND.

PRECEPTORY, *præceptoria, commenda*; a kind of benefice held by the more eminent among the ancient Knights Templars, who were created by the grand maſter, with the title of *præceptores Templi*, i. e. *maſters of the Temple*.

Stephens, De Juriſd. lib. iv. ſays, the *præceptories* were only a kind of cells, all ſubordinate to their principal manſion, the Temple in London.

Of theſe *præceptories*, Dugdale ſays, he finds ſixteen recorded, as anciently belonging to the Templars in England, viz. Croſſing Temple, Balſhal, Shengay, Newland, Yevely, Witham, Temple Bruere, Willington, Rotheley, Ovenington, Temple-Comb, Trehigh, Roſhane, Mount St. John, Temple-Newſum, and Temple-Hurſt. But there were more. See COMMANDRY.

PRECES. See PREBARIÆ.

PRECES *primariæ*, or PRIMÆ, is the denomination of an imperial prerogative, whereby the emperor exerciſes, and hath immemorially exerciſed, a right of naming to the firſt prebend that becomes vacant after his acceſſion, in every church of the empire. This right was alſo exerciſed by the crown of England in the reign of Edward II. and probably gave riſe to the royal CODICILS. See OPTION.

PRECESSION, *præceſſio*, in *Aſtronomy*, a term applied to the equinoxes, which by a very ſlow inſenſible motion, change their place, going backward, or weſtward, i. e. *in antecedentia*, as aſtronomers call it, or contrary to the order of the ſigns.

It is ſhewn, in the new aſtronomy, that the pole, the ſolſtices, the equinoxes, and all the other points of the ecliptic, have a retrograde motion; and are continually moving from eaſt to weſt, or from Aries towards Piſces, &c. by means whereof the equinoctial points are carried farther and farther back, among the preceding ſigns of ſtars, at the rate of about fifty ſeconds each year, which retrograde motion is called the *præceſſion, receſſion*, or *retroceſſion of the equinoxes*.

Hence, as the fixed ſtars remain immoveable, and the equinoxes go backward, the ſtars will ſeem to move more and more eaſtward with reſpect to them; whence the longitudes of the ſtars, which are reckoned from the firſt point of Aries, or the vernal equinox, are continually increaſing.

Hence it is that the conſtellations have all changed the places aſſigned them by the ancient aſtronomers: in the time of Hipparchus, and the oldeſt aſtronomers, the equinoctial points were fixed to the firſt ſtars of Aries and Libra; but the ſigns are now no longer in the ſame points; and the ſtars which were then in conjunction with the ſun when he was in the equinox, are now a whole ſign, or thirty degrees, to the eaſt thereof: thus the firſt ſtar of Aries is now in the portion of the ecliptic, called Taurus; and the firſt ſtar of Taurus now reſides in Gemini; and Gemini is advanced into Cancer, &c. The equinoxes will have made their revolution weſtward, and will be returned to Aries again, or the conſtellations will have made theirs eaſtward, and will again fall into their former places with regard to the equinoxes, in 25816 years, according to Tycho; in 25912, according to Riccioluss; and in 24800, according to Caſſini.

Theſe phenomena may be clearly underſtood by a view of *Tab. Aſtron. fig.* 48. Let NZSVL be the earth, SONA its axis produced to the ſtarry heavens, and terminating in A, the preſent north pole of the heavens, which is vertical to N the north pole of the earth. Let EOQ be the equator, T to Z the tropic of Cancer, and VT ♈ the tropic of Capricorn; VOZ the ecliptic, and BO its axis, both which are immoveable among the ſtars. But, as the equinoctial points recede in the ecliptic, the earth's axis SON is in motion upon the earth's centre O, in ſuch a manner as to deſcribe the double cone NOn and SOs, round the axis of the ecliptic BO,

in the time that the equinoctial points move quite round the ecliptic, which is 25,920 years; and in that length of time, the north pole of the earth's axis produced, describes the circle ABCDA in the ſtarry heavens, round the pole of the ecliptic, which keeps immoveable in the centre of that circle. The earth's axis being 23½ degrees inclined to the axis of the ecliptic, the circle ABCDA deſcribed by the north pole of the earth's axis produced to A, is 47 degrees in diameter, or double the inclination of the earth's axis. In conſequence of this, the point A, which at preſent is the north pole of the heavens, and near to a ſtar of the ſecond magnitude in the tail of the conſtellation called the Little Bear, muſt be deſerted by the earth's axis; which moving backwards a degree every 72 years, will be directed towards the ſtar or point B in 6480 years hence; and in double of that time, or 12,960 years, it will be directed towards the ſtar or point C; which will then be the north pole of the heavens, although it is at preſent 84 degrees ſouth of the zenith of London L. The preſent poſition of the equator EQQ will then be changed into eOq, the tropic of Cancer T ♋ Z into V ♎, and the tropic of Capricorn VT ♑ into t ♈ Z; as is evident by the figure. And the ſun, in the ſame part of the heavens where he is now over the earthly tropic of Capricorn, and makes the ſhorteſt days and longeſt nights in the northern hemiſphere, will then be over the earthly tropic of Cancer, and make the days longeſt and nights ſhorteſt. So that it will require 12,960 years yet more, or 25,920 from the then preſent time, to bring the north pole N quite round, ſo as to be directed toward that point of the heavens which is vertical to it at preſent. And then, and not till then, the ſame ſtars which at preſent deſcribe the equator, tropics, and polar circles, &c. by the earth's diurnal motion, will deſcribe them over again.

The ancients, and even ſome among the moderns, have taken the equinoxes to be immoveable; and aſcribed that change of diſtance of the ſtars from it, to a real motion of the orb of the fixed ſtars, which they ſuppoſed to have a ſlow revolution about the poles of the ecliptic; ſo as that all the ſtars perform their circuits in the ecliptic, or its parallels, in the ſpace of 25,920 years; after which they ſhould all return again to their former places.

This period the ancients called the *Platonic*, or *great* YEAR; and imagined, that at its completion every thing would begin as at firſt; and all things come round in the ſame order as they have already done.

The phyſical cauſe of the *preceſſion* of the equinoxes, Sir Iſaac Newton demonſtrates, doth ariſe from the broad ſpheroidal figure of the earth; which itſelf ariſes from the earth's rotation around its axis: for as more matter is accumulated all round the equatorial parts than any where elſe on the earth, the ſun and moon, by attracting this redundance of matter, bring the equator ſooner under them in every return towards it, than if there was no ſuch accumulation.

Allowing this to be the caſe, and ſince the plane of the moon's orbit is at one time above ten degrees more inclined to the plane of the equator than at another, it is reaſonable to conclude, that the part of the whole annual *preceſſion*, which ariſes from her action, muſt in different years be varied in its quantity; whereas the plane of the ecliptic, in which the ſun appears, keeping always nearly the ſame inclination to the equator, that part of the *preceſſion*, which is owing to the ſun's action, may be the ſame every year; and hence it follows, that, although the mean annual *preceſſion*, proceeding from the joint actions of the ſun and moon, were 50″, yet the apparent annual *preceſſion* might ſometimes exceed, and ſometimes fall ſhort, of that mean quantity, according to the various ſituations of the nodes of the moon's orbit; and Dr Bradley, from a variety of obſervations, found this to be the caſe: or, that the *preceſſion* of the equinoctial points varies; nor are aſtronomers entirely agreed as to the quantity of the variation, ſo as to eſtabliſh what the mean *preceſſion* is. Dr Bradley aſſumes the mean *preceſſion* to be one degree in ſeventy-one years and a half. According to this eſtimate, the Platonic or great year would be equal to 25,740 ſolar years.

Sir Iſaac Newton, in determining the quantity of the annual *preceſſion* from the theory of gravity, upon ſuppoſition that the equatorial is to the polar diameter of the earth, as 230 is to 229, finds the ſun's action ſufficient to produce a *preceſſion* of 9″ ¼ only; and collecting from the tides the proportion between the ſun's force and the moon's to be as 1 to 4½, he ſettles the mean *preceſſion* reſulting from their joint actions, at 50″. But ſince the difference between the polar and equatorial diameter is found, by the late obſervations of the gentlemen of the Royal Academy of Sciences at Paris, to be greater than what Sir Iſaac had computed it to be; the *preceſſion* ariſing from the ſun's action muſt likewiſe be greater than what he has ſtated it at, nearly in the ſame proportion. From whence it will follow, that the moon's force muſt bear a leſs proportion to the ſun's than 4½ to 1. Phil. Tranſ. vol. xlv. art. 1.

To determine the quantity of the *preceſſion*, ariſing from the action of the ſun, has been a problem much agitated among modern mathematicians; and although there is no doubt of Newton's miſtake in the ſolution of it, other authors have generally diſagreed. M. D'Alembert, in 1749, printed a treatiſe on this ſubject, and claims the honour of having been the firſt who rightly determined the method of ſolving problems of this nature. The ſubject has been alſo conſidered by Euler, De la Grange, Friſius, Silvabelle, Walmeſley, Simpſon, Emerſon, Landen, and Milner.

M. De Silvabelle, ſtating the ratio of the earth's axes to be as 178 to 177, makes the annual *preceſſion* cauſed by the ſun 13″ 52‴ 11⁗; the mean annual *preceſſion* cauſed by the moon, the ratio of the lunar force to the ſolar being ſuppoſed = 2, 34″ 16‴ 51⁗; and the NUTATION of the earth's axis cauſed by the moon, during the time of a ſemi-revolution of the pole of the moon's orbit, i. e. in 9 years, 17″ 51‴ 14⁗. Mr. Walmeſley makes the annual *preceſſion*, owing to the ſun's force, on the ſuppoſition that the proportion of the earth's diameters is as 230 to 229, and the obliquity of the ecliptic to the equator 23° 28′ 30″, equal to 10″,5835; but ſuppoſing the proportion of the diameters to be as 178 to 177, the annual *preceſſion* depending on the action of the ſun will be 13″,675. And ſuppoſing with Dr. Bradley, that the whole mean annual *preceſſion* is 50″,3, the mean *preceſſion*, owing to the force of the moon, will be 39″,717, and the force of the moon to that of the ſun as 3,753 to 1, the diameters being as 230 to 229; but this proportion being 1¼, the annual *preceſſion* ariſing from the action of the moon will be 36″,625, and the force of the moon to that of the ſun as 2,678 to 1. Mr. Simpſon, by a different method of calculation, determines the whole annual *preceſſion* of the equinoxes cauſed by the ſun, to be 21″ 6‴; and he has pointed out the errors of the computations propoſed by Mr. Silvabelle and Mr. Walmeſley. Mr. Milner's deduction agrees with that of Mr. Simpſon. For the principles and reaſoning of theſe mathematicians, we muſt refer to the Phil. Tranſ. vol. xlviii. art. 58. vol. xlix. art. 109. vol. l. art. 53. vol. lxvii. part ii. art. 15. vol. lxix. part ii. art. 32. See ECLIPTIC and NODE.

PRECIOUS, or PRETIOUS *ſtone*. See GEM.

PRECIPE, or PRÆCIPE, in *Law*, a ſpecies of original WRIT, called optional, which commands the defendant to do the thing required, or ſhew the reaſon whereſore he hath not done it. The uſe of this writ is where ſomething certain is demanded by the plaintiff, which is in the power of the defendant himſelf to perform; as, to reſtore the poſſeſſion of land, to pay a certain liquidated debt, to perform a ſpecific covenant, to render an account, and the like; in all which caſes the writ is drawn up in the form of a *precipe* or command, to do this, or ſhew cauſe to the contrary; giving the defendant his choice, to redreſs the injury, or ſtand the ſuit. This writ is diſtinguiſhed from the peremptory writ, called *ſi te fecerit ſecurum*.

PRECIPE, or PRÆCIPE, is alſo a name given to a writ of covenant; the foundation of which is a ſuppoſed agreement or covenant, that one party ſhall convey lands to the other; on the breach of which agreement action of covenant is brought by the party to whom the land is to be conveyed or aſſured, who thus commences an action or ſuit at law againſt the other.

PRECIPE, or PRÆCIPE *quod reddat*, a writ of great diverſity both as to form and uſe; extending as well to writs of right, as to other writs of entry and poſſeſſion.

It is ſometimes called a *writ of right cloſe*, as when it iſſues out of the court of chancery cloſe; ſometimes a *writ of right patent*, as when it iſſues out of chancery patent, or open, to any lord's court, for any of his tenants deforced, againſt his deforcer.

PRECIPE *in capite*. See PRÆCIPE.

PRECIPITANT, *præcipitans*, in *Chemiſtry*, a term applied to any liquor, which, being poured on a diſſolution, ſeparates what is there diſſolved, and makes it *precipitate*, i. e. fall to the bottom of the veſſel.

Thus oil of tartar, and the volatile ſpirit of ſal ammoniac, are *precipitants* with regard to the diſſolution of gold in aqua regalis; and common water is a *precipitant* with regard to the diſſolution of jalap in ſpirit of wine.

PRECIPITANT is alſo uſed in medicine, for a remedy which ſeparates and precipitates any heterogeneous matter contained in the maſs of blood; and by this means abates any irregular fermentations, efferveſcences, or the like diſorders, which that matter had excited.

Among the number of *precipitants* are ranked hartſhorn,

crabs-eyes, ivory, bezoard, barks of oak and guaiacum, iron, quinquina, chalk, &c.

PRECIPITATE, *precipitatus*, in *Chemistry*, a substance, which, having been dissolved in a proper menstruum, is again separated from its dissolvent, and thrown down to the bottom of the vessel, by the pouring in of some other liquor.

When a body is decomposed by means of an intermediate substance, and a *precipitate* is formed by this decomposition, this precipitation can be effected only by the intermediate substance uniting with one of the component matters of that body; and consequently a new compound is always formed in these operations. Sometimes the separated matter, being no longer soluble, becomes sensible, and falls as a *precipitate*, while the new compound remains dissolved. In other instances, the separated substance remains dissolved, while the new combination, not being soluble, is precipitated. This depends on the nature of the substances which act one upon another in these operations; but we may easily perceive, that the *precipitates* of the former kind are *simple*, and those of the latter are *compound*. Earths and metals, when separated from acids by means of alkalis, or other metals, are simple *precipitates*, and when separated from acids by other acids, they are compound.

The chemists make various *precipitates* of mercury, which are of various colours, as the precipitations vary; viz. *white*, *red*, *yellow*, *green*, &c. See MERCURY, and TURBITH *mineral*.

Lemery, who mentions many *precipitates* of mercury of different colours, says, that if a solution of mercury in spirit of nitre be precipitated by urine, instead of a solution of common salt, a *rose-coloured precipitate* of mercury will be formed; and that if afterwards some fixed or volatile alkali be added to the liquor from which the rose-coloured *precipitate* has been formed, another *precipitate*, which is black, will be obtained. There are other preparations described by this author, which have been used as remedies, but which are improperly called *precipitates*: such is *green precipitate*, which is a mixture of four parts of mercury, and one part of copper, dissolved separately in the nitrous acid, and treated as in the process for making red *precipitate*; afterwards, partly diffolved a second time, by being digested with vinegar: and, lastly, reduced by evaporation to a dry consistence; such also is the preparation called by Lemery violet mercury, or black mercurial panacea, or *black precipitate*, which is an artificial cinnabar overcharged with sulphur, mixed with sal ammoniac, and prepared by a very long and laborious process.

PRECIPITATE *of gold by tin*, &c. See GOLD, &c.

PRECIPITATION, *precipitatio*, a process in chemistry, which, in its most extensive sense, is applicable to all chemical decompositions made by an intermediate substance; or, to all operations in which two bodies are disunited by employing a third body, which has the property of uniting with one of these, and thereby of separating the other; *so that every precipitation* is effected by means of the AFFINITY of a precipitant, much stronger than that of the precipitate, with the substance from which it is separated. In a more confined sense, *precipitation* is a kind of separation, whereby a body, dissolved and suspended in any menstruous liquor, is detached therefrom, and falls down to the bottom of the vessel.

Precipitation is either *spontaneous*, or *artificial*.

PRECIPITATION, *spontaneous*, is when the particles of the dissolved body separate of themselves from their dissolvent.

PRECIPITATION, *artificial*, is when some other body, called a *precipitant*, is added to procure this separation.

There is also a *total precipitation*, wherein the dissolved parts are all separated, and sunk to the bottom; and a *partial precipitation*, wherein some of the parts dissolved are still suspended in the fluid, and do not fall down.

Precipitation is never occasioned but in fluid matters; and as bodies may be rendered fluid either by fire or by water, two kinds of *precipitation* may be distinguished, one by the humid way, and the other by the dry way. In the first class may be ranged all decompositions of salts with earthy or metallic bases, which salts must be dissolved in water when their bases are to be separated from their acids by proper intermediate substances. The second class includes the separations of metals, and of other solid and fusible matters from each other, which are effected by fusion and mixture with the separating substances. These two kinds of *precipitation* do not essentially differ, but many real differences distinguish the separated substances, or all those to which the general name of PRECIPITATE is given.

Boerhaave makes the following observations on the different manner in which *precipitation* is performed by several different agents.

Thus, 1. By water poured on oils dissolved in alcohol, where the liquor turns milky.

2. By water poured to solid resins dissolved in alcohol, where also the liquor turns milky.

3. By water in the distillation of oily spirits, if any water run after the spirit is drawn off.

4. By acids on acids: thus silver and mercury are *precipitated* out of spirit of nitre, in which they had been dissolved by adding spirit of salt.

5. By metals with metals, and other bodies. Thus, for example, dilute an ounce of silver dissolved in spirit of nitre, with twelve times the quantity of rain water; put polished plates of copper into this liquor, and the silver will be *precipitated*, and the copper dissolved: then put this solution of copper into another glass, and add to it polished plates of iron; the copper will be *precipitated*, and case over the iron; finally, the copper falls to the bottom, and the iron dissolves. Pour this solution of iron into a fresh glass, and drop upon it oil of tartar, per deliquium; the dissolved iron immediately falls to the bottom, and the alkali unites with the acid, and regenerates true nitre, after so many changes.

Thus does this salt travel from one body to another almost unaltered, though it is more attracted by one than another, till at length it rests in that which in this respect is the strongest, and is only thence expelled when oil of vitriol is poured upon the nitre thus regenerated. On these two principles *precipitation* depends, and is the true and often abstruse cause of numberless wonderful operations both in art and nature. Take a grain of white or red *precipitate*, rub it upon a polished and heated copper-plate, and wherever the matter has passed, the copper will immediately look like silver; for the copper attracts the acid of the nitre from the calx of the mercury, and thus presently makes an amalgam upon the surface of the copper, and then acquires a silver colour.

6. Alkalis often *precipitate* things dissolved by acids. This happens frequently, but not always, nor in perfection: alkali *precipitates* copper dissolved by an acid, but the copper is afterwards dissolved by a salt made of the two.

7. Acids generally *precipitate* things dissolved by alkalis; but in this case also there are some processes which shew us exceptions.

8. Sharp salts, without being changed, and lying perfectly concealed, have strange and unexpected effects by means of *precipitation*. If an ounce of luna cornea, which is perfectly scentless, insipid, and inactive, and affords no sign of acrimony in the fire, be ground, and united in a strong heat in a glass retort with half an ounce of inodorous and perfectly insipid regulus of antimony, there instantly arises an extremely strong poison, or an exceedingly corrosive butter of antimony, the exhalation of which proves mortal. We see in this one instance how dangerous the art of mixing is, and with what care we ought to go about the compounding of bodies. Boerh. Chem. part ii. p. 338.

PRECIPITATION, *to account for the operation of*, it may be observed, that a fluid menstruum may be made to sustain a body specifically heavier than itself, either by making the resistance, arising from the cohesion of the parts of the fluid, equal to the excess of specific gravity of those bodies above that of the menstruum: or, by the heavy body's being joined to some lighter one, so that the two together only make one whole, equal in weight to the fluid.

In the first case, the resistance, we know, is still proportional to the surface of the corpuscles; so that the surface being diminished, the resistance is weakened: the proportion therefore of the tenacity of the menstruum, to the gravity of the corpuscles, being thus destroyed, a *precipitation* must ensue.

Precipitation, then, may be effected two ways, on this foundation; viz. either by the dropping in a liquor specifically lighter, or specifically heavier. In the former case, the gravity of the menstruum, which is always proportional to the compound gravities of both, will by this mixture become lighter: thus the menstruum being diluted, the force of cohesion is also weakened, so as to become unable any longer to sustain the bodies; so hydrometers, which are easily sustained in water, upon pouring in a good deal of any burning spirits, sink to the bottom of the glass.

And this agrees not only with the laws of mechanics, but with experiments: thus spirit of sal ammoniac does very plentifully precipitate the filings of metals, dissolved in acid menstruums; though it be abundantly lighter than any of them.

The same thing is done quicker by spirit of wine, whose gravity is known to be almost the least of that of any liquor.

By this spirit also, all salts, which are suspended in water, are precipitated, and so unite into crystals. So, if

you

you drop diſtilled vinegar into the ſcoria of antimony diſſuſed in water, it falls to the bottom, and affords the golden ſulphur.

After the ſame manner, water, vinegar, &c. make a *precipitation* from acids, though more ſparingly: nay, acids themſelves, being poured upon others, which are heavier, will precipitate whatever is ſwimming in them. Thus ſpirit of ſalt precipitates either lead, copper, or tin, diſſolved in oil of vitriol; ſo little need is there of alkalis in this buſineſs, though the chemiſts have unanimouſly contended for them as abſolutely neceſſary.

In the ſecond caſe, *precipitation* will ſucceed by the addition of a heavier liquor to the menſtruum. For the particles of this liquor, partly with their weight, and partly with the impetus they acquire in their deſcent, carry down and ſink all the ſolid corpuſcles they meet with in their way; ſo that the corpuſcles being thus forced down, and kept there by this adventitious liquor, cannot mount up into their former ſituation.

To try the truth of this reaſoning by experiments, not only acid ſpirits, but even mere water, will be found to precipitate tinctures of vegetables extracted by ſpirit of wine; and the very ſame tinctures, extracted with water or wine, are precipitated very copiouſly by acid ſpirits, which are heavier.

Metals, when diſſolved in ſpirit of ſal ammoniac, are precipitated with oil of vitriol, or ſpirit of nitre. When ſuſpended in aqua fortis, they are precipitated with oil of vitriol, or bezoardic ſpirit of nitre.

As to bodies ſuſpended by means of their union with other lighter ones: this is properly the caſe of diſſolved metals; and to this may the laſt caſe of *precipitation* be reduced. Here the particles of a metal being ſeparated by a diſſolvent, and rendered imperceptible by their extreme littleneſs, only float, becauſe united to very light particles of the acid ſpirit, which keeps them ſuſpended; though the great ſurface they have, both on account of their ſmallneſs, and of their union with the acids, frequently contributes to the effect.

Now, as they are in a forced equilibrium with the fluid wherein they ſwim, and as the cauſes that ſuſtain them are only accidental, they muſt of courſe be precipitated to the bottom, when the acid or menſtruum abandons them, from whatever cauſe it be: it is even ſometimes ſufficient, that the quantity of the fluid, wherein they are ſuſtained, be diminiſhed. For then ſeveral of the metallic particles, though ſtill joined to their acid, coming to meet and unite, aſſume a ſmaller ſurface, with regard to their maſs; and thus, being no longer held up by the largeneſs of their ſurfaces, they ſubſide to the bottom. When the menſtruum abandons a diſſolved body, if that body be lighter than the menſtruum, the contrary to *precipitation* will enſue; i.e. the body will riſe to the ſurface: thus camphor being mixed in oil of olives, and the whole diſtilled, the camphor riſes firſt, &c.

If it happen, that the particles, when abandoned by the diſſolvent, are equally heavy with the ſuſtaining fluid, they will neither riſe nor fall; only ſeveral of them, now reuniting, form little maſſes, ſufficient to ſpoil the limpidneſs and tranſparency of the fluid, as is the caſe in refin diſſolved in ſpirit of wine, and water poured over them; where the water united cloſely with the ſpirit of wine, makes it let go the greateſt part of the reſinous particles. Thus is effected what we call an *imperfect precipitation*, which, in reality, is no more than a diſpoſition to precipitate.

If, in this caſe, the aqueous particles of the fluid be hid, and, as it were, abſorbed among the groſs moleculæ of the diſſolved matter, it forms what they call a *coagulum*. See COAGULATION.

Sometimes, when the liquors are poured on one another, the ſalts with which they abound, being put into motion, by their attractive force, they run mutually to embrace one another; and becauſe they do not recoil far back after the congreſs, they are at length ſo united, as to become like a ſolid, there being very little phlegm remaining, as is very obſervable in tartarum vitriolatum.

In theſe experiments there happens ſuch a conflict and effervescence, as evaporates almoſt all the moiſture with which the ſalts are diluted. And upon this depends the rationale of chemical coagulation, a thing of very great conſequence in the buſineſs of *precipitation*. Nor can we account for oil of tartar's precipitating bodies diſſolved in acids, any otherwiſe than from its making a kind of coagulum with their corpuſcles, and thereby becoming too heavy for, and exceeding the tenacity of the MENSTRUUM.

Such are the general principles of *precipitation*, propoſed by ſome mechanical writers (ſee ATTRACTION); but the chemiſts admit of no other theory of *precipitation* beſides that which refers this phenomenon to the laws of AFFINITY.

A ſatisfactory explication of this chemical proceſs, according to theſe laws, is yet among the deſiderata in ſcience. The reader may find an hypotheſis relating to it in the Chemical Dictionary, Eng. edit. art. *Gravity*. Where the author obſerves, that the force which unites the principles of a compound body to each other, ought to become ineffectual when, on one ſide, the tendency of the parts of theſe principles is entirely exhauſted by their union; and when, on the other ſide, to this compound is applied another body, with the parts of which thoſe of one of the principles of the compound may contract an union, infinitely ſuperior to that which they had with the part of the other principles of the compound. In this caſe, the principles of the compound muſt evidently be diſunited; one of theſe principles muſt form a new compound with the new ſubſtance applied to it; and the moleculæ of the other principles, being now diſengaged, muſt exerciſe their tendency upon each other, and form ſmall aggregates; which, when they have arrived at a certain maſs, muſt yield to the gravity by which they tend to the centre of the earth. Thus, he ſays, we may conceive how *precipitations* are effected.

PRECIPITATION, in *Aſſaying*, is the ſeparation of any part of a compound body, while melting in the fire, or when cooling from fuſion from the reſt of the maſs, in ſuch manner that it ſinks to the bottom, while the remainder continues at top and makes the ſurface. The heavy part thus *precipitated* from the reſt, is called the *regulus* of that body.

This is an operation which almoſt always requires the addition of ſuch ingredients, as ſerve to take away the mutual connection and coherence of the parts of the body to be ſeparated; that is, ſuch as have a menſtrual virtue, and keep others in a ſtate of diſſolution. For inſtance, the reguline part of antimony, and mineral ſulphur, diſſolve each other mutually, and conſtitute crude antimony; nor can they be ſeparated from each other by fire alone, without deſtroying the regulus; but if you add iron, copper, ſilver, &c. which are more thoroughly penetrated by ſulphur, and are thus reduced to the ſtate of ore, then the regulus of antimony is freed of its ſulphur, and ſinks to the bottom, as it is heavier than the additional bodies, when joined to the ſulphur.

Such a *precipitation by fuſion* happens in vitrifications, ſcorifications, and coppellings, while one part of the body turns into droſs, or *ſcoria*, and the other metallic part, if there be any, keeping ſtill its metallic form, is collected at the bottom of the ſpherical veſſel. Therefore ſilver and gold, which are hardly ſubject to a perfect vitrification, conſtantly remain and ſhew themſelves in their own form; and on this account, though they were in ever ſo ſmall a quantity in a *coppel*, they always ſhew themſelves very clearly to the eye when the *ſcoriæ* are abſorbed; whereas ſo ſmall a regulus of the other metals would have been as it were buried and hidden under ſo great a quantity of *ſcoriæ*.

Nor is *precipitation by fuſion* leſs neceſſary to obtain almoſt all the other metals, which, on this account, are called leſs perfect, unleſs perhaps you except a very ſmall quantity of native metal, which nevertheleſs can ſcarce be properly called pure. Beſide they are all to be had either in form of earth, or of that of a ſolid ore. In the firſt caſe you may make a glaſs by a bare fuſion: in the ſecond, if the ſulphur and arſenic, which, together with the metallic part, conſtitute an ore, are diſſipated in roaſting, the ore, deſtitute of the oily phlogiſton, becomes glaſs in a pure fire, which glaſs may be mixed with unmetallic ſtones and earths; but by adding a phlogiſton or inflammable principle to it, this metallic glaſs is again reduced to its metalline form; and ſo long as it keeps under this form it cannot be united with the glaſs of the other ſpecies, but ſinks to the bottom of it, except only a very ſmall quantity of it, which is detained by the clamminеſs of the glaſs. The *precipitating* body in this caſe, therefore, is truly the phlogiſton, or inflammable principle: any body that takes away the connection, by the removal of which a *precipitation* is made, is properly called the *precipitating* body.

Precipitation of ſolid bodies from fluid menſtrua is performed either by extracting, or evaporating over a gentle fire, the diſſolving menſtruum out of the diſſolved fixed body, or by adding ſuch a body, as is greedily diſſolved by that menſtruum: as if one metal diſſolved by an acid is *precipitated* by another metal, or by an alkaline ſalt; for inſtance, ſilver diſſolved in aqua fortis is *precipitated* by copper, copper by iron, iron by zinc, and all metals and ſemi-metals, either partly or entirely, by pot-aſhes, volatile, and urinous ſalts.

A *precipitation* is alſo made by pouring on a ſolution ſuch things as either cannot diſſolve the body in hand, whether alone, or joined to a menſtruum that contains the ſaid body; or diſſolve it in another manner; or in a leſſer quantity than if the menſtruum had been uſed pure. In the firſt caſe a total *precipitation* is performed, as may be

teen in the *precipitation* of silver out of aqua fortis, by means of spirit of salt. In the second, a great deturbation and *precipitation* is made, but a second solution soon follows, as it happens when iron being dissolved in aqua fortis, you add to it, in a proper manner, a liquor perfectly free from alkaline fixed salt; but then there remains usually a certain part which is not perfectly dissolved a second time. In the third case there is but a partial *precipitation* made. You have an instance of this, if mercury dissolved in aqua fortis, and the menstruum thoroughly saturated with it, is *precipitated* either by common salt, or sal ammoniac, or by their acid spirit. A *precipitation* is also sometimes made only by adding a large quantity of fair water to dilute; such is that made on the regulus of antimony dissolved in spirit of common salt, or in aqua regia, when a large quantity of cold water is poured on this solution; for these menstrua do not dissolve this semimetal, unless concentrated.

All these *precipitations* are promoted greatly by a gentle heat, by means of which the *precipitating* body enters more easily into the menstruum, and a considerable quantity of water is next necessary to dilute with, except in the *precipitations* of the first kind; for most commonly the more concentrated dissolutions assume the consistence of a paste so soon as the *precipitating* body is added to them, which hinders this from mixing equally with the solution. Cramer.

PRECIPUT, q. d. *præcipuum*, formed from *præcipuus, principal*, in the *French Jurisprudence*, an advantage belonging to any one, in a thing to be divided, or a portion taken off, and set by, in his favour, before the division made.

In noble partition, the eldest has always the principal fief, or manor, for his *præciput*. In which view, the *præciput* coincides with the right of primogeniture.

PRECISION, *præcisio*, in the *Schools*, the same with ABSTRACTION.

PRECISION, in *Writing*, denotes such a brevity as consists in saying nothing superfluous, and omitting nothing that is necessary. In this sense it is opposed to a tedious prolixity on the one hand, and an obscure conciseness on the other.

PRECONISATION, a proposition or declaration, which the cardinal patron makes in the consistory at Rome, of a person nominated by some prince to a prelature, by virtue of letters whereof he is the bearer; which the pope complying with, gives his collation.

The date of the bulls is dispatched on the same day with the *preconisation*.

PRECONTRACT, *præcontractus*, a contract made before, or prior to another; chiefly used in relation to MARRIAGES.

PRECORDIA, or PRÆCORDIA, &c. the parts about the heart, e. gr. the pericardium, the diaphragm, the hypochondria, and even the heart itself, with the lungs, spleen, &c.

The word is also ordinarily used for the fore-part of the region of the THORAX.

Pliny, and some other authors, use it for all the viscera, or entrails: *Præcordia vocamus non nomine extà in homine.*

One of the principal differences between men and brutes consists in this, that there is a greater correspondence and communication between the head and heart of the former than of the latter; which correspondence is effected by means of a greater number of nerves, sent from the brain to the heart and *præcordia*; brutes only receiving nerves to the *præcordia* by the branches of the par vagum; but man, likewise, by the intercostal pair.

The reason, Dr. Willis well observes, is, that brutes, being void of discretion, and but little subject to passions, need not, like man, a double passage for the spirits, the one for the service of the vital functions, the other for the reciprocal impressions of the affections.

PRECURSOR, *præcursor, forerunner*, in *Theology*, a person who goes before any one to notify his coming.

The term is peculiarly applied to St. John Baptist, who is styled the *precursor* of Jesus Christ, from what is said of him by St. Luke, *Thou, child, shalt go before the face of the Lord, to prepare his way.*

PREDECESSOR, a person who has preceded another in the same office or employ. See ANCESTOR.

PREDESTINARIAN, a person who adheres to the doctrine of absolute predestination.

St. Augustin is looked on as the founder of the sect of *Predestinarians*, he being the first of the fathers that seems to have asserted the doctrine in such express terms; though the JANSENISTS and JESUITS are still greatly divided about the real doctrine of St. Augustin, in this article, each interpreting him consistently with their own scheme.

Father Sirmond contends for an ancient sect of *Predestinarians*, or *Predestinati*, *Prædestinatiani*, contemporary with St. Augustin himself, and who had their rise in Africa, in the monastery of Adrumetum, from a false understanding of St. Augustin's doctrine. Hence they were led into a notion, that God not only predestinated the wicked to eternal punishment, but also to the sins and transgression for which they are punished; and thus both the good and bad actions of all men were determined from eternity by a divine decree, and that by an inevitable necessity.

It is added, that the opinion spread thence throughout the Gauls, where one of them, a priest, named Lucidus, was condemned by Faustus, bishop of Rheggio, and his sentence was confirmed by two councils.

However the existence of this *Predestinarian* sect has been denied by many learned men, particularly the president Maucuin, and considered as an invention of the SEMIPELAGIANS, designed to decry the followers of Augustin, by attributing to him unjustly this dangerous and pernicious error. Nor does it appear, though there might have been persons who embraced the *Predestinarian* opinions, that the abettors of them ever formed themselves into a sect.

The doctrine was again broached in the ninth century, by Godeschalcus, a Benedictine; who, as Hincmar, in a letter to pope Nicolas, says, maintained with the ancient *Predestinarians*, who had been already anathematized, that God *predestinated* some to eternal life, and others to eternal death; that God did not will all people to be saved; that Jesus Christ did not die for all, but only the elect, or those that are saved, &c.

This doctrine was again condemned in a synod held at Mentz, A. D. 848, and by a council at Quiercy, A. D. 849, in consequence of which Godeschalcus was treated with the utmost barbarity, and compelled to burn with his own hands the justification of his opinion, which he had presented to the council at Mentz. He was then cast into prison, where he died in the year 868 or 869, maintaining with his last breath the doctrine for which he had suffered.

The decrees of the former council were confirmed in a new council which met at Quiercy, A. D 853, but they were declared null by a council assembled at Valence, A. D. 855, and the decrees of this council were confirmed by the council of Langres, in the year 859, and in 860 by the council of Tousi.

This controversy was revived in the sixteenth century by Calvin, who maintained, that the everlasting condition of mankind in a future world, was determined from all eternity; and that God, in predestinating from all eternity one part of mankind to everlasting happiness, and another to endless misery, was led to make this distinction by no other motive than his own good pleasure and free will. This opinion was, in a very short time, propagated through all the reformed churches, by the writings of Calvin, and by the ministry of his disciples, and, in some places, was inserted in the national creeds and confessions; and thus made a public article of faith.

The unhappy controversy, which took its rise from this doctrine, was opened at Strasburg, in the year 1560, by Jerome Zanchius, an Italian ecclesiastic, who was particularly attached to the sentiments of Calvin, and carried on in a manner that contributed very much to exasperate the passions and foment the discord of the contending parties.

The *Predestinarian* opinions have been maintained by considerable numbers, both in popish and protestant countries: and in our own country in particular, they have had many zealous advocates.

We shall here observe, that they have undergone a kind of relaxation by those who have been denominated *Baxterians*, from the famous nonconformist minister, Mr. Richard Baxter, of the last century. The Baxterians have endeavoured to strike into a middle path between Calvinism and Arminianism, and to unite both these schemes. They profess to believe in the doctrines of election, effectual calling, and other tenets of Calvinism; and, consequently suppose, that a certain number, determined upon in the divine counsels, will infallibly be saved. This they think necessary to secure the ends of Christ's interposition. But then, on the other hand, they reject the doctrine of reprobation, and admit, that our blessed Lord, in a certain sense, died for all; and that such a portion of grace is allotted to every man, as renders it his own fault, if he doth not attain to eternal happiness. If he improves the common grace given to all mankind, this will be followed by that special grace which will end in his final acceptance and salvation. Whether the Baxterians are of opinion, that any, besides the elect, will actually make such a right use of common grace, as to obtain the other, and, at length, come to heaven, we cannot affirmedly say. There may possibly be a difference of sentiment upon the subject, according

as they approach nearer to Calvinism or Arminianism. Kippis's Ed. of the Biog. Brit. art. *Baxter*.

PREDESTINATION, *prædestinatio*, in *Theology*, a judgment, or decree of God, whereby he has resolved, from all eternity, to save a certain number of persons, hence named elect.

Others define *predestination*, a decree to give faith in Jesus Christ, to a certain number of men, and to leave the rest to their own malice and hardness of heart.

According to the Calvinistical scheme, the reason of God's predestinating some to everlasting life is not founded in a foresight of their faith and obedience, considered as independent upon any communication of grace from him, but is to be referred to his sovereign mercy and free grace; nevertheless, it is also maintained on this scheme, that the means are decreed as well as the end, and that God purposes to save none but such as by his grace he shall prepare for salvation by sanctification.

The Remonstrants define *predestination* more laxly and generally, the decree of saving believers, and damning unbelievers.

Some represent the election and *predestination* spoken of in Scripture, as relative only to nations, and not to particular persons.

The greatest difficulties wherewith the modern theology is clogged, turn on the article of *predestination*: both the Romish and reformed churches are divided about it: the Lutherans speak of it with horror; the Calvinists contend for it with the greatest zeal; the Molinists and Jesuits preach it down as a most dangerous doctrine; the Jansenists assert it as an article of faith: the Arminians, Remonstrants, and Pelagians, are all avowed enemies of *predestination*.

Those strenuous patrons of Jansenism, the Porroyalists, teach, that God *predestinates* those who he foresees will co-operate with his grace to the end. Du Pin adds, that men do not fall into sin, because not *predestinated*; but they are not *predestinated*, because God foresaw their sins. See ELECTION, and REPROBATION.

PREDESTINATION is also used for a concatenation of second causes appointed by Providence: in virtue whereof, things are brought to pass by a fatal necessity, contrary to all appearances, and in spite of all opposition. See FATE, NECESSITY, and LEIBNITZIAN *Philosophy*.

The Turks are great *Predestinarians*; they esteem the slightest accident predetermined, and on this account, are much more daring in battle, and run greater risks of their lives, than they would otherwise do.

PREDETERMINATION, *predeterminatio*, in *Philosophy* and *Theology*. The schoolmen call that concurrence of God, which makes men act, and determines them in all their actions both good and evil, *physical predetermination*, or *premotion*.

Divines hold, that God hath no part in sin, inasmuch as he only affords his concurrence to the physical part of human actions, not to the *moral* part.

Physical predetermination, or *premotion*, if there be any such thing, is that action of God, whereby he excites a second cause to act: or by which, antecedently to all operations of the creature, or before it could operate in consequence either of the order of nature or reason, he really and effectually moves, and occasions it to produce all its actions: that is, whatever the creature does or acts, is really done and acted by the agency of God on the creature, who is all the time passive. So that, without such *predetermination* of God, all creatures must remain in an eternal state of inactivity; and with such *predetermination* it is impossible but that they should do what they are thus put upon doing.

It is strongly controverted, whether or no such a *physical predetermination* be necessary to the action of natural causes: the Scotists maintain the negative; urging, that all natural causes are of their own nature determined to a certain action; whence it should seem needless to call in a new *predetermination* of God, e. gr. to fire, to make it warm the hand. For if an object be, by the course of divine providence, applied to fire; what need a second application of the fire, to make it warm the object applied thereto? since beings are not to be multiplied unnecessarily.

And such *predetermination* some philosophers hold still less requisite to produce the acts of the will: at least, say they, the human mind must be allowed the common power and privilege of a second cause, and therefore be intitled to produce its own acts, as well as other strictly natural agents.

The Thomists, on the other hand, stand up strenuously for the *physical predetermination*: one of their principal arguments is drawn from the subordination of second causes to the first. Where there are several subordinate agents, say they, the lower agents do not act, unless first moved and determined thereto by the first; this being the very essence of subordination.

Again, the like they argue from the dominion of God over all his creatures: it is of the essence of dominion, say they, to apply and direct things subject thereto, to its own operations; and this, if the dominion be only moral, morally; but if it be also physical, physically. And that this is the case in respect of God, and his creatures, is confessed. See LIBERTY, and NECESSITY.

PREDIAL *tithes*, *decimæ* PRÆDIALES, are tithes paid of things which grow from the ground only, as corn, grass, hops, and wood. See TITHE.

PREDIATORY *debts*. See DEBT.

PREDICABLE, PREDICABILE, in *Logic*, a general quality, or epithet, which may be predicated of, or applied to, several subjects.

Thus animal is *predicable* both of man and beast: man is *predicable* of Peter and James: triangle is *predicable* of a hundred different kinds of figures, as right angled, scaleneo, isoceles, &c.

The schoolmen reduce the *predicables* to five classes; viz. *genus*, *species*, *proprium*, *differentia*, and *accidens*; under one or other of which all that can be *predicated* of any subject, is included.

A *predicable* is also called *universale logicum*, as having reference to other particular, and inferior or subject things: thus animal is an universal, with regard to man and beast. It is called a *logical universal*, to distinguish it from a metaphysical one, which is a common being considered in itself, and therefore denominated universal in essence: whereas the logical one is only universal as to our conception and application.

Among the schoolmen, *predicable* is usually defined *unum, aptum* prædicari *de multis, universe, & divisim*—or, somewhat more clearly, a *predicable* is a nature which may be predicated univocally of all things to which it is common, and which, as it is dividually multiplied in all its subordinates, may be aptly predicated of them all.

Thus, when the appellation of *virtue* is attributed to justice, prudence, temperance, fortitude, charity, &c. the same reason may be given why each is distinguished by such name, as being all founded in a mediocrity, and being agreeable to right reason, which is the character of virtue.

Hence, if there be several things called by some common name, but the reason of such name is not the same in all, but different; those do not come under the name of *predicables*. As in the instance, *canis*, *dog*, which is both applied to a domestic animal, distinguished by its barking; to a constellation of the heavens; and to a sea-fish.

The way by which the mind comes to form such *predicables*, or universals, is this: among those things which fall under our observation, we find some characters and properties common to several, and others peculiar to each; what we find common, we consider apart, and thus we form an UNIVERSAL equally applicable to all.

PREDICABLY, *prædicabiliter*, is used in the schools in opposition to *predicamentally*. Thus, matter is said to be united to form *predicably*, or *per accidens*, to exclude the notion of a predicamental accident.

PREDICAMENT, *prædicamentum*, in *Logic*, a class or order of beings, or substances, ranged according to their natures, called also CATEGORY, and sometimes *categorema*.

The word *predicamentum* was first introduced by Boethius, in lieu of the Greek κατηγορια; and is used among the school-writers with a good deal of latitude and variety: for it either signifies the act of *predicating*, or the common *predicate* itself; or, the genus or basis of any category; or the collection of several common predicates disposed in a certain order: which last is its more usual acceptation.

Hence some define *predicament*, a series of predicates traced from the genus, or highest term, through all the inferior genera and species. Thus, a series of *substance* drawn from *substance* through *body*, *living*, *animal*, *man*, to *Peter*, is called the *predicament* of substance.

The usual definition among logicians is, that *predicament* is a natural order or scheme, of some most general or universal thing, and of all that is contained under the same, that is, all the subordinate genera, species, and individuals.

The properties of a *predicament*, *ex parte vocis*, i. e. of the term or word whereby the *predicament* or *predicamental* series is denoted, the logicians hold, are, that it be *one*, *simple*, *precise*, and *concinnous*.

Vox una, & simplex, rebus concinna locandis.

The conditions requisite *ex parte rei*, or of the thing to be ranged in a *predicament*, are contained in the following verse:

Entia per se, finita, realia, tuta;

i. e. it must be a *positive being*, in exclusion of non-enti-

ties, negations, privations, impossibilities, &c. and a being *per se*, to exclude accidental things, factitious things, &c. and *finite*, that is, of a limited nature and extent, to exclude God, and other transcendentals: *real*, since its intention is for the better and more commodious disposing of things in their places, to be the more distinctly known and conceived; and *whole*, or complete, as not being in the relation of a component part, or as only necessary to some other.

PREDICAMENT, *post.* See POST *Predicament.*

PREDICAMENTAL *accident.* See ACCIDENT.

PREDICATE, *prædicatum*, in *Logic*, that part of a proposition which affirms or denies something of the subject. Thus, in *God made the world*; *made the world* is the *predicate*; and *God* is the subject.

A *predicate*, say the schoolmen, is properly a name *predicated* or spoken of another, as its subject: as *man*, in the proposition, *Peter is a man.*

It is a celebrated rule or law of *predicates*, that nothing is esteemed to be absolutely spoken or affirmed of another, unless it be affirmed thereof in such manner, or by such an affirmation, as wants nothing either in the subject, *predicate*, or copule, to make it true.

This also is noted properly of a *predicate*, that it contains, in some measure, its own subject: thus metal contains gold, copper, iron, &c. of which it is *predicated.*

The word *predicate* is sometimes used indifferently with *attribute*; but the more accurate writers make a distinction. Every *predicate* is indeed an attribute, since whatever is *predicated* of a thing, is attributed to it: so, if animated be *predicated* of man, it is also attributed to him: but every attribute is not a *predicate*: thus soul, learning, &c. are attributed to man, but not *predicated* of him.

PREDICATING, in *Logic*, is properly the act of affirming or denying somewhat of something. As, *Man is not a stone*; *body is a substance.* The thing thus predicated, is called *predicate.*

In the doctrine of universals, or predicables, to *predicate* is to speak or declare a thing truly, directly, and affirmatively. Thus man is *predicated* of several, i. e. it is truly and directly affirmed that these several are men; as when I say, *Socrates is man*, *Plato is man*, *Aristotle is man*, &c.

The things *predicated* of others are reducible to three classes: *genera*, as animal, of man, &c. *forms*, as whiteness, of a swan, &c. and *equals*, of things of equal extent, as species, difference, proprium, &c.

The schoolmen distinguish several ways of *predicating*, as, 1. *In quod tantum*, which is to *predicate* essentially, both as to the thing and the manner, as, *justice is a virtue.* 2. *In quale tantum*, which is to *predicate* accidentally, both as to the thing and the manner, as *Peter is learned.* And 3. *In quale quid*, or *in quale post quid*, which is to *predicate* both essentially and accidentally, as, *man is rational.*

PREDICTION, *prædictio*, divination, prophecy, or foretelling of what is to come, either by divine revelation, by art and human invention, or by conjecture. See DIVINATION, and PROPHECY.

PREDOMINANT, *prædominans*, that which prevails, appears most, or has some superiority or ascendency over another thing.

PREDY, a sea word signifying the same as *ready.* Thus, *ready the ship*, or *ready the ordnance*, is as much as to make things ready for a fight. *Ready the hold*, is to lay or stow every thing there in its due order and proper place.

PRE-EMPTION, *præemptio*, a privilege anciently allowed the king's purveyor, of having the choice and *first buying* of corn, and other provisions for the king's house, but taken away by the stat. 12 Car. II. cap. 24.

PREENING, in *Natural History*, the action of birds, cleaning, composing, and dressing their feathers, to enable them to glide more easily through the air.

For their use herein, nature has given them an admirable piece of furniture; viz. two peculiar glands, which secrete an unctuous matter into an oil-bag, perforated; out of which the bird, on occasion, draws it with his bill.

PRE-ESTABLISHED *harmony.* See HARMONY.

PRE-EXISTENCE, *præexistentia*, the state of a thing actually in being before another.

The ancient PYTHAGOREANS and PLATONISTS all asserted the *pre-existence* of human souls, i. e. that they were in being before they were joined to our bodies.

Origen also held the eternal *pre-existence* of souls.

The orthodox believe, that God created the world out of nothing; and not of a *pre-existent* matter.

Some persons have held mankind *pre-existent* to Adam. See PRE-ADAMITE.

PREFACE, *præfatio*, formed from *præ*, and *fari*; q. d. *to speak before*, an advertisement in the beginning of a book, to inform the reader of the design, order, method, &c. observed therein; of what is necessary to receive its full effect, and facilitate the understanding thereof.

There is no part of writing that requires more art and address, or that fewer authors succeed in, than *prefaces.* Prefacing is, in effect, a particular species of writing, and has its peculiar character and taste, to distinguish it from all others. It is neither argumentation, discourse, narration, nor apology.

PREFACE *of the mass.* The Romanists call that part of their mass, which precedes the consecration, and which is to be rehearsed in a peculiar tone, *preface.*

The use of *prefaces* in the church, they contend, is very ancient; and conjecture, from some passages of St. Cyprian, &c. that it was in use in the time of the apostles.

The *preface* to the mass anciently had and still has very different names in different churches. In the Gothic, or Gallican rite, it is called *immolation*; in the Mozarabic rite, *illation*; anciently among the French, it was called *contestation*; in the Roman church alone, it is called *præfatio*, *preface.*

PREFECT, *præfectus*, in ancient Rome, was one of their chief magistrates, who governed in the absence of the kings, consuls, and emperors.

His power was somewhat different at different times; but was always greatest under the emperors. His principal care was the government and administration of the city of Rome.

He took cognizance of all crimes committed in the city, and within a hundred miles thereof. He judged capitally and finally, no appeal lying from him; and even by the sixty-second novel, he presided in the senate, taking place before all the patricii and consulares, &c.

He had the superintendence of the provisions, policy, buildings, and navigation.

There is still a *prefect* of modern Rome, who is a kind of governor, differing little from the ancient *præfectus*, except that his authority only extends to forty miles round the city, whereas that of the *prefect* of ancient Rome reached one hundred miles round.

PREFECT *of the prætorium*, *præfectus prætorii*, or *præfectus prætorio*, was the chief or leader of the prætorian bands, or cohorts, destined for the emperor's guard.

The prætorian legion, according to Dion, consisted of ten thousand men. Suetonius refers the institution of *præfectus prætorii* to Augustus. It is added, that he was usually taken from among the Roman knights.

By the favour of the emperors, his authority grew very considerable; insomuch, that he became the arbiter and supreme judge of all affairs.

To reduce this extravagant authority, Constantine divided the *prefecture* of the prætorium into four *prefectures*; and each of these he again subdivided into civil and military departments; though the name was only referred to him who was invested with the civil authority; and that of *comes belli* given him who had the command of the cohorts. See COUNT.

Thus the office of *prefect* of the prætorium, which in its origin, and till the time of Constantine, was military, and succeeded to that of *magister equitum*, now commenced a purely civil magistrature; and at length became the prime dignity of the empire.

The succeeding emperors, following Constantine's division, divided the empire into four *prefectures prætorii*, as into four dioceses; viz. the Gauls, Illyria, Italy, and the East. See DIOCESE.

The provinces whereof these dioceses consisted, had their particular governors; at the head of whom was the *prefect*, who, though he had not the command of the army, yet had the power of the sword, decided ultimately of all causes, and had all the marks and honours of sovereignty.

Justinian created a fifth *prefect* of the prætorium for the government of Egypt, which had been torn off from the diocese of the East by the invasion of the Vandals during the empire of that prince.

Under Augustus, the officer sent to govern Egypt with a proconsular authority, was called *præfectus Augustalis.* There were also several other officers distinguished by this appellation: such as *præfectus ærarii*, ordained by Augustus to supervise and regulate the public fund, which he raised for the maintenance of the army; the *præfectus alæ* appointed by the Roman consul to govern each principal division of the allies; the *præfectus classis* or admiral; the *præfectus fabrum*, who had the care of the arms, and of every thing that related to military expeditions; the *præfectus frumenti*, appointed by Augustus to inspect and regulate the distribution of corn among the common people; the *præfectus militum*, to which class belonged three different officers, viz. the *prefect* of a cohort, of a camp, and of a legion; the *præfectus vigilum*, appointed by Augustus to command the soldiers who watched the city, and whose business was to take cognizance of thieves, incendiaries,

incendiaries, idle vagrants, &c. and to punish all petty misdemeanours that were thought too trivial to fall under the notice of the *prefect* of the city, &c.

PREFECTURES, or *præfecturæ*, were certain towns of Italy, whose inhabitants had the title of Roman citizens; but were allowed to enjoy neither their own laws nor magistrates, being governed by annual prefects sent from Rome. These were generally such places as were either suspected, or had some way or other incurred the displeasure of the Roman state; this being accounted the hardest condition that was imposed on any people of Italy.

PREFIX, in *Grammar*, denotes letters or syllables prefixed to words: these are common in the Hebrew, and opposed to AFFIXES.

PREGADI, in *History*, a denomination given to the senate of Venice, in which resides the whole authority of the republic.

At its first institution it was composed of sixty senators, to whom sixty more have been added.

PREGNANCY, the state of a woman when she has conceived, or is with child.

The same state with a view to the bearing of the child in the womb, is called *gestation*.

This is a time in which women suffer many disorders, which though no way to be cured absolutely but by childbirth, yet may be greatly mitigated by medicines. Before any one venture to do any thing, however, in these or the like cases, it is very necessary to be perfectly assured, whether the patient is with child or not; and this is known by the following symptoms, in cases where there is no occasion for dissimulation, or no other distemperature joined with this; but when the woman chuses to conceal it, and there is a complication of disorders, the utmost proofs amount but to presumptive ones.

The stoppage of the menstrual discharges is the first sign of it, provided that there be no other apparent cause. But this, though the most plain and obvious symptom, is by no means a certain one; for a suppression of this kind may happen from latent causes. A second symptom is, a particular nausea at the sight of meat, or even the smell of it, while the person is otherwise well in health, and can eat heartily of other foods. A third symptom is, a swelling of the belly; which appears regularly round or globose, not irregularly protuberant, as in the case in disorders of the liver, and other viscera. This swelling, also, increases placidly, and without the legs swelling, or any other symptom, if the person is otherwise in health. After this, the twentieth week of *pregnancy* gives the most certain of all the signs, the motion of the fœtus; but this is not to be distinguished without particular attention and care, from motions of the bowels in flatulencies, which often so much resemble it as to deceive the unwary.

If the mother has a mind to hide the symptoms, the thing may, however, usually be found out at this period; for if a cold hand be laid upon the the belly when warm, or a warm hand when it is cold, the fœtus usually soon stirs, and the very figure and appearance of the belly will give very probable assurances to a person accustomed to such inspections.

In cases of a certain conception, a living fœtus is only to be distinguished from a mole or false conception by its moving; therefore when a person grows toward the full time, without ever perceiving the child to stir, it is very much to be suspected that it is a mole; which also is the more probable, if the menstrual discharges have come on at times and irregularly, during the time, and the swelling of the belly be irregular, the woman subject to violent flatulencies, and especially if she go beyond the natural period of nine months.

These symptoms are not all, however, to be expected in every *pregnant* woman; for many of the laborious part of the lower class of life, go through their whole time in the midst of fatigue and trouble, and that without any of these symptoms; so that they are in a great measure to be attributed to the course of life, not the course of nature, in the *pregnant* women of better fortunes. Those women are most subject to them who are of a tender and delicate frame, and those who are of a plethoric habit, an idle life, or given to intemperance, or subject to passions of various kinds, fear, anger, grief, or the like.

These are the more natural and less troublesome symptoms of gravidation, but this time is frequently attended with others more troublesome or hurtful, which art is able in some degree to mitigate. Some are subject to violent hæmorrhages at the nose, which are to be treated in the common way, and are usually as easily cured as any other complaints of that kind. In others the hæmorrhoidal discharges are very large during the time. These are to be assuaged by giving powder of nitre, cinnabar, and crab's eyes, once or twice a-day. Some are also subject to an hæmorrhage of the uterus itself, but this very rarely happens; when it does, it may be owing to two causes, and therefore appear in two manners. In the first it flows as in the common way of the menstrual discharges, during the first months of *pregnancy*, and by that means greatly disturbs the regular calculation of the time. In the other case it stops during the first months, but comes on again about the middle of the time, or later than that, and in this case it usually continues regularly to the time of delivery; both these cases bring on great danger of miscarriages. In these cases, nitrous, cinnabrine, and absorbent medicines are to be given; to these are to be added corroborating ones, and bleeding in the arm must never be omitted.

Headachs often also attend women during their *pregnancy*: these are principally owing to occasional causes; such as violent emotions either of the body or mind, an improper cooling of the lower parts of the body, or the drinking spirituous liquors. The method of taking off this troublesome symptom is, by giving the attemperating and nitrous medicines, with laxatives of the most gentle kind, and externally the head should be rubbed with spirit of wine and camphor, if the person can bear the smell of it, which often in this case they cannot.

A weariness and lassitude of the limbs is another very common and very troublesome accident attending *pregnancy*, and is to be remedied by proper bleedings and gentle exercise; and if these fail, the nitrous powder before given may be added to quiet the emotions of the blood, and this usually takes effect.

A dry cough and difficulty of breathing are also not unfrequently attendant on this state: these require the same methods; but when the difficulty of breathing comes on after meals, the saline and digestive powders may be given in small doses; such as the vitriolated tartar, with the nitrous and absorbent powders; and when it comes on only in the latter months, and arises merely from the pressure of the distended uterus, there is no cure but patience till the time of delivery; when the symptom always goes off of itself on the subsiding of the womb. Junck. Consp. Med. p. 701.

Abortion may happen at any period of *pregnancy*, but it is most common in the second and third month. Sometimes, however, it happens in the fourth or fifth; and those which happen in the sixth or in later months, are most dangerous. If abortion happens within the first month, it is usually called a false conception; if after the seventh month, the child may often be kept alive by proper care.

The miscarriage of *pregnant* women is principally owing to a plethora, and is most frequent with young plethoric women, in the first months of their *pregnancy*. There are, however, several other causes which concur to it; such are, any violent passions of the mind, as sudden anger, fear, or the like; an habitual great discharge at the time of the menses, a high-seasoned diet, with much wine or other strong liquors; the taking of strong purges, or violent emetics; diarrhœas, especially when of long continuance and of the aromatic kind, as they drain off the nourishment from the fœtus; a tenesmus, or violent motion to stool, and hence the use of stimulating glysters may also bring on an abortion; as also any commotions of the body, such as running, leaping, the carrying heavy burthens, falls, or blows on the abdomen: a too frequent use of venery may also occasion it, as may also the effect of strong emmenagogues, copious bleeding in the foot, the smell of burning oil or any other stinking substance, nephritic complaints, cachexies, a fluor albus, or other disorders of the womb; the taking opiates, and the death, or great debility of the fœtus while in the womb. A miscarriage may also be occasioned either by too great a stricture or an extreme relaxation of the uterus. The signs of approaching abortion are pain in the loins; or about the bottom of the belly; a dull heavy pain in the inside of the thighs; a slight degree of coldness or shivering; sickness; palpitation of the heart; the breasts become flat and soft; the belly falls; and there is a discharge of blood and watery humours from the womb.

The best methods of preventing abortion, are the use of the attemperating and particularly the nitrous medicines after every commotion of the blood; bleeding at proper times, corroborating medicines, and the milder carminatives; and to these are to be added a temperance in diet, placid motion of the body, and chearfulness of mind. Egg-shells are by some greatly recommended, and by others the stones of raisins, which are indeed, manifestly astringent.

Women of a weak relaxed habit, should avoid excess in the use of tea or other weak and watery liquors, use solid food, rise early, and go to bed soon, shun damp houses, take frequent exercise in the open air, and shun, as much as possible, damp foggy weather. Women of a full ha-

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bit ſhould uſe a ſpare diet, avoid ſtrong liquors, and every thing that may heat the body or increaſe the quantity of blood. Their diet ſhould be of an opening nature, conſiſting chiefly of vegetable ſubſtances. When ſigns of abortion appear, the woman ought to be laid in bed or a mattraſs, with her head low: ſhe ſhould be kept quiet, and her mind ſhould be ſoothed and comforted. Her food ſhould conſiſt of broths, rice and milk, jellies, gruels, &c taken cold; nor ſhould ſhe be kept too hot. If ſhe be able to bear it, ſhe ſhould loſe, at leaſt, half a pound of blood from the arm. Her drink ought to be barley-water ſharpened with juice of lemon; or ſhe may take half a drachm of powdered nitre in a cup of water-gruel every five or ſix hours. If the woman be ſeized with a violent looſeneſs, ſhe ought to drink the decoction of calcined hartſhorn prepared. If ſhe be affected with vomiting, let her take frequently two table ſpoonfuls of the ſaline mixture. Opiates are generally of ſervice; but they ſhould be always adminiſtered with caution. Sanguine robuſt women, who are liable to miſcarry at a certain time of *pregnancy*, ought always to be bled a few days before that period arrives. Buchan.

Coſtiveneſs in the time of *pregnancy* is very common, and is uſually owing to the want of drinking and exerciſe; ſometimes, indeed, it is owing to the immediate preſſure of the womb upon the rectum; but this caſe is known from the others, as it is always attended with a teneſmus. This complaint is to be relieved by a lubricating diet, the drinking more liquids than before, and the uſing placid motion of the body, or gentle exerciſe. Gum ammoniacum is alſo found a very uſeful medicine in this caſe, and ſometimes gentle infuſions of ſena are neceſſary; but theſe can only be given in very ſmall doſes. Some uſe ſuppoſitors that are not acrid or pungent, and others glyſters of water-gruel.

Flatulencies are another very frequent complaint with *pregnant* women: theſe are removed by the milder carminatives, ſuch as orange-peel, pimpernel root, and the ſeeds of aniſe, ſweet fennel, &c. taken in powders or in decoctions.

Diarrhœas, in *pregnant* women, are uſually from the ſame cauſes with thoſe in other perſons; but they require in this caſe a very peculiar regard, as they, when long continued and accompanied with a teneſmus, uſually bring on abortion.

They are to be gently reſtrained, and finally ſtopped, in the following manner: ſtrengthening, carminative, and ſtomachic medicines are to be given, ſuch as candied orange-peel, preſerved ginger, calamus aromaticus, galangals and zedoary, and the marmalade of quinces; and while theſe are taken internally, balſams and ſtomachic plaſters applied to the ſtomach have alſo a very great effect.

The fluor albus. This is a complaint that very rarely affects women with child, eſpecially if their huſbands be honeſt; but when it does, it is very difficult of cure, becauſe the purging medicines neceſſary to be given in it are by no means to be allowed of in the time of *pregnancy*. In this caſe it can only be reſtrained by the uſe of correctives, deparatives, and carminatives: of this kind are infuſions of the bitter herbs, with pimpernel-root, balm, ſouthernwood, and white dead nettle-flowers; or theſe ingredients may be made into powders, and taken in red wine.

Beſides all theſe complaints, women in their *pregnancy* are ſubject to ſeveral others which depend upon the mere weight and preſſure of the uterus. Of this kind are:

Pains in the loins and back. Theſe are principally felt in the laſt months, when the belly is greatly ſwelled and drawn forwards; in others, at the ſame period, the belly itſelf is pained, and looks red in many places, as if it threatened to burſt.

Theſe complaints are made worſe by all motion, and they admit of no cure but child-birth, which immediately takes off the whole pain.

Various tumors of the legs. Theſe are alſo very common and very troubleſome, and in phlegmatic habits have alſo very frequently œdematous tumors joined with them; and in other perſons livid marks appear upon them, ſuch as are ſeen in others after bruiſes. Theſe diſtemperatures of the legs attend *pregnant* women at all times from the ſecond month to the time of delivery, and are owing to the preſſure of the uterus upon the iliac or crural veſſels. Theſe always go off on delivery, but in many perſons return again at every *pregnancy*: in ſome caſes they are ſo ſlight as not to be worth regard, in others they are very violent and painful; theſe are to be treated in the following manner: the common antiſpaſmodic powders are to be given internally once or twice every day, and externally, a moderate bandage, with camphorated medicines and friction: and if theſe fail, a liniment made of lime-water, oil of elder, and ſugar of lead, will be found of great ſervice; and when the perſon is delivered, gentle ligatures are to be uſed all up the leg, from the ankle to the knee. In order to prevent theſe tumors for the future, early in the time of *pregnancy* the perſon ſhould be blooded, the bowels are to be kept from coſtiveneſs, and it is a thing of the greateſt conſequence, that the perſon uſe herſelf to ſit upon a high ſeat, the low ſeats in which *pregnant* women uſually love to ſit making the belly preſs greatly more on the crural veſſels than they otherwiſe. Too much exerciſe alſo is to be avoided, and particular care taken that the womb is well cleanſed before the month of a former lying in is over.

Frequent deſire of voiding the urine often attends, and is very troubleſome to *pregnant* women; but eſpecially in the latter part of their time, particularly in the *laſt* weeks; if it happen ſooner, as it ſometimes does, it is owing to the womb's hanging too much downward, from a laxity of the ligaments. This is a complaint of no ill conſequence, and therefore, though troubleſome, is to be born with patience, delivery being its proper cure.

A ſtrangury and temporary ſuppreſſions of urine [illegible] alſo frequently to *pregnant* women. In theſe caſes [illegible]ders of nitre and cinnabar are to be given internally, and externally emollient cataplaſms are to be applied warm [illegible] the diſorder ceaſes.

Hæmorrhoids. Theſe in *pregnant* women often ſwell into a ſort of bladders, and are attended with a violent burning pain, and ſometimes with an ulcerous erоſion, and are uſually a very troubleſome complaint to perſons of plethoric habits. They are to be cured by giving internally nitrous and other attemperating medicines, and applying externally the unguentum linatre, made of the herb toad-flax, cut and boiled in lard. A decoction or extract of yarrow is alſo a good medicine.

Swellings of the feet are another of the troubleſome complaints that attend *pregnant* women. Theſe, when they are confined to the feet, or do not extend above the knee, are of no great harm; but they ſometimes reach up to the abdomen, and there leave the ſymptoms of an aſcites: but, even in this caſe, it is beſt to let the tumor alone during the time of *pregnancy*, or at the utmoſt only to attempt mitigating and allaying its ſymptoms; for the cure requires ſuch medicines as cannot be ſafely given at that time. The patient muſt avoid ſtanding as much as poſſible, and after delivery the cure is to be attempted in the common way. When women in their *pregnancy* loſe their fleſh, and become extenuated and thin, the child is uſually found to be the luſtier and more robuſt for it: the woman in this caſe ſhould feed on jellies, and other the moſt nouriſhing foods, and ſhould uſe very little exerciſe, avoiding all fatigue of body and mind. Others, on the other hand, are ſubject to grow remarkably fat during their *pregnancy*: theſe generally bring forth ſmall and lean children.

Women to whom their fat grows troubleſome in this time, ſhould bleed, uſe moderate exerciſe, a thin diet, and now and then take a very gentle doſe of ſome laxative medicine.

Many are very weak and ſubject to frequent faintings during *pregnancy*: theſe ſhould take at times a gentle doſe of ſome laxative medicine, and in the intermediate days, the ſtrengthening and ſtomachic medicines, with the milder carminatives.

A voiding of the waters too ſoon always threatens abortion, or an untimely delivery, which are to be guarded againſt by ſtrengthening medicines of all kinds. Many women during *pregnancy* are troubled with large brown ſpots, or liebenes, in the neck and face: theſe principally happen to perſons of bilious habits, and are in ſome attended with a continual paleneſs, in others with frequent flaſhings of heat and redneſs: the good women apply many remedies to theſe, but they are much better wholly let alone; for they always go off of themſelves after delivery.

The too great motion of the fœtus is a complaint not uncommon with *pregnant* women; but this is principally owing to themſelves, and is brought on by the violent paſſions of the mother, eſpecially thoſe of anger: the keeping the abdomen too hot will alſo occaſion this; and ſometimes it is owing to ſome indiſpoſition of the fœtus itſelf. If any medicines are to be given in this caſe, they muſt be the attemperating ones, and ſuch as can correct the acrimony of the bilious juices; nervous epithems may alſo be externally applied, and the perſon is to be kept in as tranquil a ſtate as poſſible, both as to bodily motion, and the paſſions of the mind.

The child's kicking in the uterus is a complaint very frequent in the laſt months of *pregnancy*, and in perſons of tender habits it often occaſions tears, and ſometimes faintings. Some ſuppoſe that this threatens abortion; but this is wholly erroneous, for the fœtus has no power of

of contributing to its own birth. This is a symptom for which there is no remedy but patience, but it goes off before the time of delivery.

Weakneſs of the fœtus is known by its feeble motion in the womb, and uſually depends on the bad conſtitution of the mother, or elſe on her having been ſubjected to violent frights, or to great ſorrow. Internal medicines of the ſtrengthening kind are proper in this caſe, and, externally, balſamic and aromatic plaiſters may be applied.

The fœcundines ſometimes concrete or grow to the uterus, out of their proper order and place: this is a diſorder we have but very ſlender opportunities of gueſſing at, and is principally cauſed by too much ſitting ſtill during the latter part of *pregnancy*. When this is ſuſpected to be the caſe, internal medicines are of no uſe; and the externals are only the fat of tender animals, or ſpirit of wine impregnated with oils of aniſe or carraway, frequently rubbed in on the belly.

The winding of the navel-ſtring about the neck of the child is often a very unhappy accident, and proves fatal to it: the good women ſuppoſe this to be owing to the mother's reaching upwards, and ſtraining her arms above her head near the time of her delivery; but this is an idle opinion, and the caſe is owing to no ſudden accident, but is probably an unlucky turn of the ſtring from the beginning. Junker's Conſp. Med. p. 708. See DELIVERY, LABOUR, and LYING-in.

From the original uſe of the word *pregnant*, is derived the act of impregnating, in its more general application. See GENERATION, FLOWER, and SEED.

PREGNANCY, *plea and trial of*, in *Law*. See *Jury of* MATRONS, and REPRIEVE.

PREGNANT. *Negative* PREGNANT, in *Law*. See NEGATIVE.

PREJUDICE, *præjudicium*, a falſe notion or opinion of any thing, conceived without a due previous examination thereof.

Prejudice, q. d. pre-judgment, does not import a judgment merely as prior to another in reſpect of time, but as being prior thereto in reſpect of knowledge, or of ſufficient attention to the thing; the propoſition *præ* expreſſing an anticipation, not ſo much of time, as of knowledge and due attention.

Hence *prejudice* is alſo called among the ſchoolmen *anticipatio, & præventa cognitio*, a preconceived opinion, &c.

PREJUDICIAL *action*. See ACTION.

PRELATE, from *prælatus*, of *præ*, *before*, and *fero*, *I bear*, *carry*, an eccleſiaſtical ſuperior, raiſed to ſome eminent and ſuperior dignity of the church.

Patriarchs, primates, archbiſhops, biſhops, generals of religious orders, certain croſiered and mitred abbots, and even deans and archdeacons, are ranked among the number of *prelates*.

PRELATE *of the Garter*, is the firſt officer of that noble order, and is as ancient as the inſtitution itſelf.

William de Edynton, then biſhop of Wincheſter, was the firſt *prelate* at the erection of the order; and it has been continued in that ſee ever ſince.

It is an office of great honour, but has neither ſalary nor fees; only a convenient lodging allowed in Windſor-caſtle; and as oft as the *prelate* comes thither (by the ſovereign's command), he is to have court-livery allowed for himſelf and ſervants. See GARTER.

PRELIMINARY, or PRELIMINARY, formed from *præ*, *before*, and *limen*, *threſhold*, ſomething to be examined, diſpatched, or determined, before an affair can be treated of thoroughly, and to purpoſe.

Preliminaries of peace generally take up the greateſt part of treaties. They conſiſt in examining of powers, qualities of princes, ranks of ambaſſadors, &c.

PRELUDE, *præludium*, in *Muſic*, a ſymphony uſed by way of introduction or preparation to what follows.

A *prelude* is uſually a flouriſh, or an irregular air, which the muſician plays off-hand, to ſee if his inſtrument be in tune; and to lead him into the piece to be played.

PREMIER *ſeijeant*, in *Law*. See PRECEDENCE.

PREMISES, PREMISSES, *præmiſſæ*, in *Logic*, the two firſt propoſitions of a ſyllogiſm.

When a ſyllogiſm is in form, the two *premiſes* being granted, the concluſion cannot be denied.

The *premiſes*, ſays Chauvin, are properly the parts of the antecedent of an argument, when complex; and are called *præmiſſæ*, becauſe premiſed to the concluſion.

Thus in the argument, *Every man is an animal, Peter is a man, therefore Peter is an animal*: the propoſitions, *every man*, &c. and *Peter*, &c. are the *premiſes*.

Premiſes are the principles of our reaſonings; as being clear, evident, and demonſtrative propoſitions, from the relations whereof to one another we draw or infer new truths, propoſitions, &c.

The *premiſes* are either equal, where neither ſuffices alone for drawing a concluſion, as in the inſtance above; or *unequal*, the one *major*, *greater*, from which alone the concluſion is drawn; the other *minor*, or *leſs*, which only ſerves in applying the antecedent to the conſequent.

In the common practice of the ſchools, however, every ſyllogiſm, or formal argument, of what kind ſoever, is ſaid to have a MAJOR and a MINOR, how equal ſoever the *premiſes* may be.

PREMISES, in *Law*, the lands, &c. mentioned in the preamble or beginning of a deed, leaſe, conveyance, or the like.

PREMIUM, or PRÆMIUM, literally denotes a reward or recompence.

Among merchants it is taken for that ſum of money; viz. 8 or 10 per cent. &c. which is given to an inſurer, for inſuring the ſafe return of any ſhip or merchandize.

PREMIUM is alſo uſed in the money and paper-trade, for what is given for a thing above *par*.

Thus, lottery-tickets, &c. are ſaid to bear ſo much, e. gr. 10 or 20*l*. *premium*, when they are ſold for ſo much beyond the prime coſt, at which the government iſſued them.

PREMONSTRANTES, or PRÆMONSTRATENSES, a religious order of regular canons inſtituted in 1120, by S. Norbert; and thence alſo called *Norbertines*.

The firſt monaſtery of this order was built by Norbert in the Iſle of France, three leagues to the weſt of Laon; and by him called *Præmonſtre*, *Præmonſtratum*, whence the order itſelf was denominated; though, as to the occaſion of that name, the writers of that order are divided.

At firſt, the religious of this order were ſo poor, that they had only a ſingle aſs, which ſerved to carry the wood they cut down every morning, and ſent to Laon, in order to purchaſe bread. But in a ſhort time they received ſo many donations, and built ſo many monaſteries, that, thirty years after the foundation of this order, they had above a hundred abbies in France and Germany: and in proceſs of time the order ſo increaſed, that it had monaſteries in all parts of Chriſtendom, amounting to one thouſand abbies, three hundred proveſtſhips, a vaſt number of priories, and five hundred nunneries. But their number is now greatly diminiſhed. The rule they followed was that of St. Auguſtin, with ſome ſlight alterations, and an addition of certain ſevere laws, whoſe authority did not long ſurvive their auſtere founder.

The order was approved by Honorius II. in 1126, and again by ſeveral ſucceeding popes. At firſt the abſtinence from fleſh was rigidly obſerved. In 1245, Innocent IV. complained of its being neglected, to a general chapter. In 1288, their general, William, procured leave of pope Nicholas IV. for thoſe of the order to eat fleſh on journies. In 1460, Pius II. granted them a general permiſſion to eat meat, excepting from Septuageſima to Eaſter.

The religious of this order are clothed in white, with a ſcapulary before the caſſock. Out of doors they wear a white cloak and white hat; within, a little camail; and at church, a ſurplice, &c.

In the firſt monaſteries built by Norbert, there was one for men, and another for women, only ſeparated by a wall. In 1137, by a degree of a general chapter, this practice was prohibited, and the women removed out of thoſe already built, to a greater diſtance from thoſe of the men.

The *Præmonſtratenſes*, or monks of *Premontré*, vulgarly called white canons, came firſt into England A. D. 1146. Their firſt monaſtery, called New-houſe, was erected in Lincolnſhire, by Peter de Saulia, and dedicated to St. Martial. In the reign of Edward I. this order had twenty-ſeven monaſteries in England.

PREMOTION, *præmotio*, in the *Schools*, the action of God co-operating with the creature, and determining him to act. See PREDETERMINATION.

Phyſical premotion, according to Alvarez, Lemos, &c. is a complement of the active power, whereby it paſſes from the firſt act to the ſecond, i. e. from a complete, and next power to action. It is an influence or participation of the virtue of the firſt cauſe, which makes the ſecond cauſe actually active.

PREMUNIENTES, in *Law*, writs diſpatched to each biſhop to call them to parliament, warning them to bring with them the deans and archdeacons, one proctor for each chapter, and two for the clergy of his dioceſe.

PREMUNIRE, *præmunire*, in *Law*, a term uſed for an offence, for a writ granted thereupon, and for the puniſhment thereof.

The word is a corruption of the Latin *præmonere*, q. d. to forewarn, or bid the offender take care; of which a reaſon may be drawn from the words of the ſtatute 27 Edw. III. cap. 1. and the form of the writ, *Præmunire facias præfatum propoſitum, & J. R. procuratorem, &c. quod tunc ſint coram nobis*.

In order to underſtand properly the occaſion and origin of *præmunire*, it will be neceſſary to trace out briefly the riſe and progreſs of the papal uſurpations in England. The converſion of the Saxons in this country to the profeſſion of Chriſtianity, was effected by Auguſtin the monk, and other miſſionaries from the court of Rome: and this naturally introduced ſome few of the papal corruptions in point of faith and doctrine: but we read of no civil authority claimed by the pope in theſe kingdoms, till the æra of the Norman Conqueſt, when the reigning pontiff, having favoured duke William in his projected invaſion, by bleſſing his hoſt and conſecrating his banners, he took that opportunity alſo of eſtabliſhing his ſpiritual encroachments, which the policy of the conqueror allowed in order more effectually to humble the Saxon clergy and aggrandize his Norman prelates. Hence his legates *à latere* were introduced into England to hear and determine eccleſiaſtical cauſes; and, in the reign of Henry I. he aſſumed the diſpoſal of moſt of the biſhopricks, abbeys, and other eccleſiaſtical benefices, by mandates or bulls, called *expectative graces*, and *proviſions*, before they became void; in the reign of king Stephen, appeals to the court of Rome were eſtabliſhed; under Henry II. the pope claimed exemption of clerks from the ſecular power; and in the time of king John, pope Innocent III. obtained a reſignation of his crown to the POPE, and compelled him to accept his kingdom from the pope's donation, holding it as a vaſſal of the holy ſee, at the annual rent of a thouſand marks. Many circumſtances concurred, and many contrivances were made uſe of to extend and eſtabliſh the papal power in this kingdom.

King Edward I. a wiſe and magnanimous prince, ſet himſelf in earneſt to ſhake off this ſervile yoke; and in the thirty-fifth year of his reign was made the firſt ſtatute againſt papal proviſions, which, according to ſir Edward Coke, is the foundation of all the ſubſequent ſtatutes of *præmunire*.

In the weak reign of Edward II. the pope again endeavoured to incroach, but the parliament reſolutely withſtood him: and in the reign of Edw. III. ſeveral penal laws were enacted againſt proviſors; 25 Edw. III. ſtat. 6. 27 Edw. III. ſtat. 1. cap. 1. 38 Edw. III. ſtat. 1. cap. 4. and ſtat. 2. cap. 1, 2, 3, 4. which ordained, that the court of Rome ſhould preſent or collate to no biſhoprick or living in England; and that whoever diſturbed any patron in the preſentation to a living by virtue of a papal proviſion, ſuch proviſor ſhould pay fine and ranſom to the king at his will, and be impriſoned till he renounced ſuch proviſion; and the ſame puniſhment was inflicted on ſuch as cited the king, or any of his ſubjects, to anſwer in the court of Rome. And when the holy ſee reſented theſe proceedings, and pope Urban V. attempted to revive the vaſſalage and annual rent to which king John had ſubjected his kingdom, it was unanimouſly agreed by all the eſtates of the realm in parliament aſſembled, 40 Edw. III. that king John's donation was null and void, being without the concurrence of parliament, and contrary to his coronation oath; and all the temporal nobility and commons engaged, that if the pope ſhould endeavour by proceſs or otherwiſe to maintain theſe uſurpations, they would reſiſt him with all their power.

In the reign of Richard II. it was found neceſſary to ſtrengthen theſe laws, and, therefore, it was enacted by ſtat. 3 Ric. II. cap. 3. and 7 Ric. II. cap. 12. firſt, that no alien ſhould be capable of letting his benefice to farm; and, afterwards, that no alien ſhould be capable of being preſented to any eccleſiaſtical preferment, under the penalty of the ſtatutes of proviſors. By the ſtatute 12 Ric. II. cap. 15. all liegemen of the king, accepting of a living by any foreign proviſion, are put out of the king's protection, and the benefice made void. To which the ſtatute 13 Ric. II. ſtat. 2. cap. 2. adds baniſhment and forfeiture of lands and goods; and by cap. 3. of the ſame ſtatute, any perſon bringing over any citation or excommunication from beyond ſea, on account of the execution of the foregoing ſtatutes of proviſors, ſhall be impriſoned, forfeit his goods and lands, and moreover ſuffer pain of life and member.

In the writ for the execution of all theſe ſtatutes, the words *præmunire facias*, being uſed to command a citation of the party, have denominated, in common ſpeech, not only the writ, but the eſſence itſelf of maintaining the papal power, by the name of *præmunire*. And, accordingly, the next ſtatute, 16 Ric. II. cap. 5. uſually called the ſtatute of *præmunire*, and generally referred to by all ſubſequent ſtatutes, enacts, that whoever procures at Rome, or elſewhere, any tranſlations, proceſſes, excommunications, bulls, inſtruments, or other things which touch the king, againſt him, his crown and realm, and all perſons aiding therein, ſhall be put out of the king's protection, their lands and goods forfeited to the king's uſe, and they ſhall be attached by their bodies to anſwer to the king and his council; or proceſs of *præmunire facias* ſhall be made out againſt them, as in other caſes of proviſors. By the ſtatute 2 Hen. IV. cap. 3. all perſons who accept any proviſion from the pope, to be exempt from canonical obedience to their proper ordinary, are alſo ſubjected to the penalties of *præmunire*; and this is the laſt of our ancient ſtatutes touching this offence. Such is the original meaning of the offences which we call *præmunire*, viz. introducing a foreign power into this land, and creating *imperium in imperio*, by paying that obedience to papal proceſs, which conſtitutionally belonged to the king alone, long before the reformation in the reign of Henry the Eighth; at which time the penalties of *præmunire* were indeed extended to more papal abuſes than before; as the kingdom then entirely renounced the authority of the ſee of Rome, though not all the corrupted doctrines of the Roman church. And, therefore, by the ſeveral ſtatutes of 24 Hen. VIII. cap. 12 and 25 Hen. VIII. cap. 19 and 21. to appeal to Rome from any of the king's courts; to ſue to Rome for any licence or diſpenſation; or to obey any proceſs from thence; are made liable to the pains of *præmunire*, and in order to reſtore to the king in effect the nomination of vacant biſhopricks, and yet keep up the eſtabliſhed form, it is enacted by ſtatute 25 Hen. VIII. cap. 20. that if the dean and chapter refuſe to elect the perſon named by the king, or any archbiſhop or biſhop to confirm or conſecrate him, they ſhall fall within the penalties of the ſtatutes of *præmunire*. Alſo by ſtat. 5 Eliz. cap. 1. to refuſe the oath of ſupremacy will incur the pains of *præmunire*; and to defend the pope's juriſdiction in this realm is a *præmunire* for the firſt offence, and high treaſon for the ſecond. So too, by ſtatute 13 Eliz. cap. 2. to import any AGNUS *Dei*, croſſes, beads, or other ſuperſtitious things pretended to be hallowed by the biſhop of Rome, and tender the ſame to be uſed; or to receive the ſame with ſuch intent, and not diſcover the offender; or if a juſtice of the peace, knowing thereof, ſhall not within fourteen days declare it to a privy counſellor; they all incur a *præmunire*.

Farther, to contribute to the maintenance of a Jeſuit's college, or any popiſh ſeminary whatever, beyond ſea; or any perſon in the ſame; or to contribute to the maintenance of any Jeſuit or popiſh prieſt in England; is by ſtatute 27 Eliz. cap. 2. made liable to the penalties of *præmunire*.

The ſame penalties, thus far kept within the bounds of their original inſtitution, viz. the depreſſing the power of the pope, have been applied to other heinous offences. Thus, 1. By the ſtatute 1 and 2 Phil. & Mary, cap. 8. to moleſt the poſſeſſors of abbey lands granted by parliament to Henry the Eighth, and Edward the Sixth, is a *præmunire*. 2. So likewiſe is the offence of acting as a broker or agent in any uſurious contract, where above ten per cent. intereſt is taken, by ſtatute 13 Eliz. cap. 10. 3. To obtain any ſtay of proceedings, other than by arreſt of judgment or writ of error, in any ſuit for a monopoly, is likewiſe a *præmunire*, by ſtatute 21 Jac. I. cap. 3. 4. To obtain an excluſive patent for the ſole making or importation of gunpowder or arms, or to hinder others from importing them, is alſo a *præmunire* by two ſtatutes; the one 16 Car. I. cap. 21. the other 1 Jac. II. cap. 8. 5. On the abolition, by ſtatute 12 Car. II. cap. 24. of purveyance, and the prerogative of pre-emption, or taking any victual, beaſts, or goods for the king's uſe, at a ſtated price, without conſent of the proprietor, the exertion of any ſuch power for the future was declared to incur the penalties of *præmunire*. 6. To aſſert, maliciouſly and adviſedly, by ſpeaking or writing, that both or either houſe of parliament have a legiſlative authority without the king, is declared a *præmunire* by ſtatute 13 Car. II. cap. 1. 7. By the habeas corpus act alſo, 31 Car. II. cap. 2. it is a *præmunire*, and incapable of the king's pardon, beſides other heavy penalties, to ſend any ſubject of this realm a priſoner into parts beyond the ſea. 8. By the ſtatute 1 W. & M. ſtat. 1. cap. 8. perſons of eighteen years of age refuſing to take the new oaths of allegiance, as well as ſupremacy, upon tender by the proper magiſtrate, are ſubject to the penalties of a *præmunire*; and by ſtat. 7 and 8 W. III. cap. 24. ſerjeants, counſellors, proctors, attorneys, and all officers of courts, practiſing without having taken the oaths of allegiance and ſupremacy, and ſubſcribing the declaration againſt popery, are guilty of a *præmunire*, whether the oaths be tendered or no. 9. By the ſtatute 6 Ann. cap. 7. to aſſert maliciouſly and directly, by preaching, teaching, or adviſed ſpeaking, that the then pretended prince of Wales, or any perſon other than according to the acts of ſettlement and union, hath any right to the throne of theſe kingdoms; or that the king and parliament cannot make laws to limit the deſcent of the crown; ſuch preaching, teaching, or adviſed ſpeaking is a *præmunire*; as writing, printing, or publiſhing the ſame doctrines amount to high treaſon. 10. By

ſtatute 6 Ann. cap. 23. if the aſſembly of peers of Scotland, convened to elect their ſixteen repreſentatives in the Britiſh parliament, ſhall preſume to treat of any other matter ſave only the election, they incur the penalties of a *præmunire*. 11. The laſt offence that has been made a *præmunire*, was by ſtatute 6 Geo. I. cap. 18. the year after the infamous South Sea project had beggared half the nation. This therefore makes all unwarrantable undertakings by unlawful ſubſcriptions, then commonly known by the name of bubbles, ſubject to the penalties of a *præmunire*.

The puniſhment of *præmunire* is thus ſummed up by ſir Edward Coke, that from the conviction, the defendant ſhall be out of the king's protection, and his lands and tenements, goods and chattels, forfeited to the king; and that his body ſhall remain in priſon at the king's pleaſure, or (as other authors have it) during life. And ſo odious, adds the ſame author, was this offence of *præmunire*, that a man who was attainted of the ſame might have been ſlain by any other man without danger of law; becauſe it was provided by law (ſtat. 25 Edw. III. ſtat. 5. cap. 22). that any man might do to him, as to the king's enemy; and any man may lawfully kill an enemy. But to obviate ſuch miſtaken and ſavage notions, the ſtatute 5 Eliz. cap. 1. provides, that it ſhall not be lawful to kill any perſon attainted in a *præmunire*, any law, ſtatute, opinion, or expoſition of law to the contrary notwithſtanding. However ſuch delinquent, though protected as a part of the public from public wrongs, can bring no action for private injury, how atrocious ſoever; being ſo far out of the protection of the law, that it will not guard his civil rights, nor remedy any grievance which he, as an individual, may ſuffer. And no man, knowing him to be guilty, can with ſafety give him comfort, aid, or relief. Blackſt. Com. book iv. cap. 8.

PREMUNIRE is now chiefly uſed for the puniſhment appointed by the ſtatutes above mentioned. Thus, when it is ſaid a man for an offence *ſhall incur a præmunire*, it is meant, he ſhall incur the penalty appointed by the ſtatute 16 Ric. II. commonly called the *ſtatute of præmunire*.

PRENANTHES, in *Botany*. See *Wild* LETTUCE.

PRENDER, formed from the French *prendre, to take*, in *Law*, a power or right of taking a thing before it is offered.

Such a thing *lies in* render, *but not in* prender. Coke's Rep. p. 1. Sir John Peter's caſe. See RENDER.

PRENDER *de baron* is an exception to diſable a woman from purſuing an appeal of murder againſt the killer of her former huſband, taken from her having married a ſecond. See APPEAL.

PRENESTINÆ *ſortes*. See SORTES.

PRENOMEN, PRÆNOMEN, among the Romans, a proper name, or name prefixed to the general name of the family; as, Caius, Lucius, Marcus, &c.

The *prænomen* anſwers to our Chriſtian name, Peter, Paul, &c. It was not introduced among the Romans till long time after the *nomen*.

The name of the family was given by the Romans to their children ſoon after their birth; but the *prænomen* was not given them till they took the virile habit, or about the age of ſeventeen years. See NAME.

Varro reckons up thirty *prænomina* among the Romans. The uſual ones may be reduced to eighteen.

The Greeks had no *prænomina*; they had but one name.

PRENOTION, PRÆNOTIO, or PRÆCOGNITIO, a notice, or piece of knowledge preceding ſome other, in reſpect of time.

Such is the knowledge of the antecedent; which muſt precede that of the concluſion. See *Common* NOTIONS, and PRENOTION.

PREPARANTIA, or PRÆPARANTIA *vaſa*, in *Anatomy*, the ſpermatic veſſels; being two arteries, and as many veins of the teſticles; thus called by the ancients, from an opinion that the ſeed began to be prepared herein. See SPERMATIC *veſſels*, and GENERATION.

PREPARATION, PRÆPARATIO, *apparatus*, in *Mathematics*, makes one of the parts or branches of a demonſtration.

If it be a propoſition in geometry that is to be demonſtrated, the *preparation* conſiſts in certain lines to be drawn in the figure: if a propoſition in arithmetic, in ſome computation to be made to come the more eaſily at the demonſtration.

PREPARATION, in *Chemiſtry* and *Pharmacy*, is applied to the ſeveral manners of managing the materia medica, and of diſpoſing it to ſerve the ſeveral purpoſes.

There are various *preparations* of mercury, antimony, and other drugs, to purify them, ſublime, calcine, edulcorate them, &c.

PREPARATION, in *Anatomy*, is uſed for the art of preſerving the parts of animal bodies for anatomical uſes.

It is alſo uſed to ſignify the parts themſelves ſo prepared. Mr. Monro has given us an eſſay on the method of *preparing* and preſerving the parts of animal bodies for anatomical uſes.

The principal *preparation* which bones require is to make them white: and the beſt method of whitening the bones of young creatures is to macerate them for a conſiderable time in cold water, frequently changed; the bones being laid out each time to dry a little in the ſun. Cartilages are made pellucid in the ſame manner, after which they ſhould be brought to their natural ſhape and ſituation by ſtrings, weights, &c. Muſcles that have no large cavity are to be laid and ſecured in their deſigned poſture, and preſſed with the fingers into a natural ſhape, while they are drying. The ſeveral veſſels are prepared by INJECTION.

Ruyſch deſcribes the method of ſeparating the cutiçula and corpus reticulare from the ſkin, by ſtretching theſe common tegiments, well freed from the fat, on a board, with the cuticula outmoſt; and then dipping all into boiling water, which looſens them ſo from the ſkin, that they are eaſily ſeparated with a blunt knife, or the thin ivory handle of a ſcalpel; then with the ſame inſtrument he ſeparates the corpus reticulare from the cuticle, leaving them connected to each other, and to the ſkin in ſome part. After this they may be either dried or put into the embalming liquor. The cellular membrane under the ſkin cannot be preſerved diſtended with air, except where there is little or no fat contained in it: one of the beſt parts for making a *preparation* of this kind is the ſcrotum, where that which is commonly called muſculus dartos may, by blowing into it, be changed entirely into fine membranous cellules. In order to preſerve the dura mater with all its proceſſes in a natural ſituation, it is neceſſary to ſaw the cranium from near the root of the noſe to the middle of the os occipitis, by a perpendicular ſection at half an inch diſtance from the ſagittal future, and then by a horizontal ſection, terminating at the extremities of the former ſection, to take off a conſiderable part of the ſides of the cranium; after which the dura mater, being cut by an inciſion in form of a T, the brain and cerebellum are taken out, and the head is preſerved in a liquor; or the bones are cleaned and dried; the cut parts of the dura mater being ſtretched out with pins, hooks, or threads. The proceſſes of the *pia mater* may be eaſily ſeparated entire with this membrane, when it is preternaturally thickened by diſeaſe, as is often the caſe; or, in a ſound ſtate, large pieces of it may be obtained with its proceſſes after macerating the brain in water. When the water is paſſed from it, it ought to be immerſed in the embalming liquor, and properly extended. In order to prepare the eye for preſervation, it is neceſſary to coagulate the cryſtalline and vitreous humours, by immerſing it for ſome time in a proper liquor: after this they will bear maceration in water, for ſeparation of the choroid and Ruyſch's coat. By macerating the ear in water, the membrane, which is continued from the epidermis of the ear to line the meatus auditorius externus, and to form the outer lamella of the membrana tympani, may be brought off entire in adults, and is eaſily ſeparated in fœtuſes and very young children. The cuticle covering the papillæ of the lips is to be taken off by macerating in water; the villous ſubſtance of the tongue is eaſily made red, by injection of the arteries, and a membrane analogous to the cuticula ſeparates by ſoaking in water. The muſcles of the organs of deglutition, that are fixed to any of the ſurrounding parts, muſt be clean diſſected, and cut off from theſe parts; after which the tongue, os hyoides, fauces, velum pendulum palati, with the uvula, the larynx, pharynx, aſpera arteria, and œſophagus, are taken out with the diſſected muſcles hanging at them, to be ſecured in their natural ſituation with ſmall pieces of thin boards, and threads faſtened to hooks. A cork is then put into the lower part of the trachea; round which and the œſophagus a ſtrong thread is tied firmly, and quickſilver is poured by the fauces, or by the paſſage which led to the noſtrils till the œſophagus, trachea, larynx, and pharynx are filled; in which condition it is left to hang till the parts are pretty firm, but not quite dry; when the quickſilver is poured out, and the parts, overſtretched by the weight of it, or too much ſhrivelled, preſſed with the fingers, into their natural ſituation. The hollow viſcera of the thorax and abdomen are prepared, for preſerving their form and exhibiting their internal ſtructure, with air, quickſilver, or melted wax. The blood and other liquors contained in the bowels to be filled, are preſſed out, and all their paſſages tied, except that by which the diſtending liquor is introduced. The lungs and ſpleen, whoſe membranes retain quickſilver or air with great difficulty, require particular care; theſe muſt be diſtended, expoſed to a warm ſun or fire in order to dry ſoon; and then immerſed in ſtrong turpentine varniſh, ſo that their whole ſurface may be covered; and

and thus they will be rendered more capable of retaining the air, that is blown into them.

The manner of preserving anatomical *preparations*, is either by drying them thoroughly in the air, or putting them into a proper liquor.

In drying parts which are thick, when the weather is warm, care muſt be taken to prevent putrefaction, fly-blows, inſects, &c. This is eaſily done by the uſe of a ſolution of corroſive ſublimate in ſpirit of wine, in the proportion of two drachms of ſublimate to a pound of ſpirit: the part ſhould be moiſtened with this liquor as it dries, and by this method the body of a child may be kept ſafe even in ſummer. Dried *preparations* are apt to crack and moulder away in keeping; to prevent this, their ſurface ſhould be covered with a thick varniſh, repeated as often as occaſion requires.

Though ſeveral parts *prepared* dry are uſeful, yet others muſt be ſo managed as to be always flexible, and nearer a natural ſtate. The difficulty has been to find a proper liquor for this purpoſe. Mr. Mouro ſays, the beſt he knows is a well rectified colourleſs ſpirit of wine, to which is added a ſmall quantity of the ſpirit of vitriol or nitre. When theſe are properly mixed, they neither change their colour nor the conſiſtence of the parts, except where there are ſerous or mucous liquors contained in them. The brain, even of a young child, in this mixture, grows ſo firm as to admit of gentle handling, as do alſo the vitreous and cryſtalline humours of the eye. The liquor of the ſebaceous glands and the ſemen are coagulated by this ſpirituous mixture; and it heightens the red colour of the injection of the blood veſſels, ſo that after the part has been in it a little time, ſeveral veſſels appear which were before inviſible. If you will compare theſe effects with what Ruyſch has ſaid of his balſam, which is rectified ſpirit of malt with a third part of water, diſtilled in a tin alembic, with the addition of a handful of black pepper, you will find the liquor above mentioned to come very near to it.

The proportion of the two ſpirits muſt be changed according to the part prepared: for the brain and humours of the eye, you muſt put two drachms of ſpirit of nitre to one pound of ſpirit of wine. In preſerving other parts which are harder, thirty or forty drops of the acid will be ſufficient; a larger quantity will make bones flexible, and even diſſolve them. The part thus preſerved ſhould be always kept covered with the liquor, therefore great care ſhould be taken to ſtop the mouth of the glaſs with a waxed cork, and a bladder tied over it, to prevent the evaporation of the ſpirit; ſome of which, notwithſtanding all this care, will fly off; therefore freſh muſt be added as there is occaſion. When the ſpirits change to a dark tincture, which will ſometimes happen, they ſhould be poured off, and freſh put in their room; but with ſomewhat leſs acid than at firſt.

The glaſſes which contain the *preparations* ſhould be of the fineſt ſort, and pretty thick; for through ſuch the parts may be ſeen very diſtinctly, and of a true colour, and the object will be ſo magnified as to ſhew veſſels in the glaſs which out of it were not to be ſeen.

As the glaſs, when filled with the liquor, has a certain focus, it is neceſſary to keep the *preparation* at a proper diſtance from the ſides of it, which is eaſily done by little ſticks ſuitably placed; or by ſuſpending it by a thread in a proper ſituation.

The operator ſhould be cautious of putting his fingers in this liquor oftener than is abſolutely neceſſary; becauſe it brings on a numbneſs on the ſkin, which makes the fingers unfit for any nice operation. The beſt remedy for this is to waſh them in water mixed with a few drops of oil of tartar per deliquium. Med. Eſſ. Edinb. vol. iii. art. 10.

Dr. Chriſt. Jac. Trew prefers the rectified ſpirit of grain for preſerving anatomical *preparations* to ſpirit of wine, or compoſitions of alcohol, amber, camphor, &c. becauſe theſe ſoon change into a brown colour; whereas the ſpirit from malt preſerves its limpid appearance. When any part is to be preſerved wet, waſh it with water, till it is no more tinctured. The water is next to be waſhed away with ſpirits, and then the *preparation* is to be put among ſpirits in a glaſs, the mouth of which is to be cloſely covered with a glaſs head, over which a wet bladder and leaf-tin are to be tied. Com. Lit. Norimb. 1731. Semeth. 1. Specim. 9.

PREPARATION *of inſects*, in *Anatomy*. See INSECTS.

PREPARATORY *torture*. See TORTURE.

PREPARED *antimony*. See ANTIMONY.

PREPARED *opium*. See OPIUM.

PREPENSED, PREPENSUS, in *Law*, denotes *fore-thought*. In which ſenſe we ſay *prepenſed* MALICE, &c.

If, when a man is ſlain upon a ſudden quarrel, there were malice *prepenſed* formerly between them, it makes it murder; and, as this is called in ſome ſtatutes *prepenſed* MURTHER.

PREPOSITION, PRÆPOSITIO, in *Grammar*, one of the parts of ſpeech or diſcourſe.

The *preposition* is an indeclinable particle, which ſerves to govern the nouns that follow it. Such are *to, for, from, after, before, in, with, through, from, by*, &c.

They are called *prepoſitions*, becauſe *prepoſited* or placed before the nouns they govern.

F. Buffier does not allow the *preposition* to be a part of ſpeech, but merely a modificative of a part of ſpeech; viz. of the noun; ſerving only to modify or circumſtantiate it. See MODIFICATIVE.

The ingenious Mr. Harris ranges the *preposition* under the claſs of CONNECTIVES, and defines it a part of ſpeech devoid itſelf of ſignification, but ſo formed as to unite two words that are ſignificant, and that refuſe to unite or coaleſce of themſelves. Thoſe connectives which join ſentences are called CONJUNCTIONS. Hermes, book ii. chap. 3.

One great uſe (ſays biſhop Lowth, Int. to Eng. Gram. p. 114), of *prepoſitions* in Engliſh, is to expreſs thoſe relations, which in ſome languages are chiefly marked by caſes, or the different endings of the noun.

Prepoſitions are alſo preſixed to words in ſuch manner as to coaleſce with them, and to become a part of them. There are alſo certain particles, which are thus employed in compoſition of words, yet cannot ſtand by themſelves in conſtruction; which are called inſeparable *prepoſitions*; as *a, be, con*, &c.

PREPOSITUS *villæ* is ſometimes uſed for the chief officer of the king, in a town, manor, or village.

In ancient records, the *prepoſitus villæ* was no more than the bailiff of the lord of the manor.

Prepoſitus villæ is ſometimes alſo uſed, in later writers, for the conſtable of a town, or petty CONSTABLE.

PREPOSITUS *eccleſiæ*. See CHURCH-reve.

Quatuor hominer PREPOSITI, in Crompton, &c. denote four men of each town, who are to appear before the juſtices of the foreſt in their circuit.

PREPUCE, PRÆPUTIUM, in *Anatomy*, the *foreſkin*; a prolongation of the cutis of the penis, covering the glans, or extremity of the yard. See *Tab. Anat. (Splanch.) fig.* 10. *lit. c c.*

Dr. Drake obſerves, that nature does not ſeem more various in any part of her works than in the *prepuce*; for the figure and proportion whereof there does not ſeem any ſtandard.

Hence, probably, aroſe the neceſſity of circumciſion, ſo generally practiſed throughout the oriental parts of the world; not out of a view to religion, but to cleanlineſs, and to prevent diſeaſes, which a detention of the mucus of the *ſubprepuced* glans might breed in thoſe hot countries. For even here, the ſame author adds, he has known ſome, who, having large *prepuces*, called *ſilken-prepuces*, have been frightened at the appearance of a mucus oozing out upon a mere plenitude from between the *prepuce* and glans; which, it is probable, the great legiſlator of the Jews might have a view to in the firſt inſtitution of CIRCUMCISION.

The ſkin of the *prepuce* is double; at the connection of the internal ſkin, to the other part, are ſeveral oval and roundiſh glandules placed irregularly about the joining of the glands to the corpora cavernoſa, and on the glans itſelf.

Their uſe is to ſeparate a liquor to render the agitation of the *prepuce* on the glans eaſy. When this liquor becomes rancid, as upon old age, or venereal contacts, it excoriates the glans and *prepuce*; and even ſometimes contracts the latter, and renders it neceſſary to be divided, to afford a paſſage to the glans. See PHIMOSIS, and PARAPHIMOSIS.

PREROGATIVE, *prærogativa*, a privilege, or pre-eminence, which one perſon has over another.

The word is borrowed from the appellation of a century in ancient Rome, which gave the firſt vote, or ſuffrage, in the *comitia*, or aſſemblies for the election of magiſtrates; *quaſi* prærogati; becauſe firſt aſked, or their ſuffrage firſt required.

Their vote was called *omen prærogativum*, becauſe the reſt uſually gave their votes the ſame way.

PREROGATIVE *of the king, prærogativa regis*, is that power, pre-eminence, and privilege, which the king hath over and above all other perſons, and out of the ordinary courſe of the common law, in right of his regal dignity.

The king's *prerogatives* are either direct or incidental: the direct are ſuch poſitive ſubſtantial parts of the royal character and authority, as are rooted in and ſpring from the king's political perſon, conſidered merely by itſelf, without reference to any other extrinſic circumſtance; as the right of ſending ambaſſadors, of creating peers, and of

of making war or peace. But such *prerogatives* as are incidental bear always a relation to something elſe, diſtinct from the king's perſon, and are indeed only exceptions, in favour of the crown, to thoſe general rules that are eſtabliſhed for the reſt of the community; ſuch as, that no coſts ſhall be recovered againſt the king, that the king can never be a joint-tenant, and that his debt ſhall be preferred before a debt to any of his ſubjects. The ſubſtantial, direct *prerogatives*, are of three kinds; being ſuch as regard, firſt, the king's royal character; ſecondly, his royal authority; and, laſtly, his royal income. See KING and REVENUE.

It is one of the principal bulwarks of civil liberty, or of the Britiſh conſtitution, that the king's *prerogative* is limited by bounds ſo certain and notorious, that it is impoſſible he ſhould ever exceed them, without the conſent of the people, on the one hand; or without, on the other, a violation of that original contract, which in all ſtates implicitly, and in our's moſt expreſſly, ſubſiſts between the prince and the ſubject. And it is one of the moſt manifeſt proofs of that genuine freedom, which is the boaſt of this age and country, that the limits of the king's *prerogative* may be examined and diſcuſſed with decency and reſpect, without offence and danger. This was formerly reckoned among the arcana imperii; and queen Elizabeth directed her parliaments to abſtain from diſcourſing of matters of ſtate; and maintained, both in perſon and by her miniſters, that this auguſt aſſembly ought not to deal, to judge, or to meddle, with her majeſty's *prerogative* royal. And king James I. more than once, laid it down in his ſpeeches, that as it is atheiſm and blaſphemy in a creature to diſpute what the Deity may do, ſo it is preſumption and ſedition in a ſubject to diſpute what a king may do in the height of his power. Good Chriſtians, he adds, will be content with God's will, revealed in his word; and good ſubjects will reſt in the king's will, revealed in his law. King James's Works, 557. 531.

PREROGATIVE, *contempts againſt the king's*, are ſuch as refuſing to aſſiſt him for the good of the public, either in his councils, by advice, when called upon; or in his wars, by perſonal ſervice, againſt a rebellion or invaſion, neglecting to join the *poſſe comitatus*; preferring the intereſts of a foreign potentate to thoſe of our own, or doing or receiving any thing that may create an undue influence in favour of ſuch extrinſic power, as by taking a penſion from any foreign prince, without the conſent of the king, and diſobeying the king's lawful commands, whether by writs iſſuing out of his courts of juſtice, or by a ſummons to attend his privy-council, or by letters from the king, commanding a ſubject to return from beyond the ſeas, or by his writ of *ne exeat regnum*, or proclamation commanding the ſubject to ſtay at home. Diſobedience to any of theſe commands is a high MISPRISION, or contempt.

PREROGATIVE *copyrights* are acts of parliament, proclamations, and orders of council, liturgies, and books of divine ſervice, and grammars, and other compoſitions, compiled or tranſlated at the expence of the crown, tranſlation of the Bible, &c.

PREROGATIVE *court*. See COURT *of prerogative*.

PREROGATIVE, *felonies and miſdemeanors againſt the king's*, are thoſe that relate to the COIN, not amounting to treaſon, againſt the king's council (ſee PRIVY-*council*), and thoſe incurred by FOREIGN *ſervice*, by imbezzling the king's armour or warlike ſtores (ſee IMBEZZLE), and by deſertion from the king's army or navy, which, by the ſtanding laws of the land, and particularly by 18 Hen. VI. cap. 19, & 5 Eliz. cap. 5. is made felony, but not without benefit of clergy. But by 2 & 3 Edw. VI. cap. 2. clergy is taken away from ſuch deſerters, and the offence is made triable by the juſtices of every ſhire. The ſame ſtatutes puniſh other inferior military offences with fines, impriſonment, and other penalties. See DESERTER, and MUTINY.

PREROGATIVE, *property by*. See PROPERTY.

PRESA, in the *Italian Muſic*, is in general a character which ſhews when and where a performer in concert is to begin to ſing or play; but, in particular, in fugues or canons it is thus marked 𝄋 over the note at which the ſecond part, which is to follow or imitate the firſt, muſt begin. If the mark be repeated a ſecond time, it is to ſhew the place where the third part muſt begin, to imitate the ſecond; and ſo on through all the parts.

PRESAGE, *præſagium*, an augury, or ſign of ſomething to come.

The Romans judged of future events by certain ſigns, which their ſuperſtition, or the artifice of their prieſts, had invented. Their moſt celebrated *preſages* were ſounded on the flight of birds, or the entrails of victims. All night-birds paſſed for birds of ill *preſage*.

PRESBYS, in *Ornithology*, a name uſed by many of the ancient naturaliſts for the *regulus criſtatus*, or golden crowned WREN.

PRESBYTA, Πρεσβυτης, in *Optics*, a term applied to perſons in whom the configuration of the cryſtalline of the eye is too flat; ſo that they ſee diſtant things clearly, but thoſe near at hand confuſedly.

The reaſon is, that, in near objects, the viſual rays paſſing the retina before they unite, there can be no diſtinctneſs, ſince the diſtinct baſe falls too far off beyond the retina.

This defect is helped only with convex glaſſes, or ſpectacles; which will make the rays converge ſooner, and, if they are well fitted, fall exactly on the retina.

The word is formed from the Greek πρεσβος, *ſenex*; becauſe old people are naturally ſubject to this defect: time, and the friction of the eye-lids, &c. gradually wearing the ball flat.

Preſbytæ are oppoſed to *myopes*, in whom the cryſtalline is too round.

If the diſtance between the retina and the cryſtalline be too ſmall, the perſon will likewiſe be a *preſbyta*. See EYE, and VISION.

PRESBYTER, a *prieſt*, or perſon in prieſt's orders.

He is thus called from the Greek πρεσβυτερος, *elder*; of πρεσβυς, *old*; becauſe, anciently, none were ordained but ſuch as were advanced in years.

The great diſpute between the retainers to the Geneva and the Roman diſcipline is, about the ſameneſs or difference of *preſbyters* and biſhops, in the times of the apoſtles.

Thoſe who conſult Acts xx. 17, 28. Phil. i. 1. Tit. i. 5. 7. and 1 Tim. iii. 1. may perhaps be led to conclude, that theſe titles were applied to the ſame perſons.

The learned biſhop Uther expreſſly ſays, "I have ever "declared my opinion to be, that *epiſcopus & preſbyter* "*gradu tantum differunt, non ordine*; and conſequently, "that in places where biſhops cannot be had, the ordi- "nation by *preſbyters* ſtands valid." And being aſked by his majeſty at the Iſle of Wight, "Whether he found in "antiquity, that *preſbyters* alone ordained any?" he replied, "Yes; and that he could ſhew his majeſty more; "even where *preſbyters* alone ſucceſſively ordained bi- "ſhops;" and inſtanced in Jerom's words (Epiſt. ad Evagrium) of the *preſbyters* of Alexandria chuſing and making their own biſhops from the days of Mark, till Heraclius and Dionyſius. Baxter's Life, p. 206.

This was the conſtant ſenſe of our firſt reformers, Cranmer, Pilkington, Jewel, Grindal, Whitgift, Bancroft, &c. Biſhop Burnet expreſſly ſays: "As for the notion "of diſtinct offices of biſhop and *preſbyter*, I confeſs, it "is not ſo clear to me; and therefore ſince I look upon "the ſacramental actions as the higheſt of ſacred per- "formances, I cannot but acknowledge thoſe who are "empowered for them muſt be of the higheſt office in "the church." Vind. of the Church of Scotland, p. 336. See BISHOP.

PRESBYTERIANS, a denomination comprehending a very conſiderable number of perſons in Great Britain; but very differently applied in England and Scotland. The Engliſh *preſbyterians* do not materially differ from the independents with regard to church-government and diſcipline, and mode of worſhip; but they generally allow a greater latitude of religious ſentiments and communion in their churches. The appellation, in this reſtricted uſe of it, implies no attachment to the authority of ſynods, preſbyteries, or eccleſiaſtical aſſemblies compoſed of deputies from different churches, any more than to epiſcopacy and the eccleſiaſtical hierarchy; and, therefore, according to its original uſe, it is improperly applied to many who are now diſtinguiſhed by it, and who form a very reſpectable claſs of NONCONFORMISTS, or proteſtant DISSENTERS in this kingdom. See INDEPENDENTS.

But the *preſbyterians*, properly ſo called, and with whom the former agree in ſome particulars, admit, in general, and allowing for that latitude of ſentiment, which will ever be the reſult of unreſtrained and liberal enquiry, the doctrinal articles of the church of England: their chief difference lies in the point of diſcipline, viz. who ſhall appoint the governors of the church, and what ſubordination there ſhall, or ſhall not, be between them.

The *preſbyterians* allow of no hierarchy, no ſubordination in the perſons of their miniſters; biſhops and prieſts, they maintain, in the times of the apoſtles, were the ſame; and therefore, though they allow epiſcopacy, as now ſettled in the church of England, to be very ancient, yet they deny it to be *jure divino*.

In lieu of a ſeries of miniſters one over another, in quality of prieſts, biſhops, and archbiſhops, their polity conſiſts in a ſeries of aſſemblies, or ſynods. Thus every mi-

nister is to be obedient to the classis under which he lives; and that class to a synod, provincial, classical, or œcumenical.

The power of ordination, with them, resides in a classis; and none are admitted to administer the sacrament, but those ordained by the imposition of hands of other ministers.

They make use of deacons to take care of their poor; and, in the government of the church, they call in lay-elders; whence their name: from the Greek πρεσβυτερος, signifying *senior, elder*. See PRESBYTERY.

This is now the established discipline of the church of Scotland, where it was introduced as soon as it began to assume a regular form, about the year 1560. Calvin, whose decisions were received amongst the protestants of that age with incredible submission, was the patron and restorer of this scheme of ecclesiastical policy. The church of Geneva, formed under his eye, and by his direction, was esteemed the most perfect model of government; and Knox, who, during his residence in that city, had studied and admired it, warmly recommended it to the imitation of his countrymen. But on the first introduction of this system, he did not think it expedient to depart altogether from the ancient form; instead of bishops he proposed to establish ten or twelve superintendants in different parts of the kingdom, who were empowered to inspect the life and doctrine of the other clergy, to preside in the inferior judicatories of the church, and to perform several other parts of the episcopal function; their jurisdiction, however, extended to sacred things only; they claimed no seat in parliament, and pretended no right to the dignity or revenues of the former bishops. The number of the inferior clergy was, at this time, very small; and in a few places only were formed into regular classes or societies. In order to give greater strength and consistence to the *presbyterian* plan, Knox, with the assistance of his brethren, composed, in 1561, the first book of discipline, which contains the model or platform of the intended policy. However, though the general assembly in the year 1566 had approved of the Geneva discipline, the parliament did not confirm the votes of the assembly, nor formally deprive the bishops of their power; but all church affairs from that time were managed by presbyteries, and general assemblies. In the year 1574 they voted the bishops to be only pastors of one parish; in 1577 they ordained that all bishops should be called by their own names; and in the next year they voted the name of a bishop to be a grievance. In 1580 the general assembly, with one voice, declared diocesan episcopacy to be unscriptural and unlawful. In the same year king James with his family, and the whole nation, subscribed a confession of faith, with a solemn league and covenant annexed, obliging themselves to maintain and defend the protestant doctrine and *presbyterian* government. In the year 1584 the bishops were restored by parliament to some parts of their ancient dignity. In 1587 the king consented to an act to take away bishops lands, and annex them to the crown; and in 1590 it was ordained, that all who bore office in the kirk, or should hereafter do so, should subscribe to the book of discipline. In 1592, all acts of parliament in favour of popery and episcopacy were annulled; and an act passed for establishing the *presbyterian* government, its general assemblies, provincial synods, presbyteries, and kirk sessions, with all the different branches of their discipline and jurisdiction, in the most ample manner. This act was again confirmed in 1593 and 1594. King James, during the latter years of his administration in Scotland, revived the name and office of bishops; but they possessed no ecclesiastical jurisdiction or pre-eminence; their revenues were inconsiderable, and they were scarce distinguished by any thing but by their seat in parliament, and by being the object of the clergy's jealousy, and the people's hatred. The king, delighted with the splendour and authority which the English bishops enjoyed, and eager to effect an union in ecclesiastical policy, resolved to bring both churches to an exact conformity with each other. Three Scotsmen were consecrated bishops at London, from whom their brethren were commanded to receive orders. Ceremonies unknown in Scotland were imposed; and though the clergy, less obsequious than the nobles, boldly opposed these innovations, James, long practised and well skilled in the arts of managing them, obtained at length their compliance. But Charles I. a superstitious prince, unacquainted with the genius of the Scots, imprudent and precipitate in all the measures he pursued in that kingdom, pressing too eagerly the reception of the English liturgy, and indiscreetly attempting a resumption of church lands, kindled the flames of civil war; and the people being left at liberty to indulge their own wishes, the episcopal church was overturned, and the *presbyterian* government and discipline were re-established with new vigour. Together with monarchy, episcopacy was restored in Scotland. The aversion of the nation, however, was insurmountable, and it subsisted with difficulty. At the Revolution, the institutions of the people were thought worthy the attention of the legislature, the *presbyterian* government was re-established (see CONVENTION), and being ratified by the UNION, is still maintained in that kingdom.

The abuse of church power in the beginning of the reign of James I. obliged many learned ministers and their followers to leave the kingdom, and retire to Amsterdam, Rotterdam, the Hague, Leyden, Utrecht, and other places of the Low Countries, where English churches were erected after the *presbyterian* model, and maintained by the states according to treaty with queen Elizabeth, as the French and Dutch churches were in England.

The first *presbyterian* church in England was established at Wandsworth, near London, in 1572; and others were afterwards erected in neighbouring counties. After the commencement of the troubles in the reign of Charles I. propositions for establishing *presbyterian* government in England were made in the treaty of Uxbridge, A. D. 1645; and so zealous were the advocates for it, that many of them maintained the divine right of it. The opinion of its origin was carried in the assembly of divines, but negatived in the house of commons. This form of church government was established, by way of probation, in 1646; though not without considerable opposition and clamour. In the year 1648, an ordinance for more effectually settling the *presbyterian* government, without limitation of time, received the sanction of both houses, under the title of a form of church government, to be used in the churches of England and Ireland. Under the commonwealth, in 1649, the *presbyterian* government was declared by the house to be the established government: it continued, though at a low ebb, under the protectorate of Oliver Cromwell, who was more favourable inclined to the independents, and till the Restoration of Charles II. an event in which the *presbyterians* and army, under the direction of general Monk, concurred. At this period episcopacy was re-established; the imprudent zeal of the *presbyterians* was forgotten, and they suffered in common with others who disapproved the hierarchy, and who scrupled conformity to the established articles of doctrine and discipline, till they were in some measure relieved by the act of TOLERATION.

PRESBYTERY, *presbyterium*, πρεσβυτερον, an assembly of the order of presbyters, or priests, with lay-elders, for the exercise of church-discipline.

The kirk, or church, of Scotland, is divided into sixty-nine *presbyteries*, each consisting of a number of parishes, not exceeding twenty-four, nor less than twelve.

The ministers of these parishes, with one ruling elder, chosen half-yearly, out of every KIRK-*session*, constitute a *presbytery*; who, meeting in their chief town, whence the *presbytery* is denominated, choose a moderator, or, more properly, a prolocutor, who must be a minister, half-yearly.

They determine all appeals from kirk-sessions, i. e. from the several parochial assemblies; but can try nothing at the first instance cognizable before a kirk-session.

They compose all differences between ministers and people; for which end, they hold *presbyterial* visitations in each parish, where they examine the registers of the kirk-sessions, &c.

They enquire into repairs of churches; see that the glebe, &c. suffer no dilapidations; appoint schools in the parishes; and see that the funds be not misapplied.

They, alone, can exclude from the communion; license probationers; suspend, depose, and, in effect, determine all ecclesiastical matters within their district. From the *presbytery* there lies an appeal, in all cases, to *provincial* SYNODS.

PRESBYTERY, *presbyterium*, is sometimes also used for the choir of a church, because anciently appropriated to the presbyters. In opposition to the nave, or body of the church, which was for the people.

PRESCIENCE, in *Theology*, *prevision*, or *foreknowledge*; that knowledge which God has of things to come.

The doctrine of predestination is founded on the *prescience* of God, and on the supposition of all futurity's being present to him.

Human reason can scarce reconcile the *prescience* of God with the free-agency of man: hence some have been led to deny the divine *prescience*, and others to maintain the doctrine of NECESSITY.

PRESCRIPTION, *præscriptio*, in *Law*, a right or title acquired by use and time.

Prescription is a sort of title introduced for assuring the property of effects in favour of persons who have possessed them a certain time; and to keep off any who would disquiet

disquiet them, or recover the thing possessed, after the term fixed by the laws.

Tourneil calls *prescription* a penalty imposed, by the laws, upon negligence; and adds, that possessors, who have no other title to plead but *prescription*, are only legal usurpers.

In effect, however, the law of *prescription* does not punish the indolence of proprietors, but only interprets their silence for their consent; presuming, that a man who neglects to assert his right for a long series of years, gives it up.

There are some of the lawyers who doubt, whether time and unjust *prescription* be any legitimate means of acquiring. Others, more favourable, call it the *patroness of mankind*; as being a general presumption, under which the law will have men live in peace.

In the common law, *prescription* is usually understood of a possession from time immemorial, or beyond the memory of man: as, when my ancestors, or his from whom I have an estate, have enjoyed and used it all the time whereof any memory remains.

But in the civil law, and even in our common law, there are *prescriptions* of a much shorter date; *prescription* of forty years excludes all actions whatever. Reform. Leg. Eccles.

The distinction between CUSTOM and *prescription* is this: that custom is properly a local usage, and not annexed to any person; such as, a custom in the manor of Dale that lands shall descend to the youngest son: *prescription* is merely a personal usage: as that Sempronius and his ancestors, or those whose estate he hath, have used time out of mind to have such an advantage or privilege. All *prescription* must be either in a man and his ancestors, or in a man, and those whose estate he hath, which last is called prescribing in a QUE *estate*. And formerly a man might, by the common law, have prescribed for a right which had been enjoyed by his ancestors or predecessors at any distance of time, though his or their enjoyment of it had been suspended for an indefinite series of years. But by the statute of limitations, 32 Hen. VIII. cap. 2. it is enacted, that no person shall make any *prescription* by the seisin or possession of his ancestor or predecessor, unless such seisin or possession hath been within threescore years next before such *prescription* be made. This title of *prescription* was well known in the Roman law by the name of USUCAPIO; so called, because a man, that gains a title by *prescription*, may be said *usu rem capere*.

As to the several species of things which may, or may not, be prescribed for, it may be observed, 1. That nothing but incorporeal hereditaments can be claimed by *prescription*; as a right of way, a common, &c. but that no *prescription* can give a title to lands, and other corporeal substances, of which more certain evidence may be had. 2. A *prescription* must always be laid in him that is tenant of the fee. A tenant for life, for years, at will, or a copy-holder, cannot prescribe, by reason of the imbecility of their estates. For, as *prescription* is usage beyond time of memory, it is absurd that they should pretend to prescribe, whose estates commenced within the remembrance of man. 3. A *prescription* cannot be for a thing which cannot be raised by grant. 4. What is to arise by matter of record cannot be prescribed for, but must be claimed by grant, entered on record; such as the royal franchises of deodands, felony, goods, &c. But the franchises of treasure-trove, waifs, estrays, and the like, may be claimed by *prescription*; for they arise from private contingencies, and not from any matter of record. 5. Among things incorporeal, which may be claimed by *prescription*, a distinction must be made with regard to the manner of prescribing; that is, whether a man shall prescribe in a *que estate*, or in himself and his ancestors. For if a man prescribes in a *que estate* (that is, in himself, and those whose estate he holds) nothing is claimable by this *prescription*, but such things as are incident, appendant, or appurtenant to lands; but if he prescribes in himself and his ancestors, he may prescribe for any thing whatever that lies in grant; not only things that are appurtenant, but also such as may be in gross. 6. Estates gained by *prescription* are not, of course, descendible to the heirs general, like other purchased estates, but are an exception to the rule. Blackst. Comm. book ii. ch. 17.

The custom of Paris allows of a *prescription* of ten years, if the parties be present; and of twenty, if absent; in favour of peaceable possessors of an inheritance, if they have any title, however controverted; and of thirty years, in favour of those who possess without any title at all.

In Normandy, a *prescription* of forty years peaceable possession is equivalent to a title to immoveables; and for moveables, and personal actions, a *prescription* of thirty years sufficeth.

In Romish countries, *prescription* does not avail against the church, if short of a hundred years. In France, *prescription* of twenty years is admitted against all crimes, except duelling, which was excluded by a declaration of the year 1679. In matters of adultery, five years suffice; i. e. provided there have been a discontinuance of prosecution all that time.

By our statutes, a judge or clerk convicted of false entering pleas, &c. may be fined within two years; but, those elapsed, he *prescribes* against the punishment of the statute.

The crime of maintenance or embracery, whereby perjury is committed by a jury, must be prosecuted within six days; or otherwise the parties *prescribe*.

There is no *prescribing* against a man's lord; no *prescription* avails to take off any servitude, or tenure; a title is always required there.

The author of the History of the Inquisition observes, that no time of *prescription* avails in matters of heresy; even death itself does not secure the suspected from the researches of that tremendous court.

PRESCRIPTION, *corporations by*, are those which have existed as CORPORATIONS, time whereof the memory of man runneth not to the contrary; with regard to which the king's consent is presumed. For though the members thereof can shew no legal charter of incorporation, yet in cases of such high antiquity, the law presumes there once was one; and that by the variety of accidents, which a length of time may produce, the charter is lost or destroyed.

PRESCRIPTION, *modus by*. See MODUS *decimandi*.

PRESCRIPTION, in *Medicine*, the act or art of assigning a proper and adequate remedy to a disease, from an examination of the symptoms thereof, and an acquaintance with the virtues and effects of the materia medica.

The methodus præscribendi is the last finishing piece of furniture of a physician, and is the result of all the rest, joined with a ready, present thought.

To *prescribe* with judgment, elegance, &c. a moderate acquaintance with pharmacy, i. e. with the forms and preparations of medicines, is required.

The merits of a bill, or *prescription*, consists in its being concise, pertinent, efficacious, and agreeable: in the best and suitableſt materials being pitched on; those assembled in the most judicious proportions, made up in the best and most convenient form, and applied in the justest dose; a due regard being still had to the non-naturals, regimen, intervals of application, &c. Sydenham particularly excelled in *prescription*.

Prescription is either *officinal*, or *extemporaneous*: the former consists in ordering the medicines which the apothecaries keep by them ready prepared, according to their dispensatory.

Extemporaneous is that which the physician frames of himself, *pro re nata*, according to the circumstances of the patient, to be made up by the apothecary according to the physician's bill.

PRESCRIPTION, in *Theology*, was a kind of argument pleaded by Tertullian, in the third century, against erroneous doctors; and which has been urged by papists (see METHODISTS), and others, in more modern times. With regard to this mode of arguing, we may observe, that there is scarcely any case, in which the plea of *prescription* can be admitted as a satisfactory argument in favour of religious tenets, or articles of faith; unless by *prescription* be meant, a doctrine's being established in the time and by the authority of the apostles. In all other cases, *prescription* is no argument at all: it cannot recommend error, and truth hath no need of its support.

PRESENCE, *præsentia*, a term of relation, used in opposition to *absence*, and signifying the existence of a person in a certain place; or the state of a person considered as co-existing with another.

In this sense, an obligation is said to be passed in *presence* of a notary, and witnesses; at the breaking open a seal of a minor, or an absent person, the *presence* of a substitute is necessary.

The schoolmen hold, that *presence*, in speaking of bodies, denotes not only a co-existence, but a sort of contact.

They distinguish two kinds of *presence*: the one *virtual*, in which sense a spirit, or mind, is said to be *present* to a body when it acts thereon; the other *corporeal*, which consists in a physical contact.

The treasurers, &c. of France have what they call a *right of presence*; a certain sum due on their actual attendance in their offices, to oblige them to be the more assiduous in their function.

A person absent in the service of the king, or a community, is represented as *present*.

The Roman catholics believe the real *presence* of Jesus Christ in the eucharist, both in body and soul. See TRANSUBSTANTIATION.

PRESENT,

PRESENT, *præsens*, in *Grammar*, the firſt tenſe, or inflexion of verbs; expreſſing the time preſent, or that which now is.

It is a particular piece of addreſs in eloquence, to make uſe of the *preſent* for a paſt tenſe, in order to expreſs a paſt action with the more force and warmth. Thus, the fleet *is* no ſooner in ſight of land, than the heavens *begin* to lower, the *winds riſe*, the waves *daſh* againſt each other, thunder *rolls*, and lightning *glares* on all ſides; the ſhips *loſe* their maſts and rudders, and *are* driven impetuouſly againſt the rocks.

PRESENTATION, *præſentatio*, in the *Canon Law*, the act of a patron, nominating and offering his clerk to the biſhop or collator, to be inſtituted in a benefice of his gift, which is void.

The word is formed from the ancient phraſe, *præſentare ad eccleſiam*; which originally ſignified the patron's ſending or placing a perſon in a church; and which itſelf is formed from *repræſentare*, which, Selden obſerves, is uſed in the council of Lateran, and elſewhere, for *præſentare*.

For the difference between *preſentation* and collation, ſee COLLATION.

By common law, a DEACON, of any age, might be inſtituted and induſted to a parſonage or vicarage; but it was ordained by 13 Eliz. cap. 12. that no perſons under twenty-three years of age, and in deacon's orders, ſhould be preſented to any benefice with cure; and if he were not ordained PRIEST within one year after his induction, he ſhould be *ipſo facto* deprived. And now, by 13 & 14 Car. II. cap. 4. no perſon is capable of being admitted to any benefice, unleſs he hath been firſt ordained a prieſt; and then he is, in the language of the law, a clerk in orders. Any clerk may be preſented to a parſonage or vicarage; that is, the patron, to whom the ADVOWSON of the church belongs, may offer his clerk to the biſhop of the dioceſe to be inſtituted. A layman may alſo be preſented, but he muſt take prieſt's orders before his admiſſion. As to the right of *preſentation*, this belongs even to an infant, who is heir of a manor to which an advowſon is appendant; and in caſe of a patron's bankruptcy, the commiſſioners may ſell the advowſon. If the right of *preſentation* is in coparceners, who agree in the ſame perſon, they are to join in the act of *preſentation*; otherwiſe, the elder ſhall have the preference, and afterwards the reſt in their turns; but where the right is in joint-tenants, or tenants in common, if there hath been no compoſition in writing to preſent by turns, they muſt join in the *preſentation*. If one be ſeiſed of an advowſon in fee, and the church becomes void, the void turn is a chattel; and if the patron dies before he preſents, the avoidance doth not go to his heir, but to his executor. But if the incumbent of a church be alſo ſeiſed in fee of the advowſon of the ſame church, and dieth, his heir, and not his executors, ſhall forfeit. In the caſe of a biſhop, who holdeth an advowſon in the right of his biſhoprick, the void turn of a church doth not go to his executor, but the king ſhall preſent. If a vicarage becomes void during the vacancy of the parſonage, the patron of the parſonage, and not the executor of the deceaſed parſon, ſhall preſent. If a feme covert hath a title to preſent, the *preſentation* muſt be by huſband and wife in both their names. And though the right of patronage in the wife deſcends to her heir, yet the right of preſenting during life belongs to the huſband, who is tenant by curteſy. If a man that is ſeiſed of an advowſon takes a wife, and dieth, the heir ſhall have two preſentments, and the wife the third. In caſe of a mortgage in fee of a manor, to which an advowſon is appendant, although the legal right of *preſentation* is veſted in the mortgagee, yet a court of equity will compel the ordinary to inſtitute the clerk of the mortgager any time before foreclo ſure. But if the advowſon itſelf only is mortgaged, the mortgagee preſents. The king, as patron paramount of all the benefices in England, hath a right to preſent to all churches, not regularly filled by other patrons, whether it happen by lapſe, or through incapacity to preſent, as if the patron be attainted, outlawed, or an alien, or have been guilty of ſimony, &c. On this ground, the king hath a right to preſent to all dignities and benefices of the advowſon of archbiſhopricks and biſhopricks, during the vacation of the reſpective ſees. And it is ſaid, that this privilege which the king hath of preſenting, by reaſon of the temporalities of a biſhoprick being in his hands, ſhall be extended unto ſuch preferments to which the biſhop of common right might preſent, though by his compoſition he hath tranſferred his power unto others. Upon promotion of any perſon to a biſhoprick, the king hath a right to preſent to ſuch benefices or dignities as the perſon was poſſeſſed of before ſuch promotion, though the advowſon belongeth to a common perſon. But by law in Ireland, no perſon can accept a biſhoprick there, until he hath reſigned all preferments which he hath in England; which preferments being void before the acceptance of the biſhoprick, the king in ſuch caſe ſhall loſe the *preſentation*. The lord chancellor, or lord keeper of the great ſeal for the time being, hath right to preſent to the benefices not exceeding in the king, of the yearly value of 20l. or under, in the king's books. It is a rule of the canon law, that no perſon may preſent himſelf: in this caſe, the ſhort and regular way is to make over the right to ſome friend before the avoidance.

The *preſentation* muſt be tendered to the biſhop within a hundred eighty-two days after the living is vacant, elſe it lapſes to the biſhop; and if the biſhop do not collate in half a year more, it lapſes to the archbiſhop; and from him, in a like time, to the king; who may ſtay as long as he pleaſes; for *nullum tempus occurrit regi*. See LAPSE.

By ſome cuſtoms, a lay patron has only four months time to make his *preſentation* in; and if he have preſented a perſon incapable, he may vary it, and make a new *preſentation* within the four months.

It is ſaid that *preſentation* may be made either by word or by writing. If it be by word, the patron muſt declare in the preſence of the ordinary; if by writing, by deed, but in the nature of a letter miſſive to the biſhop. Where a corporation aggregate of many doth preſent, it muſt be under their common ſeal; and ſince the ſtatute of frauds and perjuries, 29 Car. II. cap. 3. it is neceſſary that all *preſentations* ſhall be in writing. Thus alſo by the ſeveral ſtamp-acts, which enact a double 40s. ſtamp-duty, provided that the benefice, &c. preſented to, be of the yearly value of 10l. or upwards, in the king's books.

Preſentation may be revoked or varied before admiſſion and inſtitution. But when a clerk is preſented, the biſhop may refuſe him on various accounts: as, 1. If the patron is excommunicated, and remains in contempt forty days. Or, 2. If the clerk be unfit; which unfitneſs is of ſeveral kinds. Firſt, with regard to his perſon; as if he be a baſtard, an outlaw, an excommunicate, perjured, guilty of forgery or ſimony, under age, or the like. Secondly, with regard to his faith or morals; as for any particular hereſy, or vice that is *malum in ſe*; but if the biſhop only alleges in general terms, as that he is *ſchiſmaticus inveteratus*, or objects a fault that is *malum prohibitum* merely, as haunting taverns, playing at unlawful games, or the like, it is not good cauſe of refuſal. Or, laſtly, the clerk may be unfit to diſcharge the paſtoral office for want of learning; in any of which caſes the biſhop may refuſe the clerk. In caſe the refuſal is for hereſy, ſchiſm, inability of learning, or other matter of eccleſiaſtical cognizance, there the biſhop muſt give notice to the patron of ſuch his cauſe of refuſal, who, being uſually a layman, is not ſuppoſed to have knowledge of it; elſe he cannot preſent by lapſe; but if the cauſe be temporal, there he is not bound to give notice. If an action at law be brought by the patron againſt the biſhop for refuſing his clerk, the biſhop muſt aſſign the cauſe. If the cauſe be of a temporal nature, and the fact be admitted (as, for inſtance, outlawry), the judges of the king's courts muſt determine its validity, or whether it be ſufficient cauſe of refuſal; but if the fact be denied, it muſt be determined by a jury. If the cauſe be of a ſpiritual nature (as hereſy, particularly alleged) the fact, if denied, ſhall alſo be determined by a jury; and if the fact be admitted or found, the court upon conſultation, or advice of learned divines, ſhall decide its ſufficiency. If the cauſe be want of learning, the biſhop need not ſpecify in what points the clerk is deficient, but only allege that he is deficient; for the ſtatute 9 Edw. II. ſtat. 1. cap. 13. is expreſs, that the examination of the fitneſs of a perſon preſented to a benefice belongs to the eccleſiaſtical judge. If the biſhop returns the clerk to be *minus ſufficiens in literatura*, the court ſhall write to the metropolitan, to re-examine him, and certify his qualifications; which certificate of the archbiſhop is final. Burn's Eccl. Law, vol. i. art. *Benefice*. Blackſt. Com. book i. cap. 11. See INSTITUTION and INDUCTION.

PRESENTATION *of the Virgin* is a feaſt of the Romiſh church, held on the twenty-firſt of November, in memory of the holy Virgin's being preſented by her parents in the temple, to be there educated.

Emanuel Comnenus, who began to reign in 1143, makes mention of this feaſt in his Conſtitutions. Some even imagine it to have been eſtabliſhed in the eleventh century, among the Greeks; and think, they ſee evident proofs of it in ſome homilies of George of Nicomedia, who lived in the time of Photius. Its inſtitution in the Weſt is aſcribed to Gregory XI. in 1372.

Some take it to have been inſtituted in memory of the ceremony practiſed among the Jews for their new-born [illegible]

males; corresponding to the circumcision on the eighth day for males.

PRESENTATION *of our Lady* also gives the title to three orders of nuns.

The first, projected in 1618, by a maid named Joan of Cambray. The habit of the nuns, according to the vision the pretended to have, was to be a grey gown of natural wool, &c. but this project was never accomplished.

The second was established in France, about the year 1627, by Nic. Sanguin, bishop of Senlis. It was approved by Urban VIII. This order never made any great progress.

The third was established in 1664, when Fred. Borromeo, being apostolical visitor in the Valteline, was intreated, by some devout maids at Morbegno, to allow them to live in community in a retired place; which he granted, and erected them into a congregation, under the title of *congregation of our Lady*. They live under the rule of St. Augustine.

PRESENTATIVE *advowsons*. See ADVOWSON.

PRESENTEE, in the *Canon Law*, a clerk presented by a patron to a collator. See PRESENTATION.

PRESENTMENT, in *Law*, a denunciation or information of the jurors themselves, which the grand jury find and present to the court, without any indictment delivered to them, which is afterwards reduced into the form of an indictment; or of some other officer, as a justice, constable, church-warden, surveyor, &c. of an offence, inquirable into the court whereto it is presented.

Presentments are made in courts leet and courts baron, before stewards; and in the latter of surrenders, grants, &c.

PRESENTMENT, *assise of darrein*. See ASSISE.

PRESENTS, *præsentia, free gifts*, or *gratuities*, especially those given by the clergy, or the states of a realm, to a king.

They are so called, because given into the hands of a person present; by which they are distinguished from *mandata, gifts*, which are sent to the party, or delivered by the intervention of a third person.

Thus the eighteenth law, *De verb. signif. Absentibus res donari dicuntur, munera autem mitti, & præsentia offerri.* There is no accosting the eastern princes without making them fine *presents*. Kings usually make rich *presents* to ambassadors sent to their courts.

PRESEPE, or PRÆSEPE, in *Astronomy*, a name given to three nebulous stars in the breast of the sign Cancer, or the Crab. Two of them are of the seventh, the third of the sixth magnitude. Their longitudes, latitudes, &c. see among those of the other stars in CANCER.

PRESERVATION *of vegetables*. This is to be done several ways in the several kinds, and many more might certainly be invented; for we are not yet arrived at the perfect method of *preserving vegetables* with their colours, odours, and all their sensible qualities, as well as their natural form, for a number of years. Fruits may be long preserved in spirit of wine, first well saturated with the skins and tinging parts of those fruits; and many may be tolerably preserved in perfectly fermented liquors, which generate no more air. The more solid vegetable substances may be preserved by gentle drying in the sun shade, or other slack heat. Thus peas or beans may be dried young in a slack oven in their proper season, and may afterwards be boiled in the winter, and will eat young and tender, as if just gathered. The ways of preserving fruits both dry and moist, with sugar, are now universally known; and there are in the several ways many secrets in the hands of particular artists, which it would be well to have generally known. See *Preservation of* FLOWERS.

PRESERVATIVE, or PRÆSERVATIVE, in *Medicine*, a remedy taken by way of precaution, or to secure a man from a disease that threatens him.

The principal *preservatives*, according to Boerhaave, are, abstinence, quiet, drinking of warm water; and, after this, a gentle and continued motion till the first appearance of sweat; then a profuse sleeping, the body well covered.

By such means, crass humours are diluted, the vessels are relaxed, and noxious matter excreted. He adds, that the best defence against the force of external cold is to lessen the winter's clothing late in the spring, and to increase the summer's clothing soon in autumn.

In time of plague, *preservatives* are very necessary against the contagion of the air, &c. See PLAGUE, and CONTAGION.

Generous wines, cardiacs, and sudorifics, are *preservatives*.

Dr. Asprunus tells us, he made incisions with a lancet in inguine dextro & sinistro, and put in setons, to give passage to the venom; which proved an excellent *preservative* against the plague that raged at Prague in 1680.

Dr. Wenceslaus Dobr. Zensky de Negro Ponte gives us an universal *preservative* against infection in all diseases. "Whoever, says he, in conversing with patients of any "kind, would preserve himself from infection, must, "while he is within the sphere of their effluvia, never "swallow his spittle, but spit it out." For this author conceives it to be the spittle that first imbibes the infection.

PRESERVING *of timber*. See TIMBER.

PRESIDENT, *præses*, an officer created, or elected, to *preside* over a company, or assembly; so called in contradistinction to the other members, who are termed *residents*.

Lord PRESIDENT *of the council* is a great officer of the crown, who has precedence next after the lord chancellor and lord treasurer; as ancient as the time of king John, when he was styled *consiliarius capitalis*.

His office is, to attend on the king, to propose business at the council-table, and to report to the king the several transactions there. See PRIVY-*council*.

PRESIDIAL, a tribunal, or bench of judges, established in the several considerable cities of France, to judge ultimately, or in the last resort, of the several causes brought before them by way of appeal from the subaltern judges.

The *presidials* make one company with the officers of the bailliages and senefchauflees, where they are established.

The edict of 1551 establishes these two conditions: first, that they may judge definitely, and without appeal, to the sum of 250 livres, or 10 livres per annum; and, 2. To the sum of 500 livres, or 20 livres per annum, by provision.

When they judge in the former case, they are obliged to pronounce it with these words, *par jugement dernier*; in the second, *par jugement presidial*.

When they judge finally of appeals from inferior judges, they may not pronounce the sentence or appeal, *au neant*, void; that form only belonging to the sovereign courts; but are to pronounce simply, that *it has been well or ill-judged*. To judge *presidially* and finally, they must be at least seven in number.

PRESS, *prelum*, in the *Mechanic Arts*, a machine made of iron or wood, serving to squeeze or compress any body very close.

The *ordinary presses* consist of six members, or pieces; viz. two flat, smooth planks; between which the things to be prefled are laid; two screws, or worms, fastened to the lower plank, and passing through two holes in the upper; and two nuts, in form of an S, serving to drive the upper plank, which is moveable, against the lower, which is stable, and without motion.

PRESSES *used for expressing of liquors*, are of various kinds; some, in most respects, the same with the common *presses*, excepting that the under plank is perforated with a great number of holes, to let the juice expressed run through into a tub, or receiver, underneath.

Others have only one screw, or arbor, which passes through the middle of the moveable plank, which is made to descend into a kind of square box, full of holes on all sides; through which the juices flow, in proportion as the arbor is turned; by means of a little lever applied thereto.

PRESS *used by joiners* to keep close the pieces they have glued, especially panels, &c. of wainscot, is very simple, consisting of four members; viz. two screws, and two pieces of wood, four or five inches square, and two or three feet long; whereof the holes at the two ends serve for nuts to the screws.

PRESS *used by inlayers* resembles the joiner's *press*, except that the pieces of wood are thicker, and that only one of them is moveable; the other, which is in form of a trestel, being sustained by two legs, or pillars, jointed into it at each end.

This *press* serves them for sawing and cleaving the pieces of wood required in marquetry, or inlaid work.

PRESS, *founders*, is a strong, square frame, consisting of four pieces of wood, firmly joined together with tenons, &c.

This *press* is of various sizes, according to the sizes of the moulds; two of them are required to each mould, at the two extremes whereof they are placed; so as that, by driving wooden wedges between the mould and the sides of the *presses*, the two parts of the mould, wherein the metal is to be run, may be pressed close together.

PRESS, *printing*. See PRINTING *press*.

PRESS, *messenger of the*. See MESSENGER.

PRESS, *rolling*, is a machine used for the taking off prints from copper-plates.

It is much less complex than that of the letter-printers. See its description and use under the article *Rolling-press* PRINTING.

PRESS, in *Coining*, is one of the machines used in striking

of money; differing from the balance, in that it has only one iron bar to give it motion, and preſs the moulds, or coins; is not charged with lead at its extreme, nor drawn by cordage. See COINAGE.

PRESS, *binders cutting*, is a machine uſed equally by book-binders, ſtationers, and paſteboard-makers; conſiſting of two large pieces of wood, in form of cheeks, connected by two ſtrong wooden ſcrews; which, being turned by an iron bar, draw together, or ſet aſunder, the cheeks, as much as is neceſſary, for the putting in the books, or paper, to be cut.

The cheeks are placed lengthways on a wooden ſtand, in form of a cheſt, into which the cuttings fall. Aſide of the cheeks are two pieces of wood, of the ſame length with the ſcrews, ſerving to direct the cheeks, and prevent their opening unequally.

Upon the cheeks the plough moves, to which the cutting-knife is faſtened by a ſcrew; which has its key, to diſmount it, on occaſion, to be ſharpened.

The plough conſiſts of ſeveral parts; among the reſt, a wooden ſcrew, or worm, which, catching within the nuts of the two feet, that ſuſtain it on the cheeks, brings the knife to the book, or paper, which is faſtened in the *preſs* between two boards. This ſcrew, which is pretty long, has two directories, which reſemble thoſe of the ſcrews of the *preſs*. To make the plough ſlide ſquare and even on the cheeks, ſo that the knife may make an equal paring, that foot of the plough where the knife is not fixed, ſlides in a kind of groove, faſtened along one of the cheeks. Laſtly, the knife is a piece of ſteel, ſix or ſeven inches long, flat, thin, and ſharp, terminating at one end in a point, like that of a ſword, and, at the other, in a ſquare form, which ſerves to faſten it to the plough. See BOOK-*binding*.

As the long knives uſed by us in the cutting of books or papers are apt to jump in the cutting thick books, the Dutch are ſaid to uſe circular knives with an edge all round; which not only cut more ſteadily, but laſt longer without grinding.

PRESS, in the *Woollen Manufactory*, is a large wooden machine, ſerving to preſs cloths, ſerges, rateens, &c. thereby to render them ſmooth and even, and to give them a gloſs.

This machine conſiſts of ſeveral members; the principal whereof are the *cheeks*, the *nut*, and the *worm*, or *ſcrew*, accompanied with its *bar*; which ſerves to turn it round, and make it deſcend perpendicularly on the middle of a thick, wooden plank, under which the ſtuffs to be preſſed are placed. The CALENDER is alſo a kind of *preſs*, ſerving to preſs, or calender, linens, ſilks, &c.

PRESS, *liberty of the*, in *Law*, conſiſts, ſays judge Blackſtone, in laying no previous reſtraints upon publications, and not in freedom from cenſure for criminal matter, when publiſhed; and this is eſſential to the nature of a free ſtate. Every free man has an undoubted right to lay what ſentiments he pleaſes before the public; to forbid this is to deſtroy the freedom of the *preſs*; but if he publiſhes what is improper, miſchievous, or illegal, he muſt take the conſequence of his own temerity. To ſubject the *preſs* to the reſtrictive power of a licenſer, as was formerly done, both before and ſince the Revolution, is to ſubject all freedom of ſentiment to the prejudices of one man, and make him the arbitrary and infallible judge of all controverted points in learning, religion, and government. But to puniſh (as the law does at preſent) any dangerous or offenſive writings, which, when publiſhed, ſhall on a fair and impartial trial be adjudged of a pernicious tendency, is neceſſary for the preſervation of peace and good order, of government and religion, the only ſolid foundations of civil liberty.

The art of printing (ſays the ſame excellent writer), ſoon after its introduction, was looked upon (as well in England as in other countries) as merely a matter of ſtate, and ſubject to the coercion of the crown. It was, therefore, regulated with us by the king's proclamations, prohibitions, charters of privilege and of licence, and, finally, by the decrees of the court of ſtar-chamber, which limited the number of printers, and of *preſſes*, which each ſhould employ, and prohibited new publications, unleſs previouſly approved by proper licenſers. On the demolition of this odious juriſdiction in 1641, the long parliament of Charles I. after their rupture with that prince, aſſumed the ſame powers as the ſtar-chamber exerciſed with reſpect to the licenſing of books; and in 1643, 1647, 1649, and 1652, iſſued their ordinances for that purpoſe, founded principally on the ſtar-chamber decree of 1637. In 1662 was paſſed the ſtatute 13 & 14 Car. II. cap. 33. which (with ſome few alterations) was copied from the parliamentary ordinances. This act expired in 1679, but was revived by ſtatute 1 Jac. II. cap. 17. and continued till 1692. It was then continued for two years longer by ſtatute 4 W. & M. cap. 24.; but though frequent attempts were made by the government to revive it in the ſubſequent part of that reign, yet the parliament reſiſted it ſo ſtrongly, that it finally expired, and the *preſs* became properly free in 1694, and has ſo continued ever ſince. Comm. book iv. p. 152.

PRESS, in the *Manege*. A horſe is ſaid to reſiſt, or *preſs* upon the hand, when either through the ſtiffneſs of his neck, or from an ardour to run too much a-head, he ſtretches his head againſt the horſeman's hand, refuſing the aid of the hand, and withſtands the effects of the bridle.

If your horſe is too fiery, and *preſſes* upon the hand, endeavour to pacify him, by making him go more ſoftly, and pulling him backwards; and if it proceeds from a ſtiffneſs of the ſhoulders and neck, you muſt ſupply him with a caveſſon, made after the duke of Newcaſtle's way. See HEAVY.

PRESS is alſo uſed for puſhing a horſe forewards by ſtriking him with the calves of your legs, or even ſpurring him, in order to make him go on.

PRESS, or PRESSING, in the *Sea-Language*. See MANNING *the fleet*.

PRESSING, in the *Manufactures*, the action of violently ſqueezing a cloth, ſtuff, linen, &c. in a preſs, to render it even, ſmooth, poliſhed, and gloſſy.

This, in the ſilken and linen manufactures, they properly call *calendering*.

There are two manners of *preſſing*; the one *hot*, the other *cold*.

PRESSING *cold*, *method of*. After the ſtuff has had all its preparations, i. e. has been ſcoured, fulled, and ſhorn, (ſee FULLING, and SHEERING) it is folded ſquare, in equal plaits; and a ſkin of vellom, or fine ſmooth paſteboard, is put between each plait. Over the whole is laid a ſquare, wooden plank; and, in this condition, it is put in the preſs, which is driven tight down by means of the ſcrew turned full upon it, by the hands, aſſiſted with levers.

After it has lain a ſufficient time under the preſs, they take it out, remove the paſteboards or vellums, and lay it up to keep. It may be obſerved, that ſome do not uſe a preſs with a ſcrew in *preſſing cold*, but content themſelves with laying the ſtuff on a firm table, after plaiting and paſteboarding it as before; covering the whole with a wooden plank, and loading this with a weight, greater or leſs, as is judged neceſſary.

PRESSING *hot*, *method of*. The ſtuff having received all its preparations, as before, it is ſprinkled a little with water, ſometimes with gum-water, ſpurted over it with the mouth; then plaited equally, and, between each two plaits, are put leaves of paſteboard; and between every ſixth and ſeventh plait, as well as over the whole, an iron or braſs plate, well heated, in a kind of furnace prepared for the purpoſe.

This done, it is laid upon the preſs; and a ſcrew is brought forcibly down upon it, by means of a long iron bar.

Under this preſs are laid five or ſix pieces, one over another, at the ſame time, all furniſhed with their paſteboard and iron plates. When the plates are well cold, they take the ſtuffs from under the preſs, remove the paſteboards and plates, and ſtitch it a little together, to keep it in the plaits.

This manner of *preſſing* woollen ſtuffs is very pernicious, and was only invented by the manufacturers to cover the defects of the ſtuffs, and excuſe their not giving them all the ſhearings, dyes, and preparations, that are neceſſary to render them perfect: accordingly they have been frequently prohibited.

PRESSING *to death*. See PAINE *fort & dure*.

PRESSION, or PRESSURE, in the *Carteſian Philoſophy*, an impulſive kind of motion, or rather an endeavour to move, impreſſed on a fluid medium, and propagated through it.

In ſuch a *preſſion* the Carteſians ſuppoſe the action of LIGHT to conſiſt. And, in the various modifications of this *preſſion*, by the ſurfaces of bodies, whereon that medium is thus preſſed, they ſuppoſe the various colours to conſiſt, &c. But Sir Iſaac Newton has taught us better; for if light, e. gr. conſiſted only in a *preſſion*, propagated without actual motion, it could not agitate and warm ſuch bodies as reflect and refract it, as we actually find it does; and if it conſiſted in an inſtantaneous motion, or one propagated to all diſtances in an inſtant, as ſuch *preſſion* ſuppoſes, there would be required an infinite force to produce that motion every moment, in every lucid particle.

And if light conſiſted either in *preſſion*, or in motion propagated in a fluid medium, whether inſtantaneouſly, or in time, it muſt follow, that it would inflect itſelf at *umbram*; for *preſſion*, or motion, in a fluid medium cannot be propagated in right lines, beyond any obſtacle which

which ſhall hinder any part of the motion; but will inflect and diffuſe itſelf, every way, into thoſe parts of the quieſcent medium which lie beyond the ſaid obſtacle.

Thus the force of gravity tends downward; but the *preſſure* which ariſes from that force of gravity, tends every way with an equable force; and, with equal eaſe and force, is propagated in crooked lines, as in ſtraight. Waves on the ſurface of water, while they ſlide by the ſides of any large obſtacle, do inflect, dilate, and diffuſe themſelves, by degrees, into the quieſcent water lying beyond the obſtacle. The waves, pulſes, or vibrations of our air, in which ſounds conſiſt, do manifeſtly inflect themſelves, though not ſo much as the waves of water; for the ſound of a bell, or of a cannon, can be heard over a hill, which intercepts the ſonorous object from our ſight; and ſounds will be propagated as eaſily through crooked tubes, as through ſtraight.

But light is never obſerved to go in curve lines, nor to inflect itſelf *ad umbram*; for the fixed ſtars do immediately diſappear on the interpoſition of any of the planets, as well as ſome parts of the ſun's body, by the interpoſition of the moon, Venus, or Mercury.

PRESSURE *of the air.* See AIR.

Moſt of the effects anciently aſcribed to the fuga vacui, are now accounted for from the weight and *preſſure* of the air.

The *preſſures* of the air on the ſurface of our earth, is balanced by a column of water of the ſame baſe, and about thirty-five feet high; or of one of mercury, of about twenty-nine inches.

The *preſſure* of the air on every ſquare inch on the ſurface of the earth, is computed to be about fifteen pounds avoirdupois. See ATMOSPHERE.

PRESSURE, *centre of*, in *Hydroſtatics*, is that point of any plane to which, if the total *preſſure* were applied, its effect upon the plane would be the ſame as when it was diſtributed unequally over the whole; or, it is that point in which the whole *preſſure* may be conceived to be united; or, it is that point to which, if a force were applied equal to the total *preſſure*, but with a contrary direction, it would exactly balance or reſtrain the effect of the *preſſure*. Thus if *a b c d* (Tab. V. *Hydraulics, &c. fig.* 53.) be a veſſel of water, and the ſide *ae* be preſſed upon with a force equivalent to twenty pounds of water, this force is unequally diſtributed over *a c*; for the parts near *a* are leſs preſſed than thoſe near *c*, which are at a greater depth; and, therefore, the efforts of all the particular *preſſures* are united in ſome point *x*, which is nearer to *c* than to *a*; and that point *x* may be called the centre of *preſſure*: if to that point a force equivalent to twenty pounds weight be applied, it will affect the plane *a c* in the ſame manner as by the *preſſure* of the water diſtributed unequally over the whole: and if to the ſame point we apply the ſame force with a contrary direction to that of the *preſſure* of the water, the force and *preſſure* will balance each other, and by contrary endeavours deſtroy each other's effects. Suppoſe at *x* a cord *xpw* were fixed, which paſſing over the pulley *p*, has a weight of twenty pounds annexed to it, and that the part of the cord *xp* were perpendicular to *a c*, the effort of the weight *w* is equal, and its direction contrary to that of the *preſſure* of the water. Now if *x* be the centre of *preſſure*, theſe two powers will be in equilibrio, and mutually deſeat each other's endeavours. Mr. Cotes has inveſtigated a general rule for finding this centre in the following manner. If any plane, which happens to be propoſed, be produced till it interſects the upper ſurface of the water produced, if need be, and the line which is the common ſection of the two planes be made an axis of ſuſpenſion; the CENTER *of oſcillation*, or *percuſſion* of the plane, as it is ſuppoſed to revolve about that axis, will be the centre of *preſſure* required. Then if *ac* (*fig.* 54.) repreſents the plane propoſed, let it be produced till it cuts the plane *gb* in *d*; now if *d* be made the axis of ſuſpenſion of the plane *ac*, the centre of percuſſion of the plane *ac* revolving about *d*, will be the centre of *preſſure* upon the ſame plane. For if the percuſſive forces of every point of *ac* be as the *preſſures* exerciſed upon thoſe points, then the centre of percuſſion muſt be the ſame with the centre of *preſſure*; and that the force of percuſſion is every where as the *preſſure* of the water, may be thus proved. The percuſſive force of any point, as *b*, is as the velocity of that point, and the velocity is as the diſtance *bd* of the point from the axis of motion; ſo the percuſſive force of *a* is as *a d*, of *e* as *e d*; ſince then the percuſſive forces of *a*, *b*, *c*, are as the lines *da*, *db*, *dc*, and theſe lines are as the lines *ea*, *fb*, *gc*, perpendicular to the ſurface of the water, and theſe laſt lines are as the *preſſures* upon *a*, *b*, and *c*, it follows, that the percuſſive forces, taking the interſection *d* for the axis of ſuſpenſion or motion, are reſpectively as the *preſſures* upon the ſame points; therefore the centre of percuſſion or oſcillation is the ſame with the centre of *preſſure*. Cotes's Hyd. and Pneum. Lect. p. 40, &c.

PRESSURE *of fluids.* See FLUID.

PREST, a duty in money, paid by the ſheriff upon his accounts in the exchequer, for money left, or remaining, in his hands.

The word is French, *preſt*; where it ſignifies *ready*.

PREST-MONEY is a ſum of money which binds thoſe who receive, to be ready at command, at all times appointed; chiefly underſtood in the liſting of ſoldiers.

PREST-SAIL, in the *Sea-Language*, is when a ſhip carries all the ſail ſhe can poſſibly croud.

This is ſometimes done in giving chace, &c. but it is a dangerous experiment, leſt the ſhip overſet, or bring her maſts by the board; in which latter caſe ſhe becomes an eaſy prey.

PREST, *auditors of the.* See AUDITOR.

PRESTATION-MONEY, a ſum of money paid yearly, by archdeacons, and other dignitaries, to their biſhop, *pro exteriori juriſdictione*.

PRESTATION, *præſtatio*, was alſo anciently uſed for other payments: *Et quieti ſint de* præſtatione *murargii*. Chart. Hen. VII. Sometimes alſo for pourveyance.

PRESTER, a meteor, conſiſting of an exhalation thrown from the clouds downwards with ſuch violence, as that by the colliſion it is ſet on fire.

The word is Greek, πρηστηρ, the name of a kind of ſerpent; called alſo *dipſas*, to which this meteor is ſuppoſed to bear a reſemblance.

The *preſter* differs from the thunderbolt in the manner of its inflammation; and in its burning and breaking every thing it touches with greater violence.

PRESTER, a word uſed by ſome to expreſs the external part of the neck, which is uſually inflated in anger.

PRESTER *John*, or *Jean*, an appellation given to the emperor of the Abyſſinians; becauſe, anciently, the princes of this country were really prieſts; and the word *jean*, in their language, ſignifies *king*.

He was firſt made known in Europe under this title by the French. His empire was, anciently, of vaſt extent; at preſent it is confined to ſix kingdoms, each about the bigneſs of Portugal.

The name *Preſter John* is altogether unknown in Ethiopia; and took its riſe hence, that the people of a province where this prince uſually reſides, when they requeſt any thing, ſay *Jean-coi*, i. e. *my king*. His proper title is, the *Grand Negus*.

There is alſo a *Preſter John* of Aſia, mentioned by M. Polo the Venetian. His juriſdiction is in the country of Cangingu, between China, Siſan, and Thibet; a kingdom mightily valued by the Chineſe, for its policy, and the number of its fortified cities; though they have uſually the utmoſt contempt for foreign countries.

Some ſay this latter is ſo called from a Neſtorian prieſt, or preſbyter, mentioned by Albericus, towards the year 1145, to have mounted the throne; who having been a preſbyter before his elevation to the royal dignity, was called *Preſbyter John*, or *Preſter John*, even when he was ſeated on the throne; but his kingly name was *Ungchan*. This preſbyter availing himſelf of the death of Coiremehan, otherwiſe called Kenchan, the monarch of Aſiatic Tartary, which borders upon Cathay, invaded the kingdom with ſuch vigour and ſucceſs, that he was acknowledged as its monarch. Others ſay, that he takes the name from a croſs which he bears in his hand as a ſymbol of his religion.

The hiſtory of *Preſter John* has been involved in conſiderable obſcurity and confuſion. Some have apprehended that there were two perſons in the Eaſt under this appellation, agreeably to the preceding account; whilſt others conſider the Abyſſinian *Preſter John* as a fictitious character. The fact, as Mr. Moſheim has ſtated it, ſeems to be briefly this. In the fifteenth century, John II. king of Portugal, employed Pedro Couvilliano in a laborious enquiry into the real ſituation of the kingdom of *Preſter John*. The curious voyager undertook this taſk, and, for information in the matter, travelled with a few companions into Abyſſinia; and, obſerving in the emperor of the Abyſſinians or Ethiopians many circumſtances that reſembled the accounts which at that time prevailed in Europe concerning *Preſter John*, he perſuaded himſelf that he had fulfilled his commiſſion, and found out the reſidence of that extraordinary monarch, who was the object of his reſearches. His opinion eaſily gained credit in Europe, which had not yet emerged out of its ignorance and barbariſm. But a new light was caſt upon this matter in the ſeventeenth century, by the publication of ſeveral pieces, which the induſtry of the curious drew forth from their obſcurity, and by which a great number of learned men were engaged to abandon the Portugueſe opinion, and were convinced that *Preſter John* reigned in Aſia, though they ſtill continued

to diſpute about the ſituation of his kingdom, and other particular circumſtances. There are, however, ſome men of the moſt eminent learning in our times, who maintain, that *John* was emperor of the Abyſſinians, and thus prefer the Portugueſe opinion, though (ſays Moſheim) deſtitute of authentic proofs and teſtimonies, to the other, though ſupported by the ſtrongeſt evidence, and the moſt unqueſtionable authorities. Moſh. Eccl. Hiſt. vol. ii. p. 361. 8vo. Eng. edit.

We ſhall only add, that the death of *Preſter John*, and the total defeat of his ſucceſſor by Genghizkan, emperor of the Tartars, gave an unhappy turn to the affairs of the Chriſtians in the northern parts of Aſia, towards the cloſe of the twelfth century. From this period the Chriſtian cauſe loſt much of its authority and credit in the provinces that had been ruled by *Preſter John* and his ſucceſſor David, and continued to decline, till, at length, it ſunk entirely under the weight of oppreſſion; and was ſucceeded in ſome places by the errors of Mahomet, and in others by the ſuperſtitions of paganiſm. In this general account, however, we may except the kingdom of Tangut, the chief reſidence of *Preſter John*, in which his poſterity, who perſevered in the profeſſion of Chriſtianity, maintained, for a long time, a certain ſort of tributary dominion, which exhibited, indeed, but a faint ſhadow of their former grandeur.

PRESTESSE, in the *Manege*, is uſed to denote the readineſs and diligence of a horſe in working a manege.

PRESTIMONY, *præſtimonia*, in the *Canon Law*, a term about which authors are much divided. It is derived *a præſtatione quotidiana*; and is, by ſome, defined a kind of benefice, ſerved by a ſingle prieſt: in which ſenſe, *preſtimony* is the ſame with a preſbyterian chapel.

Others will have *preſtimony* to be the incumbency of a chapel, without any title, or collation; ſuch as are moſt of thoſe in caſtles, where prayers or maſs are ſaid; and which are mere oratories, unendowed. Whence, alſo, the term is applied, in the Romiſh church, to certain perpetual offices, beſtowed on canons, religious, or others, for the ſaying of maſſes, by way of augmentation of their livings.

Others, again, will have *preſtimony* to be a leaſe, or conceſſion, of any eccleſiaſtical fund, or revenue, belonging to a monaſtery, to be enjoyed during life.

Du Moulin makes *preſtimony* a profane benefice, which, however, has a perpetual title, and an eccleſiaſtical office, with certain revenues attached to it; which the incumbent is allowed to ſell, and which may be poſſeſſed without tonſure; ſuch as the lay-churchwardens of Notre-dame. He adds, that, in propriety, the canonries of chapels are benefices of this nature.

Upon the whole, the moſt probable opinion ſeems to be this, that *preſtimony* is a fund, or revenue, appropriated by the founder, for the ſubſiſtence of a prieſt, without being erected into any title of benefice, chapel, prebend, or priory; and which is not ſubject, either to the pope, or to the ordinary; but whereof the patron, and thoſe who have a right from him, are the collators, and nominate, and confer, *plena jure*.

PRESTISSIMO, in the *Italian Muſic*, intimates to perform extremely quick, haſtily, and with fury.

PRESTO, in the *Italian Muſic*, is uſed to ſignify that the part it is joined to ſhould be performed gayly, faſt, and quick, yet not with rapidity.

Non troppo PRESTO, or *men* PRESTO, in the *Italian Muſic*, ſignifies not too quick, or leſs than *preſto*.

Più PRESTO, in the *Italian Muſic*, is uſed to intimate that we ſhould ſing, or play, the part to which it is annexed, a little briſker and quicker than the *preſto* alone requires. When *più* is added to other words, *as adagio, grave, vivace*, &c. it adds in like manner to the ſlowneſs, or quickneſs, of the movements, reſpectively.

PRESTO, PRESTO, in the *Italian Muſic*, the ſame with PRESTISSIMO.

PRESUMPTION, *præſumptio*, in *Law*, a ſuſpicion, or conjecture, founded on a reſemblance.

Preſumption is of three ſorts. 1. *Violent*, which many times is allowed a full proof: as if one be killed in a houſe, and a man is ſeen to come out of the houſe with a bloody ſword, and no other perſon was at that time in the houſe, this, though but a *preſumption*, is a proof. 2. *Probable*, ariſing from ſuch circumſtances as uſually attend the fact, which has its due weight. 3. *Light*, or *temerarious*, which is of no prevalency at all.

In caſes of a charter, or feoffment, if all the witneſſes to the deed be dead, the violent *preſumption*, that ſtands for a proof, gives continual and quiet poſſeſſion. *Stabit* præſumptio, *donec probetur in contrarium*. Coke on Litt. See CIRCUMSTANTIAL *evidence*, and EVIDENCE.

PRESUMPTION was alſo anciently uſed for INTRUSION.

PRESUMPTION, *præſumptio*, in *Rhetoric*, the ſame with PROLEPSIS.

PRESUMPTIVE *heir*. See HEIR.

PRESUMPTIVE *evidence of felony*. See EVIDENCE.

PRETENCE, in *Heraldry*. See INESCUTCHEON, and ESCUTCHEON *of pretence*.

PRETENSED, or PRETENDED *right*, in *Law*, is where one is in poſſeſſion of lands and tenements, which another, who is out, claims, and ſues for. Here the *pretenſed right* is in him who ſo claims, or ſues.

PRETER, or PRETERIT, *præteritus*, paſt, in *Grammar*, an inflexion of verbs, expreſſing the tenſe, or time paſſed.

Preter, or preterit, is a general name, that comprehends all the inflexions correſponding to the ſeveral tenſes, or ſeveral circumſtances and relations of the time paſt; all which the Latins, &c. diſtinguiſh by particular inflexions, or terminations, of the verb; which make the proper notion of tenſes. See TENSE.

The modern languages, particularly the Engliſh, in lieu of different terminations of the verbs themſelves, have uſually recourſe to thoſe of their auxiliaries, and participles.

The *preter*, or paſt time, is ſubdivided, by grammarians, into *preter imperfect*; as, *e. gr. I had, I thought*: in the Latin, *Habebam, cogitabam*; in the French, *J'avois, je penſois*; the *preter perfect*, as, *I have had, I have thought*; *habui, cogitavi*; *j'ai eu, j'ai penſé*; and *preter pluperfect*, as, *I had thought, I had had*; *habueram, cogitaveram*; *j'eus eu, j'eus penſé*. The Engliſh have properly but two caſes, or kinds, of the *preter* tenſe; viz. the *preter* time of the imperfect action; as, *I was at ſupper then*, but had not yet done it; and the *preter* time of the perfect action; as, *I had then ſupped*, and it was then done. The *preter* tenſe is oftenеſt formed of the preſent tenſe, by adding *ed*; as, *I burned*.

The French have a particular caſe of the *preter perfect*; which F. Buffier calls the *preterit ſimple*, in oppoſition to the former, called the *preterit-compoſite*; others call it the *preterit-indefinite*, becauſe expreſſing a thing done indeterminately; as, *J'arrivis hier*. This anſwers to the AORISTUS of the Greeks; and, in the diſtinction of this from the common *preterit*, does one of the greateſt niceties in the practice of the French language conſiſt.

In the paſſive voice, the Latins, French, &c. have recourſe to participles and auxiliaries, like the Engliſh, to form their *preter* tenſes; as, *I was loved, amatus eram, j'etois aimé*, &c.

PRETERIT, *præteritus*, in the *Roman Juriſprudence*. *Infans præteritus*, is a child of whom the father has forgot to make mention in his teſtament; which renders it entirely null.

Exheredation of his ſon is allowed in a father, but never *preteritio*.

PRETERITION, or PRETERMISSION, in *Rhetoric*, a figure whereby, in pretending to paſs over a thing untouched, we make a ſummary mention thereof.

I will not ſay he is valiant, he is learned, he is juſt, &c.

The moſt artful praiſes are thoſe given by way of *preteritio*. See RETICENCY.

PRETERNATURAL *rains*. See RAIN.

PRETEXT, or PRETENCE, a colour, motive, or cauſe, either real, or apparent.

PRETEXTA, or PRÆTEXTA, among the Romans, was a long white gown, or toga, having a band, or border, of purple, at the bottom.

It was worn by children of quality till the age of puberty, i. e. by boys, till ſeventeen, at which time they laid it aſide, and aſſumed the virile gown. Girls wore it till marriage.

It took its name *prætexta*, according to Godwyn, *quod ei purpura* prætexta *erat*, becauſe guarded about with purple ſilk.

The *pretexta*, at firſt, was a robe of ſtate, or ceremony, worn only by the chief magiſtrates, and the prieſts; nor was it lawful for ſuch who wore this gown to be arraigned, or ſentence to paſs againſt them, till it was pulled off. In continuance of time, it was permitted to noblemen's children; and, at length, even to all Roman children in general. See TOGA.

PRETIUM *ſepulchri*, in old *Law-Books*, &c. thoſe goods accruing to the church wherein a corpſe is buried.

In the Iriſh Canons, lib. xix. cap. 6. it is ordered, that along with every body that is buried, there go his cow, horſe, apparel, and the furniture of his bed; none of which may be diſpoſed of otherwiſe than for the payment of debts, &c. as being familiars and domeſtics of the deceaſed.

PRETOR, PRÆTOR, an eminent magiſtrate, or miniſter of juſtice, in ancient Rome: accordingly we often find a baliſtee on the medals of the *pretors*.

The title of *pretor* is derived *a præeundo*, or *præeundo*, denoting the ſuperiority of his juriſdiction.

In the firſt ages of the commonwealth, all the [illegible]

ſiſtrates were ſtyled *prætors*; afterwards, the title was beſtowed on all the principal officers of the army: at laſt, *prætor* became reſtrained to a particular magiſtrate.

About the year of Rome 386, the people ſoliciting to have one of the conſuls always choſen from among themſelves, the ſenators granted it, on condition, that a new magiſtracy ſhould be erected, to be filled wholly from among the patricians: ſuch was the origin of the *prætura*; which, Livy obſerves, was firſt diſcharged by Spurius Furius Camillus, in the year of Rome 387; and whoſe office was to look to the adminiſtration of juſtice and equity between man and man; much in quality of a lord chief juſtice, or lord chancellor, or rather both in one.

But buſineſs increaſing, in proportion as the empire was inlarged, a ſecond *prætor* was created, A. U. C. 510. to take cognizance of the affairs of foreigners reſiding at Rome; upon which the former was diſtinguiſhed by the title of *prætor urbanus*, or *major*; and the latter, by that of *prætor peregrinus*, or *minor*.

In the year 526 of Rome, when Sicily and Sardinia were reduced into Roman provinces, two more *prætors* were created to aſſiſt the conſuls in the government of the provinces; and as many more upon the entire conqueſt of Spain, A. U. C. 556. Sylla, in the year of the city 672, increaſed the number to eight; Julius Cæſar, in the year 707, augmented them firſt to ten, and then to ſixteen; under the reign of Auguſtus there were firſt ten *prætors*, and afterwards ſixteen; two whereof were called *prætores cereales*, as being charged with the providing of corn and grain; to which number Claudius added two others, viz. *prætores fidei commiſſarii*. In the Code, lib. i. tit. 39. we find a law of the emperors Valentinian and Martian, which reduces the *prætors* to three.

In the time of Juſtinian, the office of *prætor* was entirely aboliſhed.

The office of the *prætor*, or *prætor urbanus*, was to render juſtice in the city: he had a power to interpret the laws, to ſupply and reform them; and even to make new ones, when the public good required. See CIVIL *law*.

In the Inſtitutes, the edicts of the *prætors* are called *jus honorarium*; whence it ſhould ſeem, they had only the force of laws out of reſpect to that eminent magiſtrate; the buſineſs of the *prætor* being rather to look to the obſervation of the old laws than to make new ones. See EDICT.

Some are of opinion, he had not the *jus gladii*, the power of the ſword; the cognizance of criminal matters being the ſpecial province of the PREFECT of Rome.

But others are of another ſentiment. In the general, it is very difficult to fix preciſely how far his power extended. When he walked, he was preceded by ſix lictors: and was clothed with the robe called *pretexta*: he ſat in a CURULE *chair*; his tribunal was elevated in form of a ſemicircle; and he bore a ſpear and ſword.

His authority, like that of the other magiſtrates, was very much weakened and reduced under the emperors. In the Digeſt and Code is a title *de officio prætoris*.

PRETOR was alſo a title among the Romans, given the governor of a province, who had ſerved the office of *prætor*. Whence provinces governed by *prætors*, or reſtrained to thoſe who had diſcharged that office, were called *prætorian provinces*.

PRETORIAN *guards*, PRÆTORIÆ *cohortes*, were the ſoldiers of the emperor's guard; ſo called, as ſome imagine, from their place or ſtation in the palace or court called *prætorium*.

Their inſtitution is owing to Scipio Africanus, who firſt eſtabliſhed a company of the braveſt men in his army, ſelected for the purpoſe, to be his guard, and never to ſtir from his ſide in battle.

Their number was at length increaſed, as Dion tells us, to ten thouſand. They were commanded by an officer created by Auguſtus, called *præfectus prætorii*. See PREFECT.

PRETORIUM, *prætorium*, among the Romans, the place, hall, or court, wherein the pretor of a province lived, and wherein that magiſtrate ſat to adminiſter juſtice to the people.

There were of theſe *prætoriums* in all the cities of the Roman empire. The Scripture mentions that of Jeruſalem under the name of *judgment-hall*; and there are ſtill ſome remains of one at Nifmes, in Languedoc.

PRETORIUM was alſo the tent or pavilion of the general of the Roman army; wherein councils of war, &c. were held.

From the time of Auguſtus, the emperor's tent in the camp was diſtinguiſhed by the title of *prætorium Auguſtale*.

PRETORIUM was alſo a place in Rome where the pretorian guards were lodged.

Some will have the *prætorium* to be properly the tribunal of the *præfectus prætorii*, or an auditory deſtined for the rendering of juſtice in the emperor's palace. See PREFECT.

This they argue from St. Paul's Epiſtle to the Philippians; and from this place called *prætorium*, they will have the guards to have been denominated *prætoriani*, becauſe aſſembled here for the emperor's ſafety.

Others will not allow the *prætorium* to be any tribunal, or ſeat of juſtice, but merely the imperial guard-houſe.

Peritonius has an expreſs diſſertation to prove, that the *prætorium* was no court of juſtice in St. Paul's time; but the camp or place where the *prætorian* guards were quartered.

He adds, that the name *prætorium* was not given to places where juſtice was adminiſtered till a long time after; when the office of the *præfectus prætorii* was converted into a civil function.

PREVARICATION, PRÆVARICATIO, in the *Civil Law*, is when the informer colludes with the defendant, and ſo makes only a feigned proſecution.

Sylvius, in his comments on Cicero, *pro Cluentio*, gives us the difference between the three terms, *calumniari*, *prævaricari*, and *tergiverſari*. He, who in his accuſation forges faults which were never committed, is ſaid *calumniari*: he who undertakes one's ſuit, and either will not add reaſons in behalf of his client, or not anſwer the objection of his adverſary, when he is able, is ſaid *prævaricari*: and he, who deſiſts from his accuſation, and lets the ſuit drop, *tergiverſari*.

PREVARICATION, in our *Law*, is when a man, fally and deceitfully, ſeems to undertake a thing, with intention that he may deſtroy it; e. gr. where a lawyer pleads booty, or acts by collution, &c.

PREVARICATION is alſo uſed for a ſecret abuſe committed in the exerciſe of a public office, or of a commiſſion given by a private perſon.

PREVARICATOR, PRÆVARICATOR, in the *Univerſity of Cambridge*, is a maſter of arts, choſen at a commencement, to make an ingenious ſatirical ſpeech, reflecting on the miſdemeanors of the principal members. See TERRÆ *filius*.

PREVENTER, on *Board a Ship of War*, denotes an additional rope, employed at times to ſupport any other, when the latter ſuffers an unuſual ſtrain, particularly in a ſtrong gale of wind: as the *preventer*-brace, which is a temporary brace, fixed occaſionally to ſuccour the main or fore-yard of a ſhip, when it is charged with a greater effort than uſual. *Preventer*-ſhrouds and *preventer*-ſtays are applied in the ſame manner to ſerve the ſame purpoſes.

PREVENTION, PRÆVENTIO, in the *Canon*, &c. *Law*, the right which a ſuperior perſon or officer has to lay hold of, claim, or tranſact, an affair, prior to an inferior one, to whom otherwiſe it more immediately belongs.

The word is chiefly uſed in ſpeaking of the pope's *preventing* the ordinary collators; and of the royal judges *preventing* ſubaltern ones.

The Roman canoniſts maintain, that the pope, who is the ſource of all juriſdiction, has not tranſmitted it privatively to the ordinary collators; but that he may ſtill not only collate concurrently with them, but he alſo may *prevent* them by uſing his original power as head of the church.

Theſe *preventions* are grown odious in ſeveral countries, where they do not now obtain without many modifications and reſtrictions; and the civil power in France always judges in favour of the ordinary collators.

The pope has no *prevention* to the prejudice of lay-patrons; but by the concordat he has reſerved to himſelf the right of conferring elective benefices by *prevention*, and even cathedral and collegiate dignities.

If the proviſions of the pope, and collations of the ordinary, bear date on the ſame day, the ultramontane canoniſts give the preference to the pope; the French to the ordinary.

The cardinals have a particular indulgence not to be *prevented* by the pope within ſix months. See EXPECTATIVE *graces*, and PROVISIONS *by prevention*.

PRIAPE *de mer*, in *Natural Hiſtory*, a name given by the French to a peculiar ſpecies of canalis, or tubulus marinus, called alſo, by ſome authors of that nation, *the arroſoir*.

It is an oblong, and thick ſhell of this kind, with a large head, which is pierced through with a great number of holes, ſo as at once to reſemble, in ſome ſort, the glans of the penis, and the head of a common gardener's watering pot. This ſpecies is found at Amboyna.

PRIAPEIA, in *Poetry*, a name given to certain obſcene epigrams, and other pieces, compoſed on the god Priapus; whereof we have many inſtances in the Greek Catalecta. See PRIAPUS.

PRIAPEIA, in *Botany*, a name given by John Bauhine and

some other authors, to the small species of tobacco called by Mr. Tournefort and others, *Nicotiana minor*.

PRIAPISM, Πριαπισμος, in *Medicine*, a continual and painful erection or tension of the virile member.

The term is derived from Priapus, a heathen god, whom the poets and painters represent in a state of erection.

As satyrs are usually painted after the same manner, the disease is also called *satyriasis*, or *satyriasmus*.

Some, however, distinguish between the *satyriasis* and *priapismus*, in that the latter is without any effusion, or desire of coition; but the former attended with both.

The immediate cause of a *priapism* is the heat, pungency, or acrimony of the semen, accompanied with a convulsion of the muscles of the part, which, compressing the veins and cavernous bodies, prevent the return of the blood.

The more remote causes are too hot, sharp, stimulating foods; cantharides are also found to perform the same effect, but with much more violence. There are instances of people, especially old men, who, making use of cantharides to enable them to satisfy their passions the better, have been seized with a *priapism*, which has been followed with universal convulsions, and even death.

With regard to the *priapism*, chordee, and other distortions of the penis, in the venereal disease, their treatment is the same with that of the GONORRHŒA. When they prove very troublesome, the patient may take a few drops of laudanum at night, especially after the operation of a purgative through the day.

PRIAPOLITHUS, a name given by some authors to a stone found about Castro in Italy, which very aptly resembles the figure of the human penis.

PRIAPUS, Πριαπος, a term sometimes applied to the genital parts of *men*; *viz.* the penis, and testes.

The name took its rise from *Priapus*, a fabulous deity, particularly adored at Lampsacus, the place of his birth; who, for the extraordinary size of his parts, was exceedingly revered by the women; insomuch that the Scripture seems to tell us, king Asa dethroned his mother Maachah, because she had consecrated a grove to *Priapus*, and presided at his sacrifices.

The Roman poets in general seem to have looked on *Priapus* as a ridiculous god, and are all ready enough, either to despise or abuse him. Hor. lib. i. sat. 8. v. 3.

PRICE, *pretium*, the value of a thing. See VALUE.

PRICE, *current*, in *Commerce*, a weekly account of the current value of most commodities.

PRICK *madam*, in *Botany*, the name of a species of HOUSELEEK.

PRICK or *queen post*, in *Building*. See POST.

PRICK, or PINCH, in the *Manege*, is to give a horse a gentle touch of the spur, without clapping them hard to him. To *prick* or *pinch*, is an aid; but to *appuyer*, or bear hard with a spur, is correction. See PINCHING.

PRICK *timber*, or *wood*, in *Botany*. See SPINDLE *tree*.

PRICKET, among *Sportsmen*. See SPITTER.

PRICKING *of a horse's foot*, in the *Manege*, is the hurt received by a nail driven too far in the foot, so as to reach the quick, or press the vein in the horse's foot, when he is shod.

PRICKING *the chart*, is the art of tracing a ship's course upon a marine chart, by the help of a scale and compasses, so as to discover its present situation.

PRICKING the *sails*, is the art of stitching two cloths of a sail together, along the space comprehended between the two edges, or selvages, that overlay each other. Or, it is the sowing a middle-seam between the two seams which are employed to unite every cloth of a sail to the next adjoining.

PRICKLE *back*, in *Ichthyology*, a small fish, so called from the *prickles* on its sides and back. Vast numbers of these little fish are to be found in almost all fresh waters, wherever it is possible for fish to live, as Mr. Arderon informs us, Phil Trans. N° 428. sect. 15. who gives us some account of these creatures. They are very destructive to the spawn of all sorts of fish; and they themselves are tormented to death by a kind of louse of an oval figure, with eight legs and a very transparent body. This louse has little fins always in motion, whether it be swimming about or fixed on the fish. See STICKLE-*back*.

PRIDE *of the sea*, a name given by Dr. Plot to the common LAMPERN, from its being found very plentifully and very delicate in that river.

PRIDE *gavel*, a custom in the manor of Rodely in the county of Gloucester; by which to this day a rent is paid to the lord, by certain tenants, in duty and acknowledgment to him for their liberty and privilege of fishing for lampreys or lampreds in the river Severn.

PRIER *age*. See AGE.

PRIER *aid*. See AID.

PRIEST, *sacerdos*, a person set apart for the performance of sacrifice, and other offices, and ceremonies of religion.

Thus the false gods and goddesses of the heathens had their *priests*; *priests* of Mars, of Bacchus, of Hercules, of Isis; and some of them their priestesses. See PYTHIA, &c.

The Jews had three orders, *viz.* *priests*, LEVITES, and NETHINIMS, who served in the temple; over whom the high-*priest* was chief.

The title כהנים, *cohanim*, or *priests*, is applied in Scripture to the officers of state, as well as to the ministers of the sanctuary; though more commonly to the latter, as offered sacrifices, and other ways officiated in the divine worship. The true reason of the different application of the word seems to be, that in the primary sense it imports those that minister to a king; and, therefore, as God had taken upon himself the character of the king of Israel, he had his *cohanim* as well as earthly monarchs, or such as attended on his special presence in the sanctuary, and ministered in the sacred service.

When the Jewish constitution was settled, the public sacerdotal office was allotted to Aaron and his sons, and entailed on their posterity: and it was made a capital crime for any besides them to officiate, as *priests*, in the more solemn acts of offering sacrifices, burning incense, and blessing the people. The Jewish *priests* were consecrated to their office by washing, unction, enrobing in the sacerdotal vestments, and offering certain sacrifices prescribed in the book of Exodus, chap. xl.

The inferior *priests* were divided, in the time of David, into twenty-four companies, who were to serve in rotation, each company by itself, for a week. The order in which the several courses were to serve was determined by lot; and each course was in all succeeding ages called by the name of its chief at the time of its first division. The Mahometans have their *priests* called *fehreh* and *mufti*; and the Indians and Chinese their *bramins* and *bonzas*. See MUFTI, and BRACHMAN.

PRIEST, PRESBYTER, in the *Christian Church*, is a person invested with holy orders; in virtue whereof, he has a power to preach, pray, administer the sacraments, &c. and, in the Romish church also, to bless, absolve, &c.

By the canons, can. 34. a man must be twenty-four years of age before he be admitted to the priesthood; anciently thirty years were required.

And by 13 Eliz. cap. 12. none shall be made minister, i. e. *priest*, being under the age of four and twenty years; and in this case, there is no dispensation, as there is in that of a DEACON: and unless he first bring to the bishop of the diocese a testimonial both of his honest life, and of his professing the doctrine expressed in the thirty-nine articles: nor unless he be able to answer, and render to the ordinary an account of his faith in Latin, according to the said articles, or have special gift or ability to be a preacher. And by the canon just cited, it is required, that he shall have taken some degree of school in either of the two universities, or, at least, be able to give an account of his faith in Latin, according to the thirty-nine articles; and also that he exhibit letters testimonial of his good life and conversation, under the seal of some college of Cambridge or Oxford, where before he remained, or of three or four grave ministers, together with the subscription and testimony of other credible persons, who have known his life and behaviour for the space of three years next before. Nor shall any bishop admit any person into sacred orders, which is not of his own diocese, except he be either of one of the universities of this realm, or except he shall bring letters dimissory from the bishop of whose diocese he is.

For other requisites, see DEACON. For the form of ordination, see ORDINATION.

The holy Scripture makes no distinction between the title of *priest*, *presbyter*, and that of *bishop*, *episcopus*; and does not give any superiority to the one over the other. Blondel therefore, and Salmasius maintain with good reason, that, in the primitive church, the *priests* governed with perfect equality, and without any other pre-eminence beside that of age.

Yet some of the primitive writers speak of nothing but episcopacy; and frequently in such terms, as if they esteemed it of apostolical institution. See BISHOP, ORDINATION, and PRESBYTER.

As, in the ancient church, the deacons had the management and administration of the revenues of the church, their authority grew apace; and, in a little time, they were got above the *priests*. St. Jerom used his utmost endeavours to prove, that deacons were originally inferior to *priests*; and the council of Nice decided the question in favour of the latter. See DEACON.

Indeed, an order of deacons having been instituted without any other function than to assist the *priest* at the altar; these have made no difficulty of owning the superiority of the *priests*.

Add to this, that the order of a deacon being now become necessary to arrive at that of a *priest*, there is no

room to diſpute the precedency; but the deacons, who had retained their function, had the diſpoſal of the revenues, and paid the *prieſts* their penſions, ſtill maintained the ſuperiority. Upon which, the ſixth council in Trullo pronounced once more on the diſpute, and gave the pre-eminence to the *prieſts*.

In the general acceptation of the word, *prieſts* are any miniſters of a church; but in our law, this word is particularly uſed for miniſters of the church of Rome. For the laws againſt popiſh *prieſts*, ſee PAPISTS.

PRIEST, *arch*. See ARCH-*prieſt*.

PRIEST, *cardinal*. See CARDINAL.

PRIESTS, *college of*. See PONTIFICAL *College*.

PRIEST, *high*. See PONTIFEX.

PRIEST, *regular*. See REGULAR.

PRIEST *of the Oratory*. See ORATORY.

PRIEST's *cap*, in *Fortification*. See BONNET *à prestre*.

PRIEST's *pintle*, in *Botany*. See WAKE *Robin*.

PRIMA *naturalia*, in *Phyſics*, atoms, or the firſt particles whereof natural bodies are primarily compoſed; called alſo *minima naturalia*, which ſee; ſee alſo PARTICLE, and ATOM.

PRIMA *tria*, in *Chemiſtry*. See TRIA.

PRIMÆ, or *primariæ preces*, in *Law*. See PRECES.

PRIMÆ *viæ*, in *Medicine*, the firſt paſſages of the chyle; including the œſophagus, ſtomach, inteſtines, and their appendices. See CHYLE, and VIÆ.

PRIMAGE, a duty at the water-ſide, appointed by a ſtatute of Henry VIII. to be paid to the maſter and mariners of the ſhip, by the merchants whoſe goods are loaded or unloaded.

It is paid to the maſter for the uſe of his cables and ropes, in moving the goods; and to the mariners for their ſervice and aſſiſtance.

This is different, in different places; in ſome 12*d.* per ton; in others, a penny per pound; in others ſix pence per bale or pack. See DUTY, and CUSTOM.

PRIMARY *planet*, a planet which revolves round the ſun as a centre.

Such are Saturn, Jupiter, Mars, the Earth, Venus, and Mercury; thus called in oppoſition to ſecondary planets, or ſatellites. See PLANET.

PRIMARY *affections, collateral points, dials, ſection, plain*, and *qualities*. See the ſubſtantives.

PRIMATE, PRIMAS, an archbiſhop, inveſted with a juriſdiction over ſeveral archbiſhops, or biſhops.

Father Sirmond derives the origin of *primates* hence; that the large provinces have been divided and ſubdivided by the emperors; the firſt diviſions were called firſts; others, ſeconds; others, thirds, &c. and the title *primate* given to the metropolitan, i. e. to the biſhop of the city which was the capital of the province, before the diviſion was made.

This metropolitan *primate* had ſome juriſdiction over the biſhops of the inferior provinces; and was alſo called *patriarch*.

The term *primate* is Latin, and ſignifies the firſt, or preſident of a ſociety: the Greek word, correſponding to it, is ἔξαρχος, *exarch*.

Thoſe, who are advocates for a ſtrict eccleſiaſtic hierarchy, maintain a *primate* to be a dignitary who has ſeveral metropolitans under him; as a patriarch has ſeveral *primates*. Yet it is pretty evident from hiſtory, that *primates* were, at firſt, confounded with patriarchs: thus Socrates, enumerating ten patriarchs, does not make any diſtinction thereof from *primates*.

In Africa, after the diſtinction was made, the *primates* were not at all ſubject to the patriarch: thus the biſhop of Carthage, who was *primate*, paid no obedience to the biſhop of Alexandria, who was patriarch.

Nor, to be a *primate*, was it neceſſary to have metropolitans for ſuffragans: each province of Africa, except thoſe which compoſed the dioceſe of Alexandria, had its *primate*; this quality being given to age.

In France, the ſubdiviſion of provinces gave occaſion to the erection of *primates*: thus Aquitaine, e. gr. being divided into two provinces, the archbiſhop of Bourges became *primate* of the Aquitaines, becauſe Bourges was the capital of the firſt.

Thus alſo, the diviſion of England into two provinces, Canterbury and York, in 1152, gave occaſion to the introduction of *primacies* among us; Canterbury, which was the metropolis before, thence giving the title of *primate of all England* to its prelate, though the archbiſhop of York ſtill claims that of *primate of England*. And, accordingly, the firſt has ſome juriſdiction over all England, relating to adminiſtrations, &c. which the latter has only within his own province.

PRIMATES, in the Linnæan ſyſtem of *Zoology*, the firſt order of animals, belonging the claſs of *mammalia*: the characters of which are, that they are furniſhed with fore-teeth, or cutting-teeth, four above and parallel; and that they have two pectoral teats. To this order pertain four genera, *viz. homo* or man, *ſimia* or *ape*, *lemur*, or maucauco, and *vespertilio* or bats.

PRIME, *primus*, the firſt in order, degree or dignity, among ſeveral things of the ſame or like kind.

Thus we ſay, *prime miniſter, prime mover, prime ręſt*, &c. See MINISTER, MOBILE, &c.

PRIME, or PRIME *minute*, in *Geometry*, denotes the ſixtieth part of a DEGREE.

PRIME is ſometimes alſo uſed for a tenth part of an unit. See DECIMAL.

In weights, it is uſed for the twenty-fourth part of a GRAIN.

PRIME *number*, in *Arithmetic*, a number which can only be meaſured by unity; or whereof one is the only aliquot part; ſuch are 5, 7, 11, 13, &c.

Prime numbers inter ſe, among themſelves, are thoſe which have no common meaſure beſides unity; thus 12 and 19 are *prime numbers inter ſe*.

PRIME *figure*, in *Geometry*, is that which cannot be divided into any other figures more ſimple than itſelf.

Such is a triangle among planes; and the pyramids in ſolids. For all planes are made of the firſt, and all bodies or ſolids are compounded of the ſecond.

PRIME, *vertical*. See VERTICAL.

PRIME *verticals*, in *Dialling*, or PRIME *vertical dials*, are thoſe projected on the plane of the *prime* vertical circle, or on planes parallel to it.

Theſe are what we likewiſe call direct, erect, north, or ſouth dials. But ſince every plane hath that pole raiſed or depreſſed thereon, which lies open to it, therefore this plane (if a direct ſouth) hath the ſouth pole elevated; and, conſequently, the ſtyle, whoſe height muſt be the complement of the latitude of the place, will point downwards. Wherefore to find the hour's diſtance from the meridian upon this plane, the proportion is as the radius is to the ſine of the ſtyle's height, or co-latitude, ſo is the tangent of the hour, or angle at the pole, to the tangent of the ſeveral hours diſtance from the meridian.

By this canon, the hours requiſite for the plane, as alſo the half-hours, quarters, &c. being calculated and ſet in a table; the dial is deſcribed after the ſame manner, as the horizontal dial. North direct erect dials are but the backſide of the ſouth, becauſe lying in the ſame azimuth with it; therefore it is no more but turning the ſouth dial upſide down, and leaving out the ſuperfluous hours between 5 and 7, and 4 and 8, and the north dial is made. Only note, that the ſtyle muſt point upwards to the north pole. See DIAL.

PRIME *of the moon* is the new moon at her firſt appearance, for about three days after her change. See *Golden* NUMBER.

PRIME is alſo uſed in the Romiſh church, for the firſt of the canonical HOURS, ſucceeding to LAUDS.

PRIME, in *Fencing*, is the firſt and chief of the guards; which is that the body is in, immediately after drawing the ſword; being fitteſt to menace and terrify the enemy, by reaſon the point of the ſword is held higher up to the eye, than in any of the other guards.

PRIME, or PRIMING *of a gun*. See PRIMING.

PRIMER *fine*, in *Law*. See PERFINE.

PRIMER *ſeiſin*, in *Law*, PRIMA *ſeiſina*, or the *firſt ſeiſin*: a branch of the king's prerogative, whereby he had the firſt poſſeſſion of all lands and tenements held of him in chief, whereof his tenant died ſeiſed in fee; and conſequently the rents and profits thereof, till livery was ſued; which ſuit being commonly within a year and day next after the death of the tenant, therefore the king uſed to take at an average the firſt fruits, that is to ſay, one year's profit of the land. And this afterwards gave a handleto the popes, who claimed to be feudal lords of the church, to claim in like manner from every clergyman in England the firſt year's profits of his benefice, by way of PRIMITIÆ, or firſt fruits.

Theſe payments were only due, if the heir was of full age; but if he was under the age of twenty-one, being a male, or fourteen, being a female, the lord was intitled to the wardſhip of the heir, and was called the GUARDIAN *in chivalry*.

But all charges ariſing by *primer ſeiſin*, are annulled by a ſtat. 12 Car. II.

PRIMICERIUS, in *Antiquity*, the firſt or chief perſon in any office or dignity.

In this ſenſe the word occurs frequently in the code, and even in our old Engliſh Laws: though it is there alſo occaſionally uſed for a nobleman; as *primicerius totius Angliæ*.

The Romans had great variety of *primiceriі*, both in church and the emperor's court; as *primicerius of the empreſs, primicerius Auguſtalis, primicerius of the bandritiæ, primiceriі of the legions, of the court, of the chamber, of the palace*, &c.

The *archiepiscopi primicerius*, Du-Cange observes, was the same with the *chantre* among us.

In the church of Metz, the *primicerius* is the first dignitary of the diocese, and presides at assemblies of the clergy, in prejudice of the bishop.

At Venice, the dean of the church of St. Mark is called *primicerius*, or *primicerius*: he is independent of the patriarch of Venice, and enjoys episcopal privileges.

PRIMING, or PRIME *of a gun*, is the gunpowder put into the pan of small arms, and into the vent of cannon, near the opening of the touch-hole, in order to fire the piece.

The *priming* is the last thing done in charging. See CHARGE.

For pieces of ordnance, they have a pointed iron-rod to pierce the cartridge through the touch-hole, called the *primer*, or *priming-iron*: and it serves to discover whether the powder contained therein is thoroughly dry, and fit for immediate service.

PRIMING, among *Painters*, signifies the laying on of the first colour.

PRIMING, in *Japan Work*. See JAPANNING.

PRIMIPILARII, or PRIMOPILARII, or PRIMIPILARES, in *Antiquity*, were properly such as had formerly borne the office of *primipilus*, or first centurion of a legion, to whom was entrusted the care of the banner.

Some will also have *primipilarii* to have been a denomination given to the soldiers of the first cohort of a legion.

The *primipilarii* had considerable advantages; one of the chief was, that most of the soldiers who died in the campaign, left them their heirs.

PRIMIPILUS, or PRIMOPILUS, or PRIMIPILI *centurio*, in *Antiquity*, the CENTURION of the first cohort of a legion, who had charge of the Roman eagle.

PRIMITIÆ, the *first-fruits* gathered of the earth; whereof the ancients made presents to the gods.

In Leviticus, the *primitiæ* of all fruits are enjoined to be offered to God.

In our law, the *primitiæ* are one year's profits, after avoidance, of every spiritual living, as rated in the king's books. See PRIMER *seisin*, and FIRST *fruits*.

PRIMITIVE, in *Grammar*, a *root*; or a word in a language, which is neither derived from any other language, nor compounded from any other words of the same. See ROOT, WORD, &c.

Thus *God* is a *primitive*; *Godly*, a derivative; *God-like*, a compound.

PRIMITIVE, in *Arithmetic*. See PRIME, and NUMBER.

PRIMO, in the *Italian Music*, is often abridged thus, P°. or I°. and added to other words, as, *prima canto*, the first treble; *alto primo*, the first counter tenor; *tenore primo*, the first tenor; *basso primo*, the first bass; *fagotto primo*, the first bassoon; *corno primo*, the first chorus, &c.

PRIMO *tenebris exhibendis habenda*, in *Law*, a writ directed from the king to the lord chancellor, appointing him to bestow the benefice that shall first fall in the king's gift, above or under such a value, upon this or that clerk. See BENEFICE.

Propositio de PRIMO *adjacente*. See PROPOSITION.

PRIMOGENITURE, *primogenitura*, the right of first-born, or eldest son or child.

The *right of primogeniture* seems to be an unjust prerogative, and contrary to natural right: for since it is birth alone that gives children a title to the paternal succession, the chance of *primogeniture* should not throw an inequality among them.

Accordingly, the right of *primogeniture*, which calls the elder-born to the crown, preferably to the others, was not introduced into France till very late: it was unknown to the first race of kings: and even to the second.

The four sons of Clovis shared the kingdom equally among themselves: and Louis le Debonnaire did the same: it was not till the race of Hugh Capet, that the prerogative of succession to the crown was appropriated to the first-born.

By the ancient custom of GAVEL-KIND, still preserved in some parts of our island, *primogeniture* is of no account; the paternal estate being equally shared by all the sons.

PRIMOPILUS. See PRIMIPILUS.

PRIMORES, in *Ornithology*, denote the quill-feathers which spring from the first bones of the wings, and are ten in number.

PRIMROSE, *primula*, in *Botany*, a genus of the *pentandria monogynia* class. Its characters are these: the flower hath a tubulous empalement of one leaf, ending in five acute points; it hath one petal, with a cylindrical tube, which spreads open above, where it is cut into five heart-shaped segments; it has five short flamina, situated in the neck of the petal, terminated by erect acute-pointed summits, and a globular germen, supporting a slender style, crowned by a globular stigma; the germen afterward turns to an oblong capsule, with one cell, opening at the top, filled with small angular seeds. Miller enumerates [illegible] and Linnæus six species.

The common *primrose* grows wild in the woods and other shady places in most parts of England, from whence their roots may be easily transplanted into the garden; where, if they are placed under hedges and in shady walks, they make a beautiful appearance early in the spring, when few other plants are in flower.

This plant is so well known as to need no description. The flowers and roots are used in medicine; the flowers are much weaker and much less agreeable in smell than those of the cowslip; the leaves and roots partake in some degree of the nature of those of the *asarum*, acting as strong errhines or sternutatories, when snuffed up the nose, and as emetics (at least the roots), when taken internally.

There are several varieties of this, which have been accidentally obtained, as the common *primrose* with double flowers; the red *primrose* with single and double flowers; these have but one flower upon a foot stalk; and the paper-white *primrose* with single and double flowers.

The second sort is the cowslip, or paigle, or paralysis of the shops. This grows naturally in meadows and moist pastures in many parts of England. The flowers of this sort grow in bunches on the top of the foot stalk, and so are easily distinguished from the former; the flowers which have a moderately strong pleasant smell, and a somewhat roughish bitterish taste, both which they impart, together with a yellow tincture, to watery and spirituous menstrua, are much used in medicine, and sometimes the leaves. Vinous liquors impregnated with the flavour of the flower by maceration, or fermentation, and strong infusions of them drank as tea, are supposed to be mildly corroborant, antispasmodic, and anodyne. An infusion of three pounds of the fresh flowers in five pints of boiling water is made in the shops into a syrup, of a fine yellow colour and agreeably impregnated with the flavour of the cowslips.

As these grow wild, their roots may be taken up, and transplanted into gardens.

The best time to transplant them is at Michaelmas, that their roots may have strength to produce their flowers early in the spring. These delight in a strong rich soil, but will grow in almost any sort of earth, provided they have a shady situation.

There is a great variety of this at present in the gardens, as the hose in hose, the double cowslip, and all the sorts of polyanthus, which have been so much improved within the last fifty years, as almost to equal the auriculas in variety. In some parts of England they are so much admired as to sell for a guinea a root.

The several varieties of polyanthuses are produced from seed, which should be saved from such flowers as have large upright stems, producing many flowers upon a stalk, which are large, beautifully striped, open, flat, and are not pin-eyed. From the seed of such flowers there is reason to hope for a great variety of good sorts; but then no ordinary flowers should stand near them, lest by the mixture of their farina, their seed should degenerate.

These seeds should be sown in boxes filled with light rich earth in December and slightly covered; the boxes should have the benefit of the morning sun, but should not be exposed to the heat of the day; in a dry spring, they should be often refreshed with water, and with the increasing heat, they should be removed more into the shade. In the middle of May, the plants will be fit for removal to some shady border made rich with neat's dung, and may be set at four inches distance every way, and watered till they have taken root. Being kept clear of weeds, they will be fit to be transplanted in the latter end of August to borders, formed of good light rich earth, that are exposed to the east; in which they should be placed six inches asunder in rows, and watered till they have taken root. In the succeeding spring they will flower; and those that are intended for preservation should be removed when they have done flowering into a fresh border of the same rich earth, and in the following spring they will produce strong flowers.

The roots should be constantly removed and parted every year, and the earth of the border changed, otherwise they will degenerate, and lose the principal share of their beauty; and as the plants which grow from seeds, generally flower much better than off-sets, those who would have these flowers in perfection, should annually sow the seeds. Miller.

PRIMROSE, *night*, or *tree*, *anethera*, or *onagra*, in *Botany*, a genus of the *octandria monogynia* class. Its characters are these: the empalement of the flower is of one leaf, cut into four acute segments at the brim, which turn backward; the flower has four heart-shaped petals, which are lengthways inserted in the divisions of the empalement; it hath eight awl-shaped incurved flamina which are inserted in the tube of the empalement; a cylindrical

[illegible]

germen is situated under the tube of the empalement, supporting a slender style crowned by a thick, quadrifid obtuse, reflexed stigma; the germen becomes a four-cornered cylindrical capsule, having four cells filled with small angular seeds. Miller reckons five, and Linnæus seven species.

PRIMUM *ens*. See ENS.

PRIMUM *mobile*. See MOBILE.

PRIMUS *brachii inventionum*, in *Anatomy*, a name given by Vesalius, and some others who have copied from him, to a muscle generally known under the name of the PECTORALIS.

PRIMUS *communium laryngis*, in *Anatomy*, a name given by Casserius and some others to the muscle more generally known by the name of STERNOTHYROIDÆUS, or *sternothyroides*.

PRIMUS *hyoidis, ossis musonius*, in *Anatomy*, a name given by Fallopius and some others to the muscle of the *os hyoides*, called by Albinus STERNOHYOIDÆUS.

PRIMUS *oculum movens*, in *Anatomy*, a name given by Vesalius to one of the four *musculi recti* of the eye, called by Albinus and others the ADDUCTOR. It is called by Fabricius the *rectus interior*, and by some the *bibitorius*.

PRIMUS *propatorum auriculæ musculus*, in *Anatomy*, a name given by Casserius to one of the muscles of the head, called by Albinus the *auriculam attollens*, and by Cowper and Winslow SUPERIOR *auriculæ*.

PRIMUS *pectoralis*. See PECTORALIS.

PRIMUS *serratus*. See SERRATUS.

PRINCE, *princeps*, in *Politics*, a person invested with the supreme command of a state or country, independent of any superior.

PRINCE is also used for a person who is sovereign in his own territory; yet holds of some other, as his superior or lord, and pays homage or tribute to him.

Thus all the *princes* of Germany are feudatories of the emperor: they are as absolute in their respective principalities as the emperor himself; yet are all bound in certain services to him.

PRINCE, in *Ancient Records*, frequently signifies no more than *lord*. Du-Cange gives a great number of instances of this usage.

In effect, the word *princeps* in Latin, whence *prince* in English, originally signifies only the *chief*, or *first*: it is compounded of the Latin *primus*, and *caput*; and is properly a word of dignity and office, not of property and sovereignty.

Thus, in the charter of king Offa, after the bishops had subscribed their names, we read *Everdanus patritius, Binmanus princeps*; and afterwards the dukes subscribed their names.

And in the charter of king Edgar, in Mon. Angl. tom. iii. p. 301. *Ego Edgarus rex regnans ab episcopo meo Dunstano, & principe meo Athelwo*, &c. And in Mat Paris, p. 155. *Ego Haldan* princeps *regis pro vicibus assensum præbui, & ego Turbutilus dux consedi.*

PRINCE *of the senate*. There was one member of the Roman senate distinguished always from the rest by the title of *prince of the senate*. This title was given of course to that person whose name was called over the first in the roll of the senate, whenever it was renewed by the censors. He was always one of consular and censorian dignity.

After the institution of the *censors*, it became a custom to confer this title of *prince of the senate* on the oldest senator then living of censorian dignity. Yet there were no peculiar rights annexed to this title, nor any other advantage, except an accession of authority, from a notion which it would naturally imprint of a superior merit in those who bore it. See SENATE.

PRINCE *of the youth*. Among the ancient Romans, it was the custom for the emperor in his life-time to nominate him whom he would have to succeed in the empire, under the title of *princeps juventutis, & Cæsar*.

In the *ludus Troianus*, the youth who was chosen captain, was also called *princeps juventutis*.

PRINCE is also a title given to the issue of *princes*, or those of the royal family.

In which sense they are called, particularly in France, *princes of the blood*; as partaking of the blood to which the sovereignty is appropriated: and not by any hereditary right, but as a patrimony substituted to all the royal race.

In England, the king's children are called *sons and daughters of England*: the eldest son is created *prince of Wales*. The cadets, or younger, are created dukes or earls, with what title the king pleases. They have no appendages, as in France; but only what the good pleasure of the king bestows on them.

The sons are all by birth counsellors of state: and the daughters are all styled *princesses*; to violate the eldest of which, unmarried, is at this day high treason.

To all the king's children belongs the title of *royal highness*: all subjects are to kneel, when admitted to kiss their hand; and at table, out of the king's presence, they are served on the knee. The youngest sons and daughters of the king who are not in the line of succession, have PRECEDENCE before all peers and public officers, as well ecclesiastical as temporal. 31 Hen. VIII. cap. 10.

The first *prince* of the blood in France is called absolutely *monsieur le prince*. The quality of *prince* of the blood gives a rank and precedency, but it does not include any jurisdiction; they are *princes* by order, not by office.

Wicquefort observes, that it was not more than fifty years from his time that the *princes* of the blood of France gave place to all ambassadors, even those of republics; and it was at the king's request, that they were since allowed the precedency.

The moment a pope is elected, all his relations become *princes*.

PRINCE *of Wales*, the eldest son of England.

He is born duke of Cornwall; and immediately entitled to all the rights, revenues, &c. belonging thereto; as being deemed, in law, at full age on his birth-day.

He is afterwards created *prince of Wales*, and earl of Chester; the investiture whereof is performed by imposition of a cap of state, and a coronet, a verge of gold, and a ring. He holds the principality by patent, granted him and his heirs, by the kings of England.

The title and principality were first given by king Edw. I. to his eldest son: till that time, the eldest son of England was called *lord prince*. While Normandy remained to the king of England, the eldest son was always styled duke of Normandy: since the union, his title is *Magnæ Britanniæ princeps*.

He is reputed, in law, the same person with the king: to imagine his death, or to violate his wife, is high-treason by stat. 25 Edw. III. His revenues, as duke of Cornwall, are computed at 13,000*l.* per annum. The revenues of the principality were estimated, three hundred and fifty years ago, at 4680*l.* per annum.

PRINCE *of pleasantry, prince de plaisance*, in the *Customs of Flanders*. See SPORTS.

PRINCE *of the horse-comb*, in the *Customs of Flanders*. See SPORTS.

PRINCE'S *feather*, in *Botany*, a name given to the AMARANTH.

PRINCIPAL, *principalis*, the chief, most considerable, or necessary part of a thing.

Thus we say, the mayor is the *principal* magistrate of a city or town: a council of war consists of the *principal* officers. In a peroration, the *principal* points insisted on, are to be briefly summed up. The *principal* of a college or hall is the master thereof.

PRINCIPAL, in *Commerce*, is the capital of a sum due or lent; in which sense the word is used in opposition to INTEREST.

PRINCIPAL is also used for the first fund or sum put by partners into common stock; by which it is distinguished from the calls or accessions sometimes required, when the former proves insufficient.

PRINCIPAL *point*, in *Perspective*, is a point in the perspective plane, upon which a line drawn from the eye, perpendicular to the plane falls.

This point is in the interfection of the horizontal and vertical plane; and is also called the POINT *of sight*, and *point of the eye*. See PERSPECTIVE.

PRINCIPAL *ray*, in *Perspective*, is that which passes perpendicularly from the spectator's eye to the perspective plane, or picture.

Whence the point where this ray falls on the plane, is by some also called *the principal point*, which other writers call *the centre of the picture*, and *the point of concurrence*.

PRINCIPAL, *principalium*, in *Old Law-Writers*, is sometimes used for an HEIR-*loom*.

In Urchenfield com. Hereford, certain *principalia*, as the best beast, best bed, best table, &c. pass to the eldest child, and are not subject to partition.

PRINCIPAL is sometimes also used for a MORTUARY, or *corse present*. *Item leg. equum meum vocatum* le bay gelding, *ut offeratur ante corpus meum in die sepulturæ meæ, nomine* principalii. Test. Joh. de Macclesfield, 9 Hen. V.

PRINCIPAL, in *Law*, is either the actor or absolute perpetrator of the crime, who is called a *principal*, in the first degree; or he who is present, aiding and abetting the fact to be done, who is denominated a *principal* in the second degree. The presence of a *principal* need not always be an actual immediate standing by, within sight or hearing of the fact; but there may be also a constructive presence, as when one commits a robbery or murder, and another keeps watch or guard at some convenient distance. And this rule has also other exceptions; for, in case of murder by poisoning, a man may be a *principal*

felon by repairing and laying the poiſon, or giving it to another (who is ignorant of its poiſonous quality), for that purpoſe; and yet not adminiſter it himſelf, nor be preſent when the very deed of poiſoning is committed. And the ſame reaſoning will hold, with regard to other murders committed in the abſence of the murderer, by means which he had prepared before-hand, and which probably could not fail of their miſchievous effect. As by laying a trap or pit-fall for another, whereby he is killed; letting out a wild beaſt, with an intent to do miſchief; or exciting a madman to commit murder, ſo that death thereupon enſues: in every one of theſe caſes the party offending is guilty of murder as a *principal*, in the firſt degree. For he cannot be called an ACCESSORY, that neceſſarily pre-ſuppoſing a *principal*; and the poiſon, the pit-fall, the beaſt, or the madman cannot be held *principals*, being only the inſtruments of death. As therefore he muſt be certainly guilty, either as *principal* or acceſſory, and cannot be in as acceſſory, it follows that he muſt be guilty as *principal*; and if *principal*, then in the firſt degree; for there is no other criminal, much leſs a ſuperior in the guilt, whom he could aid, abet, or aſſiſt. Blackſt. Com. book iv. cap. 3.

PRINCIPALS and ACCESSORIES, in *Grammar*. See WORDS.

PRINCIPAL *cauſe*. See CAUSE.

PRINCIPAL *challenge*. See CHALLENGE.

PRINCIPAL *officers of the navy*. See NAVY.

PRINCIPII *petitio*. See PETITIO.

PRINCIPALIS, in *ſome ancient Latin writers of Muſic*, is uſed for the chord or note called νεάτη by the Greeks. See HYPATE, TETRACHORD, and DIAGRAM.

PRINCIPIUM *recti abdominis*, in *Anatomy*, a name given by Veſalius to a muſcle generally known at this time under the name of the PYRAMIDALIS.

PRINCIPLE, *principium*, a term frequently uſed for the cauſe, ſource, or origin of any thing.

In which ſenſe we ſay, the *principles of thinking*, *of willing*, &c.

In phyſics, we muſt ever have recourſe to a firſt *principle*, which is God.

The Manithees admit of two *principles*, the one of good, the other of evil; which they eſtabliſh in the quality of two contrary deities, conſtantly oppoſing each other. See MANICHEE.

According to the doctrine of Pelagius, our own wills are the *principles* of our good actions, and we ourſelves the *principles* of our good wills.

PRINCIPLE is defined, among the *School Philoſophers*, to be that from which any thing is, is done, or known; *unde aliquid eſt, fit, aut cognoſcitur*; which is a very extenſive ſignification, and agrees to all kinds of *principles*.

Thus, the premiſes are *principles*, in reſpect of the concluſion; and thus fire and every other agent are the *principles* of things which they produce.

The Thomiſts define *principle* to the like effect: *id a quo aliquod procedit aliquo modo*.

Philoſophers uſually diſtinguiſh *principles* into thoſe of *being*, *principia eſſendi*; and thoſe of *knowing*, *principia cognoſcendi*; or *principia rei*, and *cognitionis*.

Of the firſt they make two kinds; viz. *principles of origination*, which are thoſe from which ſomething proceeds really the ſame with the *principle*. And *principles of dependency*; in which ſenſe, any cauſe may be a *principle*, in reſpect of the thing cauſed; or a ſubject, in reſpect of the accidents inherent in it.

The ſecond is that from which we borrow or derive our knowledge of ſome other things; or, it is that which makes the thing be known. Such are *axioms*, *definitions*, *hypotheſes*; ſuch alſo are *examples*, *explanations*, &c.

Philoſophers and mathematicians are generally agreed in admitting that there are AXIOMS, that is, certain indemonſtrable truths, which muſt be reckoned among the *principles* of human knowledge in the ſtricteſt ſenſe. Hobbes ſeems to advance the contrary, when he ſays, in his logic, or firſt part of his book de Corpore, that definitions, or their parts, are the only primary propoſitions, *(propoſitiones primæ)* that is, *principles* in an abſolute and ſtrict ſenſe. But this doctrine of Hobbes cannot be admitted. For, however true it may be in itſelf, and with reſpect to the divine mind, it ſeems certain, that the human mind hasnever yet attained, and perhaps never will attain to a perfect analyſis of its own notions in all caſes. And wherever this analyſis ceaſes, definitions ceaſe with it; and where definitions ceaſe, we are forced, if we would demonſtrate any thing of the undefined ſubject, to have recourſe to axioms, or to indemonſtrable truths admitted by all men, though never yet demonſtrated by any one. This will appear evident to thoſe who attentively conſider Euclid's Elements. This great geometer, it is known, does not, ſtrictly ſpeaking, define a right line; becauſe he could not probably analyſe the notion of rectitude; for that which is commonly called his definition of a right line, in the beginning of his elements, is no definition, nor is it ever applied afterwards, as the definitions of an equilateral triangle, a ſquare, and a circle are. But to ſupply the place of a definition, he has aſſumed the axioms, that two right lines cannot comprehend a ſpace; and that they cannot have a common ſegment; and theſe axioms become of uſe more than once afterwards. No one has as yet been able to ſupply with ſucceſs what Euclid omitted to do; for though ſome, both ancients and moderns, have demonſtrated ſeveral very plain axioms, as that the whole is greater than its part, yet none have demonſtrated all the principles of extenſive magnitude aſſumed by Euclid, which Proclus and others chooſe to diſtinguiſh by the name of *poſtulata*. See POSTULATE.

Hobbes brings this very inſtance of the demonſtration, that a whole is greater than its part, to prove, that the propoſitions commonly called axioms, are not, ſtrictly ſpeaking, primary, but only ſecondary propoſitions, and really deducible from definitions. Had he attempted the demonſtration of all Euclid's axioms and poſtulata, he would ſoon have found that he had made a raſh induction; and what he gives for a demonſtration of the properties of parallels, evidently ſhews, how little able he was to ſupply what Euclid had omitted.

What is here ſaid of Hobbes, may be applied to others who have attempted to refine upon Euclid, and who have been fond of carrying the analyſes of their demonſtrations beyond him. They have all ſhewn their inability of demonſtrating, without taking ſome axioms or poſtulata for granted; and indeed moſt of them expreſly admit this, only contending that the *principles* they aſſume are more evident than thoſe of Euclid. But whether they be ſo, or not, is of no importance to the preſent queſtion, which is, whether we are not often obliged to have recourſe to axioms, that is, to ſelf-evident, or indemonſtrable truths, in the ſtricteſt ſenſe; and whether theſe can be ſupplied by deductions, or ſyllogiſtic reaſoning, from definitions only. We ſhould not have taken any notice of this queſtion, had not Hobbes and other metaphyſicians and logicians of repute run counter to the common opinion.

But though we are forced to aſſume axioms and poſtulata in geometry, it may be a queſtion, whether any thing of this kind be neceſſary in arithmetic, or the ſcience of numbers; and whether the analyſes of our notions may not here be carried up to the notions of unity, and of the act of addition, *tanquam poſſibilia prima*; and whether it was not ſome conſideration of this kind that led Ariſtotle to ſay, that arithmetic was more accurate *(ακριβεστερα)* than geometry. It is certain at leaſt, that the analyſis may be, though it ſeldom is, carried farther in the former than in the latter of theſe ſciences. Becauſe the axioms commonly aſſumed, and peculiar to arithmetic, ſuch as the addition and multiplication tables, are no more than the aggregates of the ſimple ſigns, or ſimple notations of numbers; and may eaſily be demonſtrated from the definitions of the ſimple ſigns made uſe of; ſuch as that $1+1=2$; $2+1=3$; $3+1=4$, &c.

Biſhop Berkeley obſerves very juſtly, that the *principles* of ſcience are neither objects of ſenſe nor imagination, but notions of relation, that is, acts of the mind. Thus, ſpace, time, number, are not objects of ſenſe or imagination, although the things coexiſtended with ſpace or time, or things numbered, be objects of ſenſe. This is moſt evident in number, which is plainly different from the perception of the things numbered. Nor can the act by which we number be taught or exemplified. For inſtance, that act of the mind by which we conceive $1+1=2$, cannot be explained or analyſed into others; and ſuppoſing it could, we muſt ſtill ſtop ſomewhere, and whatever that be, there is ſomething a diſciple muſt have *a ſe, non a præceptore*, as Ariſtotle ſays. So that, ſtrictly ſpeaking, *principles* are not taught. And thoſe who maintain them innate, are perhaps not ſo abſurd as Locke pretends. Reflect. on Tar Water, art. 264. Ibid, art. 288.

Leibnitz maintained, that the *principles* of contradiction, and of a ſufficient reaſon, were the foundations of all ſcience; that the firſt was ſufficient for the demonſtration of all neceſſity, and the other of all contingent truths. But though it be true, that the *principle* of contradiction, that is, the *reductio ad abſurdum*, often occurs expreſly, and is oftener implied in geometry, yet by what has been ſaid it appears, that this *principle* alone is not ſufficient to demonſtrate all the other univerſally received *principles* of that ſcience. Far leſs is it true, that we are enabled by the *principle* of a ſufficient reaſon, which amounts to the excluſion of pure chance out of the univerſe, to demonſtrate all phyſics and morals; but additional *principles*, derived from experience, muſt be aſſumed.

PRINCIPLES, *innate*. See INNATE.

PRINCIPLE, *in Phyſics*, or PRINCIPLE *of a natural body*, is ſomething that contributes to the eſſence of a body; or whereof a natural body is primarily conſtituted.

Ariſtotle defines *principles* to be thoſe things which are not made or conſtituted of themſelves, nor of other things, but all things of them: *quæ non fiunt ex ſe invicem, nec ex aliis, ſed ex iis omnia.*

To give an idea of natural *principles*, conſider a body in ſeveral ſtates: a coal, e. gr. that was juſt now a piece of wood: it is evident there is ſomething in the coal, which before exiſted in the wood; this, whatever it is, is a *principle*, and is what we call MATTER.

Again, there muſt be ſomething joined with this matter, to make it wood rather than fire, or fire rather than wood: this is another *principle*, and is what we denominate FORM.

Matter and form, then, are univerſal *principles* of natural bodies. The Peripatetics add a third *principle*; viz. *privation*; for though, ſay they, a thing is not made from nothing, yet it muſt be made from its not being that thing before. This Ariſtotle calls *privation*, and admits it as a third *principle*. But the moderns reject it; for if *privation* be a *principle*, it is at leaſt ſo in a very different ſenſe from matter and form.

Some late philoſophers admit no *principles* but *acid* and *alkali*. Ariſtotle diſtinguiſhes two ſorts of natural *principles*, as they concur in the generation, or in the compoſition of bodies.

PRINCIPLES *of generation*, or of a body *in fieri*, are thoſe without which a natural generation can neither be, nor be conceived. Such are the three *principles* above mentioned, *matter*, *form*, and *privation*.

PRINCIPLES *of compoſition*, or of a body *in facto eſſe*, already made, or thoſe whereof natural bodies really conſiſt. Such, according to him, are *matter* and *form*; to which ſome add a third, viz. union, to connect the two others together. But this is only neceſſary upon ſuppoſition of ſubſtantial forms.

Principles are uſually confounded with *elements*; yet is there a real difference: elements are properly the firſt and ſimpleſt beings, ariſing from the firſt determination or aſſemblage of *principles*. They are the ſimpleſt things in which matter and form are combined. Elements and *principles*, therefore, differ in this, that a *principle*, as matter, is only a begun, not a complete nature; but an element is perfect and complete.

Some ancient philoſophers diſtinguiſhed between *principles*, αρχαι, and elements, στοιχεια.

Principles, according to them, were neither compoſed nor produced; but the elements were complex or compounded beings. Plutarch, ap. Eller. in Mem. de l'Acad. Berlin, 1746.

It would be endleſs to enumerate all the opinions of philoſophers concerning the elements of bodies. A late author has given us a ſummary of many of theſe opinions; and, laſtly, adds his own, that fire and water are the only things which properly deſerve the name of elements, or *principles* of natural bodies; fire being the active, and water the paſſive *principle*. According to him, water is convertible into air, and into earth, by means of fire. Hence the four, vulgarly called elements, may be reduced to two. He endeavours to eſtabliſh his doctrine on the experiments of Boyle, Hales, and Muſchenbrock. See ELEMENTS.

To this head may likewiſe be referred what we call *mechanical principles of bodies*, which ſerve to account for the mechaniſm or artificial ſtructure of things, and all the varieties and differences of bodies from motion, figure, and other common affections.

Theſe *principles* are differently maintained by three or four different ſects of philoſophers; viz. the ancient Epicureans, or Corpuſcularians, to whom may be added the modern Gaſſendiſts, the Carteſians, and the Newtonians.

PRINCIPLES, in *Chemiſtry*, are the firſt and ſimpleſt parts whereof natural bodies are compounded, and into which they are again reſolvable by fire, &c.

Theſe are more properly, as well as more commonly, called ELEMENTS.

In each ſchool of philoſophy among the ancients, very different opinions prevailed concerning theſe *principles*; ſome of them admitting only one, and others more. Some contending for earth, and others for fire. Nor were the notions of the chemiſts of the middle ages, or about the time of Paracelſus, more clear and ſatisfactory. They admitted five *principles* of bodies, which they call mercury or ſpirit, phlegm or water, ſulphur or oil, ſalt, and earth. But it has been found by later experiments, that ſome of theſe *principles* are more ſimple than others; and, therefore, Becher attempted to reduce their number, and eſtabliſhed only two general *principles* of all bodies, viz. water and earth; extending the term earth to that which is vitrifiable, and which he conceived to be the *principle* of the fixity, ſolidity, and hardneſs of bodies; to that which is inflammable, and to which he aſcribed the inflammability of all inflammable bodies; and to that which he called *mercurial* EARTH.

This theory has been farther illuſtrated and extended by Stahl, who ſhewed, that water and vitrifiable earth enter as elements into the compoſition of many bodies; but the other two *principles* of Becher, viz. the mercurial earth and the inflammable earth, have not yet been expoſed to our ſenſes ſingle and pure: however the exiſtence of the latter is ſufficiently aſcertained (ſee PHLOGISTON), but that of the latter is not ſatisfactorily demonſtrated.

That earth, water, and fire enter into the compoſition of bodies as *principles*, may be conſidered now as demonſtrated by Becher and Stahl; and the experiments of Boyle, Hales, Prieſtley, &c. ſufficiently prove that air enters into the compoſition of many bodies as a *principle*. So that chemiſts generally admit the four *principles* of Ariſtotle, viz. fire, air, water, and earth. In whatever manner bodies are decompoſed, we always obtain theſe ſubſtances; and they are the utmoſt limits of chemical analyſis. Theſe are, therefore, called *primary principles* or ELEMENTS.

Secondary principles are thoſe which reſult immediately from the union of primary *principles*.

Principles of the third order are thoſe which are compoſed of ſecondary *principles*, &c. Thus, NITRE is a compound of the acid called nitrous, and of the fixed vegetable alkali, combined and ſaturated together; by a firſt analyſis of nitre, we obtain this acid and this alkali, which are, therefore, the proximate *principles* of nitre. But neither of theſe are ſimple ſubſtances. By a farther analyſis of each of theſe, they may be decompoſed into water, earth, and fire, or the inflammable *principle*: and theſe may be conſidered as primary *principles*; but the acid and alkali are ſecondary *principles*. The water, earth, and fire are the remote *principles* of the nitre. Dict. Chem. Eng. edit. art. *Principles*. See alſo Geoffroy's Tracts, p. 5, &c.

PRINCIPLE, *inflammable*. See PHLOGISTON.

PRINCIPLE, *original principium originale*, a name given by Tachenius and ſome other authors, to ſalt, without conſidering it as acid, alkali, or of any other particular kind, or any mode of exiſtence. But many others allow this name only to water, or at leaſt that water *is*, to almoſt all natural bodies, the moſt copious, the moſt active, and the moſt influencing part; yet even this is found to agree much better with ſome bodies than with others. See *Generation and Food of* PLANTS.

PRINCIPLES, among *Hermetic Philoſophers*. According to theſe gentlemen, the two *univerſal principles* of ſenſible nature, are ſubtile and ſolid; which, being joined in a greater or leſs degree, generate all that beautiful variety of beings in the univerſe.

The three *natural principles* are ſalt, ſulphur, and mercury. Theſe *principles* generate the four elements; and are, as it were, ſecondary elements, inaſmuch as they are contained in all mixed bodies. Sulphur is the firſt, and ſtands in the place of male; mercury the ſecond, ſtanding in the place of female; and ſalt the third, which copulates the others together. Dict. Hermet.

PRINCIPLE is alſo applied to the foundations of arts and ſciences. In this ſenſe we ſay, *principles* are not to be proved; they muſt be common notions.

There is no diſputing againſt a man that denies *principles*: the worſt reaſoning is that which includes a *petitio principii*; i. e. which ſuppoſes a *principle* that ought to be proved.

PRINCIPLE is alſo applied by extenſion to the firſt rules or maxims of an art.

In this ſenſe we ſay, a man is ignorant of the *principles* of geometry; meaning, he has not learnt Euclid's Elements.

The *principles* of moſt arts and ſciences are found in this Dictionary, under their reſpective heads.

PRINOS, in *Botany*. See WINTER *Berry*.

PRINTS, *property of*. See LITERARY *Property*, and ENGRAVER.

PRINTER, *typographus*, a perſon who compoſes, and takes impreſſions, from moveable characters, ranged in order, or from plates engraven, by means of ink and a preſs.

Laurentius called Coſter, Geinſfleich, Fauſt, Guttenberg, Schoeffer, Mentel, and Eggelſtein, were the *firſt printers*. The firſt that practiſed it in England was Fred. Corſellis, brought over from Haerlem, under king Henry VI. in France, Uldric Gering, Martin Crantz, and Michael Friburgher; at Auguſburg, John Bemler; at Rome, Conrad Sweynheim, and Arnold Pannartz, Germans; at Venice, the two brothers John and Vindelin of Spire, Nicholas Jenſon, and John de Cologn; at Florence, Bernard Cennini; at Naples, Sixtus Ruſinger.

The *great printers* were Aldus of Venice, and his ſon, Paulus Manutius; the two Badii; William and Frederic Morel; Oporin; Frobenius; Rob. Hen. and Charles Stephens; Gryphius, Turnebus, Torres, Commelin, Plantin,

Plantin, Raphelengius, Vascosan, Bleau, Crispin, and the two Elzevirs.

The *learned printers* were the Manutii, Amerbach, and Froben, of Basil, the Stephens's, the Badii, Turnebus, Wechel, Morel, Junta, &c.

Plantin had the title of *arch-printer, architypographus*, given him by the king of Spain, in consideration of his printing the Polyglot of Antwerp.

The names, characters, and elogies of all the famous *printers* are found in part II. of the first tome of the Jugemens de Savans.

The *printers*, since the establishment of that art, are esteemed a part of the company of stationers and booksellers; before that establishment, the company consisted only of booksellers, binders, writers, illuminers, and parchment-makers. The *parchment-makers* prepared the skins, and made the parchment or vellom; which were then almost the only matters books were written on. The *writers*, or *copyists*, wrote and transcribed books after copies given them by the booksellers. The *binders* were charged with the binding of those days, which was very coarse, only consisting of two flight boards covered with some paltry leather. The *illuminers* painted in miniature, and gilt initial letters, head-pieces, tail-pieces, and other compartiments. Laftly, the *stationers* or *booksellers* fet the *writers* to work, and fold their copies in shops, and other places, on the days allowed them by the statutes to expose the same.

PRINTING, *typographia*, the art of taking impreffions with ink, from characters and figures moveable or immoveable, upon paper, vellom, or the like matter.

There are two kinds of *printing*; the one for books, the other from copper-plates, for pictures. The firft called *common preſs printing*, the fecond *rolling preſs printing*.

The prime difference between the two conſiſts in this, that the characters of the former are caſt in RELIEVO, and thoſe of the latter are engraven in CREUX.

The art of *printing* is a modern invention: it is, indeed, of a very ancient ſtanding among the Chineſe; but then their *printing* is very different from our's. It muſt be owned, the European *printing*, in its original, was much the ſame with the Chineſe; yet, as there was at that time no commerce or correſpondence between Europe and China, the paſſage into the Eaſt by the cape of Good Hope being as yet undiſcovered by the Portugueſe, there is no room to charge the Europeans with borrowing their art from the Chineſe: but each muſt be owned to have fallen on the ſame thing, though at very different times. Father Couplet aſſures us, that *printing* has been in uſe in China from the year 930. Father le Compte ſpeaks more largely; ſaying, that it has been there from almoſt all ages: he adds, that there is this difference between their's and ours, that whereas we have but a very ſmall number of letters in our alphabets, and by the various arrangement of thoſe, are able to form infinite volumes; we have the advantage, by making our characters moveable, to print the largeſt works with an inconſiderable quantity of letter; thoſe that ſerved for the firſt ſheets, ſerving over again for the ſucceeding ones: the Chineſe, on the contrary, by reaſon of the prodigious number of their letters, are precluded this reſource; and find it more eaſy, and leſs expenſive to cut all their letters on wooden blocks; and thus to make as many blocks as there are pages in a book; and theſe of no farther uſe but for that ſingle work. *Their method of* printing *ſo hereafter.*

PRINTING, *origin of.* Who the firſt inventors of the *European printing* were, in what city, and what year, it was at firſt ſet on foot, is a famous problem long diſputed among the learned. In effect, as the Grecian cities contended for the birth of Homer, ſo do the German cities for that of *printing*.

Mentz, Haerlem, and Straſburgh, are the warmeſt on this point of honour: Italy alſo would have entered the liſts; but the ſuffrages being at firſt divided between the firſt three pretenders, they are left in poſſeſſion of the queſtion, which, in reality, is not yet fully decided; though it muſt be owned, Mentz has always had the majority of voices.

We ſhall not here enter into a nice diſcuſſion of the merits of the cauſe, but only propoſe the pretenſions of each. John Mentel of Straſburgh, John Guttenberg and John Fauſt of Mentz, and L. John Coſter, of Haerlem, are the perſons to whom this honour is ſeverally aſcribed by their reſpective countrymen; and they have all their advocates among the learned. Mentel, a phyſician of Paris, enters the liſts in behalf of his nameſake of Straſburgh; and contends that it was he who firſt invented *printing* in the year 1440, and that, in conſideration hereof, the emperor Frederic III. gave him a coat of arms correſponding thereto, in the year 1466. He adds, that Guttenberg, whom he had taken in as a partner, or aſſociate, carried it to Mentz, where he took in Fauſta partner.

John Geneſleiſch, a native of Mentz, who was his ſervant, communicated the art to J. Guttenberg, whom Mentel had employed in making ſome of his tools; and becoming thus poſſeſſed of the art, they removed and ſettled at Mentz, where it was perfected by the aſſiſtance of John Fauſt. But this account depends on a Straſburgh chronicle of very doubtful authority, and is contradicted by the chronicle of Cologne. Trithemius, and Wimpelingius. The laſt mentioned writer expreſly ſays, that the art of *printing* was invented, incompletely, at Straſburgh, by Guttenberg, and perfected at Mentz. Here Mentel acquired it from Guttenberg and Fauſt, and returning to Straſburgh about the year 1455 practiſed it in connection with Eggeſteiſh.

The *Haerlemers*, with Boxhornius, Scriverius, &c. refer the firſt invention to Laurens James Coſter, or Laurence John Coſter, (called Coſter on account of the public office diſtinguiſhed by this appellation, which he ſuſtained at Haerlem, and which was hereditary in his family), of Haerlem, in the year 1430, adding, that his aſſociate Guttenberg ſtole away his tools while he was at church, and carried them to Mentz, where he ſet up *for* the firſt foreſtor; though others attribute this theft, &c. to his partner Fauſt. And others, again, with greater probability, aſcribe it to John Geneſleiſch ſenior, one of his ſervants, in the year 1441: and with theſe types, &c. of Laurence, two ſmall works were printed at Mentz in 1442. The principal evidence in favour of Haerlem, is Cornelius, who had been a ſervant of Laurence, and afterwards a book-binder in that city, on whoſe authority Adrian Junius, M. D. founds his account; which appears to have been drawn up between the years 1562 and 1575, and publiſhed at Leyden in 1588. The learned Meerman, in his Origines Typographicæ, 1765, has amply vindicated and confirmed the account which Junius gives of the fact; though he diſputes and ſufficiently invalidates what this writer ſays, as to the types which were uſed by Coſter, at Haerlem. Theſe he ſhews, were neither cut nor fuſible metal types, but ſeparate wooden types.

Munſter, Polydore Virgil, Paſquier, &c. will have Guttenberg, or Guttemburgh, to have really been the inventor of *printing*; and add, that he took in Fauſt and Schoeffer for aſſociates.

Naude, in his Mafcurat, eſpouſes the cauſe of Fuſt, or Fauſt, or Fuſtus; and will have him to be the firſt *printer* in Europe, and that he took in Guttenberg for a partner. His reaſon for putting Fauſt in poſſeſſion of this privilege, is, that the firſt books that were printed, appear to have been all of his impreſſion. To this purpoſe it is alledged that it it is more than probable, if Guttenberg or Coſter had had a greater or an equal ſhare in the invention, they would not have allowed him to attribute the whole to himſelf and his ſon-in-law Schoeffer, as he has done, without ever offering to do the like, or in the leaſt contradicting him, and aſſerting their own right.

The true ſtate of the caſe ſeems to be this, that metal types were firſt invented at Mentz; of theſe there were two ſorts, viz. thoſe that were cut, and thoſe that were caſt in matrices. The invention of the former has been aſcribed by ſome writers to Fauſt, but without ſufficient authority; the real inventor being John Geneſleiſch, ſenior, who had brought the art of *printing* with wooden types from Haerlem to Mentz, with whom John Geneſleiſch junior, called Guttenberg, might probably have concurred. The æra of this invention muſt be about the year 1442 or 1443: for John Geneſleiſch ſenior, came to Mentz in 1441, and the Latin Bible with metal types, was printed in 1450, which could not require leſs than ſeven or eight years.

The latter were invented by Peter Schoeffer, the ſervant and ſon in law of Fauſt, who ſettled at Mentz, in the year 1449 or 1450, and having acquired under the two Geneſleiſchs the art of cutting types, remedied the inconvenience of this method by contriving to caſt them, which muſt have been practiſed before the year 1459. The partnerſhip that ſubſiſted between Geneſleiſch and Fauſt, and the relation between Schoeffer and Fauſt, have probably given occaſion for aſcribing to him the merit of the invention of *printing* with metal types, in which from connections of this kind he probably might have had ſome concern.

The editions above referred to in Naude's account are 1. The Codex Pſalmorium, printed in 1457, which is the moſt ancient book known to be printed with a date or inſcription, and is lodged in the emperor's library at Vienna. 2. The Rationale Divinorum Officiorum, of William Durand, printed at Mentz, in 1459, in folio. This *Rationale* is in the cabinet of Pembroke's library. Mallinkrot has erroneouſly ſuppoſed this to be the firſt printed book. 3. The Catholicon Januenſis, dated in 1460, and now in the

king's library. Fauſt's name, indeed, *is* not to this; but it is perfectly like the following ones where it is. It is ſaid that the firſt printers did not ſubjoin their names and inſcriptions at the end of their books till the year 1457: and this they continued to do till Fauſt either died or left off buſineſs. 4. The Latin Bible of 1462, being the ſecond edition of it, now in the French king's library. 5. Tully's Offices, in quarto, (the reſt being all folio's) in the year 1465, and 1466, for there are copies in the Bodleian, and the library of Corpus Chriſti college, Oxon, of both theſe dates. Some eminent writers have aſſerted that this is the firſt printed book. 6. Other Bibles of 1471. 7. St. Auguſtine de Civitate Dei, 1473. 8. Mercurius Triſmegiſtus de Poteſtate & Sapientia Dei, in 1503. 9. Titus Livius, in 1518, &c.

Add to this, that at the end of Livy is a privilege granted by the emperor Maximilian to Schoeffer, grandſon of Fauſt, for the ſole power of *printing* that author for ten years; and for ſix years, to all the other books he ſhould print thereafter; in conſideration of Fauſt's having invented the art of *printing*. This privilege is dated 1518, and ſigned Jac. Spiegel.

Eraſmus, however, in the epiſtle after that privilege, does not poſitively aver the fact; he only obſerves, that the firſt, or the chief inventor of that art, is held to be J. Fauſt. In the advertiſement to the ſaid book, Nic. Carbachius ſpeaks to the ſame effect as to the privilege, and Eraſmus.

As to Guttenberg, Mentel, and Coſter, Naude obſerves, the perſon is not yet born that can ſay he has ever ſeen books printed by any of them, before, or as early as, thoſe of Fauſt. All that is urged on their behalf, is only founded on reports, conjectures, probabilities, forged authorities, and the jealouſies of cities againſt one another.

Yet Salmuth, in his additions to Pancirollus, cites a public act, whereby it appears that Fauſt, after having invented *printing*, and ſuſtained it a long time on his own footing; at length took in Guttenberg as a partner, to contribute to the expence; which was very great, by reaſon the firſt books were moſt of them printed on vellom, or at leaſt on parchment, and after the Chineſe way.

But the cauſe is not thus decided: the advocates for Coſter urge divers things, which ſeem to put him in the place here aſſigned to Fauſt. Mr. Ellis, in the Philoſophical Tranſactions, fathers books on him prior to any of thoſe above referred to Fauſt; and even ſome as early as 1430 and 1432. It is certain, the Haerlemers ſhew printed books of that date, which agreeing ſo well with the account given by Theod. Scriverius, and others, leaves Mr. Ellis little room to doubt, whether the honour of the invention be his or the other's due. All that belongs to Fauſt, according to this writer, is the honour of eſtabliſhing the art in greater luſtre and perfection at another place many years after.

But the difficulty lies, either in ſhewing why the practice ſhould be at a ſtand from 1432, to the reviving of it at Mentz by Fauſt and Schoeffer, in 1465, or elſe in giving ſome account of the condition and progreſs of this invention during that interval.

Now, Boxhornius, Scriverius, and other authors, expreſly affirm, that ſo large a work as the De Spiegel, Speculum Salutis, of Coſter, ſhewn at Haerlem for the firſt printed book, could never be his firſt eſſay: he muſt have had the art in its rougher rudiments before, and have made many trials on leſs works: no doubt his firſt attempts were on looſe ſheets, which we may ſuppoſe were eaſily loſt. In effect, it muſt be allowed no inconſiderable argument in Coſter's behalf that the rudeſt and moſt artleſs performances ſeem to be his. Mr. Ellis mentions ſome things of this kind without date, which he had ſeen in the king's library at St. James's, in that of Bennet college and the Bodleian at Oxford, with all the marks of the utmoſt ſimplicity, and which might fairly bid for firſt eſſays. There is ſomething ſo unkward and coarſe in them, that any body almoſt might have done them; mere nature being ſufficient, without any art or experience at all. The ink was only common writing ink, unartfully ſpread upon wooden blocks, very clumſily cut, &c.

By this time we have traced up the art to ſuch a ſtate, that it may, perhaps, ſcarce ſeem worth the conteſting who it was invented it; and no doubt, *printing*, as it now ſtands, owes more to the genius and addreſs of ſome of the later improvers than it did to its firſt author.

The ſame conſideration may make us more eaſy under our preſent ignorance of the inventors of moſt other arts; many of which had ſuch ſimple unmeaning originals, that it might perhaps be no mighty credit to be eſteemed the authors of inventions nothing leſs artful and ingenious.

We ſhall conclude this account of the origin of *printing* with an abridgement of the hiſtory of it, given by the late Mr Bowyer. This writer obſerves, that the honour of having given riſe to this art has been claimed by the cities of Haerlem, Mentz, and Straſburgh. To each of theſe cities it may be aſcribed in a qualified ſenſe, as they made improvements upon one another. But the real inventor of *printing* was Laurentius, of Haerlem; who proceeded, however, no farther than to ſeparate wooden types. His firſt eſſay was about the year 1430; and he died about 1440, after having printed the Horarium, the Speculum Belgicum, and two different editions of Donatus. Some of Laurentius's types were ſtolen from him by one of his ſervants, John Genſfleiſch, ſenior, who became the firſt printer in Mentz, and publiſhed, in 1442, Alexandri Gali Doctrinale, and Petri Hiſpani Tractatus. Theſe works were executed with wooden types, cut after the model of thoſe which he had ſtolen. In 1443, Genſfleiſch ſenior entered into partnerſhip with Fauſt (who ſupplied money), Meidenbachius, and others; and in 1444, they were joined by John Genſfleiſch junior, who was diſtinguiſhed by the name of Guttenberg. Guttenberg, by the aſſiſtance of his brother, Genſfleiſch the elder, firſt invented cut metal types, with which was printed the earlieſt edition of the Bible. This edition appeared in 1450, and the completing of it took up ſeven or eight years. Guttenberg uſed none but either wooden or cut metal types. The carrying of the art to perfection was owing to Peter Schoeffer, the ſervant and ſon-in-law of Fauſt, who invented the mode of caſting the types in matrices; and who was probably the firſt engraver on copper-plates. The firſt book printed with the improved types was Durandi Rationale, in 1459. More copies of the earlieſt books were printed on vellom than on paper. This method, however, was ſoon changed; and paper was introduced for the greateſt part of the impreſſions, a few only being printed on vellom, for curioſities, and for the purpoſe of being illuminated.

With regard to the claim of Straſburgh, it appears, that Guttenberg had endeavoured to introduce *printing* into that city before he joined his brother at Mentz; but without ſucceſs. The firſt actual printers at Straſburgh were Mentelius and Eggeſtenius; and there is no certain proof of a ſingle book having been printed there, till after 1462. The diſperſion of the Mentz printers, in that year, occaſioned the art to ſpread rapidly through Europe; and in 1490 it reached even to Conſtantinople. Thoſe who wiſh to ſee this ſubject further diſcuſſed, and to find the authorities on which this abſtract of the riſe of *printing* is founded may conſult Meerman's Origines Typographicæ, quarto, 1765, and Bowyer's Origin of *Printing*, edit. 2.

PRINTING, *progreſs of*. The firſt printers, then, whoever they were, made their firſt eſſays on wooden blocks, or forms, after the Chineſe manner.

It is not improbable, ſays Mr. Bagford, they might take the hint from ancient medals and ſeals. To this purpoſe, it is obſerved, that the arts and ſciences, eſpecially ſtatuary and ſculpture, were arrived at ſo great perfection among the Romans, at the time when that empire was in its greateſt glory, that it is much to be wondered at that the art of *printing* was not found out among them; an art ſo nearly allied to that of the cutting of ſeals and the dies of medals.

The making of theſe dies, and the ſtamping of their coins with them, was, in reality, no other than *printing* on metal; and their impreſſing their ſeals, cut in cornelians, agates, &c. on wax, was another ſpecies of *printing* on that ſubſtance. And finally, a third ſort of *printing* among them, was the impreſſing the name of the workmen on their pieces of fine earthen-ware.

Montfaucon, in his Antiquities, gives the figures and deſcriptions of ſeveral very large figilia of the Romans, in which the names were all cut in hollow, in capital letters; and he imagines, that the uſe of theſe was to mark large earthen veſſels with, while the clay was ſoft, and particularly thoſe large veſſels in which the Romans kept their wines. It does not ſeem that this diligent enquirer into antiquity ever met with any of theſe figilla with the letters or characters in reliefe, or ſtanding out in the manner of our modern types for *printing*, ſince he mentions none ſuch; yet the remains of the Roman antiquities in terra cotta, or earthen-ware, ſhew that they had ſome ſuch, though they were leſs common than the others; theſe veſſels ſometimes being marked with letters going in, though in general they have them all ſtanding out, as muſt be the caſe when the impreſſion was given from a figilium cut in creux.

There is now, in the collection of the duke of Richmond, a figilium of the other more rare kind, which brings the diſcovery very near to that of *printing*: on this all the letters are raiſed, as is alſo the verge or rim of the ſeal, in

the manner of our types used this day in *printing*. The stamp is made of true ancient brass, and has on it the common green coat of *ærugo* which distinguishes the true antique medals. The plate is near two inches long, and near an inch in breadth, and has on the back part a ring for the convenience of holding it for making the impression. The letters stand in two rows; they are the common Roman capitals, very well made, and their faces all stand exactly on the level with one another, and with the surface of the verge of the seal. This seal was exactly of the nature of our method of *printing* so many letters at once. It contains the name of one Caius Julius Cæcilius Hermias, some private man, as we have no account of any person of this name upon record. It served him probably to set his name to any thing, to save him the trouble of writing; and the name being that of some private man seems also to prove, that these sigilla were very common among that people. It was evidently made to be used on parchment, or some other such thin substance; and the manner of using it must have been by first dipping it into ink, or some other coloured matter, not plunging it so far as to touch the ground, so that the letters only became marked, and gave their figures on the paper. The ground of this seal is very rough and uneven, and thence also it is plain, that the use of it was not to press down any soft substance, such as clay, or the like; because the imperfection of the ground would, in that case, have been seen; whereas in the use it was really intended for, the ground never gave any impression, and therefore there was no reason for bestowing any pains in the working it even.

The first use of *printing* among the later ages, was by wooden blocks in this very manner; and it was not till long after this invention, that we learned the way of using separate types for the letters; and these were then called *typi mobiles*, in opposition to the blocks, where the whole page was contained together, which was called *typi fixi*. This signet of the duke of Richmond's, which was found near Rome, is truly and properly one of those *typi fixi*, and prints off as impression on paper with our modern printer's ink, as well as any set of letters cut in this manner can be expected to perform. This seems, therefore, the most ancient sample of *printing* that we know of: for, by the appearance of the metal, it seems to be of the Higher Empire.

It is plain, by this stamp, that the very essence of *printing* was known to the Romans; for they had nothing to do, but to have made a stamp, with lines three or four times as long, and containing twenty lines instead of two, to have formed a frame of types that would have *printed* a whole page as Coster's wooden blocks, used in *printing* the book called Speculum Salutis, which as some say, is the first book *printed*, in the year 1440, and consisting of pictures of stories out the Bible, with some of the verses underneath each page; being *printed* from a block of wood, like a wooden cut. This was the first essay of fixed types, from which the moveable, or common separate types were soon deduced; and it seems strange that the Romans, who were as sagacious a people as any in the world, should not as easily have fallen upon the use of separate types, in which the whole art of modern *printing* consists, from such figures as these, as the later ages from Coster's wooden blocks, which were plainly no other than larger works of the same kind.

Cicero, in his book de Natura Deorum, has a passage from which Toland supposes that the moderns took the hint of *printing*. That author orders the types to be made of metal, and calls them *formæ literarum*, the very words used by the first printers to express them. It is plain from Virgil, that brands, with letters of the owner's name, were in use in his time for the marking of cattle. And we have an account of the same artifice that is now used for the painting of cards being used by the emperor Justin, who could not write. There was a smooth board, with holes cut through it, in form of the letters of his name; and when he had occasion to sign any thing, this was laid on the paper, and he marked the letters with a pen or stylus dipped in red ink and directed through the holes. Philos. Transf. N° 479, p. 393.

But others rather imagine the art of *printing* to have come from the method of making playing cards, which, it is certain, bear a nearer resemblance to the primitive process of *printing* than seals; as appears from the first specimens of that art above mentioned.

The book at Haerlem, the vocabulary called Catholicon, and the pieces in the Bodleian and Benner college, are all performed in this way; and the impression appears to have been given on one side the leaves; after which the two blank sides were pasted together.

But they soon found the inconveniencies of this method, and therefore bethought themselves of an improvement; which was by making single moveable letters, distinct from one another.

These being first done in wood, gave room for a second improvement; which was the making of them, at length, of metal; and in order to that, cutting moulds, matrices, &c. for casting them.

From this ingenious contrivance we ought to date the origin of the present art of *printing*, as practised throughout Europe; contradistinguished from the methods of the Chinese abroad, and the card-makers at home, which were the same art, only practised in a different place, or with a different view.

And of this, Schoeffer, or Schoeffer, first servant, and afterwards partner, and son-in-law of Fausk, at Mentz, above mentioned, is pretty generally allowed the inventor: so that he was properly the first printer with fusile types.

But the art being yet in its infancy, there were some imperfections in the books they printed; among the rest was the want of capital letters: hence they left the places of the initial letters blank, and gave them to the illuminers to paint in gold, or azure; though, others say, this was done designedly, to enable them to pass off their books for manuscripts.

Some authors tell us, that Fausk carrying a parcel of his Bibles to Paris, and offering them to sale as MSS. the French, upon considering the number of books, and their exact conformity with one another, even to a point, and that the best book-writers could not be near so exact, concluded there was witchcraft in the case; and, by either actually indicting him as a conjuror, or threatening to do so, extorted the secret. And hence the origin of the popular story of Dr. Faustus.

From Mentz, about the year 1462, when it was taken, plundered, and deprived of all its former rights and franchises, the art of *printing* soon spread itself throughout a good part of Europe; Haerlem and Strasburgh had it very early; which, as authors represent it, occasioned their pretending to the honour of the invention.

From Haerlem it passed to Rome in 1466, where the Roman type was introduced in 1467, which was soon after brought to great perfection; and into England in the reign of Henry VI. by means of Thomas Bourchier, archbishop of Canterbury, who sent R. Tournour, master of the rolls, and W. Caxton, merchant, to Haerlem, to learn the art. These privately prevailing with Corsellis, an under-workman, to come over, a press was set up at Oxford.

This account depends on the authority of an old manuscript chronicle, said to be preserved in the archbishop's palace, and cited by Atkins, in his Original and Growth of *Printing* in England, published at London, in 1664. This chronicle informs us, that the execution of the business entrusted with Turnour and Caxton, cost fifteen hundred marks; and that *printing* was set up at Oxford before there was any *printing*-press or printer in France, Spain, Italy, or Germany, except the city of Mentz, which claims seniority as to *printing* even of Haerlem itself, calling herself, *Urbem Moguntinam artis typographicæ incunabulum primum*; though it is known to be otherwise, that city (as the chronicle adds) gaining that art by the brother of one of the workmen at Haerlem, who had learned it at home of his brother, and afterwards stole up for himself at Mentz. This press at Oxford was at least ten years before there was any *printing* in Europe (except at Haerlem and Mentz), where also it was but new-born. This press at Oxford was afterwards found inconvenient to be the sole *printing* place in England, as being too far from London and the seat whereupon the king set up a press at St. Alban's, and another at the abbey of Westminster. But the authority of this chronicle has been warmly disputed by Mr. Palmer in his History of *Printing*, 1733, book iii. Dr. Ducarel, in his letter to Meerman, Dr. Middleton, Ames, and others, who maintain that there was no *printing* in this kingdom till the introduction of it by Caxton, who had acquired it in his travels abroad, about the year 1474, or as some say, 1470 or 1471.

But Mr. Bowyer, in the notes to his Abridgement of Dr. Middleton's Dissertation on the Origin of *Printing* in England, hath offered several reasons to shew, that the account given in Atkins's record is not so incredible or improbable as some persons have imagined.

Mr. Meerman, in his learned work already cited, is a strenuous advocate for the authenticity of this record: and he apprehends that the period, to which this history relates, must have been between the years 1454 and 1464; because Bourchier was made archbishop of Canterbury in 1454, and Edward IV. succeeded Henry VI. in 1460. This accurate writer has produced a variety of evidence in support of the claims of Corsellis, for which we must refer to his elaborate work, and particularly to his letter

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in reply to Ducarel, tom. ii. p. 19, &c. and to Mr. Bowyer, ubi supra; which evidence derives much confirmation from a book with a date of its impreſſion from Oxford, anno 1468, copies of which are in ſeveral public libraries, particularly at Cambridge, Oxford, lord Pembroke's library, &c. This is a ſmall volume of forty-one leaves in quarto, with this title; "Expoſitio Sancti Jeronimi in Symbolum Apoſtolorum ad Papam Laurentium," and at the end are the following words, "Explicit Expoſitio, &c. impreſſa Oxonie & finita, Anno Domini MCCCCLXVIII. XVII die Decembris."

If the authority of this book be admitted, it is a clear proof and monument of the exerciſe of *printing* in Oxford ſeveral years before Caxton began to deal in it. Dr. Middleton, indeed, endeavours to ſhew, that the date is a falſe one; and, not to mention the reſt of his arguments, confirms his opinion from this circumſtance, that we have no other fruit of production from the preſs at Oxford for eleven years next following. But this objection is invalidated by two conſiderations; firſt, that Corſellis's books may have been loſt, a thing by no means uncommon in thoſe days of ignorance; and, ſecondly, that the civil wars broke out in 1469, which might probably oblige our Oxford printer to ſhut up his preſs.

Mr. Bowyer produces a paſſage from the ſecond part of Shakſpeare's Henry the Sixth, as a farther evidence of a more early introduction of *printing* into England than hath generally been ſuppoſed. See alſo Meerman ubi ſupra, monitum noviſſimum, prefixed to tom. ii.

The reſult of the whole is, that this fact doth not all derogate from the honour of Caxton, who was the firſt perſon in England that practiſed the art of *printing* with fuſile types, and conſequently the firſt who brought it to perfection; whereas Corſellis printed with ſeparate cut types in wood, being the only method which he had learnt at Haerlem.

In 1467, *printing* was ſet up in the city of Tours; at Reuthlingen and Venice in 1469; and probably in the ſame or next year at Paris, where Gering, Crantz, and Friburger, all Germans, invited thither by two doctors of the Sorbonne, ſet up a preſs in that learned houſe.

Hitherto there had been nothing printed but in Latin, and the vulgar tongues; and this firſt in Roman characters, then in the Gothic, and at laſt in Italic. But in 1480, or, as ſome ſay, in 1476, the Italians caſt a ſet of Greek types; and it was at Venice or, as ſome ſay, at Milan or Florence, that the firſt editions in that language appeared.

Here we may obſerve, that the firſt Greek *printing* was a few ſentences of Tully's Offices at Mentz, in 1465, which were very incorrect. In the ſame year, ſome Greek quotations in an edition of Lactantius's Inſtitutes, were neatly printed, in a monaſtery, in the kingdom of Naples. The firſt whole Greek book was the Grammar of Conſtantine Laſcaris, at Milan, in 1476. See Bowyer, ubi ſupra, Appendix, N° 1; or the excellent edition of the Biographia Britannica, by Dr. Kippis, art. *Atkins*, note (A).

The Italians too have the honour of the firſt Hebrew editions, which were printed about the ſame time with the Greek, at Soncino, a little city in the duchy of Milan; under the *direction* of two Jewiſh rabbins, Joſhua and Moſes, whoſe works are dated in the year of the world 5244, anſwering to the year 1484, of the Chriſtian æra.

Towards the end of the ſixteenth century, there appeared various editions of books in Syriac, Arabic, Perſian, Armenian, Coptic or Egyptian characters; ſome to gratify the curioſity of the learned, and others for the liturgic uſes of the Chriſtians in the Levant: theſe were printed chiefly at Paris; whither puncheons and matrices were ſent from Conſtantinople by M. Savary, then ambaſſador at the Porte.

Out of Europe, the art of *printing* has been carried into the three other quarters of the world: for Aſia we ſee impreſſions of books at Goa, and in the Philippines; at Lima, Boſton, Mexico, &c. for America; and at Morocco for Africa.

The Turks, indeed, are ſaid rigorouſly to prohibit *printing* throughout their empire, as imagining that the too free communication with books might occaſion ſome change in religion or government; but this is to be underſtood with ſome limitation: and it it is certain that the Jews have ſeveral editions of their books printed at Conſtantinople, Theſſalonica, &c.

PRINTING, *method of.* For the *printing* letters ſee the annexed Specimen.

For the method of forming and caſting them, ſee *Letter* FOUNDERY.

And for the art of engraving the puncheons, matrices, &c. in order thereto, under the articles ENGRAVING, PUNCHEON, MATRICE, &c.

The workmen employed in the art of *printing* are of two kinds; *compoſitors*, who range and diſpoſe the letters into words, lines, paſſages, &c. according to the copy delivered them by the author, and *preſſmen*, who apply ink upon the ſame, and take off the impreſſion. See COMPOSITION, &c.

Office of the compoſitor. The types, being caſt, &c. are diſtributed, each kind by itſelf among the diviſions of two long wooden frames, an upper and under one, called *caſes*; each of which is divided into little cells, or boxes, of different ſizes.

The boxes of the upper caſe are in number ninety-eight; and in theſe are diſpoſed the capitals, ſmall capitals, accented letters, &c. In the cells of the lower caſe, which are fifty-four, are diſpoſed the common running letters, with the points, commas, ſpaces, quadrats, &c.

Each CASE is placed a little aſlope, like a reading-deſk, that the operator may reach the upper boxes the better, and be in leſs danger of mixing the letters by ſtretching his arm over them.

The compoſitor's poſt is againſt the middle of the caſe, and he works ſtanding, holding an inſtrument, uſually made of iron, called the *compoſing-ſtick*, in one hand; with the other he takes the types as he needs them, out of the boxes; ranges them on a ſlip of braſs, called a *rule*, in his compoſing-ſtick; and, putting a ſpace, to make a blank between each two words, forms one line after another, till the ſtick being full, he empties it out upon another inſtrument called the GALLEY; ſeveral of which ranged and wedged tight in a frame, called a *chaſe*, are ready for the preſs.

This ſhort view of compoſing may need to be farther illuſtrated and inlarged upon. The *compoſing-ſtick*, then (repreſented *Tab.* I. MISCELLANY, *fig.* 5.) conſiſts of a plate, or ſlip of iron, braſs, wood, &c. more or leſs broad, and contrived ſo as to be made more or leſs long, according to the width of the page, and the number of lines to be compoſed in it.

From the right ſide of this plate ariſes a ledge *a a*, about half an inch high, running the whole length of the plate, and ſerving to ſuſtain the letters, the ſides of which are to reſt againſt it; from the ſame plate likewiſe ariſe three other leſſer pieces, *b* and *c c*, two of which, *c c*, are contrived to ſlide along it, that ſo the two pieces may be either approached or withdrawn at pleaſure, to adjuſt the length of the line to the meaſure intended. And, that where marginal notes, references, &c. are required in a work, the two ſliding-pieces *c c* are opened in the compoſing-ſtick to a proper diſtance from each other.

Before the workman proceeds to compoſe, a rule, or thin ſlip of braſs plate, cut to the length of the line, and of the ſame height as the letter, is placed in the compoſing-ſtick againſt the ledge thereof, for the letter to bear immediately againſt.

Things thus prepared, the compoſitor having the copy lying before him, and the ſtick in his left hand, with the right he picks up the letters, ſpaces, &c. and places them againſt the rule; while with the thumb of the left he preſſes them cloſe to the upper ſcrew, or check: and thus keeps them right and ſteady; while the other hand is conſtantly employed in ſetting in more letters: the whole being performed with a degree of expedition and addreſs not eaſy to be imagined.

A line being thus compoſed, if it end with a word or ſyllable, and fill the meaſure, there needs no farther care; otherwiſe more ſpaces are to be put between the ſeveral words to juſtify the lines, i. e. to make the meaſure quite full, ſo that every line may end even; and thus he proceeds to another line.

The ſpaces here uſed are a ſort of blanks, of the like dimenſions as the letters, but leſs high: and white faces, therefore, when ſet, do not appear, nor give any impreſſion. They are of ſeveral kinds, according to the dimenſions of the whites or intervals to be made by them, viz. quadrats, to fill up a break at the end of a paragraph, or the like; m quadrats, which are ſquare, and of the thickneſs of an m, ſerving to make the diſtance after a period, or between ſentence and ſentence; n quadrats, of the thickneſs of an n, to be placed after colons, ſemicolons, and commas: and thick or thin ſpaces, to be uſed between the words in juſtifying, as above.

For marginal notes, in the ſpaces reſerved for them, between the two ſliding-pieces of the compoſing-ſtick, are put little quadrated pieces of metal, called *guards*; which are juſtified by other ſmaller pieces; a ſlip of ſcaleboard being placed from the top of the page to the bottom, to keep the note and text at due diſtance.

The firſt line being thus completely juſtified, the compoſitor advances to the next; in order to which, he moves the braſs rule from behind the former, and places it before it, and thus compoſes another line againſt it, after the ſame manner as the former: and thus he goes on till

his ſtick be full, which he empties into the galley, after the manner following:

Taking the rule from behind the laſt line, he places it before it; and with his two middle fingers ſqueezes the lines in the ſtick cloſe; his two fore-fingers at the ſame time being applied on the outſide of the rule: thus he lifts them out of the ſtick, and clapping his two thumbs behind the firſt line, lifts them into the galley; taking care to diſengage his two thumbs without breaking the lines.

The compoſitor having thus ſet the proper number of lines in the ſtick, viz. four, five, ſix, or more, and emptied them out into the galley, he again fills, and empties, as before, till a complete page be formed; remembering at the bottom of every page to ſet a line of quadrats, and at the end thereof the firſt word of the page enſuing, for a catch-word; and, if it be the firſt page of the theet, one of the letters for a ſignature.

The GALLEY is a flat wooden inſtrument, in form of a long ſquare; of a length and breadth proportionable to that of the page; it conſiſts of two parts, the upper, called the *ſlice*, whereby the pages of large volumes, when compoſed, are ſlidden upon the ſtone; the other, called the *coffin*, which is the body of the galley, is ledged on three ſides, to contain the ſlice; the inner ledge not to exceed half an inch in height, that the compoſed page riſing above it by one half the height of the letter, may be tied up, or bound down, and removed without danger.

This galley is placed at the top of the caſe, and prevented by a wooden pin from ſliding down the boxes.

The page, then, being compoſed, and ranged in the galley, he ties it up therein with a cord or packthread, and ſets it by, and proceeds to the next, till the number of pages of the ſheet be completed; which done, he carries them to the impoſing or correcting ſtone, there to range them in order, in a chaſe; which they call *impoſing*.

The chaſe is a rectangular iron frame of different dimenſions, according to the ſize of the paper to be printed on, having two croſs pieces of the ſame metal, called a *long* and *ſhort croſs*, mortiſed at each end, into the frame, ſo as to be taken out occaſionally.

By the different ſituations of theſe croſſes, the chaſe is fitted for different volumes, for quartos and octavos; one traverſes the middle lengthwiſe, the other broadwiſe, ſo as to interſect in the centre, which is the moſt cuſtomary ſituation; for twelves and twenty-fours, the ſhort croſs is ſhifted nearer to one end of the chaſe. For folios, the long croſs is left entirely out, and the ſhort one placed in the middle; and for broad-ſides, or ſheets printed on one ſide only, both croſſes are ſet aſide.

To dreſs the chaſe, or range and fix the pages therein, they make uſe of a ſet of furniture, conſiſting of regiets, or ſlips of wood of different dimenſions, and about half an inch high, that they may be lower than the letters; ſome of theſe are placed at the top of the pages, called *head-ſticks*; others between them, to form the inner margin, called *gutter-ſticks*; others at the ſides, called *ſide-ſticks*; and others at the bottom, called *foot-ſticks*.

The pages, then, being placed in order on the ſtone, the chaſe is put over them, and the regiets applied between the letter and the chaſe, in the poſition above mentioned; the whole is locked up by means of ſmall pieces of wood, cut in the wedge-form, called *quoins*, which are driven with a mallet and ſhooting-ſtick to a ſufficient tightneſs.

Before the form be quite locked up, they preſs down the ſame, by paſſing a ſmooth piece of wood, called the *plainer*, over the letters, to make their ſurfaces ſtand flat and even; and, when locked up, they ſhake it, to ſee that nothing ſtir.

In this condition, the work is called a FORM, containing more or fewer pages, according to the volume.

As there are two forms required for every ſheet, when both ſides are to be printed, it is neceſſary they be exactly of the ſame length and breadth; i. e. the correſponding regiets, head-ſticks, &c. are to be equal in both forms, that the pages may fall exactly on the back one of another; which is called *regiſter*.

Here, then, properly ends the compoſitor's office; the form, thus finiſhed, being to be committed to the preſſman.

Indeed, as it is impoſſible but there muſt be miſtakes in the work, either through the overſight of the compoſitor, or by the caſual tranſpoſition of the letters in the caſes. After drawing off a proof, it is delivered to the corrector; who reading it over, and rectifying it by the copy, it is remanded to the former operator, to be corrected accordingly. For the characters uſed in correcting a ſheet for the compoſitor, ſee CORRECTION.

The compoſitor, then, unlocking the form upon the correcting-ſtone, by knocking out or looſening the quoins, and ſpreading his corrected proof ſo as that the lines thereof range with the reſpective ones of the metal, by turning his eye along both, he eaſily ſpies where corrections are to be made; according to which, he proceeds to pick out the faulty letters, points, &c. with a ſharp-pointed ſteel bodkin, and puts others in their places.

Where the alterations are conſiderable, and particularly where inſertions or omiſſions are to be made, there uſually ariſes a neceſſity of over-running; in order to which, they muſt decompoſe, or return the lines back from the chaſe into the galley, and from the galley again into the compoſing-ſtick, to be new-modelled and rectified accordingly.

If, e. gr. one or more words, to be inſerted in a line, cannot be gotten in by changing the ſpaces of the line for leſſer ones, part of the line muſt be put back into the cloſe of the preceding one, or forward into the beginning of the ſubſequent one, or both; till room is obtained. If the inſertion be large, ſeveral lines will need to be over-run, either backward or forward, till a break is arrived at; when, if it be not gotten in, a line is to be driven out; and, to get in that line, the next pages, either backward or forward, muſt ſometimes be over-run before it can come in.

When an omiſſion is to be made, the contrary courſe muſt be taken. If it be but little, the compoſitor takes it out, and drives out the remaining matter, either by enlarging his ſpaces, or beſtowing the beginning of the following, or the cloſe of the preceding line therein. If it be conſiderable, he may be obliged to over-run ſeveral pages before it can be driven out.

Preſſman's office, or PRINTING *properly ſo called.* To work off the form thus prepared and corrected by the compoſitor, there are three things required, paper, ink, and a preſs.

To fit the paper for uſe, it is to be firſt wetted or moiſtened, by dipping ſeveral ſheets together in water; theſe are afterwards laid in a heap over each other; and, to make them take the water equally, they are all preſſed cloſe down with a weight at top. As to the degree of wetting, it muſt be according to the quality of the paper, and the ſize of the letter; ſmall letters, and fine paper, requiring moſt wetting.

A PRINTING-HOUSE is a place deſigned *for printing*, and fitted up for that purpoſe with preſſes, caſes, and other furniture.

The moſt conſiderable *printing-houſes* in the world are thoſe of the Louvre and Vatican. The firſt, begun under Francis I. was carried to its utmoſt perfection under Louis XIII. by the care of cardinal Richelieu; and removed into the galleries of the Louvre by Louis XIV.

The Vatican *printing-houſe*, called alſo the *apoſtolical printing-houſe*, becauſe the pope's bulls, decrees, &c. are printed therein, was begun by Pius IV. and furniſhed with great magnificence by Sixtus V. See VATICAN.

Out of both theſe *printing-houſes* have come forth very beautiful and ſplendid editions of the ancient authors. The Vatican was the firſt that printed books in the Arabic language.

The PRINTING *ink* is of two kinds, black, and red; the laſt occaſionally uſed in title-pages, calendars, &c. the firſt for the body of books. The compoſition of each, though now reckoned no part of the printer's buſineſs, but uſually furniſhed them by other hands, is as follows:

For black ink. A hundred pounds of nut or linſeed oil, being reduced, by boiling, to the conſiſtence of a ſyrup, is cleanſed and purified by throwing into it two pounds of coarſe bread, and about a dozen onions. Nut-oil is ſuppoſed to be the beſt, and is accordingly preferred for the black ink, though the darker colour which it acquires from the fire makes it leſs fit for the red. This oil is boiled in an iron pot, capable of holding at leaſt half as much more, becauſe it very much ſwells; when it boils, it is kept ſtirring with an iron ladle; and if it does not itſelf take flame, it is kindled with a piece of lighted paper, of burning wood, in order to increaſe its conſiſtence and tenacity, and to diminiſh its greatneſs. The oil is ſuffered to burn for half an hour or more; and the flame being then extinguiſhed by covering the veſſel cloſe, the boiling is afterwards continued, with a gentle heat, till the oil appears of a proper conſiſtence; to which ſtate it is called varniſh; of which there ſhould be two kinds, one more and another leſs boiled, or a thicker and thinner, to be uſed for different purpoſes, and in different weathers. The oil is ſaid to loſe in being boiled into thick varniſh from a tenth to an eighth part of its weight; but different oils, and perhaps the ſame oil in different ſtates, differ in this reſpect. The deſign of adding the bread and onions is more effectually to deſtroy the greaſineſs; but Dr. Lewis doubts, whether addititons of this kind are of much uſe. They then boil thirty or thirty-five pounds of turpentine apart, till ſuch time as they find, upon its cooling on paper, that it breaks clear, like

glass, without pulverizing; for if it pulverize easily, it is a sign it is burnt. The oil and turpentine being thus prepared, the first is gently poured, half cold, into the latter; and the two stirred together with a stick till they be well mixed; after which, the boiling is repeated, and the composition is set by, to be used occasionally. The turpentine is used in order to give a greater body to the varnish, and to increase its drying quality; and with some artists, litharge has in this intention been a secret. M. le Breton, in the Encyclopedia, observes, that when very old oil is used, neither turpentine nor litharge are needful; but that, when the oil is new, some turpentine ought to be employed, because without it, the smearing of the paper, by the spreading or coming off of the ink, cannot be avoided; and he adds, that it is much more eligible to use old oil than to have recourse to this correction of the new; both turpentine and litharge, particularly the last, making the mixture adhere so firmly to the types, that it is scarce to be got entirely off by the ley, whence the eye of the letter is soon clogged up.

Now, to proceed to make ink, they take a quantity of this mixture, and add to it a certain quantity of lamp-black, working it up with a kind of wooden mallet, or brayer, till the whole be incorporated, and reduced into a kind of pulp; which is the ink for use.

Where, note, that its thickness or strength is always to be proportioned to that of the paper, and the warmth of the weather; strong paper, and hot weather, requiring strong ink; and that the strength or weakness of the ink depends on the greater or less degree of coction of the varnish. According to M. le Breton, two ounces and a half of the lamp-black are sufficient for fifteen ounces of the varnish. Lewis's Commerce of Arts, p. 371.

For red ink. They use the same materials as for black, excepting only, that, instead of lamp-black, they add a proper quantity of vermilion. Some hold, that, by mixing and incorporating the bignets of a nut of fish-glue, or brandy, or the white of an egg, with the ink, the vermilion acquires a greater lustre.

The ink is applied upon the forms by balls, which are a kind of wooden cups with handles, the cavities whereof are filled with wool, or hair, covered with sheep's skin nailed to the wood. One of these the pressman takes in each hand, and applying them on the ink-block, to charge them with ink, he works them one against the other, to mix and distribute the ink equally; and, at last, smears over the form, by beating or daubing them several times over the whole face thereof: this leaves the form in a condition to be passed under the press, with the moistened paper laid thereon.

The PRINTING-*press* (represented *Tab.* III. *Miscel. fig.* 32.) is a very complex machine: its two principal parts, each whereof consists of several others, are the *body* of the press, which serves to give the pinch or stroke for the impression; and the *carriage*, on which the form is laid to undergo the same.

The body consists of two strong cheeks *b b*, placed perpendicularly, and joined together by four cross pieces or planks. See CHEEK.

The first plank *c c*, called the *cap* of the press, is fixed, and serves to keep the two cheeks together at the due distance at top; the second *d d*, called the *head*, is moveable, being sustained by two iron pins, or *long bolts*, that pass the cap; in this plank is fixed a female screw or *nut*, with a *brass nut*, sustained by two *short bolts*, which keep it up; the third plank *e e*, called the *shelves*, serves to keep steady a part called the *hose*, in which the *spindle* (to be spoken of hereafter) is inclosed; the fourth plank *f f*, called the *winter*, is moveable; it bears the carriage, and sustains the effort of the press beneath, as the head does above; each giving way a little, the one upwards, the other downwards, to make the pull the easier.

The spindle *g g* is an upright piece of iron, pointed with steel, of different dimensions, having a male screw, which goes into the female of the head about four inches. Through the eye *b* of this spindle is rivetted the *bar*, by which the pressman works the press.

The lower part of the spindle passes through the shelves, being inclosed in a square wooden frame *i*, called the *hose*; and its point works into the plug, fixed in a brass pan, supplied with oil; which pan is fixed to an iron plate let into the top of the platten. The pressman, then, by pulling or turning the bar, fixed in the eye by an iron key, presses upon a square, smooth piece of wood, called the *platten*, and enables it to compress the form covered with the paper, tympan, and its blankets, which, in order hereto, are brought under the platten.

At each corner of the hose, there is an iron-hook fastened to those at each corner of the platten, with cords or packthread, very exactly.

The *carriage llll*, which makes the second principal member of the press, is placed a foot below the platten, having its fore-part supported by a wooden prop *m*, called the *fore-stay*, while the other rests on the winter. On this carriage, which sustains the plank, are nailed two long iron bars, or *ribs*, *n n*; and on the plank are nailed short pieces of iron or steel *o o*, called *cramp-irons*, equally tempered with the ribs, and which slide upon them when the press is turned in or out.

Under the carriage is fixed a small piece of iron, called the *spit*, with a double wheel in the middle, round which leather *girts* are fastened, nailed to each end of the plank. To the outside of the spit is fixed a handle, or *rounce*, by which the pressman turns the plank in or out at pleasure.

Upon the plank is a square wooden frame or *coffin p p*, wherein is inclosed a marble, or polished stone, for the form to be laid on. To this coffin are fastened leather stay-girts, one to each side; which, being again fastened to the cheeks of the press, prevent the plank from running too far out, when drawn from under the platten. On the fore-part of the plank is a gallows *r r*, which serves to sustain the tympans, when taken from off the form.

On the front of the coffin are three frames much alike, though serving for different purposes; viz. the two tympans and frisket; the tympans *s s* are square, made of three slips of very thin wood, and at the top a slip of iron, still thinner, called a *head-band*, that called the *outward tympan* is fastened with iron joints to the coffin. They are both covered with parchment; and between the two are placed blankets, which serve to make the impression of the platten upon the surface of the letters more equable, an also to prevent the letters from being broken by the force of the press. The frisket *t t* is all of iron, very thin, fastened at top to the great or outward tympan, and sustained by a slip of wood hanging from the cieling, when opened to take out the printed sheets, and put in others. It is also covered with parchment or paper, cut in the necessary places, that the sheet, which is between the great tympan and frisket, may receive the ink, and that nothing may hurt the margins. On the parchment of the great or outward tympan it is, that the blank sheet is laid to be printed.

To regulate the margins, and make the lines and pages answer each other when printed on the other side, in the middle of the wood, in the sides of this tympan, are two iron points, which make two holes in the sheet, to be placed on the same pins, when the sheet is returned for an impression on the other side, which is called the *retiration*.

Every thing now about the tympans being prepared for *printing*, and the pressman having inked or beat his form, now placed on the stone, he brings the tympans and frisket down from the gallows upon the form; and, advancing the plank under the platten, by means of the spit-handle, or rounce, gives two strokes or pulls with the bar; and, with the same handle turned the contrary way, brings back the plank, to take out the printed sheet, and put in a fresh one; and this he repeats, till he has taken off the full number of sheets the edition is to consist of.

One side of the sheet being thus printed, it is remanded to the press for the other; and is so disposed, as that the iron points pass through the holes already made in the sheet.

Sometimes it is required to cut the frisket afresh, where the second side is to be more or less full of *printing* than the first, as is frequently the case at the beginning and ending of books, &c.

The number of sheets of the edition being complete, and the form to be separated, to restore the letters into the cases, they first wash it in a strong ley, to take out the remains of the ink, scouring it with a brush, and then with fair water. This done, it is carried to a wooden frame to be unlocked, and the furniture, i. e. the sticks, &c. taken off, to disengage it from the chase. Then the compositor, taking out several lines at once upon a little wooden ruler, replaces each letter in its proper box, to be again used in the remainder of the impression; which last operation they call *distribution*.

Besides the several kinds of letters and characters above mentioned, used in *printing*, they have likewise rules for black lines, borders, and head and tail-pieces, accommodated to the several kinds of letters.

The *rules* for black lines are of brass, and are made exactly of the height of the letter; otherwise they will hinder the neighbouring letters from *printing*, or will themselves be hindered by them. These the compositor occasionally cuts into proper lengths, as his work requires.

The *borders*, or *flowers*, are a kind of ornaments, in form of long bars, serving for the divisions of books, chapters, &c. Their depth is proportioned to the letter; and their length adjusted to the page; for, being composed of several

veral moveable pieces, it is eaſy to lengthen or ſhorten them.

The *head* and *tail pieces*, cut either in wood, pewter, braſs, copper, or ſilver, are compartiments uſed at the beginnings and endings of books.

The initial letters are ſometimes cut in wood, and figured; ſometimes caſt like the other characters.

For the conveniency of the binding, the *printers* had early recourſe to ſignatures, i. e. letters of the alphabet placed at the bottom of the firſt page of each ſheet, which ſhew the order they are to be bound in, as well as whether the quires be complete; which method is ſtill continued.

The *catch-words* ſerve nearly the ſame purpoſe: theſe are the firſt words of each page, which are inſerted at the bottom of the preceding pages. The number of the pages are equally ſerviceable to the reader and the binder, to guide to references, and to warrant the book duly bound and collated: ſome *printers* formerly put them at the bottoms of the pages; but cuſtom has now carried it for the tops.

In the infancy of *printing*, they had likewiſe a regiſtrum chartarum for the convenience of the binders: to draw this, at the end of each volume, they collected the ſignatures, and the firſt words of the firſt four ſheets of each alphabet. To abridge it, they afterwards contented themſelves to expreſs the ſignatures, and how often each letter was repeated; but the regiſtrum has been now long diſuſed.

As to the faults which eſcape the corrector and compoſitor, they are uſually noted in what we call the *errata*. The ancient editions had no errata; but in lieu thereof, they corrected the faults in each printed copy with a pen, which was eaſy enough in thoſe days, though impracticable now. In effect, we have anciently had *printers*, who did not need an errata of above five articles in a volume of five hundred ſheets; and the diſtinguiſhing excellence of *printing* is correctneſs; and in this reſpect many of our modern *printers* deſerve much commendation.

PRINTING, *Chineſe*. There are three opinions as to the antiquity of the Chineſe *printing*; one fixing it three hundred years before Chriſt; another nine hundred years after him; and a third carrying it ſtill farther back, and making it coeval with that mighty empire; though, it muſt be allowed, the laſt is much the leaſt probable of the three.

The manner of *printing* we have already hinted to be very different from that which now obtains among the Europeans: it is true, it has ſome advantage over our's in correctneſs, and the beauty of the character; but, in other reſpects, it comes far ſhort, the ſingle advantage of moveable characters making more than amends for all that is urged againſt us by ſome zealous advocates for this oriental *printing*.

Books are printed in China from wooden planks, or blocks, cut like thoſe uſed in *printing* of callico, paper, cards, &c. among us.

Theſe blocks are made of a ſmooth, firm, cloſe wood, and of the ſize of the leaf required. On the face-ſide they glue a paper, upon which ſome able peuman draws out the ſeveral letters and characters with a Chineſe pen, which is a kind of pencil. This is the principal part of the work, and that whereon the ſucceſs of the reſt depends.

When finiſhed, the block is put into the hands of a ſculptor, or cutter in wood; who, following the ſeveral ſtrokes of the writer with his graver, and other ſharp little inſtruments, makes them all appear in relievo on the wood. When the carving or cutting is finiſhed, they moiſten what remains of the paper, and rub it gently off.

The ink they uſe in *printing* is the ſame with the common Chineſe ink, wherewith they alſo write, and is made of lamp-black, mixed up with other ingredients.

Their preſs reſembles our rolling-preſs much more than the letter-preſs.

As to their paper, it is inferior to ours; it is made of the inner bark or rind of a kind of ruſhes, beat up with water into a pulp or paſte, and formed in moulds, much like our's.

The advantages of the Chineſe *printing* conſiſt in this, that they are not obliged to take off the whole edition at once, but print their books as they need them; that the blocks are eaſily retouched, and made to ſerve afreſh, and that there needs no corrector of the preſs.

Its diſadvantages are, that a large room will ſcarce hold all the blocks of a moderate volume; that the colour of the ink eaſily fades; and that the paper is apt to tear, and is ſubject to worms; whence it is, that ſo few ancient books are ſeen in China.

PRINTING, *rolling-preſs*, is employed in taking off prints or impreſſions from copper-plates engraven or etched.

It differs, as we have before obſerved, from *letter-printing*, in that the marks and characters, whoſe impreſſions are to be taken, in the former caſe, are indented, or cut inwards; and in the latter are in relievo, or ſtand out.

This art is ſaid to be as ancient as the year 1460, and to owe its origin to Finiguerra, a Florentine goldſmith; who, caſting a piece of engraven plate in melted brimſtone, found the exact print of the engraving left in the cold brimſtone, marked with black licked out of the ſtrokes by the liquid ſulphur.

Upon this, he attempted to do the ſame on ſilver-plates with wet paper, by rolling it ſmoothly with a roller; and this ſucceeded.

This novelty tempted Baccio Baldini, a goldſmith of the ſame city, to attempt the ſame; which he did with ſucceſs, engraving ſeveral plates of Sandro Botticello's deſign, and *printing* them off in this new way; in which he was followed by Andrew Mantegna, then at Rome.

This knowledge getting into Flanders, Martin of Antwerp, a famous painter, graved abundance of plates of his own invention, and ſent ſeveral prints into Italy, marked thus, M. C. After him, Albert Durer appeared, and gave the world a vaſt number of prints both in wood and copper. About this time, one Hugo de Carpi, an Italian painter, found out a way, by means of ſeveral pieces of wood, to make prints reſemble deſigns of chiaro ſcuro (ſee CUTTING *in wood*); a method revived in our country ſome years ago with much ſucceſs by Kirkall, and ſince at Venice by Jackſon, though very imperfectly; and ſome years after, the invention of etching was diſcovered, which was ſoon after made uſe of by Parmeggiano.

Mr. Walpole obſerves, that it was not till Raphael had formed Marc Antonio, that engraving placed itſelf with dignity by the ſide of painting. See ENGRAVING and ETCHING.

When the art reached England does not certainly appear. Mr. Chambers, on the authority of Mr. Bagford (ſee Phil. Tranſ. N° 310, p. 2397, or Abr. vol. v. part ii. p. 20.) erroneouſly ſaid, that it was firſt brought from Antwerp by Speed, in the reign of James I. whereas we had it in ſome degree almoſt as ſoon as printing: the printers themſelves uſing ſmall plates for their devices and rebuſes. Caxton's Golden Legend, printed in 1483, has in the beginning a group of ſaints, and many other cuts diſpoſed through the body of the work. The ſecond edition of his Game at Cheſs, and Le Morte de Arthur, had alſo cuts. Wynkyn de Worde, Caxton's ſucceſſor, prefixed to his title of the Statutes, in the ſeventh year of Henry VII. or 1491, a plate with the king's arms, creſts, &c. a copy of which is given in the Life of Wynkyn, by Mr. Ames, in his Typographical Antiquities, p. 79. The ſame printer exhibited ſeveral books adorned with cuts, ſome of which are particularly deſcribed by his biographer, p. 87, 88, 89, &c.

The ſubſequent printers continued to ornament their books with wooden cuts. One conſiderable work, publiſhed by John Raſtell, called the Paſtyme of the People, and Raſtell's Chronicle, was diſtinguiſhed by prints of ſuch uncommon merit for that age, as to have been aſcribed to Holbein. Grafton's Chronicle, printed in 1569, contained many heads, as of William the Conqueror, Henry VIII. queen Elizabeth, &c. and many more are recorded by Ames. But though portraits were uſed in books, Mr. Walpole obſerves, that he can find no trace of ſingle prints being wrought off in that age. Thoſe which compoſed part of the collection of Henry VIII. were probably the productions of foreign artiſts. The firſt book that appeared with cuts from copper-plates, or at leaſt the firſt that Mr. Ames had obſerved, was the Birth of Mankind, otherwiſe called the Woman's Book, dedicated to queen Catharine, and publiſhed by Thomas Raynalde in 1540, with many ſmall copper cuts, without any name. See Ames, ubi ſupra, p. 35, 44, 60, and 219. Walpole's Catalogue of Engravers, &c. 4to.

The fabric of the rolling-preſs, and the compoſition of the ink uſed therein, with the manner of applying both in the taking off prints, are as follow:

Structure of the rolling-preſs. This machine, like the common preſs, may be divided into two parts; the *body* and *carriage*, analogous to thoſe in the other.

The body conſiſts of two cheeks of different dimenſions, ordinarily about four feet and a half high, a foot thick, and two and a half apart, joined at top and bottom by croſs pieces. The cheeks are placed perpendicularly on a wooden ſtand or foot, horizontally placed, and ſuſtaining the whole preſs.

From the foot likewiſe riſe four other perpendicular pieces, joined by other croſs or horizontal ones; which may be conſidered as the carriage of the preſs, as ſerving to ſuſtain a ſmooth, even plank, which is about four feet and a half long, two feet and a half broad, and an inch and a half thick; upon which the engraven plate is to be placed.

Into the cheeks go two wooden cylinders or rollers, about ſix

six inches in diameter, borne up at each end by the cheeks, whose ends, which are leſſened to about two inches diameter, and called *trunnions*, turn in the cheeks between two pieces of wood, in form of half-moons, lined with poliſhed iron, to facilitate the motion.

The ſpace in the half moons, left vacant by the trunnion, is filled with paper, paſteboard, &c. that they may be raiſed and lowered at diſcretion; ſo as only to leave the ſpace between them neceſſary for the paſſage of the plank charged with the plate, paper, and blankets.

Laſtly, to one of the trunnions of the upper roller is faſtened a croſs, conſiſting of two levers, or pieces of wood, traverſing each other. The arms of this croſs ſerve in lieu of the handle of the common preſs; giving a motion to the upper roller, and that to the under one; by which means the plank is protruded, or paſſed between them.

Preparation of the ink. The ink, uſed in rolling-preſs *printing*, is a compoſition of black and oil mixed and boiled together in a due proportion.

The black is a factitious matter, made, as ſome ſuppoſe, of the coal of vine twigs, or, according to others, of the kernels of fruits, ſuch as peaches and apricots, well burnt, with wine lees.

This black is uſually brought hither ready prepared from Francfort on the Maine; whence our printers call it *Frankfort* BLACK.

This is ſofter and more free from grittineſs than the ivory, or other charcoal blacks, as they are uſually prepared among us.

The oil wherewith they dilute this black is nut-oil; which is ſet on fire, boiled up differently, according to the different works it is to be uſed in; but never ſo far as to communicate to the oil the adhetive gluey quality of the printer's varniſh.

They uſually make three kinds, *thin*, *thick*, and *ſtrong*; only differing in the degree of coction: the ſtrong is that uſed in the fineſt works, &c.

To make the ink, they pulverize the black very carefully, and paſs it through a fine ſieve; then mix it up on a marble with the proper oil, by means of a mullet, after the ſame manner as the painters do their colours.

Method of PRINTING *from copper-plates.* The ink being prepared, they take a little quantity of it on a rubber, made of linen-rags, ſtrongly bound about each other; and therewith ſmear the whole face of the plate, as it lies on a grate, over a charcoal-fire.

The plate ſufficiently inked, they firſt wipe it coarſely over with a ſoul rag, then with the palm of the left-hand, then with that of the right; and, to dry the hand, and forward the wiping, rub it from time to time on whiting.

In wiping the plate perfectly clean, yet without taking the ink out of the engraving, conſiſts a great part of the addreſs of the workman. The French printers uſe no whiting, as being detrimental to the colour of the ink; nor do they lay the plate on the grate to warm, till after inking and wiping it.

The plate, thus prepared, is laid on a thick paper, fitted upon the plank of the preſs; over the plate is laid the paper, firſt moiſtened, to receive the impreſſion; and over the paper two or three folds of blanketting, or other ſtuff.

Thus diſpoſed, the arms of the croſs are pulled, and, by that means, the plate, with its furniture, paſſed through between the rollers; which, pinching very ſtrongly, yet equably, preſſes the moiſtened paper into the ſtrokes of the engraving, whence it licks out the ink.

Some works require being paſſed twice through the preſs, others only once, according as the graving is more or leſs deep, or the greater or leſs degree of blackneſs the print is deſired to have.

It muſt be obſerved, that the ſtronger and thicker the ink is, the ſtronger muſt the rollers pinch the plate: this tempts many of the workmen to uſe a thinner oil, in order to ſave labour; which proves very prejudicial to the impreſſion.

The wetting of the paper ought to be done two or three days before *printing* it, to render it more ſupple and mellow: as the prints are drawn off, they are hung up to dry on lines, &c.

Laſtly, after the number of prints deſired have been wrought off from the plate, they rub it over with oil of olives, to prevent its ruſting, and ſet it by againſt a new impreſſion. If the ſtrokes of the graving be perceived full of ink hardened therein in the courſe of the *printing*, they boil it well in a ley before the oil be applied.

PRINTING *with wooden prints.* See CUTTING *in wood.*

PRINTING *in chiaro obſcuro*, is a method of producing a ſtrong effect of relief, attended with a juſt and natural gradation of the lights and ſhades, grounded with brown, with white and black, by *printing* on paper. We have already obſerved, that the art of doing this in wood was diſcovered in Italy by Hugo de Carpi. M. le Boſſe directs it to be performed in the following manner. Having provided two copper-plates of equal ſize, and exactly fitted to each other, on one of them let the propoſed deſign be engraved, and let the prints be taken off from it with *printing* ink on ſheets of grey paper. The other plate muſt then be varniſhed, and the varniſhed ſide being laid upon the ſheet printed by the firſt plate, they muſt be paſſed under the roller; when the print will have made a counter-proof on the varniſh of the plate; after which the lights muſt be graved on the plate, and corroded very deeply by aqua fortis. The ſame thing may otherwiſe be done with the graver, and with greater eaſe by thoſe who can uſe it well. In order to properly prepare the oil, the beſt method is to uſe very white nut-oil drawn without fire, and to put it into two leaden veſſels, and let in the ſun till it becomes thick in the proportion of the weak oil. Flake white muſt then be taken, which muſt be ground, and waſhed over, till it be extremely fine; and then being dry, it muſt be ground with the weak oil, and the thick oil added to it. Then having taken an impreſſion with black *printing* ink, or any other colour, from the firſt plate, that is entirely engraved, on coarſe grey paper, it muſt be left to dry for ten or twelve days; when thoſe prints having been wet, another impreſſion muſt be made upon them by the plate, on which the lights are engraven, charged with the white ſlake and oil in the uſual manner of *printing*; taking care that the correſpondent parts of the plate, and the impreſſion already made, may be adapted exactly. By this means the *printing* in chiaro obſcuro is perfectly performed. See CLAIR *obſcure.*

PRINTING *with a variety of colours to imitate painting.* See MEZZOTINTO.

PRIOR, *before*, ſomething that is nearer the beginning, than another with which it is compared.

PRIOR is particularly uſed for a ſuperior of a convent of monks, or the ſecond perſon after the abbot.

Priors are either *clauſtral* or *conventual.*

PRIORS, *conventual*, are the ſame as abbots, all the difference between them being in name; both having the ſame rights, and both alike being governors of monaſteries.

Conventual priors are of two kinds; *viz. regular conventual priors*, who govern religious living in the community; and *ſecular* or *commendatory conventual priors.*

Conventual *priors* are obliged to take up the prieſthood within a year, or at moſt two, from the date of their proviſion; in default whereof, their benefices are declared vacant.

Priors muſt be twenty-five years old before they can govern the convent; and twenty, if the convent be governed by another. See CONVENTUAL.

PRIOR, *clauſtral*, is he who governs the religious of an abbey, or *priory*, in *commendam*; ſo called, becauſe he has ſuperiority in the cloiſter or monaſtery.

His juriſdiction is wholly from the abbot, and ends with the abbot's death, unleſs he has been elected by the whole convent.

PRIOR, *grand*, is the ſuperior of a large abbey, where ſeveral ſuperiors are requiſite; as in the abbeys of Cluney and Feſchamp.

In the monaſtery of St. Denys, there were anciently five *priors*; the firſt whereof was called the *grand-prior.* In moſt monaſteries, there is alſo a *ſub-prior.* There are alſo *grand-priors* in the military orders; as in that of Malta, or St. John of Jeruſalem, &c.

PRIORS *alien* were certain religious, born in France and Normandy, ſuperiors of religious houſes erected for their country-folks here in England.

Theſe Henry V. deeming no good members for this land, ſuppreſſed; and their livings were afterwards given by Henry VI. to other monaſteries and houſes of learning; but chiefly, as Stow obſerves, to the erecting of thoſe two famous colleges, called the *King's colleges of Cambridge* and *Eton.*

PRIOR, *arch.* See ARCH-*prior.*

PRIORITES, in *Botany*, a name given by the ancient Greeks to a plant which they recommended in medicine; but they do not clearly explain what it was. It is the ſame with the ceſtrum and piuchtrotrophon of the ſame writers; and they ſay it was called *betonica*, *ſerratula*, or *roſmarinus*, by the Romans.

It is evident, from a ſtrict enquiry into their accounts, that the ſerratula was the plant they meant; for Pliny ſays, that the betonica was only a Gauliſh name for this plant, and the place of growth, which is deſcribed to be wet ſhady places, evidently excludes what we call *roſemary* from any title to the name.

Apuleius has greatly perplexed the cauſe by ſaying, that the *priorites*, or betony, has leaves like the docks; but he does not diſtinguiſh between the betonica and britannica, which laſt plant is the hydrolapathum, or great water-

Water-dock, and has leaves like the other docks; and it is plain, that both Apulcius and Pliny borrow the account of the dock-like leaves from this paſſage, and attribute them to a plant the original author never meant them for.

PRIORITY, *prioritas*, the relation of ſomething, conſidered as it is *before, or prior* to, another; i. e. as it is nearer to the beginning, or the firſt.

The principal modes of *priority* are five; viz. in reſpect of *time*; as when we ſay, that the Grecian empire was *prior* to the Roman; *nature*, as when we ſay, one is *prior* to two; *order*, *dignity*, and *cauſality*, which are all ſummed up in the technical diſtich:

Tempore, natura, prius ordine, dicit & honore;
Effectu cauſam dicimus eſſe prius.

PRIORITY, in *Law*, denotes an antiquity of tenure, in compariſon of another leſs ancient.

PRIORITY, *to hold by*, is to hold of one lord more anciently than of another; in reſpect whereof the tenant is ſaid to *hold in poſterority*. The lord of the *priority* ſhall have the cuſtody of the body.

PRIORITY *of debts*, in *Law*. See DEBT.

PRIORY denotes a ſociety of religious, the ſuperior of which was denominated a PRIOR, or prioreſs; and of theſe there were two ſorts; as where the prior was chief governor, as fully as any abbot in his abbey, and was choſen by the conſent; ſuch were the *cathedral* PRIORS, and moſt of the Auſtin order, and where the *priory* was a cell, ſubordinate to ſome great abbey; and the prior was placed and diſplaced at the will of the abbot. There were alſo *priories* ALIEN.

PRISAGE, *priſagium*, that ſhare which belongs to the king, or admiral, out of ſuch merchandizes as are taken at ſea as lawful prize. See PRISE.

PRISAGE *of wines*, a cuſtom in certain ports, whereby the king challenges out of every veſſel laden with wine, containing twenty tons, or upwards, two tons of wine; the one before, the other behind the maſt, at his own price; which is twenty ſhillings per ton.

The cuſtom varies a little in various places: at Boſton, e. gr. every bark, laden with ten tons of wine, pays *ten ſagas*.

The term is now grown into diſuſe; and in lieu of *priſage*, the cuſtom, ſays Cowel, is popularly called BUTLERAGE; becauſe it is the king's chief butler that receives it.

PRISCILLIANISTS, *Priſcillianiſtæ*, ancient heretics, who aroſe in Spain, or rather were derived thither from Egypt, towards the end of the fourth century.

The origin of this hereſy is not well known; but it appears to have been brought into Spain by one Marcus of Memphis, who had for his diſciple the rhetor Helpidius, under whom *Priſcillian* was educated.

What their particular tenets were, is not eaſy to diſcover; but they are charged by their adverſaries with indulging all kinds of ſecret filthineſs, and nocturnal mixtures, under a religious notion. Among their dogmata, this is ſaid to have been one: *Jura, perjura, ſecretum prodere noli.*

It appears, however, from authentic records, that the difference between their doctrine, and that of the MANICHEANS, was not very conſiderable; for they denied the reality of Chriſt's birth and incarnation; maintained, that the viſible univerſe was not the production of the Supreme Deity, but of ſome demon or malignant principle; adopted the doctrine of æons, or emanations from the divine nature; conſidered human bodies as priſons formed by the author of all evil, to enſlave celeſtial minds; condemned marriage, and diſbelieved the reſurrection of the body. Their rule of life and manners was rigid and ſevere; and the accounts which many have given of their laſciviouſneſs and intemperance deſerve not the leaſt credit, as they are totally deſtitute of evidence and authority. That the *Priſcillianiſts* were guilty of diſſimulation upon ſome occaſions, and deceived their adverſaries by cunning ſtratagems, is true; but that they held it as a maxim, that lying and perjury were lawful, is a moſt notorious falſhood, without even the leaſt ſhadow of probability, however commonly this odious doctrine has been laid to their charge.

Priſcillian, their leader, was a man of great birth, fortune, parts, and learning: he was condemned, with ſome biſhops his adherents, in a council at Saragoſſa, in the year 380, and in another at Bourdeaux, in 384; but he appealed to the emperor Maximus, and had a hearing at Treves; where, being convicted of broaching noveltie, he was condemned to death, with ſeveral of his followers. His doctrine, however, ſurvived him, and was propagated through the greateſt part of Spain and Gaul. Moſheim's Eccl. Hiſt. vol. i. p. 384, *&c.* 8vo edit.

PRISE, or PRIZE, in *Navigation*, a veſſel taken at ſea from the enemies of the ſtate, or from pirates, by a man of war, or a merchant-veſſel having commiſſion from the admiral.

Veſſels are looked on as lawful *prize*, if they fight under any other ſtandard than that of the ſtate from which they have their commiſſion; if they have no charter-party, invoice, or bill of lading, aboard them; if they be loaden with effects belonging to the king's enemies, or with contraband goods.

Thoſe of the king's ſubjects, recovered from the enemy, after having remained twenty-four hours in their hands, are alſo deemed lawful *prize*.

Veſſels, that refuſe to ſtrike their ſails, after having been ſummoned thereto by the king's ſhips, may be conſtrained to do it; and, if they make reſiſtance, and fight, they are lawful *prize*.

The officers and ſeamen of the king's ſhips, and of other Britiſh ſhips having letters of marque, are intitled to the ſole intereſt, and property of all ſhips and goods by them taken, and adjudged lawful *prizes* by the court of admiralty.

The *prize* is to be divided among the officers and ſeamen of the king's ſhips, as he ſhall appoint by proclamation.

Among privateers, the diviſion is according to the agreement between the owners.

The court of admiralty is to finiſh the examination of the perſons to be examined to prove the lawfulneſs of the *prize*, in five days after requeſt for that purpoſe made.

The monition is to be executed in three days. And in caſe no claim of the capture be duly entered, giving twenty days notice after the execution of the monition; or if there be a claim, and the claimant does not give ſufficient ſecurity to pay double coſts to the captors, if the *prize* be adjudged lawful, then the court is to proceed to ſentence in ten days.

In caſe of doubt, or of witneſſes being remote, the court may releaſe the *prize*, on the claimant's giving good ſecurity to the captors for the payment of the full appraiſed value, in caſe the *prize* be adjudged lawful.

Judges and officers, on failure of their duty, in reſpect to the condemnation of *prizes*, forfeit 500*l.* with full coſts of ſuit; one moiety to the king, and the other to the informer.

The judges and officers of the court of admiralty in the king's plantations or dominions abroad, ſhall not receive above 10*l.* in caſe the *prize* be under a hundred tons burthen; nor above 15*l.* if it be of greater burthen.

Commiſſioners of appeals in cauſes of *prize* are to be appointed under the great ſeal; and appeals may be made to them within fourteen days after ſentence.

Agents for *prizes* are to be choſen by the captors.

The treaſurer of the navy is to pay to the officers and ſeamen on board ſhips of war, or privateers, in any action where any ſhip of war, or privateer, ſhall have been taken from the enemy or deſtroyed, 5*l.* for every man on board ſuch *prize* or ſhip deſtroyed, at the beginning of the engagement.

The captures of fleta ſhips, or galleons, or regiſter ſhips bound from Buenos Ayres, or Honduras, can be tried only in the high court of admiralty.

The ſtatute enacts ſeveral penalties and forfeitures for taking *prizes* by colluſion. Privateers forfeit the *prize*, half to the king, and half to the informer; and the commander of a man of war forfeits 100*l.* to be divided between the king and the informer.

Alſo, if any ſhips belonging to the Engliſh be taken by the enemy, and afterwards retaken by any of our men of war, or privateers, they are to be reſtored to the owners, on paying an eighth part of the value, in lieu of ſalvage, after having been in the enemy's poſſeſſion twenty-four hours; and if above that time, paying a farther moiety, &c. 13 Geo. II. cap. 4. 30 Geo. II. cap. 18.

The regulations with regard to *prizes* in the royal navy, are as follow: 1. When any ſhip or veſſel is taken from the enemy, the hatches are to be immediately ſpiked up, and her lading and furniture ſecured from embezzlement, till ſentence is paſſed upon her in ſome court of admiralty, empowered to take cognizance of cauſes of that nature. 2. The captain is to cauſe the officers of the *prize* to be examined; three or more of the company, who can give beſt evidence, to be brought to the ſaid court of admiralty, together with the charter-parties, bills of lading, and other ſhip's papers, found on board. The 3d and 4th articles relate to finding any of the king's ſubjects in the *prize*. 5. When a privateer is taken, great care is to be had to ſecure all the ſhip's papers, eſpecially the commiſſion; but if there be no legal commiſſion found on board, then all the priſoners are to be carried before ſome magiſtrate, in order to their being examined and condemned as pirates. See articles 7, 8, and 9, for the government of the NAVY.

PRISE, in our *Statutes*, is uſed for things taken of the ſubjects by the king's purveyors.

Spelman

Specimus describes *prisot* to be corn and other provisions taken from the country-people, at lower rates than ordinary, for the maintenance of the king's houshold, garrisons, &c.

Roger de Monte Alto, who married the sister of Hugo de Alheney, claimed the following privileges; viz. his castle of Refreger cum pratis 40 *dierum*, with *prisa* of forty days: which phrase the same author understands of the liberty of taking provisions for the suppors of the garrison of his castle, upon paying for them within forty days. See Stat. 13 Car. II. cap. 34.

PRISM, *Prisma*, thus called from πρίζειν, something *sawn*, or *cut off*, in *Geometry*, an oblong solid or body, contained under more than four planes, and whose bases are equal, parallels, and alike situated.

The *prism* is generated by the motion of a rectilineal figure, as ACB (*Tab.* IV. *Geometry*, *fig.* 52.) defending always parallel to itself, along the right line AB.

If the describent be a triangle, the body is said to be a *triangular prism*; if square, a *quadrangular* one, &c.

From the genesis of the *prism*, it is evident it has two equal and opposite bases; that it is terminated by as many parallelograms as the base consists of sides; and that all the sections of a *prism* parallel to its base are equal.

Every triangular *prism* may be divided into three equal pyramids.

PRISM, *to measure the surface and solidity of a*. Find the area of the base, e. gr. ABC (see TRIANGLE), and multiply it by 2; find the areas of the planes or parallelograms, that include or circumscribe it; and add their sum to the former product. The sum is the whole surface of the *prism*.

Multiply then the base BAC by the altitude CD; the product is the solidity of the cube ABCDEF. See CENTROBARYC.

All prisms are in a ratio compounded of their bases and altitudes: if, then, their bases be equal, they are to each other as their heights; and *vice versa*. Similar *prisms*, &c. are in a triplicate ratio of their homologous sides, as also of their altitudes.

PRISM, in *Dioptrics*, is a glass in form of a triangular *prism*, much used in experiments about the nature of light and colours.

The phenomena and use of the *prism* arise from its separating the rays of light in their passage through it.

The more general of these phenomena are enumerated and illustrated under the article COLOUR: for, to enumerate all would be endless; and even these are sufficient to demonstrate, that colours do not either consist in the contortion of the globules of light, as Descartes imagined; nor in the obliquity of the pulses of the etherial matter, as Hook fancied; nor in the constipation of light, and its greater or less concitation, as Dr. Barrow conjectured; but that they are original and unchangeable properties of light itself.

PRISMATIC *antenna*, in *Natural History*, a term used to express the horns or *antennæ* of a peculiar genus of butterflies. See FEELERS.

PRISMOID, *prismoides*, in *Geometry*, a solid figure bounded by several planes, whose bases are right-angled parallelograms, parallel, and alike situated.

PRISON. See GAOL.

PRISON *breaking*, by the offender himself, when committed for any cause, was felony at the common law; or even conspiring to break it. But this severity is mitigated by the statute *de frangentibus prisonam*, 1 Edw. II. which enacts that no person shall have judgment of life or member, for breaking *prison*, unless committed for some capital offence. So that to break *prison*, when lawfully committed for any treason or felony, remains still felony as at the common law; and to break *prison*, when lawfully confined upon any other inferior charge, is still punishable as a high misdemeanor by fine and imprisonment. For the statute which ordains that such offence shall be no longer capital, never meant to exempt it entirely from every degree of punishment. Blackst. Com. vol. iv. p. 130. See ESCAPE.

Breaking of prison, by the law of Scotland, is a punishable offence, but there are no particular laws against it in that country, so they are guided by the Roman law in such cases. But though this law seems to make the punishment of this crime capital, yet this is thought too great severity in Scotland, where an arbitrary punishment, greater or less, according to the circumstances of the escape, and the violence with which it was accomplished, is thought sufficient and adequate.

PRISONER, in *Law*, one that is restrained of his liberty upon any action civil or criminal, or upon commandment.

A man, again, may be *prisoner*, either upon matter of fact, or of record.

PRISONER, *upon matter of record*, is he, who being present in court, is, by the court, committed to prison.

PRISONER, *upon matter of fact*, is he, who is committed upon an arrest, be it by the sheriff, constable, or other.

PRISONERS *of war*. See CAPITULATION.

PRINT—*Upon* PRINT. See UNCIAL.

PRISIS, in *Ichthyology*. See SAW-*fish*.

PRIVATE *owners*, *cruisers*, *captains*, and *spirit*. See the subalterns.

PRIVATEERS, are vessels of war, armed and equipped by particular merchants, &c. and furnished with a military commander by the admiralty, or the officers who superintend the marine department of a country, to cruise against the enemy, and take, sink, or burn their shippings, or otherwise annoy them as opportunity offers.

These vessels are generally governed on the same plan with his majesty's ships, though often guilty of shameful depredations.

Persons concerned in *privateers* administer at their own costs a part of a war, by providing ships of force, and all other military stores; and they have, instead of pay, leave to keep what they can take from the enemy, allowing the admiral his share, &c.

Privateers may not attempt any thing against the laws of nations; as to assault an enemy in a port or haven under the protection of any prince or republic, whether he be friend, ally, or neuter, for the peace of such places must be inviolably kept: and therefore, by a treaty made by king William and the states of Holland, before a commission shall be granted to any *privateer*, the commander is to give security if the ship be not above one hundred and fifty tons, in 1500*l.* and if the ship exceeds that burthen in 3000*l.* that they will make satisfaction for all damages which they shall commit in their courses at sea, contrary to the treaties with that state; upon pain of forfeiting their commissions, and the ship is made liable. Law Merchant, or Merch Compan. 177.

By statute, ships taken by private men of war, were to be divided into five parts, four parts whereof to go to the persons interested in the *privateer*, and the fifth to his majesty, and as a further encouragement, *privateers*, &c. destroying any French man of war, or *privateer*, shall receive for every piece of ordnance in a ship so taken, 10*l.* reward, &c. 4 & 5 Will. & M.

But by a later statute, the commissioners of the admiralty may grant commissions to commanders of *privateers*, for taking *ships*, &c. which being adjudged *prize*, and the tenth part paid to the admiral &c. wholly belong to the owners and captors. See PRIZE.

PRIVATION, *privatio*, the absence, want, or defect of something needful, or necessary.

In logic, *privation*, as applied to modes of being, and opposed to NEGATION, denotes the absence of what naturally belongs to the thing we are speaking of, or which ought to be present with it. It was called in the schools *abjunctio habitus debiti*.

In the canon-law, *privation* is used for an interdiction, or suspension.

Mystic divines use the phrase, *privation of God*, for those drinesses, which the soul experiences, to whom God does not make himself felt.

The church of Rome teaches, that children, dying without baptism, go into a limbus, where they undergo a *privation* of the sight of God.

PRIVATION, in *Physics*, is a negative principle, which, with matter and form, the Peripatetics suppose conspires to constitute natural bodies.

PRIVATIVE, in *Grammar*, a particle, which, prefixed to a word, changes it into a contrary sense.

Thus, among the Greeks, the α is used as a *privative*: as in ἄθεος, *atheist*, ἄσπαλος, &c. The Latins have their *privative* in: as *incorrigibilis*, *indestructibilis*, &c. The English, French, &c. on occasion, borrow both the Latin and Greek *privatives*.

PRIVATIVE *mode*. See MODE.

PRIVATIVE *quantity*, in *Algebra*, denotes a quantity less than nothing; called also a *negative* QUANTITY; in opposition to affirmative or positive quantities.

Privative quantities are denoted by the character of subtraction — prefixed to them.

PRIVET, *ligustrum*, in *Botany*, a genus of the *diandria monogynia* class. Its characters are these: the flower hath a small tubular empalement, cut at the top into four obtuse segments; it hath one funnel-shaped petal, cut into four oval segments at the top which spread open; it hath two stamina which stand opposite, and a roundish germen, terminated by erect stamina, supporting a short style, crowned by an obtuse bifid stigma; the germen afterwards turns to a smooth round berry with one cell, inclosing two oblong seeds, flat on one side, but convex on the other. Miller reckonstwo and Linnæus one species, making the ever-green *privet*, a species of *rhamnus*.

These plants are easily propagated by laying down their tender shoots in autumn, which in one year's time will be rooted enough to transplant; then they may be re-

moved to the places where they are designed to remain, or planted in a nursery for two years, where they may be trained for the purposes designed.

They may also be propagated by cuttings, which if planted in the autumn on a shady border and in a loamy soil, will take root very freely, and may be afterwards treated in the same way as the layers. But the strongest and best plants are those which are raised from seeds; indeed, this is a much more tedious method than the other, so is seldom practised, for the seeds generally lie a year in the ground before they vegetate; therefore, whoever would propagate the plants in this method, should gather the berries and put them in a pot, with sand between them, and bury the pots in the ground, as is practised for holly berries and haws; and after they have lain a year in the ground, take them up and sow them in a border exposed to the east, where the plants will come up the following spring. These will make great progress after they have gotten some strength, and will grow upright, without sending out suckers like the others.

Formerly these plants were greatly in use for hedges, but since so many other plants of greater beauty have been introduced, they have been almost rejected. Miller.

The leaves and flowers of *privet* are cooling, drying, and astringent, and consequently good in ulcers and inflammations of the throat and mouth, bleeding of the gums, and relaxation of the uvula.

PRIVET, *mock*, *philirea*, in *Botany*, a genus of the *dimonria monogynia* class. Its characters are these: the flower has a small permanent empalement cut into five parts at the brim; it hath one petal with a very short tube, cut into five parts which turn backward, and two short stamina, standing opposite, terminated by single summits; it has a roundish germen, supporting a slender style, crowned by a thick stigma; the germen afterwards turns to a globular berry with one cell, including a roundish seed. Linnæus enumerates three, and Miller seven species, which grow naturally in the south of France, Spain, and Italy, but are hardy enough to thrive in the open air in England, and are never injured except the winters are very severe, which sometimes causes their leaves to fall, and kills a few of the weaker branches. These, however, are repaired by new shoots the following summer; so that there are but few of the ever-green trees which are hardier than these, or that deserve more to be cultivated for pleasure.

These plants are propagated either from seeds or layers; but the latter being the most expeditious method in England, is chiefly preferred. The leaves are drying and astringent, and much commended for ulcers in the mouth.

PRIVET-*fly*, in *Natural History* the name of a species of fly very common on the shrub from whence it has its name. It is called the *ephemerum*, and is remarkable for having its wings deeply divided into segments, so that they seem composed of feathers like bird's wings. The creature, as it sits looks, like a small feather.

PRIVIES *of a camp*. See CAMP.

PRIVILEGE, *privilegium*, formed from the Latin *privata lex*, in the general, any kind of right, prerogative, or advantage, attached to a certain person, condition, or employment, exclusive of others.

PRIVILEGE, in *Law*, is a particular right granted to a single person, place, community, or the like, whereby they are exempted from the rigour of the common laws.

Privilege is either *personal* or *real*.

PRIVILEGE, *personal*, is that which is granted to any person, either against or beyond the course of the common law.

Such, e. gr. is that of a member of parliament; who may not be arrested, nor any of his servants, during the sitting of parliament, nor for a certain time before and after.

PRIVILEGE, *real*, is a franchise granted to a place.

Such is that granted to our universities, by which none who are members thereof may be called to Westminster-hall upon any contract made within their own precincts. So also, a person belonging to the court of chancery cannot be sued in any other court, certain cases excepted; and if he be, he may remove it by *writ of privilege*. It is an ancient *privilege* for men to be exempted from arrests within the verge of the court, i. e. in or near the palace where the king is resident: because, in such cases, quarrels frequently happen; and the peace ought to be strictly kept there.

In the laws of Henry I. it is expressed, that peace ought to be maintained religiously and reverently within four miles of the king's shoes towards the four quarters; and forty-nine acres, nine feet, nine palms, and nine barley-corns, around.

PRIVILEGE, *attachment of*. See ATTACHMENT.

PRIVILEGE, in *Commerce*, is a permission from a prince or magistrate, to make and sell a certain merchandize, or to engage in a certain commerce, either exclusively of others, or concurrently with them.

The first is called an *exclusive privilege*; the latter, simply, a *privilege*.

Exclusive privileges are to be granted rarely, by reason of the hindrance they are of to trade; yet they are sometimes very just and reasonable, by way of reward for the invention of useful machines, manufactures, &c.

Exclusive privileges for foreign commerce are usually granted on the following conditions: that the commodities be brought from remote parts, where there is no going without running great risques; that the *privilege* be only for a limited time; that the persons *privileged* be not allowed to monopolize, i. e. to raise and lower their commodities at pleasure; but that the sale and price be always proportionable to the expence, interest, &c. and that the *privileged* assist the state, on occasion, with part of their gains.

PRIVILEGE *for the impression of books* is properly exclusive; being a permission which an author, or bookseller, obtains under a prince's seal, to have alone the impression of a book, with a prohibition of all others to print, sell, or distribute the same, within a certain term of years, usually fourteen, under the clauses and penalties expressed therein. These *privileges* were unknown till the beginning of the fifteenth century, when they were introduced in France. The oldest is said to bear date in the year 1507, and to have been occasioned by some printers counterfeiting the works of others as soon as they appeared.

But people were yet at liberty to take or let them alone at pleasure, till the interests of religion, and the state, occasioned the restraining of this liberty.

In 1563, Charles IX. published a celebrated ordonnance, forbidding any person, on pain of confiscation of body and goods, to print any letter, speech, &c. without permission.

The like has been since done in England; though, at present, *privileges* are not only not required, but by the late act, for securing the properties of books, seem needless.

PRIVILEGES *of the clergy*. See CLERGY.

PRIVILEGE *of the sanctuary*. See SANCTUARY.

PRIVILEGED *debt*. See DEBT.

PRIVITY, an intimate freedom, or private familiarity between two persons.

The lawyers say, if there be lord and tenant, and the tenant hold of the lord by certain services; there is a *privity* between them in respect of the tenure.

PRIUS. *Nisi* PRIUS, in *Law*. See NISI.

PRIVY, in *Law*, a person who is partaker, or has an interest, in any action or thing.

In this sense they say, *privies in blood*: every heir in tail is *privy* to recover the land intailed.

In old law-books, *merchants privy* are opposed to merchants strangers.

Coke mentions four kinds of *privies*. *Privies in blood*, as the heir to his father; *privies in representation*, as executors and administrators to the deceased; *privies in estate*, as he in reverſion, and he in remainder; donor and donee; leſſor and leſſee: laſtly, *privy in tenure*, as the lord by eſcheat; i. e. when land eſcheats to the lord for want of heirs.

PRIVY *council*, called by way of eminence, *the* COUNCIL, a council of ſtate, held by the king with his counſellors, to concert matters for the public ſervice, and for the honour and ſafety of the realm.

The king's will is the ſole conſtituent of a *privy*-counſellor; and this alſo regulates their number, which in ancient time was about twelve. Afterwards it increaſed to ſo large a number, that it was found inconvenient for ſecrecy and diſpatch; and therefore, king Charles II. in 1679, limited it to thirty; whereof fifteen were to be the principal officers of ſtate, and thoſe to be counſellors, *virtute officii*; and the other fifteen were compoſed of ten lords and five commoners of the king's chooſing. But ſince that time the number has been much augmented, and now continues indefinite. At the ſame time alſo, the ancient office of *lord* PRESIDENT of the council was reviv'd, in the perſon of Anthony, earl of Shaftesbury. *Privy*-counſellors are made by the king's nomination, without either patent or grant; and, on taking the neceſſary oaths, they become immediately *privy*-counſellors during the life of the king that chooſes them, but ſubject to removal at his diſcretion.

As to the qualifications of members to ſit at this board, any natural born ſubject of England is capable of being a member of the *privy-council*; taking the proper oaths for ſecurity of the government, and the teſt for ſecurity of the church. By the act of ſettlement, 12 and 13 W. III. cap. 2. it is enacted, that no perſon born out of the dominions of the crown of England, unleſs born of Engliſh parents, even though naturalized by parliament, ſhall be capable of being of the *privy-council*.

The

The duty of a *privy*-counſellor appears from the oath of office, which conſiſts of ſeven articles. 1. To adviſe the king according to the beſt of his cunning and diſcretion. 2. To adviſe for the king's honour and good of the public, without partiality, through affection, love, meed, doubt, or dread. 3. To keep the king's counſel ſecret. 4. To avoid corruption. 5. To help and ſtrengthen the execution of what ſhall be there reſolved. 6. To withſtand all perſons who would attempt the contrary. And, laſtly, in general, 7. To obſerve, keep, and do all that a good and true counſellor ought to do to his ſovereign lord.

The *privy-council* is, or ought to be, the primum mobile of the ſtate, and that which gives the motion and direction to all the inferior parts. It is likewiſe a court of juſtice of great antiquity; the primitive and ordinary way of government in England being by the king and *privy-council*.

It has been frequently uſed by all our kings for determining controverſies of great importance: the ordinary judges have ſometimes declined giving judgment till they had conſulted the king and *privy-council*; and the parliament have frequently referred matters of high moment to the ſame, as being by long experience better able to judge of, and, by their ſecrecy and expedition, to tranſact ſome ſtate affairs, than the lords and commons.

At preſent, the *privy-council* takes cognizance of few or no matters except ſuch as may not be well determined by the known laws, and ordinary courts; ſuch as matters of complaint and ſudden emergencies: their conſtant buſineſs being to conſult for the public good in affairs of ſtate.

This power of the *privy council* is to enquire into all offences againſt the government, and to commit the offenders to ſafe cuſtody, in order to take their trial in ſome of the courts of law. But their juriſdiction herein is only to enquire, and not to puniſh; and the perſons committed by them are entitled to their *habeas corpus* by ſtatute 16 Car. I. cap. 10. as much as if committed by an ordinary juſtice of the peace.

In plantation or admiralty cauſes, which ariſe out of the juriſdiction of this kingdom, and in matters of lunacy and idiocy, the *privy-council* has cognizance, even in queſtions of extenſive property, being the court of appeal in ſuch cauſes; or, rather, the appeal lies to the king's majeſty himſelf in council.

From all the dominions of the crown, excepting Great Britain and Ireland, an appellate juriſdiction (in the laſt reſort) is veſted in this tribunal; which uſually exerciſes its judicial authority in a committee of the whole *privy-council*, who hear the allegations and proofs, and make their report to his majeſty in council, by whom the judgment is finally given.

Anciently, to ſtrike in the houſe of a *privy*-counſellor, or elſewhere in his preſence, was grievouſly puniſhed: by 3 Hen. VII. cap. 14. if any of the king's ſervants of his houſhold, conſpire or imagine to take away the life of a *privy*-counſellor, it is felony, though nothing ſhall be done upon it; and by 9 Ann. cap. 16. it is enacted, that any perſons who ſhall unlawfully attempt to kill, or ſhall unlawfully aſſault, and ſtrike or wound any *privy*-counſellor in the execution of his office, ſhall be felons, and ſuffer death as ſuch.

With advice of this council, the king iſſues proclamations that bind the ſubject, provided they be not contrary to law.

In debates, the loweſt delivers his opinion firſt, the king laſt; and thereby determines the matter.

A council is never held without the preſence of a ſecretary of ſtate.

The diſſolution of the *privy-council* depends upon the king's pleaſure; and he may, whenever he thinks proper, diſcharge any particular member, or the whole of it, and appoint another. By the common law alſo it was diſſolved *ipſo facto* by the king's demiſe, as deriving all its authority from him. But now, to prevent the inconveniences of having no council in being at the acceſſion of a new prince, it is enacted, by 6 Ann. cap. 7. that the *privy-council* ſhall continue for ſix months after the demiſe of the crown, unleſs ſooner determined by the ſucceſſor. Blackſt. Com. book i. p. 229, &c.

The officers of the *privy-council* are four clerks of the council in ordinary, three clerks extraordinary, a keeper of the records, and two keepers of the council-chamber.

Lord preſident of the PRIVY *council*. See PRESIDENT.

PRIVY *ſeal*, a ſeal which the king uſes, previouſly to ſuch grants, &c. as are afterwards to paſs the great ſeal.

Yet the *privy* ſeal is ſometimes uſed in matters of leſs conſequence, which do not require the great SEAL.

Lord PRIVY *ſeal*. See KEEPER *of the Privy Seal*, and LORD *Privy Seal*.

Clerks of the PRIVY *ſeal*. See CLERK.

PRIVY *chamber*. See CHAMBER.

PRIZE. See PRISE.

PRIZING, in *Sea Language*, denotes the application of a lever to move any weighty body, as a caſk, anchor, cannon, &c.

PRO, a prepoſition, ſignifying *for*, or in reſpect of a thing, as *procuſtos*, &c. And in law, *pro* is the grant of an annuity, *pro conſilio*, ſhewing the cauſe of the grant, amounts to a condition. But in a feoffment, or leaſe for life, &c. it is the conſideration, and doth not amount to a condition; and the reaſon of the difference is, becauſe the ſtate of the land by the feoffment is executed, and the grant of the annuity is executory.

PRO *confeſſo*. See PRO-CONFESSO.

PRO *indiviſo*. See PRO-INDIVISO.

PROA, *ſhip*, in *Navigation*, a name given to a veſſel uſed in the South Seas, on account of the ſwiftneſs with which it ſails, being with a brisk trade-wind, near twenty miles an hour. As to the conſtruction of the *proa*, her head and ſtern are exactly alike, but her two ſides are very different: the ſide, intended to be always the lee-ſide, being flat; and the windward-ſide made rounding, in the manner of other veſſels: and, to prevent her over-ſetting, which from her ſmall breadth, and the ſtraight run of her lee-ward ſide, would, without this precaution, infallibly happen, there is a frame laid out to her from wind-ward, to the end of which is faſtened a log, faſhioned into the ſhape of a ſmall boat, and made hollow. The weight of the frame is intended to balance the *proa*, and the ſmall boat, is by its buoyancy (as it is always in the water), to prevent her overſetting to windward; and this frame is uſually called an out-rigger. The body of the *proa* is made of two pieces joined endways, and ſowed together with bark, for there is no iron uſed about her; ſhe is about two inches thick at the bottom, which, at the gun-wale, is reduced to leſs than one. The ſail is made of matting, and the maſt, yard, boom, and outriggers are all made of bamboo. See the deſcription and drawing of a *proa* in Anſon's voyage, quarto, p. 343.

The *proa* generally carries ſix or ſeven Indians; two of whom are placed in the head and ſtern, who ſteer the veſſel alternately with a paddle, according to the tack ſhe goes on; the perſon in the ſtern being the ſteerſman: the other Indians are employed either in bailing out the water, which ſhe accidentally ſhips, or in ſetting and trimming the ſail.

PROBABILISTS, a ſect, or diviſion, among the Romaniſts, who adhere to the doctrine of PROBABLE *opinions*; holding, that a man is not always obliged to take the more probable ſide, but may take the leſs probable, if it be but barely probable.

The Jeſuits and Moliniſts are ſtrenuous *Probabiliſts*. See JESUIT, &c.

Thoſe who oppoſe this doctrine, and aſſert, that we are obliged, on pain of ſinning, always to take the more probable ſide, are called *Probabilioriſts*.

The Janſeniſts, and particularly the Portroyaliſts, are *Probabilioriſts*.

PROBABILITY *of an event*, in the *Doctrine of Chances*, is greater or leſs according to the number of chances by which it may happen compared with the whole number of chances by which it may either happen or fail. Wherefore, if we conſtitute a fraction, whereof the numerator be the number of chances whereby an event may happen, and the denominator the number of all the chances whereby it may either happen or fail, that fraction will be a proper deſignation of the *probability* of happening. Thus if an event has three chances to happen, and two to fail, the fraction $\frac{3}{5}$ will fitly repreſent the *probability* of its happening, and may be taken to be the meaſure of it. The ſame thing may be ſaid of the *probability* of failing, which will likewiſe be meaſured by a fraction, whoſe numerator is the number of chances, whereby it may fail, and the denominator the whole number of chances both for its happening and failing; thus the *probability* of the failing of that event which has two chances to fail and three to happen, will be meaſured by the fraction $\frac{2}{5}$. If the fractions which repreſent the *probabilities* of happening and failing be added together, their ſum will always be equal to unity, ſince the ſum of their numerators will be equal to their common denominator: and ſince it is a certainty that an event will either happen or fail, it follows, that certainty, which may be conceived under the notion of an infinitely great degree of *probability*, is fitly repreſented by unity. De Moivre's Doct. of Chances, p. 1, &c. See EXPECTATION, and GAMING.

PROBABILITY *of life*. See EXPECTATION *of life*, and LIFE-*annuities*.

PROBABILITY, in *Reaſoning*, *veriſimilitude*; or an appearance of truth.

To define it philoſophically, *probability* is the appearance

of

of the agreement or disagreement of two things by the intervention of proofs, whose connexion is not constant and immutable, or is not perceived to be so; but is, or appears, for the most part, to be so; so as to suffice to induce the mind to judge the proposition to be true or false, rather than the contrary.

That proposition, then, is *probable*, for which there are arguments and proofs to make it pass, or be received for true.

The entertainment the mind gives to this sort of propositions, is called *belief*, *assent*, or *opinion*.

Probability, then, being to supply the defect of our knowledge, is always conversant about propositions whereof we have no certainty, but only some inducements to receive them for true: and this *probability* relates either to matter of fact, which, falling under observation, and capable of human testimony, or to things which, being beyond the discovery of our senses, are not capable of any such testimony; called matters of speculation.

According to Aristotle, a proposition is *probable*, if it seem true to all or most people, and those the wiser and more reputable sort: but by *seem* he means, what, after a close inquiry, shall seem to be true.

Of *probability* there are various degrees, from the confines of certainty and demonstration, down through improbability and unlikeness, to the confines of impossibility; and also degrees of assent from certain knowledge, and what is next to it, full assurance and confidence, quite down to conjecture, doubt, distrust, and disbelief.

The grounds of *probability* are, in short, these two following: viz. the conformity of any thing with our own particular knowledge, experience, or observation, called *internal probability*; and the testimony of others, vouching their observation, or experience, called *external probability*.

In the doctrine of *probability*, one important observation may be made, viz. that if one premiss only of an argument be probable, the conclusion is necessarily probable; but if two or more premisses be probable the conclusion will not be necessarily probable. Thus for instance, supposing the *probability* of each premiss expressed by $\frac{1}{2}$, the *probability* of the conclusion will be but $\frac{1}{4}$, which shews it to be improbable. For we may call any thing *improbable*, if the measure of the chance for its happening is less than $\frac{1}{2}$. If there had been three premisses, and the *probability* of each equal to $\frac{1}{2}$, the *probability* of the conclusion would be $\frac{1}{8}$, which is considerably improbable. Again supposing the *probabilities* of the truth of each premiss to be 2 to 1 or expressed by $\frac{2}{3}$, the *probability* of the conclusion in the case of the two premises would be $\frac{4}{9}$. Where three premises are assumed to infer a conclusion, this would be $\frac{8}{27}$; and in case of four premises, the *probability* of the conclusion would be but $\frac{16}{81}$, which is less than $\frac{1}{5}$, so that one might with advantage lay 4 to 1 against the truth of a conclusion founded on four probable premises, for the truth of which separately taken 2 to 1 might be laid. It is to be observed in all these cases, that the premises are supposed independent, that is, not necessarily connected with each other. Hence it is easy to account, how it happens, that the most plausible political and physical reasonings lead so often to conclusions false in fact.

Mr. de Moivre has solved two problems, tending to establish the degree of assent that ought to be given to experience. He determines from his solution, that if after taking a great number of experiments, it should have been observed, that the happenings or fallings of an event have been very near in a ratio of equality, it may safely be concluded, that the *probabilities* of its happening or falling, at any one time assigned, are very near equal.

And if after taking a great number of experiments, it should be perceived, that the happenings and fallings have been nearly in a certain proportion, such as 2 to 1, it may safely be concluded, that the *probabilities* of happening or failing at any one time assigned, will be very near in that proportion; and that the greater the number of experiments has been, so much the nearer the truth will the conjectures be, that are derived from them.

Chance very little disturbs the events which, in the natural institution, were designed to happen or fail according to some determined law. For if in order to help our conception, we image a round piece of metal, with two polished opposite faces, differing in nothing but their colour, whereof one may be supposed to be white and the other black, it is plain that this piece may with equal facility exhibit a white or black face; and we may even suppose that it was framed with that particular view of shewing sometimes the one face, sometimes the other; and that consequently, if it be tossed up, chance will decide the appearance. But although chance may produce an inequality of appearance, and that a greater inequality, according to the length of time in which it may exercise itself, still the appearance, either one way or the other, will perpetually tend to a proportion of equality. This is, in like manner, applicable to a ratio of inequality; and thus in all cases it will be found, that although chance produces irregularities, still the odds will be infinitely great, that in process of time those irregularities will bear no proportion to the recurrency of that order which mutually results from original design. See De Moivre's Doctrine of Chance, p. 251, 243. See *Moral* CERTITUDE.

PROBABILITY, in *Poetry*, denotes the appearance of truth in the fable or action of a poem.

There are four kinds of actions: for a thing may be either only true or only probable; or true and probable at the same time; or neither the one, nor the other.

These four kinds of actions are shared between four arts: history takes the first, still keeping to truth, without regard to *probability*.

Epic and dramatic poetry have the second, and still prefer *probability*, though false, to an *improbability*, though true. Thus the death of Dido, who killed herself on her being deserted by Æneas, though false in itself, is a fitter subject for a poem, than the action of Sampson, or the maid of Orleans.

Moral philosophy takes the third; and the fabulists, as Æsop, &c. the fourth.

Bossu adds, that the epopœia, in its nature and essence, rises truth and *probability* like morality: yet, in its certainty and expressions, takes a liberty like that of Æsop; instances of each we have in the Æneid.

Poetical *probability* may be so either in respect of the rules of theology, of morality, nature, reason, experience, or opinion.

As to theology, there is scarce any thing but is probable, in respect hereof; because nothing is impossible to God. This is an expedient the poets have frequent recourse to, in order to bring things feigned contrary to the order of nature, within the bounds of *probability*. See this considered under the article MACHINE.

As to *morality*, we have observed, it requires both truth and verisimilitude: an ancient poet was condemned on the theatre for a flip herein; viz. for making a person, whom he represented as an honest man, say, that *though his tongue swore, his mind did not*.

Seneca accuses Virgil of an offence against *natural probability* in saying, that the winds were pent up in caves; for, says that philosopher, wind being only air in motion, to suppose it at rest, is to destroy its nature. To which Voslius answers, that the poet only speaks of the natural origin of winds; which are produced in mountains by vapours, &c. pent there; just as we should say, the winds are inclosed in an *exciple*.

Virgil, likewise, committed an offence against *natural probability*, by making Æneas find deer in Africa; because that country produces none.

Indeed these faults are excusable, because, as Aristotle finely observes, they are not faults in the poet's art, but they arise from his ignorance of something taught in the other arts.

However, care must be taken they be not too gross: there being some *probabilities*, of this kind, which Æsop himself could not dispense withal: he would never be forgiven, were he to represent a lion fearful, a hare daring, a fox stupid, &c.

Probability, in respect of *reason*, is frequently broken in upon by those who affect nothing but the *marvellous*. Here Statius is a notorious offender: Tydeus, being surprised in an ambuscade by fifty heroes, who had vowed his death, kills forty-nine of them, and pardons the fiftieth. But the principal and most important kind of *probability* is that in respect of *common opinion*. A thing is probable, when it looks like truth: but sometimes it shall appear true to the people, and false to the learned; and *vice versa*. Which, then, the learned and the people are divided, to which side must the poet adhere? Suppose, for instance, the adventure of Penelope, the history of Medea, Helena, or the like: what Virgil and Homer have written of them shall appear probable to the populace, yet the learned read the contrary in history; some authors having written, that Dido was chaste, and Medea innocent; that Penelope was divorced and banished, by Ulysses, for abusing his absence; and that Helena never saw Troy.

This point is soon decided: Homer and Virgil make no scruple of deviating from history, to improve their fables; and Horace does not send the poets to the truths of history; but either to fables already invented, or to common fame. All which is confirmed by Aristotle.

To these kinds of *probability* may be added another, which we call *accidental probability*: it consists not in the using of several incidents, each probable apart; but in disposing them so as to hang probably together.

A man, e. g. may probably die of an apoplexy; but that

this should happen just in the moment, when the poet wanted it for an unravelling, is highly *improbable*.

It is an offence againſt this kind of *probability*, to produce an incident all at once, and without any preparation, which yet ſeeded one. Virgil is wonderfully exact in this point: Juno prepares the tempeſt raiſed in the firſt book; Venus in the ſame book prepares the amours of the fourth. The death of Dido, in the end of the fourth, is prepared on the firſt day of marriage; Helenus, in the third, diſpoſes the whole matter of the ſixth; and in the ſixth, the Sibyl predicts all the wars that follow.

PROBABLE *opinion*, a term a long time controverted among the Romiſh caſuiſts; uſually defined, an opinion founded on a grave motive, or an apparently good foundation, and which has authority enough on its ſide to perſuade a wiſe diſintereſted perſon to aſſent to it.

Others define a *probable opinion* to be that, which, being compared with the contrary opinion, becomes problematical, by a perfect equality of the reaſons on each ſide; ſo that there is nothing in reaſon or nature to determine a this ſide, rather than that.

But the JESUITS go ſtill farther, and maintain, that to render an *opinion probable*, it ſuffices that it be either built on a reaſon of ſome conſequence, or on the authority of ſome one grave doctor. With theſe qualifications it is allowable to follow it, even though it be leſs *probable*, and leſs certain, than the contrary opinion: thus it is ſaid, that an opinion or precept may be followed with a good conſcience, when it is inculcated by four, three, or two, nay even by one doctor of any conſiderable reputation, even though it be contrary to the judgment of him that follows it, and even of him that recommends it. Here it is that the venom of *probability* lies; as this doctrine rendered the Jeſuits capable of accommodating themſelves to all the different paſſions of men, and to perſons of all tempers and characters, from the moſt auſtere to the moſt licentious.

This doctrine is attacked, with infinite addreſs, by M. Paſcal in the Provincial Letters; on which account they were burnt publicly at Paris. The doctrine of the Jeſuits was alſo attacked by Perrault in his La Morale des Jeſuits, &c. publiſhed at Mons, in 3 vols. 8vo. in 1702; which ſhared the ſame fate with the Provincials of Paſcal. The attack is farther purſued in Arnauld's La Morale Pratique des Jeſuites, 8 vols. 8vo. of which a ſecond edition was publiſhed at Amſterdam in 1742.

One of the twenty-four patriarchs of the Jeſuits, Caſtro Palao, aſſerts, that a judge, in a queſtion of right, may give ſentence according to a *probable opinion*, againſt a more *probable* one; and this, contrary to the judgment and perſuaſion of his own mind; *imo contra propriam opinionem*. Eſcobar, tr. 6. ex. 6. n. 45.

So Vaſquez maintains, that it is lawful to follow the leſs *probable* and leſs ſecure opinion, diſcarding the more *probable* and more ſecure one.

Leſſius and Eſcobar, treating of the queſtion, Whether a man may kill another for giving him a box on the ear? decide it to be a *probable opinion*, and ſpeculatively true; though there may be ſome inconveniences in the practice, for which it would be as well to let it alone. *In praxi tutum & probabilem judicarunt—ſed non facile admittendum.* Let Provinciales, p. 307, 308.

PROBANDA *proprietatis*. See PROPRIETATE.

PROBATE *of a will*, or *teſtament*, in *Law*, is the exhibiting and proving a will and teſtament, before the eccleſiaſtical judges delegated by the biſhop, who is ordinary of the place where the party dies.

When the will is proved, the original muſt be depoſited in the regiſtery of the ordinary; and a copy thereof in parchment is made out under the ſeal of the ordinary, and delivered to the executor or adminiſtrator, together with a certificate of its having been proved before him; all which together is uſually ſtyled the *probate*. The perſon before whom the teſtament is to be proved is, generally, the biſhop of the dioceſe where the teſtator dwelled, or his officer.

If all the goods of the deceaſed be in the ſame dioceſe, then the biſhop of the dioceſe, or the archdeacon, according as their compoſition leads, has the *probate* of the teſtament. If the goods lie diſperſed in ſeveral dioceſes, ſo that there be any ſum of note, BONA *notabilia*, as five pounds, in two diſtinct dioceſes or juriſdictions, then the will muſt be proved, or ADMINISTRATION taken out, before the metropolitan of the province, by way of ſpecial *prerogative*; whence the court where the validity of ſuch wills is tried, and the office where they are regiſtered, are called the *prerogative* COURT, and the prerogative office, of the provinces of Canterbury and York. The power of granting *probates* and adminiſtrations of the goods of perſons dying, for wages or work done in the king's docks and yards, ſhall be in the ordinary of the dioceſe where the perſon dieth, or in him to whom power is given by ſuch ordinary, excluſive of the prerogative court, &c. 4 Ann. cap. 16.

This *probate* may be made two ways; either in *common form*, or *per teſtes*. The proof in *common form* is only by the oath of the executor, or party exhibiting the will, who ſwears upon his belief, before the ordinary or his ſurrogate, that the will exhibited by him, is the laſt will and teſtament of the deceaſed.

This is the practice, it is ſaid, through the province of Canterbury; but within the province of York, it hath been uſual to ſwear alſo one witneſs to the will.

The proof *per teſtes*, *by witneſſes*, is, when, over and beſides his own oath, he alſo produces witneſſes, or makes other proof to confirm, that it is the laſt will of the deceaſed; and this in the preſence of ſuch as may pretend ſome intereſt in the goods of the deceaſed; or at leaſt in their abſence, after they have been lawfully ſummoned to ſee ſuch a will proved, if they think fit.

The latter courſe is commonly taken when there is fear of ſome ſtrife, or diſpute about the deceaſed's goods: for ſome hold, that a will proved in common form only, may be called in queſtion any time within thirty years after.

Where a will diſpoſes of lands and tenements of freehold, it is now frequently proved by witneſſes in chancery.

The deviſe of a perſonal eſtate is not conſidered of any effect until *probate* is made of the will by the executor; neither can an executor or other perſon give a will in evidence concerning a perſonal chattel without producing the *probate*: and a *probate* obtained in the eccleſiaſtical court cannot be ſet aſide in any other court either of law or equity. But the *probate* of a will, or a copy of the will out of the regiſter of the ſpiritual court are not to be allowed as evidence in the caſe of lands.

By 21 Hen. VIII. cap. 5. it is enacted, that on *probate* of wills, &c. 6*d.* and no more ſhall be taken by the regiſter, where the goods of the deceaſed do not exceed five pounds value; and when the goods are above the value of 5*l.* and under 40*l.* the fee to the biſhop or ordinary ſhall be 2*s.* 6*d.* and to the regiſter 1*s.* And if the goods exceed 40*l.* in value, to the biſhop or ordinary 2*s.* 6*d.* and to the regiſter 2*s.* 6*d.* which, however, he may refuſe, and take a penny for every ten lines of the will, &c. And if the officer takes more than his due fees, he ſhall forfeit 10*l.* to be divided between the king and the party grieved. See alſo 31 Geo. II. cap. 10.

By the ſeveral ſtamp acts, for every ſkin or piece of vellum or parchment, or ſheet or piece of paper on which ſhall be written any *probate* of a will, for any eſtate above the value of 20*l.* ſhall be paid a ſtamp duty of 10*s.* except of common ſeamen or common ſoldiers, ſlain or dead in the ſervice. See EXECUTOR, and WILL.

PROBATICA *piſcina*. See PISCINA.

PROBATION, in a *Monaſtic Senſe*, a time of trial; or the year of noviciate, which a religious muſt paſs in a convent to prove his virtue and vocation, and whether he can bear the ſeverities of the rule.

The year of *probation* commences from the day of novices taking the habit.

PROBATION, in the *Univerſities*, denotes the examination and trial of a ſtudent who is about to take his degrees. See DEGREE.

PROBATIONER, in the *Preſbyterian Diſcipline*, a perſon licenſed by a preſbytery to preach; which is uſually done a year before he be ordained.

A ſtudent in divinity is not admitted *probationer* till after ſeveral trials: the firſt, private, before a preſbytery; the ſecond, public, before a congregation, the preſbytery being preſent.

The private trials are a homily and exegeſis, i. e. a theological ſubject is given in to the preſbytery in theſes, and the candidate anſwers any objections ſtarted againſt it.

The public trials are a popular ſermon, and an exerciſe and addition, i. e. a text is handled, half an hour, logically and critically; and half an hour more, practically. If he acquit himſelf to the ſatisfaction of the preſbytery, he ſigns the confeſſion of faith, and owns the preſbyterian government, &c. Upon which he receives a licence to preach.

PROBATOR, in *Law*, an accuſer, or approver; one who undertakes to prove a crime charged upon another: properly, an accomplice in the crime, who impeaches others.

PROBATUM *eſt*, q. d. *it is proved*; a term frequently ſubjoined to a receipt for the cure of ſome diſeaſe.

PROBE, a ſurgeon's inſtrument, wherewith to ſound and examine the circumſtances of wounds, ulcers, and other cavities.

PROBLEM, Πρόβλημα, in *Logic*, a doubtful queſtion; or a propoſition that neither appears abſolutely true, nor falſe;

false; but which is probable on both sides, and may be asserted either in the negative or affirmative, with equal evidence.

Thus, that the moon and planets are inhabited by animals in some respect like us, is a *problem*: that the fixed stars are all suns, and each the centre of a several system of planets and comets, is a *problem*.

PROBLEM is also a proposition expressing some natural effect, proposed in order to a discovery of its apparent cause. Such are the *problems* of Aristotle.

A logical or dialectical *problem*, by the schoolmen, consists of two parts; a SUBJECT, or subject-matter, about which the doubt is raised; and a PREDICATE or attribute, which is the thing doubted whether it be true of the subject or not.

There are four topical predicates; viz. *genus*, *definitio*, *proprium*, and *accidens*: whence arise four different kinds of dialectical *problems*.

The first, when the thing attributed to the subject is in the relation of a genus: as, whether fire be an element or not?

The second, when the thing attributed has the effect of a definition: as, when it is asked, whether or no rhetoric be the art of speaking?

The third, when the attribute imports a propriety: as, whether it belong to justice to give every one their due?

The last is when the thing attributed is adventitious: as, whether justice is to be desired?

Problems, again, may be divided into those relating to things to be done, or avoided, called *ethical*; those relating to the knowledge of nature, called *physical*; those relating to spirits, called *metaphysical problems*, &c.

PROBLEM, in *Geometry*, denotes a proposition wherein some operation, or construction, is required; as to divide a line, to make an angle, to draw a circle through three points not in a right line, &c.

Mesdames of the Port Royal define a *geometrical problem*, a proposition given to be demonstrated, wherein something is required to be done; and what is done, to be proved to be the thing required.

A *problem*, according to Wolfius, consists of three parts. The proposition, which expresses what is to be done. The resolution, or solution, wherein the several steps, whereby the thing required is to be effected, are orderly rehearsed. The demonstration, wherein is shewn, that by doing the several things prescribed in the resolution, the thing required is attained.

Accordingly, the general tenor of all *problems* is this: the things prescribed in the resolution being done, the thing required is done. See GEOMETRICAL *solution of a problem*.

PROBLEM, in *Algebra*, is a question or proposition which requires some unknown truth to be investigated or discovered; and the truth of the discovery demonstrated.

In this sense it is a *problem*, to find a THEOREM. Algebra is defined to be the art of resolving all *problems* that are resolvable.

PROBLEM, *Kepler's*, in *Astronomy*, is the determining of a planet's place from the time; thus called from the astronomer Kepler, who first proposed it.

The *problem*, stated in form, stands thus: to find the position of a right line, which, passing through one of the foci of an ellipsis, shall cut off an area described by its motion, which shall be in any given proportion to the whole area of the ellipsis.

The proposer knew no way of solving the *problem* directly and geometrically; and therefore had recourse to an indirect method; for which he was taxed with an *aequivoque*, or want of geometry; and his astronomy charged with not being geometrical. But the *problem* has since been solved directly and geometrically several ways, by several authors; particularly Sir Isaac Newton, Dr. Keil, &c.

As to the solution of this *problem*, the late excellent mathematician Mr. Machin observes, that many attempts have been made, at different times, but never yet with tolerable success, towards the solution of the *problem* proposed by Kepler: to divide the area of a semicircle into given parts, by a line from a given point of the diameter, in order to find an universal rule for the motion of a body in an elliptic orbit. For among the several methods offered, some are only true in speculation, but are really of no service. Others are not different from his own, which he judged improper. And as to the rest, they are all some way or other so limited and confined to particular conditions and circumstances, as still to leave the *problem* in general untouched. To be more particular, it is evident, that all constructions by mechanical curves are seeming solutions only, but in reality unapplicable; that the roots of infinite series are, upon account of their known limitations in all respects, so far from affording an appearance of being sufficient rules, that they cannot well be supposed as offered for any thing more than exercises in a method of calculation. And then, as to the universal method, which proceeds by a continued correction of the errors of a false position, it is, when duly considered, no method of solution at all in effect; because unless there be some antecedent rule or hypothesis to begin the operation (as suppose that of an uniform motion about the upper focus, for the orbit of a planet; or that of a motion in a parabola for the perihelion part of the orbit of a comet; or some other such) it would be impossible to proceed one step in it. But as no general rule has ever yet been laid down to assist this method, so as to make it always operate, it is the same in effect as if there were no method at all. And accordingly in experience it is found, that there is no rule now subsisting but what is absolutely useless in the elliptic orbits of comets; for in such cases there is no other way to proceed but that which was used by Kepler; to compute a table for some part of the orbit, and therein examine if the time to which the place is required, will fall out any where in that part. So that, upon the whole, it appears evident, that this *problem*, contrary to the received opinion, has never yet been advanced one step towards its true solution. Vide Machin, in Phil. Trans. Martyn's Abridg. vol. viii. p. 73.

Mr. Machin afterwards proceeds to give his own solution of this *problem*, which is particularly necessary in orbits of a great excentricity; and he illustrates his method by examples, for the orbits of Mercury, of Venus, of the comet of the year 1682, and of the great comet of the year 1680, all which shew the universality of that method. See EQUATION *of the Centre*.

PROBLEM, *determinate*, *indeterminate*, *indeterminate*, *limited*, *linear*, *local*, *plain*, *solid*, *sursolid*, and *unlimited*. See the adjectives.

PROBLEM, *Delian*, in *Geometry*, is the doubling of a cube. This *problem* coincides with that for finding two mean proportionals between two given lines; whence that also is called the *delian problem*. See DUPLICATION.

PROBLEMATICAL *resolution*, in *Algebra*, a method of solving difficult questions by certain rules, called canons.

PROBOLIUM, among the Romans, a kind of spear, which hunters used in hunting boars.

PROBOSCIDI'CTANUS, in *Natural History*, a name given by some authors to a peculiar and very elegant species of penicillus marinus, which has somewhat of a funnel-like shape, and has its mouth surrounded by a number of thin hair-like filaments. See PENICILLI *marini*.

The first who has described this particular species is the accurate Fabius Columna, from whom Klein has engraven a figure of it.

PROBOSCIS, *προβοσκις*, in *Natural History*, the *trunk* or snout of an ELEPHANT, and of some other animals.

The *probofcis* is a member issuing out of the middle of the forehead, serving instead of a hand; and having a little appendix fastened to the hand thereof, in form of a finger. By the *probofcis* the elephant, it is said, sucks herself; and by the same conveys the milk to her young.

All quadrupeds have the length of their neck equal to that of their feet, the elephant alone excepted; in which the shortness of the neck is compensated by the length of the *probofcis*.

The camelion has also a kind of trunk or *probofcis*, which is its tongue; and which it darts nimbly out of its throat, as if it shot it; and draws it in again instantaneously. It serves, like the elephant's trunk, to lay hold on, and take in its food. See CAMELION.

The microscope shews us a little trunk or *probofcis* in flies and gnats, by means whereof they suck the blood of animals, or liquors, for their food.

PROBOSCIS *of flies*. See TRUNK, FLY, and INSECT.

PROBULEUMA, *προβουλευμα*, among the Athenians, a decree or vote of the areopagus, or senate of Athens.

It was so called because agreed upon by the senate, with a design to have it afterwards propounded to an assembly of the people, that it might receive from them a further ratification, without which it could not be passed into a law, nor have any force or obligatory power after the end of that year, when the senators and other magistrates laid down their commissions. Potter, Archæol. Græc. lib. 1. cap. 18. num. 3. 5. 100.

PROCATARCTIC *cause*, the original, primitive, or precurrent cause, or occasion, of an effect.

The word is *προκαταρκτικος*, formed from the verb *προκαταρχω*, *I pre-exist*, *I go before*.

Such, e. gr. is a disease which co-operates with some other disease, subsequent thereto. Thus, anger, or heat of a climate, bring on such a disposition of the juices, as occasions a fever; where the ill disposition is the mediate cause, and the heat or anger, the *procatarctic* cause. See CAUSE.

PROCEDENDO, in *Law*, a writ whereby a plea or cause, formerly

formerly called from an inferior court to the chancery, king's bench, or common pleas, by writ of privilege, habeas corpus, or certiorari, is released, and returned to the other court to be proceeded in; upon its appearing that the defendant has no cause of privilege, or that the matter comprised in the party's allegation is not well proved.

Non PROCEDENDO *ad assisam rege inconsulto.* See NON.

PROCEDURE, PROCEEDINGS, in *Law*, the course of the several acts, expeditions, and instructions of a process or law-suit.

Procedure is either civil or criminal. *Civil procedure* is that where the estate alone is concerned: *criminal* or *extraordinary procedure*, is that where the person is prosecuted.

Proceedings are also *summary* and *regular*.

PROCEED, among *Merchants*, that which arises from a thing. *In which* sense they say, the *net proceed*.

PROCELEUSMATICUS, προκελευσματικὸς, in the *Ancient Poetry*, a foot consisting of four short syllables ⏑⏑⏑⏑, *viz.* *ortetur*.

PROCELLARIA, *petrel*, in *Ornithology*, a genus of the *anseres*, in the Linnæan system: its characters are, that the bill is sub-compressed, and formed of equal mandibles, the upper of which is hooked at the end, and the lower canaliculate; the nostrils are superincumbent and cylindric; the feet are webbed, without a back toe, but furnished with a sharp spur pointing downwards. Linnæus enumerates six species. See FULMAR, SHEAR-*water*, and STORM-*fowl*.

PROCERS in *Glass Making*, iron instruments hooked at the extremity, used to settle the pots in their places, whether set too near or too far off.

PROCESS, *processus*, in *Law*, is used for all the proceedings in any cause or action, real or personal, civil or criminal, from the original writ to the end. See PROCEDURE.

In France they carry on a formal *process* against the memory of people killed in duels, or that have murdered themselves.

PROCESS denotes, in a more restrained *sense*, the means that are made use of, after suing out the original, for compelling the defendant to appear in court: this being the beginning, or principal part, and that by which the rest of the business is directed.

This is sometimes called *original process*, being founded upon the original writ; and also to distinguish it from *mesne* or intermediate *process*, which issues, pending the suit, upon some collateral interlocutory matter; as to summon juries, witnesses, and the like. *Mesne process* is also sometimes put in contradistinction to *final process*, or *process of execution*; and then it signifies all such *process* as intervenes between the beginning and end of a suit. As to civil *process*, see Blackst. Com. vol. iii. p. 279, &c. and with regard to *criminal process*, see ib. vol. iv. p. 313, &c.

The difference between *process* and *precept*, or *warrant* of the justices, is this; that the precept or warrant is only to attach or convene the party, before any indictment or conviction, and may be made either in the name of the king or the justice: but *process* is always in the king's name, and, usually, after an indictment.

Obstructing the execution of lawful *process* is a high offence; particularly when it is an obstruction of an arrest upon criminal *process*. And it hath been held, that the party opposing such arrest, becomes thereby *particeps criminis*, i. e. an accessary in felony, and a principal in treason. Blackst. Com. vol. iv. p. 129.

PROCESS, *by attainder*, see ATTAINDER.

PROCESS, in *Chemistry*, the whole course of an operation, or experiment.

PROCESS, PROCESSUS, in *Anatomy*, is a term of equal import with *apophysis*, *epiphysis*, *prominence*, *protuberance*, or *production*. See APOPHYSIS, &c.

Process is particularly applied to certain eminences of the bones, and other parts; distinguished by peculiar names, expressing their place, form, or the like.

Such are the *processus peritonæi*, *processus vermiformes*, *processus papillares*, *ciliares*, &c.

PROCESSUS *dentiformis*, *ebenicularis*, *pyramidalis*. See the several articles.

PROCESSION, PROCESSIO, in *Theology*, a term used for the manner wherein the Holy Spirit is conceived to issue from the Father and the Son, in the mystery of the Trinity.

The Greeks and Latins are not agreed about the *procession* of the Holy Sprit.

PROCESSION also denotes a ceremony in the Romish church, consisting in a formal march of the clergy in their robes, and the people after them, putting up prayers, singing hymns, &c. and in this manner making a visit to some church, or other holy place.

There are general *processions* of all the people in jubilees, and the same often in public calamities. The *processions* of the holy sacrament are very solemn. They have also *processions*, frequently around the church, at the salutations, &c. in the mass. Anciently, among us, there were, in each parish, customary *processions* of the parish-priest, and the patron of the church, with the chief flag, or holy banner, attended by the other parishioners, each Ascension week; to take a circuit round the limits of the parish, and pray for a blessing on the fruits of the earth. Of which custom there still remains a shadow in that annual PERAMBULATION, still called *processioning*; though the order and devotion of the ancient *processions* be almost lost.

PROCESSUM *continuando*, a writ for the continuance of a *process*, after the death of the chief justice, or other justices in the commission of oyer and terminer. Reg. Orig. 128.

Records & PROCESSU *mittendis*. See RECORDO.

PROCESSUS *majoris musculus*, in *Anatomy*, a name given by some of the writers on the ear to one of the muscles of that part, called by Cowper and others the *internus aurris*, and by Albinus, more properly, the *tensor tympani*.

PROCESSUS *minimi musculus*, in *Anatomy*, a name given by several authors to one of the muscles of the ear, called by Cowper and others *obliquus externus*, and by Albinus, TRANSVERSUS *auricule*.

PROCESTRIA, among the Romans, buildings adjoining to camps, especially winter-quarters or standing camps, where fustlers, strangers, traders, and others that followed the army resided; for they were not permitted to mix with the soldiers, unless when the enemy was near.

PROCHARISTERIA, Προχαριστηρια, in *Antiquity*, a solemn sacrifice which the Athenian magistrates yearly offered to Minerva, when the spring first began to appear.

PROCHEILA, formed of πρὸ and χειλος, *lip*, a word used by some authors to express the extremities of the lips.

PROCHEIN *amy*, PROXIMUS *amicus*, in *Law*, the *nearest friend*, or person next a-kin, to a child in nonage; and who, in that respect, is allowed in law to deal and negotiate for him, to manage his affairs, to see him restrained of any wrong, and to be his guardian, if he hold land in socage.

By *prochein amy* is commonly understood the GUARDIAN in socage: though, in propriety, it is he who appears in court for an infant who sues any action, and aids the infant in pursuit thereof. For, to sue, an infant is not allowed to make an attorney; but the court will admit his *prochein amy*, next friend, as plaintiff or his guardian, as defendant.

PROCHYMA, a word used by the ancients to express that kind of must which flows spontaneously from the grapes without their being pressed.

PROCICADA, in *Natural History*, a name given by some to the insect which the French call PROCIGALE. It resembles the cicada in most respects, but it has not the power of making the noise that insect does.

PROCIDENTIA, or PROLAPSUS *ani*, in *Surgery*, is when, upon a discharge by stool, the intestinum rectum is protruded so far, as that it cannot be drawn back again into the body; or, when drawn back, falls out again.

This is sometimes a chronical disease, especially when it arises from a palsy: its causes are a relaxation of the fibres of the rectum, or of the sphincter muscle; either from the astriction of the alvus, or from a diarrhœa, dysentery, or tenesmus.

It is very difficultly cured when attended with hæmorrhoids: the principal cure is by astringents. External assistance is also required to reduce the fallen gut; which, if it be not soon done is apt to putrefy and mortify, by the contact of the air.

It is subject to relapse after reduction in children, especially upon violent crying; and is difficult to keep up, in case of a diarrhœa.

For this purpose, Heister directs the application of two thick compresses; one oblong, applied betwixt the thighs and nates; the other square, traversing the former upon the anus, both which are to be retained with the T bandage. The compresses should be moistened in some proper decoction, which may be made ex rad. bistortæ, tormentillæ cort. granator. quercus, galls, folior quercus, &c. prepared by boiling them in red wine. The use of this decoction should be repeated, when the disorder returns upon the patient's walking, straining, or the like. When the disorder is still more obstinate, relief may be sometimes had from the application of a strengthening diapasma ex mastic. colophon. terr. Japon. sang. draconis. &c. assisted with a compress and bandage. For the same purpose may be also used strengthening clysters made of a decoction of aromatic and astringent herbs in red wine, by the repeated application of which the disorder may be generally cured. If all these means prove insufficient, a fulsitus may be used, e mastic. thur. fuccin. piper alga. &c. The fumes being conducted through a funnel

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in the bottom of a chair, forbidding the patient aſtringent and drying meats, and directing him to avoid ſtraining, vomiting, and all violent exerciſe, till the cure is confirmed. Heiſter's Surg. part ii. p. 303. See TENESMUS.

PROCIDENTIS, or PROLAPSUS *vaginæ*, is a deſcent of the vagina, ſo as to appear wholly or in part without the labia pudendi: when the whole vagina is prolapſed, it appears like a ſwelled, bloody ring of fleſh, in which caſe, if the prolapſed part be much inflamed, a circumſtance that ſometimes proceeds from difficult labour, there is danger of a mortification: but if none of theſe ſymptoms appear, there is no danger.

A partial *prolapſus* of the *vagina* is often miſtaken for an excreſcence, ſcirrus, or ſarcoma; and danger attends the treatment of it, either by ligatures or the knife.

In order to diſtinguiſh a prolapſus uteri from that of the vagina, and both from an excreſcence, it is to be obſerved, that the firſt never happens with an inverſion except immediately after labour; whereas the vagina may ſubſide and appear externally at any time, either within or without the time of geſtation: but it moſt frequently attends a difficult labour. In this diſorder, if the prolapſed parts be uninflamed, they ſhould be immediately replaced, and the patient reſt in bed for ſome days, uſing an injection of warm vinegar and water, or red wine and water: but if theſe fail, the T'bandage muſt be applied. If the prolapſed parts are inflamed, diſcutient fomentations and cataplaſms ſhould be applied externally, and recourſe ſhould be had to internal medicines and bleeding; and after reducing the inflammation, the parts may be ſafely returned without danger of mortification. Heiſter.

PROCIDENTIA *veſicæ urinariæ*, or the diſplacing of the bladder, accompanies the inverſion of the uterus; in which caſe, the bulb of the bladder being forced down, is no longer ſubject to the preſſure of the abdominal muſcles, and the patient can never diſcharge water without ſqueezing the bladder. See PROCIDENTIA *uteri*.

PROCIDENTIA *uteri*, the deſcent, or falling down of the womb, cauſed by a relaxation of the ligaments which ſhould hold it in its place.

If the uterus fall to the middle of the vagina, or even with the meatus urinarius, it is called a *bearing down* of the womb. If it fall quite down, ſo as to hang pendulous without the labia, but ſo as that no more of the inſide than the orifice is ſeen, it is called a *prolapſus*, or *procidentia*. Some diſtinguiſh between the *procidentia* and prolapſus, confining the former term to the deſcent of the uterus to the labia pudendi, and applying the latter to its deſcent through the labia. If falling thus low, it be turned inſide out, and hang like a fleſhy bag, with a rugged unequal ſurface, it is called a *perverſio* or *inverſio uteri*.

There is alſo another caſe of this diſorder, called the RETROVERSIO *uteri*.

Theſe diſorders may proceed from violent motions, vehement coughing, ſneezing, and the fluor albus. They appear moſt frequent in women with child, from the weight preſſing and bearing hard upon the uterus; but eſpecially if the fœtus be dead, lie in a wrong poſture, or be violently extracted.

After replacing the part, reſtringents both inwardly and by injection ware here uſed; ſuch as obtain in diarrhœas, hæmorrhoids, the gonorrhœa ſimplex, &c.

The firſt ſtep towards a cure of the *procidentia uteri*, or falling down of the womb, is to reduce it to its natural ſituation, and to keep it there by means of peſſaries. But as ſome diſadvantages attend the uſe of common peſſaries, Dr. Thomas Simſon has contrived one, and given in the deſcription and figure of it in the Medical Eſſays of Edinburgh, vol. iii. art. 18.

PROCIDENTIA, or PROLAPSUS *ani*, the deſcent or relaxation of the uvula. See PROLAPSUS.

PROCIGALE, in *Natural Hiſtory*, a name given by Reaumur, and from him by all the French naturaliſts, to a ſpecies of four-winged fly, greatly reſembling the cigale, or cicada, but wanting its power of making a noiſe.

This creature has a trunk of the ſame form with that of the cicada, very long, and laid cloſely upon the belly, and contained in a caſe or ſheath of the ſame ſtructure with that of this inſect. The female has alſo the ſame inſtrument at its tail, prepared for boring holes in wood, and called in that creature the *perrer*, and it uſes it to the ſame purpoſe, depoſiting its eggs by means of it in the branches of trees.

There is alſo another very ſmall inſect mentioned by Reaumur, as reducible to this claſs, if properly of the fly-kind; but its ſmallneſs making the ſtructure of its wings ſcarce diſtinguiſhable with any degree of accuracy; and it is hard to determine whether it has four wings, or two wings and two caſes of wings: this little fly is extremely common on roſe-trees; its wings are yellowiſh, and its body white; and it can hop as well as fly. It is hardly poſſible to find a roſe-tree in the ſummer months that is not loaded with theſe inſects, and they are principally found about the extremities of the young branches. Reaumur's Hiſt. Inſ. vol. ix. p. 241.

PROCINDYNEUONTES, *Πρωκινδυνευοντες*, among the Romans, a deſignation given to the VELITES, becauſe they were moſt expoſed to danger. The term anſwers to what we call the FORLORN-*hope*.

PROCKIA, in *Botany*, a genus of the *polyandria monogynia* claſs: its characters are, that it has a three-leaved calyx beſides two foſſets at the baſe; it has no corolla; and the fruit is a five-angled polyſpermous berry. There is only one ſpecies.

PROCLAMATION, PROCLAMATIO, an inſtrument diſpatched by the KING, with the advice of his privy-council, whereby the people are advertiſed of ſomething which his majeſty thinks fit for them to know; and whereby they are ſometimes required to do, or not to do, certain things.

The word is of Latin origin, formed from *proclamare gallum & vitiis clamare*.

Proclamations have the force of laws; but then they are ſuppoſed to be conſiſtent with the laws already in being, otherwiſe they are ſuperſeded.

Thus, the eſtabliſhed law is, that the king may prohibit any of his ſubjects from leaving the realm; a *proclamation*, therefore, forbidding this in general for three weeks, by laying an embargo upon all ſhipping in time of war, will be equally binding as an act of parliament, becauſe founded upon a prior law. But a *proclamation* to lay an embargo in time of peace upon all veſſels laden with wheat (though in time of a public ſcarcity), being contrary to law, and particularly to ſtatute 22 Car. II. cap. 12. the adviſers of ſuch a *proclamation*, and all perſons acting under it, found it neceſſary to be indemnified by a ſpecial act of parliament, 7 Geo. III. cap. 7.

By the ſtatute 31 Hen. VIII. cap. 8. it was enacted, that the king's *proclamations* ſhould have the force of acts of parliament, a ſtatute, ſays judge Blackſtone, which was calculated to introduce the moſt deſpotic tyranny, and which muſt have proved fatal to the liberties of this kingdom, had it not been happily repealed in the minority of his ſucceſſor. Stat. 1 Edw. VI. cap. 12. Comm. book i. p. 271.

PROCLAMATION is alſo uſed for a ſolemn denunciation, or declaration of war or peace.

PROCLAMATION alſo denotes the act of notifying to the people the acceſſion of a prince to the crown.

The *proclamation* does not inveſt the prince with the regal authority; it ſuppoſes him already inveſted therewith, and only gives notice thereof to the people.

PROCLAMATION *of exigent*. See EXIGENT.

PROCLAMATION *or attachment*. See ATTACHMENT, and COMMISSION *of Rebellion*.

PROCLAMATION *of a fine*, is a notice openly and ſolemnly given thereof in the court of common-pleas where it paſſed, and at all the aſſizes in the country, held within one year after the ingroſſing it. See FINE.

Theſe *proclamations*, at the aſſizes, are made on tranſcripts of the fine, ſent by juſtices of the common pleas to the juſtices of the aſſize, and of the peace.

PROCLAMATION, *in caſe of riot*. See RIOT.

PROCLAMATION, in a *Monaſtic Senſe*, is the acenſation of a friar or brother, by another brother, in open chapter, and in preſence of the ſuperior and community, for ſome external crime he has ſeen him commit.

PROCONDYLUS, *προκονδυλος*, an appellation given to the firſt joint of each finger.

PROCONNESIUM *marmor*, a name given by the ancients to a ſpecies of marble called alſo NEURIS and ELAPHONESUS, and by ſome CYZICUM, from the works of a famous ſtatuary of that name, many of which were made of it. It was of a bluiſh white, lightly variegated with black; this colour uſually running in ſmall veins, and not unaptly reſembling in many inſtances the courſe of the veins of a human body in the naked ſtatues. It was alſo uſed in the ſumptuous buildings of the Romans.

PRO-CONFESSO, in *Law*. When, upon a bill exhibited in chancery, the defendant appears, and is in contempt for not anſwering, and in cuſtody; upon an habeas corpus (which is granted by order) to bring him to the bar, the court aſſigns him a day to anſwer; which being expired, and no anſwer put in, a ſecond habeas corpus is granted, and a farther day aſſigned; by which day, if he anſwer not, the bill upon the plaintiff's motion, ſhall be taken *pro confeſſo*, or as allowed, unleſs cauſe be ſhewn by a day, which the court uſually gives. For want of ſuch cauſe ſhewed, upon motion, the ſubſtance of the plaintiff's bill ſhall be decreed, *as if it had been confeſſed* by the defendant's anſwer: or, after a fourth inſufficient anſwer made to the bill, the matter of fact not ſufficiently anſwered unto, ſhall be taken *pro confeſſo*.

By ſtat. 5 Geo. II. cap. 25. it is enacted, that in order to prevent a defendant's eloſing juſtice, by abſconding to avoid a ſubpœna, where the defendant cannot be found to be ſerved with proceſs of ſubpœna, and abſconds (as is believed) to avoid being ſerved therewith, a day ſhall be appointed him to appear to the bill of the plaintiff; which is to be inſerted in the London Gazette, read in the pariſh church where the defendant laſt lived, and fixed up at the Royal Exchange; and if the defendant doth not appear upon that day, the bill ſhall be taken *pro confeſſo*.

PROCONSUL, a Roman magiſtrate, ſent to govern a province, with a conſular authority.

The *proconſuls* were appointed out of the body of the ſenate, and ordinarily, as the year of any one's conſulate expired, he was ſent *proconſul* into ſome province.

The *proconſuls* had the ſame honours, &c. with the conſuls themſelves; except that they had only ſix lictors, and faſces before them.

The *proconſuls* did not ordinarily hear and determine proceſſes in perſon, but had that office performed by their aſſeſſors, or other judges, conſtituted or delegated by them.

As the *proconſuls* had the direction of juſtice, of war, and of the revenues; they had their ſeveral lieutenants in each capacity: theſe were called *legati*, and were ordinarily nominated by the ſenate.

The *proconſulate* function only held a year. The charges of their journey, backwards and forwards, were borne by the public, and were called *viaticum*.

After the partition of the provinces between Auguſtus and the people, thoſe who preſided over the provinces of the people were called eſpecially *proconſuls*.

Livy, lib. viii. and lib. xvi. mentions two other ſorts of *proconſuls*; viz. ſuch as being conſuls had their office prolonged beyond the time preſcribed by law; and ſuch as were inveſted with this honour, either for the government of the provinces, or the command in war, who before were only in a private ſtation. We alſo read of ſuch as the ſenate created *proconſuls* without a province, merely for the command of the army, and the eaſe of the military diſcipline; and ſuch as entered on their *proconſular* office before they were admitted to the conſulſhip, though deſigned for this honour.

PROCONSUL, in our *Ancient Law Books*, is ſometimes uſed for a JUSTICE *in eyre*, or *juſtice errant*.

PROCREATION, PROCREATIO, the action of begetting and bringing forth children.

PROCTOR, PROCURATOR, a perſon commiſſioned to act as proxy, or delegate, in behalf of another. See PROCURATOR.

PROCTOR, *procurator*, in the *Civil Law*, is an officer appointed to appear in court, and manage the cauſes of parties who will make uſe of his procuration.

Anciently, every body was obliged to appear in perſon; and, when the affair happened to be drawn out to a great length, they were allowed to create a *proctor*, or proxy, in their cauſe.

But this was a favour only granted for a certain time, till towards the middle of the ſixteenth century, when it was decreed, that all procuration ſhould hold till revoked.

PROCTORS *in the Commons*, are perſons ſkilled in the civil and eccleſiaſtical laws, who exhibit their proxies, and make themſelves parties for their clients, to draw up acts and pleadings, produce witneſſes, prepare cauſes for ſentences, and attend the advocates with the proceedings.

They are about fifty in number; are admitted by the archbiſhop's fiat; and wear black robes, and hoods lined with white furs.

By 3 Jac. cap. 5. no recuſant convict ſhall practiſe in the civil law as *proctor*: and by 5 Geo. II. cap. 18. no *proctor* in any court ſhall be a juſtice of the peace, during ſuch time as he ſhall continue in the buſineſs and practice of a *proctor*. Moreover, by the ſeveral ſtamp acts, every admiſſion of any perſon to the office of *proctor* in any of the courts ſhall be upon a treble 40*s.* ſtamp.

PROCTORS *of the clergy*, are deputies, or repreſentatives, choſen by the clergy of each dioceſe, two for each; and by the cathedral and collegiate churches, one for each, to ſit in the lower houſe of CONVOCATION.

PROCTORS, *in the univerſity*, are two officers choſen from among the ſtudents, to ſee good orders and exerciſes daily performed there.

PROCUBITORES, among the Romans, an appellation given to the VELITES, becauſe when the enemy was near, they always formed the outguard.

PROCUMBENT *leaves*, in *Botany*, ſuch leaves of plants as lie flat, or trailing on the ground.

PROCURATION, or PROCURACY, an act, or inſtrument whereby a perſon is impowered to treat, tranſact, receive, &c. in another's name, as if he himſelf were actually preſent.

When a man treats in behalf of another, the firſt thing is to examine his *procuration*, or *procuracy*.

Procuration is now little uſed in this ſenſe, except in the caſe of a perſon who collects the fruits of a benefice for another.

PROCURATION, in the *Canon Law*, is uſed for the repaſt, or entertainment, anciently given to church-officers, or ordinaries, who came to viſit in churches or monaſteries, whether they were biſhops, archdeacons, or viſitors.

Procuration was due to the pope's legates, and even to popes themſelves, when they came into France; and the charge was comprized in the bulls then granted.

Complaints were frequently made to the pope of the exceſſive charges of the *procurations* of biſhops and archdeacons; upon which they were prohibited by ſeveral councils and bulls.

That of Clement IV. mentioned in the Monaſtico, is very expreſs; wherein that pope tells us, complaint had been made, that the archdeacon of Richmond, viſiting the dioceſe, travelled with one hundred and three horſes, twenty-one dogs, and three hawks; and did ſo grievouſly oppreſs a religious houſe with that vaſt equipage, that he cruſhed the monks to ſpend in an hour as much as would have maintained them a long time.

PROCURATION is now uſed for a ſum of money paid yearly by pariſh-prieſts, to the biſhop, or archdeacon, in lieu of this entertainment, towards defraying the charge of their VISITATION.

PROCURATOR, PROCTOR, or PROXY, a perſon who has a charge, or office, committed to him, to act in behalf of another.

Thus the *proxies* of the lords in parliament, in our law-books, are called *procuratores*.

The word is alſo uſed for a vicar, or lieutenant. Thus, in Petrus Bleſenſis, we read of a *procurator regni*.

Thoſe who manage cauſes in Doctors Commons, are alſo called *procuratores*, or *proctors*.

The biſhops are ſometimes called *procuratores eccleſiarum*; and the repreſentatives ſent by the clergy to convocation, *procuratores cleri*.

In our ſtatutes, a perſon who gathers the fruits of a benefice for another, is particularly called *a procurator*; and the inſtrument impowering him to receive the ſame, is termed *a procuracy*.

PROCURATOR is alſo a kind of magiſtrate, in ſeveral cities of Italy, who takes care of the public intereſts. There are *procurators* of St. Mark at Venice, at Genoa, &c.

Originally there was but one *procurator* of St. Mark at Venice: in 1442, the number was augmented to nine, when the ſenate made a decree, appointing, that, for the future, none ſhould be admitted to the dignity, but after the death of ſome of the nine. But, in the neceſſities of the republic, the number was afterwards inlarged to forty; though of theſe there are only nine that bear the title of *procurators*, and whoſe place is regularly filled. They are adminiſtrators of the church of St. Mark, and of the revenues attached thereto, the patrons of orphans, and the executors of teſtaments.

This office receives more luſtre from the merit of thoſe who diſcharge it, than from its authority. They are clothed in black, or violet, with ducal ſleeves.

PROCURATOR *monaſterii*, anciently, was the ADVOCATE of a religious houſe, who was to ſolicit the intereſt, and plead the cauſes, of the ſociety. See ADVOWER.

PROCURATORES *eccleſiæ parochialis*, are the churchwardens, whoſe office is to act as *proxies*, and repreſentatives of the church.

PROCURATORES, in the *Roman Law*, were ſuch lawyers as aſſiſted the plaintiff in proving, or the defendant in clearing himſelf from the matter of fact. Theſe, as well as the *patroni* (ſee PATRON and ADVOCATE), were ſelected out of the ableſt lawyers, and had their names entered in the matriculation book of the forum.

This was one condition requiſite to give them the liberty of pleading; the other was the being retained by one party, or the receiving a fee, which they termed *mancheum*.

PROCURATORES *Cæſaris*, among the Romans, were officers, often mentioned by Tacitus and Suetonius, who were ſent by the emperors into every province, to receive and regulate the public revenue, and to diſpoſe of it at the emperor's command. The *procurator* of Judæa was inveſted with all the authority proper to the PROCONSUL, and, as the learned biſhop Pearſon obſerves, on the creed, art. 4. even with the power of life and death.

PROCYON, in *Aſtronomy*, a fixed ſtar, of the ſecond magnitude, in CANIS *minor*.

PRODES *homines*, q. d. wiſe, or diſcreet men, in our *Ancient Cuſtoms*, a title given to the barons, and other military tenants, who were called to the king's council, and were to give advice according to the beſt of their prudence and knowledge.

PRODICTATOR, among the Romans, a magistrate who had the power, and did the office, of a dictator.
The Romans sometimes created a *prodictator*, in cases where they could not have a dictator. Fabius Maximus was *prodictator*.

PRODIGALITY is a term, the meaning and application of which are well known. We shall, therefore, under this head, only take occasion to observe, that, by the Roman law, if a man by notorious *prodigality* was in danger of wasting his estate, he was looked upon as *non compos*, and committed to the care of curators, or tutors, by the prætor. And by the laws of Solon, such prodigals were branded with perpetual infamy.

PRODROMUS, *πρόδρομος*, literally denotes a fore-runner, an harbinger. Hence,

PRODROMUS *morbus*, among *Physicians*, is used for a lesser disease, which precedes, or foreruns, a greater.
Thus a straightness of the breast is a *prodromus* of a consumption, &c. A vertigo is sometimes a *prodromus* of an apoplexy.

PRODUCE, *net*. See NET *produce*.

PRODUCING, in *Geometry*, denotes the continuing a right line, or drawing it out farther, till it have any assigned length.

PRODUCT, in *Arithmetic* and *Geometry*, the factum of two numbers, or the quantity arising from, or produced by, the multiplication of two or more numbers, lines, &c. into one another.
Thus, if 6 be multiplied by 8, the *product* is 48.
In lines it is always (and sometimes in numbers) called the RECTANGLE, between the two lines, multiplied by one another.

PRODUCTION. See GENERATION, and PROPAGATION.

PRODUCTION, in *Anatomy*, a continuation, or PROCESS.

PROEDRI, *πρόεδροι*, among the Athenians, magistrates whose business it was to propose to the people the things they were to deliberate upon and determine at every assembly, after which their offices expired.
They were so called from the privilege they enjoyed, of always having the first seats at assemblies. See EPISTATES.

PROEM, *proemium*, a term anciently used for PREFACE.

PROEMPTOSIS, in *Astronomy*, that which makes the new moons appear a day later, by means of the lunar equation, than they would do without that equation. See METEMPTOSIS.

PROFANATION, in *Religion*, the doing of something which is disrespectful to holy or sacred things.

PROFANATION *of the Lord's day*. See SUNDAY.

PROFANE, a term used in opposition to *holy, sacred*.
Except churches, and church-yards, all places are esteemed *profane*. By the canon-law, a sacred chalice, or cup, becomes *profane*, by giving it a blow with a hammer.

PROFANE is also applied, in general, to all persons who have not the sacred character; and all things which do not belong to the service of religion.
In this sense, Xenophon, Seneca, &c. are *profane* authors. The heathen priests, pontifs, &c. also pass with us for *profane*.

PROFANENESS denotes a disrespect paid to the name of God, and to things and persons consecrated to him. By the last statute against profane and common swearing and cursing, 19 Geo. II. cap. 21. which repeals all former ones, every labourer, sailor, or soldier, shall forfeit 1*s.* for every profane oath, or curse; every other person under the degree of a gentleman 2*s.*; and every gentleman, or person of superior rank, 5*s.* to the poor of the parish; and on a second conviction, double; and for every subsequent conviction, treble the sum first forfeited, with all charges of conviction; and in default of payment shall be sent to the house of correction for ten days. Any justice of the peace may convict upon his own hearing, or the testimony of one witness; and any constable or peace officer, upon his own hearing, may secure any offender, and carry him before a justice, and there convict him. If the justice omits his duty, he forfeits 5*l.* and the constable 40*s.* And the act is to be read in all parish churches and public chapels, the Sunday after every quarter-day, on pain of 5*l.* to be levied by warrant from any justice. Besides this punishment for taking God's name in vain in common discourse, it is enacted by stat. 3 Jac. I. cap. 21. that if in any stage-play, interlude, or shew, the name of the Holy Trinity, or any of the persons therein, be jestingly or profanely used, the offender shall forfeit 10*l.* one moiety to the king, and the other to the informer. See BLASPHEMY.

PROFECTITIOUS. See ADVENTITIOUS, and GOODS.

PROFER, formed of the French *proferer*, *to produce*, in *Law*, the time appointed for the accounts of sheriffs, and other officers, to be given into the exchequer; which, by stat. 51 Hen. III. is to be twice in the year.

PROFER is also used for an offer, or endeavour, to proceed in an action, by a person concerned so to do.
Trinity-term shall begin the Monday next after Trinity-Sunday, whenever it shall happen to fall, for the keeping of the essoigns, *profers*, returns, and other ceremonies, heretofore in use. Stat. an. 32 Hen. VIII.

PROFER *the half-mark*. See HALF-*mark*.

PROFERT *in curia*, in *Law*, is where the plaintiff in an action declares upon a deed, or the defendant pleads a deed, he must do it with a *profert in curia*, to the end that the other party may at his own charges have a copy of it, and until that time he is not obliged to answer it.

PROFESSED *man*, or *nun*, one who, having made the vow, is admitted of a religious order.
In this sense the word is used in opposition to NOVICE.

PROFESSIO *viduitatis*. See VIDUITATIS.

PROFESSION, *professio*, in a monastic sense, the entering into a religious order; or an action whereby a person offers himself to God, by a vow of observing three things; viz. obedience, chastity, and poverty; which he promises inviolably to maintain.
This is called *sanctæ religionis professio*, and the person, a *religionis professus*.
Persons are not admitted to make *profession* till after a year of probation.

PROFESSOR, in the *Universities*, a person who teaches, or lectures, publicly, some art or science, in a chair established for that purpose.
The *professors* in foreign universities teach the arts, and have their classes of pupils; those in our universities only read public lectures in term-time.
Of *professors* we have a great number, some denominated from the arts they profess, as *casuistical professor*, *Hebrew professor*, *physic professor*, *chemistry professor*, &c.
Others, from those who founded the *professorship*, or assigned a revenue for the support of the *professor*; as the *Savilian professors* of astronomy and geometry, the *Lucasian professor* of mathematics, *Margaret professor* of divinity, &c.

PROFESSORS, *regius*. See REGIUS.

PROFICISCENDUM. *Capias conductus ad* proficiscendum. See CAPIAS.

PROFILE, in *Architecture*, the figure, or draught, of a building, fortification, or the like; wherein are expressed the several heights, widths, and thicknesses, such as they would appear, were the building cut down perpendicularly from the roof to the foundation.
Whence the *profile* is also called the *section*, sometimes the *orthographical section*: and, by Vitruvius, also the *scenography*.
Profile, in this sense, amounts to the same with *elevation*; and stands opposed to a plan, or *ichnography*.

PROFILE is also used for the contour, or outline of a figure, building, member of architecture, or the like; as a base, a cornice, &c.
Hence *profiling* is sometimes used for designing, or describing the member with rule, compass, &c.

PROFILE *of a fortification*. See FORTIFICATION.

PROFILE, in *Sculpture* and *Painting*. A head, a portrait, &c. are said to be in *profile*, when they are represented sideways, or in a side-view.
As, when in portrait, there is but one side of the face, one eye, one cheek, &c. shewn, and nothing of the other. On almost all medals the faces are represented in *profile*.

PROFITS, *person of*. See PERSON.

PROFLUVIUM, in *Medicine*, any kind of flux, or liquid evacuation. Whence

PROFLUVIUM *ventris*, flux of the belly, denotes a DIARRHŒA.

PROFUNDUS, in *Anatomy*, a name given by Albinus, Hunauld, and others, to a muscle of the wrist, generally known by the name of the PERFORANS. These authors called, in the same manner, the *perforatus* of others the *sublimis*.

PROGALL-INSECT, an animal nearly approaching to the GALL-*insect* class, but differing from it in some respects, and called by this name from its resemblance to those creatures; as the creatures somewhat approaching to the scarab or beetle class, but not regularly of it, are called *proscarabi*.
This class of animals pass a great part of their lives in the same manner with the gall-insects, fastened to the bark of a tree, and there remaining motionless: some of them also in the manner of the gall-insects cover their young brood with their bodies; but they are easily distinguishable as animals, in all the stages of their lives, and in that they differ from the others. The annular depressions of their bodies may in all their states be distinguished, especially with the help of a magnifying glass; whereas those of the gall-insects all disappear as they grow towards their utmost bulk.

If the gall-insects are worthy of observation on account of the great value of one species of them, the kermes; the *pregall-insects* are at least equally so on the same account, since the cochineal belongs to this class.

The most common and observable species of the *pregall-insect* class, is that of the elm.

PROGNOSTIC, *prognosis*, in *Medicine*, a judgment of the event either of a state of health, or of a disease; as, whether it shall end in life or death; be long or short; mild or malignant, &c. taken from certain symptoms thereof.

The word comes from προγινωσκω, *forethinowledge*; whence also προγνωσικον, *a pregnostic sign*.

In all continued fevers, Morton tells us, a strong, equable pulse, is a good *prognostic*, and always presages well, whatever other threatening symptoms attend it; on the contrary, a quick, feeble, intermitting pulse, is a *prognostic* of death, how much soever the other symptoms may flatter.

Hippocrates observes, that all predictions and *prognostics* of acute diseases are very fallacious: Diemerbroeck, however, adds, that, in the plague of Nimeguen, sixth day cries were constantly found fatal *prognostics*; also to be infected about the new or full moon; faintings in the beginning of the disease, and palpitations of the heart, were found deadly *prognostics*: on the contrary, a pleurisy, and suppression of stool, were good *prognostics*.

The *prognosis* is a part of *semeiology*.

PROGNOSTICS *of the weather*. See WEATHER.

PROGRAMMA, anciently denoted a letter sealed with the king's seal.

PROGRAMMA is also a college term, signifying a billet, or advertisement, posted up, or given into the hand, by way of invitation to an oration, or other college ceremony; containing the argument, or so much as is necessary for the understanding thereof. *Programmas* are sent to invite people to assist at declamations, dramatic performances, &c.

PROGRESSION, *progressio*, an orderly advancing, or going forward, in the same manner, course, tenor, &c.

PROGRESSION, in *Mathematics*, is either *arithmetical*, or *geometrical*.

PROGRESSION, *arithmetical*, is a SERIES of quantities equidistant from each other; i. e. either increasing, or decreasing, by the same common interval, or difference.

Thus 3, 6, 9, 12, 15, 18, &c. make an *arithmetical progression*; because increasing, or differing, equally, by 3: thus also 25, 20, 15, 10, and 5, are in *arithmetical progression*, decreasing by a common difference, 5.

In every *arithmetical progression*, whether increasing or decreasing, the sum of the first and last term is equal to the sum of any two intermediate terms equidistant from the extremes; as also, if the number of terms be uneven, to the double of the middle term. For instance:

3, 6, 9, 12, 15, 18, 21
21, 18, 15, 12, 9, 6, 3

24, 24, 24, 24

Hence, 1. We find the sum of any *arithmetical progression* by multiplying the sum of the first and last term by half the number of terms. Thus, let a represent the first term, z the last, and n the number of terms; and we shall have $\overline{a+z} \times \frac{n}{2} = s$, or the sum of all the terms.

2. Having, therefore, the first term, the difference, and the number of terms given, the sum of the *progression* is had by multiplying the first term by the number of terms; and to the product adding the product arising from the difference multiplied into the semidifference of the number of terms from the square of that same number.

Let b be the common difference; and since $z = a + n-1 \times b$, and $\overline{a+z} \times \frac{n}{2} = s$, we shall have, merely by substitution, $\overline{2a+nb-b} \times \frac{n}{2} = s$, i. e. $an + \frac{n^2-n}{2} \times b = s$.

Thus, suppose the first term 3, the number of terms 7, and the difference 3; the product of 3 and 7 = 21, being added to the product 63, of the difference 3 multiplied into the semi-difference of the number of terms 7, from the square thereof 49 = 21, gives 84, the sum of the *progression*.

3. The number of terms lessened by one, being multiplied by the common difference, and the first term added to the product, the sum is the last term, i. e. $n-1 \times b + a = z$. Thus, in the *progression* of 52 places, where the difference is 3, and the first term 5, 51 being multiplied by 3, produces 153; to which adding 5, the sum 158 is the last term required.

4. If the *progression* begin with 0, the sum of all the terms is equal to half the product of the last term multiplied by the number of terms, i. e. $\overline{a+z} \times \frac{n}{2}$ becomes in this case $\frac{nz}{2}$.

Whence it follows, that the sum of a *progression* beginning from 0, is subduple the sum of so many terms, all equal to the greatest.

PROGRESSION, *geometrical*, is a SERIES of quantities increasing or decreasing, in the same ratio, or proportion; or it is a series of quantities that are continually proportional: or which increase by one common multiplicator, or decrease by one common divisor; which common multiplier or divitor is called the common ratio. Thus, a, ar, ar^2, ar^3, ar^4, &c. or a, $\frac{a}{r}$, $\frac{a}{r^2}$, $\frac{a}{r^3}$, $\frac{a}{r^4}$, &c. and in numbers, 1, 2, 4, 8, 16, 32, 64, &c. or 729, 243, 81, 27, 9, 3, 1, make a *geometrical progression*.

1. In every *geometrical progression*, the product of the two extreme terms is equal to the product of the two intermediate terms equidistant from the extremes: as also, if the number of terms be uneven, to the square of the middle term. For example: let a, ar, ar^2, ar^3, &c. continued to y, the last term, be such a series; then y, $\frac{y}{r}$, $\frac{y}{r^2}$, $\frac{y}{r^3}$, will be the four last terms; and $a \times y = ar \times \frac{y}{r} = ar^2 \times \frac{y}{r^2} = ar^3 \times \frac{y}{r^3}$, &c. And in numbers,

3, 6, 12, 24, 48, 96
96, 48, 24, 12, 6, 3

288, 288, 288

2. If the difference of the first and last term of a *geometrical progression* be divided by a number less by unit than the denominator of the ratio, the quotient will be the sum of all the terms except the greatest: Hence, by adding the greatest, we have the sum of the whole *progression*.

In the preceding series, $\frac{y-a}{r-1} + y = \frac{y-a+yr-y}{r-1} = \frac{yr-a}{r-1} = s$. For the sum of a series of geometrical proportionals, wanting the first term, or the sum of all the consequents, is equal to the sum of all but the last term, or the sum of all the antecedents, multiplied by the common ratio. Thus, $ar + ar^2 + ar^3$, &c. $+ \frac{y}{r^2} + \frac{y}{r} + y = r \times a + ar + ar^2$, &c. $+ \frac{y}{r^3} + \frac{y}{r^2} + \frac{y}{r}$.

Therefore $s-a = s-y \times r = sr-yr$; or, $sr-s = yr - a$; and $s = \frac{yr-a}{r-1}$. If it be a decreasing series, whose sum is to be found, as of $y + \frac{y}{r} + \frac{y}{r^2} + \frac{y}{r^3}$, &c. $+ ar^3 + ar^2 + ar + a$; and the number of terms be supposed infinite, then a, the last term, will be equal to nothing; consequently the sum of such a series $s = \frac{yr}{r-1}$; which is a finite sum, though the number of terms be infinite. Thus $1 + \frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \frac{1}{16}$, &c. $= \frac{1 \times 2}{2-1} = 2$.

In a *progression* of 5 terms, beginning with 3, and the denominator being likewise 3, the greatest term will be 243. If, then, the difference of the first and last term 240, be divided by 2, a number less by 1 than the denominator, the quotient 120, added to 243, gives 363, the sum of the *progression*.

Hence, 3. The first or least term of a *progression* is to the sum of the *progression*, as the denominator lessened by 1, to its power likewise lessened by 1, the exponent of which power is equal to the number of terms. For, if the number of terms be n, the exponent of r in the last term will be $n-1$. Therefore $y = ar^{n-1}$; and $yr = ar^{n-1+1} = ar^n$; and $s = \left(\frac{yr-a}{r-1} = \right) \frac{ar^n-a}{r-1}$; consequently $s \times r-1 = ar^n-1$, and $a : s :: r-1 : r^n-1$.

Thus, supposing the first term 1, the denominator 2, and the number of terms 8, the sum will be 255.

4. Hence, also, the difference between the last term and the sum is to the difference between the first term and the sum, as unity to the denominator. Wherefore, if the difference between the first term and the sum be divided by the difference between the sum and the last term, the quotient is the denominator.

From art. 2. it appears, that $s-a = s-y \times r$; therefore $s-y : s-a :: 1 : r$, or $r = \frac{s-a}{s-y}$.

As a right line, or figure, may increaſe continually, and never amount to a given line or area; ſo there are *progreſſions* of fractions which may be continued at pleaſure, and yet the ſum of the terms be always leſs than a given number. If the difference between their ſum and this number decreaſe in ſuch a manner, that by continuing the *progreſſion* it may become leſs than any fraction how ſmall ſoever, that can be aſſigned, this number is the limit of the ſum of the *progreſſion*, and is what is underſtood by the value of the *progreſſion*, when it is ſuppoſed to be continued infinitely. Theſe limits are analogous to the limits of figures, and they mutually aſſiſt each other. The areas of figures can, in many caſes, be no otherwiſe expreſſed than by ſuch *progreſſions*; and when the limits of figures are known, they may ſometimes be advantageouſly applied for approximating to the ſums of certain *progreſſions*.

Thus, for inſtance, let the terms of any *progreſſion* be repreſented by the perpendiculars AF, BE, CK, HL, &c. ſtanding at a given diſtance on the baſe AD (*Tab.* III. *Analyſis*, *fig.* 70.); and let PN be any ordinate of the curve FNe paſſing over the extremities of thoſe perpendiculars. Suppoſe AP to be produced; then according as the area, APNF, has a limit to which it may approach continually, but never exceed, or may be produced till it exceed any given ſpace; there will alſo be a limit of the ſum of the *progreſſion*, or it may be continued till it exceed any given number. For ſuppoſing the rectangles FB, EC, KH, LI, &c. completed, the area APNF will always be leſs than the ſum of thoſe rectangles, but greater than their ſum after the firſt; therefore the area APNF, and the ſum of thoſe rectangles, either both have limits, or both have none. The ſame is to be ſaid of the ſum of the ordinates AF, BE, CK, HL, &c. and of the ſum of the terms of the *progreſſion* repreſented by them. If the curve FNE, for example, be the common hyperbola, *b* its center, bP the aſymptote; and AB being equal to bA, if AF repreſent unity, the ſeries of ordinates will repreſent the *progreſſion* 1, $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{5}$, &c. which may therefore be continued till it exceed any given number, as the hyperbolic area may be produced till it exceed any given ſpace. But if FNe be an hyperbola of any higher order, ſo that the ordinate PN be reciprocally as any power of the baſe AP, whoſe exponent is greater than unity, the area APNF, and the ſum of the *progreſſion* repreſented by the ſeries of ordinates, will have limits. Hence there is always a limit of the ſum of the fractions that have unity for their common numerator; and the ſquares, cubes, or any other powers of the numbers 1, 2, 3, 4, &c. whoſe exponents exceed unity for their ſucceſſive denominators.

When the area APNF has a limit, we may not only conclude, that the ſum of the *progreſſion*, repreſented by the ordinates, has a limit; but when the former limit is known, we may by it approximate to the value of the latter; and, *vice verſa*, when the limit of the *progreſſion* is given, the limit of the area may be found.

Progreſſions of fractions may be found at pleaſure, that ſhall have aſſignable numbers equal to the limit of the ſum of the terms. Thus a ſeries or *progreſſion* of any number of quantities continually decreaſing being given, their ſucceſſive differences form a new ſeries of terms, the ſum of which from the beginning is always equal to the exceſs of the firſt term of the firſt ſeries above its laſt term. For inſtance, if A, B, C, D, E, &c. be the terms of the firſt ſeries, it is manifeſt that the ſum of the difference of A and B, B and C, C and D, D and E, is the exceſs of A above E. If the terms of the firſt ſeries decreaſe in ſuch a manner, that by continuing the *progreſſion* they may become leſs than any quantity that can be aſſigned, then the firſt term of the firſt ſeries is the limit of the ſum of the ſecond ſeries. In like manner, the difference of the alternate terms of the firſt ſeries, as of A and C, B and D, C and E, &c. form a new *progreſſion* of terms, the ſum of any number of which is equal to the exceſs of the ſum of A and B, the firſt and ſecond term of the ſeries, above the ſum of the laſt and penultimate terms; and the ſum of A and B is the limit of the ſum of the new ſeries. In general, if a *progreſſion* is formed by taking the difference of the firſt term A, and the term whoſe place in the ſeries is expreſſed by any number *n*; of the ſecond term B, and that whoſe place is $n+1$; of the third term C, and that whoſe place is $n+2$, and ſo on; then will the limit of the ſum of this new *progreſſion* be equal to the ſum of the terms A, B, C, D, &c. which precede that term whoſe place is expreſſed by *n*. In this manner *progreſſions* may be found at pleaſure, which may be continued without end, and have given numbers for the limits of their ſums.

For example, let the firſt ſeries be 1, $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{5}$, &c. the ſucceſſive differences of the terms of which are $\frac{1}{2}$, $\frac{1}{6}$, $\frac{1}{12}$, $\frac{1}{20}$, &c. and the limit of the ſum of this *progreſſion* will

therefore be 1. If we multiply each term of this laſt ſeries by 2, that the firſt term may be unit, we ſhall have 1, $\frac{1}{3}$, $\frac{1}{6}$, $\frac{1}{10}$, &c. the denominators of which are the triangular numbers, unity being the common numerator, and the limit of the ſum of this *progreſſion* is 2. The ſucceſſive differences of the terms of this latter ſeries being each multiplied by $\frac{1}{2}$, that the term of the new ſeries may be unity, give 1, $\frac{1}{3}$, $\frac{1}{10}$, $\frac{1}{35}$, &c. which have the pyramidal numbers for their ſucceſſive denominators; and the limit of the ſum of this *progreſſion* is $\frac{1}{2}$. In the ſame manner, the limit of the ſum of the fractions having unity for their common numerator, and the ſigurate numbers of any order denominated by *m* for their ſucceſſive denominators, is found to be $\frac{m-1}{m-2}$.

The ſame ſeries 1, $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{5}$, &c. being again aſſumed, the differences of the alternate terms are $\frac{1}{2}$, $\frac{1}{6}$, $\frac{1}{12}$, $\frac{1}{20}$, &c. the limit of the ſum of which *progreſſion* is $\frac{1}{2}$. Dividing each term by 2, the limit of the ſum of $\frac{1}{2}$, $\frac{1}{6}$, $\frac{1}{12}$, $\frac{1}{20}$, &c. is $\frac{1}{4}$. If we take the differences of the firſt term, and that whoſe place is *m*, the ſecond term, and that whoſe place is $m+1$, &c. the common numerator of thoſe differences will be $m-1$; and their ſucceſſive denominators, the products of $1 \times m$, $2 \times m+1$, $3 \times m+2$, and the limit of the ſum of this *progreſſion* is the ſum of as many terms $1+\frac{1}{2}+\frac{1}{3}$, &c. as there are units in $m-1$. Now if each term of the new *progreſſion* be divided by $m-1$, that unity may be the common numerator, the terms $\frac{1}{m}$, $\frac{1}{2 \times m+2}$, $\frac{1}{3 \times m+2}$, &c. will ariſe, the limit of which is equal to the ſum of the fractions 1, $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, &c. (continued till their number be $m-1$) divided by $m-1$. In like manner, by aſſuming other alternate, or any equivalent terms of the ſeries 1, $\frac{1}{2}$, $\frac{1}{3}$, &c. we may form new *progreſſions*, the value of which may be found. Thus, if we take the terms 1, $\frac{1}{3}$, $\frac{1}{5}$, $\frac{1}{7}$, &c. paſſing over three terms, and divide the ſucceſſive differences of theſe terms by 96, we ſhall have the ſeries $\frac{1}{1.2.4}$, $\frac{1}{5.6.24}$, $\frac{1}{9.10.24}$, $\frac{1}{13.14.24}$, &c. which is equivalent to the ſeries C, given by Monſ. de Monmort, in the Philoſophical Tranſactions, N° 353, p. 651, viz. $C = \frac{1}{1.2.3.4.5} + \frac{14}{5.6.7.8.9} + \frac{55}{9.10.11.12.13} + \frac{140}{13.14.15.16.17} +$ &c. the ſum of which will therefore be $\frac{1}{96}$. And if we take the alternate terms of the ſeries $\frac{1}{3}$, $\frac{1}{15}$, $\frac{1}{35}$, $\frac{1}{63}$, &c. above mentioned, and divide the ſucceſſive differences of the terms by 2, we ſhall have the ſeries $\frac{5}{2.12}$, $\frac{9}{12.30}$, $\frac{13}{30.56}$, &c. which is equivalent to the ſeries $\frac{5}{1.2.3.4}$, $\frac{9}{3.4.5.6}$, $\frac{13}{5.6.7.8}$, $\frac{17}{7.8.9.10}$, &c. mentioned in the ſaid Philoſophical Tranſactions, and marked A, the ſum or limit of which, by the foregoing rule, will be $\frac{1}{3}$. So the limit of Mr. Monmort's ſeries $B = \frac{1}{1.2.3.4.5} + \frac{4}{4.5.6.7.8}$, &c. will be $= \frac{1}{108}$. See Maclaurin's Fluxions, art. 356, where there is an error of the preſs, in p. 296. l. 11. and 15. for the ſeries, which in line 11. is ſaid to be Mr. Monmort's ſeries B, is the ſeries A, p. 651. of the Philoſophical Tranſactions, N° 353 aforeſaid; ſo in line 15, for A, read B.

This may ſuffice to ſhew how the ſums of *progreſſions* ſo derived may be found. We refer, for the further application of theſe principles, to the aforeſaid Treatiſe of Fluxions, art. 357, &c. Mr. Stirling's Treatiſe of the Summation of Series, ought alſo to be conſulted, as he has improved the method of approximating to the value of *progreſſions*, which often ariſe in the ſolution of problems. See alſo Mr. de Moivre's Miſcellanea Analytica, and particularly the ſupplement to that work. Methodus Differentialis: ſive Tractatus de Summatione et Interpolatione Serierum infinitarum. Lond. 1730. 4to.

PROGRESSION, *arch of a.* See ARCH.

PROGYMNASMATA, προγυμνασματα, in *Antiquity*, certain preparatory exerciſes performed by all thoſe who offered themſelves to contend in the Olympian games.

PROHIBITED *goods*, in *Commerce*, ſuch commodities as are not allowed to be either imported or exported. See CONTRABAND.

PROHIBITIO *de vaſto directa parti*, is a writ judicial, directed to the tenant, *prohibiting* him from making waſte upon the land in controverſy, during the ſuit. It is ſometimes alſo directed to the ſheriff.

PROHIBITION, *prohibitio*, the act of forbidding, or inhibiting any thing.

It is the *prohibition* of the law that makes the ſin; a tef-

tator frequently bequeaths things with a *prohibition* to alienate.

PROHIBITION, in *Common Law*, denotes a writ iſſued out of the chancery, the king's bench, common pleas, or exchequer, to forbid ſome other court, either ſpiritual or ſecular, to proceed in a cauſe there depending; upon ſuggeſtion, that the cognizance thereof belongeth not to that court.

It is now uſually taken for that writ which lieth for one who is impleaded in the court Chriſtian, for a cauſe belonging to the temporal juriſdiction, or the cognizance of the king's courts; whereby, as well the party and his counſel, as the judge himſelf, and the regiſter, are forbid to proceed any further in that cauſe.

PROHIBITO, in the *Italian Muſic*, is a term applied to ſuch parts of a piece as are not proper, or according to juſt rule. Thus *intervallo prohibito* is every interval in melody that does not paſs the ear eaſily or naturally, to give it ſome pleaſure; ſuch are the tritone, the ſixth major, the ſeventh, ninth, &c. though, under certain circumſtances, even theſe have pleaſing effects, in that by their harſhneſs they render the ſubſequent concords more agreeable.

PROJECTILE, or PROJECT, in *Mechanics*, a heavy body, which, being put into a violent motion by an external force impreſſed thereon, is diſmiſſed from the agent, and left to purſue its courſe.

Such, e. gr. is a ſtone thrown out of the hand or a ſling, an arrow from a bow, a bullet from a gun, &c.

PROJECTILES, *the cauſe of the continuation of the motion of*, or what it is determines them to perſiſt in motion, after the firſt cauſe ceaſes to act, has puzzled the philoſophers. See MOTION and COMMUNICATION.

The Peripatetics account for it from the air, which, being violently agitated by the motion of the *projecting* cauſe, e. gr. the hand and ſling, and forced to follow the *projectile*, while accelerated thereby, does, upon the diſmiſſion of the *projectile*, preſs after it, and protrude it forward, to prevent a vacuum.

The modern account for the motion of *projectiles* on a much more rational and eaſy principle; it being, in effect, a natural conſequence from one of the great laws of nature; viz. that all bodies, being indifferent as to motion or reſt, will neceſſarily continue the ſtate they are put into, except ſo far as they are hindered, and forced to change it by ſome new cauſe.

Thus a *projectile*, put in motion, muſt continue to move eternally on in the ſame right line, and with the ſame velocity, were it to meet with no reſiſtance from the medium, nor had any force of gravity to encounter.

The doctrine of the motion of *projectiles* is the foundation of all gunnery.

PROJECTILES, *laws of the motion of*. I. If a heavy body be *projected* perpendicularly, it will continue to aſcend or deſcend perpendicularly; becauſe both the *projecting* and the gravitating force are found in the ſame line of direction.

II. If a heavy body be *projected* horizontally, it will, in its motion, deſcribe a parabola; the medium being ſuppoſed void of reſiſtance.

For the body is equally impelled by the impreſſed force, according to the right line AR (*Tab.* VI. *Mechanics*, *fig.* 97.), and by the force of gravity according to the right line AC, perpendicular thereto. While then the body, by the action of the impreſſed force, is arrived in Q; by the force of gravity it will be arrived through QM; and therefore will be found in M. But the motion, in the direction AR, will ſtill be uniform (ſee MOTION); and, therefore, the ſpaces QA and *q*A are as the times; and the ſpaces QM, *q m*, are likewiſe as the ſquares of the times (ſee ACCELERATION); therefore, $AQ^2 : A\,q^2 :: QM : q\,m$. That is, $PM^2 : p\,m^2 :: AP : A\,p$.

The courſe or path therefore, AM*m*, of a heavy body *projected* horizontally, is a PARABOLA.

Two hundred years ago the philoſophers took the line deſcribed by a body *projected* horizontally, e. gr. a bullet out of a cannon, while the force of the powder exceeded the weight of the bullet conſiderably, to be a right line; after which it became a curve.

N. Tartaglia was the firſt who perceived the miſtake, and maintained the path of the bullet to be a crooked line, throughout its whole extent; but it was Galileo who firſt determined the preciſe curve which the bullet deſcribed; and ſhewed the path of the bullet, *projected* horizontally from an eminence, to be a parabola; the vertex whereof is the point where the bullet quits the cannon. See GUNNERY.

III. If a heavy body be *projected* obliquely, either upwards or downwards, in a medium void of reſiſtance, it will likewiſe deſcribe a parabola.

Suppoſe a body projected in the direction AR (*Tab.* IV. *Mechanics*, *fig.* 47.) with the velocity it would have acquired by falling from D to A, the body, by that force alone acting upon it, would uniformly deſcribe the right line AR; and any part of the line of direction, as AR, repreſents the time in which it would be deſcribed. In the ſame time let the force of gravity, acting alone, carry the body from A to S, and, completing the parallelogram ASBR, at the end of the time repreſented by AR, the body will actually be found in B. Since, then, the time in which the body falls from D to A is the ſame in which it would deſcribe 2AD by an uniform motion, with a velocity equal to that acquired at A, that time will be repreſented by 2AD. But the time in which the body would fall from A to S being repreſented by AR, it follows, that $AS : AD :: AR^2 : 4AD^2$; and $4AD \times AS = AR^2 = SB^2$; whence it appears, that the point B is a point in the parabola, whoſe diameter is AS, and vertex A, having the parameter of that diameter equal to 4AD.

Hence, 1. The parameter of the diameter of the parabola, AS, i. e. 4AD, is a third proportional to the ſpace through which the body deſcends in any given time, and the celerity, which is meaſured by the ſpace paſſed over in the ſame time; i. e. to AP and AQ, or AS and AR.

2. Since the ſpace deſcribed by a body falling perpendicularly, is 15 ½ Paris feet, or 16 feet 1 inch London meaſure, it is a ſecond; the parameter of the diameter of the parabola to be deſcribed is found, if the ſquare of the ſpace paſſed over by the *projectile* with the impreſſed force in a ſecond, be divided by 15 ½ Paris, or 16 feet 1 inch London meaſure.

3. Since 4AD is the parameter of the diameter AS, it follows, that the parameters belonging to the vertex A of the diameter AS, are always in the duplicate ratio of the velocities of the projection, the ſpace AD being always as the ſquare of the velocity acquired by falling from D to A; and if then the velocity of the *projectiles* be the ſame, the ſpaces deſcribed in the ſame time by the force impreſſed, are equal; conſequently the parameter of the parabolas paſſed over by the compound motion is the ſame, whatever the direction AR of the *projectile* be.

4. If from the parameter of the diameter be ſubtracted quadruple the altitude of the parabola, the remainder is the parameter of the axis; the fourth part whereof is the diſtance of the vertex of the axis from the foci of the parabola. Hence the celerity of the *projectile* being given, the parabola deſcribed by the *projectile* may be laid down on paper.

5. If from A (*Tab.* VI. *Mechanics*, *fig.* 98.) as a centre, you deſcribe the ſemicircle BQI, its circumference will be the locus of all the foci of the parabolas that can be deſcribed by a *projectile* thrown from A, with the velocity it could acquire in falling from B to A; for, by a well known property of the PARABOLA, the diſtance of the focus from A is always equal to ¼ of the parameter of the diameter that paſſes through A, i. e. to ½ of 4AB, or AB itſelf. All the foci muſt, therefore, be found in the ſemicircle BQI.

6. Hence it is eaſy to determine the parabola deſcribed, when the direction of the *projectile* is given; for, drawing AF ſo as to make the angle FAD equal to the given one DAB, which the direction AD makes with the perpendicular AB, the point F, where AF cuts the ſemicircle BQI, will be the focus required; and if through F be drawn the line FN parallel to AB, cutting the directrix BE in N, this line will be the axis, I, the middle point between F and N, will be the vertex of the parabola, and 4FI the parameter of the axis.

7. If a line be drawn through the vertex I parallel to the directrix, meeting AB in C, it muſt be biſected by the line of direction in D; and if a line be drawn from the focus F to D, it will be perpendicular to the tangent, and will paſs through B, if produced; and, therefore, a ſemicircle deſcribed upon AB as a diameter, will always paſs through the point D, where the line of direction cuts CI, the tangent to the vertex of the parabola. The line of direction of the *projectile* AH is a tangent to the parabola in A; becauſe it is parallel to the ordinate PM. And it appears, that the *projectile* continually aſcends, till its direction becomes parallel to the horizon, and then it begins to deſcend; and, therefore, the higheſt point of a curve is where its tangent is parallel to the horizon. Huygens, ſuppoſing that the reſiſtance was proportional to the velocity of the moving body, concluded that the line deſcribed by it would be a kind of logarithmic curve. But ſir Iſaac Newton having clearly proved, that the reſiſtance of the line is not proportional to the velocity itſelf, but to its ſquare, ſhews, in his Principia, that the line a *projectile* deſcribes, approaches nearer to an hyperbola than a parabola. The late Mr. John Bernoulli conſtructed this curve by means of the quadratures of ſome

RAB; consequently, AIQ is double the angle of elevation; and, therefore, CQ, the fourth part of the amplitude, is the right line; AC the altitude of the range, the verſed ſine of double the angle of elevation.

XX. The altitude *rm* of a caſt, or its amplitude AB, together with the angle of elevation RAB, being given, to find the velocity wherewith the *projectile* firſt moved, that is, the altitude AD, in falling from whence it would acquire the like velocity. Since AC=*rm* is the verſed ſine, CQ=½AB, the right ſine of double the angle of elevation AIQ; to the verſed ſine of double the angle of elevation, find the whole ſine, and the height of the caſt. Or, to the right ſine of double the angle of elevation, the whole ſine, and the fourth part of the amplitude, find a fourth proportional. This will be the radius IQ or IA; the double whereof, AD, is the altitude required. See Wolfii Elem. Mathem. tom. ii. cap. 11. Gray's Treat. of Gunnery, 1731, and Maclaurin's View, &c. quarto, p. 102, &c.

The theory of *projectiles*, as delivered by almoſt all writers on gunnery ſince Galileo, proceeds on the ſuppoſition, that the flight of ſhot and ſhells is nearly in the curve of a parabola. Galileo, indeed, has ſhewn that, independently of the reſiſtance of the air, all *projectiles* would in their flight deſcribe a parabola; and did propoſe ſome means of examining what inequalities would ariſe from that reſiſtance. So that it might have been expected, that thoſe who came after him would have tried how far the real motions of *projectiles* deviated from a parabolic tract, in order to have decided how far the reſiſtance of the air was to be attended to, in the determinations of gunnery. But, inſtead of proceeding thus cautiouſly, ſubſequent writers have boldly aſſerted, that no conſiderable variation could ariſe from the reſiſtance of the air, in the flight of ſhells and cannon-ſhot; whence it became an axiom, almoſt generally acquieſced in, that the flight of theſe bodies is nearly in the curve of a parabola.

However it was proved by D. Bernoulli, that the reſiſtance of the air has a very great effect on ſwift motions, ſuch as thoſe of cannon-ſhot. He concludes from experiment that a ball which aſcended only 7819 feet in the air, would have aſcended 58750 feet in vacuo. See Comment. Acad. Petrop. tom. ii. See RESISTANCE.

Practical gunners alſo unanimouſly agree, that every ſhot flies in a ſtraight line to a certain diſtance from the piece, which imaginary diſtance they call the extent of the point-blank ſhot.

This flight in a ſtraight line, indeed, ſuppoſing it fact, would be not only a refutation of the parabolic hypotheſis, but a moſt unaccountable difficulty in itſelf, as implying a ſuſpenſion of the action of gravity. But the great velocity of cannon-ſhot, aſſigned by Mr. Robins, ſeems readily to clear up this affair. We need only ſuppoſe, that within the diſtance thus determined by practical gunners, the deviation of the path of the ſhot is not very perceptible in their way of pointing. Now as a ſhot of 24lb. fired with two thirds of its weight in powder, will, at the diſtance of five hundred yards from the piece, be ſeparated from the line of its original direction, by an angle of little more than half a degree; thoſe who are acquainted with the inaccurate methods often uſed in the directing of cannon, will eaſily allow, that ſo ſmall an aberration as this, may, by the generality of practitioners, be unattended to, and the path of the ſhot may conſequently be deemed a ſtraight line, eſpecially as other cauſes of error will often intervene, much greater than what ariſes from the incurvation of this line by gravity. See New Princip. of Gunnery, p. 140.

How raſh and erroneous the opinion of the inconſiderable reſiſtance of the air is, will eaſily appear from what is eſtabliſhed by that ingenious author, who has ſhewn that this reſiſtance to a cannon ball amounts to more than twenty times the weight of the ball. What errors may not be expected from an hypotheſis which neglects this force, as inconſiderable? In effect, it will not be difficult to ſhew, that the track deſcribed by the flight of ſhot or ſhells, is neither a parabola nor nearly a parabola. For by that author's experiments it appears, that a muſket ball of three-fourths of an inch diameter, fired with half its weight of powder from a piece forty-five inches long, moves with the velocity of near 1700 feet in a ſecond. Now, by the common parabolic theory, if this ball flew in the curve of a parabola, its horizontal range at 45° would be found to be about ſeventeen miles. But from practical writers, as Diego Uſano, and Merſennus, it appears, that this range is ſhort of half a mile; ſo that a muſket-ſhot at 45° elevation, with a reaſonable charge of powder, flies not the ⅓ part of the diſtance it ought to do, if it moved in a parabola.

Not is this great diminution of the horizontal range to be wondered at, when it is conſidered that the reſiſtance of the air to this bullet, when it firſt iſſues from the piece, amounts to one hundred and twenty times its gravity.

Again, if the flight of the heavieſt ſhot, in common uſe for land ſervice, as of iron bullets of 24lb. weight be examined, it will appear, that ſuch a ſhot made with a full charge of powder has a velocity of 1650 feet in 1″. And the horizontal range at 45° of this ſhot, would, according to the parabolic hypotheſis, be about fifteen miles; but by the experiments of Sir Remy it appears, that the range is really ſhort of three miles; which is not one fifth of the diſtance it ought to fly, if it deſcribed the curve of a parabola.

And this deviation from the parabola, happens not only in theſe great velocities, but in ſuch as are much leſs; thus in velocities of about 400 feet in 1″, by ſeveral experiments it appears, that the range of a leaden bullet of three fourths of an inch in diameter, fired at different elevations with this velocity, did not at all anſwer the common theory. So that it ſufficiently appears that this theory, or the ſuppoſition of the inconſiderableneſs of the air's reſiſtance to *projectiles*, is falſe.

Indeed the falſeneſs of this hypotheſis almoſt appears at ſight, even in *projectiles* ſlow enough to have their motion traced by the eye; for there are who do not deſcend through a curve manifeſtly ſhorter and more inclined to the horizon that that in which they aſcended, and the higheſt point of their flight, or the vertex of the curve, is much nearer to the place where they fall on the ground than to that from whence they were at firſt diſcharged. Theſe things cannot be a moment doubted of by any one, who in a proper ſituation views the flight of ſtones, arrows, or ſhells, thrown to any conſiderable diſtance. See New Princip. of Gunnery, part. 2. prop. 6.

What is here advanced may be confirmed from the conſtant obſervation of all who are converſant in the practice of throwing bombs, viz. that the ranges at elevations below 45°, conſtantly exceed the ranges at elevations above 45°, which are reſpectively at an equal diſtance from 45°. Thus the range of ſhells at 15°, will go farther than one at 60°, and ſo a range at 20° exceeds one at 65°, &c. but it is known that in the parabolic hypotheſis theſe ought to be equal; which hypotheſis is therefore falſe.

Mr. Robins has not only detected the errors of the parabolic theory of gunnery, which takes no account of the reſiſtance of the air, but ſhews how to compute the real range of reſiſted bodies: for the method which he propoſes and the tables he has computed for this purpoſe, we muſt refer to his Tracts of Gunnery, p. 183, &c. vol. I. of Math. Tracts; and alſo to Euler's True Principles of Gunnery, tranſlated with explanations and remarks by Mr. H. Brown, in 1777. See *Pointing of a Gun*.

There is an odd phenomenon in the motion of bodies projected with conſiderable force, which ſhews the great complication and difficulty of this ſubject. The phenomenon is, that bullets in their flight are not only depreſſed beneath their original direction by the action of gravity, but are alſo frequently driven to the right or left of that direction by the action of ſome other force.

If it was true that bullets varied their direction by the action of gravity only, then it ought to happen that the errors in their flight to the right or left of the mark they were aimed at, ſhould increaſe in the proportion of the diſtance of the mark from the piece only. But this is contrary to all experience; the ſame piece which will carry its bullet within an inch of the intended mark, at ten yards diſtance, cannot be relied on to ten inches in one hundred yards, much leſs to thirty inches in three hundred yards.

Now this inequality can only ariſe from the track of the bullet being incurvated ſideways as well as downwards; for by this means the diſtance between the incurvated line and the line of direction, will increaſe in a much greater ratio than that of the diſtance; theſe lines being co-incident at the mouth of the piece, and afterwards ſeparating in the manner of a curve from its tangent, at the mouth of the piece be conſidered as the point contact.

This is put beyond diſpute from the experiments made by Mr. Robins; who informs us, that having taken a barrel carrying a ball of three-fourths of an inch diameter, and fixing it on a heavy carriage, he ſatisfied himſelf of the ſteadineſs and truth of its direction, by firing at a board one foot ſquare, at the diſtance of one hundred and eighty feet, and mſſed it but once in fifteen ſucceſſive ſhot. Now the ſame barrel being fixed on the ſame carriage, and fired with a ſmaller quantity of powder, ſo that the ſhock on the diſcharge would be much leſs, and conſequently the direction leſs changed, he found that at ſeven hundred and ſixty yards diſtance the ball flew ſometimes one hundred yards to the right of the line it was pointed on, and at other times one hundred yards to the left. He found too, that its direction in the perpendicular line was not leſs uncertain, it falling one time above two hundred yards ſhort of what it did

at another; although, by the nicest examination of the piece after the discharge, it appeared not to have the least swerved from the position it was placed in.

If it be asked, what can be the cause of a motion so different from what has been hitherto supposed? It may be answered, that the deflexion in question must be owing to some power acting obliquely to the progressive motion of the body, which power can be no other than the resistance of the air. And this resistance may perhaps act obliquely to the progressive motion of the body, from inequalities in the resisted surface; but its general cause is doubtless a whirling motion acquired by the bullet about its axis; for by this motion of rotation, combined with the progressive motion, each part of the bullet's surface will strike the air in a direction very different from what it would do if there was no such whirl; and the obliquity of the action of the air arising from this cause will be greater, according as the rotatory motion of the bullet is greater in proportion to its progressive motion. Principles of Gunnery in Tracts, vol. i. p. 149, &c. Professor Euler, on the contrary, attributes this deflexion of a bullet to its figure, and scarce at all to its rotation; for, if the bullet was perfectly round, though its centre of gravity did not coincide with its centre of magnitude, the deflection from the axis of the cylinder, or line of direction sideways, would be very inconsiderable. If such a ball goes to the right or left of an object, it is a sure sign, that the object does not lie in the same vertical plane with the axis of the piece. But if it be not round, it will generally go to the right or left of its direction, and so much the more, as it goes farther from the piece. He infers from his reasoning on this subject, that cannon-shot, which are made of iron, and rounder and less susceptible of a change of figure in passing along the cylinder than those of lead, are more certain than musket-shot. True Principles of Gunnery investigated, &c. 1777, p. 308, &c. See Rifle-gun.

PROJECTING *table*. See Table.

PROJECTION, in *Mechanics*, the action of giving a projectile its motion.

If the direction of the force whereby the projectile is put in motion, be perpendicular to the *horizon*, the *projection* is said to be *perpendicular*; if parallel to the apparent horizon, it is said to be an *horizontal projection*; if it make an oblique angle with the horizon, the *projection* is oblique. The angle A B B (*Tab.* IV. *Mechan.* fig. 43.) which the line of direction A B makes with the horizontal line A B, is called the *angle of elevation of the projectile*.

PROJECTION, in *Perspective*, denotes the appearance, or representation of an object on the perspective PLANE.

The *projection*, or *draught* of a point, as A (*Tab. Perspect.* fig. 32.) is a point a, through which the optic ray O A passes from the objective point through the plane to the eye; or it is the point wherein the plane cuts the optic ray.

And hence is easily conceived what is meant by the *projection* of a line, a plane, or a solid.

PROJECTION *of the sphere in plano*, is a representation of the several points or places of the surface of the sphere, and of the circles described thereon, or of any assigned parts thereof, such as they appear to the eye situate at a given distance, upon a transparent plane placed between the eye and the sphere.

For the laws of this *projection*, see PERSPECTIVE; the *projection of the sphere* being only a particular case of perspective.

The principal use of the *projection* of the sphere is in the construction of planispheres, and, particularly, maps and charts; which are said to be of whatever kind *projection*, according to the several situations of the eye, and the perspective plane, with regard to the meridians, parallels, and other points and places to be represented.

The most usual *projection* of maps of the world is that on the *plane of the meridian*, which exhibits a *right sphere*; the next is that on the *plane of the equator*, wherein the pole is in the centre, and the meridians the radii or a circle, &c. This represents a parallel sphere.

See the application of the doctrine of the *projection of the sphere* to the construction of the various kinds of maps, under MAP.

The *projection of the sphere* is usually divided into *orthographic* and *stereographic*; to which may be added *gnomonic*.

PROJECTION, *orthographic*, is that wherein the hemispheres of the sphere is drawn on a plane, cutting it in the middle; the eye being placed at an infinite distance vertically to one of the hemispheres.

PROJECTION, *figures of the orthographic*. 1. The rays, by which the eye, as at infinite distance, perceives any object, are parallel.

2. A right line, perpendicular to the plane of the *projection*, is projected into a point, where that right line cuts the plane of the *projection*.

3. A right line, as AB, or CD, (*Tab.* IV. *Persped. fig.* 57.) not perpendicular, but either parallel or oblique to the plane of the *projection*, is projected into a right line, as EF, or GH, and is always comprehended between the extreme perpendiculars A E, and B F; or C G and D H.

4. The *projection* of the right line A B is the greatest, when A B is parallel to the plane of the *projection*.

5. Hence it is evident, that a line parallel to the plane of the *projection*, is projected into a right line equal to itself; but if it be oblique to the plane of the *projection*, it is projected into one which is less.

6. A plane surface, as A B C D (*fig.* 58.) at right angles to the plane of the *projection*, is projected into that right line, e.g. A B, in which it cuts the plane of the *projection*.

Hence it is evident, that the circle B C A D, standing at right angles to the plane of the *projection*, which passes through its centre, is projected into that diameter A B, in which it cuts the plane of the *projection*.

It is likewise evident, that any arch as C g is projected into O c, equal to C e, which is the right line of that arch; and the complemental arch e A is projected into e A, the versed line of the same arch C e.

7. A circle parallel to the plane of the *projection* is projected into a circle equal to itself, whose centre is the centre of the *projection*, and radius equal to the cosine of its distance from the plane; and a circle oblique to the plane of the *projection* is projected into an ellipsis, whose greatest diameter is the *projection* of that diameter of the given oblique circle, which is parallel to the plane of *projection*, and the least diameter is equal to double the cosine of the obliquity of the circle, the greater diameter being radius.

PROJECTION, *perspective*, is that where in the surface and circles of the sphere are drawn upon a plane by a great circle, the eye being in the pole of that circle.

PROJECTION, *properties of the stereographic*. 1. In this *projection*, a right circle is projected into a line of half-tangents.

2. The representation of a right circle, perpendicularly opposed to the eye, will be a circle in the plane of the *projection*.

3. The representation of a circle, placed oblique to the eye, will be a circle in the plane of the *projection*.

4. If a great circle be to be projected upon the plane of another great circle, its centre will lie in the line of measures, distant from the centre of the primitive by the tangent of its elevation above the plane of the primitive.

5. If a lesser circle, whose poles lie in the plane of the *projection*, were to be projected, the centre of its representation would lie in the line of measures, distant from the centre of the primitive by the secant of the lesser circle's distance from its pole, and its semidiameter, or radius, be equal to the tangent of that distance.

6. If a lesser circle were to be projected, whose poles lie not in the plane of the *projection*, its diameter in the *projection*, if it falls on each side of the pole of the primitive, will be equal to the sum of the half-tangents of its greatest and nearest distance from the pole of the primitive; let each way from the centre of the projection in the line of measures.

7. If the lesser circle to be projected fall entirely on one side of the pole of the *projection*, and not encompass it, then will its diameter be equal to the difference of the half-tangents of its greatest and nearest distance from the pole of the primitive, let off from the centre of the primitive each way, and the same ways be the line of measures.

8. In the *stereographic projection*, the angles made by the circles of the surface of the sphere, are equal to the angles made by their representations in the plane of their *projection*. See Stereographic *Projection*.

PROJECTION, *gnomonic, of the sphere*. See Gnomonic *Projection*, and Dialling.

PROJECTION, *Mercator's*. See Mercator, and Chart.

PROJECTION *of spheres, &c.* See Globe, &c.

PROJECTION, *polar*. See Polar.

PROJECTION *of shadows*. See Shadow.

PROJECTION, in *chemistry*, the casting of a certain imaginary powder, called *powder of projection*, into a crucible, or other vessel, full of fluxe prepared metal, or other matter; which is to be hereby presently transmuted into gold.

PROJECTION, *powder of*, or of the philosopher's stone, is a powder supposed to have the virtue of changing any quantity of an imperfect metal, as copper or lead, into a more perfect one, as silver or gold, by the admixture of a little quantity thereof.

The mark to which alchemists direct all their endeavours, is to find the *powder of projection*, which every one of them has been within an ace of, a hundred times.

For the characters, properties, virtues, &c. of this powder, &c. see Philosopher's *Stone*.

PROJECTION, in *Building*. See Projecture.

PROJECTIVE *dialling*, a manner of drawing, by a method of projection, the true hour-lines, furniture of dials, &c. on any kind of surface whatsoever, without any regard had to the situation of those surfaces, either as to declination, reclination, or inclination. See DIALLING.

PROJECTURE, in *Architecture*, the out-jetting, or prominence, which the mouldings and members have, beyond the plane or NAKED of the wall, COLUMN, &c.

These, the Greeks call *scpbora*, the Italians *sporti*, the French *saillies*, our workmen frequently *sailings over*, and the Latins *projecta*, from *projicio*, *I cast forward*; whence the English *projecture*.

Vitruvius gives it as a general rule, that all the *projecting* members in buildings have their *projectures* equal to their heights: but this is not to be understood of the particular members or mouldings, as dentils, coronas, the fasciæ of architraves, the abacus of the Tuscan and Doric capital, &c. but only of the *projectures* of entire cornices, &c. The great point of building, according to some modern architects, consists in knowing how to vary the proportions of *projectures*, &c. agreeably to the circumstances of the building.

Thus, say they, the nearness and remoteness, making a difference in the view, require different *projectures*; but it is evident the ancients had no such intention.

The *projecture* of the base and cornice of pedestals, M. Perrault observes, is greater in the antique than the modern buildings by one-third; which seems to follow, in good measure, from the ancients proportioning this *projecture* to the height of the pedestals; whereas the moderns make the *projecture* the very same in all the orders, though the height of the pedestal be very different.

The reason of this change, which the moderns have made of the antique, the same author refers to a view of the appearance of solidity.

PRO INDIVISO, in *Law*, a possession or occupation of lands or tenements, belonging to two or more persons, whereof none can say which is his several portion, each having the whole, &c. as co-parceners before partition.

PROLABIA, *fore-lips*, a term in *Anatomy* for that part of the labia or lips which jets out.

PROLAPSUS *oculi*, in *Surgery*, a distemperature of the eye, in which it is so violently inflamed and swelled, that it cannot be retained in its orbit or socket, but protrudes itself out of its natural seat. This disorder is not only attended with great deformity, but also intense pains, blindness, and too often an obstinate cancer are the effects of it. This is sometimes so violent in degree, that the eye bursts out of its coats.

This disorder sometimes arises from inflammations, or redundancy of humours; and sometimes from external violence, or from a cancer. Sometimes, when the disorder is recent, and but in a moderate degree, it may be carried off by bleeding, blistering, and purging, with external applications, as fomentations, and the like. When it will give way to none of these, the tumour must be opened, and the humours discharged, and this repeated as often as necessary; after every dressing, binding on a plate of lead, hollowed in a proper degree.

When the natural figure of the eye, and its office of vision, are wholly destroyed by this disease, and the pains become more intense, there is no way left but to make a large incision, and let out the humours of the eye, and afterwards cut away so much of it, that the remainder may be covered with the eye-lid. Heister's Surg. p. 427.

PROLAPSUS *uvulæ*. The *uvula* is sometimes so much enlarged and elongated, as to reach the larynx and pharynx, and obstruct the actions both of respiration and deglutition, as well as of speech. If it proceeds from a recent inflammation, the patient may be relieved by bleeding and cooling gargles, with sal ammoniac and alum; scarifications are also very very useful in this case, to prevent its spreading and inflammation.

When, on the other hand, this part is too much enlarged and elongated by phlegmatic humours, it appears white, and free from pain and inflammation, and is most relieved by a gargle of spirit of wine and water warm, or a decoction of red roses, or the like astringent substances with spirit of wine, or spirit of sal ammoniac, added in small quantities to them.

A powder of ginger, pepper, and pomegranate peel, may also be applied; but when all these methods prove ineffectual, the only remaining one is, to take off as much of the *uvula* as is necessary, either by ligature or by the scissars. This latter is much the easier and better way; and the great caution necessary in it is, neither to take off too much nor too little of the *uvula*. For, if too much be taken off, the patient's voice will be the worse for it afterwards; and if too little, he will be very little the better for the operation.

This is a very common disorder among the peasants in Norway, and they have invented a machine with a hole in it, to let through a proper portion of the *uvula* when the whole is thrust into the mouth, and a string knit, which cuts off just as much as is let through. The surgeons have copied and improved on this invention. Heister's Surg. p. 170.

PROLAPSUS *ani, uteri*, &c. See PROCIDENTIA.

PROLATE, in *Geometry*, an epithet applied to a spheroid produced by the revolution of a semi-ellipsis about its longer diameter.

If the solid be formed by the revolution of a semi-ellipsis about its shorter diameter, it is called an *oblate spheroid*; of which figure is the earth we inhabit, and, perhaps, all the planets too; having their equatorial diameter longer than the polar. See SPHEROID.

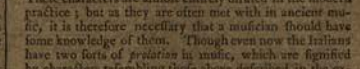
PROLATION, in *Music*, generally signifies singing as opposed to pausing or resting. More particularly it denotes singing by the notes that most frequently occur, viz. minims: or it is that admeasurement in which the semibreves are broken into minims.

Grallineau is, therefore, mistaken, when he calls *prolation* the art of shaking or making several inflexions of the voice on the same note or syllable; for this was a practice unknown to the ancients, and not introduced till the middle of the last century. Hawkins's Hist. of Music, vol. ii. p. 136.

The signs by which the modern ancients used to signify a *prolation* to be made on any note, was a point in a circle or semi-circle, thus, ⊙, ☾. This point was the length of a semibreve and minim.

Prolation was either *perfect* or *imperfect*. *Perfect prolation* was marked after the clef, as above, and then the semi-breve contained three minims, for which reason they placed the figure 3, or ⅓, or ⅔, after the circle, to signify that three such notes were required to a bar. See example A.

Imperfect prolation was marked with the same characters, but without points, and then the semi-breve contained but two minims. See example B.



A B

These characters are almost entirely disused in the modern practice; but as they are often met with in ancient music, it is therefore necessary that a musician should have some knowledge of them. Though even now the Italians have two sorts of *prolation* in music, which are signified by characters resembling those above described in the example A. The first they call *prolatione maggiore perfetta*, and it is marked thus, ⊙ and ⅔. The second they call *prolatione minore perfetta*, the characters of which are, ☾, or ⅔, or ⅓, but oftener C and ⅔; but in both cases the semi-breve contains a whole bar, and its pause the same; the minim one-third of the bar, and its pause the same; and so of the rest in proportion.

Prolation is also used for a series of several sounds or notes on the same syllable or vowel.

PROLECTATIO, a word used in chemistry to express an extraction of the finer substances of a mixed body by the attenuation of the subtler particles; so that these, being rarified, separate spontaneously from the rest, and leave the grosser and less valuable part in form of a residuum behind.

PROLEGOMENA, formed of προλεγω, *I preface*, or *speak before*, in *Philology*, certain preparatory observations, or discourses prefixed to a book, &c. containing something necessary for the reader to be apprised of, to enable him the better to understand the book, to enter deeper into a science, &c.

The generality of arts and sciences require some previous instructions, some *prolegomena*.

PROLEPSIS, προλαμβανω, or ANTICIPATION, a figure in *Rhetoric*, by which we anticipate, or prevent what might be objected by the adversary.

It serves likewise to conciliate the audience, while the speaker appears desirous to represent matters fairly, and not to conceal any objection which may be made against him.

Thus, *It may perhaps be objected*, &c. *You will ask*, &c. *But some men will say, How are the dead raised, or with what body do they come? Thou fool, that which thou sowest*, &c. Where the objection is turned into an argument against the adversary, as in the last instance, it is called *anastrophe*, or *inversio*. Where it is rejected as unsufferably absurd, it is called *apodioxis*.

PROLEPTIC, προληπτικος, denotes a periodical disease, which anticipates, or whose paroxysm returns sooner and sooner every time; as is frequently the case in agues, &c.

PROLES, (Lat.) in English progeny, are such issues as proceed

ceed from a lawful marriage; though if the word be used at large, it may denote others.

PROLIFIC, in *Medicine*, something that has the qualities necessary for generating. See FECUNDITY.

Some physicians pretend to distinguish whether or no the seed be *prolific*.

PROLIXITY, in *Discourse*, the fault of entering into too minute a detail, of being too long, precise, and circumstantial, to a degree of tediousness.

Prolixity is the vice opposite to conciseness and laconism.

Prolixity is a fault commonly charged on Guicchardini, Gassendus, &c. See METHOD.

PROLOCUTOR *of his convocation*, the speaker or chairman of that assembly.

The archbishop of Canterbury is, by his office, president or chairman of the upper house of convocation. The *prolocutor* of the lower is an officer chosen by the members the first day of their meeting, and is to be approved of by the higher.

It is by the *prolocutor* their affairs, debates, &c. are to be directed; and their resolutions, messages, &c. delivered to the higher house: by him all things propounded to the house are read, suffrages are collected, &c. See CONVOCATION.

PROLOGIA, Προλογια, in *Antiquity*, a festival celebrated by the inhabitants of Laconia, before they gathered their fruits.

The Romans also celebrated a feast of the same kind.

PROLOGUE, PROLOGUS, in *Dramatic Poetry*, a discourse addressed to the audience before the drama or play begins.

The word is formed from προ, *pro* *to* *or* *fore*, and λογος, *speech*, formed of λεγω, and λεγος, *verbum*.

The original intention of the *prologue* was to advertise the audience of the subject of the piece, and to prepare them to enter more easily into the action; and sometimes to make an apology for the poet.

The *prologue* is of a much more ancient standing than the epilogue. The French have left off the use of *prologues*, except in their operas; those few they now and then make having nothing in them of the genuine *prologue*, as bearing no relation to the subject, but being mere flourishes or harangues in praise of the king, &c.

In the ancient theatre, the *prologus* was properly the actor who rehearsed the *prologue*: the *prologue* was esteemed one of the dramatic persons, and never appeared in the piece in any other character; so that the learned are surprised to find Mercury, in Plautus's Amphitryo, speaking the *prologue*, and yet acting a considerable part in the play afterwards.

The *prologue*, therefore, among them, was a part of the piece; indeed, not an essential, but an accessary part. With us, the *prologue* is no part at all; but something entirely distinct and separate: with them the drama was opened with the appearance of the *prologue*; with us it is not opened till after the *prologue* is retired: with us therefore the curtain is kept close till after the *prologue*; with them it must have been withdrawn before.

Hence proceeds a still more considerable difference in the practice of the *prologue*; for with us the *prologue* speaks in his real or personal character: with them the *prologue* spoke in his dramatic character.

With us, he always directs his speech to the audience, considered as in a play-house; to pit, box, and gallery: with them, he ought, in propriety, to have spoken, as to a chorus of by-standers, or persons to be present at the real action: but this being in good measure inconsistent with the design of the *prologue*, those persons spoke in the dramatic capacity to the omission of its principal capacity; which was an irregularity that either the good fortune, or the good sense of the moderns, have freed them from.

They had three kinds of *prologues*; the first διαθεσις, wherein the poet delivered the argument of the piece; the second εντασις, wherein the poet recommended himself, or his piece, to the people; the third αναρρησις, wherein objections were obviated, &c.

PROLONGED *face*. See FACE.

PROLUSION, PROLUSIO, in *Literature*, a term applied to certain pieces, or compositions, made previously to others, by way of prelude or exercise.

Dionatus calls the Culex of Virgil, and his other *opuscula*, *proluviæ*; because written before the great ones. The *prolusions* of Strada are very ingenious pieces. The famous Mr. Huet, bishop of Avranches, had all Strada's *prolusions* by heart.

PROMACHIA, Προμαχια, in *Antiquity*, a festival in which the Lacedæmonians crowned themselves with reeds.

PROMALACTERION, the name of the first apartment in the hot baths of the ancients; this was a hot and close room, in which the person was kept a while before he plunged at once into the warm water.

PROMETHEIA, Προμηθεια, in *Antiquity*, an Athenian solemnity celebrated in honour of Prometheus, with torch-races, in remembrance that he was the first that taught men the use of fire.

PROMETHEUS, in the *Ancient Astronomy*, was the name of a constellation of the northern hemisphere, now called *Hercules*, or *Engonasis*.

PROMETHEUS, in *Mythology*, the son of Japetus, one of the Titans, and Clymene, according to Hesiod, or of Themis a according to Eschylus, whom the poets feign to have formed men of clay, and animated them by fire stole from heaven; at which Jupiter being angry sent Mercury to chain him to Mount Caucasus, and to set a vulture to his liver, which grew again as fast as it was devoured.

PROMISE, in *Law*, is when, upon a valuable consideration, a man binds himself, by his word, to do or perform such an act as is agreed on with another: it is in the nature of a verbal COVENANT, and wants nothing but the solemnity of writing and sealing to make it absolutely the same. If therefore, it be to do any explicit act, it is an express contract as much as any covenant, and the breach of it is an equal injury. The remedy, indeed, is not exactly the same; since instead of an action of covenant there lies only an action upon the case, for what is called the ASSUMPSIT or undertaking of the defendant; the failure of performing which is the injury done to the plaintiff, the damages whereof a jury are to estimate and settle.

By 29 Car. II. cap. 3. it is enacted, that in the five following cases no verbal *promise* shall be sufficient to ground an action upon, but at the least some note or memorandum of it shall be made in writing, and signed by the party to be charged therewith: 1. When an executor or administrator promises to answer damages out of his own estate. 2. Where a man undertakes to answer for the debt, default, or miscarriage of another. 3. Where any agreement is made, upon consideration of marriage. 4. Where any contract or sale is made of lands, tenements, or hereditaments, or any interest therein. 5. Where there is any agreement that is not to be performed within a year from the making of it. In all these cases a mere verbal *assumpsit* is void. Black. Com. book iii. p. 157, &c.

PROMISSORY *note*. See NOTE.

By 17 Geo. III. cap. 30. it is enacted, that all *promissory* or other notes, bills of exchange, or draughts, or undertakings in writing, being negotiable or transferrable, for the payment of 20*l.* or above that sum and less than 5*l.* or on which 20*l.* or above, and less than 5*l.* shall remain undischarged, shall specify the names and places of abode of the persons respectively to whom, or to whose order, the same shall be made payable, and shall bear date before or at the time of drawing or issuing thereof, but not in any day subsequent thereto, and shall be made payable within twenty-one days next after the day of the date thereof, and shall not be transferrable or negociable after the time thereby limited for payment; and every indorsement thereon shall be made before the expiration of that time, and shall bear date at or not before the time of making thereof, and shall specify the name and place of abode of the person to whom or to whose order the money is to be paid; otherwise such note, bill, or draught, or undertaking shall be void.

The publishing, uttering, or negociating notes, bills of exchange, draughts, or undertakings, contrary to this act is prohibited and restrained under the penalty of forfeiting not exceeding 20*l.* nor less than 5*l.* as by 25 Geo. III. cap. 51.

By 22 Geo. III. cap. 33. a stamp duty is charged upon inland bills of exchange, *promissory* notes, or other notes payable otherwise than upon demand; viz. of 3*d.* upon such as are under the value of 5*l.* and on those of 5*l.* and upwards, 6*d.*

PROMONTORY, in *Geography*, a high point of land, or rock, projecting out into the sea. The extremity of which to the seaward is usually called *ness*, or *head-land*.

PROMOTERS, PROMOTORES, in *Law*, those persons, who, in popular and penal actions, do prosecute offenders in their name and the king's; and are intitled to part of the fines and penalties for their pains.

These, among the Romans, were called *quadruplatores*, or *delatores*; in English also, *informers*.

Sir Thomas Smith observes, that *promotores* belong chiefly to the exchequer, and king's bench. My lord Coke calls them, *verberum famosorum genus*. 3 Inst.

PROMOTER *fiscal*. See INQUISITION.

PROMPT *payment*, ready money. See PAYMENT.

In many cases there is a discount for *prompt payment*.

PROMPTER, in the *Drama*, an officer posted behind the scenes, whose business is to watch attentively the actors speaking on the stage, in order to suggest and put them forward when at a stand, to correct them when amiss, &c. in their parts.

PROMULGATED, PROMULGED, PROMULGATUS, something published, or proclaimed.

In

In this sense we say the Jewish law was *promulgated* by Moses: the *promulgation* of the new law was chiefly effected by the apostles and disciples.

PROMUTHION, in *Rhetoric*. See FABLE.

PRONAOS, *πρόναος*, in the *Ancient Architecture*, a porch to a church, palace, or other spacious building.

PRONATION, among *Anatomists*. The radius of the arm has two kinds of motions; the one called *pronation*, the other supination.

Pronation is that whereby the palm of the hand is turned downwards: the opposite motion hereto, is called *supination*, whereby the back of the hand is downwards.

The word is formed from the Latin *pronus*, *prone*; that which lies on the forside, or with the face downwards. Mr. Winslow has advanced, that the *pronation* and supination of the hand are not effected solely by the motion of the radius; but that the cubitus, in most cases, contributes equally thereto; and that both these bones usually move at the same time. Vide Mem. Acad. R. Scienc. an. 1729. p. 36.

There are peculiar muscles, whereby the *pronation* is effected, called *pronators*. The radius has also two other muscles, called SUPINATORS, which have no opposite effect. See *Tab. Anat. Myol. fig.* 1. *n.* 27. *fig.* 2. *n.* 15.

PRONATOR *radii quadratus, brevis, seu transversus*, in *Anatomy*, a small fleshy muscle nearly as broad as it is long, lying transversely on the inside of the lower extremity of the fore-arm.

It is fixed by one side or edge in the long eminence, at the lower part of the internal angle of the ulna, and by the other in the broad concave side of the lower extremity of the radius. It is wholly fleshy, without any mixture of tendinous fibres. It is situated transversely, but that extremity which lies on the radius is nearer the carpus than that on the ulna. It is of a moderate thickness; the fibres nearest the surface are longest, the rest decreasing in proportion as they lie nearer the interval between the two bones, and the interosseous ligament. It has a ligamentary or tendinous fremum belonging to it, one end of which is fixed in the interosseous ligament, the other in the inner edge of the basis of the radius. Winslow.

PRONATOR *radii longus, seu obliquus*, a small muscle broader than it is thick, situated on the upper part of the ulna, opposite to the supinator brevis, with which it forms an angle like the letter V.

It is fixed to the internal condyle of the os humeri, partly by fleshy fibres, and partly by a tendon common to it with the ulnaris internus; from thence it passes obliquely before the extremity of the tendon of the biceps, and reaches to the middle part of the convex side of the radius; where it becomes flat, and is inserted below the supinator brevis, by an extremity almost wholly fleshy.

It is called *teres*, to distinguish it from the quadratus; but the name of *pronator superior* is much more proper: but that of *pronator obliquus* is certainly most proper of all. Winslow.

PRONG-*hoe*, in *Husbandry*, a term used to express an instrument used to *hoe* or break the ground near and among the roots of plants.

The ordinary contrivance of the *hoe* in England is very bad, it being only made for scraping on the surface; but the great use of *hoeing* being to break and open the ground, beside the killing of the weeds, which the ancients, and many among us, have thought the only use of the *hoe*, this dull and blunt instrument is by no means calculated for the purposes it is to serve.

The *prong-hoe* consists of two hooked points of six or seven inches long, and when struck into the ground will stir and remove it the same depth as the plough does, and thus answer both the ends of cutting up the weeds and opening the land.

The ancient Romans had an instrument of this kind, which they called the *bidens*; but they were afraid of its use in their fields and gardens, and only used it in their vineyards. The *prong-hoe* comes into excellent use even in the horse-hoeing husbandry; in this the *hoe*-plough can only come within three or four inches of the rows of the corn, turneps, and the like; but this instrument may be used afterwards, and with it the land may be raised and stirred even to the very stalk of the plant. Tull's Huſbam. See HOE, HOEING, and HUSBANDRY.

PRONOMÆA, a word used by some naturalists to express what is usually called the TRUNK, or proboscis in insects; an instrument somewhat resembling the trunk of an elephant, which most of those small animals are provided with, for the extracting the juices of plants, &c. destined for their food.

PRONOUN, PRONOMEN, in *Grammar*, a part of speech used instead of a noun, or name, as its substitute or representative.

Whence the denomination; from *pro*, and *nomen*; q. d. *for nam*, or NAME.

As it would have been disagreeable to have been always repeating the same name, there are words invented in all languages, called *pronouns*, to save the necessity thereof, and to stand in the place of names: as *I, thou, he*, &c.

As nouns are the marks or signs of things, *pronouns* are the signs of nouns. Father Buffier, however, shews, that *pronouns* are real nouns or names; and that all the difference between what the grammarians call nouns, and *pronouns*, is, that the former are more particular, and the latter more general.

They are called *pronouns* because used in the place of particular nouns: indeed, sometimes they do not fill the place of nouns entirely, but need other words to affix them, to express the object spoken of: such, e. gr. are, *who, whoever*, &c. which do not express any determinate object whereof a thing may be affirmed, unless accompanied with another word, especially a verb: as, *whoever labours, deserves a reward*.

These father Buffier calls *incomplete pronouns*, to distinguish them from those which express an object completely: as, *I, thou*, &c.

Pronouns have three cases; the nominative, the genitive, or possessive, like nouns; and moreover a case, which follows the verb active, or the preposition, expressing the object of an action, or of a relation, which, says bishop Lowth, may be properly enough called the objective case.

Pronouns are distinguished into three several sorts, viz. *pronouns* of the first, the second, and the third person, according as the subject of the conversation is the speaker himself, the party addressed, or some third object different from both.

The grammarians ordinarily distinguish *pronouns* into four classes, with regard to their different significations, formation, &c. viz. *pronouns personal, relative, possessive*, and *demonstrative*; to which may be added *indeterminate pronouns*.

PRONOUNS, *personal*, are those used in lieu of names of particular persons; such are, *I, thou, he, we, ye, they*.

PRONOUNS *relative*, which Buffier calls *conjunctives*, or *determinatives*, are those placed after nouns, or other *pronouns*, with which they have such affinity, that without them they signify nothing: such are, *qui, quæ, quod, that*, &c. Frequently the noun or *pronoun* with which the relative is joined, is understood.

PRONOUNS *possessive* are those which denote the enjoyment or possession of any thing, either in particular or in common: as, *mine, thine, his*, &c.

These are pure adjectives, and only differ from the rest by the relation they bear to *persons*, whence they are derived, and by some particular inflections which they have in some languages.

PRONOUNS *demonstrative*, those which serve to indicate or point out the subject spoken of: as, *this, that*, &c.

PRONOUNS *indefinite*, are those which express their subject indeterminately: as, *whoever, any*, &c. These consist with what father Buffier calls *incomplete pronouns*.

Pronouns are likewise divided into *substantive* and *adjective*. To the first belong, *I, thou, he*; to the second, *my, mine, his, whose*, &c.

Pronouns may also be considered in two states: the first, or foregoing state, as *I, we*; the second, or following one, as *me, us*.

Mr. Harris distinguishes *pronouns*, which, he says, are words invented to supply pointing or indication by the finger or hand, called *deictic*, into *prepositive* and *subjunctive*.

Prepositive pronouns are those which are capable of introducing or leading a sentence, without having reference to any thing previous, and are divided into three orders called the first, the second, and the third person.

Subjunctive pronouns are those which serve to subjoin one sentence to some other which is previous, as *who, which, that*, &c. and may be distinguished from other *pronouns*, as they are not only substitutives, but also connectives. They include the powers of the three orders into which the prepositive are distinguished, having superadded the peculiar force of connective. Hermes, chap. 3.

PRONOUNCING, PRONUNCIATION, in *Painting*, the marking and expressing the parts of all kinds of bodies with that degree of force necessary to make them more or less distinct and conspicuous.

Thus the painters, in speaking of a piece, say, those or those parts are well *pronounced*, which is a rather rhetorical way of speaking: as when we say, that a man who talks well, has a fine *pronunciation*.

PRONUNCIATION, *pronunciatio*, in *Grammar*, the manner of articulating, or sounding, the words of a language, represented to the eye by writing, and orthography.

From the definition it would seem, that the *pronunciation* were only the image of the orthography: but as we pronounce before we write, and only write to express what we pronounce, it is more just to lay down the *pronunciation* as the rule and model of orthography.

Pronunciation

Pronunciation makes much the moſt difficult article of a written grammar: in effect, a book only expreſſing itſelf to the eyes in a matter that wholly concerns the ears, the caſe ſeems next akin to that of teaching the blind to diſtinguiſh colours.

Hence it is, that there is no part ſo defective in the grammars as that of the *pronunciation*: for the writer has frequently no term whereby to give the reader an idea of the ſound he would expreſs: for want of a proper term, therefore, he frequently ſubſtitutes a vicious or precarious one. Thus the French grammarians frequently tell us, that the vowels *a, e, i*, &c. are pronounced, in French, the ſame as in Latin; never conſidering, that there is not any known and determinate *pronunciation* of the Latin; but each nation, now, pronounces the Roman characters in the Latin, the ſame as it pronounces thoſe ſame characters in its own language. Thus the Latin *cæsar* is pronounced, by the Engliſh, *ſeſar*, and, by the Italians, *tchetchesar*, &c.

Hence it appears, that the relation between ſounds and characters, as well as between things and words, is purely arbitrary and national.

Indeed, Plato ſeems of a contrary opinion, and will have a natural relation between words and the things they expreſs, as there is a natural relation between the ſigns made by mutes, and the things they would intimate: ſo that, according to Plato, to every ſeveral word there muſt be a ſeveral motion of the mouth relative to the action expreſſed by the word.

Whether or no there might be ſuch a thing in the primitive language, we dare not undertake to ſay; but it is certain, ſuch a relation would require a facility of contortions in the mouth, to which we are ſtrangers.

To give a juſt and preciſe idea of the *pronunciation* of a language, it ſeems neceſſary to fix, as nearly as poſſible, all the ſeveral ſounds employed in the *pronunciation* of that language: this Mr. Lodwick has done, in his attempt towards an univerſal alphabet, where he enumerates forty-three ſeveral ſimple ſounds (ſome of them, indeed, ſtrangers to the Engliſh language); and F. Buffier, who gives thirty-three ſeveral ſounds in the French tongue, twenty-nine in the Italian, thirty in the German, twenty-two in the Spaniſh, and twenty-four in the Engliſh.

The French language is clogged with a difficulty in *pronunciation*, from which moſt others are free; and it conſiſts in this, that moſt of their words have two different *pronunciations*; the one in common proſe, the other in verſe. In proſe, e. gr. they omit the *pronounciation* of the final *s* in the plural of nouns, and of the *t* in the third perſon of the plural of verbs, and of ſeveral other final conſonants; but in verſe they pronounce all.

Thus, in *à qui bon revendre mes meſſes, mes moiſſons?* the final *s* of *meſſes* is pronounced; and in *mille & mille douceurs y ſemblent entendre*, the *t* of *ſemblent* is to be pronounced.

Add to this, that in proſe they ſoften the ſound of a great many words; pronouncing *croire* for *croire*: but in poetry the genuine *pronounciation* is retained.

PRONUNCIATION is alſo uſed for the fourth and laſt part of rhetoric, which conſiſts in regulating and varying the voice and geſture agreeable to the matter and words; ſo as more effectually to perſuade and touch the hearers.

The *pronunciation* is of ſuch importance, that Demoſthenes called it the firſt, the ſecond, and the third part of eloquence. By which he ſeemed to intimate, that he thought the whole art of oratory did in a manner conſiſt in it. And indeed, if he had not judged this highly neceſſary for an orator, he would ſcarce have taken ſo much pains himſelf in correcting thoſe natural defects under which he laboured at firſt, in order to acquire it. For he had both a weak voice, and likewiſe an impediment in his ſpeech, ſo that he could not pronounce diſtinctly ſome particular letters. The former of which defects he conquered, partly by ſpeaking as loud as he could upon the ſhore, when the ſea roared and was boiſterous; and partly by pronouncing long periods, as he walked up hill; both which methods contributed to ſtrengthen his voice. And he found means to render his pronunciation more clear and articulate, by the help of ſome little ſtones put under his tongue. Nor was he leſs careful in endeavouring to gain the habit of a becoming and decent geſture, for which purpoſe he uſed to pronounce his diſcourſes alone before a large glaſs. And becauſe he had got an ill cuſtom of drawing up his ſhoulders when he ſpoke; to amend that, he uſed to place them under a ſword, which hung over him with the point downward.

Quinctilian defines the *pronunciation*, *vocis, & vultus, & corporis moderatio cum venuſtate*; a decent, agreeable manner of managing the voice, geſture, and action of the whole body.

Cicero ſomewhere calls it *quædam corporis eloquentia*, a certain eloquence of the body; and in another place, *ſermo corporis*, the language or ſpeech of the body.

Pronunciation is the ſame with what we otherwiſe call ACTION. Though if we attend to the proper ſignification of each of theſe words, the former reſpects the voice and the latter the geſtures and motions of the body. Some writers, particularly Mr. Henley, confound it with *elocution*, which is a very different thing. That author, when he ſtyles himſelf *reſtorer of the ancient elocution*, means of the ancient *pronunciation*.

There are three things which come under the *pronunciation*; the memory, voice, and geſture. See each under its proper article.

Auguſtus, to avoid being balked by his memory, and at the ſame time ſave the trouble of getting off by heart, uſed to harangue from a writing; as we are told by Dio and Suetonius.

PRONUNCIATION, in *Painting*. See PRONOUNCING.

PRONTIA *lapis*, a name given by the writers of the middle ages to a foſſil of which they relate ſeveral extraordinary things; but their reſembling it to the head of a tortoiſe, and giving it the virtue of preſerving people from injuries by lightning, ſeem to make it plain that the word is only a corrupt ſpelling of the *bronton* of the ancients, of which Pliny has related the ſame things.

This was a ſpecies of echinites, ſuppoſed to fall from the clouds in thunder-ſtorms. See BRONTIA.

PROOF, PROBATIO, in *Arithmetic*, an operation whereby the truth and juſtneſs of a calculation is examined and aſcertained.

The proper proof is always by the contrary rule; thus, ſubtraction is the *proof* of addition, and multiplication of diviſion; and *vice verſâ*. The *proof* of multiplication by 9 or by 7 is precarious.

There would need no *proofs* in arithmetic were it not that a man is liable to make miſtakes; for all the rules and operations being built on demonſtration, it is hence we are aſſured of their truth and certitude.

The *proof*, then, does not confirm the rule, but only ſhews us whether or no we have applied it right.

PROOF, in *Law*, *Logic*, &c. denotes the mediums or arguments uſed to evince the truth of any thing. See EVIDENCE.

By the French law, a *literal proof*, or *proof in writing*, called alſo *dead proof*, *probatio mortua*, is preferable to a teſtimonial, or *proof viva voce*, by witneſſes. The ordonnance de Moulins excludes all *proof* by witneſſes for ſums of above 100 livres.

The *proof* of crimes was anciently effected among our anceſtors divers ways; viz. by duel or combat, fire, water, &c.

The *proof* by red hot iron was very frequent; the accuſed, to purge himſelf, was here obliged to make an oath, as he touched the iron. The formula, ceremonies, prayers, &c. made on this occaſion, are ſtill extant in the notes at the end of the Capitularies of Charlemagne. See ORDEAL.

This cuſtom was abrogated by the emperor Frederick; but it ſtill obtains in Mingrelia; as we are told by Lamberti, in his relation inſerted in Thevenot's voyages.

If they cannot have *proof* of a crime, a croſs is laid at the bottom of a cauldron full of boiling water, out of which the accuſed is obliged to fetch it with his naked hand and arm: this done, the arm is put up in a bag, tied, and ſealed, and three days after opened; when, if there be no marks of the burn or ſcald, the accuſed is declared innocent.

In the kingdom of Siam, to have *proof* of a crime, the party is obliged to waſh his hands in boiling oil, or to walk on burning coals; from either of which he muſt come out untouched to be reputed innocent.

Sometimes they oblige the two contending parties to plunge under water; and he who ſtays there longeſt, gains the cauſe; and ſometimes to ſwallow a grain of rice, prepared and charmed by their doctors: he who is able to ſwallow it, is declared innocent, and carried home in triumph; and the accuſer puniſhed. This looks like an imitation of what was done among the Jews to have *proof* of adultery.

The *proof* by COMBAT is likewiſe laid to ſubſiſt among the Mingrelians.

PROOF, in *Artillery*. See PROVING *Guns*, GUN-*powder*, and POWDER-*tower*.

PROOF, in the *Sugar Trade*, a term uſed by the refiners of ſugar for the proper ſtate of the diſſolved ſugar when it ſhould be ſet to harden.

The proceſs in the bringing of ſugar to this ſtate may be underſtood by performing the whole work in little in this manner: take ſix pounds of coarſe, or unrefined ſugar, diſſolve it over the fire in ſix pints of lime-water; add to this the whites of four eggs beat up to a froth, ſtir the whole together; then boil the liquor to a higher conſiſtence than a ſyrup, or till, when expoſed to the cold, it will concrete into grains. This is what the ſugar-bakers call *proof*. Pour this ſyrup into an earthen mould, with a hole at its bottom; ſtop the hole, and ſet the veſſel in a moderately warm place.

The sugar in a few days will set and harden; then open the hole at the bottom, and lay over the top of the sugar some tobacco-pipe clay, made into a soft pap with water. The clay must be afterwards wetted at times, and the water from among it will gradually be soaked up by the sugar, and running through it will wash away the treacle, without dissolving the grained part. And thus all the treacle will by degrees be drained out of the mass, and a loaf of white sugar procured. See SUGAR.

PROOF *spirit*, among *Distillers*. See SPIRITS.

PROOF, *bread*. See BREAD.

PROPAGATION, *propagatio*, the act of multiplying the kind, &c. of producing the like in the way of natural generation.

PROPAGATION *of plants*. See *Propagation of* PLANTS.

PROPEMPTICON, *Προπεμπτικον*, in *Poetry*, a poem wherein are expressed ardent wishes and solemn vows for the safety of a person going upon a journey or voyage. Such is that of Horace, lib. i. od. 3. addressed to Virgil on his setting out for Athens. It was otherwise called *apopompticon*. See APOPEMPTIC.

The word is derived from *προπεμπω*, *I send forward*, or *accompany on the way*.

PROPER, *proprium*, something naturally and essentially belonging to any being.

The school-philosophers, after Porphyry, distinguish four kinds of *propria*, or modes of *propriety*, which are expressed in the following verse:

Est modicus, risor, comicus, risibilisque.

The first, called PROPRIUM *primo modo*, what agrees to a single species, but not to all the individuals: this they call *rise, sed non omni*. As, to be a geometrician, a physician, a divine, &c. which are things *proper* to man; but not to all men.

The second, PROPRIUM *secundo modo*, is what agrees to the whole species, but agrees likewise to another; which they call *omni, sed non soli*. Thus, to have two feet is *proper* to a man, but is likewise *proper* to a bird.

The third, PROPRIUM *tertio modo*, is that which agrees to a single species, but not at all times; *omni & soli, sed non semper*. As to grow grey, according to Porphyry, is *proper* to a man, but it is to an old man.

The last, and highest, PROPRIUM *quarto modo*, is that which alone agrees to one kind, to all the individuals thereof, and at all times; *omni, soli, & semper*. Thus, the faculty of laughing is *proper* to man, of neighing to horses, &c. And it is this that Porphyry calls the *true proper*.

The first three species are only accidents of the fifth vulgar predicable, to which they directly belong.

The fourth is an universal agreeing to every individual, or subject of predication of any species, in such a manner as to be always found absolutely in the species alone, but not at every determinate time: thus man alone is naturally risible; not that he is always laughing, but that he has the faculty of laughing at all times.

PROPER, in respect of *terms*, denotes their immediate and peculiar signification, or that directly and peculiarly attached to them.

In which sense the word stands opposed to *figurative*, and *improperical*.

PROPER is also used in a *Moral Sense*, to denote something that is usually found in things: as, their particular or specific virtues, &c.

In which sense we say, magnanimity is the *proper* virtue of heroes.

PROPER is also used for the natural qualities necessary to succeed in a thing.

In which sense we say, people of a hot vigorous temperament are *proper* for the army; the cold and phlegmatic are *proper* for study. The Romans became less *proper* for war, in proportion as they grew more learned and polite.

PROPER, in *Grammar*, is also applied to nouns or names, which are distinguished into *proper* and *appellative*.

Man is the appellative, Peter the *proper* name.

The *proper* NAME among Christians is that imposed at BAPTISM.

PROPER *food*. See FOOD.

PROPER *fraction*. See FRACTION.

PROPER, in the *Civil Jurisprudence*, is used in opposition to *acquired*, for an inheritance derived by direct or collateral succession.

By the French laws, a testator can only dispose of one fifth of his *proper* effects; the paternal relations inherit the paternal *propria*, and the maternal the maternal ones: so that *propria* always return to the line whence they proceed.

The origin of the law which fixes this difference between *proper* goods and acquests, is not known; neither the Greeks nor Romans having ever made any such distinction. Indeed it seems founded on this principle of natural equity, that men are usually desirous to preserve and attach to their family the goods which they have received from their fore-fathers, and to transmit them to those descending from the same stock.

PROPER *sometimes* also stands as a reduplicative, serving to mark or design a thing more explicitly and formally. In this sense we say, Jesus Christ came to redeem the world in his *proper* person. The king did such and such a thing of his own *proper* motion.

PROPER *motion*. See MOTION.

PROPER *object*. See OBJECT.

PROPERTY, or PROPRIETY, PROPRIETAS, that which constitutes or denominates a thing PROPER; or it is a particular virtue or quality, which nature has bestowed on something, exclusive of all others.

Thus colour is a *property* of light; extension, figure, divisibility, and impenetrability, are *properties* of body.

PROPERTY, or PROPRIETY, in *Law*, denotes dominion or the highest right a man can have to a thing; and such as no way depends on any other man's courtesy.

In this sense, none in our kingdom have the *property* of any lands or tenements, except the king, in right of his crown; all other lands being of the nature of fees, and held of the king either mediately or immediately. See FEE.

Property, or *propriety*, however, is used for that right in lands, tenements, &c. which common persons have; importing as much as *absolute dominium*, though our *freeholds* and consisting in the free enjoyment, and disposal of all those acquisitions, without any control or diminution, save only by the laws of the land.

The original of private *property* probably founded in nature: the earth and all things therein became the general *property* of all mankind, exclusive of other beings, from the immediate gift of the Creator; and while the earth was thinly inhabited, it is reasonable to suppose, that all was in common among them, and that every one took from the public stock to his own use, such things as his immediate necessities required. However this communion of goods seems to have been applicable, even in the earliest ages, only to the substance of the thing, and not extended to the use of it: for, by the law of nature and reason, he who first began to use it, acquired therein a kind of transient *property*, that lasted so long as he was using it, and no longer; or, the right of possession continued for the same time only that the act of possession lasted. In process of time it became necessary to form notions of more permanent dominion; and to appropriate to individuals not the immediate use only, but the very substance of the thing to be used. The labour of cultivation and improvement by degrees introduced and established more permanent *property* in the soil than [illegible] received and adopted. And as occupancy [illegible] to the temporary use of the soil, so occupancy [illegible] the original right to the permanent *property* in the substance of the earth itself; which excludes [illegible] that the owners from the use of it. On this [illegible] and Pufendorf infer, that this right of occupancy [illegible] upon a tacit and implied assent of all mankind, that the first occupant should become the owner: and Barbeyrac, Titius, Mr. Locke, and others, maintain, that there is no such implied assent, neither is it necessary that there should be: for that the very act of occupancy alone, being a degree of bodily labour, is, from a principle of natural justice, without any consent or compact, sufficient of itself to gain a title. However, it is agreed on both sides, that occupancy is the thing by which the title was in fact originally gained; every man seizing to his own continued use such spots of ground as he found most agreeable to his own convenience, provided he found them unoccupied by any one else.

Property, both in lands and moveables, thus acquired by the first taker, continued in him by the principles of universal law, till such time as he does some other act which shews an intention to abandon it; for then it becomes, naturally speaking, *publici juris* once more, and is liable to be again appropriated by the next occupant. But this method of one man's abandoning his *property*, and another's seizing the vacant possession, could not long subsist in fact. Mutual convenience introduced commercial traffic, and the reciprocal transfer of *property* by sale, grant, or conveyance. The most universal and effectual way of abandoning *property* is by the death of the occupant; in which case all *property* must cease, considering men as absolute individuals, and unconnected with civil society. But as such a constitution would be productive of endless disturbances, the universal law of almost every nation (which is a kind of secondary law of nature) has either given the dying person a power of continuing his *property*, by disposing of his possessions by will, or the municipal law declares who shall be the heir of the deceased, or the doctrine of ESCHEATS is adopted. Thus we see, that though the origin of *property* is founded in nature, the modifications under which it now exists, the method of preserving it to the present owner, and of transfusing it from man to man, are entirely derived from society; and are some of those civil advantages, in exchange for which, every individual has resigned a part of his natural liberty.

The laws of England are, therefore, in point of honour and justice, extremely watchful in ascertaining and protecting the right of *property*. Upon this principle the great charter has declared, that no freeman shall be disseised or divested of his freehold, or his liberties, or free customs, but by the judgment of his peers, or by the law of the land. And by a variety of ancient statutes, viz. 5 Edw. III. cap. 9. 25 Edw. III. stat. 5. cap. 4. 28 Edw. III. cap. 3. it is enacted, that no man's lands or goods shall be seised into the king's hands against the great charter, and the law of the land; and that no man shall be disinherited nor put out of his franchises or freehold, unless he be duly brought to answer, and be forejudged by course of law; and if any thing be done to the contrary, it shall be redressed, and holden for none. So great is the regard of the law for private *property*, that it will not authorize the least violation of it; no, not even for the general good of the whole community.

The objects of dominion or *property* are things, as contradistinguished from persons; and things are by the law of England distributed into two kinds, viz. things real, and things personal. Things real are such as are permanent, fixed and immoveable, which cannot be carried out of their place, as lands, tenements, and hereditaments of all kinds; things personal are goods, money, and all other moveables, which may attend the owner's person wherever he thinks proper to go. Hence *property* is divided into *personal* and *real*.

Moreover, the right of personal *property* may be considered, as in possession or in action. Those in possession are liable to two species of injuries, viz. the deprivation of that possession by unjust and unlawful taking them away, or by unjust detaining them, though the original taking might be lawful; and the abuse or damage of the chattels, while the possession continues in the legal owner. Rights of *property* in action, are such as are founded on and arise from contracts, which are either express or implied: the former sort include debts, covenants, and promises; and the latter are either such as are necessarily implied by the fundamental constitution of government, to which every man is a contracting party, or such as do not arise from the express determination of any court, or the positive direction of any statute; but from natural reason and the just construction of law.

Real *property* is liable to various kinds of injury, the principal of which are the following, viz. usher, disseisin, intrusion, wafte, fubtraction, and diftruction. Blackft. Com. book i. p. 138, &c. book ii. p. 2, &c. book iii. p. 142, 167, &c.

There are three manners of right or *property*, viz. *property* abfolute, *property* qualified, and *property* poffeffory. See TITLE.

PROPERTY, *literary*. See LITERARY.

For offences or crimes againft private PROPERTY; fee LARCENY, *Malicious* MISCHIEF, and FORGERY.

PROPERTY *by prerogative*, is that *property* in perfonal chattels, a right to which may accrue either to the crown itfelf, or to fuch as claim under the title of the crown, as by grant or by prefcription; fuch are all tributes, taxes, and cuftoms; all forfeitures, fines, and amercements due to the king, which accrue by virtue of his ancient prerogative, or by particular modern ftatutes; wreck, treafure-trove, waifs, eftrays, royal fifh, fwans, &c. and thofe animals known by the denomination of GAME.

PROPERTY, *right of, pro tempore*, is that which is veffed in a man without either poffeffion, or even the right of poffeffion. This is often fpoken of under the name of the mere right, *jus merum*; and the eftate of the owner is in fuch cafes ftiled to be totally diverted, and *jus in re* to *jus ad rem*. A perfon thus circumftanced, may have the true ultimate *property* of the lands in queftion; but by his own negligence, the folemn act of his anceftor, or the determination of a court of juftice, the prefumptive evidence of that right is ftrongly in favour of his antagonift, who has thereby obtained the abfolute right of POSSESSION. Incumbents have not the *property* of benefices, they have only the enjoyment thereof. The monks have a long time difputed whether they had the *property* of the bread they eat, or only the ufe?

One may give the *property* of an eftate, yet referve the ufufruct; in which cafe, by the death of the ufufructuary, the ufufruct is conſolidated to the *property*. In the law of England, ſtrictly ſpeaking, that which is called an *eſtate* in lands and tenements, is termed a *property* in perſonal chattels: the law conſidering the firſt as permanent, the other as temporary and precarious.

PROPHECY, Προφητια, a prediction, made by divine inſpiration.

One of the ſtrongeſt evidences for the truth of revealed religion is that ſeries of *prophecies* which is preſerved in the Old and New Teſtament; and a greater ſervice, ſays an excellent writer, could not be done to Chriſtianity than to lay together the ſeveral predictions of ſcripture with their completions, to ſhew how particularly things here been foretold, and how exactly fulfilled. A work of this kind was deſired by the lord Bacon (vide De Augmentis Scientiarum, lib. ii. cap. 11.) and he ſatisfies it the Hiſtory of *Prophecy*; in which he propoſes, that every *prophecy* of the ſcripture be ſorted with the event fulfilling the ſame throughout the ages of the world, both for the better confirmation of faith, and for the better illumination of the church, touching thoſe parts of *prophecies* which are yet unfulfilled; allowing, nevertheleſs, that attitude which is agreeable and familiar unto divine *prophecies*, being of the nature of the author with whom a thouſand years are but as one day, and therefore they are not fulfilled punctually at once, but have ſpringing and germinant accompliſhment throughout many ages, though the height or fulneſs of them may refer to ſome one age. A work of this kind has been actually executed by the learned biſhop Newton in his Diſſertation on the *Prophecies*.

With regard to the credibility of *prophecy*, it may be obſerved in general, that it is not at all incredible that God ſhould upon ſpecial occaſions foretell future events; and, if he *affords* an extraordinary revelation of his will to mankind, that he ſhould atteſt its divine original by this kind of evidence; an evidence, which, if the *prophecies* point to the events, and the events correſpond with the *prophecies*, is in the higheſt degree concluſive and convincing. No previous conjecture nor accidental coincidence are ſufficient to counteract and invalidate this kind of evidence.

As to moſt of the ſcripture *prophecies*, they comprehend ſuch a variety of particulars; they ſo minutely deſcribe diſtant events, to be accompliſhed in circumſtances which no human ſagacity could foreſee or conceive likely to occur; and they accord ſo exactly with the facts to which they refer, that there is no way of evading the concluſion, but by either denying the premiſes that ſuch *prophecies* were ever delivered and recorded, againſt which fact and hiſtory militate, or by pretending that what we call predictions are only hiſtories written after the events had happened, in a prophetic ſtyle and manner. But it is alledged in anſwer to this abſurd plea, that there are all the proofs and authorities, which can be had in caſes of this nature, that the prophets propheſied in one age and that the events happened in another and ſubſequent age: and we have as much reaſon to believe theſe, as we have to believe any ancient matters of fact whatever; and by the ſame rule which leads us to deny theſe, we may as well controvert and contradict the credibility of all ancient hiſtory whatſoever. Beſides, Chriſtian writers undertake to prove the truth of *prophecy*, and conſequently the truth of revelation, not by an induction of particulars long ago foretold and long ago fulfilled, the predictions of which may be ſuppoſed to have been written after the hiſtories, but by inſtances of things which have confeſſedly many ages ago been foretold, and have in theſe later ages been fulfilled, or are fulfilling at this very time; ſo that there is no pretence for aſſerting ſuch *prophecies* to have been written after the events; but it muſt be acknowledged that the events many ages after correſpond exactly with the predictions many ages before. The evidence, therefore, which *prophecy* furniſhes in favour of the truth of religion, is a growing evidence; and the more *prophecies* are fulfilled, the more teſtimonies there are and confirmations of the truth and certainty of divine revelation. One of the greateſt difficulties in Chriſtianity turns upon the manner of completion of the Scripture *prophecies*. In the prophets of the Old Teſtament are frequent predictions of the Meſſiah; which the writers of the New frequently urge to the Jews and heathens as fulfilled in Jeſus Chriſt; and on this principle evince the truth of his miſſion: but theſe texts, thus urged from the Old, in the New Teſtament, are ſometimes not to be now found in the Old; and at other times are not urged in the New in the literal and obvious ſenſe which they ſeem to bear in the Old: whence moſt of the Chriſtian commentators, divines, and critics, ancient and modern, judge them to be applied in a ſecondary, typical, allegorical, or myſtical ſenſe. Thus, e. gr. St. Matthew, after an account of the conception of the Virgin, and the birth of Jeſus, ſays, "All this was done, that it might be fulfilled which was "ſpoken by the prophet, ſaying, Behold a virgin ſhall "be with child, and ſhall bring forth a ſon, and they "ſhall call his name Emmanuel." But the words, as they ſtand in Iſaiah, whence they are ſuppoſed to be taken, do, in their obvious and literal ſenſe, relate to a young woman who was to bring forth a child in the days of Ahaz; as appears from the context, and as is owned by Grotius, Huetius, Caſtalio, Cafcellanus, Epiſcopius, Hammond, Simon, Le Clerc, Lowth, &c. This *prophecy*, then, not being fulfilled in Jeſus, in the primary, literal, or obvious ſenſe of the words, is ſuppoſed, like the other *prophecies* cited by the apoſtles, to be fulfilled in a ſecondary, typical, or allegorical ſenſe;

i. e.

i. e. this *prophecy*, which was first literally fulfilled by the birth of the prophet's son in the time of Ahaz, was again fulfilled by the birth of Jesus, as being an event of the same kind, and intended to be signified either by the prophet, or by God, who directed the prophet's speech. Grotius observes this to be the case in most, if not all the *prophecies* and citations quoted from the Old in the New Testament; and Dodwell, with Sir John Marsham, refer even the famous *prophecy* in Daniel, about the seventy weeks, to the time of Antiochus Epiphanes; shewing, that the expressions taken thence by Christ, and urged by him as predicting the destruction of Jerusalem by the Romans, have only, in a secondary sense, a respect to that destruction.

And even that famous *prophecy* in the Pentateuch, "A "prophet will the Lord God raise up unto thee, like "unto me; to him shall ye hearken;" which St. Luke refers to as spoken of Jesus Christ, is by Simon, Grotius, Stillingfleet, &c. understood to signify, in its immediate sense, a promise of a succession of prophets.

It is allowed, then, the apostles applied the *prophecies* which they quote from the Old Testament, in a typical sense; but, unhappily, the rules whereby they quoted them are lost. Dr. Stanhope laments the loss of the Jewish traditions or rules for interpreting Scripture received among the rabbins, and followed by the apostles. But this loss, Surenhusius, Hebrew professor at Amsterdam, thinks he has retrieved from the Jewish Talmud, and the ancient Jewish commentaries; and has accordingly published to the world the rules whereby the apostles quoted the Old Testament.

But the truth is, these rules are too precarious, strained, and unnatural, to gain much credit.

Mr. Whiston condemns all allegorical explanation of the *prophecies* of the Old Testament cited in the New, as weak, enthusiastic, &c. and adds, that if a double sense of the *prophecies* be allowed, and there be no other method of shewing their completion than by applying them secondarily and typically to our Lord, after having been in the first and primary intention long ago fulfilled in the times of the Old Testament, we lose all the real advantages of the ancient *prophecies*, as to the proofs of Christianity.

He therefore sets up a new scheme in opposition thereto: he owns, that taking the present text in the Old Testament for genuine, it is impossible to expound the apostles citations of the *prophecies* of the Old Testament on any other than the allegorical foundation; and therefore, to solve the difficulty, he is forced to have recourse to a supposition contrary to the sense of all Christian writers before him, viz. that the text of the Old Testament has been greatly corrupted since the apostolic age by the Jews. His hypothesis is, that the apostles made their quotations out of the Old Testament rightly and truly from the Septuagint version, which in their time was in vulgar use, and exactly agreed with the Hebrew original; and that as they made exact quotations, so they argued justly and logically from the obvious and literal sense of the said quotations, as they then stood in the Old Testament; but that, since their times, both the Hebrew and Septuagint copies of the Old Testament have been so greatly corrupted, and so many apparent disorders and dislocations introduced therein, as to occasion many remarkable differences and inconsistencies between the Old and New Testament in respect to the words and sense of those quotations.

As to the manner wherein these corruptions were introduced, he says, the Jews, in the second century, greatly corrupted and altered both the Hebrew and Septuagint, especially in the *prophecies* cited by the apostles, to make their reasoning appear inconclusive; that, in the third century, they put into Origen's hand one of these corrupted copies of the Septuagint; which Origen mistaking for genuine, inserted in his Hexapla, and thus brought into the church a corrupted copy of the Septuagint; and that, in the end of the fourth century, the Jews put into the hands of the Christians, who, till then, had been almost universally ignorant of the Hebrew, a corrupted copy of the Hebrew Old Testament.

The disagreement, then, between the Old and New Testament, in respect to the said quotations, he contends, has no place between the genuine text of the Old Testament (now no-where existing), but only between the present corrupted text of the Old and New Testament; and therefore, to justify the reasonings of the apostles, he proposes to restore the text of the Old Testament, as it stood before the days of Origen, and as it stood in the days of the apostles; from which text, thus restored, he doubts not, it will evidently appear, that the apostles cited exactly, and argued justly and logically, from the Old Testament. But this scheme of accomplishing *prophecies* labours under difficulties at least as great as the allegorical scheme. Its foundation is incredible, and its superstructure, from first to last, precarious. In short it is inconceivable, that the Old Testament should be corrupted; and it may even be made appear, that the Hebrew and Septuagint disagreed in the times of the apostles: add to this, that the means whereby he proposes to restore the true text, will never answer that end, nor has he himself, from all the means he is yet possessed of, been able to restore one prophetical citation, so as to make that seem literally, which before only seemed allegorically applied.

Upon this head it may be observed, that the double sense of *prophecies*, for which some have zealously contended, and others have as strenuously opposed, ought not to be understood, as if a *prophecy* equally and indifferently referred to many persons or events; or as if, literally referring to a lower person, it was only figuratively and allegorically to be interpreted of the Messiah (for a passage only capable of being accommodated to him is not by any means a prediction of him); but it is to be so explained, as that it may appear the Messiah was principally intended, and the *prophecy* literally referred to him, though it might in part be applied to some other person; and might have been understood as referring to that inferior person alone, if farther light had not been thrown upon it, by comparing other *prophecies*, or by the testimony of those whom on other accounts we have reason to regard as authentic interpreters. Nevertheless it must be acknowledged, that though the tracing of the Messiah in such *prophecies* as these may serve to illustrate the units of design, which is a considerable additional proof of the truth of a revelation, yet the main stress is to be laid upon such *prophecies* as evidently and solely relate to the Messiah and his kingdom; rather than on those which are capable of reference to other persons or events.

PROPHECIES, *false*, are those delivered by persons pretending extraordinary commissions from God, to raise jealousies in the people, or terrify them with impending judgments, &c. Such persons are punishable at common law as impostors. This was a capital offence by stat. 1 Edw. IV. cap. 12. which was repealed in the reign of queen Mary. By statute 5 Eliz. cap. 15. none shall publish or set forth any false *prophecy*, with an intent to raise sedition, on pain of 200*l.* for the first offence, and a year's imprisonment; and for the second offence to forfeit all his goods and chattels, and suffer imprisonment during life; the prosecution to be within six months. 3 Inst. 328, 329. To *prophesy* when the king shall die hath been anciently held to be treason. Rast. Rep. 88.

PROPHET, *propheta*, προφητης, a person inspired by God with the knowledge of future events; and commissioned to declare his laws, his will, &c. to the world.

The word is derived from the Greek προ, and φημι, *fari*, of προ, *I say*; whence also the Latins derive their *fatum*, *fabula*.

Among the canonical books are those of fifteen *prophets*; four of which are denominated the *greater prophets*, viz. Isaiah, Jeremiah, Ezekiel, and Daniel; so called from the length or extent of their writings, which exceed those of the others; viz. Hosea, Joel, Amos, Obadiah, Jonah, Micah, Nahum, Habbakuk, Haggai, Zechariah, and Malachi; who are called the *less prophets*, from the shortness of their writings.

The writings of the *prophets* form one of the three divisions of the CANON of the Old Testament; and to those already enumerated, called the books of the latter prophets, are added those of the former prophets; viz. Joshua, Judges, Samuel, and Kings.

The Jews only reckon three *greater prophets* Daniel they exclude, as no more to be ranked among the *prophets* than David; not but that both the one and the other foretold many important things, but because their manner of life differed from that of the other *prophets*; David being a king, and Daniel a peer.

In the Greek church, the lesser *prophets* are placed in order before the great ones; apparently, because many of the lesser *prophets* are more ancient than the greater.

Among the Greeks, too, Daniel is ranked among the lesser *prophets*. In the forty-eighth chapter of Ecclesiasticus, Isaiah is particularly called the *great prophet*; both on account of the great things he foretold, and the magnificent manner wherein he did it.

Spinoza says, the several *prophets* prophesied according to their respective humours; Jeremiah, e. gr. melancholy, and dejected with the miseries of life, prophesied nothing but misfortunes.

Dacier observes, that, among the ancients, the name *poet* is sometimes given to *prophets*; as that of *prophet* is, at other times, given to *poets*.

PROPHETS, *sons of the*, in *Scripture History*, an appellation given to young men who were educated in the schools or colleges under a proper master, who was commonly, if not always, an inspired *prophet*, in the knowledge of religion, and in sacred music, and thus were qualified to

be public preachers, which seems to have been part of the business of the *prophets* on the Sabbath-days and festivals. It is probable, that God generally chose the *prophets*, whom he inspired, out of these schools.

PROPHETICAL, *propet.* See TYPE.

PROPHYLACTICE, *προφυλακτικὴ*, that part of the art of medicine which directs the preventing or preserving from diseases.

PROPITIATION, in *Religion*, a sacrifice offered to God to assuage his wrath, and render him propitious.

Among the Jews there were both ordinary and public sacrifices; as holocausts, &c. offered by way of thanksgiving; and extraordinary ones offered by particular persons guilty of any crime, by way of *propitiation*.

If it were a crime of ignorance, they offered a lamb, or a kid; if done wittingly, they offered a sheep: for the poor, a pair of turtles was enjoined as a *propitiation*.

The Romish church believe the mass to be a sacrifice of *propitiation*, for the living and the dead. The reformed churches allow of no *propitiation*, but that one offered by Jesus Christ on the cross.

PROPITIATION also gives the name to a solemn feast among the Jews, celebrated on the tenth of the month Tisri, which is their seventh month, and answers to our September.

It was instituted to preserve the memory of the pardon proclaimed to their forefathers by Moses on the part of God; who thereby remitted the punishment due for their worship of the golden calf.

PROPITIATORY, among the *Jews*, was the cover or lid of the ark of the covenant; which was lined both within and without-side with plates of gold; insomuch that there was no wood to be seen.

Some even take it to have been one piece of massive gold. The cherubims spread their wings over the *propitiatory*.

This *propitiatory* was a type or figure of Christ, whom St. Paul calls the *propitiatory* ordained from all ages. See ARK *of the covenant*.

PROPLASM, *proplasma*, *προπλασμα*, is sometimes used for a mould, wherein any metal or soft matter, which will afterwards grow hard, is cast.

PROPLASTICE, *προπλαστικὴ*, the art of making moulds, for casting things in.

PROPOLIS, *προπολις*, a thick, yellow, odorous substance, smelling like storax, nearly akin to wax, but more tenacious; wherewith the bees stop up the holes and crannies of their hives, to keep out the cold air, &c.

These wary animals not only stop up in this manner all the cracks they can find, but even examine all the weak places of the hive, and will eat away a rotten or too weak part, and make up the deficiency with this *propolis*. This was elegantly seen in the case of some of *Mr.* Reaumur's glass hives, which were framed of wood, and had squares of glass in the proper places: these squares of glass were fastened in with slips of pasted paper. The bees finding this a much weaker part of the hive than any other, and capable of being eaten through by their enemies, soon gnawed to pieces all the paper and paste, and covered those parts with the *propolis* in the place of that matter.

It might seem that the bees might use wax on this occasion; but this would be no defence against these of their enemies, which devour and feed on wax; and nature has guarded them against these, by supplying them with a matter which spreads more easily, is of a greater tenacity, and fixes itself much more strongly in the small crevices than wax could do. It has been known from the earliest times, that the bees made use of this substance; Pliny mentions it, and tells us, that the authors of his time distinguished three kinds of it; the first they called *euros*, the second *pissoceros*, and the third *propolis*. The last of these names is only retained among the later writers, and seems to have stood with the ancients for the pure substance, the other kinds differing from it only as they were more or less mixed with wax.

The *propolis* itself is a substance perfectly different from wax; it is found to be soluble in spirit of wine, or in oil of turpentine; and is soft when laid on by the bees, but grows hard afterwards; it may, however, even in its hardest state, be softened by heat. By all these observations it appears very plainly, that the *propolis* is a true genuine vegetable resin, of the nature of many others which we have in common use. The authors who have treated of this substance, have described it very differently; George Pictorius, who has written of bees, says, that it is of a yellow colour, and an agreeable smell, like that of storax, and that it would spread when warmed properly. Pliny and the old authors describe it as being of a rank and strong smell, and being used as a succedaneum for galbanum; and at present we usually find it of an aromatic and agreeable smell, insomuch that some rank it among the perfumes. The apothecaries, in some places, keep it as a medicine in their shops; but it is to be observed, that it is very various in its nature; for, according to the descriptions of authors, it is sometimes sweet and sometimes stinking. The truth is, that the bees, who collect it as a thing to be used for a cement, not for food, are not over curious of what plants they gather it from; and hence in different hives it is found of very different colours and consistences. In general, the *propolis* is of a brownish red colour on the surface; the red sometimes predominating, sometimes the brown; but when broken it is yellowish, or approaching to the colour of wax. It very readily dissolves in spirit of wine or oil of turpentine; and this solution is of a fine gold colour, and will serve extremely well as a varnish to colour silvered picture-frames, or other the like work, into the appearance of gold. It gives a fine gold-like appearance, indeed, to any white metal of a polished surface; all that it wants is a little more brilliancy, which is easily given it by mixing a small quantity of mastich, or of sandarach, in the solution.

It is the general opinion of those who have studied bees, that the willow and the poplar are the trees which principally furnish them with this resin, which, when it has passed through their management, we call *propolis*. It is very certain, however, that these are not the only trees which afford it, since the bees are not found to want this necessary material for their work, in places where there are no trees of that kind in the neighbourhood of the hives.

Mr. Thorley declares, as he tells us likewise upon the fullest evidence, that the combs both in their foundation and superstructure, are framed of nothing but pure wax. Besides the uses of the *propolis* already mentioned, there is another very singular one, which must by no means be passed over in silence: this is the embalming and preserving, by means of it, certain bodies which they know not how to dispose of otherwise. Notwithstanding the care that the bees take to guard the entrances of their hives, enemies of one kind or other will often get in: these usually fare very ill; for the bee's sting is a weapon very capable of punishing such an intruder, and the swarm is so numerous, that it is not easy for the intruder to escape repeated wounds. When a creature of small size has thus entered, and thus been killed for it, the bees with great care and pains carry him out; for they will bear no sort of foulness in the hive. It sometimes happens, however, that an unlucky snail, particularly of the large naked kind, crawls into the hive; in this case he never ceases crawling over the combs so long as he lives. It is no wonder that so cleanly creatures as the bees are highly enraged at this nasty visiter: they soon surround and kill him with their stings; but then as he is a load too heavy to allow a possibility of their carrying him out, they prevent the mischiefs attending the stinking of the carcase, by covering it over with a thick coat of this *propolis*, which perfectly well preserves it from putrefaction.

The common garden snail, with the shell, sometimes also visits these industrious and cleanly animals; and this creature they secure in a different manner, and that at the expence of only a very small quantity of the *propolis*: but Reaumur had an opportunity of observing their method of destroying this enemy in a very accurate and easy manner, in one of his glass hives. The snail had entered the hive early in the morning, and after crawling about for some time, had fixed itself to one of the glass squares by the same glutinous matter, by means of which it is frequently found fixed to old walls and trees; when the bees found their enemy thus fixed, they surrounded him, and in a few minutes formed a border of *propolis* round the verge of the mouth of the shell: this they continually added more and more to, till they had formed so thick a coat round it, that the snail could never move from the place again.

The snail is easily able to loosen the fastening which it gives itself to any place, because this is done by means of a gum, which water will dissolve; therefore the first shower of rain, or the moisture which the animal is able to secrete from its own body, releases it in this case; but the fastening which the bees use to fix the shell to the glass being a resin, this remains untouched by water, and must keep the animal fixed in its place till death, and even long afterwards. Reaumur's Hist. Ins. vol. v. p. 77, &c.

Mr. Thorley observes, that he has frequently seen snails within the boxes and at the back-window, moving about, changing their situation, and continuing at times for several days together, but not so much as a single bee assaulting the offensive animal, or offering the least resistance, but, on the contrary, shunning or flying from him. He adds, that he has often observed snails coming out of the colonies, in no respect hurt or wounded, but in full health and vigour. Thorley's Enquiry, &c. p. 136.

It ſeems probable, that the bees are not over curious in the choice of the matter of the *propolis*; but that many vegetable reſins indifferently ſerve for this purpoſe: it has been tried, however, whether they would uſe common turpentine, and ſome other of the reſins in uſe among us, by laying them before their hives; but without ſucceſs. This is an experiment, however, that requires frequent repetition; ſince there are many ſeaſons at which the bee has no occaſion for this matter.

The *propolis* is by ſome eſteemed ſovereign in diſeaſes of the nerves. It is alſo uſeful to make holes in abſceſſes; and being heated on the fire, its vapour is received for inveterate coughs.

PROPOMA, a name given by the ancients to a potion prepared of honey and wine boiled together: the proportions were four parts of wine to one of honey.

PROPORTION, *proportio*, in *Arithmetic*, the identity or ſimilitude of two ratios.

Hence quantities that have the ſame ratio between them, are ſaid to be *proportional*; e. gr. if A be to B, as C to D; or 2 be to 4, as 30 to 15; A, B, C, D, and 2, 4, 30, and 15, are ſaid to be *in proportion*, or are ſimply called *proportionals*.

Proportion is frequently confounded with *ratio*; yet have the two, in reality, very different ideas, which ought by all means to be diſtinguiſhed.

Ratio is, properly, that relation or habitude of two things, which determines the quantity of one from the quantity of another, without the intervention of any third: thus we ſay, the ratio of 5 and 10 is 2; the ratio of 12 and 24 is 2.

Proportion is the ſameneſs or likeneſs of two ſuch relations: thus the relations between 5 and 10, and 12 and 24, being the ſame, or equal, the four terms are ſaid to be in *proportion*. Hence ratio exiſts between two numbers; but *proportion* requires at leaſt three.

Proportion, in fine, is the habitude or relation of two ratios, when compared together; as RATIO is of two quantities.

Proportion again is frequently confounded with *progreſſion*. In effect, the two often coincide: the difference between them only conſiſting in this, that progreſſion is a particular ſpecies of *proportion*; wherein the ſecond of the three terms is a mean *proportional* between the other two, or has the ſame ratio to the third, which the firſt has to the ſecond.

Add to this, that *proportion* is confined to three terms, but progreſſion goes on to infinity (ſo that progreſſion is a ſeries or continuation of *proportions*); and that in four terms, 3, 6, 12, 24, *proportion* is only between the two couples 3, and 6, and 12 and 24; but PROGRESSION is between all the four terms.

Proportion is ſaid to be *continued*, when the conſequent of the firſt ratio is the ſame with the antecedent of the ſecond; as, if 3 be to 6, as 6 to 12.

The *proportion* is ſaid to be *diſcrete*, or interrupted, when the conſequent of the firſt ratio differs from the antecedent of the ſecond; as, if 3 be to 6, as 4 to 8.

Proportion, again, is either ſaid to be *arithmetical*, or *geometrical*; as the ratios are.

PROPORTION, *arithmetical*, is the equality of two or more arithmetical ratios, or the equality of difference between three or more ſeveral quantities.

Thus, 1, 2, 3, and 2, 5, 8, 11, 14, are in *arithmetical proportion*; becauſe there is the ſame difference betwixt the numbers compared, which are 1 to 2, and 2 to 3; or 2 to 5, and 5 to 8, &c.

If every term have the ſame ratio to the next, as the firſt has to the ſecond; the terms are ſaid to be in *continual arithmetical proportion*; as 5, 7, 9, 11, 13, 15.

If the ratio between any two terms differs from that of any others, the terms are ſaid to be in *arithmetical proportion diſcrete*, or *interrupted*; as where 2 : 5 :: 6 : 9, the ratios of 5 and 6 being different from that of 2 and 5.

A ſeries of more than four terms in *arithmetical proportion*, form an arithmetical PROGRESSION.

1. If three numbers be in *arithmetical proportion*, the ſum of the extremes is equal to double the middle term: thus, as 3 : 7 : 11 : the ſum of 3 and 11 is equal to twice 7; viz. 14.

Hence we have a rule for finding a mean *arithmetical proportional* between two given numbers; half the ſum of the two being the mean required: thus, half the ſum of 11 and 3, viz. 14, is 7.

2. If four numbers be in *arithmetical proportion*, the ſum of the extremes is equal to the ſum of the middle terms: thus, in 2 : 3 :: 4 : 5; the ſum of 5 and 2 is equal to the ſum of 3 and 4, viz. 7.

Hence, four terms in *arithmetical proportion* are ſtill proportional, if taken inverſly, 5 : 4 :: 3 : 2; or alternately, thus, 2 : 4 :: 3 : 5; or inverſly and alternately, thus 5 : 3 :: 4 : 2.

3. If two numbers in *arithmetical proportion* be added to other two, the leſs to the leſs, &c. their difference is in a duplicate ratio, i. e. double that of the reſpective parts added: thus, if to 3 : 5 be added 7 : 9, the ſums are 10 : 14; whoſe difference 4, double the difference of 3 : 5, or 7 : 9. And if to this ſum you add other two, the difference of the laſt ſum will be triple the ſum of the firſt two, and ſo on.

If two *arithmetical proportionals* be ſubtracted from two others in the ſame ratio, the leſs from the leſs, &c. the arithmetical ratio of the remainder is 0. Thus, from 9 : 7 taking 5 : 3, the remainders are 4, 4.

Hence, if *arithmetical proportionals* be multiplied by the ſame number, the difference of their products will contain the firſt difference as often as the multiplier contains unity: thus, 3 : 2, multiplied by 4, produce 12, 20, whoſe difference 8 is equal to 4 times 2, the difference of 3 and 5.

4. If two numbers in *arithmetical proportion* be added to, or multiplied by other two in another ratio of the ſame kind, leſs by leſs, &c. the ſums are in a ratio which is the ſum of the ratios added or multiplied: thus 2 : 4 and 3 : 9 being added, the ſums are 5 : 13, whoſe difference is 8, the ſum of 2 and 6, the difference of the numbers given.

PROPORTION, *geometrical*, is the equality of two geometrical ratios, or compariſons of two couples of quantities.

Thus as 8 : 12 :: 12 : 24, are in *geometrical proportion*; the ratio of 4 and 8 being equal to that of 12 and 24; i. e. 4 is contained as often in 8, as 12 is in 24. Again, 9, 3, 1, are in *geometrical proportion*, 9 being triple of 3, as 3 is of 1.

If, in a ſeries of terms, there be the ſame ratio between every two terms, that there is between the firſt and ſecond, they are ſaid to be *continual geometrical proportionals*; as 1 : 2 :: 4 : 8.

If any two terms have a different ratio from that of the firſt and ſecond, they are ſaid to be in a *diſjunct*, or *interrupted geometrical proportion*; as are 2 : 4 :: 3 : 6; where 2 is to 4, as 3 to 6; but not ſo as 4 to 3.

A ſeries or progreſſion of more than four *geometrical proportionals* is called a *geometrical* PROGRESSION.

1. If three quantities be in continual *geometrical proportion*, the product of the two extremes is equal to the ſquare of the middle term: thus, in 6 : 12 :: 12 : 24, the product of 6 and 24 is equal to the ſquare of 12, viz. 144. Hence we have a rule,

2. To find a mean *geometrical proportional* between two numbers, e. gr. 8 and 72.

Multiply one of the numbers by the other, and from the product 576, extract the ſquare root 24: this will be the mean required.

3. To find a fourth proportional to three given numbers, e. gr. 3, 12, 5; or a third proportional to two given numbers.

Multiply the ſecond 12 into the third 5, in the firſt caſe; and in the latter, multiply the ſecond into itſelf; divide the product by the firſt 3, the quotient 20 is the fourth *proportional* ſought in the one, or the third in the other. The ſolution of this problem is what we popularly call the *rule of proportion*, or the *golden rule*, or RULE *of three*.

4. If four numbers be in *geometrical proportion*, the product of the extremes is equal to the product of the two middle terms: thus, in 2 : 5 :: 4 : 10, the product of 10 and 2 is equal to that of 5 and 4; viz. 20. Hence,

5. If four numbers repreſented by *a* : *b* :: *c* : *d*, be either in *arithmetical*, or *geometrical proportion*; they will alſo be in the ſame, if taken inverſly, viz. *d* : *c* :: *b* : *a*; or alternately, as *a* : *c* :: *b* : *d*; or alternately and inverſly, as *d* : *b* :: *c* : *a*.

6. If the two terms of a geometrical ratio be added to, or ſubtracted from other two in the ſame ratio, the leſs to or from the leſs, &c. the ſums or differences are in the ſame ratio: thus in 6 : 3 :: 10 : 5, where the common ratio is 2, 6, added to 10, makes 16, as 3 to 5 makes 8; and 16 : 8 is in the ſame ratio as 6 : 3, or 10 : 5. Again, 10 being to 8, as 6 to 3, their differences 10 and 5 are in the ſame ratio.

The reverſe of which propoſition is likewiſe true; viz. if to or from any two numbers be added or ſubtracted other two, if their ſums or differences be in the ſame geometrical ratio as the firſt two, the numbers added or ſubtracted are in the ſame ratio. Hence,

7. If the antecedents, or the conſequents, of two equal geometrical ratios, 3 : 6, and 12 : 24, be divided by the ſame 3; in the former caſe, the quotients 1 and 4 will have the ſame ratio to the conſequents, viz. 1 : 6 :: 4 : 24; and in the latter, the antecedents will have the ſame ratio to the quotients, viz. 3 : 1 :: 12 : 4.

8. If

8. If the antecedents or conſequents of ſimilar ratios, 2 : 6, and 3 : 9, be multiplied by the ſame quantity 6; in the former caſe the facts 12 and 18 have the ſame ratio to the conſequents, viz. 12 : 6 :: 18 : 9; and in the latter, the antecedents have the ſame ratio to the products, viz. 2 : 6 :: 3 : 9.

9. If in a *geometrical proportion* 3 : 6 :: 12 : 24, the antecedents be multiplied or divided by the ſame number 2, and the conſequents be multiplied or divided by the ſame number 3; in the former caſe, the facts, in the latter, the quotients, will be in the ſame *proportion*, viz. 6 : 18 :: 24 : 72, and 1 : 3 :: 4 : 12.

10. If in a *proportion* 4 : 2 :: 10 : 5, the antecedent of the firſt ratio be to its conſequent, as the antecedent of the ſecond to its conſequent; then by compoſition, as the ſum of the antecedent and conſequent of the firſt ratio is to the antecedent or conſequent of the firſt, ſo is the ſum of the antecedent and conſequent of the ſecond to the antecedent or conſequent of the ſecond; viz. 6 : 2 :: 15 : 5, or 6 : 4 :: 15 : 10.

11. If in a *proportion* 6 : 4 :: 15 : 10, as the antecedent of the firſt ratio is to its conſequent, ſo is the antecedent of the other to its conſequent; then, by diviſion, as the difference of the terms of the firſt ratio is to its antecedent or conſequent, ſo is the difference of the terms of the ſecond ratio to its antecedent or conſequent, viz. 2 : 4 :: 5 : 10; or 2 : 6 :: 5 : 15.

12. If in a *proportion* 4 : 2 :: 6 : 3, as the antecedent of the firſt ratio is to its conſequent, ſo is the antecedent of the ſecond to its conſequent; and as the conſequent of the firſt is to another number 8, ſo is the conſequent of the ſecond to another number 12; viz. 2 : 8 :: 3 : 12; then will the antecedent of the firſt be to 8, as the antecedent of the ſecond to 12, viz. 4 : 8 :: 6 : 12.

13. If in a *proportion* 8 : 4 :: 12 : 6, as the antecedent of the firſt ratio is to its conſequent, ſo is the antecedent of the ſecond to its conſequent; and as the conſequent of the firſt is to another number 16, ſo is another number 3 to the antecedent of the ſecond, viz. 4 : 16 :: 3 : 12; then will the antecedent of the firſt be to 16, as 3 to the conſequent of the ſecond; viz. 8 : 16 :: 3 : 6.

14. Suppoſe any four proportional quantities; viz. 3 : 6 :: 12 : 24; and any other four proportional quantities, 1 : 3 :: 9 : 27; if you multiply the ſeveral terms of the latter into thoſe of the former, the products will likewiſe be *proportional*, viz. 3 : 18 :: 108 : 648.

15. If there be ſeveral quantities continually proportional, A, B, C, D, &c. the firſt A is to the third C, in a duplicate ratio; to the fourth D, in a triplicate ratio, &c. of the firſt A to the ſecond B.

16. If there be three numbers in continual *proportion*, the difference of the firſt and ſecond will be a mean proportional between the difference of the firſt and ſecond term, and the difference of the ſecond and third, and the firſt term.

PROPORTION, *harmonical or muſical*, is a third kind of *proportion* formed out of the other two, thus: of three numbers, if the firſt be to the third as the difference of the firſt and ſecond to the difference of the ſecond and third; the three numbers are in *harmonical proportion*.

Thus 2, 3, 6 are harmonical, becauſe 2 : 6 :: 1 : 3. So alſo four numbers are harmonical, when the firſt is to the fourth as the difference of the firſt and ſecond to the difference of the third and fourth.

Thus 24, 16, 12, 9, are harmonical, becauſe 24 : 9 :: 8 : 3. By continuing the proportional terms in the firſt caſe, there ariſes an harmonical progreſſion, or ſeries.

1. If three or four numbers in *harmonical proportion* be multiplied or divided by the ſame number; the products, or quotients, will alſo be in *harmonical proportion*: thus, if 6, 8, 12, which are harmonical, be divided by 2, the quotients 3, 4, 6, are alſo harmonical; and reciprocally their products by 2, viz. 6, 8, 12.

2. To find an harmonical mean between two numbers given: divide double the product of the two numbers by their ſum, the quotient is the mean required; thus ſuppoſe 3 and 6 the extremes, the product of theſe is 18, which doubled, gives 36; this divided by 9 (the ſum of 3 and 6) gives the quotient 4. Whence 3, 4, 6 are harmonical.

3. To find a third *harmonical proportional* to two numbers given.

Call one of them the firſt term, and the other the ſecond; multiply them together, and divide the product by the number remaining after the ſecond is ſubtracted from double the firſt; the quotient is a third *harmonical proportional*: thus, ſuppoſe the given terms 3, 4, their product 12 divided by 2 (the remainder after 4 is taken from 6, the double of the firſt), the quotient is 6, the harmonical third ſought.

4. To find a fourth *harmonical proportion* to three terms given: multiply the firſt into the third, and divide the product by the number remaining after the middle or ſecond is ſubtracted from double the firſt; the quotient is a third *harmonical proportional*: thus ſuppoſing the numbers 9, 12, 16, a fourth will be found by the rule to be 24.

5. If there be four numbers diſpoſed in order, whereof one extreme and the two middle terms are in arithmetical *proportion*, and the *ſame* middle terms with the other extreme, are in *harmonical proportion*, the four are in geometrical *proportion*; as here, 2 : 3 :: 4 : 6, which are geometrical; whereof 2, 3, 4, are arithmetical, and 3, 4, 6 harmonical.

6. If betwixt any two numbers you put an arithmetical mean, and alſo an harmonical one, the four will be in geometrical *proportion*: thus, betwixt 2 and 6, an arithmetical mean is 4, and an harmonical one 3; and the four 2 : 3 :: 4 : 6, are geometrical.

We have this notable difference between the three kinds of *proportion*; that from any given number we can raiſe a continued arithmetical ſeries increaſing *in infinitum*, but not decreaſing; the *harmonical* is decreaſable *in infinitum*, but not increaſable; the geometrical is both.

PROPORTION, *contra-harmonical*. See CONTRA-HARMONICAL.

PROPORTION, *extreme and mean*. See EXTREAM.

PROPORTION, *inordinate*. See INORDINATE.

PROPORTION, *reciprocal*. See RECIPROCAL.

PROPORTION *of equality*. See EQUALITY.

PROPORTION, *compoſition of*. See COMPOSITION.

PROPORTION, *rule of*. See RULE.

PROPORTION, *terms of*. See TERM.

PROPORTION is alſo uſed for the relation between unequal things of the ſame kind, whereby their ſeveral parts correſpond to each other with an equal augmentation, or diminution.

Thus, in reducing a figure into little, or enlarging it, care is taken to obſerve an equal diminution, or enlargement, through all its parts; ſo that if one line, e. gr. be contracted by one third of its length, all the reſt muſt be contracted in the ſame *proportion*.

The making of reductions of this kind is the great uſe of the proportional compaſſes.

PROPORTION, in *Law*. See PRORATA, and ONERANDA.

PROPORTION, in *Architecture*, denotes the juſt magnitude of the members of each part of a building, and the relation of the ſeveral parts to the whole; e. gr. of the dimenſions of a column, &c. with regard to the ordonnance of the whole building.

One of the greateſt differences among architects, M. Perrault obſerves, is in the *proportions* of the heights of entablatures with reſpect to the thickneſs of the columns, to which they are always to be accommodated. See ENTABLATURE.

In effect, there is ſcarce any work, either of the ancients or moderns, wherein this *proportion* is not different; ſome entablatures are even nearly twice as high as others; yet it is certain, this *proportion* ought of all others to be moſt regulated: none being of greater importance, as there is none wherein a defect is ſooner ſpied, nor any wherein it is more ſhocking.

PROPORTION is likewiſe underſtood of the magnitudes of the members of architecture, ſtatues, or the like, with regard to the diſtance whence they are to be viewed.

The moſt celebrated architects are much divided in their opinions on this ſubject: ſome will have it, that the parts ought to be enlarged in *proportion* to their elevation; and others, that they ought to remain in their natural dimenſions. See STATUE.

PROPORTION, in *Painting*, is the juſt magnitude of the ſeveral members of a figure, a groupe, &c. with regard to one another, to the whole figure, the groupe, and the entire piece.

Proportion makes one of the moſt important articles in the art of painting, the principal ſubject it is employed in being the human body; for which reaſon, the curious in that art will not be diſpleaſed with the following ſcheme of the rules and laws thereof.

By the way, let it be obſerved, 1. That to meaſure and ſet off *proportions*, they either divide the module into twelve parts, and ſubdivide each of theſe into four; or elſe they divide the face into three lengths of the noſe, ſubdividing each length into twelve: or laſtly, divide the whole face into three, and ſubdivide each of thoſe into four; which laſt method is what we ſhall here follow.

2. That the multiplicity of little meaſures is to be ſtudiouſly avoided, becauſe they confound, and becauſe they require great ſkill in oſteology to hit juſtly.

3. That in meaſuring there be a regard had to the relievo, or ſittings out of figures.

PROPORTION, *rules of, in painting*. In the *proportions* of a human figure, regard is had to the *ages*, *ſex*, and *quality*. See FACE.

As to *age*; we conſider the ſtages thereof, infancy, youth, and manhood. For the firſt, at three years of age, we count five lengths of the face from top to toe; viz. from the tip of the head to the bottom of the belly, three; thence to the foot, two; breadth about the ſhoulders, one face, one eighth; and in the place of the hips, one face.

At four years, the height is ſix faces $\frac{3}{4}$; viz. from the top of the head to the bottom of the belly, three faces $\frac{1}{4}$; thence to the ſole of the foot, three faces; the breadth about the ſhoulders, one face $\frac{3}{4}$; about the haunches, one face $\frac{1}{4}$.

At five years, the height is ſix faces $\frac{1}{4}$, $\frac{1}{4}$ abated, the lower being ſhorter.

In youth, at twelve years, we have two *proportions*; the one from nature, which gives nine faces for the height; for the breadth about the ſhoulders, two faces; about the haunches, one face $\frac{1}{4}$; the other from the antique ſtatues, as that of Laocoon, &c. which gives the height, ten faces $\frac{1}{4}$; the breadth from one ſhoulder to another, one face $\frac{1}{4}$; at the haunches $1\frac{1}{4}$; at the place of the muſcle called *vaſtus externus*, 2; at the thigh 1; the knee, $\frac{1}{4}$ and $\frac{1}{8}$; a ſubdiviſion; and at the ankles $\frac{1}{4}$.

In the ſtate of manhood, when the proportions are arrived at perfection, we reckon the height ten faces; the firſt, from the top of the head to the noſtril; the ſecond, to the hole in the neck between the clavicles; the third, to the pit of the ſtomach, called *cartilago enſiformis*; the fourth, to the navel; the fifth, to the pyramidal muſcles; thence to the knee, $2\frac{1}{2}$; and as much to the ſole of the foot. The extent of the arms is the ſame with the height; viz. from the tip of the long finger to the joint of the wriſt, one face; thence to the elbow $1\frac{1}{2}$; thence to the juncture of the ſhoulders, $1\frac{1}{2}$; thence to the hole in the neck, $1\frac{1}{2}$; in all, five heads; which, with the five of the other arm, gives ten; the thickneſs of the arms to be adjuſted by the quality or character.

As to the breadth of the figure ſeen frontwiſe, the width of the ſhoulders across the deltoides is 2 faces $\frac{1}{2}$; breadth of the pectoral muſcle, to the juncture of the arm, 2. About the haunches, where the obliqui externi are, 1 $\frac{1}{2}$, and the ſubdiviſions. The thighs, at the biggeſt place, 1. The knee, $\frac{1}{2}$, three ſubdiviſions $\frac{1}{4}$. The leg, at the thickeſt, $\frac{1}{2}$, and one ſubdiviſion. The extreme of the ankle, $\frac{1}{2}$, one ſubdiviſion $\frac{1}{4}$. The feet, $\frac{1}{2}$, and one half a ſubdiviſion. Their length, 1 face $\frac{1}{2}$; one ſubdiviſion.

Others, meaſuring by the length of the whole head, make only eight heads in height and breadth, thus: the head, one; thence to the bottom of the breaſts, one; thence to the navel, one; thence to the yard, one; thence to the middle of the thigh, one; thence to the lower parts of the knee, one; thence to the ſmall of the leg, one; thence to the bottom of the foot, one.

The breadth thus: from the end of the long finger to the wriſt, one; thence to the bend of the arm, one; thence to the bottom of the ſhoulder, one; thence over to the other ſhoulder, two; thence to the end of the other long finger, three.

To theſe general *proportions* may be added others, which uſually obtain; as, that the hand is to be of the length of the face; the thumb the length of the noſe; and the great toe the ſame: the two nipples, and the hole in the neck, make a juſt equilateral triangle: the ſpace between the eye is the breadth of an eye; the breadth of the thigh, at the thickeſt, is double that of the thickeſt part of the leg, and treble that of the ſmalleſt: from the top of the head to the noſe, the ſame as from the top of the noſe to the chin. The diſtance from the chin to the throat-pit, is the breadth of the throat; the diſtance of the centre of the eye to the eyebrow, the ſame as the prominence of the noſtrils, and the ſpace between them and the upper lip; the length of the fore-finger the ſame as the ſpace thence to the wriſt; the ſpace from the tip of the fore-finger to the wriſt, the length of the face.

For the *ſex*; the *proportions* of man and woman differ in height, in that the woman has a longer neck; the parts at the breaſts, and the lower parts of the belly, bigger by half a part; which makes the ſpace from the breaſt to the navel leſs by one part; and the thigh ſhorter by a third part.

As to breadth, a woman hath her breaſts and ſhoulders narrower, and her haunches larger; and thighs, at the place of their articulation, larger; arms and legs thicker, feet ſtraighter; and becauſe women are more fat and ſoftly, their muſcles are leſs ſeen, and therefore the contours are more ſmooth and even.

Young maids have little heads, long necks, low or down ſhoulders, ſlender bodies, haunches big, legs and thighs long, feet little.

Young men have the neck thicker than women, the ſhoulders and breaſts larger, the belly and haunches narrower, legs and thighs ſlenderer, and feet larger.

As to the *qualities* of ſubjects, we are either to follow ſimple nature, or fine and agreeable nature, or to chooſe nature, or exceed it. In following *ſimple* nature, in common and country ſubjects, men of dull wit, and a moiſt temperament, are to be of a heavier and rougher *proportion*, the muſcles appearing but little diſtinguiſhed, the head big, neck ſhort, ſhoulders high, ſtomach little, knees and thighs thick, and feet large.

In nature, as *fine* and *agreeable*, for ſerious hiſtories, &c. the figures of the heroes to be well ſhaped, the haunches high and upright, the joints well knit, little and compact, and free from fleſh and fat.

Military men are to have the head little, neck thick and nervous, ſhoulders large and high, body and paps elevated, haunches and belly little, thighs muſcular, principal muſcles raiſed up and knit together at the heads; the legs ſmooth, feet ſlender, ſoles hollow.

Nature is ſometimes to be *ſelected*, i. e. made up of parts from various good originals, to form extraordinary and perfect figures for great and heroic ſubjects; as in Roman hiſtories; giving, thus, a character of force ſufficient to execute actions agreeable to the deſcription the poets, &c. make.

Laſtly, ſometimes nature is to be *exceeded*, as in repreſentations of fabulous deities, of heroes and giants: in theſe the great pieces, which ſerve to form the body, are to be ſet out in meaſures agreeable to the height; only diverſifying them by their bigneſs.

In the rule of *proportions*, it is to be obſerved, that there is a difference in the contours of ſome parts, when put in different poſtures: thus, when the arm is bent, it is larger than when ſtraight; and the ſame is true of the foot and knee, as is ſhewn by Leonardo da Vinci.

PROPORTION, *rule of*, in *Arithmetic*, a rule whereby we find a fourth proportional to three numbers given.

This is popularly called the *golden rule*, and ſometimes the RULE *of three*.

PROPORTION, *compaſs of*, a name by which the French, and after them ſome Engliſh authors, call the *ſector*. See its conſtruction and uſe under the article SECTOR.

PROPORTIONAL, relating to proportion. Thus we ſay, *proportional compaſſes*, *parts*, *ſcales*, *ſpirals*, &c. See COMPASSES, &c.

PROPORTIONALS, in *Geometry*, are quantities, either linear or numeral, which bear the ſame ratio, or relation to each other.

Thus, if 3, 6, 12, be *proportionals*, then will 3 : 6 :: 6 : 12.

To find a fourth PROPORTIONAL *to three given lines*, A B, A C, *and* B D *(Tab. IV. Geom. fig. 73.)* draw an angle F A G at pleaſure; from A ſet off the firſt of the lines to B; from A, the ſecond, to C; and from B, to D, the third: draw B C; and in D make an angle equal to A B C; then is C E the fourth *proportional* ſought; and A B : A C :: B D : C E.

If a third *proportional* be required to two given lines, A B and A C; make B D equal to A C; i. e. let A C be repeated twice: then A B : A C :: A C : C E.

To find a mean proportional *between two given lines*, A B and B E, *(fig. 74.)* join the two given lines into one continued right line, and biſect it in C. From C, with the interval of A C, deſcribe a ſemicircle A D E; and from B erect a perpendicular B D; this is the mean *proportional* ſought; and A B : B D :: B D : B E.

The geometricians have been theſe two thouſand years in ſearch of a method for finding *two mean proportionals*.

The ancients performed it mechanically, by the meſolabe deſcribed by Eutochius; and many of them attempted to give the demonſtration; ſome by the ſolid loci, as Menechmus; others by the plain loci, as Nicomedes, Diocles, and, in our times, Vieta; and others by implicit motions, as Plato, Archytas, Pappus, and Sporus; others tentatively, by the deſcription of circles, as Hero and Apollonius, &c. but all in vain. See DUPLICATION *of a Cube*.

To find a mean proportional *between two numbers*: half the ſum of the two given numbers is an arithmetical mean *proportional*, and the ſquare root of the product a geometrical mean *proportional*. See PROPORTION *arithmetical* and *geometrical*.

To find a mean harmonical proportional. See PROPORTION *harmonical*.

PROPORTIONALS, in *Grammar*. See NUMERALS.

PROPORTIONAL *compaſſes*, an inſtrument for the ready drawing of lines and figures in any given ratio to other lines or figures. See their conſtruction and uſe under the article COMPASSES.

PROPORTIONAL *part*. See PART.

PROPORTIONAL *ſcales*, called alſo *logarithmical ſcales*, are the artificial numbers or logarithms, placed on lines, for the eaſe and advantage of multiplying, dividing, &c. by means of compaſſes, or of ſliding-rules.

They are, in effect, only ſo many lines of numbers, as

they are called *A* by Gunter, but mode single, double, triple, or quadruple; beyond which they seldom go. See GUNTER's *line*, SCALE, &c.

PROPORTIONAL *signs*. See SIGNS.

PROPORTIONALITY, a term used by Gregory de St. Vincent, for the proportion that is between the exponents of four ratios.

PROPORTUM, *in* PERSPECT., in our *Law Books*, the intension or meaning of any thing. *Secundum* proportum *dicit demonstrationem in universo.*

PROPOSITION, PROPOSITIO, in *Logic*, part of an argument, wherein some quality, either negative or positive, is attributed to a subject.

Chauvin defines *proposition*, a complete, consistent sentence, indicating or expressing something either true or false, without ambiguity: as, *Xantippe is a bad wife. If an ass fly, he must have wings.*

Others, more philosophically, define *proposition*, a speech, uttered or produced, to signify some judgment of the mind. Or again, a *proposition* may be defined, a sentence wherein two or more ideas or terms are joined and disjoined by one affirmation or negation.

A *proposition* consists of two terms; the one, that whereof we affirm or deny, called the *subject*; the other, the thing affirmed or denied, called the *attribute* or *predicate*. These two are either joined, or separated, by the intervention of some copula or disjunctive.

Thus in the *proposition*, *God is just*: the subject, *God*, is joined with the attribute, *just*, by the verb substantive, *is*. The schoolmen call the two terms the *matter*, and the copula the *form*, of the *proposition*.

Now, as terms may be either singular, or common and universal, if the subject of a *proposition* be a common term, taken in all its extent, the *proposition* is called *universal*: as, *every atheist is blind*.

This is called a division according to the *subject*, or a division arising from the *quantity*.

If the common term be only taken in an indeterminate part of its extent, the *proposition* is called *particular*: as, *some atheists are solicited*.

If the subject of the *proposition* be singular, the *proposition* is called *singular*: as, *George is king of England*.

If no more, either of universality or particularity be prefixed to a subject, in its own nature general, the *proposition* is *indefinite*: as, *angels are noble creatures*.

These *propositions* which have only one subject, and one predicate, are called *simple*. And these are again either *simple* or *complex*: a *purely simple proposition* is that whose subject and predicate are made up of single terms, but if either or both be made up of complex terms, the *propositions* are called COMPLEX. Those that have several subjects or predicates, are called *compound*: each *proposition* of this kind contains in it two or more *propositions*, which are either plainly expressed, or concealed and implied. The former sort are distinguished into six kinds, viz. COPULATIVE, DISJUNCTIVE, CONDITIONAL, *causal*, where two *propositions* are joined by causal particles, RELATIVE, and DISCRETIVE. The latter sort comprehend EXCLUSIVES, EXCEPTIVES, *comparatives*, as, *pater it, the greatest affection, inceptives*, and *desitives*, which relate to the beginning or ending of any thing, and *continuatives*, as *Rome remains to this day*.

Some writers add under this class of *propositions*, another division of them into *direct* and *indirect*.

PROPOSITION, *direct*, is that wherein a higher or more general thing is predicated of a lower and more particular: as, *man is an animal*.

Others will have it, that wherein the subject stands as a matter receiving, and the predicate as a form received: as, *Peter is learned*.

PROPOSITION, *indirect*, according to some, is that wherein an inferior is predicated of an higher: as *an animal is man*. According to others, it is that wherein the subject stands as the form, and the predicate as the matter: as, *every rational is man*.

Propositions considered with regard to their *form* or *copula*, or according to their *quality*, are divided into *affirmative* and *negative*.

An *affirmative* PROPOSITION is when the idea of the predicate is supposed to agree to the idea of the subject, and is joined to it by the word *is* or *are*, as, *God is a spirit*.

A *negative* PROPOSITION is when the predicate is not supposed to agree with the subject, and is disjoined from it by the particles *is not*, *are not*, &c. as, *Man is not immortal*.

There is another division of *propositions* among scholastic writers into *pure* and *modal*; which may be called a division according to the *predicate*.

PROPOSITIONS are said to be *pure*, when they imply or involve nothing besides their matter and form, or, when they merely express that the predicate is connected with the subject: as, *man is rational*.

PROPOSITION, *modal*, is that which, beside the pure matter and form, involves some mode, or manner of connection between the predicate and the subject: as, *it is necessary man be rational*.

Hence such a *proposition* is said to consist of a mode and a dictum; the mode denotes some circumstance which affects the *proposition*; as, *it is necessary*: the dictum is the rest of the *proposition*, *that man be rational*.

There are four of these modes very famous; viz. *necessary*, *possible*, *impossible*, and *contingent*. Others produce other modes; as *true*, *false*, *certain*, *uncertain*, *probable*, &c.

To modal *propositions*, some philosophers refer *exclusive*, *inceptive*, and *reiterative propositions*; all which are denoted by a common name, *expositive propositions*, because requiring some explanation to make them clearly understood.

Propositions, according to their *sense* or *signification*, are distributed into *true* and *false*.

A *true* PROPOSITION represents things as they are in themselves, or joins those ideas and terms together whose objects are joined and agree; or disjoins those ideas and terms, whose objects disagree or are disjoined; as, *every bird has wings*, *a beast is not immortal*.

A *false* PROPOSITION is that which represents things otherwise than they are in themselves, or joins those ideas or terms whose objects disagree, or disjoins those whose objects agree; as, *birds have no wings*, *brutes are immortal*.

Propositions according to their *different degrees of evidence* are distinguished into *certain* and *uncertain*.

A *certain* PROPOSITION is that where the EVIDENCE of the agreement or disagreement of the ideas is so strong and plain, that we cannot withhold nor delay our assent; which assent is distinguished by the name of KNOWLEDGE. See CERTITUDE.

A *dubious* or *uncertain* PROPOSITION is where there is any obscurity upon the agreement or disagreement of the ideas, so that the mind does not clearly perceive it, and is not compelled to affirm or dissent; such uncertain *propositions* are called OPINIONS. See on this subject Watts's excellent Introduction to Logic, part ii. chap. 1 and 2.

A syllogism consists of three *propositions*, major, minor, and conclusion. An enthymeme, of two.

The schoolmen make several other species and divisions of *propositions*; as, a

PROPOSITION *de primo adjacente*, where the subject and predicate are both included under the verb; such are, *runs*, *walks*, *etc.*

PROPOSITION *de secundo adjacente* is, where either the subject or predicate is included in the verb; as, *I hear*, or, *I write*.

PROPOSITION *de tertio adjacente* is, where both the subject and predicate are expressed, and kept distinct from the verb; as, *the king is just*.

This *proposition* is the rule or standard of all the other; so that whatever *proposition* can be reduced thereto, is legitimate; and what cannot, is not.

PROPOSITIONS, *contradictory*, *contrary*, *subaltern*, *etc.* See the adjectives.

PROPOSITIONS, *conversion*, *opposition*, and *reduction of*. See CONVERSION, &c.

PROPOSITION, *in Mathematics*, is either some truth advanced and shewn to be such by demonstration; or some operation proposed, and its solution shewn.

If the proposition be deduced from several theoretical definitions compared together, as this; a parallelogram is double of a triangle, standing on the same base, and of the same altitude; it is called a *theorem*.

If it be deduced from a praxis or series of operations, it is called a *problem*; as, to find a third proportional to two given quantities.

Indeed, in strictness, the *proposition* is only part of a theorem; viz. that which shews what agrees to such a thing under such conditions, and what not: in which sense it is distinguished from the *demonstration*, which shews the reason why the understanding conceives that to agree to it.

Again, strictly speaking, the *proposition* is only a member of a problem, viz. that which shews what is required to be done; in which sense it is distinguished from the *solution*, which rehearses the several things to be done in order to effect what is required; and from the *construction*, which proves, that by doing the things insisted in the solution, the thing required in the *proposition* is truly done.

PROPOSITION, in *Poetry*, denotes the first part of an epic poem, wherein the author proposes, or lays down, briefly and in general, what he has to say in the course of his work.

The *proposition*, P. Bossu observes, is to contain the bare matter of the poem, i. e. the action, and the persons that are to execute it, both human and divine.

This is what we have both in the Iliad, the Odyssey, and the Æneid. The action proposed in the Iliad, is the wrath of Achilles; that of the Odyssey, the return of Ulysses; and that of the Æneid, the transition of the Trojan empire into Italy.

The same author observes, that the divine persons are named in all three *propositions*. Homer, e. gr. declares, that what happens in the Iliad, is by the will of Jupiter; and that Apollo was the cause of the quarrel between Agamemnon and Achilles: the same poet says, it was Apollo prevented the return of Ulysses's companions; and Virgil mentions the Destinies, the will of the gods, and the anger of Juno. But they all three dwell chiefly on the person of the hero, as if he were the matter of the poem.

Yet there is some difference, in this respect, in the three poems; in that Achilles is named in the Iliad, but Ulysses and Æneas are not: they are only pointed at, and that in such general terms, as if it were supposed they were known before.

This practice seems to fall in with the first intention of the poet; who is to feign an action without names, and who, as Aristotle says, does not relate the action of Achilles, nor Ulysses, nor Æneas, not any particular person, but of an universal, general, and allegorical person.

Add to this, that the character which the poet is to give his hero, and his whole work, is expressed in the *proposition*, both by Homer and Virgil.

The whole Iliad is anger and violence; it is Achilles's character, and it is what the poem commences with: *Menin aeide.* The Odyssey presents us in the first verse with the prudence, dissimulation, and address, which make the character of Ulysses, and the business of the poem: *Andra moi ennepe.* And we see the piety and mildness of Æneas in the beginning of the Latin poem: *Insignem pietate virum.*

As to the manner of the *proposition*, Horace contents himself to prescribe modesty and simplicity; not to promise much, nor raise great expectations in the reader. *Do not begin*, says he, *like that wretched poet, who sat and wrote*, Fortunam Priami cantabo, & nobile bellum. *How much better is that of Homer*, Dic mihi, musa, virum! &c. *He does not spend all his fire at once, and brags nothing but smoke: from this feeble beginning, you shall soon see him rise to the wonders of Antiphates, Scylla, Charybdis, and Polyphemus.*

The same modesty we find in the *proposition* of the Æneid: if that of the Iliad be a little more furious, it is, perhaps, in conformity to the character of the poem, which is a series of violences, and extravagances.

Add, that if the poet be to speak with modesty of his hero; much more is he to do so of himself: thus Virgil only says, *I sing the action of Æneas.* Homer begs his Muse to *sing*, or to *sing*. How far does Claudian exceed from these examples!

——*Audax promite cantus*
Mens cogesta fubit; grassis remeabile, profani:
Jam furor humanas vultus de pectore fugit;
Expulit, & totum spumans præcordia Phœbum.

A short poem, e. gr. an ode, &c. wherein the violent strain could be pursued to the end, might admit of such a pompous beginning. Thus we find Horace begin an ode much after the manner of Claudian:

Odi profanum vulgus, & arceo——
——*Cæstra non ante*
Audita Musarum sacerdos
Virginibus puerisque canto.

But the length of an epic poem quite excludes all pompous *propositions*.

There is scarce any fault we have yet observed a *proposition* liable to, but there is an instance of in the *proposition* of Statius's Achilleid: he bids his *Muse rehearse the deeds of the magnanimous son of Æacus, who was formidable even to the Thunderer.* He adds, *That he has worthily discharged a former undertaking; and that Thetis claims him a second Amphion.*

Magnanimum Æacidem, formidatumque Tonanti
Progenien, & patria cautum succedere cælo,
Diva, refer——
Tu modo, si vetiti digna deplevimus hastis,
Da fontes mihi, Phœbe, novos, &c.

PROPOSITION, in *Rhetoric*, is that part of a just and regular discourse, in which the speaker lays down or *proposes* the subject upon which he designs to treat, in a distinct and express manner. This first employs his thoughts, though it usually follows both the INTRODUCTION and NARRATION in the order of the discourse.

As the *proposition* is the basis of his whole design, it is necessary, in the first place, that this be duly weighed, and represented to his mind in all the different views, in which he can place it; that he well considers the nature of it, the several parts of which it consists, and the particular force of each part. By this means he will be the better enabled to offer such arguments, as may be proper, in its defence, and to refute any objections, which may be brought against it.

Orators use several methods of laying down the subject of their discourses. Sometimes they do it in one general *proposition*. We have an instance of this in Cicero's speech to the senate, the day after Cæsar was killed, as it is given us by Dion Cassius, lib. xliv. p. 250, ed. Leunclav. in which his design was to persuade them to peace and unanimity. *To-day*, says he, *being the first of our assembling, I think it necessary to put by all the discords and enmity, which have been among us, and return again to our former peace and agreement.* And then he proceeds to offer his reasons for this advice.

At other times, in order to give a clearer and more distinct view of their discourse, they subjoin to the *proposition* the general heads of argument, by which they endeavour to support it. Thus method Cicero uses in his seventh Philippic, sect. 3, where he says: *I, as to have always commended and adopted a peace, was against a peace with Mark Antony. But who am I now to favour? Because it is best, because it is dangerous, and because it is impracticable, and I beseech you to hear me with your usual candour, while I shall assign the reasons.* See PARTITION.

But some orations, especially of the demonstrative kind, do not require any particular *proposition*, being little more than a continued narrative or illustration of the subject: of this sort is that of Cicero, in which he returns thanks to Cæsar, in the name of the senate, for pardoning Marcellus; and his invective against Piso: as likewise Pliny's panegyric in praise of the emperor Trajan. Not but that such discourses are disposed in a regular order, and under proper heads, though they are not laid down at first in distinct *propositions*.

Quintilian, Inst. Orat. lib. iv. cap. 5. observes, that orations sometimes avoid laying down any direct *proposition*, when the chief thing they have in view may be disagreeable to those whom they address; for which reason they take them off from attending to it, till they have first prepared them for it, by offering some thing else, which, when proved, the other may with less difficulty be admitted. Cicero makes use of this art in his defence of Ligarius. Ward's Or. vol. 1. sect. 14.

PROPREFECT, *propræfectus*, among the Romans, the prefect's lieutenant; or an officer whom the prefect of the prætorium commissioned to do any part of his duty in his place.

In Gruter, p. CCCIXX. the third inscription mentions *propræfecto* of the prætorium under Gratian, in the city of Rome, and the neighbouring parts.

PROPRETOR, or PROPRÆTOR, a Roman magistrate, who, having discharged the office of prætor at home, was sent into a province to command there with his former prætorial authority.

PROPRETOR was also an appellation given to those, who, without having been prætors at Rome, were sent extraordinarily into the provinces, to administer justice with the authority of prætors.

PROPRETOR is also a denomination given by some to those sent by the emperors into the provinces, which, upon partition in Augustus's time, fell to their lot: as the name *proconsul* was given to those sent into the provinces that fell to the people's share.

PROPRIETARY *governments in America*. See the account of CHARTER *Governments*.

PROPRIETARY *goods*, were such as had reserved goods and effects to themselves, notwithstanding their formal renunciation of all at the time of their profession.

They are frequently mentioned in the Monast. Anglic. &c. and were to be very severely dealt with; to be excommunicated, deprived of burial, &c. Monachi proprietarii *excommunicentur ab ecclesiâ: & si in morte proprietatem inventa fuerit, sicut asino sepeliatur carni.* Addit. ad Matt. Par.

PROPRIETATE *probanda* is a writ to the sheriff to inquire of the property of goods distrained, when a defendant claims a property upon a replevin had.

Where a property is proved by the defendant, a replegiari properly lies not.

PROPRIETATIS *elicit*. See ELIXIR.

PROPRIETOR, or PROPRIETARY, he who has the property in propriety of any thing.

PROPRIETOR, in *Law*, is strictly such a one as has, or possesses, any thing as his own in the utmost degree: *Sine ullius arbitrio ab omnia.*

The term was formerly applied, in a particular manner, to him who had the fruits of a benefice to himself, and his successors; as, in ancient times, abbots and priors had.

PRO-

PROPRIETY, in *Grammar*, is where the direct and immediate signification of a word agrees to the thing it is applied to.

In which sense *propriety* is used in opposition to a figurative or remote signification.

PROPTOSIS, in *Surgery*, a name by which some authors have called that distemperature of the eye commonly called EXOPHTHALMY.

PROPYLÆUM, Προπύλαιον, the porch of a temple, or great hall.

Hence *propylæum* is also used figuratively, in matters of learning, for an introduction, apparatus, or prodromus, to some greater work. In this sense, we say, the *propylæum* of the Jesuits at Antwerp, &c.

PROQUESTOR, PROQUÆSTOR, the quæstor's lieutenant, or a person who discharged the office of quæstor in his stead, without the deputation of the senate.

The word is chiefly applied to an officer appointed by the governor of a province to discharge the quæsture after the decease of the quæstor, or when he went to Rome without being succeeded by another quæstor, till the senate and people should send a new one.

PRORÆ *os*, in *Anatomy*, a bone of the cranium, called also *os sagittale*.

PRO RATA, in *Commerce*, a term sometimes used among merchants, for *in proportion*.

Thus, when speaking of any undertaking, they say, each person must keep the profit, or sustain the loss, *pro rata* to his interest; i. e. meant, each shall gain or lose, in proportion to the sum he put in stock.

PRO RATA *portionis*, in *Law*. See ONERANDO *pro rata portionis*.

PRORoGANDA *officia*. See ASSISA.

PROROGATION, *prorogatio*, the act of prolonging, adjourning, or putting off, to another time.

PRORoGATION *of parliament*. See PARLIAMENT.

The proroguing of the lower house of CONVOCATION is a power vested in the archbishop with the consent of the suffragans.

PROSAIC *numbers*. See NUMBERS.

PROSCARABÆUS, in *Zoology*, the name by which some call the *meloe*, a genus of four-winged flies. See *Oil* BEETLE.

PROSCENIUM, in the *Ancient Theatre*, was an eminence whereon the actors performed their parts.

The *proscenium* answered to our stage. It consisted of two parts among the Greeks; one particularly so called, where the actors performed; the other was the *logeion*, where the singers and the musicians acted their parts. Among the Romans, the *proscenium* and *pulpitum* were the same thing.

PROSCHÆRETERIA, Προχαιρετηρία, in *Antiquity*, a day of rejoicing, kept when a new-married wife went to cohabit with her husband.

PROSCLYSMA, a word used to express an irroration, or sprinkling of any part with a fluid, as the throwing water in the face in cases of fainting, &c.

PROSCRIPTION, *proscriptio*, a publication made in the name of the chief or leader of a party, whereby he promises a reward to any one who shall bring him the head of one of his enemies.

Sylla and Marius, by turns, *proscribed* each other's adherents. Under the triumvirate, a great part of the best and bravest of the Romans fell by *proscription*.

The term took its rise from the practice of writing down a list of the persons names, and posting it in public; from *pro*, and *scribo*, *I write*.

PROSE, *prosa*, the natural language of mankind, loose, and unconfined by poetical measures, rhymes, &c. In which sense it stands opposed to *verse*.

The word comes from the Latin *prosa*, which some will have derived from the Hebrew *porus*, which signifies *expound*: others deduce it from the Latin *prorsa*, or *prorsus*, *going forwards*; by way of opposition to *versa*, or turning backwards; as is necessary in writing verse.

Though *prose* hath its connexions, which sustain it, and a structure which renders it numerous, it ought still to appear free: its character consists in running easy, and unrestrained.

Poets very rarely have the talent of *prose*: the habit of wearing chains fits fast upon them, even when the chains are off.

St. Evremond compares *prose* writers to foot-travellers, who walk with less noise, but more security, than the cavaliers.

PROSECUTION. To make men liable to criminal *prosecutions* by the law of England, it is required that they have the use of reason, and that they be *sui juris*. On the first account the law indulges infants under the age of discretion, idiots, and lunatics, whatever the nature of the fact may be; and even against the person of the king, as it has been held of late: neither will it suffer one who becomes *non compos* after he has committed a capital offence, to be either arraigned or executed. See LUNATIC and INFANT.

As to an offender's being *sui juris*, it is to be observed, that neither a son, nor a servant, nor any other person, except a feme covert, is excused on the account of acting by command or coercion of another. See FEME *covert*.

PROSECUTION *of felons*. See LARCENY, and REWARDS.

PROSECUTOR, in *Law*, is he that pursues a cause in another's name.

PROSELYTE, *proselytus*, a new CONVERT to the faith.

The word is Greek προσήλυτος, which, in Latin, signifies *advena*, in English, *stranger*, or one arrived out of another country.

The term was much used in the primitive church. The Jews too had their *proselytes*, who, from being Gentiles, embraced Judaism.

Among the Hebrews there were two sorts of *proselytes*; one called *proselytes of righteousness*, who became complete Jews, by submitting to the rite of circumcision, and were in all respects united to the Jewish church and nation; the latter called *proselytes of the gate*, who did not embrace the Jewish religion, and yet were suffered to live among the Jews under certain restrictions; as that they should not practise idolatry, nor worship any other God beside the God of Israel; that they should not blaspheme the God of Israel; and that they should keep the Jewish sabbath, so far at least as to refrain from working on that day. These strangers were permitted to worship the God of Israel in the outer court of the temple, which, for that reason was called the court of the Gentiles.

PROSERPINA, in *fabling*, a name given by some authors to CHAMOMILE.

PROSERPINACA, in *Botany*, a genus of the *triandria trigynia* class; its characters are, that the calyx is triportite, that it has no corolla, and a single three-celled seed.

There is only one species.

PROSERPINE, in *Mythology*, the daughter of Jupiter and Ceres, wife of Pluto, stolen by him out of Sicily, and carried to his subterranean dominion, where she was the partner of his empire. The poets and painters represent her with a dark complexion and a melancholy air in her face. Statius Theb. l. v. ver. 11. affigns her the employment of keeping a register of the dead, and marking down all that should be added to that number. He also says, lib. 5. Sylv. 1. v. 257. that when any woman dies who has been a remarkable good wife in this world, *Proserpine* prepares the spirits of the best women in the other to make a procession to welcome her into Elysium with joy, and to strew all the way with flowers, where she is to pass. See CORSIA.

PROSEUCHÆ, derived from προσεύχεσθαι, *prayer*, or σταθμοὶ, in *Antiquity*, were the places of prayer among the Jews, and nearly the same as their synagogues. But the synagogues were originally in the cities, and were covered places; whereas for the most part, the *proseuchæ* were out of the cities, and upon the banks of rivers, having no covering, except, perhaps, the shade of some trees, or some covered galleries.

Dr. Prideaux mentions another distinction in respect to the service performed in them: in synagogues, he says, the prayers were offered up in public forms in common for the whole congregation; but in the *proseuchæ* they prayed, as in the temple, every one apart for himself. Conn. part i. book 6. vol. ii. p. 536, &c. edit. 10.

After all it remains a question with some whether the synagogues and the *proseuchæ* were any thing more than two different names for the same place; the one taken from the people's assembling in them, the other from the service to which they were more immediately appropriated, viz. prayer.

PROSLAMBANOMENOS, in the *Ancient Greek Music*, was the first note of their scale, whether ascending or descending. Phil. Trans. N° 481. p. 269.

It was usual among the Greeks to consider a descending as well as an ascending scale; the former proceeding from acute to grave precisely by the same intervals as the latter did from grave to acute. The not distinguishing these two scales has led several learned moderns to suppose, that the Greeks, in some centuries, took the *proslambanomenos* to be the lowest note in their system; and in other centuries to be the highest. But the truth of the matter is, that the *proslambanomenos* was the lowest or highest note, according as they considered the ascending or descending scale. The learned author of this remark, thinks this distinction of the ascending or descending scales conducive to the variety and perfection of melody; but he says, he never met with above one piece of music, where the composer appeared to have any intelligence of that kind: and this piece was above one hundred and fifty years old.

The *proslambanomenos* was one of those sounds which the ancients called *fastiles*, from their remaining fixed throughout all the genera and species.

PRO-

PROSODIA, Προσῳδία, in *Antiquity*, a sacred song, or hymn sung in honour of the gods. It differed from the *prosodia* with an omega, προσῳδῶ, which was a song sung in concert with some musical instrument.

PROSODY, *prosodia*, that part of grammar which teaches and directs the pronunciation, and manner of rehearsal; marks the accents; and distinguishes the long and short syllables.

The word is formed from προσῳδία, compounded of πρὸς, and ᾠδὴ, *cantus, singing*.

Prosody is properly that branch of grammar which relates to syllables; treating of their true pronunciation in respect of accents, and time or quantity.

The English *prosody* turns chiefly on two things: NUMBERS, that is, a certain number of feet or syllables; and RHYME, or a similitude of sound between the last syllables of words.

The Greek and Roman *prosodies* were unacquainted with rhyme; but, in lieu thereof, had something to make their verse harmonious without, viz. *quantity*.

PROSONOMASIA, Προσωνομασία, a figure in *Rhetoric*, whereby allusion is made to the likeness of a sound in several names or words; much the same with PARONOMASIA, or *agnominatio*.

PROSOPIS, in *Botany*, a genus of the *decandria monogynia* class: its characters are, that the calyx is hemispherical and quadridentated; the stigma is simple and the fruit is an inflated, polyspermous pod. There is only one species.

PROSOPOLEPSIA, προσωποληψία, in *Ethics*, is used by some writers for that bodily impression, which inclines to the love or hatred, esteem or contempt of persons or things, on account of some slight or trivial circumstances attending them.

PROSOPOPOEIA, Προσωποποιία, formed from προσωπον, *person*, and ποιεω, *I make*, or *feign*, in *Rhetoric*, a figure, whereby we make persons that are absent, or dead; or even things which are inanimate, as cities, &c. to speak.

The poets, in their fictions, make frequent use of the *prosopopœia*; as also do the orators, in their painting of violent passions, which seem to transport, and make them forget themselves.

This figure is of very extensive use to the orator: when he thinks his own character not of sufficient weight to affect his audience, in the manner he desires, he substitutes a person of greater authority than himself to engage their attention. When he has severe things to say, and which may give offence, as coming from himself, he avoids this by putting them in the mouth of some other person, from whom they will be better taken; or makes inanimate nature bring a charge, or express a resentment, to render it the more affecting. And by the same method he chooses sometimes to secure himself from a suspicion of flattery, in carrying a compliment too high. In the management of this figure, care should be taken, that what is said be always consistent with the character introduced, in which both the force and beauty of it consist.

There are two kinds of *prosopopœia*; the one *direct*, the other *indirect*. For an instance of the latter: *Just gods, protectors of the innocent, permit the order of nature to be interrupted for one moment, and let this carcase refume the use of speech.*

Instances of the former are found every where among the orators and poets: that which follows is a very beautiful one; found, by way of epitaph, on a tomb-stone: the dead wife addresses her surviving husband thus:

Immatura peri: sed tu felicior, annos
Vive tuos, conjux optime, vive meos.

PROSPECTIVE. See PERSPECTIVE.

PROSPECTIVE *glass*. See OPERA *glass*.

PROSPHYSIS. See ADHESION.

PROSTATÆ, Προστατα, in *Anatomy*, two white spongy, glandulous bodies, situate at the root of the penis, or just below the neck of the bladder, and about the size of walnuts. *See Tab. Anat. (Splanch.) fig.* 8. *litt.* pp. *fig.* 13. *litt.* cc.

The body of the *prostatæ* lies on the intestinum rectum, and the apex is under the internal labium of the cartilaginous arch of the os pubis.

Authors allow two kinds of substance to the *prostatæ*, the one of which is glandulous, the other spongious, or porous; this last seems nothing but a congeries of minute vessels and cells, through the middle of which pass the vesiculæ seminales, without any communication therewith.

The *prostatæ* have excretory ducts of their own, pretty numerous: De Graaf does not remember to have known them fewer than ten in the *prostatæ* of a man: in dogs they are sometimes a hundred, each of which discharges itself into the urethra, some above, some below, the caput gallinaceum; each having its proper caruncle.

Out of these there issues a whitish, slimy humour, secreted in the glandular part of the *prostatæ*, and conveyed into the cavity of the urethra.

The use of this humour is to line and lubricate the cavity of the urethra, and prevent its from being annoyed with the acrimony of the urine in its passage through it; and to serve as a vehicle to the seed, in the time of ejaculation.

Some take it for a third kind of seed, but without much reason. Boerhaave thinks it may serve to nourish the animalcule during the first moments after coition. This humour, he adds, remains after castration, but if is not prolific.

The same author, from the Memoirs of the French Academy, makes the *prostatæ* to consist of an aggregate of twelve glands, each of which terminates by its excretory duct in a little bag, into which it discharges its humour.

These twelve bags open by as many excretory ducts into the cavity of the urethra, so as to encompass the exit of the vesiculæ; whence the seed, and the humour of the *prostatæ*, are the more accurately mixed.

There are also two glandular bodies situated on the two convex sides of the spongy substance of the urethra near the bulb. Each of these is about the size of a dolichy stone, but they are oblong and flat, and covered entirely by the muscles called accelleratores. These are commonly called *prostatæ inferiores*, but if their situation be carefully examined, they will be found to be higher than the true *prostatæ*.

PROSTATES, Προστατης, among the Athenians, was used to signify any patron to whose protection sojourners in the city committed themselves.

He was allowed to demand several services of them, in which, if they failed, or neglected to choose a patron, an action was commenced against them before the polemarchus, and their goods were confiscated. See SOJOURNERS.

PROSTHAPHÆRESIS, formed from προσθη, *auxi*, *super*, and αφαιρεσις, *adempio*, in *Astronomy*, the difference between the true and mean motion, or true and mean place, of a planet; called also EQUATION *of the orbit*, or *of the centre*, and simply *the equation*.

Prosthaphæresis amounts to the difference between the mean and equated anomaly.

Thus, suppose the circle ALMPNR (*Tab. Astron. fig.* 51.) the orbit of the earth, surrounded by the ecliptic ♈, ♉, ♊, &c. and suppose S the sun, and the earth in R, the mean anomaly will be the arc APR, or calling away the semicircle, the arc PR, or the angle PCR: and the true anomaly, rejecting the semicircle, will be PSR, which is equal to PCR, and CRS: if then to the mean anomaly we add the angle CRS, we shall have the true anomaly PSR, and the earth's place, in the ecliptic.

And here the angle CLS, or CRS, is called the *prosthaphæresis* or EQUATION, by reason it is sometimes to be added, and sometimes to be subtracted from the mean motion, that we may have the true motion or place of the earth.

PROSTHESIS, Προσθεσις, in *Grammar*, a species of METAPLASM; being the prefixing of some letter or syllable at the beginning of a word: as in *gnovus*, pro *novus*.

This is also called *apposition*.

PROSTHESIS, among *Surgeons*, is the filling up of what was before wanting, by the apposition of new matter. Such, e. gr. is the filling up fistulous ulcers with new flesh.

PROSTHETA, προσθετα, from προσθημι, *to apply*, signify in Hippocrates, substitutious medicines, whether suppositories or pessaries.

PROSTYLE, Προστυλος, formed from προ, *before*, and στυλος, *columna*, in the *Ancient Greek Architecture*, a range of columns in the front of a temple.

PROSTYPA, Προστυπα, in the *Sculpture of the Ancients*, images carved in such a manner as to be only half raised above the ground, or plain, on which they were formed. They seem to adhere to it, and have only one side exposed to view. To *prostypa* is opposed ANTYPA.

PROSYLLOGISM, *prosyllogismus*, is used, by some schoolwriters, for a reason or argument produced to strengthen or confirm one of the premises of a syllogism.

Others define *prosyllogism*, an argument composed of two syllogisms, so disposed, as that the conclusion of the former is the major or minor of the latter: e. gr. Every rational is risible: but every man is rational, therefore, every man is risible: but no ass is risible, therefore no ass is a man.

The major, or the second syllogism, may be omitted or understood; and some even contend, that it ought to be so: so that, on their principle, a *prosyllogism* or redundant syllogism, is when two syllogisms are so contained in five propositions, as that the conclusion of the former is the major or minor of the latter.

PROTASIS, *πρότασις*, formed from *προτείνω, proniti, I hold forth*, in the *Ancient Drama*, the firſt part of a comic or tragic piece; wherein the ſeveral perſons of the play are ſhewn; their characters and manners intimated; and the action, which is to make the ſubject of the piece, propoſed, and entered upon.

The *protaſis* muſt not go about as far as our two firſt acts. See ACT.

Where the *protaſis* ended, the epitaſis commenced.

PROTATICUS, *προτατικὸς*, in the *Ancient Drama*, a perſon who never appeared but in the *protaſis*, or firſt part of the plays as Soſia, in Terence's *Andria*, &c.

PROTEA, in *Botany*. See SILVER-tree.

PROTECTION, *protectio*, the ſhelter, defence, authority, and aid, employed by any one in behalf of the helpleſs or unhappy.

Active protection ſuppoſes power, intereſt, favour, &c. in the perſon that protects. *Paſſive protection*, on the contrary, implies neceſſity, weakneſs, and dependence, in the perſon protected.

PROTECTION is alſo uſed for a privilege belonging to ambaſſadors, members of parliament, &c. whereby they, and their domeſtics, are exempt from arreſts, &c.

PROTECTION is ſometimes alſo underſtood of the perſon of the *protector*. Such a cardinal has the protection of France. The *protection* of Spain is become vacant by the death of ſuch a cardinal.

PROTECTION, in *Law*, in its general ſenſe, denotes that benefit and ſafety which every ſubject, denizen, or alien, ſpecially ſecured, hath by the law.

PROTECTION, in a more ſpecial ſenſe, is uſed for an exemption, or immunity, given by the king to a perſon, to ſecure him againſt ſuits in law, or other vexations, upon reaſonable cauſes moving him thereunto, and for a certain time.

Of this, Fitzherbert makes two kinds: the firſt he calls a *protection, cum clauſula volumus*; wherein he mentions four caſes: 1. A *protection, quia proficiscitur*, for him that is to paſs over-ſea in the king's ſervice. 2. A *protection quia moratur*, for him who is already abroad in the king's ſervice; as an ambaſſador, &c. 3. A *protection* for the king's debtor, that he be not ſued or troubled, till the king be paid his debt; but by the ſtatute 25 *Edw.* III. ſtat. 5. cap. 19. notwithſtanding ſuch *protection*, another creditor may proceed to judgment againſt him, with a ſtay of execution till the king's debt be paid; unleſs ſuch creditor will undertake for the king's debt, and then he ſhall have execution for both. 4. A *protection* for a perſon in the king's ſervice beyond ſea, or in the marches of Scotland.

The ſecond form of *protection is cum clauſula ualumus*, which is moſt commonly granted to a ſpiritual company, for their immunity from having their cattle taken by the king's miniſters. But this may be alſo granted to a ſingle perſon, either ſpiritual or temporal.

Protection extends not to pleas of dower, quare impedit, aſſize of novel diſſeiſin, darrein preſentment, attaints, nor pleas before juſtices in eyre.

PROTECTOR, a perſon who undertakes to ſhelter and defend the weak, helpleſs, or diſtreſſed.

God, and the magiſtrate, are the *protectors* of the widow and orphan. Among the heathens, MINERVA was eſteemed the *protectreſs* of arts.

Every catholic nation, and every religious order, has a *protector* reſiding at the court of Rome, who is a cardinal, and is called the *cardinal protector*.

PROTECTOR is ſometimes alſo uſed for a REGENT of a kingdom, made choice of to govern it during the minority of a prince.

Cromwell aſſumed the title and quality of *lord protector of the commonwealth of England*.

PROTELARII, among the Romans, were the poorer ſort of citizens, whoſe eſtate did not exceed fifteen hundred pieces of ſilver. They were diſtinguiſhed from thoſe who were worth little or nothing; their bill being called CAPITE cenſi.

PROTEST, in *Law*, is uſed for a caution, or call of witneſſes, or an open atteſtation, that a perſon does either not at all, or but conditionally, yield his conſent to any act; or to the proceeding of any judge in a court, wherein his juriſdiction is doubtful: or to anſwer upon his oath farther than by law he is bound.

Any of the lords in parliament have a right to *proteſt* their diſſent to any bill paſſed by a majority; which *proteſt* is entered in form. This privilege is ſaid not to be very ancient; the commons have no right to *proteſt*.

PROTEST, in *Commerce*, is a ſummons made by a notary public to a merchant, banker, or the like, to accept or diſcharge a bill of exchange drawn on him, after his having refuſed either to accept or pay the ſame.

It is called a *proteſt*, becauſe it contains a proteſtation, that the party will return the bill, and even take up money at intereſt; and charge all coſts, damages, carriage, and recarriage, on the refuſer.

There are two kinds of *proteſts*, the one for want of acceptance, the other for want of payment.

The firſt is to be made by the bearer of the bill, at the time of preſenting it, in caſe the perſon on whom it is drawn refuſes to accept it for the time, or the ſum, there expreſſed.

The latter is made as the bill falls due, whether it has been accepted or not.

The bearers of bills of exchange that have been accepted, or which become payable at a certain day, are obliged to have them either paid or *proteſted* within three days after that, on the penalty of anſwering for the endorſers. And it muſt be obſerved, that if the third day happen to be a holiday, the *proteſt* is to be made on the eve thereof. See NOTE.

At Paris the *proteſt* is to be made within ten days; at Hamburgh within twelve days; at Venice, where all bills are paid in banco, the *proteſt* for want of payment is to be made within ſix days; but then the bank is ſuppoſed open, otherwiſe no *proteſt* to be made: at Rome, *proteſts* for want of payment are to be made within fifteen days: at Legorn, Milan, and Bologna, there is no time fixed: at Amſterdam, they are to be made within ſix days.

The negociants of ſome places, as thoſe of Rome, M. Savary obſerves, do not look on themſelves as obliged to *proteſt* in default of payment: but this opinion is contrary to univerſal cuſtom, and natural reaſon; ſince, till after *proteſtation*, they have no remedy or reſource, againſt the drawer, or endorſer, nor any title to be reimburſed.

M. Ricard adds, that bills of exchange drawn from Amſterdam, or Antwerp, or Spain, are to be *proteſted*, in default of payment, within fourteen days after they fall due; after which time the bearer ſtands the riſque and chance of the *non-proteſted* bill (not the drawer, or its endorſer), in caſe the party happens to fail after the ſaid fourteenth day. See BILL *of Exchange*.

PROTEST, in *Sea Language*, is an inſtrument, drawn up in writing, atteſted before a juſtice of the peace, by the maſter and a part of the ſhip's crew, after the expiration of a voyage, deſcribing the ſeverity of the laſt voyage, occaſioned by tempeſtuous weather, heavy ſeas, an inſufficient crew, or any other circumſtances by which the ſhip has ſuffered, or may ſuffer, either in her hull, maſts, rigging, or cargo. It is chiefly intended to ſhew, that ſuch damages or misfortunes did not happen through any neglect or ill conduct of the maſter or his officers. Falconer.

PROTESTANDO, in *Law*, is a word made uſe of to avoid double pleading in actions; it prevents the party that makes it from being concluded by the plea he is about to make, that ſince cannot be joined upon it; and it is alſo a form of pleading, where one will not directly affirm or deny any thing alleged by another or himſelf. In the firſt caſe, it is where a man pleadeth a thing which he dares not affirm, or that he cannot plead for fear of making his plea double; as in title to lands by two deſcents, the defendant muſt plead one of them, and put the word *proteſtando* inſtead of dicit; as to the other, that ſuch a one died ſeiſed, &c. and in the laſt caſe, when one is to anſwer to two matters, and by the law he ought but to plead to one; then in the beginning of the plea he may ſay *proteſtando*, that ſuch matter is not true, and add to his plea *pro placito dicit*; and ſo he may take iſſue upon the other part of the matter. Plowd. 276. Finch 359.

PROTESTANTS, a name firſt given in Germany to thoſe who adhered to the doctrine of Luther; becauſe, in 1529, they *proteſted* againſt a decree of the emperor Charles V. and the diet of Spires; and declared, that they appealed to a general council.

In a former diet held at Spires in 1526, it was unanimouſly agreed to preſent a ſolemn addreſs to the emperor, beſeeching him to aſſemble, without delay, a free and a general council; and it was alſo agreed, that in the mean time, the princes and ſtates of the empire, ſhould, in their reſpective dominions, be at liberty to manage eccleſiaſtical matters in the manner they ſhould think the moſt expedient, yet ſo as to be able to give an account to God and to the emperor an account of their adminiſtration, when it ſhould be demanded of them. This decree was conſidered by the adverſaries of the reformation as almoſt equivalent to a toleration of Luther's opinions, and, therefore, as ſoon as the emperor had concluded a treaty of peace with Clement VII. who now ſat in the papal chair, he aſſembled the new diet at Spires in 1529; where the power which had been granted by the former diet to every prince, of managing eccleſiaſtical matters as they thought proper, until the meeting of a general council, was revoked by a majority of votes; and every change was declared unlawful, that ſhould be introduced into

the doctrine, discipline, or worship of the eſtabliſhed religion, before the determination of the approaching council was known. Againſt this decree, the elector of Saxony, the marquis of Brandenburgh, the landgrave of Heſſe, the dukes of Lunenburg, the prince of Anhalt, together with the deputies of fourteen imperial or free cities entered a ſolemn proteſt.

The name has been ſince alſo given to thoſe who adhere to the ſentiments of Calvin; and is now become a common denomination applied indiſcriminately to all the ſects, of whatever denomination, which have revolted from the Roman ſee.

PROTESTANTS, *French.* See HUGUENOTS.

PROTESTANT *diſſenters.* See DISSENTERS, and NONCONFORMISTS.

PROTESTATION, a ſolemn declaration, made by ſome judiciary act, or proceeding, againſt any oppreſſion, violence, or injuſtice; or againſt the legality of a ſentence, judgment, decree, or other procedure; importing, that the party is determined to oppoſe it at the proper time, &c. See PROTEST.

Proteſtation is defined by juſtice Walſh, a defence, or ſafeguard, to the party that makes it, from being concluded by the act he is about to do; ſo that iſſue cannot be joined upon it.

Proteſtation is defined by Plowden, a form of pleading, when one does not either directly affirm or deny any thing alledged by another, or which he himſelf alledges. Plowd. fol. 276. See PROTESTANDO.

PROTEUS, in *Mythology*, the ſon of Neptune and Phœnice, or Oceanus and Tethys, who was reputed one of the gods of the ſea, and ſuppoſed capable of foretelling future events, and of transforming himſelf into any ſhape at pleaſure.

According to Diodorus Siculus he was king of Egypt, and, after the manner of their kings, he ſometimes uſed a lion, and ſometimes a bull for his creſt. He is ſaid to have reigned two hundred and forty years after Moſes, and by his diſtinguiſhed knowledge of aſtronomy to be able to predict the revolutions of the planets.

PROTHESIS, πρόθεσις, derived from προτίθημι, *I expoſe to view*, among the Greeks, the ceremony of laying the dead near the door till the time of their interment, with their feet outwards; on which account the Romans called them POSITI.

PROTHESIS, a little altar in the Greek churches, whereon a ceremony is performed, called by the name πρόθεσις.

On this altar the prieſt, with the other miniſters, prepare every thing neceſſary to the celebration of maſs, viz. the bread, wine, &c. After which they go in proceſſion from this to the great altar, to begin maſs; carrying with them the ſpecies thus prepared.

PROTHONOTARY, PROTONOTARIUS, PROTONOTARY, a term properly ſignifying *firſt notary*; and which was anciently the title of the principal notaries of the emperors of Conſtantinople.

With us *prothonotary*, called alſo *prejgnotary*, is uſed for an officer in the court of king's bench, and common pleas; the latter whereof has three, the former one. See COURT, &c.

PROTHONOTARY *of the king's bench* records all actions civil, ſued in that court; as the clerk of the crown-office doth all criminal cauſes.

PROTHONOTARIES *of the common pleas* enter and inroll all declarations, pleadings, aſſizes, judgments, and actions: they alſo make out all judicial writs, as the venire facias, after iſſue joined; except habeas corpus, and diſtringas juratot, for which there is a ſeparate office; writs of execution and ſciſin, of ſuperſedeas, of privilege, &c. they inroll all recognizances acknowledged in that court, all common recoveries; make exemplifications of records, &c.

PROTHONOTARY, or PROTONOTARY, is alſo an officer in the court of Rome, who has a degree of pre-eminence over the other notaries.

There is a college of twelve *prothonotaries*, called *participantes*; becauſe partaking in the fees of the expeditions in chancery.

They are ranked among the number of prelates, and wear the violet rochet, the hat, &c. They aſſiſt at all grand ceremonies, and have a place in the pope's chapel.

Their office is to diſpatch the acts in grand cauſes, which the ſimple apoſtolical notaries diſpatch in leſſer cauſes: they may create apoſtolical notaries and doctors, to officiate out of the city.

Theſe out of the college have none of the privileges of the others, except the habit.

The *prothonotaries* were firſt eſtabliſhed at Rome by pope Clement I. with deſign to write the lives of the martyrs.

PROTHYRIS, in the *Ancient Architecture*, is ſometimes uſed for a quoin, or corner of a wall; otherwiſe called *ante*. See CORNER.

Sometimes, alſo, for a croſs-beam, or over-thwart rafter.

PROTHYRIS is alſo uſed, by Vignola, for a particular ſort of key of an arch: an inſtance of which we have in his Ionic order, conſiſting of a roll of water-leaves, between two reglets and two fillets, crowned with a Doric cymatium; its figure being much like that of a modillion.

PROTHYRUM, πρόθυρον, a porch at the outer door of a houſe, or portal.

PROTIPULA, in *Natural Hiſtory*, a name given to a ſpecies of fly reſembling the TIPULA, or long-legs, in many reſpects; but differing in regard to the eſſential character, which, in the tipula, is the having two beards growing on the anterior part of the head, and occaſionally falling over the mouth, and cloſing its aperture; theſe the *protipula* want.

PROTO, formed from πρῶτος, *firſt*, a word uſed in compoſition with divers terms in our language, to expreſs a relation of priority; as in *proto-martyr*, *proto-type*, &c.

PROTO-*canonical*. See DEUTERO-*canonical*.

PROTOCOLLUM, πρωτόκολλον, a term uſed in the ancient juriſprudence for the firſt leaf of a book, wherein was the mark of the paper, or parchment.

It was even ſometimes uſed for the mark itſelf; which was uſually in the margin, but ſometimes at the top of the page.

The forty-fourth novel of Juſtinian forbids cutting the *protocollum* of charters, which ſhew the year wherein the paper or parchment was made, and the officer commiſſioned for the delivery of them; by means whereof frauds were frequently detected.

PROTOCOLLUM was alſo uſed for the firſt minute, draught, or ſummary, of an act to be paſſed, which the notary drew up, in ſhort, in little table-books, to be afterwards inlarged at leiſure.

PROTO-FORESTARIUS was he whom our ancient kings made chief of Windſor-foreſt, to take cognizance of all cauſes of death or mayhem there; after the manner of a lord chief juſtice in eyre.

PROTOGALA, the term uſed by the ancients for what we call *beeſtings*, the firſt milk of a cow or other animal after her having brought forth young.

PROTO-MARTYR, compounded of πρῶτος, *firſt*, and μάρτυς, μάρτυρος, *the firſt martyr*, or witneſs, who ſuffered death in teſtimony of the truth; as Abel, improperly reckoned ſo by ſome, in the Old Teſtament, and St. Stephen in the New.

PROTONOTARY. See PROTHONOTARY.

PROTOPASCHITÆ, πρωτοπασχῖται, in *Church Hiſtory*, heretics, who, after the manner of the Jews, celebrated the feaſt of Eaſter with unleavened bread. They were likewiſe called SABBATIANI.

PROTOPLAST, *protoplaſtus*, a title ſometimes given to our firſt father Adam; from the Greek πρωτόπλαστος, q. d. *firſt formed*.

PROTOTYPE, πρωτότυπον, the original, or model, whereby a thing is formed.

It is chiefly uſed for the patterns of things to be engraven, moulded, or caſt.

PROTOTYPON, πρωτότυπον, in *Grammar*, is ſometimes uſed for a PRIMITIVE, or original word.

PROTRACTING, or PROTRACTION, in *Surveying*, the act of plotting, or laying down, the dimenſions taken in the field, by means of a *protractor*, &c.

Protracting makes one part of SURVEYING.

PROTRACTING-*pin*, a mathematical inſtrument, or rather an appendage of an inſtrument called a *protractor*.

The *protracting-pin* is a fine needle, fitted into a handle, uſed to prick off degrees and minutes from the limb of the PROTRACTOR.

PROTRACTOR, a name of an inſtrument uſed in *Surgery*, to draw out any foreign or diſagreeable bodies from a wound or ulcer, in like manner as the forceps.

PROTRACTOR, is alſo an inſtrument uſed in *Surveying*, whereby the angles taken in the field with a theodolite, circumferentor, or the like, are plotted, or laid down, on paper.

This *protractor* conſiſts of a ſemicircular limb ADB (*Tab.* III. *Surveying*, *fig.* 45.) of braſs, glaſs, horn, or the like, divided into 180°, and ſubtended by a diameter BA; in the middle whereof is a little notch, or lip, C, called the *centre of the protractor*.

For the convenience of reckoning both ways, the degrees are numbered from the left hand towards the right, and from the right hand towards the left.

But this inſtrument is made much more commodious by tranſferring the diviſions on the ſame circumference to the edge of a ruler, whoſe ſide EF is parallel to AB, which is eaſily done by laying a ruler on the centre C, and the ſeveral diviſions on the ſemicircumference ADB, and marking the interſections of that ruler on the line EF; ſo that a ruler with theſe diviſions marked on three of its ſides and numbered both ways, as in the *protractor*, (the fourth or blank ſide repreſenting the diameter of the

circle

circle) is of the same use as a *protractor*; and much better adapted to a case.

On the limb of the *protractor* are sometimes also placed numbers, denoting the angles at the centres of regular polygons: thus, against the number 5, denoting the sides of a pentagon, is found 72, the angle at the centre of a pentagon.

PROTRACTOR, *use of the.* 1. *To lay down an angle of any given quantity, or number of degrees, at any point, and with a given line, e. gr.* Lay the centre of the *protractor* on the given point, and the diameter of the *protractor* on the given line. Make a mark against the given degree 50, on the limb of the *protractor*; through which, from the given point, draw a line: this gives the angle required.

2. *To find the quantity of a given angle.* Lay the centre of the *protractor* on the point of the angle, and the diameter on one of the lines forming it. The degree of the limb cut by the other line; viz. 50; is the number of degrees of the angle required.

3. *To inscribe any given regular polygon, e. gr. a pentagon, in a circle.* Lay the centre and diameter of the *protractor* on the centre and diameter of the circle, and make a dot against the number of degrees of the angle at the centre; viz. 72. Through this dot and the centre of the circle, draw a line cutting the circumference of the circle. To the point of intersection, from the point where the diameter cuts the circumference, draw a right line: this line will be a side of the pentagon, which, being taken in the compasses, and set off as often as it will go in the circumference, will give points, which, being connected by lines, will form the pentagon required. See POLYGON.

4. *To describe any regular polygon, e. gr. an octagon on a given line.* Subtract the angle at the centre, which the *protractor* gives 45° from 180, the remainder 135 degrees is the angle included between two sides of the octagon; one half whereof is 67½. Applying then the diameter of the *protractor* over the given line, with the centre over one extreme; make a dot against 67½, to which from the centre draw a line: apply the *protractor* to the other end of the line, so as the centre be over the extreme, and there set off another angle of 67½°.

From the point where the two lines thus drawn intersect as a centre, describe a circle with the interval of the given line.

The given line will be one side of the octagon; which, being set off as often as it will go in the circumference thus drawn, will give points, which, being connected, will form the octagon required.

PROTRACTOR *improved*, is an instrument much like the former, only furnished with a little more apparatus, whereby we are enabled to set off an angle to a minute; which is impracticable in the other.

The chief addition is an index fitted on the centre, and moveable thereon, so as to play freely and steadily over the limb. Beyond the limb the index is divided, on both edges, into sixty equal parts of the portions of circles, intercepted by two other right lines drawn from the centre, so that each makes an angle of one degree with lines drawn to the assumed points from the centre.

To set off an angle of any number of degrees and minutes with this *protractor*, move the index, so that one of the lines drawn on the limb, from one of the forementioned points, may fall upon the number of degrees given; and prick off as many of the equal parts on the proper edge of the index as there are minutes given: thus, drawing a line from the centre to that point so pricked off, you have an angle with the diameter of the *protractor*, of the proposed number of degrees and minutes.

Indeed, it may be of good use to lay down an angle to a minute, when we are able to take it to a minute: but, till we have better needles, and juster theodolites, than are yet made, the old *protractor* may serve very well.

PROTRUSORES *oris exteriores*, in *Anatomy*, a name given by Santorini to certain fasciculi of the great ZYGOMATIC muscle, running under the fleshy part of the lower lip. See LIPS.

PROTRUSORES *interiores oris*, in *Anatomy*, a name given by Somorini to a muscle of the face, called by Albinus *orbicularis oris*; and by Cowper and Douglass CONSTRICTOR *labiorum* and *sphincter labiorum*. See LIPS.

PROTRYGIA, *Πρωτρυγία*, in *Antiquity*, a festival in honour of Neptune, and of Bacchus, surnamed *ἀφέσπορος*, or *πρόσπορος, ἀπὸ τῆς τρυγὸς*, i. e. from new wine.

PROTUBERANCE, *protuberantia*, in *Anatomy*, denotes any eminence, whether natural, or preternatural, that projects, or advances out beyond the rest.

The *orbicular protuberances* of the third ventricle of the brain, are called *nates*; and the apophyses of the *orbicular protuberances*, are called *testes*.

The *annular protuberance* is a process of the MEDULLA *oblongata*, in form of a ring; whence its name, first given it by Willis.

PROVEDITOR, PROVEDITOUR, or PROVEDITORE, an officer in several parts of Italy, particularly at Venice.

There are various kinds of *provveditori* in Venice; as *provveditor of the common*, who is nearly the same with *edile* among the Romans, consul in Languedoc, and eschevin in other cities. Of these *provveditori* there are three.

The *provveditori alle ragioni vecchie, alle nuove, alle giustizie*, &c. have the direction of matters relating to policy, throughout the Signory.

PROVEDITOR *general of the sea*, is an officer whose authority extends over the whole fleet when the captain-general is absent. He has, particularly, the disposal of the cash; and pays the seamen, and the soldiers.

The captain-general and *provveditor* are mutually spies over one another: though the *provveditor* be inferior to the general, yet is the power so divided, that one has authority without strength, the other strength without authority.

PROVENCAL *poets*, in the *History of Literature*, a name given to certain professions of men who sprang up in Provence about the end of the tenth century, comprehending those that were called TROUBADOURS, or Troverres, Jongleurs, Cantadours, Violars, and Musars, in whom the faculties both of music and poetry seemed to be united. The first of these were to denominated from the art which they professed of inventing or finding out, as well subjects and sentiments as rhymes, constituting what at that time was deemed poetry. The jongleurs are supposed to have taken their name from some musical instrument, on which they played, probably of a name resembling in its sound that by which their profession was distinguished: whence spring the jugleri, *giuoghi teatrali*, as Menage conjectures, who went about singing their verses in courts and the houses of noblemen, with a viol or harp, or other instrument, and were clothed in a peculiar habit, for the sake of entertaining in a burlesque manner their protectors and patrons. The cantadours, called also chanterres, were singers of songs and ballads, as were also the musars; and the violars were players on the viol.

All these arts were comprehended, in the French language, under the general denomination of menestrandie, menestrandise, and jongleurie.

The *Provencal* poets were not only the inventors and compilers of metrical romances, songs, ballad and rhymes, to so great a number, and of such a kind, as to raise an emulation in most countries of Europe to imitate them; but, if we may credit the Italian writers, the best poets of Italy, namely Petrarch and Dante, owed much of their excellence to their imitation of the *Provencals*: and it is also said that the greater part of the novels of Boccace are taken from *Provencal* or ancient French romances. The learned Dr. Percy, in his Essay on the Ancient English Minstrels, has given a very curious and satisfactory account of these fathers of modern poetry and music; and although he agrees that the several professions above enumerated were included under the general name of MINSTREL, he has in the notes to that Essay, p. 42. with great accuracy assigned to each its distinct and peculiar office. Of the ancient writers of romance a history is extant in the lives of the *Provencal* poets, written in French by J. Nostradamus, compiled and published at Lyons in 1575; but a much more satisfactory account of them is contained in the translation of this work into Italian, with many additions, by Gio. Mario de Crescimbeni, and published, in 1710, under the title of Commentari intorno all' Istoria della Volgare Poesia. See Hawkins's Hist. of Music, vol. ii. p. 44, &c.

PROVEND, or PROVENDER, is properly a sort of vessel containing the measure of grains daily given to a horse, or other beast of labour, for his subsistence.

Some derive the word from the Latin *præbenda*, or *prebenda*.

Hence *provender* is also become a general name for all food of cattle. In monasteries, when the religious go to meals, they are said to go to *provend*.

PROVER, in *Law*, *probator*, an approver, or person who confessing felony, appeals, or accuses another of the same. He is thus called because he must prove what he alledges in his appeal; which proof is either by battle, or by the country, at his election who is appealed.

39 Edw. III. coram rege, rot. 97. Suff. a man became an *approver*, and appealed five, who all joined battle with him, and he overcame them all: four of them were accordingly hanged, and the fifth pleaded he was a clerk. The *prover* was pardoned.

PROVER, among *Jewellers*, an instrument by which they examine the fine and depth of diamonds. It is a spring in shape not unlike a pair of caliber compasses, kept at the proper distance by means of a spring.

PROVERB, *proverbium*, is defined, by Camden, a concise, witty, and wise speech, grounded upon long experience; and containing, for the most part, some useful caveat. Such are, *A slow mouth catches no flies. A high building, a low foundation. A torrion like will never be a good house. A short horse is soon curried. A man may lose his horse will, though he ride not on the ridge. A false knave needs no broker. Better to spare at brim, than at bottom*, &c.

PROVERBS, in *Scripture History*, is the name of one of the canonical books of the Old Testament, containing a collection of moral sentences and maxims, adapted to the regulation of the conduct in every period and condition of life, and ascribed to Solomon; though some writers, among whom is Grotius, have expressed their doubts, whether Solomon was the author of this book.

PROVIDENCE, *providentia*, the conduct and direction of the several parts of the universe, by a superior, intelligent being.

The notion of a *providence* is very ancient, even in the heathen theology; we find Thales mentions it. It is founded on this supposition, that the Creator has not so fixed and ascertained the laws of nature, nor so connected the chain of second causes, as to leave the world to itself; but that he still preserves the reins in his own hands, and occasionally intervenes, alters, restrains, enforces, suspends, &c. those laws, by a particular *providence*.

Some use the word *providence* in a more general sense, signifying by it that power or action whereby the several parts of the creation are ordinarily directed.

Thus Damascenus defines *providence* to be that divine will whereby all things are ordered and directed to the proper end. Which notion of *providence* supposes no laws at all fixed by the Author of nature at the creation; but that he reserved it at large, to be governed by himself occasionally.

The ancients called *providence* by the names of *fate, fortune, nature, destiny, necessity*, &c.

The ancient Egyptians seem to have been the first who had the notion of a divine *providence*. Anubius observes, they reasoned thus. "*Providence* is so essential "to a prince, that without it he cannot be, nor even be "called, a prince; and the more august a prince is, the "more perfect ought his *providence* to be. Since, then, "God is the greatest and most august of all princes, to "him must belong the most perfect *providence*."

The Epicureans deny any divine *providence*, as thinking it inconsistent with the ease and repose of the divine nature, to meddle at all with human affairs.

Others deny the existence of a *providence*, from the seemingly unjust distribution of good and evil; which appear to fall indiscriminately on the just and unjust.

Simplicius argues thus for a *providence*: if God do not look to the affairs of the world, it is either because he cannot, or will not; but the first is absurd, since to govern cannot be difficult, where to create was easy; and the latter is both absurd and blasphemous. See GOD.

PROVIDENTLÆ, in old *Law Books*, were provisions of meat and drink.

Providentia *vini ante adventum suum in villatas erat antiquo debitum*. Knighton, anno 1355.

PROVINCE, *provincia*, among the Romans, was a country conquered by them, without the bounds of Italy, governed by a deputy, or lieutenant, and having peculiar laws and privileges. See LEGATORY.

Nicod derives the word *a procul vincendo, living afar off*; but it is better deduced from *pro*, and *vinco, I overcome*. Of these countries that part of France next the Alps was one; and it still retains the name *Provence*.

PROVINCE is now chiefly used for a canton, or division, of a kingdom, or commonwealth, comprehending several cities, towns, &c. all under the same government; and usually distinguished by the extent either of the civil or ecclesiastical jurisdiction.

The *provinces* were anciently duchies, counties, &c. which have been since all reunited under the same chief. The church distinguishes its provinces by archbishoprics, each containing a certain number of bishoprics.

In this sense England is divided into two *provinces*, Canterbury and York.

The monks make particular divisions of *provinces*, according to the antiquity and number of convents in each.

The United *Provinces* are the seven northern *provinces* of the Low Countries; which, revolting from the Spanish dominion, made a firm and perpetual alliance, offensive and defensive, at Utrecht, in the year 1579.

PROVINCIAL, *provincialis*, something relating to a *province*.

Thus we say, a *provincial council*, or *synod*, &c. See SYNOD, and COUNCIL.

PROVINCIAL *constitutions*. See CONSTITUTIONS.

PROVINCIAL *establishments in America*. See the account of CHARTER *governments*.

PROVINCIAL, in the monastic sense, denotes a person who has the direction and superintendency of the several convents of a *province*, according to the division established in that order.

The general of the order has several *provinces* under him, the provincial several priors, abbots, &c.

PROVINE, *provin*, a branch of a vine laid in the ground to take root.

PROVING *of guns* is an operation performed, in order to determine whether they will bear the quantity of powder allotted for this purpose, or whether they are sufficiently strong for service. The rule of the board of ordnance is, that all guns under twenty-four pounders be loaded with a charge of powder, which weighs as much as the shot, i. e. a brass twenty-four pounder with 24 lb. a brass thirty-two pounder with 26 lb. 21 oz.; and a forty-two pounder with 31 lb 8 oz.; the iron twenty-four pounder with 18 lb, the thirty-two pounder with 24 lb 8 oz. and the forty-two pounder with 25 lb. The brass light field-pieces are proved with a quantity of powder that weighs half as much as their shot; except the twenty-four pounder, which is loaded only with ten pounds. See GUN.

In the proof of all sorts of small arms, the quantity of powder used is the weight of the ball exactly. For the number of bullets used in *proving* muskets, carabines, and pistols, see BULLET.

When guns of a new metal, or of a lighter construction, are proved, then, besides the common proof, they are fired two or three hundred times, as quick as possible, loaded with the common charge allowed for actual service. In *proving* cannon, with a view of ascertaining their being well cast, without any cavities in the metal, and their being fit to resist the effort of their charge of powder, the piece is laid upon the ground, supported only by a log of wood in the middle, of about five or six inches thick, to raise the muzzle a little; and then the piece is fired against a solid butt of earth. The instruments used in the proof of cannon are the SEARCHER and BELIEVER. Lieutenant-general Desaguliers has lately invented a curious instrument for finding the principal defects in pieces of artillery, which is no sooner introduced into the hollow cylinder of the gun, than it discovers its defects, and particularly its not being truly bored, to which most of the injuries incident to pieces of artillery are owing. In the proof of MORTARS and HOWITZES, they are placed upon the ground, with some part of their trunnions or breech sunk below the surface, and resting on wooden billets, at an elevation of about seventy degrees. The mirror is generally the only instrument for discovering the defects in these pieces. In order to use it, the sun must shine; the breech must be placed towards the sun, and the glass over against the mouth of the piece, and thus the flaws in the bore and chamber are observed. The Prussians prove their battering train and garrison artillery with a quantity of powder equal to half the weight of the shot, and by firing seventy-five rounds as quick as in real service, i. e. two or three rounds in a minute. Their light field-train, from a twelve-pounder upwards, are proved with a quantity of powder equal to one-third of the weight of the shot, and fired a hundred and fifty rounds, at three or four rounds in a minute. From a twelve-pounder downwards, they are proved with a quantity of powder equal to one-fifth of the shot's weight, and fired three hundred rounds, at five or six rounds each minute, properly sponged and loaded. Their mortars are proved with the chambers full of powder, and the shells loaded. Three rounds are fired as quick as possible. The Dutch prove all their artillery by firing each piece five times; the first two rounds with a quantity of powder equal to two-thirds of the weight of the shot, and the three last rounds with a quantity of powder equal to one half the weight of the shot. The French method of proof is the same with that of the Dutch. The Portuguese prove their artillery in the following manner:

42 pounders, 36 & 24 pounders } 28 first shot, 24 ——— 20 ——— 16 lb. } then diminishing 2 lb. each round.

12 pounders, 6 pounders, 3 pounders } 18 first shot, 14 ——— 12 ——— 8 lb. } diminishing 1 lb. each round.

They are fired only once in every minute. Their mortars are proved by filling the chambers full of powder, a loaded shell, and the mortar rammed full of earth. Muller's Treatise of Artillery, p. 180. Milit. Dict. art. *Proof*.

PROVING *of gun-powder.* See GUN-*powder*, and POWDER-*tryers*.

PROVING *of wills*, in *Law*. See PROBATE, EXECUTOR, and WILL.

PROVISION, *provisio*, any thing got or procured, as necessary for the subsistence of life.

Salting of unwholesome *provisions* is prohibited by 51 Hen. III. stat. 6. cap. 7. under pain of amercement for the first offence, pillory for the second, fine and imprisonment for the third, and abjuration of the town for the fourth.

PROVISION, in *Traffic*, is sometimes used for the wages due to a factor. See FACTORAGE.

PROVISIONS, *commissary of*. See COMMISSARY.

PROVISIONS, *park of*. See PARK.

PROVISION, in the *Canon Law*, the title or instrument, by virtue whereof an incumbent holds, or is provided of, a benefice, bishopric, or the like.

Ordinary collators give *provisions* in case of vacancy by death, pure and simple demission, and permutation. See COLLATION.

The court of Rome grants *provisions* by resignation, devolution, and prevention.

PROVISIONS *by precaution* are also called *gratiæ expectativæ*, and *mandata de providendo*; of the great abuse whereof throughout England frequent complaint was made in our ancient statutes, and a remedy was provided for the same by the statute of PREMUNIRE. See EXPECTATIVE *graces*.

Provisions of small benefices, in the court of Rome, are only simple signatures, which are, as it were, minutes of the bull; because the bulls themselves, dispatched on parchment, would be too expensive. The signature is no more than the petition of the impetrant answered by the pope in these words: *Concessum ut petitur in præsentia D. N. papæ*, wrote in the hand of the prelate who presides over the signature.

Extraordinary *provisions* are figned by the pope himself, in these words, *Fiat ut petitur*; with the first letter of his name.

PROVISO, in *Law*, a condition inserted in a deed, upon the observance whereof the validity of the deed depends.

PROVISO, in *Judicial Matters*, is where the plaintiff desists from profecuting an action, by bringing it to trial in a due time; in which case, the defendant may take out a venire facias to the sheriff, having it in these words: *Provisi quod*, &c. to the end that, if the plaintiff take out any writ to that purpose, the sheriff shall summon but one jury upon them both. In which case it is called, *going to trial by proviso*. See JURY.

PROVISO, *casus*. See CASU.

PROVISO is also a sea-term. A ship is said to moor a *proviso*, when she has an anchor out, and also a hawser a-shore; and so is moored with her head to the shore with two cables at least.

PROVISOR is generally taken for him who hath the care of providing things necessary; in which sense it coincides with SURVEYOR.

PROVISOR *mansionis* is used for the steward or treasurer of a religious house.

PROVISOR, in our *Statutes*, also denotes a person who sued to the court of Rome for a PROVISION, or EXPECTATIVE grace. See PREMUNIRE.

Provisores *aliorum, qui vel ejectionem, vel ostiofiorem locum ejectorum in Romana curia sibi ambiunt ac parant, quod ei gratiæ expectativæ nuncupantur, quia, ubique dum vacent, expectandum est.* Spelm.

PROVOCATIVE, in *Physic*, a medicine which strengthens nature, and stimulates or incites to venery.

Such are cantharides, satyrion, &c.

PROVOCATORES, in *Antiquity*, a class of *gladiators*, supposed by Lipsius to be generally matched with the SAMNITES.

PROVOST, *præpositus*, an officer, whereof there are divers kinds; civil, military, &c.

PROVOST *of the city*, or *of the merchants*, is the chief municipal magistrate in several considerable trading cities; particularly Edinburgh, Paris, and Lyons; much the same with the *mayor* in other places.

The *provost* presides at the city-courts, and, together with the sheriffs, or bailiffs, decides all differences relating to trade and merchandize: he takes cognizance of the affairs of officers of policy of the city, with regard to their functions; of the delinquencies of merchants, commissioners, and factors; inspects the ports, rivers, duties, impostes, &c.

Authors attribute the institution of *provost* of the *merchants* of Paris to Philip Auguste. Du Haillan refers its epocha to the year 1190.

The *provost* of Edinburgh has the title of *lord*; the bailiffs are his deputies. He calls conventions of the boroughs by his own missives.

PROVOST, or PREVOT *royal*, also denotes a sort of inferior judge established throughout France, for the taking cognizance of all civil, personal, real, and mixt causes, among the people; but without any jurisdiction in the causes of nobles.

These, in the Bourbonnois, Auvergne, &c. are called *chatellains*; in Normandy, *vicomptes*; in Languedoc and Provence, *viguiers*.

Grand PROVOST *of France*, or *of the houshold*, has jurisdiction in the king's house, and over the officers therein: he looks to the policy and regulation thereof, the rates of provisions following the court, &c. He was anciently called *vel des ribaulds*.

Grand PROVOST *of the constable*, a judge of the sword, who manages processes against the soldiers in the army, who have committed any crime.

He has four lieutenants, distributed throughout the armies, called *provosts of the army*; and particularly *provosts* in the several regiments.

PROVOST *guard*. See GUARD.

PROVOST *marshal of an army* is an officer appointed to seize and secure deserters, and all other criminals.

The *provost marshal* is to go often abroad round the army, to hinder the soldiers from pillaging. It is his office to indict offenders, and to see the sentence passed upon them executed.

He likewise regulates the weights and measures, and the price of all provisions, &c. in the army, when in the field. For the discharge of his office, he has a lieutenant, a clerk, and a troop of *provosts* of marshals men on horseback; as also an executioner.

There is also a *provost marshal* in the navy, who hath charge of the prisoners taken at sea.

The French have a *provost general of the marines*, who is to prosecute the marines when guilty of any crime, and to make report thereof to the council of war; besides a *marine provost* in every vessel, who is a kind of gaoler, and takes the prisoners into his care, and keeps the vessel clean.

PROVOSTS *of the marshals* are a kind of lieutenants of the marshals of France, established for the security of the country against rogues, vagabonds, and deserters.

They take cognizance of royal cases; which, for this reason, are called *prevotal cases*: such are all crimes committed by strollers, or people without any fixed abode; robberies on the highway, infraction of safeguard, burnings, &c. They pronounce *en dernier ressort*, or without appeal.

There are a hundred and eighty seats of these *provosts* in France; their chief jurisdiction regards highwaymen, footpads, housebreakers, &c. They correspond to the officers established by Augustus and Tiberius, called, as Cujas tells us, *latrunculatores*, to shew that their office was to pursue thieves.

PROVOST *of the mint* is a particular judge instituted for the apprehending and prosecuting of false coiners.

PROW, *prora*, in *Navigation*, denotes the head or forepart of a ship; being that which is opposite to the *poop* or stern.

In the front hereof is the beak that cuts the water to make way for the vessel.

The *prow* is lower than the poop, and contains fewer stories or decks. On the beak is usually some figure or hieroglyphic, which often gives name to the vessel.

PROW, in fortifications, is only that part of the forecastle which is aloof, and not in the hold; particularly that part between the chase and the loof.

The ancients represented beaks of birds in the *prows* of their ships, whence they were called *rostra*.

PROW is also a name given by seamen to the beak or pointed cut-water of a polacre, xebeck, or galley. The upper part of the *prow* in those vessels is usually furnished with a grating platform for the convenience of the seamen, who walk out to perform whatever is necessary about the sails or rigging, or the bowsprit.

PROX, in *Natural History*, a name given by Aristotle to the *serpens platyceros*, or broad-horned flag.

PROXENETA, or PROXENETES, a kind of broker or agent, who transacts between two persons. See BROKER, and AGENT.

The word is Greek, προξενητης, q. d. *conciliator* or *procurator*, *reconciler* or *mediator*. The Latins give them a more honourable appellation, calling them *interpretes*.

The term *proxeneta* is chiefly applied to those who negociate offices, marriages, &c.

The Roman law grants the *proxeneta* an action for recovery of their hire or wages.

These made a kind of office or college in Rome: to them the fathers addressed themselves, to sound and examine the inclinations of the young men they intended for their daughters. A commentator on the Digest accounts it a great defect in the modern policy, that there are not now

any of these *provenetæ*, or match-makers, established by public authority.

PROXIMITY, *proximitas*, denotes the relation of nearness, either in respect of place, blood, or alliance.

PROXY, *procurator*, a deputy, or person who officiates in the room of another.

Princes are usually married by *proxies*, or representatives.

Peers are allowed to give their votes by *proxies*.

PROXY, *procuracy*, among *Civilians*, also denotes a commission given to a PROCTOR, by a client, to manage a cause in his behalf.

PRUDENCE, in *Ethics*, may be defined an ability of judging what is best, in the choice both of ends and means. According to the definition of the Roman moralist, De Officiis, lib. i. cap. 43. *prudence* is the knowledge of what is to be desired or avoided. Accordingly he makes *prudentia* (De Legibus, lib. i.) to be a contraction of *providentia*, or foresight. Plato (De Legibus, lib. iii.) calls this the leading virtue; and Juvenal, Sat. x. observes,

Nullum numen abest si sit prudentia.

The idea of *prudence* includes *solertia*, or due consultation, that is, concerning such things as demand consultation, in a right manner, and for a competent time, that the resolution taken up may be neither too precipitate nor too slow; and *eurota*, or a faculty of discerning proper means when they occur; and to the perfection of *prudence*, these three things are farther required, viz. *eurota*, or a natural sagacity; *εὐστοχια*, presence of mind, or a ready turn of thought; and *εμπειρια*, or experience. The extremes of *prudence* are craft or cunning on the one hand, which is the pursuit of an ill end by direct and proper, though not honest means; and folly on the other, which is either a mistake, both as to the end and means, or prosecuting a good end by foreign and improper means. Grove's Moral Philosophy, vol. ii. chap. ii.

PRUINA, in *Physiology*. See *Hoar* FROST.

PRUNE-*tree*, in *Botany*. See PLUM-*tree*.

PRUNE, *wild*. See SLOE.

PRUNELLA, a name given, by some physicians, to a dryness of the tongue and throat, happening in continued fevers, especially acute ones, accompanied with a heat and redness of the throat, and a scurf covering the tongue; sometimes whitish, and sometimes blackish.

Some also give the name *prunella* to the quinzy, and others to the aphthæ. *Prunella* is also the name of a plant, called in English SELF-*heal*.

PRUNELLE, *sal*, in *Pharmacy*, is a preparation of purified salt-petre; called also *lapis prunellæ*, and CRYSTAL *mineral*.

It is prepared by separating and absorbing some of the more volatile parts of the salt-petre, which is done by burning upon it, when melted in a crucible over the fire, about a twenty-fourth part of its weight of flowers of brimstone. When the deflagration is over, the melted salt is poured into clean, dry, warm, brass moulds, so as to form it into little cakes.

It is given to cool, and provoke urine, in fevers and quinzies; though some think, that salt-petre, purified three or four times, would be a better medicine.

The *sal prunellæ* is said to be frequently adulterated with alum; and that the deceit is known by its whiteness, and glittering.

PRUNES, *prunæ*, are plums dried or baked in an oven, or in the sun.

Three sorts of this fruit are ranked among the articles of the materia medica: they are all met with in our gardens; but the shops are supplied with them, moderately dried, from abroad. These are the Brignole plum, or prunellos, brought from Brignole in Provence, of a reddish yellow colour, and a very grateful, sweet, subacid taste; the common, or French *prunes*, called by our gardeners the little black damask plum; and damsons, the larger damask violet plum of Tours, which is seldom kept in the shops, but has been generally supplied by the common *prunes*. All these fruits possess the same general qualities with the other summer fruits. The prunelloes, in which the sweetness has a greater mixture of acidity than in the other sorts, are used as mild refrigerants in fevers and other hot indispositions, and are sometimes kept in the mouth for alleviating thirst in hydropic cases. The French *prunes* and damsons are the most emollient, lubricative, and laxative; they are taken by themselves for gently loosening the belly in costive habits, and where there is a tendency to inflammation; decoctions of them afford an useful basis for laxative or purging mixtures, and the pulp in substance for electuaries. Lewis.

PRUNIFEROUS *tree*, or *shrub*, the *plum-bearing kind*, are those whose fruit is pretty large and fast, with a stone in the middle.

In this kind, the flower adheres to the bottom of the base of the fruit.

PRUNING, in *Gardening* and *Agriculture*, the operation of lopping or cutting off the superfluous branches of trees; either to dispose them to bear better, to grow higher, or to appear more regular.

Pruning is one of the most important branches of the gardener's province, and that wherein the thriving or barrenness of his fruit-trees, as well as the form and regularity of his garden, in great measure depend.

It is sometimes practised purely for the trimming or adjusting of trees to the eye, by taking away irregular branches; as in box, holly, yew, &c.

Sometimes, to make the stem grow fairer, and rise higher, by taking off all the large branches arising out of it, and thus sending the sap, which would otherwise be expended by them, to the top of the tree, to nourish and prolong the same.

But its more ordinary use is, to render the tree more fertile, and to mend its fruit, by retrenching such useless branches as might impoverish the trunk, and consume the juice necessary to nourish the branches that bear.

Pruning is an annual operation: the amputation is usually made sloping, sometimes slump-wise. Its best season is about the end of February, though it may be begun as soon as the leaves are off, viz. in November; and continued to the time when fresh leaves come on, viz. in April or May, which is the proper season.

As the gardener has usually three kinds of trees to manage, viz. some too weak, others too strong, and others in a just plight, he will find *pruning work* through all that space; it being proper to *prune* some sooner, and some later. The weaker and more languishing a tree is, the sooner it ought to be *pruned*, to ease it of its offensive branches; and the more vigorous the tree is, the longer may the *pruning* be deferred.

For PRUNING *a tree of the first year*, i. e. a tree planted the year before: if it have only that one fine branch from the middle of the stem, it must be cut to that branch, and the branch shortened to four or five eyes or buds; the effect of which is, that the next year there will be, at least, two fine branches opposite to each other.

If the tree produce two fine branches well placed, with weak ones among them, all required is to shorten them equally, to the compass of five or six inches in length; care, however, being taken, that the two last eyes or buds of the extremes of the branches, thus shortened, look on the right and left to the two bare sides, that each may bring forth at least two new ones; and the four be so well placed, that they may be all preserved. If one of the two branches be much lower than the other, or both on one side, or the like, only one is to be preserved, and that the tallest to begin a fine figure; the other is to be cut off so close, as that it may never be able to produce thick ones in the same place. If a tree have put forth three or four branches, all in the extremity, or a little beneath, they must be all *pruned* by the same laws as the two above mentioned: if they be equally thick, they are to be used alike; if some of them be smaller than the rest, they must only be *pruned* with a prospect of getting a single branch each, taking care to have it on that side which shall be found empty; in order to which, they should be shortened to an eye or bud that looks on that side; and the same care into be taken in the larger, in order to begin to fill up the better, if these fine branches shoot a little below the extremity, it is but shortening the stem to them; on the contrary, if the branches be most of them ill ones, two at least, if possible, are to be preserved, and *pruned* in the same manner as the two fine ones above. Good weak branches are to be carefully preserved for fruit; only cutting them a little at the extremity, when they appear too weak for their length; not failing to take away all the spleis branches. If the tree have produced five, six, or seven branches, it is sufficient to preserve three or four of the best; the rest are to be quite cut off, at least if they be thick; for if they be weak, i. e. fit for fruit-branches, they should be kept till they have performed what they are capable of doing; and if among the great ones there happen to be many small ones, two or three of the best are only to be preserved, pinching off the ends of the longest.

PRUNING *of a tree of the second year*. If, having put out two fine wood branches, and one or two small ones, for fruit the *first year*, the sap have steered its course in the second year, from the thick branches to the small ones, so that the small become wood, and the large fruit-branches, the productions of the former must be quite cut off to the mother branch, and those of the latter used as fruit-branches. If a tree, from the first year's *pruning*, have produced four or five branches, or more, it must needs be very vigorous; for which reason it may be some-

times adviseable to preserve those branches, even though they be not necessary to the figure of the tree, but only to consume part of the sap, which might otherwise be prejudicial to the fruit-branches. These superfluous branches may be left long, without much ill consequence; but those essential to the beauty of the tree, must be all *pruned* a little longer than those of the preceding year, i. e. about two, or at most three eyes, or a good foot. This is making an advantage of the figure of the tree, which, without this, would not yield fruit in a long time, the redundant sap converting all the eyes into wood-branches, which, with a more spare diet, would have been fruit-branches. In these vigorous trees, some branches cut stump-wise, are to be left on, and even some thick ones, though of false wood, especially where there are any necessary to the form of the tree, to employ the excess of sap, and prevent its doing mischief. Still more to assuage its violence, it may be necessary to preserve many long, good, weak branches, when placed so as to occasion no confusion; and even on the thick branches, a good number of outlets for the sap to range in. Be it a general rule, rather to spare the lower branches, and cut off the higher, than the contrary: by this means the tree spreads more easily to the bottom of the wall.

PRUNING *of a tree of the third year.* In a tree that has been planted three years, and *pruned* twice, if it be vigorous, as many old branches as possible are to be preserved, especially for fruit; if it be weak, it must be eased of the burden of old branches, as well those for fruit, as wood: it must likewise be cut short, to enable it to shoot out new ones; which if it cannot do with vigour, let it be pulled up, and a new one, with fresh earth, planted in its place.

In all *pruning*, provision is to be made for branches to proceed from those now under the *pruning-knife*, to prepare such as may be proper for the form; with this assurance, that when the high branch is taken down from over the lower, this latter being reinforced with the sap that would have gone to the former, will certainly produce more branches than it would have done without such reinforcement.

PRUNING *fruit-trees, general rules of.* The *pruning* of fruit-trees requires a strict observation of the different manners of the several sorts, because some produce their fruit on the same year's wood, as vines; others produce their fruit, for the most part, upon the former year's wood, as peaches, nectarines, &c. and others upon curfors or spurs, which are produced upon wood of three, four, or five, to fifteen or twenty years old, as pears, plums, cherries, &c. therefore, in order to the right management of fruit-trees, there should be always provision made to have a sufficient quantity of bearing wood, in every part of the trees, and at the same time there should not be a superfluity of useless branches, which would exhaust the strength of the trees, and cause them to decay in a few years.

1. The more the branches shoot horizontally, the apter and better disposed the tree is to bear fruit; consequently, the more upright the branches, the more inclined is the tree to increase in wood, and the less to bear fruit.

Hence, ever take care to keep the middle of a tree from wood or thick branches; and as those increase and grow upon you, cut them out entirely; for there is no danger but the place will be soon filled with better and more fruitful wood.

In dwarfs you are to *prune* all open, and clear of wood, leaving none but horizontal branches; and in wall-trees, if you do but furnish your walls with horizontal branches, nature will provide for the middle. Chuse, therefore, such shoots as are not vigorous, to furnish bearing branches.

2. Take care the tree be not left over full of wood, not even of bearing branches; as is frequently seen in the management of peaches, nectarines, and cherries.

Nature cannot supply them all with juice enough; whence none will be supplied well: the consequence of which, is, that either the blossoms will fall off, or the fruit will dwindle. It is certain, a multitude of branches, crouding on one another, produce neither so good, nor so much fruit as where there is a convenient space, beside the disagreeable effect of crossing one another.

3. All strong and vigorous branches are to be left longer on the same tree than weak and feeble ones; consequently, the branches of a sickly tree must be *pruned* shorter, and left fewer in number, than those of a strong healthful tree.

4. All branches shooting directly forward from trees that grow against a wall, are to be *pruned* close to the branch whence they spring, &c.

5. When a branch well-placed either against a wall, or in a dwarf, has shot some false wood, neither fit for the figure nor the fruit, *prune* it off within the thickness of a crown-piece, or slopingly; though this is best *pinched* off in the beginning of summer.

6. Cut off all branches arising from hard knobs, whereon pear-stalks grew; or from short straight branches, like spurs.

7. If a tree, in its first years, have produced branches of moderate vigour, and afterwards put forth strong ones, well placed, though of false wood; the latter may be used as the foundation of the figure, and the other kept a time for bearing fruit.

8. When an old tree shoots stronger branches towards the bottom than the top, and the top is in ill case; cut it off, and form a new figure from the lower ones. If the top be vigorous, cut off the lower ones, unless well placed.

9. The order of nature, in the production of shoots and branches, is, that a branch is always less than that out of which it shoots: if this order be inverted, use them as false wood.

10. Regard is to be always had to the effects of former *pruning*, in order to correct its defects, or continue its beauties.

11. In vigorous trees, the weaker branches are the fruit-bearers; in weak trees, the stronger, chiefly; therefore, in the latter, *prune* off the feeble and small.

12. In vigorous trees, three good branches may put forth at one eye or bud: in which case, the two side-branches are generally to be preserved, and the middlemost cut off in May or June.

13. It is difficult to strengthen a weak branch without cutting off others above it; sometimes it can scarce be done without cutting off the end of the branch it shoots out of.

14. The *pruning* of vigorous peach-trees is to be deferred till they are ready to blossom, the better to know which branches are likely to bear fruit.

15. Fruit-buds next the ends of branches are commonly thicker and better fed than others. In weak trees, therefore, it may be best to *prune* them early, that the sap may not waste itself in such parts as are to be re-trenched.

16. The farther a weak branch is from the trunk, the less nourishment it receives; and therefore the more it is to be shortened: but thick branches, the more distant they are from the heart, the more they receive; and they are therefore to be removed, that the vigour may extend itself to the middle or lower part.

17. A branch for wood must never be *pruned* without especial occasion; as where it annoys others.

18. If an old well-looking tree be disordered with false wood, through ill *pruning*, or want of *pruning*; take it lower, by cutting off a branch or two yearly, till it be sufficiently reduced. Some trees put forth so vigorously, that they cannot be reduced to compass in one year; but must be allowed to extend themselves, otherwise they will produce false wood.

19. All trees have a predominant branch or two, if not more; yet the more equably the vigour is divided, the better; where it runs much on one side, it is faulty.

20. The buds of all stone-fruit frequently form themselves the same year in which the branch they grow on is formed; the same holds of pears and apples; though it is, generally, at least two or three years before the latter come to perfection.

21. All shoots that are put forth in autumn, are to be *pruned* off, as naught: the same may be said of all sapless branches.

22. When a tree puts forth much stronger shoots on one side than on the other, a great part of the strong ones must be cut off close to the body, or some of them stump-wise.

23. In all trees less length is to be allowed the weak than the strong branches.

24. Upper branches are to be cut off close to others, that they may heal over: lower branches are to be cut sloping, or at a little distance, that new ones may grow out of them.

25. If a young crooked tree produce a fine branch beneath the crook, cut the head off close to the branch.

26. Though five, six, or seven inches, be the ordinary lengths wood-branches are left at; yet must this be varied on occasion of the vigour or weakness of the tree, thickness or smallness of the branch, the fullness or vacuity of the place, &c.

27. Be careful not to prune many thick branches standing over weak ones; lest the sap, which fed the larger, flow so plentifully into the less, as to occasion them to put forth much ill wood and suckers.

28. Branches shot from the ends of others are usually good wood; sometimes it happens otherwise, and then they must be *pruned*.

As to the grand *yearly prunings*: fruit branches being of short

short continuance, and perishing the first year wherein they produce fruit, are to be cut off, unless they put forth shoots for blossoms the succeeding year. In the second *pruning*, about the middle of May, where the fruit is so close as to be like to obstruct each other, some of them and their branches are to be taken off, as must also the multitude of young shoots that cause confusion. Branches more luxurious than others are to be cut clear off. To preserve old trees, they must be disburdened by leaving few branches for wood on them, and those to be shortened to five or six inches; and very few weak ones, and none dry, and high wafted.

PRUNING *of forest or timber trees*. See FOREST *Trees*, and LOPPING.

PRUNING *of vines*. See VINE.

PRUNUS, in *Botany*. See PLUM *tree*, APRICOT, and SLOE.

PRURITUS, a painful, and yet pleasurable kind of sensation of the skin, popularly called *itching*; which is supposed to arise hence, that the extremities of the capillary veins being obstructed, cannot take up the redundant blood of the limbs, to carry it back again to the heart; whence, as there is a fresh stock of blood continually sent into the part by the incessant pulsation of the heart, the fibres become preternaturally stretched or distended. And hence the usually thrilling sense of itching.

PRUSSIAN *blue*. See BLUE.

PRUSSIAN *green*. See GREEN.

PRYK, a kind of service or tenure, and according to Blount, signifies an old fashioned spur with one point only, which the tenant holding land by this tenure, was to find for the king. *Per servitium inveniendi unum equum, unum falconem, & unum pryk in Guerra Walliæ*. 1 Ric. II. and in the time of king Hen. VIII. light horsemen in war were called *prickers*, because they used such spurs or *pryks*, to make their horses go with speed.

PRYTANEUM, πρυτανεῖον, in *Antiquity*, a considerable building in Athens, where the council of *prytanes* assembled, and where those who had rendered any signal services to the commonwealth, were maintained at the public expence.

PRYTANIS, or PRYTANES, in *Antiquity*, the first magistrate in most of the cities of Greece.

At Athens there were fifty *prytanes*; at Corinth there was but one, who was the same with what the *archon* was at Athens.

The *prytanes* of Athens were the senators who composed the grand council that governed the state; and correspond to what we now call *the states general of the United Provinces*.

Fifty of these were chose each year out of each tribe; and to these were nominated fifty more, to supply the places of the former, in cases of death, or mal-administration.

The tribes took the government by turns, each after other, for the space of thirty-five days. This was an establishment of Solon. Scaliger is mistaken, when he says the tribes took their turns every day.

All the fifty *prytanes* of the tribe did not govern together during those five weeks; but in companies, ten at a time, chosen by lot; seven days each company: after which another tribe came into office, and had its five weeks after the same manner.

PRYTANITIDES, in *Antiquity*, a name given to those widows who at Athens, and throughout all Greece, had the sacred fire of Vesta committed to their care. The custom of the Greeks, in this respect, differed very much from that of the Romans; who allowed none but virgins to tend this sacred fire, whence they were called VESTALS.

They had the appellation *Prytanitides* from πρυτανεῖον, a name common to all places sacred to Vesta.

PSADURIA, a genus of rough stones of a plain uniform structure, not laminated but splitting equally in all directions.

PSAGDA. See SAGDA.

PSALM, ψαλμὸς, formed from ψάλλω, *I sing*, a divine song, or hymn.

The denomination *psalm* is now appropriated to the one hundred and fifty *psalms* of David; and the name *canticle*, or *song*, is given to other pieces of the same kind, composed by other prophets and patriarchs.

The ancients, as is observed by St. Augustine, made this difference between a *canticle*, or *song*, and a *psalm*, that the former was sung by the voice alone, but the latter accompanied with a musical instrument.

The *psalms*, in the ancient editions, are divided into five books; nor is David's name found at the head of more than seventy-three of them; though some, and among the rest St. Augustine and St. Chrysostom, attribute all the hundred and fifty to him without exception.

The Jews, however, were always of another opinion; and it is certain there are some few, at least, that are not his. St. Jerom observes, among the number, several that were composed a long time after David. Du Pin adds, that it is difficult to ascertain the authors; all we know of the book is, that it is a collection of songs compiled by Ezra.

Gradual psalms were those anciently sung on the steps of the temple. The *penitential psalms* were not formerly the same with those now called by that name.

PSALMIST, in the *Church of Rome*, one of the lesser ecclesiastical orders, the same with what among us is called *clerk, precentor*, or *singer*.

PSALMODY, ψαλμῳδία, the art of singing psalms.

PSALTER, ψαλτήριον, the book or collection of psalms, ascribed to David.

There are a multitude of editions of the *psalter*. Augustine Justinian, a Dominican, and bishop of Nebo, published a Polyglot *Psalter* at Genoa, 1516. And Cagtarinus published the *Psalter* in Hebrew, Greek, Chaldee, and Arabic, with Latin notes and glosses.

PSALTER is also used among religious for a large chaplet or ROSARY, consisting of one hundred and fifty beads; the number of the psalms in the *Psalter*.

St. Dominic is said to have been the inventor of this *Psalter*.

PSALTERY, PSALTERION, also denotes a musical instrument much in use among the ancient Hebrews, who called it *nebel*.

We know but little of the precise form of the ancient *psaltery*. Kircher has taken pains to prove that it was of a square form; and from an old book in the Vatican library he has exhibited a figure of it. See *Tab. Musica, fig.* 8. and the NEBEL or *nevel*, from his account was a different instrument; *see fig.* 7.

That now in use is a flat instrument; in form of a trapezium, or a triangle truncated at top.

It is strung with thirteen wire-chords, set to unison or octave, and mounted on two bridges on the two sides. It is struck with a *plectrum*, or little iron rod, or sometimes with a crooked stick; whence it is usually ranked among the instruments of percussion.

Its chest, or body, is like that of a spinet. It has its name *a psallendo*; some call it *nablum*, or *nabulum*.

Papias also gives the name *psaltery* to a kind of flute, used in churches, to accompany the singing; called in *Latin, fistulatum*.

PSAMMISMUS, ψαμμισμὸς, formed from ψάμμος, *sand*, in *Medicine*, a term sometimes used for a bath of dry and warm sand, to set the feet of dropsical persons upon.

PSATYRIANS, ΨΑΤΥΡΙΑΝΟΙ, a sect of ARIANS, who, in the council of Antioch, held in the year 360, maintained, that the Son was not like the Father, as to will; that he was taken from nothing, or made of nothing; and that in God, generation was not to be distinguished from creation.

PSEGMA, a name given by some of the ancients to the flos æris, or flowers of brass.

PSELAPHIA, a word used by the ancient medical writers to express friction with the hands, in cases where the distempered parts required it. This was always esteemed a part of the business of a physician, and was done with his own hand.

PSEN, ψὴν, the name given by naturalists to the fig-gnat, a small species of gnat bred in figs while growing on the tree, and always remaining on the leaves of the same tree, and feeding on its juices. See CAPRIFICATION.

PSEPHISMA, ψήφισμα, among the Athenians, a decree of the senate; the same with PROBOULEUMA.

PSEPHOMANTIA, ψηφομαντία, in *Antiquity*, a species of divination, the same with CLEROMANCY.

PSEPHOPHORIA, in *Antiquity*, the art of using the *pfephi*, ψῆφοι, or *counters*. This was the first arithmetic taught children of every condition. Capitolinus, in his life of Pertinax, says, *Puer theatis elementariis & calculo imbuitur*.

PSEPHOS, ψῆφος, in *Antiquity*, a name given to several things, as small stones, shells, and beans, used among the Greeks in giving their suffrages, and in their computations. Their origin is, by Mr. Mahudel, ascribed to the sons of Noah, who used this kind of calculation to assist their memory in numbering their flocks. Josephus assures us, that the Egyptians borrowed this method of counting from Abraham; and Herodotus relates, that these small stones were used both by the Egyptians and Greeks, only with this difference, that the latter placed them and cyphers from left to right, and the former from the right to the left. The art of using them in calculations was called PSEPHOPHORIA.

Pfephi were in use too among the Romans, who called them *calculi*. Whatever materials they consisted of, they were all of the same colour when used in calculations; whereas those used in giving suffrages were partly black

and partly white. Lucky days were denoted by white, and unlucky by black ones. See CALCULUS.

PSETA, in *Ichthyology*, a name given by Athenæus to the fish we call the PLAISE, the *passer laevis* and *platessa* of authors.

PSETTES, in *Natural History*, a name given by authors to a ſtone, having in it the figure of a turbot. There are ſtones found in ſome parts of Germany having the impreſſions of ſeveral kinds of fiſh as perfect as if drawn by a pencil, and it is not to be doubted, but that they in reality owe them to the fiſh themſelves; which were received into beds of the matter of ſtone, yet unhardened, which taking its conſiſtence while they were in it, muſt cruſh them, and retain the marks of their bodies. They are uſually found in a whitiſh flaty ſtone.

PSEUDO, a term or particle, uſed in the compoſition of divers Latin and Engliſh words; in the ſenſe of *falſe*, or *ſpurious*.

The word is formed from ψεῦδος, *lie*, *falſhood*, of ψεύδω, *I deceive*.

We ſay a *pſeudo-martyr*, q. d. *a falſe witneſs*; *pſeudo-prophet*, *pſeudo-apoſtle*, *pſeudo-chriſt*, &c.

PSEUDO *acacia*, in *Botany*. See ACACIA.

PSEUDO-APIOS, in *Botany*, a name given by ſome authors to the roots of the *bulbocaſtanum*, or EARTH-*nut*.

The peaſants in Burgundy, and other parts of France, turn up theſe in great quantities with the plough, and eat them. They call them *arnottas*, and ſome of the writers of the adjacent places not diſtinguiſhing what they truly were, have avoided the common name, by giving them this of *pſeudo-apios*, formed of the name of a root to which they have no alliance, and taking away a name by which they would have been much better known; *arnotta* being only a corruption of the Dutch name *ernute*, or earth-nut, a name by which they are called almoſt every where. See PIG-*nut*.

PSEUDO-ARGYRON, in *Mineralogy*, a word uſed by the ancients in two very different ſenſes; ſome make it the name of what Virgil calls *aricbalcum album*, *white braſs*; and others of a mineral with which the common braſs was made.

It is very evident, from the joint teſtimony of the old Greeks and Romans both, that they had in uſe a kind of white metal made of copper, and they eſteemed it greatly above the yellow, or braſs.

Ariſtotle tells us of this white metal, and gives it great encomiums; he ſays, it was very white and very bright; and that it was made by melting copper together with a certain earth: but this he does not deſcribe, ſo that we are left in the dark as to what it was.

This ſhining white met.. might very naturally be called *pſeudo-argyron*, or baſtard-ſilver.

PSEUDO-CARPASUM, in *Botany*, a name given by ſome authors to the plant called by the generality of writers *libanotis*.

This is a plant of a very ſtrong ſmell; and the *carpaſum*, or *carpaſium* of the ancients, being a poiſonous gum, and the ſmell of the libanotis approaching to the ſame odour, occaſioned its being called the *baſtard-carpaſum*.

PSEUDO-*dictamnus*. See HOREHOUND.

PSEUDO-*fumaria*, in *Botany*, a name uſed by ſome for a ſpecies of FUMITORY.

PSEUDO-*lotus*, in *Botany*, a name by which ſome call the *guaiacana* of Tournefort. See *Indian Date* PLUM.

PSEUDO-*pinaſtrum*, in *Botany*, the name given by Rivinus to a ſpecies of LANTANA.

PSEUDO-*diptera*, ψευδοδίπτερος, in the *Ancient Architecture*, a temple with eight columns in front, and a ſingle row of columns all around.

The word ſignifies *falſe or imperfect diptera*; and is uſed to diſtinguiſh this from the *diptera*; which had two rows of columns all around.

PSEUDOGELSEMINUM, in *Botany*, a name given by Rivinus to a genus of plants, the ſame with the SIGNONIA, of authors. See TRUMPET-*flower*.

PSEUDO-*ipecacuanha*, in *Botany*, the name by which ſome authors have called a poiſonous kind of American apocynum, the root of which ſomething reſembles the true IPECACUANHA, and has ſometimes been unfortunately collected and uſed in its place.

PSEUDONYMUS, ψευδώνυμος, formed from ψεῦδος, *lie*; and ὄνομα, *name*, a name given by the critics to thoſe authors who publiſh books under falſe or feigned names. As the name *cryptonymus* is given to thoſe who publiſh under ſecret and diſguiſed names; and *anonymus*, to thoſe who publiſh without any names at all.

The apoſtolical conſtitutions, the greater epiſtles of St. Ignatius, &c. are uſually ſuppoſed to be *pſeudonymous*.

PSEUDO-*pulex arboreus*, in *Natural Hiſtory*, the name of a genus of inſects deſcribed by M. Reaumur, and ſomewhat approaching in their form to the *pulex arboreus*; but having their wings covered with a ſquammoſe caſe, which thoſe creatures have not, and having broader and flatter bodies.

Theſe principally live upon the fig-tree and the box; they paſs through a ſort of metamorphoſis into a hopping fly, ſuppoſed by ſome of the nature of a graſs-hopper; but erroneouſly, for that animal has a caſe for its wings, and the other not.

PSEUDO-STELLA, in *Aſtronomy*, any kind of meteor or phenomenon, appearing in the heavens, and reſembling a ſtar.

PSEUDO-*thera*, in *Natural Hiſtory*, the name of a ſpecies of two-winged fly, approaching to the nature of a common waſp, but having no ſting.

This is, according to the later diſtinctions in the hiſtory of inſects, properly called a *waſp-fly*. There are beeflies, as much reſembling the bees as this does the waſp.

PSEUDO-*tinea*, in *Natural Hiſtory*, the name of a very remarkable ſpecies of inſect deſcribed by M. Reaumur, approaching to the nature of the *tinea*, or cloth-moth, while in the worm-ſtate; but not making themſelves coats of the ſubſtance of leaves, cloth, &c. though they form a ſort of caſes for their defence againſt a very terrible enemy.

Theſe creatures are truly of the caterpillar kind, and have, in the manner of many of theſe inſects, ſixteen legs. They feed on wax, and for food enter the bee-hives; where they boldly engage the bees, and are not to be prevented by them from feeding, though at the expence of their habitations and the cells of their reſervoirs of honey: ſo that it is no uncommon thing for a ſwarm of bees to be forced to change their place of habitation, and make new combs elſewhere; leaving the old ones to this contemptible victor, whom they know not how to drive out or diſpoſſeſs.

Virgil and Ariſtotle, and all the authors who have written on bees, have complained of this deſtructive animal. It never eats the honey, but feeds only on the wax; attacking principally thoſe waxy cells where the female bee depoſits her eggs for the future progeny.

The bees, who are a match for moſt other creatures, by means of their ſtings, would eaſily deſtroy thoſe weak creatures were it not for the impervious armour they are covered with. They form themſelves a coat of armour of a double matter; the firſt, which immediately covers the body, is of a kind of ſilk of their own ſpinning; and the outer covering over this is of the bees wax: this is laid conſiderably thick, and the creature juſt thruſting out its head to feed, goes on devouring the cells undiſturbed, while a whole army of the inhabitants are in vain buzzing about him, and attempting to pierce him with their ſtings.

When the time of the change of this creature approaches, it contracts its body within its double covering, and there changes into the nymph ſtate; whence, after a proper time, it comes forth in form of a moth, with granulated horns and crooked proboſcis.

The bees have cunning enough to know their deſtructive enemy in this new form, and as this is a weak and defenceleſs ſtate, they attack and deſtroy all the moths of this ſpecies they can meet with. They ſeldom are ſo fortunate, however, as to kill the whole race as ſoon as produced; and if only one eſcapes, it is able to lay a foundation of revenge for the death of its brethren.

The moth produced by this caterpillar flies but little, yet is very nimble in avoiding danger by running, which it does with great ſwiftneſs.

There are ſpecies of theſe *pſeudo-tineæ*, or wax-eating caterpillars, which infeſt the ſubterranean hives of waſps, and other creatures which make wax: the manner of living, feeding, and defending themſelves from their enemies, is the ſame in all theſe ſpecies.

The accurate author of theſe obſervations deſcribes alſo a kind of *pſeudo-tineæ*, which feed on wool, and another that eats leather; both making themſelves houſes alſo on the materials they feed on. All theſe creatures, whatever be their food or habitation, finally become *phalenæ*, or moths; and may be diſtinguiſhed, even in this ſtate, from the other ſpecies, by having granulated horns of a remarkable ſtructure, and all of them a proboſcis, or trunk, more or leſs incurvated.

PSIDIUM, in *Botany*, the name by which Linnæus calls a genus of plants, named GUAJAVA by Tournefort and others.

PSILOCITHARISTA, among the *Ancients*, one who plays on the cithara, without ſinging in concert to it.

PSILOTHRON, ψιλόθρον, formed from ψίλωσις, *deglabro*, *I make bald*, or *bare*, and θρὶξ, *hair*, in *Medicine*, DEPILATORY; an external form of medicine proper to take off the hair.

Such are the ſtrong lixiviums, quick-lime, arſnic eggs, ſandarac, orpiment, and arſenic.

PSITTACUS, in *Ornithology*. See PARROT.

PSOAS *magnus*, or *lumbaris*, in *Anatomy*, a round, hard, fleshy muscle, which arises from the internal side of the transverse processes of the vertebræ of the loins, within the abdomen; and descending upon part of the internal side of the ilium, is inserted in the lower part of the little trochanter. It is the first of the flexors of the thigh.

It is fixed above to the last vertebra of the back, and to all those of the loins; that is, to the lateral parts of the bodies of these vertebræ, and to the roots of their transverse apophyses. The insertions in the bodies of the vertebræ are by a kind of digitations, and are very little tendinous: from thence the muscle runs down laterally over the os ilium, on one side of the iliac muscle; and passes over the ligamentum Fallopii, between the anterior inferior spine of the os ilium, and that eminence which, from its situation, may be called *iliopectinæa*. Before it goes out of the abdomen it unites with the iliacus, and afterwards covers the forehide of the head of the os femoris. It is sometimes accompanied by a small muscle, called *psoas parvus*. Winslow.

PSOAS *parvus*, arises fleshy from the inside of the upper vertebræ of the loins, and hath a thin and broad tendon which embraces the *psoas magnus*; and which is inserted into the os innominatum, where the os pubis and ilium join together. This, though ordinarily reckoned among the muscles of the thigh, properly belongs to the lower venter.

It is sometimes wanting; but though some have imagined it wanting in one sex more than the other, the conjecture seems without foundation. It is fixed above by a short tendon, sometimes to the last transverse apophysis of the back, or higher; sometimes to the first of the loins, and sometimes to both: from thence it runs down wholly fleshy, and more or less complex on the great *psoas*, in a direction a little oblique; and having reached the middle of the regio lumbaris, it forms a slender flat tendon, which gradually increasing in breadth like a thin aponeurosis, runs over the *psoas major*, and *iliacus internus* at their union; and from thence down to the symphysis of the os pubis and os ilium, and is inserted chiefly in the crista of the os pubis, above the insertion of the pectinæus. Winslow.

Beside this *psoas parvus*, there is another, still smaller, between it and the vertebræ.

PSOPHIA, in *Ornithology*, a genus of the *grallæ*; its characters are, that the beak is cylindrico-conic, convex, sharp, with the upper mandible longer than the other; the nostrils are ovated and wide, and the feet have four toes and cloven. There is only one species. See MACUCAQUA.

PSORA, ψώρα, in *Medicine*, a cutaneous disease, called by the Latins *scabies*, and by the English ITCH.

PSORA, in *Botany*, a name by which Aetius and several others of the late Greek writers have called the *pforice* of the ancient Greeks, that is, the *scabiosa* of the Latins, and our common scabious. It has been supposed by some, that the ancient Greeks were not acquainted with our scabious; but that is an erroneous opinion, both the description and virtues of the pforice being the same with those of the scabious.

PSORALEA, in *Botany*, a genus of the *diadelphia decandria* class. Its characters are these: the empalement of the flower is of one leaf, cut into five parts, the lower segments being twice the length of the other; the flower is of the butterfly kind; it hath five petals; the standard is roundish, and indented at the top; the wings are small, obtuse, and moon-shaped, the keel is moon-shaped, and composed of two petals; it hath nine stamina joined together, and one bristly stamen standing separate, terminated by roundish summits; with a linear germen, supporting an awl-shaped rising style, crowned by an obtuse stigma; the germen afterwards turns to a slender compressed pod, inclosing one kidney-shaped seed. Miller reckons ten, and Linnæus thirteen species.

PSORAS, in *Ornithology*, a name by which some authors have called a fish of the turdus kind, remarkable for the variety and beauty of its spots, and more usually known by the name LEPRAS.

PSORIASIS, a peculiar species of itch affecting the scrotum.

PSORICA, ψωρικα, medicines good against the itch, scabs, and other cutaneous eruptions, especially those of the eye-lids.

PSORICE, or PSORICE-*pea*, a name given by the botanical writers among the ancient Greeks to the plant we call *scabiosa*, or *scabious*.

PSOROPHTHALMIA, ψωροφθαλμια, formed from ψωρα, *itch*, and οφθαλμος, *eye*, a scurfy eruption of the eye-brows, attended with a pruritus, or itching of the part, or an inflammation and ulceration of the edges of the eye-lids.

Mr. Ware, in his Remarks on the Ophthalmy, *Psorophthalmy*, and *Purulent* Eye, 1780, proposes for the cure of this disorder the unguentum citrinum of the Edinburgh dispensatory, applied to the parts, either with the finger or a small brush of camel's hair. He has exemplified the utility of this application by the relation of several cases.

PSUCHAGOGICA, formed of ψυχη, *anima*, and αγω, *duco*, a word used by the ancients to express such medicines, as were used in apoplexies and faintings, to recall life.

PSUCHROTROPHON, in the *Materia Medica of the Ancients*, a name given to a plant often recommended, but not perfectly understood as to what species it means. It is the same plant called *ceforum* by the Greeks, and has this first name only because of its growing in moist places; the word being formed of the Greek ψυχρος, *moist*, and τρεφω, *to nourish*, or *cause to grow*.

PSYCHOLOGY, ψυχολογια, formed from ψυχη, *soul*, and λογος, *discourse*, the doctrine of the SOUL.

Anthropology, or the science which considers man, consists of two parts; the first treating of the body, and the parts belonging thereto, called *anatomy*; and the second of the soul, called *pfychology*.

PSYCHOMANCY, formed of ψυχη, *soul*, and μαντια, *divination*, a kind of magic or divination, performed by raising the souls of persons deceased.

PSYCHOTRIA, in *Botany*, a genus of the *pentandria monogynia* class: its characters are, that the calyx is quindentated and coronate; the corolla tubular; the fruit a globular berry, containing two hemispherical seeds. There are two species.

PSYCHROLUSIA, formed of ψυχρος, *cold*, and λυω, *I loose*, a word used by medical writers to express cold bathing.

PSYCHROMETER, formed from ψυχρος, *cold*, and μετρον, *measure*, an instrument for measuring the degree of coldness of the air; more usually called a THERMOMETER.

PSYCTICA, formed of ψυχω, *I cool*, a term used by medical writers to express cooling remedies.

PSYDRACIA, derived from ψιδρακες, *pustules*, a term used by medical writers to express small tubercles on the head, which resemble pustules, and after a little time corrode and eat through the skin.

PSYGMATA, derived from ψυχω, *I cool*, a name given by physicians to all refrigerating medicines, external and internal.

PSYLON, in *Ichthyology*, a name given by Aristotle, and many other of the old Greek writers, to the tench, or cyprinus niger.

PSYLLIUM, in *Botany*. See FLEA-*wort*, and PLANTAIN.

PTARMICA, πταρμικα, formed of πταρνω, *sneezing*, medicines proper to promote sneezing; more usually called *errhines*, and *sternutatories*. *Ptarmica* is also used as the name of a genus of plants. See SNEEZEWORT.

PTARMIGAN, the *lagopus* of Pliny, and the TETRAO *lagopus* of Linnæus, in *Ornithology*, is also called the *white game*, and erroneously the white partridge. This bird is of a pale brown or ash-colour, elegantly crossed or mottled with small dusky spots, and bars, the head and neck with broad bars of black, rust-colour, and white; the wings are white, but the shafts of the greater quill-feathers black; and the belly white. In the male, the grey colour predominates, except on the head and neck, where is a great mixture of red, with bars of white. The females and young birds have a great deal of rust-colour. Both agree in their winter-dress, being entirely white; except that in the male a black line occurs between the bill and the eyes; the shaft of the seven first quill-feathers is black; the tail consists of sixteen feathers; the black feathers being covered by two upper ones, which in summer are brown, and in winter white.

These birds are called by Pliny *lagopi*, because their feet are clothed with feathers to the claws, as the hare's are with fur, which serves to guard them from the rigour of the winter: the nails are long, broad, and hollow, scooped off at the end exactly like a writing pen, without the slit, which enables them to form a lodgment under the snow, where they lie in heaps to protect themselves from the cold. Their length is near fifteen inches, the extent twenty-three; and the weight nineteen ounces. They are found in these kingdoms only on the summits of the highest hills of the Highlands of Scotland and of the Hebrides; and some few are found on the lofty hills near Kefwick, in Cumberland. They resemble the GROUSE in taste, and like them keep in small packs, but never like these birds take shelter in the heath, but beneath loose stones.

In Hudson's Bay, this bird is called the willow-partridge. They gather together in large flocks in the beginning of October, harbouring among the willows, the tops of which are their principal food. They then change to their winter dress; change again in March, and have their complete summer dress by the latter end of June. They make their nest in the ground in dry ridges, and are so plentiful, that ten thousand have been killed in the three forts in one winter. Pennant's Brit. Zool. *vol.* i. p. 272, &c. Phil. Trans. vol. lxiii. part 2. art. 28. See GOUCHER.

PTE-

PTELEA, in *Botany*. See *Shrub* TREFOIL.

PTERARIA, in *Natural History*, a claſs of INSECTS, according to the diſtribution of Dr. Hill.

PTERIDION, in *Botany*, a name uſed by ſome authors for a ſmall kind of fern common in damp places. Ger. Emac. Ind. 2.

PTERIS, *brakes, or female fern*, in *Botany*, the name of a genus of ferns, the characters of which, according to Linnæus, are theſe: the fructifications are diſpoſed into a line, which ſurrounds the whole margin of the under part of the leaf. In this diſpoſition the *pteris* evidently differs from all the other capillary plants. There are twenty ſpecies.

PTEROCARPUS, in *Botany*, a genus of the *Decandria decandria* claſs: its characters are, that the calyx is quinquedentated; the fruit is a falcated, foliaceous, varicoſe capſule, and the ſeeds ſingle. There is only one ſpecies.

PTERONIA, in *Botany*, a genus of the *ſyngeneſia polygamia æqualis* claſs: its characters are, that the receptacle conſiſts of multipartite briſtles; the down is plumoſe, and the calyx imbricated. There are two ſpecies.

PTEROPHŒNICUS *Indicorum*, in *Ornithology*, a name under which Nieremberg has deſcribed a bird, which he ſays is called by the Spaniards there *commendadora*, remarkable for the redneſs of the upper part of its wings. It is of the ſhape and ſize of the ſtarling, and not unlike it in colour, but for the ſingularity of the upper part of their wings, which in one part of their lives are of a yelloweſh or orange colour, and in the reſt red. They are kept in cages and learn to imitate the human voice: they feed on vegetables, principally Indian corn, and are common as well in the colder as in the hotter climates; flying in large flocks, and often doing great damage to the people. They build in trees and are eaten there; but are no very valuable bird.

PTEROSPERMADENDRON, in *Botany*, the name of a genus of plants, eſtabliſhed by Dr. Amman.

The name is derived from the Greek πτερον, *a wing*, σπερμα, *ſeed*, and δενδρον, *a tree*, to expreſs a tree with alated ſeeds.

The characters of the genus are theſe: the flower is of the roſaceous kind, conſiſting of ſeveral petals arranged in a circular order; from the cup of the flower there ariſes a piſtil, with an embryo fruit, which finally becomes a woody ſeed-veſſel of the ſhape of a pod, which, when ripe, opens at the end, and is ſeen to be diviſed into five cells, containing alated ſeeds.

Of this genus the author deſcribes two ſpecies. The firſt has leaves like the cork-tree, angulated and hoary underneath, and white flowers; the other has ſuriculated leaves, and a large flower and fruit. The firſt of theſe is mentioned in Petiver's Muſeum, N° 349, under the name of a tree from Champana, with a woody fruit containing alated ſeeds: and the other ſeems to be the tree called *ſalaka*, in the Hortus Malabaricus, vol. vi. tom. 58.

Beſides theſe two ſpecies, the author ſuſpects there are four others, which have not yet been ſufficiently examined in their various ſtates, to determine whether they are properly of this genus or not.

PTERYGIUM, πτερυγιον, formed by diminution from πτερυξ, *ala, a wing*, q.d. *a little wing*, in *Medicine*, a diſeaſe of the eye, much of the ſame nature with what the Latins call UNGUIS, *nail*, and ſometimes, though improperly, PANNUS, *web*.

It is a preternatural membrane, formed externally upon the coats of the eye, extending itſelf over the cornea and pupil, and obſtructing the ſight. Sometimes this pellicle or membrane appears red, and is then called *pannus*.

It uſually ariſes in the angles of the eyes from the temples toward the noſe, and ſometimes from above or below, extending itſelf by degrees over the pupil. Sometimes it only adheres to the cornea by a few ſlender fibres, and ſometimes it is extended over the whole eye, and is every where firmly and intimately attached to it; and in this caſe the cure is rendered very difficult.

If the patient's conſtitution, or a beginning inflammation require it, bleeding and bliſtering are proper in this caſe; and when the membrane is but thin, gentle eſcharotics may perform a cure, ſuch as burnt alum, vitriol, &c. mixed into a powder with ſugar, or a ſolution of half a ſcruple of white vitriol in two ounces of celandine or other water.

If theſe methods prove ineffectual, the aſſiſtance of a ſurgeon muſt be called in; who ſeating the patient before him, with his head bent backwards upon his lap, while an aſſiſtant holds open the eyelids, takes hold of the thickeſt or looſeſt part of the pellicle with a hook, and elevating it a little, paſſes a threaded needle through it; and taking hold of both ends of the thread, makes a gentle elevation of it; then ſeparates its upper and lower margin with a lancet, that he may afterwards cut off the reſt immediately in a ſtraight line near the lachrymal caruncle, with a ſtraight and fine pair of ſciſſars; then he draws back the thread and membrane towards the cornea, and if it adheres any where to the eye, frees it by degrees with the ſcalpel, or ſciſſars, not wounding the cornea, nor leaving any of the membrane behind to give riſe to a new production of it. Heiſter.

PTERYGIUM is alſo the name given to a WHITLOE, when ſeated at the root of the nail.

PTERYGOIDES, πτερυγοειδης, derived from πτερυξ, πτερυγος, *wing*, and ειδος, *form*, in *Anatomy*, two apophyſes of the os ſphenoides; ſo called from their reſembling the wings of a bat. See SPHENOIDES.

PTERYGOIDÆUS *major*, or *internus*, is a muſcle that lies on the inſide of the lower jaw, almoſt in the ſame manner that the maſſeter does on the outſide, and is of the ſame figure with that muſcle, only ſmaller and narrower.

It is fixed above chiefly to the inſide of the external ala of the apophyſis *pterygoides*. This inſertion is wholly fleſhy, and from hence it runs down obliquely toward the angle of the lower jaw, and is inſerted a little tendinous in the inequalities on the inſide thereof, oppoſite to the inſertion of the maſſeter. Winſlow.

When it acts, it draws the jaw to one ſide.

PTERYGOIDÆUS *minor*, or *externus*, an oblong ſmall fleſhy muſcle, ſituated almoſt horizontally between the outſide of the apophyſis *pterygoides*, and the condyloide apophyſis of the lower jaw, the ſubject being conſidered in an erect poſture.

It is fixed by one extremity to the outſide and edge of the outer ala of the *pterygoide* apophyſis, filling that foſſula which is at the baſis of this apophyſis, near the baſis of the temporal apophyſis of the ſphenoidal bone; from thence it runs backward and a little outward into the void ſpace between the two apophyſes of the lower jaw, and is inſerted anteriorly in the condyloide apophyſis, at a ſmall foſſula immediately under the angle of the inner condyle. It is alſo fixed to the capſular ligament of the joint. Winſlow.

This pulls the lower jaw forwards, and makes it ſhoot beyond the upper.

PTEROPHORI, Πτεροφοροι, in *Antiquity*, a name given to ſuch of the Roman couriers as brought tidings of any declaration of war, a battle loſt, or any miſhap befallen the Roman armies.

They were ſo called, becauſe they bore wings on the points of their pikes: from the Greek πτερον, *wing*, and φερω, *I bear*.

PTERYGOPHARYNGÆI, a pair of muſcles ariſing from the proceſſus *pterygoides*, where the tendon of the *pterygoſtaphylinus* is reflected. Some fleſhy fibres of them do likewiſe ariſe from the upper jaw-bone, behind the fartheſt grinder, and ſome from the ſides of the tongue, and os hyoides.

From all theſe places the fleſhy fibres paſs ſemicircularly, and meet with thoſe of the oppoſite ſide in the middle line on the backſide of the pharynx externally.

In the inner ſurface of the fauces is another order of fleſhy fibres, deciſſating each other at acute angles. They ariſe both from the ſides of the uvula, and from the root of the cartilage; and deſcend obliquely to their inſertions in the glandulous membrane of the pharynx.

This muſcle ſerves both to conſtringe the pharynx, and to compreſs the tonſils, and force out the mucus; whence its uſe in hawking.

The various originations of the ſeveral parts of this muſcle have cauſed it to be generally divided into ſeveral muſcles. Thus Valſalva calls that part ſpringing from the tongue, the *gloſſopharyngæus*; that immediately below it, the *hyopharyngæus*. Hence, in like manner, come the *cephalopharyngæus*, *ſphenopharyngæus*, &c.

PTERYGOSTAPHYLINUS, formed from πτερυξ, πτερυγος, and σταφυλη, *uvula*, in *Anatomy*, the internal muſcle of the uvula; called by Valſalva, *uvæ tubæ muſculus*; as being unknown to the ancient anatomiſts.

It ariſes fleſhy near the ſphenoſtaphylinus, from the os petroſum, where the tube from the palate enters that near an acute proceſs of the ſphenoides; and aſcending to the proceſſus *pterygoides*, becomes a broad flat tendon, which expands itſelf on the fore-part of the uvula.

Some of the tendinous fibres aſcend to the lower edge of the os palati, others deſcend down the ſides of the fauces; the middle ſeries either unites with thoſe of the other ſide, or is loſt in two fleſhy bodies that compoſe the uvula.

This muſcle, with its partner, draws the uvula upwards and forwards, and alſo raiſes the amygdalæ.

PTINUS, in the Linnæan ſyſtem of *Natural Hiſtory*, a genus of inſects of the *coleoptera* order; with filiform antennæ and roundiſh thorax, comprehending ſix ſpecies.

PTYLOSIS, πτύλωσις, from πτύλος, in *Medicine*, a perſon who has loſt his eye-laſhes; a baldneſs of the eye-lids. Paulus Ægineta, lib. iii. cap. 22. ſays, the *ptiloſis* and madaroſis, are diſorders of the internal margin of the eye-lids. The madaroſis is the falling off of the hair, produced by a defluxion of acrid humours; whereas in a *ptiloſis*, the margins of the eye-lids become thick and callous; ſo that it is a diſorder complicated of a madaroſis, and a hard lippitude; for which reaſon the remedies proper for the one are alſo conducive to the removal of the other.

PTISAN, Ptisana, πτισάνη, in *Medicine*, a cooling potion uſually made of barley boiled in water, and ſweetened with liquoriee, &c.

To theſe are ſometimes added the roots of quick-graſs, and ſometimes ſena, to render it laxative. Moſt of the decoctions of phyſicians are called *piſans*. Feveriſh patients are prohibited wine, &c. and reduced to *piſans*.

PTOLEMAIC *ſyſtem*, or *hypotheſis*. See System.

Ptolemaic *ſphere*. See Sphere.

PTOLEMAITES, a branch of the ancient Gnoſtics, ſo called from their leader Ptolemy, a man of conſiderable learning, who improved greatly on the ſyſtem of the Gnoſtics his predeceſſors, and inlarged it with a number of notions and viſions of his own.

The *Ptolemaites* were properly a branch of the ſect of the Valentinians, which ſprung up towards the cloſe of the ſecond century, under Ptolemy, who differed in opinion from his maſter Valentine, with reſpect both to the number and nature of the æons.

St. Epiphanius is very full on the ſubject of the *Ptolemaites*, and produces a letter of Ptolemy to Flora, wherein that heretic lays down his doctrine. He maintained, that in the law of Moſes there were three things to be conſidered, inaſmuch as it did not all come from the ſame hand; but part of it, ſaid he, from God, part of it from Moſes, and part of it from neither of them, but from the pure traditions of the ancient doctors: on which laſt part it was that he founded his dreams.

PTOSIS, a diſtemperature of the eyelids, occaſioned by a relaxation or tumor of thoſe parts, the ſame as the Phalangosis. Heiſter.

PTYALAGOGA, formed of πτύαλον, *ſpittle*, and ἀγω, *I draw*, a word uſed by phyſicians to expreſs ſuch medicines as promote a copious diſcharge of the ſaliva, ſuch as pellitory-root, and the like.

PTYALISM, Ptyalismus, Πτυαλισμος, formed from πτύω, *ſpuo*, *exſpuo*, *I ſpit*, in *Medicine*, a *ſpitting*, or a diſcharge of ſaliva by the glands of the mouth; whether it amount to an abſolute ſalivation, or not.

PTYSMA, a word uſed to expreſs whatever is brought up from the lungs by ſpitting.

PTYSMAGOGA, medicines which promote a copious diſcharge by ſpitting.

PUBERTY, Pubertas, in the *Civil Law*, a natural Majority, or the age wherein a perſon is allowed to contract marriage.

Boys arrive at *puberty* at fourteen years of age, maids at twelve. *Full puberty* is accounted at eighteen.

Dr. Kramer obſerves, that all boys at the time of *puberty*, between twelve and fourteen years of age, complain of uneaſineſs at their breaſts, which are ſwelled and itchy, the nipples and areolæ round them inflaming with pain, and ſometimes excoriation and exulceration of ſome of the ſudiferous ducts. The beſt remedy for which, he ſays, is to preſs out the white ſerum then contained in them, after which they cure with a bit of plaſter.

By the law of Scotland, perſons under *puberty*, or under the years of diſcretion, are capable of committing the higher crimes, which being contrary to the law of nature, are obvious. But they are not chargeable with ſmaller offences ariſing from poſitive law or ſtatute.

PUBES, a term uſed for the external parts of the *pudenda*, or parts of generation, in both ſexes.

This, from the age of *puberty*, is ſuppoſed to be covered, more or leſs, with hair; whence the name.

PUBIS *os*, or *Os* Pectinis, in *Anatomy*, a bone of the hip, ſituate in the fore and middle part of the trunk, and making the lower and inner part of the os innominatum. See *Tab. Anat. (Splanch.) fig.* 1 *lit. y. (Oſteol.) fig.* 3. *n.* 18. *fig.* 7. *n.* 19. *fig.* 12. *lit. d.*

It is joined to the other part by a cartilage, thicker, but looſer in women than men; in the former whereof the *os pubis* recedes, or gives a little in time of travail, to make way for the fœtus.

It has a large foramen, which makes room for the paſſage of two muſcles of the thigh, beſides a ſinus, whereby the crural veins and arteries paſs to the thighs. See *Tab. Anat. (Oſteol.) fig.* 3. *lit. S. S.*

The *os pubis*, is the leaſt of the three portions of the oſſa innominata; the two together form the fore-part of the pelvis, and anatomiſts diſtinguiſh in each, the body, the angle, and the branch.

The body of the *os pubis* is its upper part, ſituated tranſverſely before the inferior part of the os ilium. Its poſterior extremity is very thick, and by its union with the oſſa ilium forms the oblique eminence which diſtinguiſhes theſe two portions of the oſſa innominata. It likewiſe contributes to the formation of the cotyloide cavity. Its anterior extremity ends in a ſmall eminence, or tuberoſity, called the *ſpine of the os pubis*, which is ſometimes double. The upper edge has on its inner part an oblique ridge, which may be called the *criſta of the os pubis*, and is continuous with that ridge which diſtinguiſhes the margin and the bottom of the pelvis. Before this criſta is a broad, oblong, and oblique ſlope. The lower edge is obliquely notched, and forms the upper part of the foramen ovale. The angle of the *os pubis* is its anterior portion, and makes part of that connection called the *ſymphyſis* of the *oſſa pubis*. This portion is flat, and not very thick; and in ſome ſubjects toward the upper part of the fore-ſide, near the angular curvature, it has an eminence, which increaſes the ſize and extent of the ſpine already mentioned. The two *oſſa pubis* connected together by this portion, form, on the foreſide, an unequal convexity; but on the backſide a pretty even concavity.

The branch of the *os pubis* is a flat thin apophyſis, which running downwards, unites with the branch of the os iſchium by a cartilaginous ſymphyſis; of which, however, there remain only ſome light marks in adults. It completes the formation of the foramen ovale. The branches of the two *oſſa pubis* form, on the foreſide, a pointed arch; which, however, in a natural ſtate, is much more round than in a dried ſkeleton. Winſlow.

PUBLIC *accounts*. Commiſſioners are to enquire of the accounts of ſheriffs, cuſtomers, and other the king's officers, after having been paſſed in the exchequer, and if detected of any fraud, they ſhall pay treble damages, by ſtat. 6 Hen. IV. cap. 3. And all the lands, tenements, and hereditaments, which any accountant hath, ſhall for the payment of debts to the crown, be liable and put in execution in like manner as if he had ſtood bound by writing obligatory, having the effect of a ſtatute ſtaple, &c. ſtat. 13 Eliz. cap. 4. and there have been ſeveral ſtatutes for taking the *public accounts* of the kingdom, and examining and determining the debts due to the army and navy; alſo corruptions in the management of the king's treaſure, &c. impowering commiſſioners for that purpoſe, who were to give an account of their proceedings to the king and parliament. ſtat. 2 W. & M. 1 Ann. 2 Geo. I. &c.

Public *acts*. See Acts, and Statute.

Public *buildings*. See Building.

Public *notary*. See Notary *public*.

Public *road*. See Road.

Public *verdict*. See Verdict.

PUBLICAN, *publicanus*, among the Romans, a perſon who farmed the impoſts, taxes, and public revenues.

Theſe *publicans* are diſtinguiſhed by Sigonius into three ſorts or degrees, the farmers of the revenues, their partners, and their ſecurities; in which he follows Polybius. Theſe are called the Manciples, Socii, and Prædes, who were all under the the Quæſtores Ærarii, that preſided over the finances at Rome. But there were properly only two ſorts of *publicans*, the Manciples and the Socii. The former called by the Greeks ἀρχιτελῶναι, were much ſuperior to the common *publicans* in dignity, being moſtly of the equeſtrian order; ſo they were generally in their moral character. Cicero mentions them with great reſpect and honour; *ſic*, ſays he, *equitum Romanorum, ornamentum civitatis, firmamentum reipublicæ, publicanorum ordine continetur*. Orat. pro Plancio, apud Opera, vol. v. ſect. 9. p. 544. Olivet edit. He likewiſe calls them *ordinem mihi commendatiſſimum*. Epiſt. Fam. lib. xiii. epiſt. 10. Oper. v. 7. p. 442. epiſt. 9. and epiſt. ad Attic. lib. 1. ep. 17. vol. viii. p. 80.

But as for the common *publicans*, the collectors or receivers, as many of the Socii were, they are ſpoke of with great contempt, by Heathens as well as Jews; and particularly by Theocritus, who ſaid, that among the beaſts of the wilderneſs, bears and lions are the moſt cruel; among the beaſts of the city, the *publican* and parаſite.

The reaſon of this general hatred was, without doubt, their rapine and extortion. For having a ſhare in the farm of the tribute, at a certain rate, they were apt to oppreſs the people with illegal exactions, to raiſe as large a fortune as they could for themſelves. Beſides, *publicans* were particularly odious to the Jews, who looked upon them to be the inſtruments of their ſubjection to the Roman emperors; to which they generally held it ſinful for them to ſubmit. So that paying tribute to the Roman emperor they looked upon to be a virtual acknowledgement of his ſovereignty. This was, therefore, a peculiar grievance, and created an averſion to the collectors, as the inſtruments of illegal oppreſſion, apart from all conſidera-

tion of their rapacious practices. Moreover, the Jews, who accepted the office of *publicans*, were on that account hated of their own nation equally with heathens; and according to the rabbies it was a maxim; a religious man, who becomes a *publican*, is to be driven out of the society of religion.

PUBLICANS was alſo a name given to the ARNOLDISTS and ALBIGENSES.

PUBLICANDIS, *regula de.* See RULE.

PUBLICATION, *publicatio*, the act of *promulgating*, or making a thing known to the world.

By the canons, *publication* is to be made of the bans of marriage three times before the ceremony can be ſolemnized; without eſpecial licence to the contrary. See MARRIAGE.

PUBLICATION, is uſed of depoſitions of witneſſes in a cauſe in chancery, in order to the hearing; and rules may be given to paſs *publication*; which is a power to ſhew the depoſitions openly, and to give out copies of them, &c. There is alſo a *publication* of a will, which is a ſolemnity requiſite to the making thereof, by declaring it to be the laſt will of the teſtator, in the preſence of a number of witneſſes; and a will which hath been made many years, may be new publiſhed, with additions, and that makes it equivalent to a new will. 3 Neſſ. abr. 27.

PUBLICATION *of libels.* See LIBEL.

PUCCOON, *ſanguinaria*, in *Botany*, a genus of the *polyandria monogynia* claſs. Its characters are theſe: the empalement of the flower is compoſed of two oval, concave leaves, which fall away; it hath eight oblong, obtuſe, ſpreading petals, which are alternately narrow; it has many ſingle ſtamina, which are ſhorter than the petals, terminated by ſingle ſummits; and an oblong compreſſed germen, having no ſtyle, crowned by a permanent thick ſtigma, with two channels; the germen becomes an oblong bellied capſule, with two valves, pointed at both ends, incloſing round acute-pointed ſeeds. We have but one ſpecies of this genus, which is a native of the northern parts of America.

The roots of this plant are tuberous, and the whole plant has a yellow juice, with which the Indians paint themſelves.

PUCELAGE, in *Natural Hiſtory*, a name by which ſome authors among the French have called the PORCELAIN-*ſhells*.

PUCELLAGE, *puellagium*, in an ancient manuſcript written PUELLAGIUM, denotes the ſtate of VIRGINITY, or maidenhead.

PUCERON, the name given by naturaliſts to a ſmall inſect of a peculiar nature, frequently found on the young branches of trees and plants, often in ſuch cluſters as wholly to cover them. See *Tab. of Inſects.*

The *puceron* is a ſmall animal, but very numerous in the ſeveral genera and ſpecies; inſomuch, that Reaumur has obſerved that there is ſcarce a vegetable to be found, either in the fields or gardens, that has not its peculiar ſpecies of *puceron* to feed on its juices. Mr. de la Hire, of the Paris Academy, has left many curious particulars in regard to theſe animals in the Memoirs of the year 1703; and Mr. Leewenhoek, and others ſince, have given figures and deſcriptions of ſeveral of the ſpecies.

Pucerons are all viviparous animals, and that after a very ſingular manner. It is to be obſerved, that the name is ſcarce more expreſſive of the creature, than ſome of the others given of late to inſects; that of the polype to a creature which has no legs or feet at all, is very improper; and that of the *puceron* hardly leſs ſo, as it would naturally lead us to imagine, that the creature thus called was able to hop like a flea, whereas, in reality, it is very ſlow in its motions, and ſeldom ſo much as walks.

Theſe creatures have ſix legs, which are extremely ſmall and ſlender; and which, when the animal is at its full growth, are loaded with a weight ſo large, that they ſeem ſcarce able to ſupport it. Some of the ſpecies arrive at a tolerable bigneſs for common obſervation; but the greater number are too ſmall to be accurately ſeen without the aſſiſtance of glaſſes. Among theſe inſects there are great numbers that in their full perfection have wings, and become a ſort of little flies: theſe are diſtinguiſhed from the others by the name of *alated pucerons*.

Thoſe ſpecies which never become winged, have nothing of the appearance of the caterpillar kind; having not long, but ſhort bodies, and much reſembling flies whoſe wings had been taken off. All the ſpecies have antennæ or horns; but theſe in the ſeveral kinds are very different from one another, ſome being very ſhort, and others as remarkably long; and of theſe laſt kinds, ſome carry them ſtraight before the head, as is the uſual cuſtom, and others carry them laid along over their backs; in ſome of theſe the horns are longer than the body. But beſide theſe antennæ, the greater number of theſe creatures have two other horns or ſpines placed in a very ſingular manner behind them, near the tail. They are placed at ſome diſtance at their origin, but they become more diſtant as they go out from the body. Theſe are much thicker and much ſhorter than the antennæ; and there are among the various kinds of them, ſome which actually want them, and others which appear to want them, though they have them in reality; and others have in the places of them certain round ſpots, which ſtand juſt where they ſhould, and ſeem deſtined to perform their functions.

The ſeveral kinds of *pucerons* differ greatly in colour. The greater number of them are green; but many are brown, ſome yellow, and ſome are black. In Auguſt the roſe-trees afford a vaſt number of them of a pale red, and ſome exactly of the colour of the damaſk roſe; in ſome other months of the year we find green ones on the roſe-trees. The ſycamore and ſeveral other plants afford green ones in the ſummer, and red ones in November; and there ſeems no doubt, but that theſe are the ſame individual animals which change colour, the leaves and juices of the plants being not capable of affording them the ſame ſort of nouriſhment at ſome times that they do at others. Some of them alſo are of a duſky colour, and others bright and ſhining, as if varniſhed over. Thoſe of the willow, of the poppy, and ſome other plants, are of a cloth-like appearance, and ſome reſemble velvet; others, as thoſe of the apricot, and of the catch-fly, are ſhining, as if covered with the fineſt lacquer. Some appear of the colour of bronze metal, when it has its higheſt poliſh; ſuch are thoſe of the tanſy, and ſome other plants. The largeſt kind are found on the oak and other trees. The gooſeberry buſh affords a ſpecies that are of the colour of mother of pearl; and in general, the ſkin or covering of thoſe ſpecies which are thus bright and ſhining, is much harder and firmer than that of the others. The more uſual ſpecies are all over of one colour, but there are ſome others which are ſpotted; that of the common wormwood is prettily ſpeckled with black and brown; thoſe of the forrel are green in the middle, and black at each extremity; and there are ſeveral others, as of the willow, &c. that are variegated with theſe two colours.

It is not certain, however, that all the ſpecies are peculiar to the plants that they are found upon; for it has been obſerved, that when a plant of the common wormwood has been full of them, by ſome accident they all have left it to fix themſelves upon plants in the neighbourhood, which had juices of a leſs diſagreeable taſte. Theſe creatures always live in companies; we never find them ſingly on plants, and very ſeldom otherwiſe than in extremely great numbers. In plants they faſten themſelves on every part; but in trees they only ſeize upon the leaves and young ſhoots, and they uſually cover theſe entirely, leaving no part to be ſeen.

The elder is the tree on which they are of all others the moſt plentifully produced, and on which they are obſerved in their ſeveral ſtages with the greateſt accuracy and eaſe. They often cover the thick green roots of this tree for many inches together, and ſometimes for many feet; and they are always placed ſo cloſe together, that they touch in every part, and ſometimes they lie in two beds, one over another. Theſe are of a greeniſh black. If they are obſerved on the branches undiſturbed, they are always found to be perfectly quiet, and ſeem to paſs their whole lives in inaction; but they are all this time doing the moſt neceſſary buſineſs of life, that is, ſucking in their nouriſhment from the juices of the tree. They do this by means of a fine ſlender trunk, which eaſily eſcapes the naked eye; but is always found by the microſcope, and it is by means of this that they pierce the bark of the tender part of the vegetables, and get at their juices. The trunk is uſually of two thirds of the length of the body; but when they are moving on, it is always applied ſo cloſely under the belly, that it is not ſeen.

When there are two ſeries of theſe inſects placed one over another, they are always more looſely placed in the upper ſeries, and theſe are uſually the larger, and the nimbler in all their motions. In this caſe they have no power of ſucking the plant; for beſide that it is cloſe covered with the other ſeries, their trunks are not long enough to reach and penetrate it from the height at which they ſtand above it. Theſe, therefore, are ſuch as have no farther need of nouriſhment, but are employed in propagating their ſpecies.

Mr. Reaumur ſaw them brought forth; and indeed Mr. Leewenhoek long before ſaw, by the help of microſcopes, the young animals perfectly formed, though extremely minute, in the bodies of the full grown females.

They are a ſort of animal which propagates ſo quickly, that uſually there are many females on the ſame leaf or branch of a plant in labour at the ſame time; and their fecundity is ſo great, that when they have once begun to bring forth young ones, they ſeem to continue it inceſſantly

antly for a long time together. They will often bring forth fifteen or twenty ſucceſſively, and if their bodies be a little ſqueezed afterwards, there are forced out of them a vaſt number of others leſs mature.

Theſe little inſects are extremely plentiful on many different trees, and are very eaſily obſerved in their ſeveral ſtages and progreſſions by a curious ſearcher after them; but if at any time they are not ſo eaſily found, the perſon who ſeeks after them may be conducted to them by the ants, which he will find moving in great numbers on the trees and plants where they are, and pointing out the way to them.

Mr. Leewenhoek, Hartſoeker, and others, have obſerved this, and have ſuppoſed that the ants fed on them, by their frequenting the places where they are found; but that is far from being the caſe; the ants, on the contrary, ſeem to love them as friends. We may eaſily find out the reaſon of the ants following the cluſters of *pucerons*, without doing them any injury, when we conſider that the ants love ſugar and all ſweet things, and the places about which the *pucerons* are, have uſually the cavities filled with a thick ſaccharine matter, and this the ants feed upon.

The moſt natural opinion would ſeem, that this was the juice of the tree ſimply extravaſated; but experience ſhews that it has another origin; it is really the excrement of theſe *pucerons*; they receive no ſolid food into their bodies, all that is conveyed into them coming through their trunk, which is an extremely fine pipe; and as none but a very thin and pure juice can be received through ſuch an organ, it is no wonder that the creature, which lives wholly upon it, ſhould void no ſolid excrements. The drops of this liquor are not ſo frequently found on the leaves of plants as might be expected, and that becauſe many of them are immediately devoured by the ants, and many others are dried up by the ſun; but they may always be found collected in ſome quantity in the bladders of the elm, and other trees inhabited by theſe creatures, as there the liquor is defended from the heat of the ſun, and is ſafe from being devoured.

The *puceron*, like moſt other inſects, changes its ſkin three or four times before it arrives at its full growth. Theſe exuviæ perfectly reſemble the animal in its natural ſtate, the legs and other parts being all in their proper places; but whatever is the colour of the ſpecies of *puceron*, theſe ſkins which it caſts are whitiſh.

The male and female *pucerons*, as they are uſually ſuppoſed to be, differ greatly from one another in form, even in their time of growing, but much more eminently at the time of their maturity, the male having then wings, which the females never have. Leewenhoek and others, who have treated of theſe animals, have ſuppoſed that they all became at length little flies, that is, were winged; but this is a great error.

Notwithſtanding, however, the general opinion, that the winged *pucerons* are all males, and the unwinged ones females, it appears that their manner of generation is yet unknown to us. This opinion was founded too haſtily by ſome from a ſuppoſed analogy of theſe and other inſects; but later obſervations prove, that this is not ſtrictly the caſe: for that the winged ones, as well as the others, bring forth young ones. Some have ſuppoſed, that theſe winged and naked *pucerons* were the offspring of different families of ſeveral ſpecies living together; but the contrary is proved by this, that the winged ones are found to produce ſome winged and ſome naked ones; and the naked to produce both kinds in the ſame manner. Some have imagined, that they found the male *pucerons* among the others, obſerving ſome of a ſlatter ſhape, in whoſe bodies there were never found any young ones, as there always were in the others, even when they were very young; but theſe have been ſince found to be only ſuch females as had already brought forth their offspring.

The young *pucerons* being themſelves filled with embryos, and that in every individual, ſo that all that have been ever examined appear mothers, has given many ſtrange ideas of the manner of their generation: many have imagined them all to be hermaphrodites; and as no copulation has ever been obſerved among them, they are by ſome ſuppoſed to be able to impregnate each itſelf. The later opinion, however is, that when a female is once impregnated by a male, ſhe will bring forth young ones already impregnated with others, and thus to the third or fourth ſucceſſion; ſo that copulation is only neceſſary to theſe animals once in three or four generations, and the children and children's children of an old *puceron* that has had congreſs with a male, will bring forth young ones without having ever had any ſuch congreſs. Reaumur's Hiſt. Inſ. vol. vi. p. 9, &c. See Wood-*puceron*, Oak-*puceron*, &c.

PUCERON, *bladder*, a ſort of *puceron* that lives in bladders on the leaves of trees. See PUCERON, *ſupra*.

We often obſerve on the leaves of different trees, a ſort of roundiſh bladders, which only adhere to the leaf by a ſhort pedicle: theſe are a ſort of ſmall galls, and their figure varies much in the different kinds; ſome are leſs round than others, and many are very rough on the ſurface, and ſometimes they are long, terminating in a point, and being broader at the baſe than in any other part, and ſuſtained by no pedicle, but fixed immediately to the leaves.

The elm and aſh afford us more frequent inſtances of theſe than any other trees, and very often on the firſt of theſe they grow to the bigneſs of a nut, and ſometimes much larger; and when they are grown to their full ſize, they often take up the whole ſurface of the leaf. When theſe bladders are opened, they are found to contain a large number of *pucerons*.

If theſe bladders are examined at the time when they are but newly riſen, which uſually is the beginning of June, on opening them there is uſually found in them only one *puceron*, and that always a female big with young; and in others more advanced, the parent inſect is found ſurrounded with different numbers of her young ones. Theſe bladders have all of them at firſt only one female *puceron*; but afterwards they have more, as they become larger; and the largeſt of all are uſually found filled with a prodigious number of young ones. The newly riſen bladders are always found cloſe and firm in every part, the aperture, at which the female *puceron* had entered, being uſually neatly and cloſely ſtopped up. The queſtion is, how this bladder was formed?

The method of the formation of them ſeems to be this: as ſoon as the female *puceron* is produced, ſhe fixes her trunk into the leaf to ſuck its juices; the conſequence of this in all the *pucerons* is, that the ſurface of the leaf ſeparates a little from the nervous part: in the common caſes the creature takes no advantage of this, but only continues ſucking the juices; but in this kind, the female, as ſoon as ſhe has made the ſeparation between the parts of the leaf, gets into the cavity that is formed there, by enlarging the orifice firſt made by the trunk, till it will admit her body. When once in, ſhe works forward in a ſtraight line, and the hole behind her ſoon cloſes up, as there was no rupture, but only a ſtretching open of the parts of the leaf. The female thus finds herſelf in a ſecure place, and the elevation ſhe makes in the leaf is ſcarce perceivable, only appearing as an oblong ſmall ſpecies of gall. The mark of the aperture at which the made her way in is always to be ſeen at ſome diſtance behind her, though uſually very neatly cloſed up: thus the whole continues till the creature produces her young. But then the ſcene is quite altered; the young ones begin to ſuck as ſoon as produced, and as they uſually ſeize upon the ſides of the ſmall gall, already formed for that purpoſe, this derives more juices than otherwiſe would flow into it; and it begins to elevate itſelf much higher, and forms a tubercle of the ſhape of a nut or pear.

Its growth in this caſe is entirely analogous to that of the common galls on the branches of trees, &c. and all the difference in the ſhape of the ſeveral bladders, is owing to the manner of the young *pucerons* ſucking; for if they ſuck much at its baſe, that enlarges and becomes the broadeſt part, as is the caſe in the conic and pointed ones; but if they let this alone, and ſuck only the ſides and upper part, they ſwell while this does not, and conſequently this forms a ſort of pedicle to the growing bladder.

PUCERON, *baſtard*. See Fig-*inſect*, and Gall *of the box*.

PUCERON, *earth*. See Earth.

PUCERON, *grub*. See Grub.

PUCERON-*water*, or *Lion*-PUCERON. See Lion-*puceron*.

PUCERON, *oak*. See Oak.

PUCERON, *ver*. See Ver *puceron*.

PUCERON, *wood*. See Wood.

PUCKAUN *beads*, in *Natural Hiſtory*, a name given by the people of the Eaſt Indies to a peculiar ſpecies of orpiment, which they uſe in medicine.

They find it on the hills and on the banks of rivers. It is prepared by ſeveral tedious proceſſes, and then is given with ſucceſs in a diabetes.

PUDDENING, in a *Ship*, a thick wreath or circle of cordage, tapering from the middle towards the ends, and faſtened about the main-maſt and fore-maſt of a ſhip, to prevent their yards from falling down, when the ropes by which they are uſually ſuſpended are ſhot away in battle. The *puddening* is generally formed in the following manner: a ſmall piece of rope, whoſe length is twice the diameter of the maſt, is ſpliced together at the two ends; and being thus doubled and extended, a thimble is ſeized into each of the extremities. After this a large quantity of PARCELLING is firmly wound about its ſurface in ſuch a manner as to make it gradually larger from the two ends towards the middle. It is afterwards once or twice ſewed with ſpun-yarn throughout the whole length, to bind the parcelling more cloſely, and render it more compact;

compact; and the whole is completed by pointing it on the furface. Being then fitted with a lanard at one of the eyes, it is fixed about the maft by paffing the lanard alternately through both eyes or thimbles on the fore-fide of the maft. Falconer. See DOLPHIN.

Puddenings are alfo ropes nailed to the arms of the main and fore-yards, near the ends, and then at three or four due diftances inwards one from another, in order to keep the robbins from galling or wearing afunder upon the yards, when the top-fail fheets are haled home.

They call alfo thofe ropes which are wound about the rings of anchors, to fave the clinch of the cable from being galled with the iron, by this name; fo that when the ring is fo ferved, it is called the *puddening of the anchor*.

PUDDING-*grafs*, a name by which the *pulegium*, or penny-royal, a fpecies of MINT, is called.

PUDDING-*pipe-tree*, the Engliſh name of a genus of plants, called by botanical writers CASSIA.

PUDDING-*ſtone*. See OCULATUS *lapis*.

PUDENDUM denotes a thing to be aſhamed of. Hence, *pudendum virile*, and *pudendum muliebre*. See GENITAL.

It is remarkable, that among the fifh-tribe, all that are oviparous have no *pudenda*, properly ſpeaking; that is, they have no penis or vulva, unleſs the ovaria of the females, and the vaſculæ ſeminales of the males, may be called by that name.

The viviparous fifh, on the other hand, as the cetaceous fifh in particular, and many kinds of the cartilaginous, have the penis and vulva, diſtinctly and properly ſo called. Artedi Ichthyolog.

PUDENDUM *regale*. See APHRODITA.

PUDIANO, called alſo *pudiano* and by others *vermelho*, *aguamixira*, and *tetamixira*, a fifh of the ſize of a middling pearch, but not ſo broad as that fifh. Its whole body is of a gold yellow; but that the upper part of its head, and its back, to the end of the back-fin, are of a very beautiful purple; the rim or edge of the belly-fin is alſo purple, and the reſt of a gold yellow. It is a wholeſome and well-taſted fifh.

PUDIANO *verde*, in *Ichthyology*, the name of an American fifh of a very remarkable colour, and very well taſted and wholeſome. See *Tab.* IV. *of Fiſh*, N° 40.

It is of an oblong ſhape, and its uſual ſize is about ten fingers long, and three broad in the broadeſt part; for towards the tail it is but about half that breadth.

PUDICA *planta*. See SENSITIVE *plant*.

PUERI *alimentarii*. See ALIMENTARII.

PUERILE *ſtyle*. See STYLE.

PUERILITY, in *Diſcourſe*, is by Longinus defined to be a thought, which, by being too far fetched, becomes flat and inſipid. *Puerilities*, he adds, is the common fault of thoſe who affect to ſay nothing but what is brilliant and extraordinary.

PUERITIA, or *childhood*, in the *Civil Law*, denotes the age of minors from ſeven to fourteen, which was divided into two equal parts; from ſeven to ten and a half, which was *ætas infantiæ proxima*; and from ten and a half to fourteen, which was *ætas puberati proxima*; during which ſtage they were puniſhable, if found to be *doli capaces*, or capable of miſchief; but with many mitigations, and not with the utmoſt rigour of the law.

PUERORUM *epiſcopus*. See EPISCOPUS.

PUERPERAL (from *puer*, *child*, and *pario*, *I bear*) *fever*. See FEVER.

PUFF-*ball*, the common Engliſh name for the *fungus pulveris lenius*, or lycoperdon; the characters of which are theſe: the whole plant, while young, is of the fleſhy ſubſtance of the muſhrooms, and of a roundiſh figure; but when ripe, it becomes hollow, and full of an extremely ſubtile powder.

The ſpecies of lycoperdon, enumerated by Mr. Tournefort, are twenty-ſeven, and by Linnæus eleven.

The duſt contained within this body (which, when it is cruſhed, flies out in an inconceivably fine powder, in form of a cloud of ſmoak) when examined by the microſcope, appears to be a multitude of regularly figured, though extremely ſmall bodies. Theſe require the moſt powerful magnifiers to diſtinguiſh them, and are found to be little globules of an orange colour, and ſomewhat tranſparent; and ſo ſmall, that the cube of the diameter of a hair would be equal to a hundred and twenty-five thouſand of them. In other ſpecies of this muſhroom, the globules are evidently ſeen to be ſo many *puff-balls*, being of a darker colour, and having each a little ſtalk or tail; by means of theſe ſtalks they penetrate into the ground, when ſhed from their parent plant.

The duſt of theſe muſhrooms is very hurtful to the eyes, and we have had inſtances of perſons being blinded for a long time by it, with violent pain, ſwelling, and inflammation; and this is probably owing to the ſharpneſs of theſe almoſt inconceivably minute ſtalks or tails. Baker's Microſcope, *p.* 255.

PUFFIN, in *Ornithology*, a name by which ſome call the anas arctica Cluſii, or the northern duck, or *alca arctica* of Linnæus.

This bird weighs about twelve ounces; its length is twelve inches, and the breadth from tip to tip of the wings extended, twenty-one inches; the bill is thort, broad at the baſe, compreſſed on the ſides, and running up to a ridge, triangular, and ending in a ſharp point; the baſe of the upper mandible is ſtrengthened with a white, narrow, prominent rim, full of ſmall holes; the bill near the head is of a bluiſh grey, and the lower part red; in the former is one tranſverſe furrow, in the latter three furrows; and the ſize of the bill varies in different birds; the noſtrils are long and narrow; the irides are grey, and the edges of the eye-lids of a fine crimſon; on the upper eye-lid is a ſingular callous ſubſtance, grey, and of a triangular form; on the lower is another of an oblong form; the crown of the head, whole upper part of the body, tail and covert feathers of the wing, are black; the quill-feathers are of a duſky hue; the cheeks are white, and full of feathers; the chin of the ſame colour, bounded on each ſide by a broad bed of grey; from the corner of each eye is a ſmall ſeparation of the feathers, terminating at the back of the head; the neck is encircled with a broad collar of black, but the whole lower part of the body is white; the tail is compoſed of ſixteen feathers, and black; the legs ſmall, of an orange colour, and placed ſo far behind as to render it incapable of ſtanding otherwiſe than in an erect poſition, reſting not only on the foot but the whole length of the leg, which circumſtance makes the riſe of the *puffin* from the ground very difficult; but when it gets on the wing, few birds fly longer or ſtronger.

Theſe birds frequent the coaſts of ſeveral parts of Great Britain and Ireland, but are moſt numerous in Prieſtholm iſle, off the coaſt of Angleſea. They are birds of paſſage, reſorting there annually about the fifth or tenth of April; quit the place, and return twice or thrice before they ſettle, to burrow, and prepare for ovation and incubation. They begin to burrow the firſt week in May; but ſome diſlodge the rabbits, and make uſe of their holes. The taſk of burrowing falls chiefly to the males, which alſo aſſiſt in incubation. The firſt young are hatched in the beginning of July, to which the old ones diſcover a very ſtrong affection, which ceaſes at the ſtated time of migration, taking place punctually about the eleventh of Auguſt, when they leave ſuch young as cannot fly to the mercy of the peregrine falcon. They lay only one egg, and the eggs are of very different forms. The fleſh of theſe birds is exceeding rank, as they feed on weeds and fiſh, eſpecially ſprats; but when pickled and preſerved in ſpices, they are admired by thoſe who love high eating. Dr. Caius tells us, that in his time the church allowed them in Lent inſtead of fiſh. They are taken by digging them out, or drawing them from their burrows with a hooked ſtick. Their noiſe, when taken, is very diſagreeable, being like the effort of a dumb perſon to ſpeak. The winter reſidence of this genus is but imperfectly known; it is probable they live at ſea, in ſome more temperate climate, remote from land, forming thoſe multitudes of birds which navigators obſerve in many parts of the ocean; they are always found there at certain ſeaſons, retiring only at breeding time; repairing to the northern latitudes; and during that period are found as near the pole as navigators have penetrated. Pennant.

PUFFIN, *Manks*. See SHEAR-*water*.

PUFFINET, in *Ornithology*, the name of a bird known among authors by that of the *columba Groenlandica*, or the Greenland or ſea turtle-dove.

It is common on the northern coaſts, and is black all over, except two ſmall ſpots on its head; but it is pretended by ſome, that in winter it turns white.

PUGIL, from *pugillus*, *little hand*, among *Phyſicians*, &c. a meaſure of flowers, ſeeds, or the like matters, containing ſo much as may be taken up between the thumb and two fore-fingers.

The *pugil* is eſteemed the eighth part of the MANIPULE or handful; though ſome confound *pugil* with *manipulus*, and uſe it for a handful. The French frequently call it *pincée*, a *pinch*.

PUGNAX *avis*, in *Ornithology*, the name of the bird called in Engliſh the RUFFE, and the female of which is the *reeve*. It has its Latin name from its quarrelſome diſpoſition, the males being always fighting.

PUGNITIUS. See STICKLE-*back*.

PUGNITIUS *longus*, in *Ichthyology*, the name of a Weſt Indian ſea-fiſh, caught about Chili and in ſome other places, and approaching in many particulars to the European *pugnitii*.

It is a ſmall animal; its body is ſquare, and of a tender conſtruction; of the thickneſs of a finger, and of five, ſix, or ſeven inches long, becoming gradually ſmaller towards

wards the tail; its skin is smooth, and its back is black; its belly yellow; its head resembles that of the pike, but that the nose is somewhat longer; it has two fins at the gills, one of a triangular shape on the back; and from this to the neck there is placed a row of fifteen prickles, which bend a little backward, and are not connected by a membrane. On the middle of the belly it has also two spines at the two sides, and one behind the anus; behind this there is a fin answering to that on the back, and the body is terminated by a fine small tail.

PUIS *darrein continuance*, q. d. since the last adjournment, in *Law*, a plea which the defendant may plead even after issue or demurrer joined, when some new matter arises, at the day given for his next appearance. Pleas of this kind, when brought to a demurrer in law, or issue of fact, shall be determined in like manner as other pleas.

PUISNE, *puny*, in *Law*, a younger-born; or a child born after another.

The word is French, in which language it bears the same signification.

Puisne is not only applied to the second, third, fourth, &c. with regard to the first; but to the third with regard to the second, &c. The last of all is called absolutely *cadet*.

In the like sense we say a *puisne judge*, a *puisne counsellor*. Three of the judges of the court of common pleas are called *puisne* justices; and also three of the BARONS of the court of exchequer are distinguished by the same appellation.

PUKING, a cant word for a NAUSEA, or disposition to vomit. See VOMITING.

PUL, in *Commerce*, a general name which the Persians give to all the copper monies current in that empire.

Olearius, who was at Ispahan in 1637, in the retinue of the ambassador of Holstein, assures us, that each city in Persia has its several copper money, marked with its particular badge, which is only current in that district, and is changed every year. At the beginning of each year, which is at the vernal equinox, all the old money is cried down, and the new appears in its place.

Both the emperor and the state find their interest in this frequent change: the first, in that he only gives at the rate of 17*d.* sterling per pound for copper; yet delivers it out coined in *babeiqui* and *demi-babeiqui*, at about 2*s.* per pound: the second, in that the copper money is by this means less abundant, being reduced each year to nearly the same quantity.

PULCHER *piscis*, in *Ichthyology*, a name given by Gaza to the fish commonly known by the name of the *uranoscope*, or star-gazer. See URANOSCOPUS.

It is a species of the trachinus, and distinguished by Artedi by the name of the *trachinus* with many beards on the lower jaw.

PULEGIUM, in *Botany*. See PENNY-*royal*.

PULEX. See FLEA.

PULEX *aquaticus*. See *Water* BEETLE, and MILLEPEDES.

PULEX-*roters*, a name given by naturalists to a sort of worms frequently found on the leaves of trees, where they devour the animals called *pulices arborei*.

Of these there are several species, which owe their origin to the eggs of different creatures; for they are none of them in their ultimate state in this their time of feeding. According to the different animals whose eggs they are hatched from, these are of different form and structure: some are hexapodes, or endued with six feet; these belong to the beetle tribe, and finally change into beetles like the parent animals from whose eggs they sprung; others have no legs, and are produced from the eggs of flies of various kinds: and finally, others are genuine caterpillars, though small; but these are the most rare of all. The two general kinds are the hexapodes or beetle-worms, and the apodes, or fly-worms. The fly which gives origin to the last of these is a four-winged one, and takes care always to deposit her eggs in a place where there are plenty of the *pulices*, usually on the stalk or young branches of a tree in the midst of large families of them. The worm, as soon as hatched, finds itself in the midst of abundance of food, preying at pleasure on these animals, which are wholly defenceless. The stalk of the elder and woodbine are frequently found covered over with these *pulices*, and among them there may usually be found one or more of these destroyers feeding at will, sucking in the juices from their bodies, and then throwing away the dry skins. Besides the worms of this four-winged fly, there is one of a two-winged wasp-fly, very destructive of these animals. Reaumur's Hist. Ins. tom. i.

PULEX-*arborum*, in *Natural History*, the name given by Mr. Reaumur to a very large genus of small animals. They are a kind of half-winged creatures; they have geniculated antennæ, and some of them, in their most perfect state, have complete wings. These are distinguished from the others by the name of *marina pulex*, or the *winged pulex*.

The several species of these creatures are of different colours; some are brown, others yellow; but the most frequent are green. They all feed upon the leaves of trees, which become withered and curled up on their eroding them; and they are so common, that wherever a leaf of a tree is found curled up, or of a different form from the others, it is highly probable these animals are on it, or that it is their work. Among trees the willow and the rose are the most infected by them; and among plants, the bean and the poppy. They live a social life, multitudes of males and females being found together. The females are easily distinguished from the males, by their being thicker in the body, and having larger bellies.

It is very wonderful, that of all the known animals of the winged kind, these are the only ones which are viviparous. This is easily seen beyond a possibility of doubt; for, on examining a cluster of them together, it is a common thing to see, by the help of a small magnifier, a female in the act of parturition; and the author of this account frequently saw the young *pulex* protruded out, from a passage near the anus of the female, perfectly formed. He had suspected this from the total want of eggs among so numerous a tribe of animals, and from their remarkably speedy propagation, and was thus convinced of it by ocular demonstration. Reaumur's Hist. Insects, tom. i.

PULLEY, in *Mechanics*, one of the five MECHANICAL *powers*; consisting of a little wheel, or rundle, having a channel around it, and turning on an axis; serving, by means of a rope which slides in its channel, for the raising of weights.

The Latins call it *trochlea*; and the seamen, when fitted with a rope, a *tackle*. An assemblage of several *pulleys* is called a system of *pulleys*, or POLYSPASTON: some of which are in a block or case, which is fixed; and others in a block which is moveable, and rises with the weight. The moveable wheel or rundle, is called the *sheave* or *shiver*; the axis on which it turns, the *gudgeon*; and the fixed piece of wood or iron, into which it is put, the *block*.

Doctrine of the PULLEY. 1. If the equal weights W and P (*Tab.* VI. *Mechanics*, *fig.* 100.) hang by the cord BB upon the *pulley* A, whose block *b* is fixed to the beam HI, they will counterpoise each other, just in the same manner as if the cord were cut in the middle, and its two ends hung upon the hooks fixed in the *pulley* at A and A, equally distant from its centre. See MECHANICAL *powers*.

Hence, a single *pulley*, if the lines of direction of the power and the weight be tangents to the periphery, neither assists nor impedes the power, but only changes its direction.

The use of the *pulley*, therefore, is when the vertical direction of a power is to be changed into an horizontal one; or an ascending direction into a descending one; and on the contrary.

This is found a good provision for the safety of the workmen employed in drawing with the *pulley*.

This change of direction by means of a *pulley* has this farther advantage; that if any power can exert more force in one direction than another, we are here able to employ it in its greatest force.

Thus, e. gr. a horse cannot draw in a vertical direction, but draws with all its advantage in a horizontal one. By changing the vertical draught, therefore, into a horizontal one, a horse becomes qualified to raise a weight.

But the grand use of the *pulley* is, where several of them are combined; thus forming what Vitruvius, and others after him, call *polyspasta*, the advantages whereof are, that the machine takes up but little room, is easily removed, and raises a very great weight with a moderate force.

2. If a weight W hangs at the lower end of the moveable block *p* of the *pulley* D (*fig.* 100.), and the cord GF goes under the *pulley*, it is plain that the half G of the cord bears one half of the weight W, and the half F the other; for they bear the whole between them. Therefore, whatever holds the upper end of either rope, sustains one half of the weight; and if the cord at F be drawn up so as to raise the *pulley* D to C, the cord will then be extended to its whole length, except that part which goes under the *pulley*; and consequently, the power that draws the cord will have moved twice as far as the *pulley* D with its weight W rises; on which account, a power whose intensity is equal to one half of the weight, will be able to support it, because if the power moves (by means of a small addition) its velocity will be double the velocity of the weight; as may be seen by putting the cord over the fixed *pulley* C (which only changes the direction of the power, without giving any advantage to it) and hanging

on the weight P, which is equal only to one half of the weight W; in which case there will be an equilibrium, and a little addition to P will cause it to descend, and raise W through a space equal to one half of that through which P descends. Hence, the advantage gained will be always equal to twice the number of *pulleys* in the moveable or undermost block. So that, when the upper or fixed block *a* contains two *pulleys*, which only turn on their axes, and the lower or moveable block U contains two *pulleys*, which not only turn upon their axes, but also rise with the block and weight, the advantage gained by this is as four to the working power. Thus, if one end of the rope KMOQ be fixed to a hook at I, and the rope passes over the *pulleys* N and R, and under the *pulleys* L and P, and has a weight T of one pound hung to its other end at T, this weight will balance and support a weight W of four pounds, hanging by a hook at the moveable block U, allowing the said block as a part of the weight. And if as much more power be added, as is sufficient to overcome the friction of the *pulleys*, the power will descend with four times as much velocity as the weight rises, and consequently through four times as much space. The two *pulleys* in the fixed block X, and the two in the moveable block Y, are in the same case with those last mentioned; and those in the lower block give the same advantage to the power. See POLYSPASTON.

It is necessary to observe, that if the lower *pulleys* do not rise all together in one block with the weight, as in the cases just recited, but act upon one another, and the weight is only fastened to the lowest of them, the force of the power is very much increased, each *pulley* doubling it. E. g. A power whose intensity is equal to 8lb. applied at *a* (*fig.* 151.) will, by means of the lower *pulley* A, sustain 16lb.; a power equal to 4lb. at *b*, will, by means of a lower *pulley* B, sustain the power of 8lb. acting at *a*; a third power equal to 2lb. at *c*, will, by means of the *pulley* C, sustain the power of 4lb. at *b*; a fourth power of 1lb. at *d*, will, by means of the *pulley* D, sustain the power of 2lb. at *c*; and this is not altered by having its rope carried over the upper *pulley* or roller E. In the former cases, the force of the power is augmented in an arithmetical proportion of the number of ropes or *pulleys*; but in this, in a geometrical proportion.

3. If a power move a weight by means of several *pulleys*, the space passed over by the power will be to the space passed over by the weight, as the weight to the power. Hence, the smaller the force that sustains a weight by means of *pulleys* is, the slower is the weight raised: so that what is saved in force, is spent in time.

The common methods of arranging *pulleys* in their blocks, may be reduced to two. The first consists in placing them one by the side of another, upon the same pin; the other, in placing them directly under one another, upon separate pins. Each of these methods is liable to inconvenience. Mr. Smeaton, in order to avoid the impediments to which these combinations are subject, proposes to combine these two methods in one. Accordingly, the *pulleys* are placed in each block in two tiers; several being upon the same pin, as in the first method, and every one having another under it, as in the second; and so that, when the tackle is in use, the two tiers that are the remotest from one another, are so much larger in diameter than those that are nearest, as to allow the lines of the former to go over the lines of the latter without rubbing. From this construction arises a new method of reeving the line upon the sheaves; for here, whatever be the number of sheaves, the fall of the tackle will be always upon the middle sheave, or on that next to the middle, according as the number of *pulleys* in each pin is odd, or even. To do this, the line is fixed to some convenient part of the upper block, and brought round the middle sheave of the larger tier of the under block, from thence round one of the same sort next to the centre one of the upper block, and so on, till the line comes to the outside sheave, where the last line of the larger tier falls upon the first sheave of the smaller, and being reeved round those, till it comes at the opposite side, the line from the last sheave of the smaller tier again rises to the first of the larger, whence it is conducted round, till it ends on the middle sheave of the upper block on the larger tier. See *Tab.* VI. *Mechanics*, *fig.* 102. Phil. Trans. vol. xlvii. art. 82. p. 494, &c.

As a system of *pulleys* has no great weight, and lies in a small compass, it is easily carried about, and can be applied, in a great many cases, for raising weights, where other engines cannot be used. But they have a great deal of friction on these accounts; 1. because the diameters of their axes bear a very considerable proportion to their own diameters; 2. because in working they are apt to rub against one another, or against the sides of the block; 3. because of the stiffness of the rope that goes over and under them. Ferguson's Mechan. p. 37, 40.

PULLING, in *Sea Language*, denotes the act of rowing with the oars.

PULMO, in *Anatomy*. See LUNGS.

PULMO *marinus*, *sea-lungs*, among *Naturalists*, a light spongious body, of a shining colour, like crystal, intermixed with blue, and usually of a figure resembling the human lungs; whence its name. It is also called URTICA *marina*, or the sea-nettle.

It swims on the surface of the water, and is popularly reputed to presage a storm. It is commonly supposed to be only a viscous excrement of the sea, hardened by the sun; but Sir Robert Sibbald and Dr. Merret rank it among the zoophytes. It shines in the night time, and communicates an luminous property to a stick rubbed therewith. Being applied to the skin, it raises an itching, and takes off the hair.

PULMONARIA, in *Botany*. See LUNG-*wort*.

PULMONARY *vessels*, in *Anatomy*, are those which carry the blood from the heart to the lungs, and back again from the lungs to the heart.

These are two in number; viz. the *pulmonary artery* and *vein*.

The PULMONARY *artery*, which the ancients called *vena arteriosa*, the *arterial vein*, is, in reality, an artery, and is composed, like the rest, of several tunics. It arises from the right ventricle of the heart, and divides into two large branches; which, subdividing into several smaller, diffuse themselves throughout the whole substance of the lungs. See *Tab. Anat. (Angeiol.) fig.* 8. *lit. dd, &c. bb. fig.* 12. *lit. I.*

PULMONARY *vein*, which the ancients called *arteria venosa*, the *venous artery*, consists of four membranes like the other veins. It arises in the lungs from an infinity of little branches; which, uniting in one trunk, open into the left ventricle of the heart. See *Tab. Anat. (Angeiol.) fig.* 9. *lit. a. b. c. d. d. d.* See also HEART.

For the office of these vessels, see CIRCULATION.

Mr. Cowper gives us an instance of a POLYPUS in the *pulmonary vein*.

PULMONARY *consumption*, or consumption of the lungs, is what we properly call a PHTHISIS. See CONSUMPTION.

PULMONES *marinæ*. See URTICA *marina*.

PULMONIC *machine*, is a machine contrived for drawing fresh air, or medicated steams, into the lungs or throat, &c. Some have recommended for this purpose an inverted funnel: others have contrived machines for infusing herbs, &c. and annexed to them tubes for inspiring the steam or volatile parts thus obtained for them. A machine of this kind was contrived some years ago by Mr. Arden of Derby, which is described in the Gentleman's Magazine for 1748, vol. xviii. p. 486. A machine of this kind was contrived by Dr. Hales, for meliorating the air passing through the lungs of miners, &c. and is described in his Vegetable Statics, vol. i. p. 264, &c. An instrument designed for similar purposes, and called an inhaler, was lately invented by Mr. Mudge.

PULMONUM *anima*. See ANIMA.

PULP, *pulpa*, in fruits, the *flesh*; or that soft and succulent part between the rind and the nucleus or seed.

The *pulp* of a tree or plant, is the PARENCHYMA, which grows and swells by means of a juice, at first very coarse and disagreeable; at length sweeter, and more delicate.

PULP, in *Pharmacy*, denotes the soft part of fruits, roots, or other bodies, extracted by infusion or boiling, and passed through a sieve.

PULP, in *Medicine*, denotes the fattest, fullest, and most solid part of the flesh.

Some people apply the word particularly to the upper part of the belly, because fleshy; and because it is here that they feel animals, to examine whether they be fat.

This part the Latins call *pulpa*, from *palpare*, *to feel, handle*.

PULPIT, *pulpitum*, a term now restrained to an elevation, or apartment in a church, whence sermons are delivered.

Some authors derive the word from *publicum*, because people are there exposed to open view.

PULPITUM, among the *Romans*, was a part of the theatre, called also PROSCENIUM, or what we now call the *stage*, whereon the actors trod.

Though some say it was properly an eminence on the stage for the music, or a suggestum whence declamations, &c. were spoken.

The French use the word *pulpit*, *pupitre*, for a reading-desk in a church, library, or the like: those large ones in churches they properly call *lutrins*.

PULSATILLA, in *Botany*. See CAMPANA FLORE.

PULSATION, *pulsatio*, in *Medicine*, the motion of the PULSE, or the beating of an artery.

PULSATOR, a name given by some writers to that species of beetle, commonly known among us by the name of the DEATH-*watch*, and about which so many superstitious fancies prevail.

PULSE, *pulsus*, in the *Animal Oeconomy*, denotes the beating or throbbing of the heart and arteries.

The *pulse* is that reciprocal motion of the heart and arteries, whereby the warm blood, thrown out of the left ventricle of the heart, is so impelled into the arteries, to be by them distributed throughout the body, as to be perceivable by the finger.

The pulsation of the arteries arises from that of the heart; and has, like it, a systole and diastole; the systole of the one corresponding to the diastole of the other.

Galen tells us, that Hippocrates was the first who observed the motion of the *pulse*. M. Homberg mentions a case of a woman in Paris, who had a *pulse* in the veins, perfectly like that we commonly observe in the arteries. He adds, that he is the first author that ever mentioned such a thing.

The *pulse* is thus accounted for. When the left ventricle of the heart contracts, and throws its blood into the great artery; the blood in that artery is not only thrust forwards towards the extremities, but the channel of the artery is likewise dilated; because fluids, when they are pressed, press again towards all sides, and their pressure is always perpendicular to the sides of the containing vessels: but the coats of the artery, by any small impetus, may be distended; therefore, upon the contraction of the heart, the blood from the left ventricle will not only press the blood in the artery forwards, but both together will distend the sides of the artery: and thus is a motion of dilatation effected.

And when the impetus of the blood against the sides of the artery ceases, that is, when the left ventricle ceases to contract, then the spiral fibres of the artery, by their natural elasticity, return again to their former state, and contract the channel of the artery, till it is again dilated by the systole of the heart: so that here is a motion of dilatation and contraction effected.

The diastole or dilatation of the artery is called its *pulse*; and the time of the spiral fibres returning to their natural state, is the distance between two *pulses*.

This *pulse* is in all the arteries of the body at the same time: for while the blood is thrust out of the heart into the aorta, that artery being full, the blood must be propelled in all the arteries at the same time; and because the arteries are conical, and the blood moves from the basis of the cone to the apex, therefore the blood is continually pressing against the sides of the vessels; and consequently, every point of the artery must be dilated, at the same time that the blood is thrown out of the left ventricle of the heart; and as soon as the elasticity of the spiral fibres can overcome the impetus of the blood, the arteries are again contracted.

Thus, two causes operating alternately, the heart and fibres of the arteries, keep the blood in a continual motion.

The observation of the pulse has been deemed of the utmost importance to a physician; both as it discovers the state of the heart, the first mover in the animal frame; and as it shews the nature, quantity, and motion of the blood, that universal humour, whereon all the rest depend; and as it indicates the condition of the artery, the primary vessel of the whole body.

However Celsus calls the *pulse*, *res fallaciſſima*: and as the variety of *pulses* with regard to their being quick or slow, is owing to the different degrees of irritability in different constitutions, every accident that happens to the body, and every affection of the mind have an influence upon them, so that the conclusions deduced from the state of the *pulse*, separately considered, are often very insufficient and erroneous.

It is certain that the climate will alter the *pulse* of persons, and on this is founded the observation of *pulses* being naturally various in the people of different nations.

The *pulses* of Frenchmen are said to be more equal and quick, and those of the British, Dutch, and Germans, more irregular and uncertain; and this is to be jointly attributed to the air of the country, and to the manner of living.

In general, the higher and nearer the sun is, the quicker is the *pulse*; and the lower and farther off, the slower. In rainy seasons, the *pulse* is more free and quick, because of the smaller pressure of the atmosphere. It is more impetuous in the spring; more equal after a quiet sleep; weak and uncertain in men very intent upon business. Melancholy renders the *pulse* extremely inconstant, probably through the great thoughtfulness of such men: in bilious tempers it is high and strong; in sanguine, more equal and regular than in any: in the phlegmatic, equal enough, but more slow: in children, especially infants, the *pulse* is very small; and in old men it is extremely uncertain: in gluttonous people it is dull and slow, unless by drinking it is made stumbling and vertiginous: this sort of *pulse* also frequently foretells sudden death. By too sparing a diet it becomes small and slow, and always abates upon fasting. By the passions the *pulse* may be also greatly altered; but most of all by fear, joy, and anger. In fevers the *pulse* is varied according to the beginning, height, and declination. In hysterick and hysteric persons it is very uncertain: in hydropical persons it is much stopped and interrupted by flegmatic humours: in the gout it is free and expedite: in the plague, as in the asthma, it is mightily oppressed, unless freed by the hot fit. In general, any variation of the *pulse* certainly denotes some alteration in the habit of the body.

The *pulse* is unequal either in regard to time or strength; that is, it either strikes quicker and slower, or stronger and weaker.

The first is common in most acute distempers, and does not threaten any immediate danger; but the latter, both in acute and chronic cases, is always a dangerous symptom; very often it is the forerunner of death, which happens two or three days after this is first observed. It is said to be interrupted when the strokes are much smaller and weaker than at other times, or their intervals much greater. This first shews a great decay of strength; and the latter, which is, as it were, a cessation for a time, denotes approaching palsies, apoplexies, and the like terrible distempers, and sometimes death itself.

The intense *pulse* is when the stroke is very hard, the parts being, as it were, upon the beat; or else this strength is made up by the multiplicity and frequency of less pulsations, as in the height of acute fevers.

The remiss *pulse* has strokes less quick and strong, and in sickness shews more danger than the other. The superficial *pulse* shews an exact temperament of body, as also a free and easy temper of mind.

The deep *pulse* shews a disposition to melancholy, asthmas, and lethargies, and is more frequent in aged than in young people.

The leaping *pulse* often shews no great danger; but the trembling *pulse* is usually a fatal symptom, after which very few people recover.

But of all others the wandering *pulse* is the most terrible and fatal; this is felt sometimes in one part of the artery, and sometimes in another, and sometimes in no part at all. This is a certain fore-runner of death, and that usually very speedily following; and if great power in nature gives a short reprieve after this, it is only a very short relief. Abercomb. de Variat. Pulsus.

The *pulse* has been observed to beat faster in persons electrified. Phil. Trans. N° 478. p. 59.

A strong PULSE denotes, 1. A great muscular force of the contracting heart; and, consequently, the strength of the contracting cause; i. e. 2. A brisk and copious influx of the nervous juice into the villi of the heart. 3. Plenty of blood. 4. A laudable secretion and circulation of humours.

A strong *pulse*, therefore, is a good presage, if it be alike throughout the whole body. Indeed it is frequently fallacious in apoplectic, and some other diseases, where the passage between the heart and the brain is free; and when other parts, especially the viscera, are obstructed.

A weak PULSE denotes the contrary of the former; though this sometimes deceives, particularly in fat people.

A hard PULSE signifies, 1. That the membrane of the artery is drier than ordinary: and therefore, 2. Obstructions in the minute vesicles, whereof the membranes of the artery are woven. 3. That the arteries are full: but, 4. That their capillary extremities are obstructed with an inflammatory viscidity. 5. That the blood is very dense and compact: hence, 6. That the circulations, secretion, and excretions are depraved.

A soft PULSE denotes the contrary to all these; yet is very fallacious in an acute peripneumonia.

A slow PULSE denotes, 1. That the contractions of the heart are slow; and therefore, 2. A slowness of the influxes of the nervous juice from the brain into the villi of the heart. 3. That the blood has circulated a great number of times. 4. That all the humours circulate easily through their vessels. Indeed, if the *pulse* be thus from weakness, it is an *ill* sign.

A quick PULSE denotes the contrary to all these; as acrimonies, spirits agitated, fevers, and phrensy.

An equable PULSE denotes a constant tenor of the vital functions; an uneven one, the contrary.

An intermitting PULSE shews life in a slippery situation.

An intermitting *pulse* is either owing to a fault in the nervous juice, which flows unequally into the heart; or in the vessel which transmits the blood and humours; or to the humours themselves.

The cause of this disorder is various, as convulsions, polypuses,

lypuſes, cacochymias, inflammations, want of blood, bony or cartilaginous arteries, &c. See INTERMITTENT.

A ſtrong, equable, and, at the ſame time, ſlow *pulſe*, is of all others the beſt. A ſtrong and great, or ſtrong and ſlow *pulſe*, together, are good. A weak, ſmall, hard, unequal, intermitting, quick *pulſe*, is of all others the worſt.

Yet, in all theſe things, regard muſt be had to the nature of the particular artery, the age, ſex, temperament, affections of the mind, the ſix non-naturals, habit of body, ſeaſon, country, &c. all which have an influence on the *pulſe*.

Schwalbius of Prague contented himſelf with three *pulſes*, viz. the equal and unequal, the quick and ſlow, and the ſtrong and weak. Sylvius reduces *pulſes* to three kinds, viz. the ſtrong and weak, the large and ſmall, and the quick and ſlow. The full and ſmall *pulſes* are owing chiefly to the different diameters of the arteries; and except the quick, the ſlow, and the irregular *pulſes*, there are none of the kinds ſo accurately diſtinguiſhed, as not in many caſes to be found fallacious. It is obſerved, that there are adults in health, whoſe *pulſe* does not exceed 30 or 40 ſtrokes in a minute; and that others, while at reſt, have a *pulſe* ſo quick, that it may be counted to 120; and during the preſence of a fever, the *pulſe* hath been obſerved, in ſome inſtances, to beat 220 times in this ſhort period. Dr. Heberden (Lond. Med. Tranſ. vol. ii. p. 18, &c.) has given us ſome obſervations on the *pulſe*, which ſhew how little it is to be depended upon, without the concurrence of other ſymptoms; in how few caſes an attention to the *pulſe* is of real importance; and how groundleſs are the various diſtinctions of *pulſes*. Thoſe moſt to be regarded, are the quick and ſlow *pulſes*. To this writer we are indebted for the following obſervations on this ſubject. The *pulſe* of a child under two years old ſhould be felt whilſt it is aſleep, becauſe it is ſo eaſily quickened by every new ſenſation. The *pulſe* of a healthy infant on the day of its birth, and when it is aſleep, is between 130 and 140 in a minute; the mean rate during the firſt month is 120, and rarely, if ever, below 108. During the firſt year, the limits may be from 108 to 120; the ſecond year, at 90 and 100; the third year, at 80 and 108; the fourth, fifth, and ſixth, nearly the ſame as the third; the ſeventh year it is ſometimes at 72, but generally more; the twelfth, about 70. In adults, it is uſually from a little below 60 to a little above 80.

A full meal quickens the *pulſe* to about 10 or 12 in a minute more than its number of pulſations was before the advantage of refreſhment.

If the *pulſe* is quickened, ſo as to exceed the healthy ſtandard by ten pulſations in a minute, there is ſome diſorder; but the irritability of a child is ſuch, that a very ſlight fever will make the artery beat 140, or even 160, when no danger attends: and as there is much difficulty in counting the *pulſe*, when it is at 180 and upwards, we are better enabled to judge of the danger of fevers in children by the thirſt, quickneſs of breathing, averſion to food, and want of ſleep, than by the *pulſe*.

A child of two years old will die of an inflammatory fever, though the artery beats only 144 in a minute; yet children of four years ſometimes recover from fevers, when the *pulſe* is at 156.

If the *pulſe* of a child be 15 or 20 below the healthy ſtandard at its loweſt limits, and there be at the ſame time the ſigns of conſiderable illneſs, it is a certain indication that the brain is affected, conſequently ſuch a quiet *pulſe* ſhould alarm us with the probability of danger.

In adults labouring under an inflammatory fever, the danger is generally not very great, where the beats are fewer than one hundred. A hundred and twenty ſhew the beginning of danger; and they ſeldom exceed this number, unattended with deliriouſneſs, and where the caſe does not prove fatal. To this there are two exceptions; firſt, before ſome critical ſwelling begins to ſhew itſelf in fevers, then the *pulſe* hath riſen to 150; ſecondly, in acute rheumatiſms the *pulſe* riſes to 120, without danger: but in both theſe caſes the appetite, the ſenſes, ſleep, and ſtrength, deviate leſs from their natural ſtate, than when the life of the patient is in danger.

When aſthmatic patients are ſeized with a ſudden fit, the *pulſe* ſometimes beats 120 times in a minute, in which caſe danger is great; but if this is exceeded, they rarely recover.

When the *pulſe*, from being very quick, ſuddenly becomes quiet, all other ill ſymptoms continuing, it ſhews that the patient is become irritable; that the diſeaſe is tranſlated to the brain; and that a palſy, an apoplexy, or death, will be the conſequence.

In an inflamed ſcirrhus ſeated in any of the viſcera, in a cancer, ulcers in the internal parts, a quick *pulſe* is a more certain ſign of danger, than a quiet *pulſe* is of ſafety. In hectic and rheumatic patients the appetite continues, and an ability to take ſmall journies, when the *pulſe* is ſo quick, that in an acute fever, with ſuch a quickneſs in the *pulſe*, they would be forced to keep in bed.

A good *pulſe*, with a loſs of appetite, ſtrength, and ſleep, with thirſt, and a quickneſs of breathing, is a dangerous ſituation. On the contrary, a bad *pulſe*, the appetite, ſleep, and ſtrength not much affected, with moderate thirſt, and the breathing but little affected, is ſafe.

A diminution, or total ſuſpenſion, of the *pulſe*, is reducible either to a LIPOTHYMIA, where it fails to ſuch degree as that there is ſcarce ſtrength left to ſuſtain the body.

Or to a LIPOPSYCHIA, when it is attended with a ſenſible diminution of the natural heat.

Or to a SYNCOPE, when the heart fails, ſo as the heat, motions, ſenſes and all, are almoſt deſtroyed.

Or, laſtly, to an ASPHYXIA, where thoſe are all abſolutely deſtroyed as to ſenſe, and death itſelf ſeems in poſſeſſion.

PULSE is alſo uſed for the ſtroke with which any medium is affected by the motion of light, ſound, &c. through it.

Sir Iſaac Newton demonſtrates, lib. ii. prop. 48. Princip. that the velocities of the *pulſes* in an elaſtic fluid medium (whoſe elaſticity is proportionable to its denſity) are in a ratio compounded of half the ratio of the elaſtic force directly, and half the ratio of the denſity inverſly; ſo that in a medium whoſe elaſticity is equal to its denſity, all *pulſes* will be equally ſwift.

PULSE, *legumen*, in *Botany*, is a term applied to thoſe grains or ſeeds which are gathered with the hand: in contradiſtinction to corns, &c. which are reaped or mowed.

Pulſe is the ſeed of the leguminous ſpecies of plants.

The word is primarily underſtood of grains that grow in pods; as beans, peas, vetches, &c. but it is by ſome alſo uſed by extenſion for artichokes, aſparagus, and other kitchen-herbs and roots.

PULSILOGIUM, a name given by authors to a pulſe-watch, or inſtrument to meaſure the celerity of the pulſe. Sanctorius was the firſt inventor of this machine; but ſeveral have ſince ſpoke very largely in praiſe of it, and Sir John Floyer wrote a treatiſe on this ſubject.

PULSION, formed from *pello*, *I drive*, the act of driving or impelling a thing forwards.

PULSUS *laxus*. See LAXUS *pulſus*.

PULTURA, formed from *pulſare*, *to knock, to oſſ*, in our *Old Law-Books*, denotes a previous demand or examination: on account of the monks, who, before they were admitted into the monaſteries, *pulſabant ad fores*, knocked at the doors for ſeveral days. *Et quia, ut ſunt quieti de omnibus cauſis, & querelis, & placitis hallowarum & propoſturarum hundredi, & a pultura ſerjantarum*, i. e. from the examination of ſerjeants; *& de rewarde foreſtarum*, i. e. the viſitation of the foreſts.

PULVERATICUM, in *Roman Antiquity*, the fee paid to ſurveyors for their trouble; alſo a ſum exacted from the provincial cities by their garriſon.

PULVERIZATION, *pulveriſatio*, the act of *pulverizing*, or reducing a dry body into a fine powder.

This is performed, in friable bodies, by pounding or beating in a mortar; but to *pulverize* malleable ones, other methods muſt be taken.

To *pulverize* lead, or tin, the method is this: rub a round wooden box all over the inſide with chalk; pour a little of the melted metal nimbly into the box, when, ſhutting the lid, and ſhaking the box briſkly, the metal will be reduced into powder.

PULVILLUS, in *Surgery*, a term uſed to expreſs a little pledget-bolſter, or compreſs.

PULVINARIA, in *Roman Antiquity*, cuſhions upon which the ſtatues of the gods were laid in the temples, at the time that thanks were given for ſome ſignal victory.

PULVINATED, *pulvinatus*, in the *Ancient Architecture*, a term applied to a frieze, which ſwells, or bulges out, in manner of a pillow, *pulvinus*: whence the name.

PULVIS, in *Chemiſtry* and *Medicine*. See POWDER.

PULVIS *antiſyſſus*, was originally compoſed of equal parts of the *lichen cinereus terreſtris*, or *aſh-coloured ground* LIVERWORT, and black pepper; but this quantity of pepper rendering the medicine too hot, only one part of the pepper is now uſed to two of the lichen. The efficacy of this powder, as a preſervative againſt the MADNESS occaſioned by the bite of a mad dog, was firſt communicated to the Royal Society by Mr. Dampier, and an account of it publiſhed in the Phil. Tranſ. N° 237. It is highly extolled by Dr. Mead, who directs a dram and a half of the powder to be taken in the morning faſting, in half a pint of warm cow's milk, for four mornings

mornings successively: but previously to these four doses, the patient is to lose nine or ten ounces of blood; and after them, to be dipped in cold water every morning fasting, for a month, and then thrice a week for a fortnight longer. Mech. Account of Poisons, Ess. iii. But Dr. Lewis observes, that the lichen does not promise to have any considerable medicinal power.

PULVIS *facundous*, in *Natural History*, a name given by late writers to that fine powder, which is contained in capsules upon the stamina or threads in the flowers of plants, and is called by some English writers the *male-dust*, and in general the FARINA of flowers.

PULVIS *fulminans*, or the thundering powder. See FULMINANS.

PULVIS *patrum*, the Jesuit's powder. See CORTEX *Peruvianus*.

PULVIS, *Puteolanus*, in *Natural History*, the name of a fossile substance, found in form of powder, and famous for its consolidating under water. The accounts of it seem, however, to be a little erroneous. See POZZOLANA.

PUMICE *flour*, *pumex*, a kind of spongy stone, very porous and friable; resembling the scoria of furnaces.

Naturalists are not agreed about the nature and origin of *pumice*. Some look on it as a fragment of rock half-burnt, and calcined, cast up in eruptions of volcanoes, particularly Ætna and Vesuvius, into the sea; and which, by being there washed in the salt-water, loses the black colour which the impression of the subterranean fires had given it, and becomes whitish, or sometimes only greyish, according as it has floated more or less in the sea.

Dr. Woodward considers *pumice* as only a sort of slag or cinder; and affirms, it is only found either where forges of metals have anciently been, or near some volcano, or burning mountain.

Other authors will have the *pumice* to rise from the bottom of the sea; whence they suppose it detached by subterranean fires; and hence account both for its lightness and porosity, and its saline taste; alledging, in confirmation hereof, that *pumice* is frequently found in parts of the sea far remote from all volcanoes; and adding, that several parts of the Archipelago are frequently found covered with it, all at once, after a few inward flukes and hearings of the bottom of the sea.

Thus there have been many different conjectures about the nature and origin of this substance; but the very earliest writers of antiquity, and the most judicious of the later ages, agree, that it is no native fossile, nor in its original condition, but a mere cinder, or remainder of some other fossile body, calcined by a violent fire.

This may have been either subterranean and unseen, or perhaps since extinguished; or that of the well known burning mountains, on and about which *pumices* are constantly found, and that in vast abundance. The more violent explosions of these may also, at one time or other, have tossed vast quantities of *pumices* to places so distant, as to make people forget from whence they came; or into seas, whose tides and storms may have carried them to other shores, near which no such repositories of *pumices* are situated; and this might very much puzzle and mislead people about its true nature and origin.

The great quantities of *pumices* found in this manner, far from fires by which they might have been formed, floating on the surface of the sea, thus thrown on it, or perhaps raised by the bursting of volcanoes from its bottom, and something altered from their original form and colour, by being washed and rounded by the motion of the waves, and by rolling against one another, gave rise to an opinion in some, that these were of another kind, and were different from those *pumices* found on the burning mountains, and that they were formed by the concretion of the froth of the sea. Many have supposed, that the authors who have favoured this opinion, ranked the alcyonia among the bodies they call *pumices so formed*; and Theophrastus has been very unjustly censured of the same fault, though not guilty of it. Hill's Theophrastus, p. 48.

There are whole mountains in the principality of Hesse, which consist of rocks of the *pumice* stone, as it is there vulgarly called. This is a spongy and cavernous stone, of a grey colour, and very much resembles the *pumices* in external appearance, but, on examination, proves to be a very different substance; and there is not the least ground for supposing, that it owes its present appearance to the action of fire, as the common *pumices* thrown out of the burning mountains certainly do. It is very necessary, in order to treat accurately of the nature of the *pumice* stone, to distinguish rightly between these stones, and such as have been burnt into their spongy state. Yet this is generally neglected, and these are called *pumices* as well as the rest, and are all supposed to be of the same origin.

Pumice makes a very considerable article in commerce; and is much used in the arts and manufactures, to polish and smooth several works.

Its pieces are of several sizes: the parchment makers and marblers use the largest and lightest; the curriers, the heaviest and flattest; pewterers, the smallest.

Pliny observes, that the ancients made considerable use of *pumice* in medicine; but it is out of the present practice.

PUMMEL. See POMMEL.

PUMP, *antlia*, in *Hydraulics*, a machine formed on the model of a syringe, for the raising of water.

Vitruvius ascribes the first invention of *pumps* to Ctesibes the Athenian; whence the Latins call it *machina Ctesibiana*, or *organum Ctesibicum*.

Pumps are distinguished into several kinds, with regard to the several manners of their acting. As the

Common sucking PUMP, which consists of a pipe open at both ends, in which is a moveable piston, bucket, or sucker, as big as the bore of the pipe in that part wherein it works, and leathered round so as to fit the bore exactly; and may be moved up and down, without admitting any air to come between it and the pipe or *pump* barrel. There are several kinds of buckets: the most simple of all, which is commonly used for ordinary *pumps*, consists of a cylindric piece of wood, whose diameter is somewhat less than the bore of the barrel, that it may move in it freely, having a hole quite through the middle of it. Upon the top of this there is an iron piece fastened to a rod of iron or wood, which goes quite to the top of the *pump*, and by means of which the motion is given to the bucket. Near the top of the cylindric wood, there is a leather ring fastened round it, which goes a little higher than its top; the hole in the wood is stopped by a valve, made of a round piece of leather fastened in one part to the wood with nails. Upon this there is an iron plate, a little larger than the bore of the hole, and another iron plate under it, a little less than the same bore; and the plates and leather are fastened together by means of a rivet or screw in the middle of them. When the bucket is put into the barrel, and the leather becomes wet, it will apply itself to the sides of the barrel, and prevent the passage of the air. The use of the two iron plates is to sustain the pressure of the water, which would otherwise bend the leathers. For larger *pumps*, the bucket is made in the following manner: there is a hollow piece of brass, almost equal at top to the bore of the barrel, but smaller at the bottom, having at its top a brass bar, and at the bottom two notches to receive the ends of another brass bar, of the same figure as that at the top. Round the brass piece there goes a leathern ring, fastened to it at its lower part by means of an iron ring, which being almost at the bottom of the brass piece, is not so large as its top, and consequently does not touch the sides of the barrel: this leathern ring should go a little higher than the cross-piece at bottom. The valve consists of a piece of leather almost equal to the top of the brass piece, covered by two iron plates of the same size as the leather, and having under it two plates somewhat smaller than the bore of the brass piece at its top; these iron plates and leathers are fastened together with screws. This valve must be applied to the top of the brass piece or box, so that the brass bar upon it may be between the two iron plates under the leather. The whole is fastened together by means of an iron piece, whose lower part goes through the holes in the middle of the valve, and the two brass rods, so that its upper part getting between the two upper iron plates of the valve, presses upon the leather, and makes it apply itself close to the upper brass bar. This iron piece or rod ought to have two holes, one at the bottom, just under the lower brass rod, to hold it close by means of a pin or key; and another at its top, to fasten it to another iron rod, which is continued quite to the top of the *pump*, in order to give motion to the bucket. The chief advantages of this kind of buckets are, that they give the freest passage to the water, having the least friction possible, as they touch the barrel only at the upper end of the brass box; and that the sand or gravel, which is commonly mixed with the water, cannot get between the bucket and the barrel, because the leathern ring is higher than the brass tube; besides, if by any accident the motion of one side of the valve were hindered, the other would serve till it were mended. See VALVE.

The construction of *pumps* is usually explained by glass models, in which the action both of the pistons and valves may be seen. In order to understand the structure and operation of the *common pump*, let the model DCBL (*Tab.* V. *Hydraulics*, &c. *fig.* 55.) be placed upright in the

the veſſel of water K, the water being deep enough to riſe at leaſt as high as from A to L. The VALVE *a* on the moveable bucket G, and the valve *b* on the fixed box H (which box quite fills the bore of the pipe or barrel at H) will each lie cloſe, by its own weight, upon the hole in the bucket and box, until the engine begins to work. The valves are made of braſs, and covered underneath with leather for cloſing the holes the more exactly: and the bucket G is raiſed and depreſſed alternately by the handle E and rod D *d*, the bucket being ſuppoſed at B before the working begins.

Take hold of the handle E, and thereby draw up the bucket from B to C, which will make room for the air in the pump all the way below the bucket to dilate itſelf, by which its ſpring is weakened, and then its force is not equivalent to the weight or preſſure of the outward air upon the water in the veſſel K: and therefore, at the firſt ſtroke, the outward air will preſs up the water through the notched foot A, into the lower pipe, about as far as *e*: this will condenſe the rarefied air in the pipe between *e* and C to the ſame ſtate it was in before; and then, as its ſpring within the pipe is equal to the force or preſſure of the outward air, the water will riſe no higher by the firſt ſtroke; and the valve *b*, which was raiſed a little by the dilatation of the air in the pipe, will fall, and ſtop the hole in the box H; and the ſurface of the water will ſtand at *e*. Then, depreſs the piſton or bucket from C to B, and as the air in the part B cannot get back again through the valve *b*, it will (as the bucket deſcends) raiſe the valve *a*, and ſo make its way through the upper part of the barrel *d* into the open air. But upon raiſing the bucket G a ſecond time, the air between it and the water in the lower pipe at *e* will be again left at liberty to fill a larger ſpace; and ſo its ſpring being again weakened, the preſſure of the outward air on the water in the veſſel K will force more water up into the lower pipe from *e* to *f*; and when the bucket is at its greateſt height C, the lower valve *b* will fall, and ſtop the hole in the box H as before. At the next ſtroke of the bucket or piſton, the water will riſe through the box H towards B, and then the valve *b*, which was raiſed by it, will fall when the bucket G is at its greateſt height. Upon depreſſing the bucket again, the water cannot be puſhed back through the valve *b*, which keeps cloſe upon the hole whilſt the piſton deſcends. And upon raiſing the piſton again, the outward preſſure of the air will force the water up through H, where it will raiſe the valve, and follow the bucket to C. Upon the next depreſſion of the bucket G, it will go down into the water in the barrel B; and as the water cannot be driven back through the now cloſe valve *b*, it will raiſe the valve *a* as the bucket deſcends, and will be lifted up by the bucket when it is next raiſed. And now, the whole ſpace below the bucket being full, the water above it cannot ſink when it is next depreſſed; but upon its depreſſion, the valve *a* will riſe to let the bucket go down; and when it is quite down, the valve *a* will fall by its weight, and ſtop the hole in the bucket. When the bucket is next raiſed, all the water above it will be lifted up, and begin to run off by the pipe F. And thus, by raiſing and depreſſing the bucket alternately, there is ſtill more water raiſed by it; which getting above the pipe F, into the wide top I, will ſupply the pipe, and make it run with a continued ſtream.

So, at every time the bucket is raiſed, the valve *b* riſes, and the valve *a* falls; and at every time the bucket is depreſſed, the valve *b* falls, and *a* riſes.

As it is the preſſure of the air or atmoſphere which cauſes the water to riſe, and follow the piſton or bucket G as it is drawn up; and ſince a column of water 32 feet high is of equal weight with as thick a column of the atmoſphere, from the earth to the very top of the air; therefore, the perpendicular height of the piſton or bucket from the ſurface of the water in the well muſt always be leſs than 32 feet; otherwiſe the water will never get above the bucket. But, when the height is leſs, the preſſure of the atmoſphere will be greater than the weight of the water in the *pump*, and will therefore raiſe it above the bucket: and when the water has once got above the bucket, it may be lifted thereby to any height, if the rod D be made long enough, and a ſufficient degree of ſtrength be employed, to raiſe it with the weight of the water above the bucket; without ever lengthening the ſtroke.

The force required to work a *pump*, will be as the height to which the water is raiſed, and as the ſquare of the diameter of the *pump*-bore, in that part where the piſton works. So that, if two *pumps* be of equal heights, and one of them be twice as wide in the bore as the other, the wideſt will raiſe four times as much water as the narroweſt; and will therefore require four times as much ſtrength to work it.

The wideneſs or narrowneſs of the *pump*, if any other part beſides that in which the piſton works, does not make the *pump* either more or leſs difficult to work; except what difference may ariſe from the friction of the water in the bore, which is always greater in a narrow bore than in a wide one, becauſe of the greater velocity of the water.

The *pump*-rod is never raiſed directly by ſuch a handle as E at the top, but by means of a lever, whoſe longer arm (at the end of which the power is applied) generally exceeds the length of the ſhorter arm five or ſix times; and, by that means, gives five or ſix times as much advantage to the power. Upon theſe principles, it will be eaſy to find the dimenſions of a *pump* that ſhall work with a given force, and draw water from any given depth.

The quantity of water raiſed by each ſtroke of the *pump*-handle, is juſt as much as fills that part of the bore in which the piſton works, be the ſize of the reſt of the bore above and below the piſton what it will. The preſſure of the atmoſphere will raiſe the water 32 feet in a pipe exhauſted of air; but it is adviſable never to have the piſton more than 20 or 24 feet above the level of the ſurface of the water in which the lower end of the *pump* is placed: and the power required to work the *pump* will be the ſame, whether the piſton goes down to be on a level with the ſurface of the well, or whether it works 30 feet above that ſurface; becauſe the weight of the column of air that the piſton lifts, is equal to the weight or preſſure of the column of water raiſed by the preſſure of the air to the piſton. And although the preſſure of the air on the ſurface of the well will not raiſe or force up the water in the *pump*-bore more than 32 feet, yet, when the piſton goes down into the column raiſed, the water gets above it; and may then be raiſed to any height whatever, above the piſton, according to the quantity of power applied to the handle of the *pump* for that purpoſe.

Pumps ought to be made ſo (ſays Mr. Ferguſon) as to work with equal eaſe in raiſing the water to any given height above the ſurface of the well. And this may be done by duly proportioning the diameter of the bore (in that part where the piſton works) to the height the water is to be raiſed, as that the column of water may be no heavier in a long *pump* than a ſhort one; or indeed equally heavy in all *pumps*, from the ſhorteſt to the longeſt, on ſuppoſition that the diameter of the bore is of the ſame ſize from top to bottom: and whatever the ſize of the bore be, above or below that part in which the piſton works, the power required to work the *pump* will be juſt the ſame as if the bore was of the ſame ſize throughout.

In order that a man of common ſtrength may raiſe water by *pumps*, with the ſame eaſe, to any height not leſs than 10 feet, or more than 100 feet, above the ſurface of the well, Mr. Ferguſon has calculated the annexed table, in which the diameter of the bore is duly proportioned to the height: and in theſe calculations he ſuppoſes the *pump*-handle to be a lever increaſing the power five times.

Height of the *pump*, in feet, above the ſurface of the well.	Diameter of the bore. Inches.	Diameter of the bore. Parts of an inch.	Water diſcharged in a minute, in wine meaſure. Gallons.	Pints.
10	6	·93	81	6
15	5	·60	54	4
20	4	·90	40	7
25	4	·38	32	6
30	4	·00	27	2
35	3	·70	23	3
40	3	·46	20	3
45	3	·27	18	1
50	3	·10	16	3
55	2	·95	14	7
60	2	·84	13	5
65	2	·72	12	4
70	2	·62	11	5
75	2	·53	10	7
80	2	·45	10	2
85	2	·38	9	5
90	2	·31	9	1
95	2	·25	8	5
100	2	·19	8	1

In the firſt column, look for the number of feet the water is to be raiſed; then, in the ſecond column you have the diameter of that part of the bore in which the

piston or bucket works; and in the third column, the quantity of the water which a man of ordinary strength can raise in a minute by the *pump* to the given height.

The quantity of water contained in a pipe of either of those heights in the table, supposing the diameter of the bore to be the same from top to bottom of the pipe, is 4523.2 cubic inches, or 19.58 gallons in wine measure, as near as the hundredth part of an inch in the diameter of the bore can make it.

Mr. Ferguson has calculated the following table, by which the quantity and weight of water in a cylindrical bore of any given diameter and perpendicular height may be very readily found.

Diameter of the cylindrical bore one inch.

Feet high.	Quantity of water in cubic inches.	Weight of water in Troy ounces.	In Avoirdupois ounces.
1	0.4247781	4.9712340	5.4541539
2	18.8495562	9.9424680	10.9083078
3	28.2743343	14.9137020	16.3624617
4	37.6991124	19.8849360	21.8166156
5	47.1238905	24.8561700	27.2707695
6	56.5486686	29.8274040	32.7249234
7	65.9734467	34.7986380	38.1790773
8	75.3982248	39.7698720	43.6332312
9	84.8230029	44.7411060	49.0873851

For tens of feet high, remove the decimal points one place toward the right hand; for hundreds of feet, two places; for thousands, three places; and so on. Then, multiply each sum by the square of the diameter of the given bore, and the products will be the answer.

EXAMPLE.

Qu. *What is the quantity and weight of water in an upright pipe 85 feet high, and 10 inches in diameter of bore?* The square of 10 is 100.

Feet high.	Cubic inches.	Troy ounces.	Avoirdupoife ounces.
80	753.982248	397.698720	436.332312
5	47.1238905	24.8561700	27.2707695
85	801.1061385	422.5548960	463.6030815
Multiply by	100	100	100
Anf.	80110.61385 00	42255.4890000	46360.3081500

Which number (80110.61) of cubic inches being divided by 231, the number of cubic inches in a wine gallon, gives 342.6 for the number of gallons in the pipe: and 42255.489 Troy ounces being divided by 12, gives 3521.29 for the weight of the water in Troy pounds: and lastly, 46360.3 Avoirdupoife ounces being divided by 16, gives 2897.5 for the weight in Avoirdupoife pounds.

The power required to work a *pump*, or any other hydraulic engine, muft not only be equal to the weight of the whole column of water in the *pump*-bore, but as much fuperior to it as will overcome all the friction of the working parts of the engine.

The forcing PUMP, raifes water through the box H (*fig.* 56.) in the fame manner as the fucking *pump* does, when the plunger or piston *g* is lifted up by the rod D *d*. But this plunger or FORCER has no hole through it, to let the water in the barrel B C get above it, when it is depreffed to B, and the valve *b* (which rofe by the afcent of the water through the box H when the plunger *g* was drawn up) falls down and ftops the hole in H, the moment that the plunger is raifed to its greateft height. Therefore, as the water between the plunger *g* and box H can neither get through the plunger upon its defcent, nor back again into the lower part of the pump I, *c*, but has a free paffage by the cavity around H into the pipe M M, which opens into the air-veffel K K at P; the water is forced through the pipe M M by the defcent of the plunger, and driven into the air-veffel; and in running up through the pipe at P, it opens the valve *a*; which fhuts at the moment the plunger begins to be raifed, becaufe the action of the water againft the under fide of the valve then ceafes.

The water, being thus forced into the air-veffel K K by repeated ftrokes of the plunger, gets above the lower end of the pipe G H I, and then begins to condenfe the air in the veffel K K. For, as the pipe G H is fixed air-tight into the veffel below F, and the air has no way to get out of the veffel but through the mouth of the pipe at I, and cannot get out when the mouth I is covered with water, and is more and more condenfed as the water rifes upon the pipe, the air then begins to act forcibly by its fpring againft the furface of the water at H, and this action drives the water up through the pipe I H G E, from whence it fpouts in a jet S to a great height; and is fupplied by alternately raifing and depreffing of the plunger *g*, which conftantly forces the water that it raifes through the valve H, along the pipe M M, into the air-veffel K K.

The higher the furface of the water H is raifed in the air-veffel, the lefs fpace will the air be condenfed into, which before filled that veffel; and therefore the force of its fpring will be fo much the ftronger upon the water, and will drive it with the greater force through the pipe at F: and as the foring of the air continues whilft the plunger *g* is rifing, the ftream or jet S will be uniform, as long as the action of the plunger continues; and when the valve *b* opens, to let the water follow the plunger upward, the valve *a* fhuts, to hinder the water, which is forced into the air-veffel, from running back by the pipe M M into the barrel of the *pump*.

If there was no air-veffel to this engine, the pipe G H I would be joined to the pipe M M N at P; and then, the jet S would ftop every time the plunger is raifed, and run only when the plunger is depreffed.

Mr. Newham's water engine, for extinguifhing fire (fee FIRE *engine*) conffts of two forcing *pumps*, which alternately drive water into a clofe veffel of air; and by forcing the water into that veffel, the air in it is thereby condenfed, and compreffes the water fo ftrongly, that it ruffies out with great impetuofity and force through a pipe that comes down into it; and makes a continued uniform ftream by the condenfation of the air upon its furface in the veffel.

By means of forcing *pumps*, water may be raifed to any height above the level of a river or fpring; and machines may be contrived to work thefe *pumps*, either by a running ftream, a fall of water, or by horfes. See WATER *works*.

The rod of the plunger in a forcing *pump* is fometimes made to work through a collar of oiled leathers and brafs plates, connected with the barrel of the *pump* by fcrews, and kept moift by water contained in a veffel at the top. This apparatus is called by the workmen in the North, a *jack-head*. Defaguliers's Exp. Phil. vol. ii. p. 152, &c. Ferguſon's Lectures, p. 73, &c. 400.

The ſucking PUMP differs from the *forcing pump* only in the difpofition of its valves, and the form of its pifton frame. This kind of *pump* is repreſented in *fig.* 57. A B is a barrel fixed in a frame I E L M which is immoveable, with its lower part communicating with the water. G E Q H O is a frame with two ſtrong iron rods, moveable through holes in the upper and lower parts of the *pump*: I K and L M are the bottom of this frame O Q H is fixed an inverted piſton D D, with its bucket and valve upon the top at D. Upon the top of the barrel there goes on a part F R, either fixed to the barrel, or moveable by a ſkull and ſocket; but in either caſe water and air-tight. In this part, at C, is fixed a valve opening upwards. It is evident, that when the piſton frame is thruſt down into the water, the piſton D deſcends, and the water below will ruſh up through the valve D, and get above the piſton; and that, when the frame is lifted up, the piſton will force the water through the valve C up into the ciſtern P, there to run off by the ſpout. The piſton of this *pump* plays below the ſurface of the water. Mr. Martin has deſcribed a *mercurial pump*, which works by quickſilver, invented by Mr. Hoſkins, and perfected by Defaguliers; and another *pump* of the ſame ſort, invented by Meſſ. Goſſet and De la Deville, and ſet up in the king of France's garden at Paris, the piſton of which works without friction. Phil. Brit. vol. ii. p. 57, &c. ed. 3.

PUMP, *Cuſhion's*, the firſt of all the kinds, acts both by ſuction and piſton. Its ſtructure and action are as follow:—A braſs cylinder A B C D (*fig.* 58), furniſhed with a valve in I, is placed in the water. 2. In this is fitted the embolus M K, made of green wood, which will not ſwell in the water, and adjuſted to the aperture of the cylinder with a covering of leather, but without any valve. In H is fitted on another tube N H, with a valve that opens upwards in I.

Now, the embolus E K being raiſed, the water opens the valve in L, and riſes into the cavity of the cylinder:—and when the ſame embolus is again depreſſed, the valve I is opened, and the water driven up through the tube H N.

This is the *pump* uſed among the ancients, and that from which both the others are deduced. Sir S. Morland has contrived to increaſe its force by leſſening the friction; which he has done to good effect, inſomuch as to make it work without almoſt any friction at all.

PUMPS uſed in ſhips are of ſeveral kinds: the common *pump* is a long wooden tube, whoſe lower end reſts upon the ſhip's bottom, between the timbers, in an apartment called the well; incloſed for this purpoſe near the middle of the ſhip's length. This *pump* is managed by means of the brake, and the two boxes or piſtons. Near the middle of the tube, in the chamber of the *pump*, is fixed the lower box, which is furniſhed with a ſtaple, by which it may at any time be hooked and drawn up, in order to examine it. To the upper box is fixed a long bar of iron, called the ſpear, whoſe upper end is faſtened to the end of the brake, by means of an iron-bolt paſſing through both. At a ſmall diſtance from this bolt the brake is confined by another bolt between two cheeks, or ears, fixed perpendicularly on the top of the *pump*. Thus the brake acts upon the ſpear as a lever, whoſe fulcrum is the bolt between the two cheeks, and diſcharges the water by means of the valves, or chaps, fixed on the upper and lower boxes. Theſe *pumps*, however, are very rarely uſed in ſhips of war, unleſs of the ſmalleſt ſize. The moſt uſeful machine of this kind, in large ſhips, is the

Chain PUMP, which is univerſally uſed in the navy. This is no other than a long chain, furniſhed with a ſufficient number of valves, at proper diſtances, which paſſes downward through a wooden tube, and returns upward in the ſame manner on the other ſide. It is managed by a roller or winch, whereon ſeveral men may be employed at once; and thus it diſcharges, in a limited time, a much greater quantity of water than the common *pump*, and that with leſs fatigue and inconvenience to the labourers. This machine is, nevertheleſs, ſubject to ſeveral accidents by the nature of its conſtruction. The chain is of too complicated a fabric, and the ſprocket-wheels, employed to wind it up from the ſhip's bottom, are deficient in a very material circumſtance, viz. ſome contrivance to prevent the chain from ſliding or jerking back upon the ſurface of the wheel, which frequently happens when the valves are charged with a conſiderable weight of water, or when the *pump* is violently worked. The links are evidently too ſhort, and the unmechanical manner in which they are connected, expoſes them to a great friction in paſſing round the wheels. Hence they are ſometimes apt to break or burſt aſunder in very dangerous ſituations, when it is extremely difficult or impracticable to repair the chain. Of late ſome conſiderable improvements have been made in the naval *chain-pump* by Mr. Cole, under the direction of Capt. Bentinck. The chain of this machine is more ſimple and mechanical, and much leſs expoſed to damage. It is exactly ſimilar to that of the fire-engine, and appears to have been firſt applied to the *pump* by Mr. Milne, to exhauſt the water from the caiſſons at Blackfryars bridge. It has thence been tranſferred to the marine by Capt. Bentinck, after having received ſome material additions to anſwer that ſervice. The principal ſuperiority of this *pump* to the former, conſiſts in the following particulars, viz. 1. That the chain is more ſimple and more eaſily worked, and of courſe leſs expoſed to injuries by friction. 2. That the chain is ſecured upon the wheel, and thereby prevented from jerking back when charged with a column of water. 3. That it may be eaſily taken up and repaired when broken, or choaked with ballaſt, &c. 4. That it diſcharges a much greater quantity of water with a leſs number of men. A ſection of this machine, as fixed in a frigate of war, is exhibited in *Tab.* V. *Hydraulics*, *fig.* 593 wherein A is the keel, V the floor-timber, X the kelſon, 1, 2, 3, the ſeveral links of the chain, b b the valves, C the upper wheels, D the lower wheels, c c the cavities upon the ſurface of the wheels to receive the valves, as they paſs round thereon, d d the bolts fixed acroſs the ſurface of the wheels, to fall in the interval between every two links, to prevent the chain from ſliding back. The links of the chain, which are no other than two long plates of iron with a hole at each end, and fixed together by two bolts ſerving as axles, are repreſented in a larger ſcale as *a a*, the valves are two circular plates of iron, with a piece of leather between them, which are exhibited at large in *b b*. Upon a trial of this machine with the old *chain-pump* aboard the Seaford frigate, it appears, in a report ſigned by rear admiral Sir John Moore, twelve captains, and eleven lieutenants of his majeſty's navy, that its effects, when compared with the latter, were as follow:

New *Pump*.			Old *Pump*.		
Numb. of men.	Tuns of water.	Seconds of time.	Numb. of men.	Tuns of water.	Seconds of time.
4	1	43½	7	1	76
2	1	55	4	1	81

The ſubſcribers farther certify, that the chain of the new *pump* was dropped into the well, and afterwards taken up and repaired and ſet to work again in two minutes and a half; and that they have ſeen the lower wheel of the ſaid *pump* taken up to ſhew how readily it might be cleared and refitted for action, after being choaked with ſand or gravel, which they are of opinion may be performed in four or five minutes. Falconer's Mar. Dict. art. *Pump*.

PUMPS, *hand*, are ſmall ones made of cane, or a piece of wood bored through, uſed in lieu of cocks, &c. to *pump* beer or water out of the caſks.

PUMPS, *ſhip*, called alſo *bilges pumps*, are chiefly uſed by the Dutch, who have them by their ſhips ſides. In theſe is a long ſtaff, with a bar at the end like a gunner's ſponge, to *pump* up the BILDGE *water*.

PUMP, *air*, in *Pneumatics*, is a machine, by means whereof the air is emptied out of veſſels, and a ſort of vacuum produced therein. For the invention, ſtructure and uſe, of this *pump*, ſee AIR-*pump*; and for Smeaton's improved gage, ſee GAGE.

PUMP, *fetching the*, ſee FETCHING.

PUMPS, *ſpiral*, ſee *Archimedes'* SCREW.

PUMPELMOES, a name uſed by ſome for a ſpecies of ORANGE.

PUMPING *at ſea*, is uſually done by ſpells, that is, by relieving the men with freſh ones, and counting how many ſtrokes they *pump* each watch. By this means they know if the ſhip be ſtanch, or how her leaks increaſe.

When all the water is drawn up, and there comes up nothing but wind and froth, they ſay the *pump ſucks*.

PUMPKIN, *cucurbita* in *Botany*; for the characters, ſee GOURD. The *pumpkin* is frequently cultivated by the country people in England, who plant them upon their dunghills, where the plants run over them, and ſpread to a great diſtance; and when the ſeaſons are favourable, they will produce plenty of large fruit; theſe they uſually allow to grow to maturity, then they cut open a hole on one ſide, and take the ſeeds out of the pulp as clean as poſſible, after which they fill the ſhells with apples ſliced, which they mix with the pulp of the fruit, and ſome add a little ſugar and ſpice to it; then bake it in an oven, and eat it in the ſame manner as baked apples; but this is a ſtrong food, and only fit for thoſe who labour hard, and can eaſily digeſt it.

They may be propagated by ſowing their ſeeds in April on a hot bed; and tranſplanting the plants on another moderate bed, where they ſhould be brought up hardily, and have a great deal of air to ſtrengthen them; and when they have got four or five leaves, they ſhould be tranſplanted into holes made upon an old dunghill, or ſome ſuch place, allowing them a great deal of room to run, for ſome of the ſorts will ſpread to a great diſtance.

PUN, or PUNN, a luſus verborum, the wit whereof depends on a reſemblance between the ſounds or ſyllables of two words, which have different, and, perhaps, contrary ſignifications. See PARONOMASIA.

Such are,—*Cane, de cane, cane.*—*Par nobile mole mihi.*—*Lex Dei, lux dei.*—All houſes are turned to ale-houſes.—Matrimony is become matter of money.—Some men's paradiſe is a pair of dice.—Was it ſo in the time of Noah? Ah no.—*L'ordre tiré du déſordre, ou déſordre ordonné*, is the title of a French book.

Puns, when they come eaſily, and are very ingenious, poignant, and appoſite, are allowed of in converſation, letters, epigrams, madrigals, and the like compoſitions; but they are abſolutely baniſhed out of the grave, ſerious, and ſublime, becauſe they weaken its force, and diminiſh its beauty, which conſiſts in ſomething great and elevated. The Greeks and Romans, it is true, ſometimes indulged themſelves in the practice, and uſed *puns* as ornaments in the moſt ſerious diſcourſes: but the moſt ſevere and philoſophical genius of our age, is by no means ſatisfied with ſuch an outſide of wit. Devices, ſymbols, rebuſes, motto's, &c. are their proper ſphere, where they ſhine to moſt advantage.

PUNARU, in *Ichthyology*, the name of a ſmall fiſh of the Canada kind. It has an oblong body, and a thick head, obtuſe at the ſnout. The mouth is ſmall, and in the lower jaw there are only two oblong teeth, which are ſharp and pointed like needles. The eyes ſtand high in the head, the pupil is black, and the iris yellow; and over theſe there are two ſhort red filaments. The gills are large, and have two oblong fins placed behind them. The back fin reaches from the head to the tail, and is prickly at the edge. The belly-fin reaches from the anus to the tail. The ſkin and fins are all brown.

Beſides this, there is another ſpecies, variegated on its ſides with lines of a duſky purple. Its jaws beſet with very ſmall teeth, and its fins not prickly. Both kinds are found among the rocks about Braſil, and ſometimes

get into the shells of the larger shell-fish. Margrave's Hist. of Brasil.

PUNAY, in *Natural History*, a name given by the people of the Philippine islands to a very beautiful species of turtle, common in their woods.

It is of the size of a small parrot, and is of a fine green colour; but the extreme feathers of its wings are tipped with white, and the lower part of its belly is of a saffron colour. Its beak is yellow.

PUNCH, an instrument of iron or steel, used in several arts, for the piercing and stamping holes in plates of metals, &c. being so contrived, as not only to perforate, but to cut out and take away the piece: whence the French call it, *emporte-piece*, q. d. take-off piece.

The *punch* is a principal instrument of the metal-button-makers, wafer-makers, patch-makers, shoe-makers, &c.

The *punch* of the makers of plate-buttons serves to cut and parcel out the plates of gold and silver wherewith they cover their moulds.—It is large, round, four or five inches high, the bottom hollow for about half an inch, well steeled, and the edge very sharp.

To use it, they extend the plate of metal on a leaden table or block, and with a pretty heavy hammer strike the head of the *punch*, &c. See BUTTON-*making*.

PUNCH *horse*, in the *Manege*, is a well-set, well-knit horse, short-backed and thick-shouldered, with a broad neck, and well lined with flesh.

PUNCH is also a name of a sort of compound drink frequent in England, and particularly about the maritime parts thereof.

Its basis is spring-water, which being rendered cooler, brisker, and more acid, with lemon-juice, and sweetened again to the palate with fine sugar, makes what they call *sherbet*; to which a proper quantity of a spirituous liquor, as brandy, rum, or arrac, being superadded, the liquor commences *punch*.

Several authors condemn the use of *punch*, as prejudicial to the brain, and nervous system.—Dr. Cheyne insists, that there is but one wholesome ingredient in it, viz. the mere water.

The proportions of the ingredients are various.—Some, instead of lemon-juice, use lime-juice, which makes what they call *punch-royal*: this is found less liable to affect the head, as well as more grateful to the stomach.

Some also make *milk punch*, by adding near as much milk to the sherbet as there is water, which tempers the acrimony of the lemon. Others prefer *tea punch*, made of green tea instead of water, and drank hot.

Lastly, What they call *punch for chamber-maids* is made without any water, of lime juice, sharpened with a little orange and lemon-juice; twice as much white-wine as lime-juice, and four times as much brandy, with sugar.

PUNCHEON, see PUNCHION.

PUNCHIN, or PUNCHION, in *Building*, see PUNCHION.

PUNCHION, or PUNCHEON, a little block or piece of steel, on one end whereof is some figure, letter, or mark, engraven either in creux, or in relievo; impressions whereof are taken on metal, or some other matter, by striking it with a hammer.

There are various kinds of these *punchions* used in the mechanical arts.—Such, for instance, are those of the goldsmiths, cutlers, pewterers, &c.

PUNCHION, in *Coining*, is a piece of iron steeled, whereon the engraver has cut, in relievo, the several figures, arms, effigy, inscription, &c. that are to be in the matrices wherewith the species are to be marked.

Miners distinguish three kinds of *punchions*, according to the three kinds of matrices to be made; that of the effigy, that of the cross or arms, and that of the legend or inscription.

The first includes the whole portrait in relievo. The second are small, each only containing a piece of the cross or arms, *v. gr.* a fleur-de-lys, an harp, a coronet, &c. by the assemblage of all which the entire matrice is formed. The *punchions* of the legend only contain each one letter, and serve equally for the legend on the effigy-side, and the cross side. See COINING.

For the manner of engraving, tempering, and stamping, these *punchions*, to form the matrices, see ENGRAVING on steel, MATRICE, &c.

PUNCHIONS, in *printing*, are those used in stamping the matrices, wherein the types of printing characters are cast. See *Letter* FOUNDERY.

PUNCHION is also used for several iron tools of various sizes and figures, used by the engravers in creux on metals. Seal-gravers particularly use a great number, for the several pieces of arms, &c. to be engraven; and many stamp the whole seal from a single *punchion*.

PUNCHION is also a common name for all the iron instruments used by stone-cutters, sculptors, lock-smiths, &c. for the cutting, inciding, or piercing their several matters.

Those of sculptors and statuaries serve for the repairing statues, when taken out of the moulds.

The lock-smiths use the greatest variety of *punchions*; some for piercing hot, others for piercing cold; some flat, some square, some round, others oval; each to pierce holes of its respective figure in the several parts of locks.

PUNCHION, or PUNCHIN, in *Carpentry*, is a piece of timber placed upright between two posts, whose bearing is too great, serving, together with them, to sustain some large weight.

The *punchion* is usually lower and slighter than either prick-posts or principal posts, and is joined by a brace, or the like, of iron. See POST. Those on each side of a door are called *door punchions*.

PUNCHION is also a piece of timber raised upright under the ridge of a building, wherein the little forces, &c. are jointed. Vitruvius calls the *punchion columen*.

PUNCHION is also used for the arbor or principal part of a machine, whereon it turns vertically; as that of a CRANE, &c.

Punchion is also a MEASURE for liquids, containing a hogshead and ½, or 84 gallons, or ¼ of a tun.

The Paris *punchion* is the same with their demiqueue: at Rouen it is three bushels, &c.

PUNCTA *lacrymalia*, see LACHRYMALIA.

PUNCTATED *hyperbola*, in the *higher geometry*, an hyperbola whose oval conjugate is infinitely small, i. e. a point.

PUNCTICULARIS *febris*, a name given by some authors to a fever attended with small eruptions.

PUNCTION, or PUNCTURE, in *Surgery*, an aperture made in the lower belly, in dropsical persons, to discharge the water; called also *paracentesis*.

PUNCTUATION, in *Grammar*, the art of pointing; or of dividing a discourse into periods, and members of periods, by POINTS expressing the PAUSES to be made in the reading thereof; and necessary both for understanding and pronouncing it.

The points used herein are four; viz. the *period*, *colon*, *semicolon*, and *comma*. See the particular use of each under its proper article.

Punctuation is a modern art: the ancients were entirely unacquainted with the use of our commas, colons, &c. and wrote not only without any distinction of members and periods, but also without distinction of words; which custom, Lipsius observes, continued till the 104th Olympiad; during which time the sense alone divided the discourse.

The antiquity of *pointing*, however, has had its advocates: some have ascribed the invention of it to Thrasymachus, who was cotemporary with Plato; others to Isocrates, who flourished about the same time; and others to Nicanor, in the time of Adrian. A late writer observes, that *pointing* was not unknown in the time of Alexander the *Great*. Aloysii Antonii Verneii &c. de Orthog. Lat. Rom. 1747.

Cicero's expressions, *verborum et sententiarum interpunctas clausulas in oratoribus*, Lib. 3. de Orat. and *clausulas atque interpuncta verborum*, &c. in his Orat. pro Murena, have been alleged by some as evidences of the antiquity of this practice: but others have referred the former words to speaking, and not to writing; the latter, to those points which were formerly placed after each word, in order to distinguish word from word, when the whole was written in large capitals, at equal distances from one another; which is a very different thing from that sort of *punctuation*, which divides the sense and subject matter into members and sentences and parts of sentences, in such proportions as either the sense or the construction may require. The words of Seneca in his 40th *Ep. Nec etiam cum scribimus interpungere solemus*, are more applicable to this latter sort of *pointing* than those of Cicero; and yet these have been understood to refer to the distinctions of words. See an Essay on the Use of *Pointing*, by Sir James Burrow, F. R. S. and F. A. S. 4to. p. 6.

There is much more difficulty in *pointing* than people are generally aware of. In effect, there is scarce any thing in the province of the grammarians so little fixed and ascertained as this. The rules usually laid down are impertinent, dark, and deficient; and the practice, at present, is perfectly capricious, authors varying not only from one another, but from themselves too.

Dr Lowth observes, that few precise rules can be given which will hold without exception, in all cases: they must be laid down with as much exactness as the nature of the subject will admit; and they may serve for a general direction, to be accommodated to different occasions, and to be supplied, when deficient, by the taste and judgment of the writer. Introd. to Eng. Gram. Ed. 1772. p. 194.

Indeed

Indeed P. Buffier, and after him Dr. Ward, and bishop Lowth, have done something towards a fixed and precise ſyſtem of *pointing*, from the reaſon and analogy of things. Their doctrine the reader will find under the articles COMMA, COLON, SENTENCE, &c.

In the general, we ſhall only here obſerve, that the comma is to diſtinguiſh nouns from nouns, verbs from verbs, and ſuch other parts of a period as are not neceſſarily joined together. The ſemicolon ſerves to ſuſpend and ſuſtain the period when too long: the colon, to add ſome new, ſupernumerary reaſon, or conſequence, to what is already laid: and the period, to cloſe the ſenſe and conſtruction, and to relieve the voice. For the proportional quantity, or time of the points, with reſpect to one another, ſee COMMA.

PUNCTUM, in *Geometry*, &c. ſee POINT.

In the ſchools they have their

PUNCTUM *terminans*, which is the indiviſible extreme of a line, beyond which no part of the line extends.

PUNCTUM *tantinum*, an indiviſible magnitude between contiguous points of a line, whereby they are connected, and from whence ariſes a continuity.

PUNCTUM *initians*, an indiviſible point, from which the line begins.

PUNCTUM *formativum*, or *generativum*, in *Conics*, is a point determined by the interſection of a right line drawn through the vertex of a cone to a point in the plane of the baſe that conſtitutes the conic ſection.

PUNCTUM *ex comparatione* denotes either of the foci of an ellipſis and hyperbola; thus called by Apollonius, becauſe the rectangles under the ſegment of the tranſverſe diameter in the ellipſis, and under that and the diſtance between the vertex and the focus in the hyperbola, are equal to one fourth part of what he calls the *figure* thereof.

PUNCTUM *ſaliens*, in *Geometry*, is a term uſed by ſome authors for that point of the generating circle of a cycloid, or epicycloid, which in the genеſis produces any part of the cycloidal line.

PUNCTUM *ſalicans*, in *Anatomy*, the firſt rudiments of the heart, in the formation of the fœtus, where a throbbing motion is perceived.

This is eaſily obſerved with a microſcope in a brood-egg, wherein, after conception, we ſee a little ſpeck or cloud; the middle whereof is a ſpot that appears to beat, or leap, a conſiderable time before the fœtus be formed for hatching.

PUNCTUM *lachrymale*, in *Anatomy*, a little hole in the edge of each eye-lid, opened into a bag called *glandula lachrymalis*. See LACHRYMALIA and LACHRYMAL *gland*.

PUNCTURE, PUNCTURA, in *Surgery*, &c. any wound made by a pointed inſtrument.

Among the number of the moſt ſimple wounds are reckoned thoſe which are made by *puncture*, or ſtabbing on the external parts, and not penetrating to a very great depth. In theſe wounds, after the blood has been ſtopped at the firſt dreſſing, by the application of dry lint, the common digeſtive, or *linimentum Arcæi*, is to be ſpread upon a pledget and applied once every day; or if the diſcharge is but ſmall, every other day, covering the dreſſings with a plaiſter and compreſs, and ſecuring the whole with a proper bandage. At each dreſſing, care muſt be taken to remove every thing that will give way readily; the pus or ſanies is to be gently wiped of with fine rags; and unleſs a great diſcharge of matter makes it neceſſary, too frequent dreſſings do rather harm than good. The firſt dreſſings that have been applied, eſpecially when there has been a flux of blood, ſhould by no means be removed forcibly; but be left till they will fall off of themſelves, which they will do after a ſuppuration is formed; and by this caution, much pain, and, perhaps, a freſh hæmorrhage, are avoided.

When a *puncture*, however, penetrates very deep, the cure is attended with many difficulties; eſpecially if it is made perpendicularly down, and has no depending orifice; for in this caſe, the blood and matter are eaſily collected at the bottom, and protract the cure, and frequently form ſiſtulæ. To prevent theſe conſequences, it will be proper to preſs the wound from the bottom upwards, to apply a compreſs toward the bottom of the wound externally, and to apply a bandage over all, which preſſes much tighter upon the lower than upon the upper parts. If all this precaution, however, prove of no effect, which, indeed, is too often the caſe, it is the moſt proper method to make a large opening at the bottom of the wound, before any ſiſtulæ are formed there. In order to make this opening to the greater advantage, it will be proper to get a particular ſort of probe or needle, very blunt at top, and at the other end provided with a large eye, or hole, through which a linen rag may be paſſed. This probe is to be paſſed to the bottom of the wound, and the blunt end of it preſſed outwards toward the ſkin, till you can feel it with a finger: when you can feel it, cut down upon it if you can ſafely, and make a large opening; ſpread the rag that you have run through the eye of the probe with ſome vulnerary balſam, and draw it through the wound after the manner of a ſeton, and leave it there, dreſſing up both the orifices with the ſame balſam, and covering the whole with compreſſes and the proper bandages. In every ſucceeding dreſſing, that part of the rag that is left out of the wound is to be ſpread with freſh ointment, and the lower part drawn down till this takes place in the new wound. This method is to be continued till the wound is well cleanſed, the diſcharge gently diminiſhed, and all in a readineſs to heal: the ſeton is then to be removed, and the wound healed as uſual. Heiſter's Surg. p. 35.

In phlebotomy, people are ſometimes brought in danger of the loſs of a limb, and even of life, by the *puncture of a tendon*.—The patient here does not immediately feel any pain; but about twelve hours after the operation, complains thereof; not in the puncture itſelf, but in the parts tending towards the arm-pit.—The wounded part then ſwells to the ſize of a filbert, and diſtils an aqueous humour, or ichor, which is the chief diagnoſtic of the *punctura tendinis*. See TENDON.

POUND-BRECH, or POUND-BREACH, compounded of the Saxon, *pund*, *pannę*, and *brech*, *fraction*, *breaking*, denotes the illegal taking of cattle out of the pound; either by breaking the pound, picking the lock, or otherwiſe.

—*Si* pund-brech *fiat in curia regis, plena wyta ſit: alibi quinquin marcæ.* Leg. Hen. I. See POUND.

PUNDFULDA, a pound for cattle, or pinfold. *Placita inter abbat.* Glaſton. & Hen. de Hainel, anno 1230.

PUNICA, in *Botany*, ſee POMEGRANATE.

PUNICUS *lapis*, a name given by the writers of the middle ages to a ſtone of a ſpongy texture, the powder of which was good in diſeaſes of the eyes.

This ſeems to have been no other than the PUMICE, the writers of theſe times having been ſtrangely incorrect in their orthography; and all the virtues aſcribed to this ſtone, as alſo the places where it was found, which are the Æolian iſlands, &c. ſeeming to have been copied from Pliny's account of the pumice.

PUNISHMENT, a penalty impoſed upon the commiſſion of ſome crime or offence againſt the laws.

It is eſſential to the nature of a law, that it import or decree a *puniſhment* to the tranſgreſſors thereof.

The forms and manners of *puniſhment* are various in various countries and ages, and for various crimes; as treaſon, felony, adultery, parricide, &c.

Among the Romans, the *pecuniary puniſhments* were the *multa* and *confiſcatio*. The *corporal puniſhments* were *capitis diminutio, aquæ & ignis interdictio, proſcriptio, deportatio, relegatio, furca, verbera, carcer, cadena, equuleus, ſcalæ gemoniæ, damnatio ad gladium, ad metalla, flagellatio, talio*, &c. which ſee deſcribed under their reſpective articles.

Among us the principal *civil puniſhments* are *fines*, *impriſonments*, *the ſtocks*, *pillory*, *burning in the hand*, *whipping*, *ducking-ſtool*, *hanging*, *beheading*, *quartering*, *burning*, *tranſportation*, &c.

The *eccleſiaſtical puniſhments* are *cenſures*, *ſuſpenſion*, *depoſitions*, *degradations*, *excommunication*, *anathema*, *penances*, &c. The *military puniſhments* are, *being ſhot*, *running the gantelope*, *riding the wooden horſe*, *the bilboes*, &c.

Among the Turks, &c. *impaling*, *baſtinadoes* on the ſoles of the feet, &c. obtain. See IMPALEMENT, &c.

PUNITORY *intereſt*, in the *Civil Law*, ſuch intereſt of money, as is due for the delay of payment, breach of promiſe, &c.

PUNK, in *Natural Hiſtory*, the inward part of the excreſcence or exuberance of an oak. It is uſed by the Indians in Virginia for medicinal burning, as the Eaſt Indians uſe MOXA. Phil. Tranſ. N° 454. ſect. 1.

PUNN. See PUN.

PUNT, in *Sea-Language*, a ſort of oblong flat-bottomed boat, whoſe floor reſembles the platform of a floating ſtage; and uſed by ſhipwrights for breaming, caulking, or repairing a ſhip's bottom.

PUPA, in *Natural Hiſtory*, a name lately ſubſtituted in the room of *chryſalis* or AURELIA, becauſe many inſects in this ſtate reſemble an infant in ſwaddling clothes; and all, except thoſe of the *hemipteron* order, take no nouriſhment.

PUPIL, *pupillus*, in the *Civil Law*, a boy or girl not yet arrived at the age of puberty, i. e. under fourteen years of age for the boy, and under twelve for the girl.

While a minor remained under the direction of a tutor, he was called a *pupil*; after puberty, a curator being aſſigned him, he ceaſed to be called a *pupil*.

A tutor is obliged to pay intereſt for what monies of his *pupil* lie idle and unemployed. A tutor is allowed to do any thing for his *pupil*, but nothing againſt him.

PUPIL is also used, by way of extension, in *Universities*, &c. in the sense of *alumnus*, for a youth under the education or discipline of any one.

PUPIL, *pupilla*, in *Anatomy*, denotes a little aperture in the middle of the uvea and iris of the eye, through which the rays of light pass to the crystalline, in order to be painted on the retina, and cause vision.

It is observed, that as we are forced to use various apertures to our optic glasses, so nature has made a like provision in the eyes of animals, whereby to shut out too much, and admit sufficient light, by the changes in the aperture of the *pupil*.

The structure of the uvea and iris is such, as that, by their aperture, the *pupil* is contractible and dilatable at pleasure, so as to accommodate itself to objects, and to admit more or fewer rays, as the object, being either more vivid and near, or more obscure and remote, requires more or less light: it being a constant law, that the more luminous the object, the smaller the *pupil*; and again, the nearer the object, the smaller the *pupil*; and *vice versa*.

This fact has been long ago noticed by optical writers. B. Porta, about the middle of the sixteenth century, in his treatise De Refractione, p. 74, observes, that the pupil is contracted involuntarily when it is exposed to a strong light, and opens of itself when the light is small. A similar observation was made by his countryman and contemporary, Father Paul of Venice. Galen, indeed, first observed the dilatation of the *pupil* of one eye, when the other was shut or lost, and the contraction of it, when the other was opened or recovered; and in this opinion he was followed by all naturalists and philosophers, till Fabricius ab Aquapendente, professor at Padua, by observing the eye of a cat, found that the *pupil* not only dilated and contracted itself, when one of the eyes was shut, but also when both were open. F. Paul found, from repeated experiments, that the *pupil* not only of cats, but also of men, and other animals, always contracted itself when the eye was exposed to a bright light, and again dilated itself when the light was faint and languid. This he always observed, as well when both eyes were open, as when one of them was shut. The same remark had been made by Achillinus, in a treatise published in 1522; and the fact was known to the Arabians, Rhazes and Avicenna. That the *pupil* of the eye is enlarged, in order to view remote objects, and that it is contracted while we are viewing those that are near, is a fact with which Scheiner, in the beginning of the seventeenth century, was well acquainted, and which he proved by experiments, and illustrated by figures. When a needle, or any small object, is brought near to the eye of any person, who looks attentively at it, the *pupil*, he says, is plainly seen to contract; and it as constantly expands whenever it is withdrawn.

This alteration of the *pupil* is effected by certain muscular fibres on the outside of the uvea, which arrive from nerves detached hither from the sclerotica. These fibres, proceeding straight from their origin towards the centre, terminate in the orbicular limb or verge of the *pupil*, which consists of orbicular fibres, whereby the figure and space of the *pupil* are defined. The first, or longitudinal fibres, dilate the aperture of the *pupilla*; the latter, or orbicular ones, constringe it.

Some authors, however, attribute the motions of the *pupilla* to the ligamentum ciliare; and others think, that both this, and the fibres of the uvea, concur herein. Dr. Derham adds, that while the *pupil* opens and shuts, the ligamentum ciliare dilates or compresses the crystalline, and brings it nigher to, or farther from, the retina, as the object is more or less remote.

There is no doubt that the change to which the *pupil* is subject is the effect of light upon the eye. Dr. Hartley, Obs. on Man, vol. i. p. 219, supposes, that the light which enters at the *pupil* has great efficacy in contracting both the greater and less rings of the iris, as may be concluded, he says, from the immobility of the *pupil* in a gutta serena; also because, on this supposition, the light which passes in at the *pupil* must, by contracting the less ring, become a check and guard against its own too free admission, which is agreeable to the tenor of nature in like instances. The retina, he observes, extends to the greater ring, and may send some nervous fibres to it, and even to the iris. Dr. Whytt also says, Essay on vital and involuntary Motion, p. 112, that the contraction of the *pupil* is not performed by the action of light upon the iris, but upon the retina; since whatever intercepts the rays of light, so as to prevent their reaching the retina, causes a preternatural dilatation of the pupil; because in a cataract, where the crystalline humour, being considerably opaque, intercepts a great part of the rays, the *pupil* loses a good deal of its contractile power. This author also observes, that the wideness of the *pupil* in a syncope, apoplexy, and confirmed gutta serena, shews that, in order to dilate the *pupil* to its largest size, no effort of the mind is necessary, but only the superior contractile power of the longitudinal fibres of the uvea, when its circular muscle is not excited into action by the stimulus of light on the retina. M. Mery informs us (Mem. Ac. Paris for 1704) that, having plunged a cat in water, and exposing her eye to the strong light of the sun, the *pupil* was not at all contracted by it; whence he infers, that the contraction of the iris is not produced by the action of the light, but by some other circumstance. For he contends that the eye in this situation receives more light than in the open air. M. de la Hire, in reply, endeavours to shew, (Mem. Ac. Par. for 1709) that fewer rays enter the eye under water, and that, in those circumstances, it is not so liable to be affected by them. Besides, it is obvious to be remarked, that the cat must be in great terror in this situation; and being an animal that has a very great voluntary power over the muscles of the iris, and being now extremely attentive to every thing about her, she might have her eyes open, notwithstanding the action of the light upon it, and though it might be very painful to her.

The figure of the pupil, in various animals, is wonderfully adapted to their various circumstances and occasions: in some, e. gr. in man, it is round, that form being fittest for the position of our eyes, and the various uses we make of them in all directions.

In others, it is elliptical or oblong; in some of which, e. gr. the horse, sheep, ox, &c. the ellipsis is transverse, and the fissure large, to enable them to see laterally, and even with a little light; and thereby both to gather their food the better in the night, and to avoid dangers on either side. In others, e. gr. the cat, the ellipsis is erect, and is also capable of opening very wide, and shutting very close; by means of the latter of which states, that animal can exclude all, but, as it were, a single ray of light, and so avoid all the inconveniencies of the bright sun; and, by the former, at can take in all the faintest rays, and thus avoid the inconveniencies of the night. An incomparable provision for these animals, which are to watch and way-lay their prey both by day and night, to see upwards and downwards, to climb, &c. See EYE and VISION.

PUPIL *contracted*. The distemper of the eye called by surgeons a *contraction of the pupil*, is so total or close a contraction of that part as will not let it transmit light enough to the bottom of the eye, to enable the patient to see objects distinctly. Sometimes this disorder is from infancy, and sometimes it arises from an intense inflammation of the eye, or other causes.

The cure of this is extremely difficult; but Mr. Cheselden has invented a method by which he has often proved very successful in his attempts to relieve it. The method is this: the eye-lids being held open by a speculum oculi, he takes a narrow single-edged scalpel, or needle, almost like that used for couching in a cataract, and passing it through the sclerotica, as in couching, he afterwards thrusts it forward through the uvea or iris, and in extracting it cuts through the iris.

If the disorder is not accompanied with a cataract, it will be best to cut through the iris in the middle; otherwise, when there is a cataract, the incision should be made a little higher in the uvea, that the cataract may not obstruct the ingress of the rays of light. The cataracta that accompany this disorder are usually very small, and sometimes their adhesion to the iris is so firm, as to render it impracticable to couch or suppress them. Heister.

PUPILLARITY, or PUPILLAGE, the state of a pupil; in opposition to *puberty*.

PUPPET, in *Natural History*. See AURELIA.

PUPPIS, a name given by some authors to the os frontis.

The future in this bone is also called by many anatomists the *future puppis*.

PUPULÆ, a name used by some to express the extremities of the fingers.

PUR *autre vie*, in our *Law-Books*, is used where lands are held for the life of another.

PURA *elemosina*, PURE *alms*, denotes a tenure, whereby the churchmen hold lands in Scotland, somewhat on the footing of the primitive clergy.

PURA *hostia*. See HASTA.

PURBECK *stone*, the *saxum arenarium cinereum Purbeccnse* of Da Costa, and *plinthorum fissilis albidi fulcum* of Hill, is an alkaline sand stone, which is harsh and rough, of a disagreeable ashen colour, very heavy, and moderately hard, of a texture not very compact, but somewhat porous, and is composed of an angular grit, cemented together by an earthy spar: it cuts freely, and with a tolerable even or smooth surface, but will not take a polish. It will not strike fire with a steel, and burns to a white colour. The quarries of this stone are in the

iſland of *Purbeck* in Dorſetſhire, whence it is brought to London in great quantities, and uſed in building, and for pavements. There is alſo another kind of *Purbeck* ſtone, the *ſaxum fuſco-albidum* of Da Coſta, and the *ſymphytum duriſſimum, ſplendidum albicio-fuſcum* of Hill, which is alkaline, of a dull, diſagreeable, pale, brownith white colour, and is not capable of a poliſh, though it cuts to a very ſmooth ſurface: it is of a fine, cloſe, compact texture, not quite deſtitute of brightneſs, but full of ſparks of pure ſpar, and intimately mixed with vaſt quantities of ſmall pectunculi, which are often ſaturated and filled with the ſame ſubſtance; it is very heavy and hard, and water does not pervade its texture; it does not ſtrike fire with ſteel, and when burnt, acquires a clear aſhen colour. This ſtone is brought from *Purbeck*, and uſed in building, pavements, &c. Hill informs us, that it is likewiſe found in many other parts of the kingdom, and that there are large ſtrata of it in Yorkſhire. Da Coſta's Foſſils, p. 128—152.

PURCELAIN. See PORCELAIN.

PURCHASE, in *Law*, in its largeſt and moſt extenſive ſenſe, is defined by Littleton to be the poſſeſſion of lands and tenements, which a man hath by his own act or agreement, and not by deſcent from any of his anceſtors or kindred. In this ſenſe it is contradiſtinguiſhed from acquiſition by right of blood, and includes every other method of coming to an eſtate, but merely that by inheritance; wherein the title is veſted in a perſon, not by his own act or agreement, but by the ſingle operation of law. *Purchaſe*, in its vulgar and confined acceptation, is applied only to the acquiſition of goods, lands, tenements, or the like, by means of money, or ſome other valuable conſideration.

What we call *purchaſe*, *perquiſitio*, the feudiſts call CONQUEST, *conquiſtus*, or *conquiſitio*; both denoting any means of acquiring an eſtate out of the common courſe of inheritance; and this is ſtill the proper phraſe in the law of Scotland. The difference, in effect, between the acquiſition of an eſtate by deſcent and by *purchaſe*, conſiſts principally in theſe two points. 1. That by *purchaſe* the eſtate acquires a new inheritable quality, and is deſcendible to the owner's blood in general, and not the blood only of ſome particular anceſtor. 2. An eſtate taken by *purchaſe* will not make the heir anſwerable for the acts of the anceſtor, as an eſtate by deſcent will. According to this legal ſignification of the word *perquiſitio*, or *purchaſe*, it includes the five following methods of acquiring a title to eſtates, viz. ESCHEAT, OCCUPANCY, PRESCRIPTION, FORFEITURE, and ALIENATION, conveyance, or *purchaſe*, in its limited ſenſe: under which latter head may be compriſed any method wherein eſtates are voluntarily reſigned by one man, and accepted by another; whether that be effected by ſale, gift, marriage ſettlement, deviſe, or other tranſmiſſion of property, by the mutual conſent of the parties.

Natural perſons, incorporate perſons, ſole or aggregate, deaf, dumb, and blind perſons, minors, and all reaſonable creatures, may *purchaſe*, except in ſome caſes; but ſome have capacity to *purchaſe*, and not to hold; as aliens, felons, &c. and others have ability to hold or not to hold upon a *purchaſe*, at the election of themſelves or others, as infants, and feme coverts. 1 Inſt. 2, 3. 11 Rep. 77. 7 Rep. 17.

PURCHASE *and value of land.* Lands are *purchaſed* at diverſ rates in this kingdom, according to their ſituation, &c. An eſtate of fee ſimple in lands, is uſually valued in the country at twenty years *purchaſe*. Lands near London yield about twenty-five years *purchaſe*; and in Wales not above eighteen or nineteen. The fee of tithes of perpetual advowſons is worth about twenty-two years *purchaſe*; and fee-farm rents iſſuing out of lands, and the fee of ground-rents, are rated at twenty-four or twenty-five years *purchaſe*. The fee of houſes in London ſells for ſeventeen or eighteen years *purchaſe*, if in good repair, and the ground-rents are not high; otherwiſe, for leſs. Houſes not in London, but well ſituated, without any lands to them, are ſold for fifteen or ſixteen years *purchaſe*. For a leaſe of a houſe for thirty years, about eight years *purchaſe* is given in London; and for one-and-twenty years about ſix years value. A freehold leaſe for three lives abſolute, or a copyhold eſtate for the like term, where the quit-rents and heriots reſerved are not higher than uſual, is rated at fourteen years *purchaſe*; for the firſt life eight, for the ſecond four, and two for the third life; or ſeven, five, and two. A chattel leaſe for three lives, thirteen years *purchaſe*. The exchanging one life for another is generally one year's *purchaſe*; but if a ſickly life be exchanged for a healthy one, two or three years *purchaſe*. A widowhood in a copyhold, after the death of the huſband a third life, is valued at one year's *purchaſe*. The fee in reverſion after lives, is worth nine, ſeven, and five years' *purchaſe*, after one, two, or three lives; and more where there is timber, or the eſtate is improvable.

PURCHASE *of writs.* See WRIT.

PURCHASE, in the *Sea-language*, has the ſame ſignification with *draw in*, at land. Thus, they ſay, *the capſtern purchaſes apace*, i. e. draws in the cable apace; and, when they cannot draw or hale any thing in with the tackle, they ſay, *the tackle will not purchaſe.*

PURCHASE is alſo a name given by ſailors to any mechanical power employed in raiſing or removing heavy bodies, or in fixing or extending the ſhip's rigging. Such are the tackles, windlaſſes, capſterns, ſcrews, and handſpikes.

PURCHASE-*book*, among *Traders*, is the name given to a book which is a kind of journal, containing an account of all the purchaſes made, or things bought in the day.

PURE, ſomething free from any admixture of foreign or heterogeneous matters.

PURE *fire.* See FIRE.

PURE *hyperbola*, in *Conics*, is an hyperbola without any oval, node, ſpike, or conjugate point. See CURVE.

PURE *mathematics.* See MATHEMATICS.

PURE *propoſition.* See PROPOSITION.

PURE *quadratics.* See QUADRATIC.

PURE *reſignations.* See RESIGNATION.

PURE *villenage.* See VILLENAGE.

PURETTA, a name given by ſome writers to the common ſhining black ſand, uſed to ſtrew over writing, and erroneouſly called by ſome *ſteel-duſt*.

It is a natural mineral ſubſtance, found on the ſhores near Genoa, and in other places.

PURFLEW, a term in *Heraldry*, expreſſing ermines, peans, or any of the furs, when they compoſe a bordure round a coat of arms.

Thus they ſay, he beareth gules a bordure, *purfleW*, vairy; meaning, that the bordure is vairy.

PURGATION, *purgatio*, the act of *purging*, ſcouring, or putifying a thing, by ſeparating and carrying off any impurities found therein.

PURGATION, in *Pharmacy*, is the cleanſing of a medicine by retrenching its ſuperfluities; as taking the wood and ſeeds out of caſſia, and the ſtones out of dates, tamarinds, and other fruits.

PURGATION is alſo uſed, in *Chemiſtry*, for ſeveral preparations of metals and minerals, intended to clear them of their impurities; more uſually called *purification* and *refining*.

The ordinary *purgation* of MERCURY is performed, by paſſing it through a chamois ſkin. Gold is *purged* by the coppel, cementation, &c. See GOLD, COPPEL, &c.

Purgation, in other metals, is performed by repeated FUSION, &c.

PURGATION, *cathorſis*, in *Medicine*, is an excretory motion, ariſing from a quick and orderly contraction of the fleſhy fibres of the ſtomach and inteſtines; whereby the chyle, corrupted humours, and excrements, lodged therein, are protruded farther and farther, and at length quite excluded the body by ſtool.

Purgation is one of the principal ſpecies of EVACUATION. For the means and manner wherein it is effected, ſee PURGATIVE.

PURGATION, in *Law*, is the clearing one's ſelf of a crime, whereof publicly ſuſpected or accuſed before a judge, called alſo *judicium Dei*.

Of theſe *purgationes* there was anciently much uſe in England, eſpecially touching matters of felony charged on clerks; and there is ſomething of them ſtill retained in the eccleſiaſtical court in ſuſpicion of incontinency, &c. *Purgation* is either *canonical*, or *vulgar*.

PURGATION, *canonical*, is that preſcribed in the canon-law, the form whereof, obtaining in the ſpiritual court, is, that the party ſhall take his oath he is clear of the fact objected; and bring ſo many of his honeſt neighbours, not above twelve, as the court ſhall aſſign him, to ſwear, on their conſciences, that they believe he ſwears truly.

The canonical doctrine of *purgation*, whereby the parties were obliged to anſwer upon oath to any matter, however criminal, that might be objected againſt them, continued till the middle of the laſt century to be upheld by the ſpiritual courts; when the legiſlature was obliged to interpoſe, to teach them a leſſon of ſimilar moderation. By the ſtatute of 13 Car. II. cap. 12. it is enacted, that it ſhall not be lawful for any biſhop, or eccleſiaſtical judge, to tender or adminiſter to any perſon whatſoever, the oath uſually called the oath *ex officio*, or any other oath whereby he may be compelled to confeſs, accuſe, or purge himſelf of any criminal matter or thing, whereby he may be liable to any cenſure or puniſhment. But this doth not extend to oaths in a civil ſuit; and, therefore, it is ſtill the practice both in the ſpiritual courts, and in equity, to demand the perſonal anſwer of the party himſelf upon oath. Yet if in the bill any queſtion be put, that tends to the diſcovery of any crime, the defendant

may

may thereupon demur, and refuse to answer. Anciently, upon the allowance of the *benefit of* CLERGY, the perſon accuſed was delivered to the ordinary, to make his *purgation*, which was to be before a jury of twelve clerks, by *his own oath affirming* his innocence, and the oaths of twelve *compurgators* as to their belief of it. But now, by the ſtatute 18 Eliz. cap. 7. this kind of *purgation* is alſo taken away; and the perſon admitted to his clergy ſhall not be delivered to the ordinary.

PURGATION, *vulgar*, being the moſt ancient manner, was by fire, or water, or combat; uſed by infidels, and by Chriſtians too, till aboliſhed by the canon-law. See ORDEAL and COMBAT.

Combat, though now diſuſed, may yet be ſtill practiſed by the laws of the realm, in caſes where evidence is wanting, and where the defendant rather chooſes combat than any other trial. See COMBAT.

Terris, bonis, &c. reſtituendis poſt PURGATIONEM. See TERRIS.

PURGATION, in *Rhetoric*, is uſed for that kind of defence which takes place when the accuſed perſon owns the fact, but denies that he did it with deſign, or with any bad intention.

PURGATION, in *Tragedy*, is a term which Ariſtotle uſes for the effect of tragedy on the mind.

That philoſopher obſerves, that tragedy, by means of the terror and compaſſion which it excites, *purges* paſſions out of the ſoul.

Indeed, Corneille adds, that TRAGEDY frequently creates paſſions, inſtead of *purging* them; ſo that he takes Ariſtotle's *purgation* to be no more than a chimera.

PURGATIONS, *menſtrual*, the catamenia or MENSES of women.

PURGATIVE, or PURGING *medicine*, a medicament, which evacuates the impurities of the body by ſtool; called alſo CATHARTIC.

Purgatives are divided, with regard to their effect, into *gentle*, *moderate*, and *violent*.

Gentle purgatives are ſuch as operate very mildly, as tamarinds, caſſia, manna, rhubarb, ſena, and moſt of the mineral waters.

The *moderate* purge ſomewhat more briſkly; as jalap, ſcammony, &c.

The *violent* operate exceſſively; as coloquintida, hellebore, lamech, &c.

Purgatives are again divided, with regard to the humour they evacuate, into *phlegmagogues*, *cholagogues*, *melanagogues*, and *hydragogues*; each whereof ſee under its proper article.

The modern phyſicians reject this diviſion; and ſhew the operation of all *purgatives* to be alike.

Purgatives make one of the moſt important articles in medicine. Their effect is produced by vellicating and irritating the nervous fibres of the ſtomach and inteſtines, and thereby urging them to an expulſion.

An idea of the manner of their operation is thus given by Dr. Cheyne.

A purgative medicine being received into the ſtomach by the mouth, its particles do there vellicate or ſtimulate the fibres of the ſtomach, and thereby increaſe the digeſtive faculty; i. e. they bring the muſcular fibres of the ſtomach, and the muſcles of the abdomen and diaphragm, into more frequent contractions than ordinary, till the medicine is admitted into the inteſtines; the fibres and glands whereof being more ſenſible than thoſe of the ſtomach (whoſe parts, by the frequent rough contacts of one againſt another, and of the groſs bodies often thrown into it, are, as it were, deadened) it eaſily moves, and brings them into frequent forcible contraction, whereby theſe glands are ſqueezed, and ſo emit a fluid matter, which lubricates the paſſages, and which, mixing with the feculent matter of the inteſtines (which is rendered fluid by the ſame active and ſtimulating quality of the *purgative* medicine) renders it more fluid; by which, and by the uncommon contractions of the inteſtines, it paſſes more eaſily and plentifully into the inteſtinum rectum, and is thence ejected by ſtool.

Thus do gentle purges act, and only cleanſe the inteſtines, few of their particles entering in by the lacteal veins, ſo as to affect the blood. But in violent *purgatives*, the ſtimulating particles are mixed with the blood, and produce there, many times, very great effects, by occaſioning unnatural fermentations, by ſeparating the natural coheſions of the fluids of the body; and they do alſo, by vellicating the ſpiral fibres of the veins and arteries, bring thoſe into more forcible contractions, and thereby accelerate the motion of the blood; all which may have ſometimes a good, but ſometimes a bad, effect.

As to the effects of *purgatives* on animal bodies, Dr. Quincy adds, that every irritation of the inteſtines either quickens the periſtaltic motion in its natural direction, or occaſions ſome little inverſions of it. Now, in both caſes, any matters, that but ſlightly adhere to the coats, or inner membranes, will be looſened and ſhaken off, and carried forward with the other contents; and they will alſo be more agitated, and thus rendered more fluid.

Hence it is manifeſt, how a *purging* medicine haſtens and increaſes the diſcharges by ſtool; but the ſame manner of operation alſo carries its effects much farther, in proportion to the force of the ſtimulus: for, where it is great, all the appendices of the bowels, and even all the viſcera in the abdomen, will, by a conſent of parts, be pulled or twitched, ſo as to affect their reſpective juices, in the ſame manner as the inteſtines themſelves do their contents. The conſequence of which muſt be, that a great deal will be *drained back* into the inteſtines, and made a part of what they diſcharge. And, when we conſider the vaſt number of glands in the inteſtines, with the outlets of thoſe viſcera opening thereunto, and particularly of the liver and pancreas, it will be no wonder that vaſt quantities, eſpecially in full conſtitutions, may be carried off by one *purge*.

As to thoſe *purgatives*, diſtinguiſhed by the names of *cholagogues*, *hydragogues*, *phlegmagogues*, on a ſuppoſition of an ejective quality therein, they may be accounted for upon more intelligible principles: for, when the diſcharges by ſtool diſcover an over-proportion of any particular humours, it is always to be ſuppoſed there was a redundance of ſuch a humour, whoſe *diſcharge any irritation* would have occaſioned. Thus, in proportion to the proximity of ſome humours in the inteſtinal tube, and the diſpoſition of the paſſages to convey them that way, do they require greater or leſſer vibrations or ſhakes of the fibres to fetch them out.

For this reaſon, the briſker cathartics, which vellicate the membranes moſt of all, pump out, as it were, from all the inteſtinatic glands, and neighbouring parts, their contents, which, becauſe they abound ſo much with lymphatics, and viſcid watery humours, make the diſcharges thin and watery.

Thoſe which act in a ſomewhat lower degree, yet irritate enough to deterge and draw out a great deal of mucous and viſcid matter, which, ſometimes by lodgment, and want of due motion, changing into various colours, occaſions the different names of *phlegm* or *choler*: as the former, therefore, paſs for hydragogues, ſo do the latter for purgers of phlegm and choler. But there is another principle, beſides that of a ſtimulus, whereby a purging medicine is enabled to anſwer its intention; viz. by ſuiting the humours, and rendering them more fluid than before, whereby they are better fitted to paſs off by their proper emunctories. Thoſe which conſiſt of very ſubtile and active parts, are not ſo ſenſible in the larger paſſages, becauſe of the great quantities of matter, which lay too great a load upon them, and make them unbended; but when they are got into the blood in any conſiderable number, they diſſolve and ſuſe thoſe coheſions, which obſtruct or move heavily along the capillaries, and ſcour the glands; inſomuch that every pulſation throws ſomething through the interſtitial glands, which goes away by ſtool, that the reſluent blood has waſhed away, and brought back, from all parts of the body.

Of this kind are all thoſe cathartics, which are ſaid to purge the joints, and are preſcribed in rheumatiſms, and arthritic pains; as the radix turpethi, and all the aloetics. And this is the reaſon why purging medicines of this ſort are ſo eaſily changed into the moſt efficacious alteratives; for an alterative is a cathartic in a low or degree, or of a more remiſs operation. Whatſoever brings ſuch particles to a ſecretory orifice, which are fitted for its paſſage, either by accelerating the blood's motion, or breaking it into more particles of that particular ſize and diſpoſition, will increaſe the ſecretion. According, therefore, to the difference of the parts where ſuch ſecretions are enlarged, as the glands of the inteſtines, kidneys, or ſkin, are the medicines, which are the inſtruments therein, called either *cathartics*, *diuretics*, or *diaphoretics*.

Quincy has made ſome improvements in the doctrine of *purging* medicines, their nature, manner of action, effects, and analogy with other medicines; with the circumſtances of their preparation, management, &c. in a diſcourſe inſerted in the Philoſophical Tranſactions; the ſubſtance of which we cannot do better than here ſubjoin.

In order herein, it is to be premiſed, 1. That all thoſe parts of an animal body, which are veſicular, or through which any fluid paſſes from the inteſtines to the minuteſt fibre, are the ſeat of the operation of medicines.

2. That this whole courſe of circulation, or animal motion, is naturally diſtinguiſhed into three different ſtages, by the different capacities of the veſſels, and motions of their contents, each having its proper outlet; and that theſe are the ſeat of the three concoctions ſo often mentioned by phyſical writers: the firſt being the ſtomach

and bowels, and having the anus for its emunctory: the ſecond, all that ſpace within the blood's motion, ſo far as it retains its red colour, having the kidneys; and the third, all beyond that circuit, having the ſkin for an excretory organ.

3. That every medicine which cauſes evacuation, is, in ſome ſenſe, a *purge*.

4. That every *purge* operates either as a diſſolvent, by fuſing the juices, and increaſing the quantity fit for expulſion; or, as a ſtimulus, by accelerating their motions, ſo as to bring the matter fit for expulſion oftener to the ſecretory outlet, or both.

Theſe poſtulata are only premiſed, in order to prove this grand propoſition, that a change in the bulks, figures, and motions, of the component particles of a purging medicine, will change the ſeat of its operation, and fit it for exertion in the larger or ſmaller veſſels, as thoſe mechanical affections are intended or remitted.

For illuſtration hereof, it may be convenient to attend to the common way of making a *purge* operate more or leſs than it otherwiſe would do.

Subſtances, then, which are groſs and heavy, as thoſe conſiſting chiefly of ſaline and earthy particles, ſuch as tartar, manna, and the like, when reduced ſmaller by triture, or by repeated ſolutions, operate more gently; but when actuated by acids, or any way made to expoſe their angles more plentifully to the membranes, they become rougher, and ſooner take effect.

Reſinous medicines, as ſcammony, gamboge, jalap, and moſt vegetable productions, are more violent, and operate ſooner, when they are more tenacious and adhetive, as in their extracts; but are gentler, when divided by hard brittle ſubſtances, ſuch as ſalt of tartar, ſugar, &c.

Medicines, which have in their compoſition ſulphur and ſalt, are more or leſs rough and ſpeedy in their operation, in proportion to their greater or leſs participation of the ſaline ingredient, and the aſperity of its angles. Of this kind are moſt minerals, and their preparations: it may be ſufficient to inſtance in the management of antimony and mercury; the firſt of theſe is, by chemical analyſis, known to be a compoſition of a ſubtile ſulphur and ſalt; and the more the ſaline part is ſet looſe by preparation, and *ſpuing* the ſulphur, as it is commonly termed, the ſpeedier, and with the greater vehemence, will it operate; whereas, in its more imperfect preparations, when the ſalts are cloſely wrapped up in their native ſulphur, it will hardly work at all, till it reaches the fartheſt ſtages of circulation.

Mercury *per ſe* is little uſed as a medicine; and its firſt preparation, which makes it into a ſublimate, ſo loads it with ſaline ſpiculæ, that it amounts even to a poiſon; but the more thoſe ſpiculæ are broken by triture, ſublimation, &c. the milder doth it operate; and, if to the comminution of its points be added a ſulphur ſubtile enough to join it, it may be reduced to ſo mild a medicine as not to be felt, but in the laſt ſtage of operation.

This ſhort view may be ſufficient to ſhew, 1. That it is the too great aſperity and motion in a medicine, that will not ſuffer it to paſs the ſtomach, without irritating it into ſuch convulſions, as will throw it up again by vomit.

2. That a farther comminution, and ſmoothing its figure, will gain it admittance into the bowels, and cauſe it to operate, as a proper *purgative*, by ſtool.

3. That a yet farther remiſſion of theſe properties will convey it into the blood, and allow it there to promote evacuation by urine.

And, laſtly, that a ſtill farther comminution will paſs it into the minuteſt canals, where, by the ſame properties, only in a lower degree, it will cauſe ſweat, or increaſe perſpiration.

Hence it appears, that the more ſubtile medicines operate in the capillaries, and ſmalleſt fibres, by the ſame mechaniſm that the more groſs ones do in the common ſtream of the blood, when they go off by urine; or as the groſſeſt of all do in the greater paſſages, when they promote evacuation by ſtool.

Hence it is evident, that the ſkill of preparing and adminiſtering medicines conſiſts in proportioning their manifeſt and known properties to the capacity and circumſtances of the part they are to operate in; and to intend or remit their mechanical affections, as they are ſooner or later to take place in the greater or ſmaller veſſels.

Of the firſt claſs, or gentle purging medicines, there are few that can be reduced ſmall enough to go beyond the larger paſſages, and none of them are worth the pains they require to fit them farther than for diuretics; beſides, their natural diſpoſition to attract and join with the ſerous part of the blood, whenever they get into that ſtage of motion, runs them off by the kidneys, before they can undergo comminution enough to get farther; but if, by frequent repetitions of ſuch medicines, and an uncommon laxity of the paſſages, any parts are paſſed into the habit, their groſſneſs fouls the delicate ſtrainers, which are deſtined for their expulſion; and they lodge upon the glands and capillaries in ſuch a manner, as to induce intermittents; which are obſervable, in many perſons, after a long uſe of cream of tartar, the common cathartic ſalts, and the purging waters, eſpecially at the latter end of the ſummer, when the heat of the preceding ſeaſon has debilitated the ſolids, and left them under too great a relaxation.

Among the reſinous purges, there are many very powerful ones; but where their operation is deſired in the viſcera, blood, and remoter parts, they muſt be extremely divided; and this we find ſpirituous menſtruums will beſt do, by taking up the moſt ſubtile parts only, and carrying them into the very ſmall paſſages, where they operate chiefly by fuſion; becauſe the ſottneſs of ſuch ſubſtances cannot enable them, hardly in any degree, to act as ſtimuli, farther, at leaſt, than ordinary detergents. And thus we find, that aloes, the chief of this tribe, goes fartheſt into the habit, and continues longeſt before it operates, when managed with a ſpirituous menſtruum, as in the tinctura ſacra. The rad. turpethi, and colocynth likewiſe, with all of the vegetable kind, that will yield to a ſpirituous liquor, may, by that means, be carried into the fartheſt ſcenes of animal action, where they will prove efficacious medicines in caſes which, with other management, they would never be able to reach, and, on this account, it muſt undoubtedly have been, that we frequently meet, in practical writers, with many materials of this ſort mentioned as alteratis; the colocynth particularly by Helmont: for all medicines, which operate in the fartheſt paſſages, they commonly include under that general appellation.

But the moſt efficacious purges, and thoſe which require the moſt ſkill in the managing, are procured from the mineral kingdom: theſe abound in ſolidity beyond any other materials; and therefore, wherever they are brought into action, they neceſſarily excel in the quantity of impulſe; many of theſe, therefore, want not only the utmoſt comminution to carry them into the farther ſcenes of operation, but alſo ſome reſtraint of their aſperities and motions, to fit them for many intentions. Thus, ſublimate is not only to be much ſweetened, that is, ſmoothed in its points, to make it a ſafe purge in the larger veſſels; but if it be intended to go farther than the blood, and thoſe glands, which, in that circuit, it is moſt apt to be lodged upon when it ſalivates, it muſt not only be rendered very fine, but alſo covered with ſuch ſubſtances as weaken its points, and make it paſs into the laſt ſubdivisions of the conſtitution. To this purpoſe, the common practice wiſely contrives in diſtempers, which, according to the courſe of circulation, lie moſt remote, to wrap up the baſis of this medicine in fuligo, and ſuch like ſubſtances, as follow it into its laſt diviſion, without giving it any aſperities to make it act as a ſtimulus. Thus, for all cutaneous foulneſſes, and halituſ tainted, the cinnabar, the æthiops, and all of that ſortment, are in readineſs; and that ordinary ſulphurs will cover and deaden the efficacies of mercurial preparations, ſo that they ſhall not operate, but in ſuch parts only, and in ſuch circumſtances, is demonſtrable in ordinary ſalivations, which are to be lowered by ſulphureous medicines.

Medicines from ſuch minerals, where a ſalt and ſulphur are united by nature, as they are in ſome mercurials by art, as antimony, the native cinnabar, ſteel, &c. are manageable only upon the ſame principles; and the more they are deſigned to be carried into the habit, the more are they to be reſtrained by their natural or adventitious ſulphurs. Steel, when opened by, and joined with, the points of acid liquors, operates the ſooner, and will ſometimes prove even emetic; but when it is covered with an additional ſulphur, it will go farther, and anſwer intentions much more remote; as is manifeſt in the common preparations of ſteel with tartar or vinegar, and with ſulphur.

This way of reaſoning, on theſe occaſions, ſeems the more juſt, from conſidering the texture of thoſe ſubſtances, which, by a natural preparation, are fitted for operation in the minuteſt part of an animal body; ſuch as thoſe of the aromatic kind, all which, more or leſs, according to their greater or leſs degree of ſubtilty and ſmoothneſs, promote a diaphoreſis; for theſe conſiſt of exquiſitely fine ſalts, covered with a moſt ſubtile ſulphur, as is demonſtrable by chemical analyſis; and the common ſal volatile oleoſum is an admirable contrivance upon the ſame foundation, where a very volatile animal ſalt is covered with a moſt exalted vegetable oil, whereby it is fitted to paſs into the minuteſt fibres, and make, as it were, a part of the animal ſpirits themſelves.

And here it may not be amiſs to obſerve, that all animal ſalts are very volatile, or eaſily rendered ſo; but when bare and naked, juſt as the fire draws them out, with a

mixture also of its own particles in their composition, they are too pungent to be felt without painful sensations; and, when softened with a fine portion of somewhat of an opposite texture, which is smooth and yielding, they become most efficacious and safe sudorifics.

On these considerations, it likewise ceases to be a wonder, why the subtile salts of cantharides are more sensibly injurious to the bladder than to any other parts; and why camphor prevents those injuries; for the exquisite smallness of those spiculæ makes them imperceptible, but in the most minute canals, into which the fibres, composing the membranes of the bladder, are known to be divided; and camphor blunts their irritations, because its extreme subtilty enables it to follow them into those meanders, and there to sheath their asperities.

To this purpose is very remarkable what many now commonly practise in guarding even mercurials against their stimulating properties, and sending them into the finest passages to operate by fusion, and the bare force of impulse; for not only calomel and the mercurius dulcis may be restrained from manifest operation in the wider passages, and the glands about the mouth, but even the mineral turbith, which of itself, in a small dose, will operate powerfully by vomit and stool, will not, when mixed with camphor, be so much felt in those respects, but will go into the farthest circuit of motion, and promote the cutaneous discharge in a more efficacious manner than any medicine of less specific gravity. In this management, the camphor is to be mixed but a very little while before taking, otherwise it has not the effect; which appears to proceed from its great volatility, which makes it, in a great measure, exhale, while it stands mixed in the medicine.

As to the doses of *purgatives*, Dr. Cockburn attempts to determine them on the following suppositions. 1. That no part of them operate, but in the blood. 2. That they operate there by changing the blood, and other circulating fluids derived from it.

From which postulata, he concludes, that, in the same constitution of blood, the dose required to produce the like effects, must be proportionable to the blood's quantity; so that where a certain dose is required to alter one pound of blood, for instance, to a certain degree, there will be required a double dose to alter two pounds to the same degree, and a triple dose to three pounds, &c. And universally, if the quantity of blood *b* require the dose *d*, the quantity *m b* requires the dose *m d*. For as $b : d :: mb : md$.

We have had attempts of adjusting the doses of *purgative* medicines scientifically. Dr. Cockburn endeavoured at the solution of this problem, but, it is said, on wrong principles. Dr. Balguy has also given us an essay on this subject in the Med. Ess. Edinb. vol. iv. art. 5.

He assumes, that part of the medicine is spent on the first passages, where it acts as a stimulus; and that the other part is carried into the blood, and has its effect there by thinning and rarifying it. This being premised, 1st. If the medicine acts only in the first passages, the dose will be as the size of the person into the constitution. 2d. If the whole medicine passes into the blood, the dose will be as the size into the square of the constitution; and therefore, 3d. You are to dose so much of the medicine as is spent on the stomach and intestines directly, as the constitution; and so much as is carried into the blood, as the square of the constitution, and the sum into the person's size, is the quantity required.

The same rules hold in vomits. How far in either case the practice of physic may be thereby improved, we leave to the judgment of the learned. The solution of the problem supposes a great posse comitatum, no less than the art of measuring a person's constitution.

PURGATORY, *purgatorium*, in the Romish church, a place where the just are supposed to suffer the pains due to their sins, for which they have not satisfied in this world.

It is by the mercy of God, the indulgences of the church, and the prayers of the faithful, that people are supposed to be delivered out of *purgatory*.

This doctrine of *purgatory*, which some derive from the Platonic fancies of Origen, the Montanists of Tertullian, pretended visions, and pagan stories, rhetorical flourishes, and doubtful expressions of the later fathers, and in which we may discern an obvious resemblance to the famous pagan doctrine, concerning the purification of departed souls, by means of a certain kind of fire, was partly introduced, at least in the spirit of it, towards the close of the fifth century, and by Gregory the Great in the sixth century; but it was not, however, positively affirmed till about the year 1140, nor made an article of faith till the council of Trent. Sess. 25. Decret. de Purgat. See PAPERY.

In Ireland is a place called St. Patrick's *purgatory*, where, as the legend has it, at the prayers of St. Patrick, bishop of the place, there was made a visible representation of the pains which the wicked undergo after death, in order to deter sinners, &c.

PURGE, in *Medicine*, a term frequently used for a dose of some purgative medicine.

PURGING *ale*, *Butler's*. See ALE.

PURGING *cassia*, *nut*, in *Botany*. See SESAMUM.

PURGING *nut*, in *Botany*. See CASSADA, and CROTON.

PURGING *thorn*. See BUCKTHORN.

PURIFICATION, in *Chemistry*, &c. the act of *purifying* or refining natural bodies; or of separating the faces and impurities therefrom.

For the methods of *purifying* metals, gold, silver, iron, copper, tin, &c. see GOLD, SILVER, &c. and REFINING.

For the *purification* of semi-metals, minerals, and other matters, as antimony, sulphur, camphor, salt petre, &c. see ANTIMONY, SULPHUR, CAMPHOR, &c.

PURIFICATION, in *Pharmacy*. See TRYING.

PURIFICATION, in *Matters of Religion*, denotes an offering made the priest by women rising out of child-bed, before they are re-admitted into the church.

By the law of Moses, a woman, after bringing forth a male child, was unclean forty days; after a female, eighty days; during which time, she was not to touch any thing holy, nor to go near the temple, but was to continue within doors, separate from all company, and commerce of others.

This term expired, she was to present herself at the temple, and at the door of the tabernacle, to offer a lamb, as an holocaust, and a pigeon or turtle; which the priest taking, offered to God, and prayed for her, that she might be *purified*.

This ceremony, which consisted of two things, an holocaust, and a sacrifice of expiation, was called טהרה טהר, *purificatio*, *purgatio*.

The holy Virgin, though, according to the fathers, exempt from the terms of the law, yet complied therewith, and, at the time prescribed, went to the temple, and accomplished the law: in commemoration whereof, the church yearly solemnizes the feast of the Purification of the Virgin, on the second of February; called also the *feast of* CANDLEMAS.

PURIFICATION, *the feast of the*, seems to be very ancient. It is ordinarily said to have been instituted in the time of Justinian, in the year 542, and this on occasion of a mortality, which that year depeopled almost the whole city of Constantinople. Yet there are some, who imagine it to have been observed before, though in another manner, and on a different day from that fixed by Justinian; viz. between the Circumcision and Epiphany. See CANDLEMAS.

The same day is the presentation of our Saviour in the temple.

PURIM, a solemn feast held among the Jews on the fourteenth and fifteenth of March, in memory of their deliverance from the conspiracy of Haman by Esther. See ESTHER.

This feast, which derives its name from the Persian word *purim*, q. d. *lots*, because it was by the casting of lots that Haman determined this time for the destruction of the Jews, is the Bacchanals of these people, which they celebrate with all manner of rejoicing, mirth, and jollity; indulging themselves in every kind of luxury, especially in drinking wine even to drunkenness, which they consider as part of the duty of the solemnity; because it was by means of the wine banquet (they say) that Esther made the king's heart merry, and brought him into that good humour, which inclined him to grant the request presented by her for their deliverance; and, therefore, they think they ought also to make their hearts merry, when they celebrate the commemoration of it. During this festival the book of Esther is solemnly read in all their synagogues from the beginning to the end, at which they are all to be present, men, women, children, and servants, because all shared in the benefit of the deliverance which Esther obtained for them. And as often as the name of Haman occurs in the reading of this book, the custom is for all to clap with their hands, and stamp with their feet, and cry out, Let his memory perish. Prideaux's Conn. vol. ii. p. 456.

PURITANS, in *Ecclesiastical History*. See CATHARI and NOVATIANS.

PURITANS is also a term anciently used for the Calvinists of Great Britain, from their professing to follow the pure word of God, in opposition to all traditions, human constitutions, and other authorities.

The separation, whence this distinguishing appellation took its rise, commenced on the following occasion. Upon the accession of queen Mary, it is well known that popery revived in this kingdom; the statutes of king Ed-

ward were repealed, and the penal laws againſt heretics were put in execution againſt the reformers. Many ſuffered at home; and others eſcaped the fury of perſecution by ſeeking refuge in foreign countries. Some went into France and Flanders; ſome to Geneva; and others into thoſe parts of Germany and Switzerland, where the reformation had taken place, and where the magiſtrates received them with great humanity, and allowed them places for public worſhip. The exiles were moſt numerous at Frankfort; and there that conteſt and diviſion began, which gave riſe to the *Puritans*, and to that ſeparation from the church of England, which continues to this day. In the year 1554, ſome of the Engliſh fugitives ſettled in this city; and agreed to conduct their worſhip, without anſwering aloud after the miniſter, and without uſing the liturgy and ſurplice; to begin the public ſervice with a general confeſſion of ſins, then to ſing a pſalm, after which the miniſter prayed for the divine aſſiſtance, and next proceeded to the ſermon; after ſermon, a general prayer for all eſtates, and particularly for England, at the end of which was ſubjoined the Lord's prayer, and a rehearſal of the articles of belief; then the people were to ſing another pſalm, and the miniſter to diſmiſs them with a bleſſing. Such was the order which they had unanimouſly adopted; and having choſen a miniſter and deacons, they invited their diſperſed brethren to join with them. In the year 1556, Dr. Cox, afterwards biſhop of Ely, came to ſettle at Frankfort with ſeveral of his friends; who, interrupting the public ſervice by anſwering aloud after the miniſter, and reading the whole litany, in violation of the agreement upon which the congregation was formed, overpowered the firſt ſettlers; and obtaining leave of the magiſtrates for the free uſe of king Edward's ſervice book, performed divine worſhip according to the rites that had been authoriſed by that prince; while others, who preferred the Genevan method of worſhip, as more pure and ſimple, left the city of Frankfort, and removed to Baſil and Geneva. Thus commenced the diſtinction of *Puritans* and *Conformiſts*, by which the two parties were afterwards known. The former were called *Conformiſts*, on account of their compliance with the eccleſiaſtical laws enacted by Edward VI. and the denominations of *Nonconformiſts* and *Puritans* were given to the latter, from their inſiſting upon a form of worſhip, more exempt from ſuperſtition, and of a purer kind than the liturgy of Edward ſeemed to them to be. Upon the acceſſion of queen Elizabeth, the exiles returned to England, where each party ſtrove to advance the reformation according to their own ſtandard. The queen, with thoſe who had weathered the ſtorm at home, were only for reſtoring king Edward's liturgy; but the majority of the exiles were for the worſhip and diſcipline of the foreign churches, and refuſed to comply with the old eſtabliſhment, declaiming loudly againſt the popiſh habits and ceremonies. However, the queen's party prevailed; and in 1559 a committee of divines was appointed to review king Edward's liturgy, who were inſtructed to ſtrike out all offenſive paſſages againſt the pope, and to make people eaſy about the belief of the corporal preſence of Chriſt in the ſacrament. But no alterations were made in favour of thoſe who now began to be called *Puritans*, from their attempting a purer form of worſhip and diſcipline than had yet been eſtabliſhed; and whoſe ſentiments in many points were agreeable to thoſe maintained by John Wickliffe, the firſt reformer. For they agreed with him in opinion, that in the ſacrament of orders there ought to be but two degrees, preſbyters or biſhops, and deacons; that all human traditions are ſuperfluous and ſinful; that we muſt practiſe and teach only the laws of Chriſt; that myſtical and ſignificant ceremonies in religious worſhip are unlawful; and that to reſtrain men to a preſcribed form of prayer is contrary to the liberty granted them by God. The old feſtivals, with their eves and the popiſh habits, were continued as they were in the ſecond year of king Edward VI. In 1558 the act of ſupremacy was paſſed, in which there is a remarkable clauſe, that gave riſe to the court of *high commiſſion*, which proved afterwards ſo oppreſſive; and in 1559 was paſſed an act for the uniformity of common prayer, and ſervice in the church, and adminiſtration of the ſacraments. The *Puritans* remonſtrated againſt theſe proceedings, and complained, that the groſs ſuperſtitions of popery, which they had looked upon as abrogated and aboliſhed, were now revived, and even impoſed by authority. Some required nothing leſs than that the church of England ſhould be exactly modelled after that of Geneva; others only deſired liberty of conſcience, with the privilege of celebrating divine worſhip in their own way; but neither party obtained the object of their wiſhes. The queen intent upon the ſuppreſſion of this troubleſome ſect (as ſhe was uſed to call it) permitted its enemies to employ for that purpoſe all the reſources of artifice, and all the ſeverity of the laws. The court reformers pleaded, that every prince had authority to correct all abuſes of doctrine and worſhip within his own territories; the *Puritans*, on the other hand, whilſt they diſowned all foreign authority and juriſdiction over the church, could not admit of that extenſive power which the crown claimed by the ſupremacy; apprehending it unreaſonable, that the religion of a whole nation ſhould be at the diſpoſal of a ſingle lay perſon. However they took the oath, with the queen's explication in her injunctions, as reſtoring her majeſty only to the ancient and natural rights of ſovereign princes over their ſubjects.

Farther, the court reformers allowed, that the church of Rome was a true church, though corrupt in ſome points of doctrine and government; that all her miniſtrations were valid, and that the pope was a true biſhop of Rome, though not of the univerſal church. But the *Puritans* affirmed the pope to be antichriſt, the church of Rome to be no true church, and all her miniſtrations to be ſuperſtitious and idolatrous; they renounced her communion, and durſt not ſuſpend the validity of their ordinations upon an uninterrupted line of ſucceſſion from the apoſtles through her hands. Moreover it was agreed by all, that the holy ſcriptures were a perfect rule of faith; but the biſhops and court reformers did not allow them to be the ſtandard of diſcipline or church government; affirming that our Saviour and his apoſtles left it to the diſcretion of the civil magiſtrate, in thoſe places where Chriſtianity ſhould obtain, to accommodate the government of the church to the policy of the ſtate. But the *Puritans* apprehended the holy ſcriptures to be a ſtandard of church diſcipline as well as of doctrine; at leaſt that nothing ſhould be impoſed as neceſſary but what was expreſly contained in, or derived from them by neceſſary conſequence; and, beſides, they maintained that the diſcretionary power was not lodged with the civil magiſtrate, but with the ſpiritual officers of the church. Farther, the court reformers maintained, that the practice of the primitive church for the firſt four or five centuries was a proper ſtandard of church government and diſcipline, and in ſome reſpects a better than that of the apoſtles, which (according to them) was only accommodated to the infant ſtate of the church while it was under perſecution, whereas theirs was ſuited to the grandeur of a national eſtabliſhment. Whereas the *Puritans* were for adhering to the Bible in the main principles of church government, and for admitting no church officers or ordinances, but ſuch as are herein mentioned; and they apprehended, that the apoſtles, in eſtabliſhing the firſt Chriſtian church on the ariſtocratical plan then obſerved in the Jewiſh ſanhedrim, deſigned it as an unchangeable model to be followed in all times and places. The court reformers alſo maintained, that things indifferent in their own nature, which are neither forbidden nor commanded in the holy ſcriptures, ſuch as rites, ceremonies, habits, &c. might be ſettled, determined, and made neceſſary by the command of the civil magiſtrate, and that in ſuch caſes it was the indiſpenſible duty of all ſubjects to obſerve them. But the *Puritans* inſiſted, that thoſe things which Chriſt had left indifferent ought not to be made neceſſary by any human laws, and that ſuch rites and ceremonies as had been abuſed to idolatry, and had a manifeſt tendency to lead men back to popery and ſuperſtition were no longer indifferent, but to be rejected as unlawful. Nevertheleſs, both parties agreed too well in aſſerting the neceſſity of an uniformity of public worſhip, and of calling in the ſword of the magiſtrate for the ſupport and defence of their ſeveral principles; which they made an ill uſe of in their turns, as they could graſp the power into their hands. The ſtandard of uniformity, according to the biſhops, was the queen's ſupremacy, and the law of the land; according to the *Puritans*, the decrees of provincial and national ſynods, allowed and enforced by the civil magiſtrate; but neither party were for admitting that liberty of conſcience, and freedom of profeſſion, which is every man's right, as far as is conſiſtent with the peace of the government under which he lives.

In the year 1564, upon a report that the habits, enjoined on the clergy, were generally neglected, and alſo of inattention to other impoſed forms, the queen directed the eccleſiaſtical commiſſioners to conſult ſome proper methods to reduce them to an exact uniformity; upon which they agreed on certain *advertiſements* (as they were called) partly for due order in preaching and adminiſtering the ſacraments, and partly for the apparel of eccleſiaſtical perſons. To theſe advertiſements certain proteſtations were annexed, to be made, promiſed, and ſubſcribed by ſuch as ſhould hereafter be admitted to any office or cure in the church. The queen, though ſhe would give no authority to the advertiſements, which had occaſioned much

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remonſtrance and complaint, iſſued out a proclamation in 1565, peremptorily requiring uniformity in the habits, upon pain of prohibition from preaching, and deprivation. Parker, the archbiſhop of Canterbury, was violent and unrelenting; and by various methods of ſeverity harraſſed, ſilenced, and deprived many of thoſe who ſcrupled the uſe of the habits. The ſuſpended miniſters, finding that renewed applications to the queen and her commiſſioners were ineffectual, publiſhed in 1566 a ſmall treatiſe in vindication of their conduct; in which they allege, that neither the prophets of the Old Teſtament, nor the apoſtles in the New, were diſtinguiſhed by their garments; that a diſtinction of garments in the Chriſtian church did not generally obtain till long after the riſing of antichriſt; that the garments againſt which they objected, had been abuſed to idolatry, ſorcery, and all kinds of conjurations; that they were an offence to weak Chriſtians, an encouragement to ignorant and obſtinate papiſts, and the uſe of them an affectation of returning to their communion; that at beſt they were only human appointments, ſubject to the apoſtle's reproof; Col. ii. 20—22. that allowing them to be indifferent (which they did not grant) yet they ought not to be impoſed, becauſe it was an infringement of the liberty with which Chriſt had made them free; and finally they urged the ſuffrage of foreign divines, who all condemned the habits, though they were not willing to hazard the reformation in its infancy, on account of them.

If, at this time, the habits and a few ceremonies had been left indifferent, both miniſters and people would have acquieſced; but it was the compelling of theſe things by law that made them ſeparate from the eſtabliſhed church. Accordingly, in 1566, they came to a reſolution, alledging it to be their duty, in their preſent circumſtances, to break off from the public churches, and to aſſemble, as they had opportunity, in private houſes, or elſewhere, to worſhip God in a manner that might not offend againſt the light of their conſciences; and it was debated among them, whether they ſhould uſe as much of the common prayer and ſervice of the church as was not offenſive, or reſolve at once, ſince they were cut off from the church of England, to ſet up the pureſt and beſt form of worſhip, moſt conſonant to the holy ſcriptures, and to the practice of the foreign reformers. The latter of theſe meaſures was concluded upon; and accordingly they laid aſide the Engliſh liturgy, and made uſe of the Geneva ſervice book. However, it is neceſſary to obſerve, that though all the *Puritans* of theſe times would have remained in the church, if they might have been indulged in the habits and a few ceremonies, yet they were far from being ſatisfied with the hierarchy. They had other objections beſides thoſe for which they were deprived; of which we ſhall here ſubjoin a ſummary. They complained of the biſhops affecting to be thought a ſuperior order to preſbyters, and claiming the ſole right of ordination, and the uſe of the keys; and aſſuming, in connection with their office, temporal dignities, titles, and employments. As long, however, as the Engliſh biſhops pretended to derive their dignity and authority from no other ſource than the laws of their country, and pleaded a right, merely human, to the rank they held in church and ſtate, the controverſy was carried on without exceſſive animoſity and zeal; but the flame broke out with redoubled fury in the year 1588, when Bancroft, afterwards archbiſhop of Canterbury, ventured to aſſert that the order of biſhops was ſuperior to the body of preſbyters, not in conſequence of any human inſtitution, but *jure divino*, or by the expreſs appointment of God himſelf. Farther, the *Puritans* excepted againſt the titles and offices of archdeacons, deans, chapters, and other officials, belonging to cathedrals, as having no foundation in Scripture, or primitive antiquity, and intrenching upon the privileges of the preſbyters in the ſeveral dioceſes. They complained of the exorbitant power and juriſdiction of the biſhops and their chancellors in their ſpiritual courts, as derived from the canon law of the pope, and not from the word of God, or the ſtatute law of the land. They lamented the want of a godly diſcipline, and were uneaſy at the promiſcuous and general acceſs of all perſons to the Lord's table. Though they did not diſpute the lawfulneſs of ſet forms of prayer, provided a due liberty was allowed for prayers of their own compoſure before and after ſermon, yet they diſliked the frequent repetition of the Lord's prayer in the liturgy, the interruption of the prayers by the frequent reſponſes of the people, ſome paſſages in the office of marriage, as *With my body I thee worſhip*, and in that of burial, as *In ſure and certain hope of the reſurrection to eternal life*, pronounced over the worſt of men, if not excommunicated, &c. They alſo objected againſt the reading of the apocryphal books in the church, while ſome parts of canonical Scripture were omitted; and though they did not diſlike the homilies, they thought that no man ſhould be ordained a miniſter in the church, who was not capable of preaching and expounding the holy ſcriptures. They diſapproved of ſeveral of the church feſtivals or holidays, as having no foundation in Scripture, or primitive antiquity; and they diſallowed of the cathedral mode of worſhip; nor did they approve of muſical inſtruments in the church ſervice. Finally, they ſcrupled conformity to certain rites and ceremonies, which were enjoined by the rubric, or the queen's injunctions; as the ſign of the croſs in baptiſm, baptiſm by midwives or other women, in caſes of ſickneſs, and the mode of churching women; the uſe of god-fathers and god-mothers, to the excluſion of parents from being ſureties for the education of their own children; the cuſtom of confirming children, as ſoon as they could repeat the Lord's prayer and their catechiſm, by which they had a right to come to the ſacrament, without any other qualification, and the impoſition of hands, as a ſign of the divine favour, which ſeemed to them to imply a ſacramental efficacy in this ceremony; kneeling at the ſacrament of the Lord's ſupper, whilſt they conſidered that Chriſt gave it to his diſciples rather in a poſture of feaſting than of adoration; that it had no foundation in antiquity; that it had been groſly abuſed by the papiſts to idolatry in their adoration of the hoſt, and that, if the poſture were indifferent, it ought not to be impoſed as a neceſſary term of communion; nor did they approve of adminiſtering either of the ſacraments in private, even in caſes of danger; bowing at the name of Jeſus; giving the ring in marriage, which they conſidered as derived from the papiſts, who make marriage a ſacrament, and the ring a ſort of ſacred ſign or ſymbol; the prohibition of marriage during certain times of the year, and the licenſing it for money; and, laſtly, the wearing of the ſurplice, and other veſtments to be uſed in divine ſervice.

In points of doctrine there was, at this time, no difference between the *Puritans* and *Conformiſts*; and if we add one article more to the preceding, we ſhall have the principal heads of controverſy between the church of England and the proteſtant diſſenters at this day; viz. the natural right which every man has to judge for himſelf, and make profeſſion of that religion he apprehends moſt agreeable to truth, as far as it does not affect the peace and ſafety of the government under which he lives; without being determined by the prejudices of education, the laws of the civil magiſtrate, or the decrees of councils, churches, or ſynods.

Towards the latter end of queen Elizabeth's reign, there aroſe a party, which were firſt for ſoftening, and then for overthrowing, the received opinions concerning predeſtination, perſeverance, free-will, effectual grace, and the extent of Chriſt's redemption. The clergy of the epiſcopal church began to lean towards the notions concerning theſe intricate points, which Arminius propagated ſome time after this; while, on the other hand, the *Puritans* adhered rigorously to the ſyſtem of Calvin. Several epiſcopal doctors remained attached to the ſame ſyſtem in the reign of James I. &c. and all theſe abettors of Calviniſm, whether epiſcopal or preſbyterian, were called *doctrinal Puritans*. At length, according to Mr. Fuller (Church Hiſt. book ix. p. 97. book. x. p. 100) the name was extended to ſtigmatize all thoſe who endeavoured in their devotions to accompany the miniſter with a pure heart, and who were remarkably holy in their converſation; ſo that a *Puritan* was a man of ſevere morals, a Calviniſt in doctrine, and a non-conformiſt to the ceremonies and diſcipline of the church, though he did not totally ſeparate from it.

Queen Elizabeth was violent in her oppoſition to the *Puritans* through the whole courſe of her reign; and beſides the ordinary courts of the biſhops, ſhe erected, as we have already obſerved, a new tribunal, called the court of *high commiſſion*, which ſuſpended and deprived men of their livings, not by the verdict of twelve men upon oath, but by the ſolemn determination of three commiſſioners of her own nomination, founded not upon the ſtatute law of the realm, but upon the canon-law; and inſtead of producing witneſſes in open court to prove the charge, they aſſumed a power of adminiſtering an oath *ex officio*, whereby the priſoner was obliged to anſwer all queſtions the court ſhould put to him, though never ſo prejudicial to his own defence. If he refuſed to ſwear, he was impriſoned for contempt; and if he took the oath, he was convicted upon his own confeſſion.

During the reign of James I. from whom the *Puritans* expected more indulgent treatment, they were treated with great ſeverity, and many of them obliged to leave the kingdom, and retire to Holland; and from thence conſiderable numbers migrated to America, in the year 1620. All were *Puritans*, in the eſtimation of king James,

who adhered to the laws of the land in oppoſition to his arbitrary government, though otherwiſe ever ſo good churchmen. Theſe were called *Puritans in the ſtate*; and thoſe who ſcrupled the ceremonies, and adhered to the doctrines of Calvin, were *Church Puritans*, who, though comparatively few, yet being joined by thoſe of the other claſs, became the majority of the nation. The ſucceſs that attended the firſt emigrators, who ſettled in that part of America, afterwards called New Plymouth, engaged great numbers of *Puritans*, who groaned under the oppreſſion of the biſhops, and the ſeverity of a court, by which this oppreſſion was authoriſed, to follow the fortunes of theſe religious adventurers; and this produced a ſecond emigration in the year 1629, which gave birth to the ſecond grand colony, commonly known by the name of the Maſſachuſet's Bay. The colony of Connecticut was formed by emigrants of the ſame claſs in 1646, and that of New Haven in 1637, who fled from the perſecution of Laud, and the oppreſſions of the Star-chamber and High-commiſſion courts. Afterwards, when the *Puritans* were not allowed to tranſport themſelves to New England, many of them removed, with their families, into the Low Countries.

After the reſtoration of Charles II. in the year 1662, the name of *Puritans*, ſays biſhop Burnet, was changed into that of *Proteſtant* NON-CONFORMISTS, who were ſubdivided into PRESBYTERIANS, INDEPENDENTS, ANABAPTISTS, and QUAKERS. At this time a public law, called the *Act of Uniformity*, was enacted, by which all who refuſed to obſerve the rites, and ſubſcribe the doctrines, of the church of England, were entirely excluded from its communion. From this period until the reign of king William III. the *Non-conformiſts* were in a precarious and changing ſituation, ſometimes involved in calamity and trouble, and at other times enjoying ſome intervals of tranquillity and certain gleams of hope, according to the varying ſpirit of the court and miniſtry, but never entirely free from perplexities and fears. But in the year 1689, their affairs took a favourable turn, when a bill for the toleration of all Proteſtant DISSENTERS from the church of England, except the Socinians, paſſed in parliament almoſt without oppoſition, and delivered them from the penal laws to which they had been ſubjected by the act of uniformity, and other acts paſſed under the houſe of Stuart. For the preſent ſtate of the toleration, ſee TOLERATION. See alſo CORPORATION *act* and TEST. Neal's Hiſt. of the Puritans, in 4 vols. 8vo. paſſim.

PURITY, in *Oratory*, is one of the conſtituent parts of ELEGANCE, and denotes the choice of ſuch words and phraſes as are ſuited and agreeable to the uſe of the language in which we ſpeak. Grammarians reduce the faults which they oppoſe to it to two forts, which they call BARBARISM and SOLECISM; the former of which reſpects ſingle words, and is an offence againſt etymology; and the latter, their conſtruction, or is an offence againſt ſyntax: to which Dr. Campbell adds a third claſs of faults, under the denomination of impropriety, which is an offence againſt lexicography, the buſineſs of which is to aſſign to every word of the language the preciſe meaning or meanings which uſe hath aſſigned to it. Dr. Ward recounts the principal things, that vitiate the *purity* of language. It often happens, he ſays, that ſuch words and forms of ſpeaking, as were introduced by the learned, are afterwards dropped by them, as mean and ſordid, from a ſeeming baſeneſs contracted by vulgar uſe: and it is common to language, with all other human productions, that it is in its own nature liable to a conſtant change. Hor. Art. Poet. v. 68. We muſt, therefore, no leſs abſtain from antiquated, or obſolete words and phraſes, than from ſordid ones. On the other hand, we ſhould refrain from new ones, or ſuch, whoſe uſe has not been yet ſufficiently eſtabliſhed, at leaſt among thoſe of the beſt taſte. Beſides, any miſtake in the ſenſe of words or their conſtruction, is oppoſed to *purity*, for to ſpeak purely is to ſpeak correctly. And farther, a diſtinction ought to be made between a poetic diction, and that of proſe writers: for poets in all languages have a ſort of peculiar dialect, and take greater liberties, not only in their figures, but alſo in their choice and diſpoſition of words; ſo that what is a beauty in them, would often appear unnatural and affected in proſe. Ward's Or. vol. i. p. 368, &c. Campbell's Phil. of Rhet. vol. i. p. 469, &c.

PURLIEU. See PURLUE.

PURLINS, in *Building*, thoſe pieces of timber that lie acroſs the rafters on the inſide, to keep them from ſinking in the middle of their length.

PURLUE, PURLIEU, or POURALLER, formed from the French *pur*, *pure*, and *lieu*, *place*, is all that ground near any foreſt, which, being added to the ancient foreſt by our kings, was, by perambulation granted by ſome of their ſucceſſors, ſevered again from the ſame, and made *purlieu*, i.e. pure and free from the laws and obedience of the foreſt.

A *purlieu*, or *pouralloe*, is defined a circuit of ground adjoining to the foreſt, and circumſcribed with immoveable boundaries, known only by matter of record; which compaſs of ground was once foreſt, and afterwards was diſafforeſted by the perambulations made for ſevering the new foreſt from the old.

Purlieus, or *pouralloes*, commenced after the manner following. King Henry I. at his acceſſion to the crown in 1154, took ſo much delight in the foreſts of this kingdom, that, not being contented with thoſe he found here, though many and large, he began to enlarge divers of them, and to afforeſt the lands of his ſubjects near adjoining to the ſame.

His ſucceſſors, Henry II. and Richard I. far from retrenching or reſtoring any thing, made ſtill farther encroachments: and thus did the lands continue till the 17th year of king John; at which time, the grievance being grown notorious, and generally felt by all degrees of people, divers noblemen and gentlemen beſought the king to grant, that they might have all thoſe new afforeſtations made by his predeceſſors aforeſaid, and by himſelf, diſafforeſted again; and the king, after much ſolicitation, was at length prevailed on to ſubſcribe and ſeal ſuch articles concerning the liberties of the foreſt, as they then demanded; being, for the moſt part, ſuch as are now contained in the charter of the foreſt.

Hereupon choice was made of divers noblemen, &c. to the number of twenty-five, who were ſworn, with others their aſſiſtants, to ſee the ſaid liberties, ſo granted and confirmed by the king, to be in every point obſerved.

But, before any thing was done to the purpoſe, king John died; and king Henry III. ſucceeding, freſh ſolicitations were made to him; who, for the better accompliſhing of the ſaid diſafforeſtation, ordered inquiſitions to be taken, by ſubſtantial juries, for ſevering all the new foreſts from the old: upon which, two commiſſioners were ſent to take thoſe inquiſitions; in virtue whereof, many great woods and lands were not only diſafforeſted, but were improved to arable lands by the owners thereof.

After this charter was made and confirmed, ſome of theſe new afforeſtations were perambulated, and proper inquiſitions taken, and the certainty was determined by matter of record, which were the old, and which the new: though it appears, that the greateſt part of the new afforeſtations were ſtill remaining during the life of king Henry III.

Under Edward I. freſh petitions and ſolicitations being ſet on foot, three biſhops, three earls, and three barons, were at length appointed to ſee theſe perambulations performed and continued; who cauſed them to be made accordingly, and inquiſitions to be taken thereupon, and returned into the court of chancery; and all thoſe that were ancient foreſt to be meered, and bounded with irremoveable boundaries, to be known by matter of record for ever.

Thoſe woods and lands, that had been newly afforeſted, the king likewiſe cauſed to be ſeparated from the *old*, and to be returned into the chancery by marks, meres, and bounds, to be known in like manner by matter of record for ever.

Thus it appears how the *purlieus*, or *pouralloes*, had their firſt beginning; for all ſuch woods and lands as were afforeſted by Henry II. Richard I. or king John, and, by perambulations, ſevered from the ancient foreſts, were, and yet are, called *pouralloes*, q. d. woods and lands ſevered from the old foreſts, and diſafforeſted by perambulation; *pouralloe* being the ſame as *perambulatio* in Latin.

But, notwithſtanding ſuch new afforeſtations were diſafforeſted by perambulation, whereby the ſame became *pouralloe*, or *purlieu*, yet they were not thereby ſo diſafforeſted as to every man, but that they do, in ſome ſenſe, continue foreſt ſtill as to *others*. For, by the words of *charta de foreſta*, if the king has afforeſted any woods or lands of his ſubjects, to the damage of the proprietors, they ſhould forthwith be diſafforeſted again; that is, only as to thoſe perſons, whoſe woods and lands they were; who, as the proper owners thereof, might fell and cut down their woods at their own pleaſure, without any licence from the king; as alſo convert their meadows and paſtures into tillage, or otherwiſe improve their ground to the beſt advantage. So alſo they might hunt, and chaſe the wild beaſts of the foreſt towards the ſame, &c. But no other perſon might claim ſuch benefit of hunting in the *pouralloe*, beſide the proper owner of the ſoil thereof, who is left at liberty to ſuffer the *pouralloe* to remain foreſt ſtill, as ſome, in effect, have thought moſt expedient, becauſe hereby entitled to the

benefit of the common within the foreſt, which otherwiſe they were excluded from. Hence, if the beaſts chance to wander out of the foreſt into the *pourallee*, the king hath a property in them ſtill, againſt every man, but the owner of the ground wherein they are, who hath a ſpecial property in them, *ratione ſoli*; yet ſo as he may only take them by hunting, or chaſing with his greyhounds, or dogs, without any foreſtalling or foreſetting them in their courſe again towards the foreſt.

Beſide what hitherto has been ſaid of the difference between foreſt and *purlieu*, or *pourallee*, there is this farther diverſity, that all the woods and lands within the regard of the foreſt, are abſolutely within the bondage or charge of the foreſt, as well in reſpect of the owners thereof, as of any other perſon; for no one may cut down his own woods, or improve his own lands, within the regard of the foreſt, without licence from the king, or his chief juſtice in eyre of the foreſt. Neither ſhall any perſon hunt, chaſe, or moleſt the wild beaſts of the foreſt in his ground, within the regard of the foreſt, without licence or warrant from the king, or his chief juſtice of the foreſt, ſo to do.

But thoſe, whoſe grounds are within the *pourallees*, are not ſubject to theſe reſtrictions. Yet are not the woods and lands in the *pourallees* abſolutely freed from the bondage of the foreſt, in reſpect of the wild beaſts having their haunts therein, when they happen to ſtray out of the foreſt; but, as they were once abſolutely foreſt, ſo they are ſtill conditionally ſo.

PURLIEU-*man*, or PURLIEU-*man*, or POURALLEE-*man*, is one who has land within the *purlieu*; and is allowed or qualified to hunt or courſe within the ſame, though under certain reſtrictions.

By ſtat. 13 Ric. II. he, who may lawfully hunt in any *pourallee*, ought to have woods or lands of freehold within the *pourallee*, to the yearly value of 40*l.* By ſtat. Jac. I. he ought to have lands of inheritance of the yearly value of 10*l.* or lands of freehold of the yearly value of 30*l.* or have goods worth 200*l.* or be the ſon of a knight or baron, or perſon of a higher degree, or ſon and heir apparent of an eſquire. But, by a later act, Car. II. no man may keep greyhounds within the *pourallee*, or elſewhere within England or Wales, unleſs he have a free warrant, or be lord of a manor, or ſuch a freeholder as is ſeiſed, in his own right, or in right of his wife, of lands, tenements, or hereditaments, of the clear yearly value of 40*l.* over and above all charges and reprizes of ſuch eſtate of inheritance; or of lands, tenements, or hereditaments, in his own right, or in right of his wife, for term of life or lives, of the yearly value of 80*l.* over and above all charges and reprizes, or that is worth in goods or chattels 400*l.*

The *pourallee*, or *purlieu*, then, is ſaid to be for him that is ſo qualified: others, not qualified, and therefore not *purlieu-men*, yet having land in the *pourallee*, may, if they find any wild beaſts of the foreſts in their own grounds within the *pourallee*, chaſe them thereout with little dogs; but not with greyhounds, or other dogs.

Nor is the *purlieu-man* left at large to hunt at his own diſcretion; but he is tied down to ſeveral rules: as,

1. That he always begin his chaſe in his own ground; and that, though he find ſuch wild beaſts in his own *pourallee*, and, in reſpect thereof, hath a property in them, *ratione ſoli*, againſt all perſons, but the king; yet ſuch his property is only on this condition, that he can lay them with his dogs in chaſe, without foreſtalling them, before they can recover the foreſt. If they be within the liſt of the foreſt, before the dogs faſten on them, they are the king's, or other owner of the foreſt.

2. But if the *pourallee-man* firſt make his chaſe in his own freehold, he may purſue the ſame through every man's ground, within the *pourallee*, and his dogs faſten on a wild beaſt, before he can get within the bounds of the foreſt, and the beaſt draw the dogs into the foreſt, and is there ſlain by them; here the *pourallee-man* ſhall not enter into the foreſt, nor take the beaſt ſo killed, becauſe his courſe was irregular from the beginning, as he could claim no property in the beaſt, *ratione ſoli*.

3. A *pourallee-man* may hunt in his own *pourallee* with no more company than his own ſervants; neither may he appoint, licenſe, or warrant any other perſon, except his ſervants, to hunt by his commandment in his *pourallee*.

4. Every *pourallee-man* is forbidden, by the laws of the foreſt, to hunt in his own grounds within the *pourallee* every day, or oftener than three days in any one week, Sunday excepted.

5. Nor is any man to diſturb, or make a courſe after any deer found in his *pourallee*, within forty days after the king hath made a general hunting in the foreſt adjoining thereunto; becauſe then the wild beaſts of the foreſt come not into the *pourallees* of their own accord, but as they are forced into the ſame by the hunters, with clamours, and blowing of horns, ſo that they fly thither for refuge.

6. No man ſhall hunt within ſeven miles of the borders of the foreſt, or in his own *pourallee*, within forty days next before the king hath iſſued out his proclamation, declaring his royal will and pleaſure to make a general hunting in that foreſt.

Inaſmuch as the *pourallees* were once, and in ſome ſenſe ſtill are foreſt, it was neceſſary to have officers to attend, and take on them the charge of the preſervation of the game that may happen to wander out of the foreſt into the *pourallees*; ſince otherwiſe the laws of the *pourallees* could not be executed, but the foreſt itſelf would ſoon be deſtroyed by the *pourallee*-men.

For this reaſon, rangers were firſt appointed, who, though not officers in the foreſt, yet appertain thereto; for all officers in the foreſt have charge of the vert and veniſon of the foreſt; but a ranger hath no charge of vert, but only of veniſon coming out of the foreſt, into the *pourallees*, his place of charge; from whence his office is to conduct the ſame back again into the foreſt.

This officer is appointed by the king, or his chief juſtice in eyre, and is made by patent, with a fee commonly of twenty, thirty, or forty pounds or more, by the year, payable out of the exchequer, as alſo certain fee-deer, both red and fallow, to be taken annually, at proper ſeaſons, out of the foreſt.

The ſubſtance of his oath is, to recháſe, and with his hounds drive back, the wild beaſts of the foreſt, as often as they range out of the ſame into his *pourallee*; to prevent all unlawful hunting and hunters of wild beaſts of venery and chaſe, as well within the *pourallees*, as within the foreſt; and to preſent thoſe and other offences, at the next court of attachments or ſwainmote, which ſhall firſt happen.

Rangers, it is to be obſerved, belong only to ſuch *pourallees* as were once the woods and lands of the ſubject, and were afterwards diſafforeſted again, and ſo became *pourallees*. Hence, as there are ſome foreſts in England, which never had any enlargement by new afforeſtations, and therefore have no *pourallees* at this day, there can be no rangers belonging to them.

PURPARTY (Fr. *pour part*, i. e. *pro parte*) is that part or ſhare of an eſtate, firſt held in common by parceners, which is by partition allotted to any of them. To make *purparty* is to divide and ſever the lands that fall to parceners, which till partition they held jointly, and *pro indiviſo*. Old Nat. Br. 11.

PURPLE, *purpura*, πορφυρα, a red colour, bordering on violet; now dyed chiefly with cochineal.

Purple was much eſteemed among the ancients; eſpecially the Tyrian *purple*, which underwent more dyes than the reſt, and which was almoſt peculiar to the emperors and kings. Yet this *purple* did not exceed that now in uſe: the chief reaſons why the ancient *purple* dye has been diſuſed, are, that the later is both cheaper and finer.

The ancient *purple* was tinged or given with the blood or juice of a precious turbinated teſtaceous ſea-fiſh, called by the Greeks πορφυρα, and by the Latins *purpura*; whereof we have deſcriptions in ſeveral authors, and ſhells in moſt of the cabinets of the curious. See PURPLE-*fiſh*.

The method of obtaining the colour, Mr. Cole (ſee PURPLE-*fiſh*) deſcribes thus:

The ſhell, which is very hard, being broken (with the mouth of the fiſh downwards, ſo as not to cruſh the body) and the broken pieces being picked off, there appears a white vein lying tranſverſly in a little furrow or cleft next the head of the fiſh.

In this vein is the *purple* matter lodged; ſome of which being laid on linen, appears at firſt of a light green colour; and, if expoſed to the ſun, ſoon changes into a deep green, and, in a few minutes, into a ſea-green, and, in a few more, into a blue; thence it ſoon becomes of a *purpliſh* red, and, in an hour more, of a deep *purple* red.

And here the ſun's action terminates; but by waſhing in ſcalding water and ſoap, and drying it, the colour ripens to a moſt bright and beautiful crimſon, which will bear waſhing admirably without the addition of any ſtyptic. While the cloth marked with this colour lies in the ſun, it will yield a very ſtrong and fœtid ſmell, as if garlick and aſſa fœtida were mixed together.

The juice which gives this beautiful *purple* colour is, ſays M. Du Hamel, while it remains in the body of the animal, and while that is in health, wholly white; but no ſooner is it expoſed to the ſun, than it begins to change colour, and in leſs than five minutes goes through the ſeveral changes of pale green, yellowiſh, and a beautiful emerald green; after this it becomes of a deeper

and darker green, then bluiſh, reddiſh, and finally a deep and very beautiful *purple*. Sometimes the juice is found naturally green in the animal; this is probably from the creature's being in a diſeaſed ſtate; but when it is naturally thus, it immediately becomes red, and afterwards *purple*, on being expoſed to the ſun, its ſeveral preceding changes ſeeming to have been made already in the body of the animal.

If a piece of linen be rubbed over with this juice, and part of it expoſed to the ſun, part not, that only will turn red which is ſo expoſed, the other remaining green without any alteration; and it is obſerved, that the ſtronger the ſun ſhines, the quicker the change appears, and probably the colour is in proportion alſo the more beautiful and lively. And it is very remarkable, that if a needle, or any other opake body, be laid upon the linen which is yet green, and is to become red on being expoſed to the ſun; after ſuch an expoſure the whole ſhall be changed red or *purple*, excepting only that ſmall ſpot which is covered by the needle, which will ſtill remain green.

A plate of glaſs, though it be three inches thick, will not prevent the colour from changing *purple* by being laid over it; but the thineſt piece of metal will keep it wholly green. The one being opake, and the other pellucid, are evidently the only reaſons for this difference.

If the coloured linen be ſucceſſively covered by three pieces of paper, the one blacked with ink, the other in its natural ſtate, and the third rubbed over with oil, it will change colour on being expoſed to the ſun in different degrees; and that exactly in proportion to the degree of tranſparence in each of the papers: moſt of all in that which was covered with the oiled paper; ſomething leſs in that covered by the paper in its natural ſtate; and leaſt of all in that which was covered with the blacked paper, as that is leaſt tranſparent.

The common heat of a fire, or that of a red hot iron, produce no change at all in the colour when green. The vapour of burning ſulphur produces a little; but the green which had not changed to *purple* by theſe experiments, immediately changed to it on being expoſed to the rays of the ſun.

Theſe experiments were all made in the months of January and February, by M. Du Hamel, in Provence; and the ſun having power to change the colour ſo ſpeedily there in theſe cold months, probably in a warmer climate or ſeaſon the air would have been ſufficient for the purpoſe, without the open ſun; ſince it ſeems, from experiment, that both the ſolar rays, and the light alone in a cloudy day, can act upon this colour. The light and heat of the ſun both act on this colour: light is always ſufficient to produce the effect; but the heat may eaſily be too great, or too little, and to do the whole in perfection it muſt be at a certain middle degree.

This beautiful *purple*, if it can ever be brought into uſe in dying, will have one very great advantage from its viſcoſity. The pieces of cloth that had been ſtained by it retained their colour, in ſpite of ſeveral boilings in different liquors, which M. Du Hamel made them paſs through; and the colour, on examination, was found not to be ſuperficial, but penetrated the whole body of the ſtuff, which was tinged by it. There are many inconveniences which muſt naturally attend the uſe of this ſubſtance as a dye, but they may, perhaps, all be got over by care and application. It is very certain, that it is of too viſcid a nature eaſily to penetrate many ſubſtances; but it is alſo certain, that this might be obviated by diſſolving it in ſome proper liquor. It appears very plainly, that the ancients had a method of thus diſſolving their *purple*; but we neither know what was their *purple*, nor what was its diſſolvent; nor, which would be of much more conſequence to us at preſent, what is the proper diſſolvent for our own. Mem. Acad. Scien. Par. 1736.

M. Reaumur has alſo diſcovered another very different kind of *purple*. This is produced in oval grains about a quarter of an inch long, full of a white liquor bordering on yellow, which cover certain ſhores or ſands, about which the buccina of Poictou uſually aſſemble.

By the experiments M. Reaumur has made, it appears that theſe grains are neither the eggs of the buccinum, nor the ſeeds of any ſea-plants, nor any riſing plants, but the eggs of ſome other unknown fiſh.

Theſe grains, being bruiſed on a white linen, at firſt only tinge it yellow, and that inſenſibly; but in three or four minutes they give it a very beautiful *purple* red, provided the linen be expoſed to the open air; for the air of a room, even though the windows be open, will not do. This colour fades, however, a little by repeated waſhings.

M. Reaumur concludes, from ſome experiments he made, that the effect of the air on the liquor does not conſiſt in its taking away any particles thereof, nor in giving it any new one, but only in its agitating it, and changing the arrangement of the parts that compoſe it. He adds, that the liquor of the buccinum, and that of the grains, ſeem to be nearly of the ſame nature; except that the latter is more watry, and only ſaline; whereas the other is hot, and pungent.

P. Labat gives us the deſcription of another *purple* dye, produced by a tree growing in the Antilles. The juice of this tree, when cut ſtanding, is of a blood-red, and communicates the ſame colour to cloths; though, like the former, it loſes much in often waſhing.

PURPLE, *Dying*. See DYEING.

PURPLE *Gold*. See GOLD *Precipitate*, &c.

PURPLE, in *Medicine*. The *purple fever*, *febris purpurea*, is a kind of plague, or a malignant fever diſcovering itſelf in cruptions on the ſkin like the bites of bugs or fleas, or like grains of millet, or the ſmall-pox; whence it is ſometimes alſo called the *ſpotted*, and *miliary* FEVER.

The cruptions are red, orange, violet, azure, livid, or black; and when they riſe in great quantity, it is eſteemed a good ſign. Sometimes they ſpread to a great extent, like erypelaſes, according to the quality of the poiſon.

PURPLE *apple*, in *Botany*. See *Coſſard* APPLE.

PURPLE-*fiſh*, *purpura*, in *Natural Hiſtory*, the name of a genus of ſhell-fiſh, the characters of which are theſe: it is an univalve ſhell, jagged and beſet from head to tail with ſpines, tubercles, umbos, or ſtriæ. The mouth is ſmall and roundiſh; the tail is ſhort, and uſually the baſe runs out into a long beak.

It has been uſual with moſt authors to confound together the genera of the murex and *purpura*, and to uſe the words as ſynonymous: but though there is ſome external reſemblance between many of the ſhells of the two genera, yet they are eaſily diſtinguiſhed by this, that the mouth of the *purpura* is leſs long, and is leſs dentated and alated than that of the murex. The body and the head of the ſhells of this genus are not ſo elevated as thoſe of the murex kind, and are not covered with points or buttons at the mouth. If a ſhell is therefore found to have a ſmall, ſmooth, and round mouth, and a body covered with undulated leaves, as it were, like thoſe of ſavory or endive, and ſometimes with long points, and its tail, whether long or ſhort, be hollowed and ſomewhat bent, this may be called a *purpura*, and not a murex. Linnæus makes the *purpura* a ſpecies of the MUREX.

The ancients diſtinguiſhed three kinds of *purpura*; one which had a long and crooked tail, made hollow like a tube or pipe; a ſecond which had either no tail at all, or at the moſt a very ſhort one; and a third which had no ſpiral head, or, as we ſhould expreſs it, no clavicle.

On examining the whole family of the *purpuræ*, we may diſtinguiſh four remarkable ſpecific differences among them. The firſt of theſe comprehends thoſe *purpuræ* which have the body of the ſhell garniſhed with a ſort of undulated foliage in clouded ridges, and have a ſhort and crooked tail. The ſecond comprehends thoſe which have the body of the ſhell covered with acute points, and have a long tail. The third comprehends thoſe which have as long a tail as the former, but have a ſmooth body, or at the utmoſt have only a few ſlight protuberances and wrinkles on it. And the fourth takes in thoſe which are ſmall, and have an elevated clavicle, a ſhort crooked tail, and the body of which is covered either with ſlender ſpines or hairs. See *Tab. of Shells*, N° 14.

This ſpecies of fiſh, as well as the murex, ſerved among the ancients to dye the fine *purple* colour they were ſo fond of, and ſome of the buccina (e. g. the *lapillus* of Linnæus) have been of late found to have the ſame juice. The *purpura* and murex are both filled up in great plenty in the gulph of Tarentum; but the ſmall quantity of the coloured juice which each fiſh contains, and the neceſſity of uſing it before the animal dies, makes it impoſſible to bring it to any regular article of traffick. The ancients uſed this colour only on cotton and woollen ſtuffs; whereas our cochineal, which was unknown to the ancients, ſtrikes equally well on ſilk and ſtuffs. Theſe ſhells are alſo found in various parts of the Mediterranean.

In the ſeas of the Spaniſh Weſt Indies about Nicoya, is found a ſhell-fiſh, which perfectly reſembles the ancient *purpura*, and, in all probability, is the very ſame. This fiſh, Gage tells us, uſually lives ſeven years; it hides itſelf a little before the dog-days, and continues to diſappear for three hundred days running.

They are gathered plentifully in the ſpring, and, by rubbing one againſt another, they yield a king of ſaliva or thick glair, reſembling ſoft wax; but the *purple* dye is in the throat of the fiſh, and the ſmall part is lodged in a little white vein; the reſt of the body is of no uſe.

He adds, that the chief riches of Nicoya consist in this fish. Cloth of Segovia, dyed with it, is sold for twenty crowns the ell; and none but the greatest Spanish lords use it.

There are also found upon the coasts of the South Sea near the equator, in the neighbourhood of point St. Helena, in the province of Guayaquil, certain sea-snails, as Don Antonio de Ulloa calls them, sticking to the stones, and covered by the sea at high water, about the size of small nuts, which contain a liquor or juice, that has the true colour of *purple*. The colour is very bright, and so durable, that washing rather increases than diminishes its lustre, nor does it fade or decay by use and wearing. Woven stuffs are not dyed with it, but only cotton threads. As soon as a sufficient quantity of the liquor is squeezed from the fish, the cotton thread is drawn through it, and it takes and retains the tincture without any farther trouble; but the *purple* colour is not discovered till the thread is dry, the juice being of a milky colour at first, but it soon changes into green, and at last settles in a *purple*.

Besides the Indian *purple* fishes, we have others much nearer home. In the Philosoph. Transact. abr. vol. ii. p. 823, we have an account of *purple* fish discovered in 1684, by Mr. W. Cole, on the coasts of Somersetshire, South Wales, &c. where it is found in great abundance.

The modern *purple* fish, M. Reaumur observes, is a kind of buccinum, a name given by the ancients to all fishes whose shell bears any resemblance to a hunting-horn; and it appears from Pliny, that part of the ancient *purple* was taken from this kind of shell-fish: so that this may be esteemed a recovery of what had been supposed entirely lost.

The fish, he observes, is good; and adds, that there are several kinds of it differing in size and shell, and also in the colour of the tinging liquor. There are some found on the coasts of Poictou.

The Caribbee islands have likewise their *purple* fish. This is called *lucuan*, being of the size of the end of the finger, and resembling our periwinkles: its shell is of a brownish azure, its flesh white, its intestines of a very bright red, the colour whereof appears through the body; and it is this that dyes the froth, which it casts forth when taken, and which is at first of a violet hue, bordering on blue.

To oblige them to yield the greater quantity of froth, they lay them on a plate, and shake and beat them against one another; upon which the plate is immediately covered with the froth, which is received on a linen cloth, and becomes *purple* in proportion as it dries.

P. Labat observes, that if this be the real Tyrian *purple*, the secret of preparing and fixing it is lost; this colour being found to dwindle and dissipate, in proportion as the linen dyed with it is washed.

The *purpura* lives on other fish. It usually hides itself at a small depth in the sand, sometimes even in fresh-water rivers, and as it lies hid, it thrusts up a pointed tongue, which wounds and kills any thing that comes over it. We frequently find sea-shells with round holes bored through them, as regularly as if made with a boring instrument: these are generally allowed to be made by the tongue of the *purpura*, in order to its feeding on the fish within.

The *purpura* has two horns like that of a snail; and Fabius Columna says, that they have eyes in these, not placed at the ends, as in the snail, but in the middle of each horn.

The *purpura* is a shell-fish very well known, and has been known also in almost all times to afford a *purple* liquor; but as there has been no method discovered of bringing this liquor into use in dying, the fish has been neglected, and its juice never attempted to be brought into use.

PURPLE-*wort*, in *Botany*, a name given to several species of TRICOLI.

PURPRESTURE, in our *Ancient Law Books*. See POURPRESTURE.

PURPRISUM, of the French *pourpris*, denotes a close, or inclosure: also the whole compass or extent of a manor or place.

Dantes eis unum purprisum *de Kirkeham, & domos meas, & molendinum, & prata*, &c. Charta Walteri Episc. Priorat. de Kirkeham.

PURPURA, *Persian*, the fame with the Persian shell, a species of DOLIUM.

PURPURE, POURPRE, or PURPLE, in *Heraldry*, according to some, is one of the five colours of armories, mixed or compounded of gules, and azure, bordering on violet; and, according to others, of a little black, and much red, colour. It is, by the heralds, supposed a symbol of temperance, liberality, dignity, authority, faith, and piety. Most authors in heraldry, as Favyn, Geliot, Monet, and Menestrier, do not allow *purple* for a colour, in regard it is not simple, but composed of a mixture of other colours. They rather esteem it a kind of intermediate tincture, sometimes metal, and sometimes colour: hence the Spaniards call it *una mistion*: so that one cannot lay it on metal and colour without falsifying the arms.

Add, that many take the *purple*, as it is accounted, on many ancient bearings, by which some of the moderns would evince the regularity and legitimacy of this colour in armory, to be no other than silver tarnished.

Spelman, however, in his Aspilogia, allows *purple* the preference before all other colours, as having been an ensign of royalty for many ages; yet even he allows it to have been excluded, by the ancient heralds, as only an imperfect colour.

It is represented in engraving, by diagonal lines drawn from the sinister chief to the dexter base point. Vid. *Tab.* II. *Herald. fig.* 81. In the coats of noblemen it is called *amethyst*; and in those of princes, *Mercury*.

PURPURATI, in our *Ancient Historians*, denotes the sons of emperors and kings.

PURPURINA, a name used by Caneparius, and some other authors, for the AURUM *mosaicum*, or *aurum musivum* of the shops, the present preparation of which differs from that of that author only in the proportions of the ingredients.

PURPURISSUS, in the *Ancient Writers*, both Greek and Roman, the name of a compound colour or fucus of a fine purplish red, used to paint women's cheeks.

It seems by the composition to have been somewhat like our rose-pink, as it is called by the colourmen. It was made of the *creta argentaria*, or fine white kind of chalk, dissolved in a strong purple tincture of some of the roots of woods which dyed red; and when the coarser part was subsided to the bottom of the vessel, the liquor, while yet thick, was poured off into another vessel; and what subsided from this, which was as fine as flour, was of a beautiful pale purple, and was the *purpurissus* saved for use.

PURREL, *anno* 35 Eliz. cap. 10. a list ordained to be made at the ends of kerseys, to prevent deceit in diminishing their length.

PURSE, a manner of accounting; or, as some call it, a species of money of account, much used in the Levant, particularly at Constantinople.

The *purse* consists of about five hundred dollars, or one hundred and twenty pounds sterling. It is so called, because all the grand signor's treasure in the seraglio is kept in leather bags of this value.

In this, however, there is some difference; for the *purse* in Egypt is twenty-five thousand medines, and in other parts of Turky it is only twenty thousand.

This method of accounting the Turks derive from the Greeks, and they from the Romans; the emperors whereof brought it to Constantinople, as appears from a letter of Constantine to Cecilian, bishop of Carthage, quoted by Eusebius and Nicephorus. See FOLLIS.

PURSER, an officer aboard a man of war, appointed by the lords of the admiralty, who receives her victuals from the victualler; and is to take care, that it be in good condition, and well laid up, and stowed. He is also to see that they are carefully distributed to the officers and crew, according to the instructions which he has received from the commissioners of the navy for that purpose. To him also belongs the distribution of the slops, &c.

He is also to keep a list of the men and boys belonging to the ship, and to set down, exactly, the day of each man's admittance into pay; that the paymaster or treasurer of the navy may issue out his disbursements, and pay off the men according to the muster-book.

PURSIVENESS, or PURSINESS, among *Farriers*, *thickness of wind*, a name common to all those diseases in horses, which arise from obstructions in the passages of the lungs.

Purfiveness, sometimes also called *broken wind*, may proceed from an ulcer, or some inward wasting of the lungs, wherein the small vessels are worn or abraded by the sharpness or acrimony of the common discharges.

The like disorder may also arise from a stagnation, hindering the air from penetrating so as to lift up the lungs in the act of respiration; or from some tough and mucilaginous matter separated in the branches of the wind-pipe.

The usual occasions are cold, surfeits, and other diseases not thoroughly carried off. *Pursive* disorders may also arise from unwholsome food, bad air, and hard riding when a horse is full. The signs are commonly a heaving and beating of the flanks; a wheezing and rattling. Sometimes the kernels about the throat will swell, and there

there will be a glandulous running at the nose, which is the utmost stage of the disease, and usually reputed desperate.

PURSLANE, *portulaca*, in *Botany*, a genus of the *dodecandria monogynia* class. Its characters are these: the empalement of the flower is small, bifid, and permanent, sitting upon the germen; the flower has five plain, erect, obtuse petals, and many hair-like stamina, about half the length of the petals, terminated by single summits; and a roundish germen, supporting a short style, crowned by five oblong stigmas; the germen afterward becomes an oval capsule with one cell, containing many small seeds. Miller enumerates four, and Linnæus seven species.

Purslane is propagated from seeds, which may be sown upon beds of light rich earth, during any of the summer months. This seed is very small, so that a little of it will be sufficient to supply a family. There is no other culture which this plant requires, but to keep it clear from weeds, and in dry weather to water it two or three times a week. In warm weather, this plant will be fit for use in six weeks after sowing; so that in order to continue a succession of it, you should sow it at three or four different seasons, allowing a fortnight or three weeks between each sowing. This will be sufficient to last the whole summer, while it is proper to be eaten, for being of a very cold nature, it is unsafe to be eaten, except in the heat of summer in England; for which reason it is not to any purpose to sow it upon a hot bed, since it will come early enough for use in the open air. Miller.

The leaves are much used as a sallad, being cooling, and good for the scurvy, attempering the heat of the bile, and relieving the strangury, heat of urine, and gonorrhœa. The seed is cooling and restringent, and good to kill worms.

PURSLANE, *Horse*. See TRIANTHEMA.

PURSLANE, *Sea*. See ORACH.

PURSLANE, *Water*, *peplis*, in *Botany*, a genus of the *hexandria monogynia* class. Its characters are, that it has a bell-shaped perianthium, divided into twelve segments, and six petals inserted in the empalement; the fruit is a double-celled capsule. There are two species.

PURSUIVANT. See POURSUIVANT.

PURVEYANCE. See POURVEYANCE.

PURVEYOR. See POURVEYOR.

PURVIEW, from the French *pourveu*, *a gift*, *grant*, *provision*, &c. a term frequently used, by Sir Edward Coke, for the body of an act of parliament, or that part which begins with *Be it enacted*, &c. as contradistinguished from the *preamble*.

The statute of 3 Hen. VII. stands upon a *preamble* and a *purview*. 12 Rep.

PURULENT, *purulentus*, in *Medicine*, something mixed with, or partaking of, pus or matter.

Phthisical people frequently spit a *purulent* matter. In a dysentery, the stools are *purulent*: when there is an ulcer in the reins or bladder, the urine is *purulent*.

The *purulent* eye is a disorder to which new-born children are subject; for the cure of which Mr. Ware recommends the application of astringents, on a conviction that the discharge is not real pus, but merely mucus, increased in quantity, and altered in colour, by some irritating cause. The remedy which he has found to be highly useful in this disorder, is the aqua camphorata of Bates's dispensatory, much diluted with water, and injected with a syringe. Ware's Remarks on the Ophthalmy, &c. 8vo. 1780.

PUS, formed of the Greek πυον, in *Medicine*, a putrid matter, white and thick, formed of blood corrupted in a wound or ulcer, and issuing out of the lips thereof.

Wounds are always to be kept open while they suppurate, i. e. while they generate *pus*.

A very small portion of *pus* absorbed into the blood-vessels, raises a putrid fever as certainly as yest does a fermentation in wort. This fever is not owing to its stimulating the solids to quicker and greater vibrations, but to its increasing the intestine motion, and accelerating the animal process, hastening the change of the juices to that subtle acrid state which renders them unfit to be retained in the body, and disposes them to run off in colliquative evacuations, such as sweating and purging, which constantly attend these putrid or hectic fevers, or rising to internal ulcers. Med. Ess. Edinb. vol. v. art. 77. See PUTREFACTION.

When *pus* is laudable and mild, it is one of the most powerful digesters, suppurants, and incarners; when it stagnates too long, or when the liquors and vessels are faulty, it may become an acrid, stimulating, eroding sanies; when absorbed into the blood, it affects all the liquors, stimulates the vessels, and is capable of producing violent disorders.

PUSHERS, a name given to Canary birds when new flown. See BRANCHER, and CANARY *bird*.

PUSILLATUM, a word used by some medical writers to express a course powder, or any medicinal substance, beat into small pieces for infusion, or the like purposes.

PUSTULE, *pustula*, a little pimple, or eruption, on the skin, full of pus; especially arising in the small and great pox. See EXANTHEMA.

PUSU, in *Botany*, the name of a famous plant growing in China, and greatly esteemed there. This and the ginseng these people a long time kept to themselves; but at length it was discovered, that the one was esteemed a certain prolonger of life, and the other a preservative against all diseases.

They, in their manner of speaking, say, that the *pusu* gives immortality. We have not been so happy to obtain any of this famous plant for the trial, but the ginseng having been brought over, and found not to possess those great virtues they ascribe to it, and the people in China, who are possessed of the *pusu*, dying, as well as those who have it not, we find, that the virtues of both are so greatly exaggerated by the Eastern dialect, that there is not much to be expected from them.

PUT, in the *Manege*, called in French *metre*, is used for the breaking or managing of a horse: thus,

To put a horse to corvets, or caprioles, is to teach him those parts of the manege.

To put a horse upon his haunches, called in French *asseoir*, is to make him bend them handsomely in galloping in the manege, or upon a stop. See HAUNCHES.

To put a horse to the walk, trot, or gallop, is to make him walk, trot, or gallop.

To put a horse under the button. See BUTTON.

PUTAGE, *putagium*, in our *Old Law Books*, denotes whoredom or fornication on the part of the woman.

The word is formed from the French *putte*, *whore*; *putagium*, q. d. *putam agere*. *Quid autem generaliter solet dici*, putagium, *hæreditatem non admittit; illud intelligendum est de* putagio *matris; quia filius hæreditagitimus est, quem utpiam demonstrant*. Glanv. lib. vii. cap. 12.

PUTANISM, *putanismus*, an Italian term, naturalised by some English writers, signifying *whoredom*, or the life or condition of a courtezan.

The word we borrow immediately from the French, *putanisme*; and they from the Italian, *puttana*, *whore*; of *putto*, *girl*.

PUTATIVE, *suppositive*, something reputed to be what it really is not.

The word is seldom used but in the phrase *putative father*. Thus we say, Joseph was the *putative father* of Jesus Christ.

PUTEAL, among the Romans, a small kind of edifice raised in the place where a thunder-bolt had fallen. See BIDENTAL.

PUTEOLANUS *pelvis*. See POZZOLANA.

PUTICULI, among the Romans, ditches or holes in the earth, a little without the Esquiline gate, in which the poorer sort of people were buried.

PUTLOGS, or PUTLOCKS, in *Building*, short pieces of timber, about seven feet long, used in building scaffolds. They lie at right angles to the wall, with one of their ends bearing upon it, and the other upon the ledges or poles which stand parallel to the side of the wall of the building.

PUTORIUS, in *Zoology*. See POLE *cat*.

PUTORIUS *serpens*, in *Zoology*, a name given by some to that species of serpent called by others DIPSAS.

PUTREFACTION, or PUTRIFACTION, in *Chemistry* and *Medicine*, is a species of FERMENTATION; being the last stage of the fermentatory process, and consisting not merely in the decomposition and transposition of the particles of putrefying substances, whether animal or vegetable, by which new combinations are produced, but also in the extrication and expulsion of some of the constituent parts of these substances.

In order to understand the modern theory of *putrefaction*, it will be necessary to recollect what has been already recited under the articles *fixed* AIR, DIGESTION, and FERMENTATION. It is sufficient to repeat in this place, that Dr. Hales ascribed the cohesion and solidity of bodies to the air, which exists in them in a fixed state, and forms, as he expresses it, the cement or bond of union between their several constituent particles. To this purpose he observes, that air abounds much more in solid than in liquid bodies; and that solid bodies being generally denser than water, the attraction of the air of these solid bodies in a fixed state, and its repulsion when in an elastic state, are greater than the attraction and repulsion of the lighter watery particles in a fixed and in an elastic state; and hence the particles of air are fitter to be the principal bond of union in solid bodies, than the

particles of water. This opinion was afterwards adopted by Baron de Haller, who maintains that air is the *vinculum elementorum primarium*, or the true cement which binds together the earthy particles of bodies. Dr. Macbride, as we have elsewhere shewn, has taken occasion, by a variety of experiments, to illuſtrate and eſtabliſh this opinion; and in ſupport of it he alledges, that the preſervation of firmneſs and ſoundneſs in bodies depends on reſtraining the eſcape of that principle, now known by the name of *fixed* AIR, and which he ſuppoſes to be the immediate cauſe of cohesion: for the moment it flies off and reſumes its elaſticity, the other conſtituent particles, viz. the earthy, the ſaline, the oily or inflammable, and the aqueous, being thereby put in motion, immediately begin to exert their ſeveral peculiar attractive and repulſive powers, and run into new combinations, which firſt change, and at length altogether deſtroy the texture of the ſubſtance they formerly compoſed; provided that this ſubſtance contained in itſelf a ſufficient quantity of water to allow of the inteſtine motion, by giving the proper degree of fluidity; for without fluidity there can be no inteſtine motion; and without inteſtine motion there can be no change of combination: becauſe we ſee that ſuch animal and vegetable bodies as are ſuddenly deprived of their water, or naturally contain very little, are almoſt as durable and unchangeable in their texture as minerals. Hence Acoſta obſerves, that in Peru, and others have obſerved the ſame in Egypt, where it very rarely rains, every thing will continue a long time uncorrupted: unleſs we ſhould rather aſcribe this effect to the abundance of nitrous ſalt in the air of thoſe places, which is known to reſiſt *putrefaction*. Indeed, all *putrefactions*, both of animal and vegetable bodies, are affirmed by the learned Boerhaave to be performed by means of water alone. Take, ſays he, a pound of freſh fleſh, and keep it in a heat like that of our body, and, in a few days, the *putrefaction* will be completed: but if you firſt drain out, or exhale, all the watery part from the ſame in ſome chemical veſſel, though the ſalt and oil remain, the fleſh will harden like a ſtone, and may be kept for ages without *putrefaction*. Though when thus hardened, water poured on it, or even the common dew, will ſoon ſet it a putrefying.

By ſuch means, bread, fleſh, or the like foods, may be preſerved for many ages; provided regard be had to the place. Hence it is, that in dry countries, as Egypt, dead carcaſes never putrefy, but dry and harden uncorrupted: as we ſee alſo in the mummies found buried under the ſand.

Even human blood, which, naturally, is ſo prone to *putrefaction*, if you deprive it of its watery part, may be kept for fifty years. Goat's blood, we actually find, kept ſo long in the ſhops, without corrupting; though, if you diſſolve it in water, and expoſe it to a gentle warmth, it will putrefy immediately. See BLOOD.

In *putrefaction* there is a great inteſtine motion, which, when carried to an extreme, and when the putrefying ſubſtance is much compreſſed, is accompanied with heat and ſmoke, and ſometimes flame. However, M. Beaumé affirms, that *putrefaction* is not attended with any ſenſible heat: when, indeed, it proceeds ſlowly, and the quantity of putrefying matter is but ſmall, the heat, if any, is very little. That putrefcent ſubſtances emit light, is an unqueſtionable fact; and on this principle philoſophers account for the *luminouſneſs* of the ſea, the IGNES *fatui*, &c. To this purpoſe M. Ant. Martin (Swed. Abhand. vol. xxiii. p. 225; cited by Dr. Prieſtley, in his Hiſtory of Light, &c. p. 576) obſerves, that human bodies have ſometimes emitted light about the time they begin to putrefy; and that the walls and roof of a place in which dead bodies had often been expoſed, had a kind of dew or clamminеſs upon them, which was ſometimes luminous. And he imagines that the lights which are ſaid to be ſeen in burying grounds, may be owing to this cauſe. It has been obſerved, that heat extinguiſhes the light of putrefcent ſubſtances; Mr. Canton, attending to this circumſtance in ſome experiments for aſcertaining the cauſe of the luminouſneſs of the ſea, remarks, that though the greateſt ſummer-heat is well known to promote *putrefaction*, yet twenty degrees more than that of the human blood ſeems to hinder it; for, putting a ſmall piece of a luminous fiſh into a thin glaſs ball, he found that water of the heat of one hundred and eighteen degrees would extinguiſh its light in leſs than half a minute; but that, on taking it out of the water, it would begin to recover its light in about ten ſeconds: but it was never afterwards ſo bright as before. See LIGHT.

The moſt ſudden and remarkable changes produced upon a body by *putrefaction*, are upon its colour, ſmell, and taſte. Fleſh beginning to putrefy, is well known to exhale very ſoon after a penetrating fœtid ſmell, its colour becomes livid and black, and its taſte naufeous. Tranſparent liquor, as urine and broth, during *putrefaction*, becomes alſo turbid: as the *putrefaction* advances, the ſmell becomes more and more fœtid, and it alſo acquires great pungency, which is cauſed by a large quantity of volatile alkali, diſengaged from thoſe ſubſtances that are completely putrefied. Solid bodies, whilſt they are putrefying, ſwell, become ſoft, loſe the cohesion of their parts, and are laſtly reduced to a very diſagreeable liquor. Sir John Pringle has obſerved, that, as all the humours of animal bodies become thinner by *putrefaction*, ſo the ſolid or fibrous parts are thereby relaxed, and rendered more tender: and hence the extraordinary bulk of the heart, liver and ſpleen, incident to perſons labouring under putrid diſeaſes, may be accounted for. It is remarkable, that in diſſections of perſons who die of the plague, the heart is almoſt always found of an uncommon magnitude; and as to the ſcurvy, the liver and ſpleen are ſometimes enlarged to ſuch a degree, that the tumor may be ſeen outwardly.

From matters completely putrefied may be obtained by diſtillation volatile alkali, ſome liquid and ſome ſolid; a pungent fœtid oil, which at firſt is thin, and afterwards becomes more thick; and a reſiduum of coal, not eaſily reducible to aſhes. Some writers on this ſubject have apprehended, that putrid ſubſtances are not to be regarded as alkaline. Sir John Pringle, finding from the experiments which he made in the year 1750, that ſyrup of violets was not changed into a green colour by the ſerum of putrid blood; that this ſerum did not make any effervescence, when ſpirit of vitriol was poured upon it; that water, in which corrupted fleſh had been for ſome time infuſed, neither effervesced nor changed the colour of the ſyrup; and that alkaline ſalts, both fixed and volatile, powerfully oppoſe *putrefaction*; was led to adopt this opinion. But when he became acquainted with the experiments made by M. J. Bapt. Gaber of Turin (Acta Taurinenſ. vol. i. p. 78, &c.) he embraced, with the liberality of a true philoſopher, the firſt opportunity of acknowledging his miſtake. M. Gaber, having poured a drop or two of aqua fortis upon bile, taken out of the gall bladder of a perſon who had died of an inveterate jaundice without a fever, and whoſe body had lain about twenty-four hours in a cold place in winter, found, that the mixture immediately effervesced, became ſenſibly warm, and that ſeveral air-bubbles roſe to the ſurface. He alſo expoſed the remainder of this bile in three open glaſſes to the thirty-fifth, twenty-fifth, and tenth degrees of heat, indicated by Reaumur's thermometer, and at the end of twenty-four hours mixed them with acids; and he found, that the bile which had been placed in a degree of heat anſwering to thirty-five, was moſt diſtated, and gave very ſlight indications of effervescence; that which had ſtood in twenty-five was alſo diſtated, and the acid produced a more ſenſible effervescence, but ſtill very ſlight; and the bile which had been expoſed only to the temperament of the air, varying from ſeven to ten, preſerved its tenacity, and fermented as much as that in his firſt experiment. Having mixed ſome blood, taken out of a vein of the dead body at the ſame time, and which appeared to be of a yelloviſh red, with ſpirit of nitre, the mixture effervesced, but in a much leſs degree than the bile: this mixture, being left to digeſt for ſome hours, a yellow ſerum ſeparated from the blood, and covered its whole ſurface; and the blood, being ſubjected to the ſame heat as the bile, and for the ſame time, appeared more diſpoſed to effervesce than the bile, though this diſpoſition afterwards gradually diminiſhed. From theſe experiments the ingenious writer infers, that in diſeaſed bodies the humours may become ſo alkaleſcent as to effervesce with acids; that a very ſlight degree of *putrefaction* and fœtor, which is not ſufficient to produce alkaleſcence out of the body, will produce it in the body; that alkali formed in the body, and contained in the bile, is extremely volatile, ſince a heat of twenty-five degrees made a great part of it evaporate; and that the ſame alkali contained in the blood, being a little more entangled with other elements, is conſequently leſs volatile, ſince the ſame degree of heat, continued for the ſame time, diſſipated but a very inconſiderable part of it: and, therefore, that the different phenomena taken notice of by thoſe who have proſecuted experiments of this kind, ſome of whom affirm that they have ſeen undoubted proofs of the preſence of an alkali, and others that they have ſcarce diſcovered any ſuch indications at all, are the effects of different degrees of heat, the ſtaleneſs of the ſubſtance expoſed to the heat, or the different volatility of the alkali ariſing from its cohesion with other principles. Having made ſimilar experiments upon healthy bile, blood, and ſerum, and ſubmitted them to the action of mineral acids, he found the bile moſt diſpoſed to effervesce; that human bile was more diſpoſed to effervesce than

than the bile of an ox; that corrupt blood ferments with acids ſtill ſlower; and that ſerum ferments ſlower than blood. He alſo obſerved, that putreſcent humours not only effervelce with mineral acids, but with very weak diſtilled vinegar: and that thoſe humours that have been expoſed to artificial heat, become fœtid and effervelce ſooneſt, and ſooneſt arrive at the laſt ſtage of fermentation; in which caſe the fermentation ceaſes, though the heat is continued; and the ſmell, which till then is intolerably fœtid, becomes herbaceous, and is not diſagreeable. The fœtor, he ſays, manifeſts itſelf ſooner, and laſts longer than the alkaleſcence.

M. Gaber farther obſerves, in relation to the experiments of Sir John Pringle, that at the degree of heat to which he expoſed putreſcent ſubſtances, and which was equal to the hundredth degree of Fahrenheit, correſponding nearly to the thirtieth degree of Reaumur, animal humours very ſoon become putrid; but that they as ſoon loſe the alkaleſcence which they derive from *putrefaction*, if this degree of heat is continued: ſo that as the corrupting humours manifeſt their alkaleſcent quality only for a very ſhort time, it might eaſily happen that no ſign of alkaleſcence appeared in his experiment, if it was not made in the critical moment, i. e. if he examined the putreſcent humours a little before the alkali was formed, or a little after it had evaporated. And he, therefore, apprehends, that if Sir John Pringle's experiments were made with a degree of heat juſt equal to his own, the reſult, *ceteris paribus*, muſt have been the ſame.

From other experiments this writer infers, that blood received from the arm, agitated and left to putrefy, does not putrefy ſo ſoon, nor ſo ſoon manifeſt ſigns of alkaleſcence, as the red part ſeparated from the ſerum, becauſe the ſerum putrefies more ſlowly than any other animal humour; and that the alkali, which evaporates with a degree of heat from twenty-five to twenty-eight of Reaumur, being collected in a receiver, will effervelce, and that the reſiduum is a maſs extremely fœtid, wholly deſtitute of alkali, and, conſequently, that no effervelcence is to be expected by pouring acids upon it. Having kept ſome blood in a glaſs veſſel cloſe ſtopped, he found that it retained its alkaleſcence a long time, though expoſed to a degree of heat equal to twenty-five; but upon unſtopping the veſſel, it flew off with great violence, in an extremely fœtid vapour. Theſe exploſions he attributes to the expanſion of the air, in conſequence of the *putrefaction*; and hence he deduces the reaſon, why the humours that are contained in the veſſels of a human body become alkaleſcent while they are yet ſcarce fœtid, although when drawn from the body, and kept in open veſſels, they become fœtid before they give ſigns of alkaleſcence. As ſoon as they begin to form alkali in the veſſels, the alkali is retained; but as it exhales from veſſels expoſed to the air, a greater quantity muſt be formed than exhales before it can become ſenſible. Having collected the diſtilled liquor of blood in ſuch a ſtate of putrefcence as to effervelce with acids, and expoſed it to the action of various acids, a violent effervelcence enſued; and when poured upon ſyrup of violets, it produced as fine a green as ſpirit of hartſhorn; and this tincture, having been changed into a red by the affuſion of a few drops of aqua fortis, became again blue, upon pouring into it ſome more of the diſtilled liquor: whence he concludes, that putreſcent humours form a true alkali, which exhales with a very ſlight heat. From other experiments he infers, that the alkali of putreſcent ſubſtances is not the productive cauſe of their fœtor, becauſe the latter remains when the former is departed. But as both appear in the ſame degree of heat, when long continued, it appears, he ſays, that this fœtor is produced by the effluvia of parts extremely volatile, but different from volatile alkali, which, though ſooner produced, are more ſlowly diſſipated. Alkaleſcence, however, may be ſometimes connected with a ſlight fœtor; and, on the contrary extreme, fœtor may ſubſiſt without alkaleſcence. And this fact confirms the obſervation of Sir John Pringle, who found a difference between the fœtid and alkaline particles; ſince the exhalations of freſh urine are not pernicious, though they contain more alkali than any ſubſtance in a ſtate of *putrefaction*, the odour of which is pernicious in the higheſt degree; and, therefore, putrid effluvia are of a different nature from alkaline ſalts. M. Gaber farther adds, by way of inference from this fact, that a volatile alkali is not a neceſſary product of *putrefaction*, and that the degree of alkaleſcence is not equal to that of *putrefaction*. Dr. Crell, profeſſor of chemiſtry at Brunſwick, has objected to this doctrine, as not conformable to the phenomena (Phil. Tranſ. vol. lxi. part 1. art. 39.) for he ſuppoſes, that as all ſmell depends on a ſaline matter joined with phlogiſton, and the ſaline matter producing the putrid fœtor was very probably not an acid, it muſt be a volatile alkali, which, involved in phlogiſtic matter, might fly off before the alkali was developed. From ſome experiments made with a view of aſcertaining this fact, he infers, that the volatile alkali is preſent as long, at leaſt, as the putrid ſmell continues, and that this volatile alkali is the baſis of it; becauſe, as this was diſtilled over, in his experiments, the reſidue, being ſtill in inteſtine motion, acquired only the herbaceous ſmell. The reaſon why the volatile alkali has been diſtinctly obſerved at a certain period of *putrefaction*, and not in the other, he apprehends to be this: the volatile alkali has, it ſeems, a tendency to diſentangle itſelf, by inteſtine motion, of all ſuch matter as it is involved with; but if it is not combined with ſuch fixed matter as retains it till it has gone through all its evolutions, it is, being itſelf volatile, carried off by the ſtill more volatile phlogiſtic matter with which it is commonly joined. For this reaſon, he ſuppoſes, the putrefying matter ſhews in its beginning no ſign of a volatile alkali, becauſe its ſmell depends only on thoſe particles, which have been on the ſurface, without any ſtrong cohelion with the ſubſtance. In the farther progreſs of *putrefaction*, the matter involving the alkali, or forming it, is intermixed, and in cohelion with the ſolid particles of the ſubſtance, and is by theſe means retained till the alkali is come to its purer ſtate. Towards the end of *putrefaction*, the cohelion of the particles being almoſt entirely taken off, the volatile alkali is carried off before it can go through all its ſtates.

Dr. Macbride made ſeveral experiments with putrid blood and putrid bile, which aſcertain the fact, that as ſoon as an animal ſubſtance begins to putrefy, it begins to diſcover an alkaline quality; and this volatile matter, now produced in it, may be ſeparated by diſtillation in a very gentle warmth: but he obſerves, that the volatile alkali obtained from putrid ſubſtances is not exactly ſimilar to that obtained by violent heat from animal ſubſtances not putrid. It differs remarkably in the flavour, which is naſſeous and diſagreeable, is not ſo pungent, and is much weaker than the common volatile alkali; and this latter is capable of diſpoſſeſſing the putrid alkali, and of driving it off from any body to which it has been united. But to return from this digreſſion. As to the cauſe and proceſs of *putrefaction*, it has been generally believed, that the contact of atmoſpherical air is neceſſary for this purpoſe, and that bodies become putrid, becauſe air communicates ſomewhat to them: accordingly it has been alledged, that bodies buried deep under earth or in water, out of the reach of any air, have remained entire for ages; which, when expoſed to the open air, have ſoon rotted and mouldered away. It is alſo well known, that bodies are preſerved from *putrefaction* by covering them with wax, ſuet, &c. and Mr. Boyle relates, that he has preſerved lemons, oranges, and other fruits, from *putrefaction*, during ſeveral years, by including them in an exhauſted receiver. Experiments of the ſame kind have been lately made by M. Eller of Berlin, which ſhew that ſubſtances, even of the moſt putreſcent nature (ſuch as blood) may be kept ſound *in vacuo* for many years. But Dr. Macbride has urged a variety of facts and conſiderations to prove, that *putrefaction* enſues in conſequence of the loſs of ſome principle, which cemented the conſtituent particles of bodies, and that, when this is diſengaged from them, they ſeparate, and are diſſunited. This principle he diſcovered to be air, which, in *putrefaction* and fermentation, is extricated and thrown off, from a fixed and non-elaſtic ſtate, into one that is volatile and elaſtic; but which immediately, upon meeting with a proper recipient, returns again to its former nature. Thus he found, that cauſtic alkali and quickline may be rendered mild by abſorbing this air, extricated from putrefying and fermenting ſubſtances; that without the extrication of this air no *putrefaction* can happen; and that even by abſorption of it, putreſcent ſubſtances may be corrected and rendered ſweet. To the ſame purpoſe Dr. Alexander has endeavoured to prove, that putrid matter will preſerve other ſubſtances from *putrefaction*, which is not improbable, becauſe, being already ſaturated with the putrid effluvium, they cannot readily take any more. Dr. Macbride, having expoſed putrid matters to the vapours ariſing from fermenting mixtures, or from alkaline ſubſtances effervelcing with acids, found that the putrid quality was deſtroyed; and hence he conſiders the fixed air as powerfully antiſeptic. And it appears alſo from the experiments of Dr. Prieſtley, that fixed air corrects and renders wholeſome air tainted with reſpiration or *putrefaction*. Hence he infers, that limekilns, which diſcharge great quantities of this air, may be wholeſome in the neighbourhood of populous towns, the atmoſphere of which muſt abound with putrid effluvia. Sir William Lee, in a hot ſeaſon, contrived, by impregnating water with fixed air, in the manner deſcribed under PYRMONT *water*, and waſhing meat with it two or three

three times a-day, not only to preſerve it as perfectly ſweet and good to the extent of ten days, as at the firſt killing, but alſo to recover ſome meat that had begun to change. And it is farther well known, that fixed air has been lately introduced into the materia medica, and adminiſtered with ſucceſs in a variety of putrid caſes. Dr. Macbride has alſo proved, that *putrefaction* is accelerated by taking off the preſſure of the atmoſphere; and from ſome experiments he was led to conclude, that it will take place ſooner *in vacuo* than in the open air; but making a more complete vacuum by means of two braſs hemiſpheres joined together, he found that the obſervation of Mr. Boyle, and others, was agreeable to fact. It appeared alſo, by incloſing fleſh in condenſed air, that increaſing the preſſure of the ſurrounded air, retarded *putrefaction*; and hence he deduces, what he deems to be a demonſtrative proof, that bodies do not putrefy, becauſe the air adds ſomewhat to them; for if they did, then a piece of fleſh which lay in condenſed air ought to have putrified the ſooneſt, becauſe it had the greateſt quantity of air applied to its ſurface. But the reaſon why, according to his ſyſtem, condenſed air prevents *putrefaction* is, that the preſſure on every ſide muſt force the conſtituent particles cloſer together, thus increaſe their coheſion, and prevent the inteſtine motion; and without inteſtine motion there can be no change of combination. However, it is obſerved by Sir John Pringle, that the *putrefaction* of meat and other ſubſtances, advances quicker in a confined than free air; for as the moſt putrid parts are alſo the moſt fugitive, they inceſſantly iſſue from a corruptible ſubſtance, and diſperſe with the wind; but in a ſtagnation of air they remain about the body, and, in the nature of a ferment, excite its corruption.

It has been long obſerved, that *putrefaction* generates air. Hence, though fleſh, as well as blood, be ſpecifically heavier than water, yet dead bodies are found to float, after lying ſome time at the bottom, from air generated in the bowels by *putrefaction*. And ſince it has been found by experiments, that the blood and other animal ſubſtances begin to emit air before they are ſo far corrupted, as they frequently are in putrid diſeaſes, it is probable that ſeveral of the ſymptoms in deep ſurfeits may be owing to the action of the confined air. As dead bodies become putrid from the loſs of their fixed air, according to Dr. Macbride's theory, he ſuggeſts, that the immediate cauſe of *putrefaction* in living bodies may be the detachment of too large a proportion of their fixed air. This fact he endeavours to evince by an enumeration of the ſymptoms that occur in the ſcurvy, and other highly putrid diſeaſes, which ſhew that the air is actually detached from the blood in ſuch caſes; as well as from an examination of the principal and prevailing cauſes of ſuch diſorders. And ſince the air tainted with animal or vegetable *putrefaction* is the ſame with air rendered noxious by animal reſpiration; ſince both equally extinguiſh flame, are equally noxious to animals, are equally and in the ſame way offenſive to the ſmell, equally precipitate lime in lime-water, and are reſtored by the ſame means (ſee *Phlogiſticated* AIR) Dr. Prieſtley ſuggeſts, that one uſe of the lungs is to carry off the putrid effluvia, without which, perhaps, a living body might putrefy as ſoon as a dead one. See BLOOD and RESPIRATION.

We ſhall here obſerve, that putrefying and fermenting ſubſtances have been found, by the experiments of Mr. Cavendiſh, Dr. Prieſtley, &c. to yield not only *fixed* but *inflammable* AIR. From an experiment of Dr. Prieſtley, intended to determine the proportion of each of the kinds of air, in the different ſtages of the putrefactive proceſs, it appears, that a piece of mutton weighing four pennyweights ſix grains, yielded in all 2½ meaſures of air, of which 2-⅛ was fixed, and the reſt inflammable; and that all the inflammable part was exhauſted a conſiderable time before the fixed air. The ſame ingenious writer has obſerved, that the diminution of common air, by means of *putrefaction*, amounts to a complete fourth part of the whole, notwithſtanding the production of ſome permanent air from the putrefying ſubſtance, and has, in all reſpects, the appearance of being produced ſolely by the precipitation of fixed air. It muſt occur to every reader, in any way acquainted with this ſubject, that if inflammable air be the ſame with PHLOGISTON, as Dr. Prieſtley ſeems lately to have diſcovered, many of the phænomena of *putrefaction*, depending on this principle, ſuch as the ſmell, colour, light, &c. will probably from hence admit of an eaſy explication.

Putrefaction is one of the inſtruments in nature by which many great changes are brought about. In the proceſs of vegetable *putrefaction*, if we throw together any of the tender, green, and ſucculent parts of recent vegetables, whether acid or alkaline, in a large heap, in the warm open air, and preſs them down with an additional weight, if their own be inconſiderable; the middle part of the heap will, in a little time, ſpontaneouſly conceive a ſmall degree of heat, and paſs ſucceſſively through the other degrees, till it arrive at a ſtate of ebullition, and be perfectly putrefied.

In the ſpace of three days, from the firſt putting them together, they will yield a heat, perceivable by the hand, equal to that of a human body in a healthy ſtate; by the fifth, the heat will be too great for the hand to bear without pain; and, laſtly, by the ſixth, ſeventh, or eighth day, the juices will generally appear ready to boil; and ſometimes the matter will even flame, and burn away.

By this ſpontaneous operation, the vegetable acquires an abominably putrid, ſtercoraceous, or cadaverous, taſte and odour; and turns entirely into one ſoft, ſmutty, pulpy maſs, or craſſamentum, greatly reſembling fetid human excrements in the ſcent, and putrefied fleſh in the taſte.

If now this fetid matter, thus obtained, be directly, whilſt it remains in its fetid ſtate, committed to a glaſs retort, and diſtilled with proper degrees of fire, there will come over, 1. A water impregnated with an urinous ſpirit, perfectly like that obtainable from animal ſubjects, and ſeparable by a freſh diſtillation ſlowly made in a tall glaſs, into elementary water, and a large quantity of pure, white, volatile, dry, alkaline ſalt, not to be diſtinguiſhed from animal ſalts. 2. A volatile, alkaline, oily ſalt, that ſhoots into globes. 3. An exceedingly volatile and thick fetid oil, both which are entirely like thoſe of animals. And, laſtly, the remainder, being calcined in an open fire, affords not the leaſt particle of fixt ſalt; juſt as if the ſubject had really been of the animal, and not of the vegetable kingdom.

This proceſs is truly univerſal, and holds equally in all kinds of vegetables, though ever ſo different in their nature and virtue.

Experiments have been made in the coldeſt and moſt ſucculent, or watry, plants; ſuch as purſlain, ſorrel, &c. as well as with the hotteſt or moſt acrimonious, ſuch as the ſpurges, &c. and it was always found to ſucceed; but that the ſooner, as the vegetable employed contained the greater quantity of oil; though with the ſame phænomena.

It will likewiſe ſucceed with dry vegetables, provided they be moiſtened with water before they are thrown into heaps; and thus we ſometimes ſee, that ſtacks of hay will ſpontaneouſly take fire, and burn away; eſpecially if the hay was not well dried in the making.

It is ſurpriſing to conſider, that, by this means, the difference betwixt vegetables may be entirely taken away, and the whole kingdom thereof reduced to the ſame common nature; ſo that wormwood and tanſey, for inſtance, or ſorrel and ſcurvy-graſs, ſhall appear as one and the ſame thing; and this thing appear no otherwiſe than like putrefied fleſh.

Though ſorrel be famed for its power of preſerving the animal fluids uncorrupted whilſt they are circulating in the body, and feordium, for its embalming virtue, as continuing them in a ſtate of incorruption after death; yet even theſe plants are themſelves thus eaſily corrupted and changed into ſuch a kind of putrefied fleſh, as it is their virtue to prevent.

This Boerhaave conſiders as a general law of nature, wiſely eſtabliſhed to produce wonderful changes in the world, and to prevent the inaction and decreaſe of matter in our globe; this active principle, or medium, giving an eaſy and reciprocal tranſition of vegetable into animal ſubſtances, and of animal into vegetable.

This operation may let us a little into the nature of animal DIGESTION, or the change which the aliment ſuffers in the human body. For the change our vegetable foods undergo in the body, being ſuch as brings them to be of the ſame nature, and to afford the ſame principles, with the change induced by *putrefaction*, is a preſumption, that digeſtion is nothing elſe. Beſides, as we know that neither animal nor vegetable ſubſtances can become aliment, without undergoing ſome degree of *putrefaction*, many diſtempers muſt proceed from a deficiency of this action; the criſis of fevers ſeems to depend upon it; and even animal heat, according to Dr. Stevenſon, does the ſame.

Now, that the concoction of the humours is nothing elſe but *putrefaction*, ſeems probable from hence, that whenever they are in that ſtate, they are always more fluid, and fitter to paſs through the ſmaller veſſels, where they ſtagnated before. Again, the offenſiveneſs of the ſweats, or other excretions conſequent on a criſis, is likewiſe a ſure ſign of a high degree of corruption. The time of reſolution or *putrefaction* depends on the degree of heat, the habit of the patient, and on the part obſtructed. Reſolution is the *putrefaction* of the impacted humour only, but ſuppuration implies a corruption of the veſſels alſo. This manner of ſpeaking, indeed, has been diſuſed, from

the prejudice that nothing was putrid but what was offenſively ſo; whereas, in fact, every fibre becoming more tender, and humour thinner, may be conſidered as putrid in ſome degree, whether the change tends to the better health, or to the deſtruction of the perſon, or whether it becomes grateful or offenſive to the ſenſes.

Mr. Boyle has uſed the words *fermentation* and *putrefaction* of the blood promiſcuouſly, in his Treatiſe on the Human Blood. Stahl and other celebrated chemiſts likewiſe uſe the term *putrid* FERMENT.

It is, therefore, juſtly obſerved by lord Bacon (Nat. Hiſt. Cent. iv.) that an enquiry into the means of preventing or ſtaying *putrefaction* is of excellent uſe in phyſic. Sir John Pringle has made many curious experiments with a view of determining the power of certain ſubſtances to promote or to prevent *putrefaction*, together with remarks on this ſubject, which are publiſhed in the Phil. Tranſ. vol. xlvi. p. 480, 525, 550, and by way of appendix to his Obſervations on the Diſeaſes of the Army. From the experiments of this learned and judicious phyſician, it appears, that ſalts of every kind, whether acid, alkaline or neutral, fixed or volatile, as well as the aſtringent and gummy-reſinous part of vegetables, all of them reſiſt and moſt of them correct *putrefaction*; and he purſued this branch of enquiry ſo far as to enable him to form a table ſhewing the comparative antiſeptic power of the ſeveral ſubſtances, that of ſea-ſalt being the ſtandard. See this table under the article ANTISEPTIC.

Of all reſinous ſubſtances, he found that camphor reſiſted *putrefaction* moſt powerfully; its antiſeptic power being three hundred times greater than that of ſea-ſalt. Decoctions of wheat, barley, and other farinaceous grains, checked *putrefaction*, by becoming ſour. He alſo made experiments to diſcover the effects of mixing vegetable with animal matters.

Two drams of raw beef, as much bread, and an ounce of water, being beat to the conſiſtence of pap, and expoſed to 90° of heat, according to Fahrenheit's thermometer, began to ferment in a few hours, and continued in a fermentation two days. When it began to ferment and ſwell, the *putrefaction* had begun; and in a few hours afterwards the ſmell was offenſive. Next day the putrid ſmell ceaſed, and an acid taſte and ſmell ſucceeded. Freſh alimentary vegetables, as ſpinach, aſparagus, ſcurvy-graſs, produced ſimilar effects as bread on fleſh, but in a weaker degree. From ſeveral other experiments he found that animal ſubſtances excite the fermentation of vegetable ſubſtances; and that the latter ſubſtances correct the putreſcency of the former.

By adding ſaliva to a ſimilar mixture of fleſh, bread, and water, the fermentation was retarded, moderated, but rendered of twice the uſual duration, and the acid produced at laſt was weaker than when no ſaliva was uſed.

By adding an oily ſubſtance to the common mixture of fleſh, bread, and water, a ſtronger fermentation was produced, which could not be moderated by the quantity of ſaliva uſed in the former experiment, till ſome fixed alkaline ſalt was added, which ſalt was found, without ſaliva, to ſtop ſuddenly very high fermentations.

He did not find that ſmall quantities of the following ſalts, ſal ammoniac, nitre, vitriolated tartar, ſal diureticus, ſalt of hartſhorn, ſalt of wormwood, were ſeptic, as ſmall quantities of ſea-ſalt were.

Sugar was found to reſiſt *putrefaction* at firſt, as other ſalts do, and alſo to check the *putrefaction* after it had begun by its own fermentative quality, like bread and other fermentative vegetables.

Lime-water made ſome ſmall reſiſtance to *putrefaction*.

Port-wine, ſmall beer, infuſions of bitter vegetables, of bark, and the juice of antiſcorbutic plants, retarded the fermentation of mixtures of fleſh and bread. But an unitrained decoction of bark conſiderably increaſed that fermentation.

Lime-water neither retarded nor haſtened the fermentation of ſuch a mixture; but when the fermentation ceaſed, the liquor was neither putrid nor acid, but ſmelt agreeably.

Fleſh pounded in a mortar was found to ferment ſooner than that which had not been bruiſed.

The tough inflammatory cruſt of blood was found to be moſt putrefcent, next to which the craſſamentum, or red coagulated maſs, and laſtly the ſerum.

The experiments of the author of the Eſſai pour ſervir à l'Hiſtoire de la *Putrefaction*, ſhew that metallic ſalts, reſinous powders, extracts of bark, and opium, are very powerfully antiſeptic, and that ſalts with earthy baſes are leſs antiſeptic than any other ſalts.

The ſame ingenious phyſician made ſome attempts towards the ſweetening of corrupted fleſh by means of mild ſubſtances. For this purpoſe he put a piece of putrid fleſh into an infuſion of chamomile flowers, which was renewed twice or thrice in as many days, and its ſweetneſs and firm texture were recovered. Several pieces of putrid fleſh were alſo ſweetened by repeated anſuions of a ſtrong decoction of the bark; and he conſtantly obſerved, that not only the corrupted ſmell was removed, but a firmneſs reſtored to the fibres. The corrupt yolk of an egg, diluted with water, was ſweetened by mixing it with a ſtrong infuſion of chamomile flowers. He found alſo, that decoctions of wormwood, of the bark, and infuſions of chamomile flowers, and of ſnake-root, preſerved yolks of eggs for a longer time than water, even with the addition of a conſiderable quantity of ſea-ſalt; and that they were preſerved better by ſalt of hartſhorn than by four times its weight of ſea-ſalt. Ox-gall was kept for ſome time from *putrefaction* by ſmall quantities of ley of tartar, ſpirit of hartſhorn, crude ſal ammoniac, and the ſaline mixture; and ſtill longer by a decoction of wormwood, infuſion of chamomile flowers and of ſnake-root, and by ſolutions of myrrh, camphor, and ſalt of amber. The ſerum of human blood was preſerved by a decoction of the bark, and an infuſion of ſnake-root, as effectually as fleſh. See ANTISEPTIC.

For an account of Sir John Pringle's experiments and obſervations with reſpect to thoſe ſubjects that haſten or promote *putrefaction*, ſee SEPTICS.

Dr. Macbride's experiments confirm many of thoſe above related, eſpecially thoſe which ſhew that the fermentation of vegetable ſubſtances is increaſed by a mixture of animal or putreſcent matter; that the putreſcency of the latter is corrected by the fermentative quality of the former; and that the *putrefaction* and fermentation of mixtures of animal and vegetable ſubſtances were accelerated by additions of abſorbent earths and of Peruvian bark. He alſo found, that although unburnt calcareous earths were ſeptic, quick-lime and lime-water prevented *putrefaction*, but that they deſtroyed or diſſolved the texture of fleſh.

From his experiments we learn alſo, that acids, even when greatly lowered, have a ſtrong degree of power to reſiſt *putrefaction*, and alſo to correct it; but that they deſtroy the texture of the ſubſtance whoſe ſoundneſs they were ſuppoſed to reſtore; that ſalts in general, by a property which is common to them all as ſalts, have the ſame power, but that they exceed the acids in their efficacy for correcting *putrefaction*; that fermenting and effervefcent mixtures are the moſt powerful of all known antiſeptics; and, in general, that whatſoever hath a power to reſtrain the eſcape of the fixed air, or hinder the inteſtine motion, muſt of courſe prevent *putrefaction*; and that fixed air, when tranſferred from a ſound body to one that is putrid, appears to reſtore to that body the principle which has been deſtroyed or loſt.

Dr. Macbride objects againſt the adminiſtration of acids in putrid diſeaſes, for the following reaſon; becauſe, if they came unchanged to the abſorbent veſſels, they would not abſorb of them, and if they did, they would be dangerous, and they are quite changed before they leave the primæ viæ. Dr. Crell (Phil. Tranſ. vol. lxi. part i. p. 340) has replied to this reaſoning, and propoſed experiments to prove, that acids, though changed in the alimentary canal ſo far as not to effervefce with alkalis, may, notwithſtanding, check *putrefaction*, and, therefore, that their uſe is of great conſequence, and ought not to be omitted in putrid diſeaſes.

With regard to the exhibition of alkalis, Dr. Macbride obſerves, that the point is not yet ſatisfactorily ſettled. There can be no doubt of their power to reſiſt and correct *putrefaction* in dead bodies; but whether, upon the preſumption of this virtue, they can be given with propriety as antiſeptics, he adds, is not ſo clear. Dr. Crell affirms, that they can never be uſed in living bodies as antiſeptics; for, laying aſide their ſtimulating quality, which muſt prevent their uſe in moſt of the putrid diſeaſes, they would, he apprehends, increaſe the morbific matter, by being intimately mixed by circulation with phlogiſtic matter, which they find abundantly in ſuch bodies. Aſtringents, ſays Dr. Macbride, prevent *putrefaction* very powerfully, but they have not the leaſt degree of efficacy in correcting it; and as antiſeptics they can be of importance only in thoſe caſes where, from extreme relaxation and reſolution of the ſolids, the diſſolved fluids are ſuffered to tranſude, and either form ſpots of different hues, or run off by actual hæmorrhage; and he apprehends, that acids act in thoſe caſes where they have been adminiſtered with ſucceſs, merely as aſtringents. The antiſeptic virtue of the gummy-reſinous vegetables, judging of their effect by that of the bark, appears to depend on their fermenting in the body, and parting with fixed air in the courſe of their fermentation, and throwing a great quantity of it into the blood; and attending to the things that prevent *putrefaction* in living bodies, we ſhall find that the dependence is on the quantity of air. Thus, vegetable food prevents the putrefactive diatheſis; and

to the frequent use of fresh vegetables and sugar, in the diet of the European nations, it is owing that putrid diseases, or plagues, are now so uncommon. See *Putrid* FEVER. And what proves almost to a demonstration the antiseptic power of the fermentable substances is the cure of the *sea*-SCURVY.

Dr. Crell disagrees with the opinion of Dr. Macbride, that putrid diseases may be cured with fermentable substances only; nor is he convinced that *putrefaction* depends only on the loss of fixed air. This, he apprehends, is an effect rather than the cause of *putrefaction*. We shall here only add, that Dr. Macbride recommends, in the putrid *yellow* FEVER of the West Indies, to give the patient repeated doses of the alkaline salts, in fresh lime juice, or the like, and to let it be swallowed during the effervescence; and to order the patient's drink to be somewhat of the highly fermentable kind; such as the juice of the green sugar-cane, diluted and acidulated with some of the recent sour juices. The natives on the coast of Africa give in fevers of this kind, with good success, a drink prepared by macerating in water a fruit of the plum kind, that grows there in great plenty. He adds, that by throwing in such a quantity of antiseptic vapour as would be furnished from this kind of materials, the putrefactive acrimony, which at first seems chiefly to affect the biliary system, might be corrected and saturated. See on the subject of this article Dr. Macbride's Essays, 1776, passim.

PUTREFACTION *of water*. It is said to be the peculiar quality of the Thames water, that it will stink and yet be wholesome; and after this will recover itself again. Many sailors have been obliged to drink it stinking, so that they held their noses while they poured it down their throats, yet no sickness ensued from it. It generates a sort of spirit also in this stinking state, which will take fire at the approach of a lighted candle as if spirit of wine were touched by the same.

It appears from the preceding article, that, though a volatile alkali may be obtained from putrid substances by distillation, such substances must not be suffered to remain too long before they are distilled, unless they are kept in close vessels; because the volatile alkali, which is the offspring of *putrefaction*, is dissipated as fast as it is generated, insomuch that, at length, nothing is left behind but an insipid water, or a solid matter, being an earth similar to common mould. It is in this way, says Dr. Macbride, that stinking water, after some time, becomes sweet; the volatile alkali, generated by the *putrefaction* of the animal and vegetable substances at first contained in the water, being, after a while, entirely dissipated, leaves the remainder without any disagreeable smell.

A method of preserving water free from *putrefaction* was some years since proposed by Dr. Alston. It consisted in adding a quantity of lime to every cask of water; and as lime is known to have a strong antiseptic property, water, as long as it retains the impregnation of lime, never putrefies. In order to free the water at the time of using it from the lime, Dr. Alston proposed the precipitation of the latter by throwing a quantity of magnesia alba, on this principle; that as lime-stone is rendered soluble in water by the deprivation of its fixed air, and has a greater affinity with that air than magnesia has, the particles of quicklime dissolved in the water would attract the air from the magnesia, and thereby becoming no longer soluble, would fall to the bottom, and leave the water tasteless and fit for œconomical uses. See LIME-*water* and MAGNESIA.

The expence, however, attending this process prevented the execution of the proposal. Mr. Henry has lately suggested a cheap and easily practicable method of precipitating the lime, and thus of restoring the water to its original taste. The following is a short sketch of the author's process. To preserve the water from *putrefaction*, two pounds of good quicklime are directed to be added to each cask of water of a hundred and twenty gallons. To free the water afterwards from the lime with which it has been impregnated, it is to be drawn off into a strong cask, containing about sixty gallons, with an aperture at one end large enough to admit a vessel, which is to be let down into it by means of strings, and which contains a proper quantity of effervescent materials, that is, of marble or chalk, and vitriolic acid. Eight ounces of mild calcareous earth, and six ounces of strong vitriolic acid, will be sufficient for sixty gallons of lime-water. The mouth of this last vessel is to be stopped with a tubulated stopper, through which the fixed air, let loose from the marble, passes up through the body of the water. The lime is thus rendered insoluble, and is soon precipitated in the form of an impalpable powder of chalk; the water being thus restored to the same state of purity as when it was first shipped on board; or, as Mr. Henry believes, to a state of still greater purity; several hard waters having, in consequence of this process, been rendered as soft as rain-water, and freed from different impregnations. For farther particulars, and the description and drawing of an apparatus for this operation, see Henry's Account of a Method of preserving Water at Sea, &c. p. 10, &c. 1781.

PUTRID, *putridus*, something rotten, or putrefied. See PUTREFACTION.

Thus we say, *putrid* flesh; a *putrid* humour; *putrid* limbs, i. e. mortified ones, are to be cut off.

PUTRID *ferment*. See FERMENT.

PUTRID *fever*. See FEVER.

PUTRID *ulcer*. See ULCER.

PUTTOCKS, or PUTTOCK-*shrouds*, otherwise called *futtock* or *foot-hook shrouds*, in a *Ship*, are small shrouds which go from the shrouds of the main-mast, fore-mast, and mizen-mast, to the top-mast shrouds; and if there be any top-gallant-masts, there are *puttocks* to go from the top-mast shrouds into these. These *puttocks* are at the bottom seized to a staff, or to some rope which is seized to a plate of iron, or to a dead-man's eye, to which the lanniards of the fore-mast shrouds do come. See SHROUDS.

PUTTY sometimes denotes a white powder of lead and tin calcined together, in the proportion of two parts of lead to one of tin; used in polishing, and giving the last gloss to works of iron and steel. This is also the basis of white ENAMELS, and GLAZINGS for earthen ware.

PUTTY is also used to denote SPODIUM.

PUTTY, in its popular sense, denotes a kind of paste, compounded of whiting, with or without a little white lead, and linseed oil, beaten together to the consistence of a tough dough; used by glaziers for fattening the squares of glass in sash-windows, &c. and by painters, to stop up the crevices and clefts in timber and wainscot, to prevent the wet from getting in, and ruining the work.

PUTTURA, a custom claimed by the keepers of forests, and sometimes by bailiffs of hundreds, to take man's meat, horse's meat, and dog's meat, of the tenants and inhabitants, gratis, within the perambulation of the forest, hundred, &c.

Johannes clamat unam puturam in privata de Prestwoldham, qui est quædam cella abbatiæ de Ecclesham, pro se & ministris, equis, & garcionibus suis, per unum diem & duas noctes, de tribus septimanis, in tres septimanas; viz. de victualibus, ut & esculentis & poculentis, ad costas priorates prædicti indebite. Placit. apud Præstom. 17 Edw. III.

This custom, within the liberty of Knaresburgh, was long since turned into the payment of four pence, *pro putura*.

The land subject to this service is called *terra putturata*. The learned Somner has erred in his exposition of this word.

PUWAKHAGA, in *Botany*, the name by which some authors call the faufel-tree, of whose fruit the expressed juice called *terra Japonica*, or Japan earth, is made.

PYANEPSIA, Πυανέψια, in *Antiquity*, a feast celebrated by the Athenians in the month *Pyanepsion*; which, according to the generality of the critics, corresponded to our September.

Plutarch refers the institution of this feast to Theseus; who, at his arrival from Crete, made a kind of sacrifice to Apollo of all the provisions remaining in his vessel; putting them all into a kettle, boiling them together, and eating them with his six companions; which custom was afterwards continued. The scholiast of Aristophanes says, this was done to acquit himself of a vow he made to Apollo in a tempest.

M. Baudelot writes the word *Pyanopsia*, and takes it to be a feast instituted in memory of Theseus's return after killing the Minotaur.

The Greeks vary as to the origin and signification of the word *Pyanepsion*, whence the feast is denominated. Harpocration calls it *Pyanopsia*; he adds, that others call it *Pompeia*, because then the fruits all appear to the eye. Hesychius writes *Pyanepsia*; and derives it from πυανος, *bean*, and εψω, *coquo*; because in this feast the Athenians gathered their beans, and made a kind of broth of them.

PYANEPSION, Πυανεψιων, in the Athenian *Chronology*, a month of thirty days, in which the festival PYANEPSIA was celebrated, and called by the Bœotians DAMATRIUS.

PYCIELT, in *Botany*, a name given by Hernandez, and some other authors, to a peculiar species of tobacco, distinguished by Mr. Tournefort by the name of *nicotiana major lato et rotundo folio*, the broad roundish leaved great TOBACCO.

PYCNI, πυκνοι, in the *Ancient Music*, was used for such sounds

founds or chords of a tetrachord as might enter the ſpiſſum, or πυκνον.

Theſe were the hypatæ, the parypatæ, and the lichani, of the ſeveral tetrachords. The hypatæ were called *barypycni*, βαρυπυκνοι; the parypatæ *meſopycni*, μεσοπυκνοι; and the lichani *oxypycni*, οξυπυκνοι; becauſe the firſt were the loweſt notes; the ſecond, the middle notes; and the third, the higheſt of the ſpiſſum. Such chords as could never enter the ſpiſſum were called *apycni*, απυκνοι, εκτατοιδεις, παχυτατοιδεις, οξυτονοιδεις.

Hence, in the Greek ſcale or diagram, containing eighteen chords, there were five *barypycni*, as many *meſopycni*, and an equal number of *oxypycni*, together with three *apycni*. The *apycni* and *barypycni* were ſtabiles or fixed chords; but the *meſopycni* and *oxypycni* were moveable, or mobiles. See DIAGRAM.

PYCNON, πυκνον, in the *Ancient Muſic*. See SPISSUM.

PYCNOSTYLE, πυκνοστυλος, formed from πυκνος, *cloſe*, and στυλος, *columna*, in the *Ancient Architecture*, a building where the columns ſtand very cloſe to one another; one diameter and a half of the column being only allowed for the intercolumnation. See *Tab. Architecture, fig.* 40. *lit.* A.

The *pycnoſtyle* is the ſmalleſt of all the intercolumnations mentioned by Vitruvius. Some make it the ſame with *ſyſtyle*; others diſtinguiſh the latter, by its allowing half a module more in the Corinthian intercolumnation.

The *pycnoſtyle*, Mr. Evelyn obſerves, chiefly belonged to the Compoſite order, and was uſed before the moſt magnificent buildings; as, at preſent, in the periſtyle of St Peter's at Rome, conſiſting of near three hundred columns; and ſuch as yet remain of the ancients among the late diſcovered ruins of Palmyra.

PYCNOTICS, *incraſſants*, or medicines of an aqueous nature, which have the faculty of cooling and condenſing, or thickening, the humours.

The word, in its original Greek, πυκνωτικα, ſignifies ſomething that has the power of thickening.

Purſlain, the nenuphar or water-lily, ſolanum, &c. are ranked among *pycnotics*.

PYE, in Engliſh *Antiquity*. See PICA.

PYE, in *Mechanics*. See CRAB.

PYE, in *Ornithology*. See PICA.

PYE, *ſea*. See PICA *marina*.

PYGAIA, in the *Materia Medica*, a name by which ſome authors have called the IPECACUANHA, or vomiting Indian root.

PYGARGITES, in *Natural Hiſtory*, a name given by Pliny and ſome other of the old writers to the eagle-ſtone, when it was variegated with white, in the manner of the tail of the eagle called *pygargus*.

PYGARGUS, a ſpecies of eagle, called alſo by ſome authors *albicilla*, and *binnularius*. Linnæus has claſſed this bird among the vultures, calling it the *vultur albicilla*, becauſe its bill is rather ſtraighter than is uſual in the eagle; but Mr. Pennant obſerves, that it can have no claim to be ranked with that genus, becauſe the *pygargus* is wholly feathered; whereas the characteriſtic mark of the vulture is, that the head and neck are either quite bare, or only covered with down.

It is a large and fierce bird, of the ſize of a common turkey; its beak is yellow, and covered with a yellow membrane at its baſe; it has large hazel-coloured eyes; its feet are yellow, and its claws extremely ſtrong and ſharp; the head is white, and there are no feathers, but ſome fine hairs between the eyes and noſtrils; the upper part of the neck is of a reddiſh brown, and the rump black; all the body beſides this is of an obſcure ruſt colour, and its wings are partly black, partly grey; its tail is long, and the upper half of it is white, and the reſt black. It is from this white part that it has its name *albicilla*. The male is of a darker colour than the female. This bird inhabits Scotland and the Orkneys, and feeds on fiſh as well as on land animals.

Authors who have written on this ſubject ſeem not at all agreed to call the ſame bird by this name. The *pygargus* of Aldrovand ſeems different from this, and the *pygargus prior* of Bellonius ſeems no other than the male of that kind of hawk, called in Engliſh the *hen-harrier*.

Mr. Willughby imagines his firſt *pygargus*, p. 61, to be only a variety of the *white-tailed* EAGLE, having the ſame characteriſtic mark, and differing only in the pale colour of the head.

PYGARGUS *accipiter*, in *Ornithology*, a name by which many authors have called the ſubbuteo, a bird of the hawk kind; the male of which is called in Engliſh the HEN-HARRIER, and the female, ſuppoſed by ſome to be the RINGTAIL.

PYGME, πυγμη, the length, or extent, between the elbow and extremity of the hand, the fiſt being ſhut; called alſo a CUBIT.

PYGMY, *pygmæus*, πυγμαιος, formed of πυγμη, *cubit*, a DWARF, or perſon of exceeding ſmall ſtature, not exceeding a cubit in height.

The appellation is given among the ancients to a fabulous nation, ſaid to have inhabited Thrace; who generated and brought forth young at five years of age, and were old at eight; famous for the bloody war they waged with the cranes.

PYKER, or PYCAR, in our *Writers*, a ſmall ſhip or herring-boat.

PYLÆA, πυλαια, in *Antiquity*, a name given to the aſſembly of the Amphictyons, as well when they met at Delphi as at Thermopylæ. The concourſe of people at theſe aſſemblies was ſo great, that the term *pylæa* came to be uſed for any very numerous aſſembly, or croud of people. Mem. Acad. Inſcr. vol. iv. p. 287, 290.

PYLAGORÆ, Πυλαγορης, in *Antiquity*, a name given to the AMPHICTYONS, becauſe they aſſembled at Thermopylæ, or Pylæ.

PYLING *the ground for foundations*. See FOUNDATION, and PALLIFICATION.

PYLORIC *artery*, in *Anatomy*, is a branch of the hepatic artery, which is ramified on the PYLORUS, and having diſtributed branches to the neighbouring parts of the ſtomach, which communicate with thoſe of the right gaſtrica, it terminates in the pylorus, by an anaſtomoſis with the coronary artery of the ſtomach.

PYLORIC *vein*, in *Anatomy*, is a branch from the vena portæ inferior; ſometimes it is only a branch of the right gaſtrica. It paſſes over the PYLORUS to the ſhort arch of the ſtomach, where it is joined by anaſtomoſis with the coronaria ventriculi.

PYLORUS, πυλωρος, primarily ſignifying *janitor*, or *door-keeper*, in *Anatomy*, the right and lower orifice of the STOMACH, whereby it diſcharges itſelf into the INTESTINES. See *Tab. Anat. (Splanch.) fig.* 2. *litt.* t, t.

The *pylorus* is ſituate on the right-ſide of the ſtomach, and paſſes, by an oblique aſcent, to the duodenum, to prevent the too precipitate paſſage of the aliment out of the ſtomach.

For this end it is likewiſe furniſhed with an extraordinary ſerica of fibres, to conſtringe it more than any other part: theſe, running around it, ſerve as a kind of ſphincter, which is opened by the contraction of the ſtomach, and the appulſe of the chyle.

At the bottom of the *pylorus* is a large cavity, which Willis calls ANTRUM *pylori*.

Kerkring gives us an account from his own knowledge of the entire ſtoppage of this part, by a Dutch ſtiver accidentally ſwallowed, the conſequence of which was the death of the patient in a few days. On the other hand, he mentions an inſtance of another perſon's ſwallowing a copper coin, which, without any other effect than violent nauſeas and ſickneſs, was, at the end of about a month, diſcharged by purges; but ſo corroded by the juices of the ſtomach, that it was ſcarce to be known, all the letters and marks being eaten down to the ſame common ſurface on both ſides.

PYNANG, in *Botany*, a name by which ſome authors call the *faufel*, or AREKA-*tree*; a kind of palm, from the expreſſed juice of which the drug commonly, but improperly, called JAPAN-*earth* is made.

PYONY *water*. See WATER.

PYRACANTHA, in *Botany*, a name given by ſome authors to the *lycium*, or BOX-*thorn*.

PYRÆIA, or PYRETHRA, among the *Eaſtern Nations of Antiquity*, were great incloſures uncovered, and dedicated to the ſun, in which a perpetual fire was kept up in honour of this luminary, which was worſhipped by moſt of them. See CHAMANIM.

PYRALIS, the *fire-fly*, a name given by authors to a ſuppoſed inſect, which they ſay is produced in the violent fires of the glaſs and metal furnaces. Plin. lib. ii. cap. 36.

PYRAMID, πυραμις, in *Geometry*, a ſolid ſtanding on a ſquare, triangular, or polygonal baſis, and terminating at top in a point; or a body whoſe baſe is a regular rectilineur figure, and whoſe ſides are plain triangles; their ſeveral vertices meeting together in one point.

Euclid defines it a ſolid figure, conſiſting of ſeveral triangles, whoſe baſes are all in the ſame plane, and have one common vertex.

Wolfius defines it a ſolid, bounded by as many triangles, ADC, DCB, and ADB, terminating in one point D, as the baſe ABC has ſides. *Tab. III. Geometry, fig.* 75.

The *pyramid* is ſaid to be *triangular, quadrangular, quinquangular*, &c. according as the baſe is triangular, quadrangular, &c. The *pyramid* may be called a ſquare, triangular, &c. cone; or the cone a round *pyramid*.

PYRAMID, *properties of the*. 1. All *pyramids* and cones ſtanding on the ſame baſe, and having the ſame altitude, are demonſtrated to be equal.

2. A triangular *pyramid* is the third part of a prism, ſtanding on the ſame baſe, and of the ſame altitude.

3. Hence, ſince every multangular may be divided into triangulars, every *pyramid* is the third part of a priſm, ſtanding on the ſame baſis, and of the ſame altitude.

4. If a *pyramid* be cut by a plane *abc*, parallel to its baſe ABC, the former plane, or baſe, will be ſimilar to the latter.

5. All *pyramids*, priſms, cylinders, &c. are in a ratio compounded of their baſes and altitudes: the baſes, therefore, being equal, they are in proportion to their altitudes; and the altitudes being equal, they are in proportion to their baſes.

6. Similar *pyramids*, priſms, cylinders, cones, &c. are in a triplicate ratio of their homologous ſides.

7. Equal *pyramids*, &c. reciprocate their baſes and altitudes; i. e. the altitude of the one is to that of the other, as the baſe of this to the baſe of that.

8. A ſphere is equal to a *pyramid*, whoſe baſe is equal to the ſurface, and its height to the radius of the ſphere.

PYRAMID, *to meaſure the ſurface and ſolidity of a.* Find the ſolidity of a priſm that has the ſame baſe and height with the given *pyramid*. And divide this by three; the quotient will be the ſolidity of the *pyramid*.

Suppoſe, v. gr. the ſolidity of the priſm be found 67010328, the ſolidity of the *pyramid* will be thus found 22336776.

The ſurface of a *pyramid* is had, by finding the areas, both of a baſe ABC, and of the lateral triangles ACD, CBD, DBA. See TRIANGLE. The ſum of theſe is the area of the *pyramid*.

The external ſurface of a right *pyramid*, ſtanding on a regular polygonal baſe, is equal to the altitude of one of the triangles which compoſe it, multiplied by the whole circumference of the baſe of the *pyramid*.

PYRAMID *on a plane, to deſcribe a.* 1. Draw the baſe, v. gr. the triangle ABC (if the *pyramid* required be triangular); ſo as that the ſide AB, ſuppoſed to be turned behind, be not expreſſed. 2. On AC and CB, conſtruct the triangles ADC, and CDB, meeting in any aſſumed or determined point, v. gr. D; and draw AD, CD, BD; then will ADBC be a triangular *pyramid*.

PYRAMID *of paſteboard, &c. to conſtruct a.* Suppoſe, v. gr. a triangular *pyramid* required. 1. With the radius AB deſcribe an arc BE *(fig. 76.)*; and to this are apply three equal chords, BC, CD, and DE. 2. On CD conſtruct an equilateral triangle DFC, and draw the right lines AD, and AC. This paſteboard, &c. being cut off by the contour of the figure, what remains within will turn up into a *pyramid*.

PYRAMID, *truncated.* See TRUNCATED.

PYRAMID, *fruſtum of a.* See FRUSTUM.

PYRAMID, in *Architecture*, denotes a ſolid, maſſive edifice; which, from a ſquare, triangular, or other baſe, tiſes diminiſhing to a point, or vertex.

Some derive the word from πυρος, *wheat*, and αμαω, *colligo*; pretending that the firſt *pyramids* were built by the patriarch Joſeph, for granaries. But Villalpandus, with much better reaſon, derives the word from πυ, *fire*; becauſe of their ending in a point like flame.

When they are very narrow at bottom, i. e. their baſe very ſmall, they are called OBELISKS, and *needles*.

Pyramids are ſometimes erected to preſerve the memory of ſingular events, and, ſometimes, to tranſmit to poſterity the glory and magnificence of princes; but, as they are the ſymbol of immortality, they are more commonly uſed as funeral monuments.

Such is that of Ceſtius at Rome, the mauſoleum of this diſtinguiſhed Roman, who was one of the ſeven officers called EPULONES, and is ſaid to have lived under Auguſtus, repaired in 1673 by Alexander VII. and thoſe other celebrated ones of Egypt, as famous for their ſize, as their antiquity.

Theſe laſt are all ſquare in their baſes; and it is a thing that has been frequently propoſed, to eſtabliſh a fixed meaſure from them, to be thereby tranſmitted to poſterity. See their deſcriptions, meaſures, &c. in Thevenot, Pietro della Valle, Greaves, Pococke, Shaw, Perry, &c.

The *pyramids* of Egypt, comprehending the great and ſmall, are very numerous; of theſe there are about twenty of the larger ſize. The moſt remarkable are the three *pyramids* of Memphis, or, as they are now called, of Gheiſa or Gize. The dimenſions of the greateſt of theſe have been differently ſtated both by ancient and modern writers. Herodotus (lib. ii.) makes the baſe of it to be 800 feet long; Diodorus (lib. i.) 700; Strabo (lib. xvii.) leſs than 600; and Pliny (lib. xxxvi. cap. 12.) 883 feet. Among the moderns, Sandys found it to be 300 paces; Bellonius 324; Greaves 693 Engliſh feet; and Le Brun 770 feet. In order to reconcile theſe differences, Dr. Shaw obſerves, that none of the ſides of this *pyramid* are exactly upon a level; ſo that it is difficult to find a true horizontal baſe: beſides, it is impoſſible to ſay how much the driſts of ſand, to which it is expoſed, may have been accumulated above the foundation of it; and, therefore, all calculations, depending upon the time and circumſtances of the ſituation, when they were made, muſt be exceedingly precarious. The perpendicular altitude of it, according to Greaves, is 499 feet; but its oblique height is equal to the breadth of the baſe, or 693 feet. The whole area of the baſe contains 480,249 ſquare feet, or $11\frac{1}{100}$ Engliſh acres. The aſcent to the top of the *pyramid* is by ſteps, the lowermoſt being near four feet high and three broad; the ſecond of the ſame dimenſions, but retiring inward from the firſt near three feet; and in the ſame manner the third row is placed upon the ſecond, and the reſt in the ſame order to the top, which terminates in a ſmall flat or ſquare; and they are ſo diſpoſed, that a line ſtretched from the bottom to the top would touch the angle of every ſtep. Theſe ſteps are called by Herodotus little altars, on account of their form; and their number has been variouſly aſſigned; Greaves ſtates them at 207. For a deſcription of the inſide of this *pyramid*, as well as for an account of the others, we muſt refer to Greaves, &c. *ubi infra*.

Dr. Shaw apprehends that neither of theſe *pyramids* was ever finiſhed, ſuppoſing that the ſteps already mentioned ſhould have been filled up with priſmatical ſtones, ſo that each ſide of the *pyramid* might be ſmooth and level, like that of Ceſtius at Rome. The ancients inform us, that the ſtones of the *pyramids* were brought from the mountains of Arabia, and Herodotus (lib. ii. cap. 124.) has deſcribed the manner in which they were conveyed; but Dr. Shaw imagines that they were taken from the ſpot where they were employed; and he obſerves, that the greateſt of them, eſpecially, is not an entire heap of hewn ſtones, becauſe that portion of it, which lies below the horizontal ſection of the entrance, may probably be no more than an incruſtation of the natural rock on which it is founded. Dr. Bryant conjectures, that, like the SPHYNX, which ſtands directly in the front of the ſecond *pyramid*, they were immenſe rocks which ſtood upon the brow of the mountain; that the Egyptians caſed them over with large ſtones, and brought them by theſe means to a degree of ſymmetry and proportion. At the ſame time they filled up the unneceſſary interſtices with rubbiſh and mortar, and made chambers and apartments, as the intervals in the rock allowed, being obliged to ſurmount the indirect turns and openings in the original maſs to execute what they propoſed. Thus he infers from the narrowneſs and unneceſſary ſloping of the paſſages, which are often very cloſe and ſteep, and alſo from the fewneſs of the rooms in a work of ſo immenſe a ſtructure. That the *pyramids* were built upon a rock in the place where they now ſtand, was ſuggeſted by Mr. Hooke. See Birch's Hiſt. Royal Society, vol. iv. p. 245.

It is very ſurpriſing, that the *pyramids*, which have been reckoned among the wonders of the world, ſhould not have preſerved a more certain æra, and tradition of the names of their founders. Pliny reckons a number of authors who have wrote concerning them; and all, he informs us, diſagree in their accounts of thoſe who built them. Some modern writers maintain that they were erected by the Iſraelites, under the tyranny of the Pharaohs, and alledge to this purpoſe the teſtimony of Joſephus, Antiq. lib. i. cap. 5.

According to the relations of Herodotus (lib. ii.) and Diodorus (lib. i.), the firſt *pyramid* was erected by Cheops or Chemmis, a king of Egypt, who is ſaid to have employed three hundred and ſixty thouſand men for twenty years in the ſtructure. Cephren, brother to the former king, is ſaid to be the founder of the ſecond *pyramid*; and the third is ſaid to have been built by Mycerinus, the ſon of Chemmis, according to Diodorus, but according to Herodotus, of Cheops. However, Herodotus ſays, that ſome aſcribed the laſt to Rhodope, a courtezan, and the other two to the ſhepherd Philition. The learned Greaves places the three kings who erected theſe *pyramids*, in the twentieth dynaſty; Cheops having begun his reign in the year 3448 of the Julian period, 490 years before the firſt Olympiad, and 1260 years before the Chriſtian æra. He reigned fifty years. Cephren, the builder of the ſecond, reigned fifty-ſix years; and Mycerinus, the builder of the third, ſeven years.

Dr. Bryant gives a different account of the origin of theſe *pyramids*: he aſcribes the ſtructure of them to the Cuthites (ſee DISPERSION *of mankind*) or Arabian ſhepherds, who built Heliopolis, and who were the giants and Titans of the firſt ages. Theſe ſons of Chuſh, according to this writer, ſeem to have come into Egypt immediately after their diſperſion from Babel. Many have conſidered theſe ancient ſtructures with contempt, as being vaſt piles without any great ſymmetry, and have

thought the labour idle, and the expence unneceſſary. Thus Pliny (lib. xxxvi. cap. 12.) calls them *regum pecuniæ otioſa ac ſtulta oſtentatio*, &c. built for oſtentation, to keep an idle people employed, and to prevent emotion and rebellion. Ariſtotle (Poliſt. lib. iii.) calls them the works of tyranny.

The general opinion with regard to their intention and uſe is, that they were ſepulchres and monuments of the dead, particularly of kings. This is expreſly affirmed by Diodorus (lib. i.), and Strabo (lib. xvii.) and the opinion is confirmed by the writings of the Arabians. And the reaſon, ſays Greaves, of their erecting theſe magnificent ſtructures is founded in the theology of the Egyptians, who, as Servius ſhews in his comment upon Virgil, (Æneid, lib. iii.) where he deſcribes the funeral of Polydorus—*Animamque ſepulchro condimus*—believed, that as long as the body endured, ſo long the ſoul continued with it; and this was alſo the opinion of the Stoics. Upon this principle, that the bodies might neither be reduced to duſt by putrefaction, nor converted into aſhes by fire, they embalmed them, and laid them up in theſe ſtately repoſitories, where they might continue from the injury of time and of men. The reaſon of their building their ſepulchres in the form of *pyramids* was either from a notion, that this was the moſt permanent form of ſtructure, or becauſe they hereby intended to repreſent ſome of their gods; particularly, as Greaves conjectures, Oſiris, or the ſun with many rays; for under this form the ſtatues of the gods were frequently exhibited, and the gods themſelves worſhipped.

Among the Egyptians, the *pyramid* is ſaid to have been a ſymbol of human life; the beginning whereof is repreſented by the baſe, and the end by the apex; on which account it was that they uſed to erect them on ſepulchres. Herodotus.

Some, however, have objected to this deſign of the Egyptian *pyramids*, and are of opinion that they were originally intended for ſome nobler purpoſe. If Cheops, or any other perſon, ſays Dr. Shaw, who was the founder of the great *pyramid*, intended it only for his ſepulchre, what occaſion was there for ſuch a narrow, crooked entrance into it; for the well, as it is called, at the end of the entrance; for the lower chamber, with a large nitch or hole in the eaſtern wall of it; for the long narrow cavities in the walls of the upper room; or for the two antichambers and the lofty gallery, with benches on each ſide that introduce us into it?

As the whole of the Egyptian theology was clothed in myſterious emblems and figures, it ſeems reaſonable to ſuppoſe, ſays this writer, that all theſe turnings, apartments, and ſecrets in architecture, were deſigned for ſome purpoſe of religion, and that the deity, which was typified in the outward form of this pile, was to be worſhipped within. The ſquare cheſt of granate marble, which is placed in the upper chamber of the great *pyramid*, may be ſuppoſed to have been rather intended for ſome religious uſe than for the coffin of Cheops. It might have ſerved for one of their ſacred cheſts, in which either the images of their deities, or their ſacred veſtments or utenſils were kept, or it might have been a *ſarcoſſa* or coffin; ſuch as contained the holy water uſed in their ceremonies. Its length favours the opinion of its having been deſigned for a coffin, but its height and breadth far exceed the dimenſions that were adhered to on ſuch occaſions; the Egyptian ſtone coffins were made of a different form, and inſcribed with hieroglyphics. Nor is this cheſt placed according to the manner in which the Egyptians depoſit their dead; for their mummies always ſtand upright, whereas this cheſt lieth flat upon the floor. If, therefore, this cheſt was not intended for a coffin, it is inferred that the *pyramid* itſelf could not have taken the name of a ſepulchre from it. Cheops, indeed, and others, might have been buried within the precinct of this or any other of the *pyramids*, and this was no more than was practiſed in other temples, and, therefore, could not deſtroy the principal uſe and deſign for which they were erected. Upon the whole, Dr. Shaw concludes, from the outward figure of theſe piles, the ſtructure and contrivance of the ſeveral apartments in the inſide of the greateſt, together with the ample proviſion that was made on each ſide of it for the reception, as may be ſuppoſed, of the prieſts, that the Egyptians intended the latter for one of the places, as all of them were to be the objects, at leaſt, of their worſhip and devotion.

Dr. Bryant has lately maintained, with conſiderable force of argument, this opinion, that the *pyramids* were deſigned for high altars and temples, and were conſtructed in honour of the Deity. If the chief *pyramid* were deſigned for a place of burial, what occaſion, ſays he, was there for a well, and for paſſages of communication, which led to other buildings? The apartments near the *pyramids* he ſuppoſes to be deſigned for the reception of prieſts, and to be appendages not to a tomb, but to a temple of the Deity. The ſtone coffin, he apprehends, was a trough or reſervoir for water, which by means of the well they drew from the Nile. The prieſts of Egypt delighted in obſcurity, and they probably came by the ſubterraneous paſſages of the building to the dark chambers within; where they performed their luſtrations, and other nocturnal rites. Many, he adds, of the ancient temples in this country were caverns in the rock, enlarged by art, and cut out into numberleſs dreary apartments; for no nation upon the earth was ſo addicted to gloom and melancholy as the Egyptians. From the top of the *pyramids* they obſerved the heavens, and marked the conſtellations; and upon the ſame eminence it is probable that they offered up vows and oblations. See on this article Greaves's Works, vol. i. p. 1, &c. Shaw's Travels, fol. p. 413, &c. Pococke's Deſcript. of the Eaſt, vol. i. p. 41, &c. Perry's View of the Levant, p. 413, &c. Bryant's Anal. of Ancient Myth. vol. iii. p. 523, &c. Palmer's Worſhip of Human Spirits, &c. p. 379, &c.

The tomb of Perſenna, king of Hetruria, at Cluſium in Italy, is an ancient monument of ſquare ſtone, each ſide of which is three hundred feet broad, and fifty feet high. Within the ſquare baſe there is an inextricable labyrinth; upon this ſquare there ſtand five *pyramids*, four in the angles, and one in the middle, ſeventy-five feet broad at the bottom, and a hundred and fifty feet high, and terminating in a point; at top they are covered with a braſs circle, from which are ſuſpended bells, which are put in motion by the wind, ſo as that their ſound may be heard at a great diſtance. Upon this circle there are four other *pyramids*, each a hundred feet high, above which upon one plane there are five other *pyramids*. Such is the account which Pliny gives from Varro, lib. xxxvi. cap. 13.

PYRAMID, *ſcenography of a*. See SCENOGRAPHY.

PYRAMID, *optics*. See OPTIC *pyramid*.

PYRAMIDAL *fountain*. See FOUNTAIN.

PYRAMIDAL *mirror*. See MIRROR.

PYRAMIDAL *numbers* are the ſums of polygonal numbers, collected after the ſame manner as the POLYGONAL *numbers* themſelves are extracted from arithmetical progreſſions. See *Figurate* NUMBERS.

Theſe are particularly called *firſt pyramidals*. The ſums of firſt *pyramidals* are called *ſecond pyramidals*. And the ſums of thoſe *third pyramidals*; and ſo on, *ad infinitum*. Particularly, thoſe ariſing from triangular numbers are called *prime triangular pyramidals*; thoſe ariſing from *pentagonal numbers* are called *prime pentagonal pyramidals*, &c. The numbers 1, 4, 10, 20, 35, &c. formed by the addition of the triangular numbers 1, 3, 6, 10, &c. are uſually called by the ſimple name of *pyramidals*; and the general formula for finding them is $n \times \frac{n-1}{3} \times \frac{n-2}{4}$; i. e. the fourth *pyramidal* may be found by ſubſtituting 4 for n; the fifth by ſubſtituting 5 for n, &c.

PYRAMIDALE, *corpus*, in *Anatomy*, a plexus of blood-veſſels on the back of the teſticles, thus called from its form; and, from its ſtructure, alſo called *corpus varicoſum*, and PAMPINIFORME.

It conſiſts of innumerable little veins, communicating with each other, and forming a kind of net-work; which at length uniting, terminate in one vein, by which the blood is conveyed into them all.

The origin of this plexus is from the ſpermatic veins; which, a little above the teſticles, ſplit into ſeveral branches; which again uniting ſeveral times, form the *corpus pyramidale*.

PYRAMIDALES *papillæ*. See PAPILLÆ *pyramidales*.

PYRAMIDALES *abdominis*, in *Anatomy*, denote ſmall muſcles in the abdomen, lying in the lower part of the rectus. They have their name from their figure, and their origin from the margin of the oſſa pubis, with a pretty broad fleſhy head, whence they grow gradually narrower, till they end in a ſmall, round tendon, in the linea alba; ſometimes almoſt at the navel. See *Tab. Anat. (Muſcl.) fig.* 1. *n.* 46. *fig.* 2. *n.* 31.

When theſe muſcles are wanting, the lower extremities of the recti are always thicker than uſual; often there is only one found, and ſometimes, though rarely, three. Winſlow.

PYRAMIDALIS *oculorum*, in *Anatomy*, a name given by Moliner and ſome others to one of the muſcles of the face, called by Douglas and Cowper APERIENS *palpebram*, and by Albinus *levator palpebræ ſuperioris*.

PYRAMIDALIS is alſo a name given to the PYRIFORMIS.

PYRAMIDOID, called alſo *parabolic ſpindle*, a ſolid figure, formed by the revolution of a ſemiparabola round one of its ordinates.

According to the method of indiviſibles, this may be conceived to conſiſt of an infinite ſeries of circles, whoſe

diameters are all parallel to the axis of the revolving parabola.

The *parabolic spindle* is equal to $\frac{1}{2}$ of its circumscribing cylinder.

PYRAMIDOID, *parabolic*. See PARABOLIC *pyramidoid*.

PYRATE. See PIRATE.

PYRITA, in *Natural History*, the name of a stone found [illegible] of the stone of an olive. It is of the [illegible] kind, being no other than the petrified [illegible] species of ECHINITES.

PYRENOIDES *processus*, in *Anatomy*, a process of the second vertebra of the neck; called also *odontoides*, and *cuspiformis*, or the tooth-like process.

The word *πυρηνοειδης* is formed of *πυρην*, *nucleus*, *kernel*, or *berry*, and *ειδος*, *figure*.

PYRETHRUM, in *Botany*. See PELLITORY.

PYRETICS, formed from *πυρετος*, *fever*, of *πυρ*, *fire*, medicines good against fevers.

PYRGUS, among the Romans, a dice-box of the shape of a modius, open above, and having a great many theleæ or partitions within it; so that when the dice were thrown into it out of the fritillum, they were thereby overturned many times before they could reach the bottom, in which there was an opening for them to fall through upon the table.

PYRHOPOECILOS, in the *Natural History of the Ancients*, a stone so called from its having a great many spots of the colour of fire.

PYRIATERION, a word used by the ancients to express a sweating-room.

PYRIATOS, a word used by some authors to express a brick when heated, in order to be applied to the body wrapped up in a cloth by way of a dry fomentation.

PYRICAUSTUM, a word used by medical writers to express a burn or scald.

PYRICUBIUM, in *Natural History*, the name of a genus of fossile bodies, usually comprehended, with many others of very different figure and structure, under the general name *pyrites*. See *Tab. of Fossils, Class* 5.

The distinguishing characters of the *pyricubia* are these: they are compound, inflammable metallic bodies, of a cubic figure, or resembling a die, being composed of six sides. Of this genus there are only two known species. Hill.

PYRIFORMIS, called also *pyramidalis*, in *Anatomy*, a small oblong muscle of the thigh, receiving its name from its figure, which resembles that of a pear. It is also called *iliacus externus*, from its situation. See *Tab. Anat. (Myol.) fig.* 7. *n.* 21, 22.

It is situated almost transversely between the os sacrum and ischium, being covered and hid by the first two glutæi. It is fixed to the interior lateral part of the os sacrum by fleshy fibres, and to the neighbouring part of the anterior or concave side of that bone, by three digitations lying between the anterior holes. It is also fixed by a small insertion to the ligamentum sacro-sciaticum, and the edge of the great sinus of the os ilium. From thence it runs transversely toward the joint of the hip, its fibres contracting in breadth; it terminates in a short tendon, which is inserted in the middle of the internal labium of the upper edge of the great trochanter, by two or three branches. The upper part of this tendon receives several fibres from the glutæus medius, and its lower part is united to the gemellus superior, and tendon of the obturator internus. This muscle moves the os femoris somewhat upwards, and turns it outwards. Sometimes there are two *pyriformes*, separated only by the nervus sciaticus. Winslow.

PYRIPHLEGES, a word used by the old writers in medicine to express a person labouring under an extreme degree of a febrile heat.

PYRIPLACIS, in *Natural History*, the name of a genus of pyrites, the characters of which are these: they are compound, inflammable, metallic bodies, found in loose detached masses of a simple and uniform, not striated internal structure, and are covered with an investient coat or crust.

Of this genus of fossils there are three known species. Hill. See *Tab. Fossils, Class* 5.

PYRIPOLYGONIUM, in *Natural History*, the name of a genus of fossils, the characters of which are, that they are compound metallic bodies, of a regular figure, consisting of twelve planes. See *Tab. of Foss. Class* 5.

There is only one known species of this genus, though subject to great varieties in its appearance; and this has been by authors hitherto confounded, with many other bodies of very different nature and figure, under the general name *pyrites*.

It is not unfrequent in Cornwall and Devonshire; but is much more common in Germany. Hill.

PYRITES, in *Physiology*, a mineral resembling the true ores of metals, in its substance, colour, and weight, and in the parts of the earth where it is found; and composed, like them, of metallic substances, mineralised by sulphur or arsenic, or by both, and of an unmetallic earth intimately united with its other principles. The Greek word *πυριτης*, formed of *πυρ*, *fire*, denotes *fire-stone*; a denomination given to this substance on account of its inflammability, which is such, that, by collision with steel, it will yield sparks of fire. The generality of writers distinguish between *pyrites* and ores, on account of a difference in the proportion and connection of the materials of which they are respectively composed. The *pyrites*, it is said, generally contains less metal, and a greater quantity of sulphur and arsenic and unmetallic earth: and these matters are more strongly connected in *pyrites* than in ores, and they are accordingly much harder. *Pyrites* differs also from ores by its form and position in the earth; being found in distinct masses often unaccompanied with ores, and in all sorts of gravels and stones, and also in pit-coal and other bituminous matters. *Pyrites* is also distinguishable from ores by its lustre and figure, which is almost always regular and uniform. However, other writers will not allow that there is any sufficient reason for considering the *pyrites* as a distinct class of substances from ores; as they have no mark, by which they can certainly and constantly be distinguished from these. The distinction has been chiefly introduced by miners, because the *pyrites* in general contain so little metal, and so much of the mineralising substances, that they are seldom smelted. Nevertheless, there are some kinds of *pyrites* which yield a great quantity of copper, and are smelted with great advantage. Accordingly, some later mineralogists consider the cupreous yellow *pyrites* as an ore of copper, the pale yellow martial *pyrites* as an ore of iron, and the white arsenical *pyrites* as an ore of arsenic.

The *pyrites* bears a near affinity to MARCASITE, with which some authors have confounded it. Dr. Woodward makes this distinction between the two, that *pyrites* is restrained to the nodules, or those pieces that are found lodged in strata of another kind, and marcasite to those composing whole strata. Dr. Hill uses the name *pyrites* as the classical term for the less regularly figured bodies of the number of those usually called, too indeterminately, by that name. See *Tab. of Fossils*, Class 5.

According to this distinction, *pyrites* are compound, inflammable, metallic bodies, found in detached masses, but of no determinately angular figure. The forms of these minerals are exceedingly various; they are spherical, oval, cylindrical, pyramidal, prismatical, cubic; they are solids with five, six, seven, eight, nine, ten, &c. sides. The surface of some is angular, and consists of many bases of small pyramids, the points of which all unite in the centre of the mass.

Of this class Hill distinguishes two general orders of bodies; the first, those which are of a p[illegible]e internal structure; and the second, thos[illegible] regularly striated within: and of each of t[illegible] two genera. Those of the first are:

1. The *pyroplaces*. These are *pyrites* [illegible]ternal structure, and covered with an investi[illegible]ull.

2. The *cyanopyres*. These are *pyrites* [illegible]nternal structure, and naked, or not cove[illegible]ficient coat or crust.

The genera of the second order, or [illegible]*yrites*, are,

1. The *pyritricha*. These are the *pyr*[illegible]striated structure.

And, 2. The *pyritichiphyllæ*. The[illegible]*yrites* whose surfaces are covered with foliat[illegible]made by a continuation and expansion of the[illegible]rites. Hill's Hist. of Foss. p. 612.

The several species of each of these gene[illegible] the several generical heads, PYRITRICHÆ, &c.

The *pyrites* differ not only in their [illegible]their component substances; accordingly [illegible]ful-phureous, martial, cupreous, arseni[illegible]rites of these substances predominates.

Dioscorides mentions only one kind [illegible]ch is the common yellow species. Avice[illegible]other Arabians mention two yellow sorts, [illegible]and a ferruginous one. None of these au[illegible]distinction between the marcasites and *pyrites*, but this sort of matter, whether formed into small nodules, or continued strata, was called indifferently by one or other of these names.

The four kinds of this stone mentioned by the Arabians are called from their colours, the golden, the silver, the brassy, and the ferruginous *pyrites*. The oldest authors are of the opinion of Dioscorides, and mention only one kind, deducing them all from the same principles, and supposing their variety of colours to be only owing to accidents. Aristotle and Theophrastus thus mention the

pyrites

pyrites is one thing, under the name *mylia*, which having been translated *molaris lapis*, has be as understood by some to mean some sort of mill-stone, or other coarse stone, fit for such purposes; and by that means the whole sense of the authors has been perverted and misunderstood.

Pliny mentions two kinds of the *pyrites*, the gold and the silver kind.

The principal contents of *pyritæ* may be in general guessed at from their colour. Henckel distinguishes them in general into three colours, white, yellowish or a pale yellow, and yellow. The white *pyrites* contains most arsenic, the greatest part of it being iron and arsenic; the yellowish is chiefly composed of sulphur and iron; and the fully yellow, of sulphur and copper. The colours, therefore, make a very essential mark for the distinction of the several kinds of this fossil. The yellowish *pyrites*, that is, such as contains iron and sulphur, is found in the strata of several kinds of stone, in clay, and in the earth lying over the mines of several metals. The white, or arsenical *pyrites*, and the fully yellow, are less common, but are usually met with about mines.

The ancients in general supposed, that copper was contained in the *pyrites*; but they had no opinion that iron was a part of it, though it is certain that iron is the basis of almost all of them, and copper has a part only in a very few: but this was the effect of judging from appearances, instead of having recourse to experiments. Our own Lister has the honour of being the first author who has treated properly of them, and found out their true and general basis to be iron; accordingly he supposes them to be all properly iron ores. Lister de Font. Medic. Angliæ.

Berger, who has written on the Caroline baths, has taken up the subject, and though he allows that iron seems the basis of great numbers of the *pyritæ*, as is evident from the observation, that the remaining matter of many of them, after burning away the sulphur, is found to be attracted by the magnet; yet he observes also, that in many copper is mixed with the iron, and that though iron is in general found in even those kinds which give the most obvious proofs of copper, yet there are some in which there can no iron be found.

This author observes also, that besides the metalline particles, whether iron or copper, there is also contained in the *pyritæ* an unmetallic earth, which is in the composition of this stone most equally mixed and perfectly blended with the particles of their metals, and with those of the salts and sulphurs contained also in the mass. Sulphur also he acknowledges to make a great part of many of the *pyritæ*, particularly of all the yellowish and full yellow kinds. The white or silvery *pyrites* contains less sulphur than any of the others; and the yellow or vermeil *pyrites*, though it contain much arsenic, yet does not fail to contain sulphur also in considerable quantity. Berger de Font. Carolin.

Henckel, in his Pyritologia, observes, that in general all the *pyritæ* are martial, as ferruginous earth is the essential and fundamental part of every *pyrites*. This earth, he says, is joined with an unmetallic earth, with sulphur or arsenic, or with both these matters, in which case the sulphur always predominates over the arsenic. These he considers as the only essential principles of *pyrites*, believing that all the other matters, metallic and unmetallic, which are found in it, are only accidental; among which he includes even copper, although so much of it exists in some kinds of *pyrites*, that they are worked for the sake of copper, and sometimes contain even forty pounds of copper each quintal. The existence of an unmetallic earth in *pyrites* has been demonstrated by Henckel, Cramer, and others; and this earth is intimately united with the other constituent parts of this fossil, so essential to its existence, and inseparable from it, otherwise than by its total decomposition. According to Henckel, this unmetallic earth abounds much in the white pyrites, since he found from the analyses which he made, that the iron, which is the only metal existing in these pyrites, is only about one twentieth part of the fixed substance that remains after the arsenic has been expelled by torrefaction or sublimation. In the pale yellow *pyrites*, the proportion of iron is generally about twelve pounds to a quintal of *pyrites*, and sometimes fifty or sixty pounds; and this is, therefore, called martial *pyrites*. It contains about one fourth its weight of sulphur, and the rest is unmetallic earth. The quantity of this earth contained in the yellow or cupreous *pyrites*, which is also martial, because iron is an essential part of every *pyrites*, has not yet been determined. These kinds probably contain some of that earth, though perhaps less of it than the others. As to the nature of this earth, Henckel thinks, that it is an earth disposed already by nature to metallisation, but not sufficiently elaborated to be considered as a metallic earth; and perhaps it is different in the different kinds of *pyrites*.

The mention of gold and silver in the *pyrites* is very common among authors, but the colour of these stones seems principally to have given ground for that opinion. In reality, these metals are very seldom found naturally making parts of the *pyrites*; and when they are, it is only in a very inconsiderable quantity. But in those specimens found about the mines of gold and silver, the particles of those metals assembled into visible masses are sometimes found imbedded in lumps of the *pyrites*; and such pieces of this stone may then well be said to contain these precious metals. The occasion of this accident, however, is no more than this, that the *pyrites* is formed in mines and other places at this day; and thus it may adhere to particles of gold and silver, and thereby give ground to the supposition of their being parts of it. These precious metals Henckel also considers as accidental to *pyrites*. In some specimens the gold has been found in its metallic form, and visible to the naked eye; sometimes otherwise: and in these cases, the ore has been thought to contain the gold united first with iron, and that compound united with sulphur. But Dr. Fordyce observes, that it has not yet been proved, that a compound metal can be combined with sulphur: and, from some experiments made by this ingenious chemist and Mr. Alchorne, in order to determine, whether this ore contains the gold in its metallic form, only mechanically mixed with the *pyrites*, or combined with the sulphur by means of the iron, they were led to conclude, that the gold was in its native form, and not mineralised. Phil. Transf. vol. lxix. part ii. p. 327, &c.

The common *pyritæ* of our clay-pits and sea-coasts are used in the making of copperas or vitriol; but among these there is found a very great difference, some of them turning themselves very easily to vitriol, when only exposed to moist air; others doing it with more difficulty; and some not at all, though exposed many years. Some also yield all their vitriol at once, on pouring warm water on them; while others must lie exposed to the air at several different times, and roasted in the mean while in order to obtain it. The settled observations on this subject, as collected from experiments, are these:

No *pyrites* which contains any copper, or any arsenic, will of itself turn into vitriol, but requires a previous roasting.

The sulphureous iron *pyrites*, void of copper or arsenic, all turn to vitriol on being only exposed to the air; and that the sooner or later, as they are of a more or less compact substance. The fibrous or radiated *pyritæ* are usually of this kind; but this is no general rule, for there are some radiated ones which remain whole years unaltered in the air.

Copper and arsenic always resist the shooting of the salts of the *pyrites*, or its turning to vitriol; but these are not the only agents that resist this change, for in some merely ferreous and sulphureous *pyritæ* the change is not made, but with much time and difficulty.

It is remarkable also, that vitriol is found in some *pyritæ*, if water be poured upon them immediately after the roasting; while others will not yield any till they have been afterwards exposed to the air. It even seems, that we are to look into the air for the cause of the appearance of vitriol in the copperas stones. This it may greatly assist in effecting, as it carries a quantity of moist vapours in it: for it is well known, that the acid of sulphur has not the power to resolve iron into the form of a salt without the addition of water; nay, oil of vitriol, or of sulphur, being moderately concentrated, though it be then diluted with much more water than it is united with while yet in sulphur, does not even dissolve filings of iron unless there be four times or six times as much water poured to it. Water alone, however, though a great and necessary agent, cannot be supposed to effect the whole change; for though there are some of the *pyritæ* that yield their vitriol by means of it, yet there are others that do not; and some *pyritæ* are presently turned into vitriol, when exposed to the air, which had before remained for many years under water unaltered. Of this kind there are many on the shores of the sea in most parts of Europe. In England particularly we have them in great plenty in Sheppey Island in Kent. These *pyritæ* will long resist the change into vitriol, when in the air, and yet they evidently contain no copper nor arsenic.

There is also a kind very common on the shores, which resembles wood in texture and appearance; and has probably once been wood, but has now its pores filled with the *pyrites*: of these many lie buried a foot or more deep in the sand under the sea water; and in that state they never shoot into vitriol, but are of a firm texture

and

and considerable hardness, and when broken look very bright within, and have no taste of vitriol, nor give any mark that they contain any: yet these, if they are taken up and exposed to the air for a fortnight, lose all their brightness and their hardness, and mouldering to pieces, become so rich in vitriol, that it forms itself into regular crystals on their surfaces. Now, if moisture alone was sufficient to produce this effect, there is no reason why they should not have been resolved into vitriol under a very moist sand. The great cause we are able to assign, appears to be the vague acid, so common in the fossile world, and filling also the region of the air; but an ingenious reasoner will still own, that though this may do much, yet there must be some other cause, yet undiscovered, for the production of vitriol in these fossils; since this, as well as the moisture of the air, ought to act more equally than we find by experience it does on these stones, if all were owing to it.

In the exposing these copperas stones to the air, if it be a moist season, no further care need be taken of them than the piling them up in a heap; but moistening them now and then is a necessary circumstance in dry seasons, and in this case the water should be sprinkled on them in small quantities at a time, and the heaps now and then turned and new made. Much depends on this management, the same quantity of stones yielding twice as much copperas, with proper care, as they would without it.

It is well known, that iron and sulphur have a singular action on each other, when they are well mixed together and moistened. Hence it happens, that many kinds of *pyrites*, particularly those which contain only the principles now mentioned, sustain a singular alteration, and even a total decomposition, when exposed during a certain time to the combined action of air and water. The moisture, gradually penetrating them, divides and attenuates their parts; the acid of the sulphur particularly attacks the martial and also the unmetallic earth, its inflammable principle is separated from it, and dissipated. In these circumstances, the *pyrites* changes its nature. The acid of the sulphur which is decomposed forms with the fixed principles of the *pyrites*, vitriolic, aluminous, and selenitic salts; so that a *pyrites*, which was once a shining, compact, very hard mineral, becomes in a certain time a greyish, saline, powdery mass, the taste of which is saline, austere, and ilypic. And if this mass be lixiviated with water, crystals of vitriol, and sometimes of alum, according to the nature of the *pyrites* employed, may be obtained by evaporation and crystallization. This decomposition of *pyrites* is called efflorescence and vitriolisation, because it becomes covered with a saline powder, and because vitriol is always formed. In the pale yellow *pyrites*, containing chiefly sulphur and iron, the fermentation excited by moisture in its constituent parts is so violent, that when the quantity is considerable, not only a sulphureous vapour and heat may be perceived, but the whole mass kindles and burns intensely. Thus in an experiment of Dr. Slare (Phil. Trans. N° 253.) a heap of *pyrites* consisting of two or three hundred tons, which was covered from the air five or six months, took fire and burnt for a week. Some of it looked like melted metal; and other parts like red-hot stones. It also emitted a very noisome smoke. To this decomposition of *pyrites* in the bowels of the earth some philosophers have ascribed subterranean fires and volcanos: and Lister mistakenly attributes thunder and earthquakes to the sulphureous and inflammable breath of the *pyrites*. No other *pyrites* is subject to this spontaneous decomposition, when exposed to humid air, besides the pale yellow *pyrites*, which is both martial and sulphureous. The arsenical *pyrites* is not changed by exposure to air. This kind is harder, heavier, and more compact than the former; and Wallerius proposes to distinguish it by the name of MARCASITE. When cut, it may be polished so as to give a lustre almost equal to that of diamonds, but without refracting the light, as it is perfectly opake. It has been employed some years past in the manufacture of toys, as of buckles, necklaces, &c. Dict. Chem. Eng. ed. art. *Pyrites*.

The *pyrites*, in substance, are never used medicinally; nevertheless, in their products they are very important. From these common sulphur is extracted, in Sweden and Saxony; the native vitriols are produced in caverns of the earth, or on its surface; the greatest quantities of artificial vitriol are prepared; and the mineral waters, vitriolic, aluminous, sulphureous, hot or cold, are supposed to receive their impregnation.

When the matter of the *pyrites* is mixed with the lead ores, the method of separating the metal by assaying is this: roast two centners of the ore, as in the usual method, and keep a stronger fire than when the ore is pure. The *pyrites*, especially when it is merely iron, hinders an ore from easily growing clammy, or turning into large lumps, or entirely melting. When the ore is sufficiently washed, let it cool, beat it to powder, and repeat the roasting to a third fire, till when it is red-hot in the fire, there is no smell of sulphur; then mix the ore with six centners of the black flux, and two of sandiver, and finish the work in the common way, only making the fire greater, and continuing it longer, toward the end of the operation. Cramer's Art of Assaying, p. 292. See LEAD-ore.

PYRITES is applied by some authors to the marcasite ores of all metals; the names whereof are varied according to the metals they partake of.

Thus *chrysites* is that of gold; *argyrites* that of silver; *sideritis* that of iron; *chalcitis* that of copper; and *molybditis* that of lead, &c.

PYRITICUM *liquamen*. See LIQUAMEN *pyriticum*.

PYRITRICHIPHYLLUM, in *Natural History*, the name of a genus of fossils of the class of the PYRITES, the characters of which are these: they are compound, inflammable, metallic bodies, found in loose masses not of any regularly angular figure, and of a striated texture, with foliaceous ends to the strix, appearing on the surface or within the mass. See *Tab. of Fossils, Class* 5.

Of this genus there are only two known species; one having the foliaceous ends of the strix on the outer surface of the mass; and the other having a smooth external surface, and the foliaceous ends of the strix covering the sides of internal hollows.

The first of these is found in many of the English and German mines; the other has been yet only found in the mines on Mendip hills in Somersetshire, but there in considerable plenty. Hill's Hist. of Foss. p. 618.

PYRITRICHUM, in *Natural History*, the name of a genus of PYRITES, the characters of which are these: they are compound, inflammable, metallic fossils, always found in detached masses of no regularly angular figure, and of a simply striated internal structure. See *Tab. of Fossils, Class* 5.

Of this genus of *pyritæ* there are three known species. All the three species are found plentifully in different parts of the kingdom: the first in all sorts of strata, and often loose on the ground; the second, principally in the chalk-pits of Kent and Suffex; and the last in Essex and Hampshire, and very frequently in the German mines. Hill's Hist. of Foss. p. 617.

PYRMONT *water*, in *Physiology* and *Medicine*, a very brisk, spirituous chalybeate, abounding in fixed air, and which, when taken up from the fountain at *Pyrmont* in Westphalia, in Germany, whence its name, sparkles like the brisket Champaign wine. It has a pleasant, vinous taste, and a somewhat sulphureous smell. It is perfectly clear, and bears carriage better [illegible] water.

The history of these waters is accurately [illegible] man in his observations on them, both [illegible] state and in mixture with other bodies.

He first observes, that they contain a vo[illegible] principle, much more penetrating and [illegible] in larger quantity, than any other min[illegible] that this is not to be expected in them [illegible] upon the spot, for those who transport [illegible] places are constrained to let a part of this [illegible] serve the rest. If either glass or earthen [illegible] at the spring, and immediately corked and [illegible] the consequence is, that they will burst o[illegible] tion or heat of the weather. They are, th[illegible] to fill them only in part at first, and [illegible] awhile for this subtile spirit to exhale, an[illegible] after the filling them up to cork and [illegible] carriage.

2. If they are drank upon the spot in a [illegible] empty stomach, they affect the nose wi[illegible] tingling, and disturb the head for many [illegible] wards.

3. If they are taken at the spring, they p[illegible] strile; but if taken in another place, afte[illegible] tion, they purge considerably more, and ren[illegible] black. It is observable also, that if they are [illegible] an open veffel a few days, their virtue wholly exhales, and they no longer purge nor render the stools black.

4. If tea-leaves, balaustine-flowers, or galls, are put into this water, they first change it to a blue, from that to a purple, and finally to a black. This is a ready proof, that black is only a deep purple, and purple only a deep blue: a little spirit of vitriol added to this liquor destroys all the colour, and renders it limpid as before.

5. If any acid be mixed with *Pyrmont water*, there is raised an effervescence, and bubbles of air are carried up in great quantity; and this whether the stronger acids, such as spirit of vitriol, or aqua fortis, be used; or the weaker, as vinegar, lemon juice, or Rhenish wine.

6. If an alkaline liquor be added, whether it be volatile, as the ſpirit of ſal ammoniac, or fixed, as the oil of tartar, there is no ebullition raiſed, but the liquor becomes turbid and milky. If ſpirit of vitriol be afterwards added to this, to ſaturate the additional alkali, the liquor becomes limpid again.

7. Cow's milk mixed in equal quantity with *Pyrmont water* does not coagulate, but, on the contrary, becomes thinner than before, and is preſerved from turning ſour ſo ſoon as it otherwiſe would in hot weather. This is a proof that there is no predominating acid in theſe waters.

8. If ſyrup of violets be added to *Pyrmont water*, it turns it to a beautiful green. This is a proof of the alkaline nature of theſe waters; and it is farther proved by adding ſpirit of vitriol, or any other acid, to this green liquor, which on that becomes limpid again.

9. Four pints of this water evaporated over a gentle fire, yield no more than two ſcruples of a dry reſiduum. Oil of vitriol being poured on this, an acid effervescence ariſes, and with it an acrid and pungent vapour, like that produced by mixing oil of vitriol and common ſalt. If ſpirit of vitriol be uſed inſtead of the oil, the effervescence is in a leſs degree, and the ſalt is in part changed to a bitter ſaline maſs, the remainder ſeparated from which proves to be a calcareous earth, no longer fermenting with the ſpirit of vitriol.

10. If a quantity of *Pyrmont water* be expoſed twenty-four hours to the open air in a baſon, it will at the end be found to have loſt all its virtues, falling wholly inſipid, and being turbid inſtead of the fine clearneſs it had before, and a yellow ochreous earth is precipitated to the bottom; after this the liquor will no longer ſhew any of thoſe qualities which were before its diſtinguiſhing characters, it will no longer ferment with acids, nor turn black with galls, nor green with ſyrup of violets.

It appears from the whole, that the *Pyrmont waters* poſſeſs a pure, extremely penetrating, and elaſtic mineral ſpirit, and that in a very large proportion; and to this their virtues are principally to be attributed. This mineral ſpirit, while it remains engaged in a calcareous earth, imitates the properties of an alkaline ſubſtance; and when joined with a ſubtile martial earth, it emulates the properties of vitriol, giving the ſtools a black colour, and turning a tincture of galls into ink: and while this remains in the water in theſe forms of an alkaline or vitriolic principle of ſo great ſubtilty, it cannot but give them very great virtues in ſtrengthening the tone of the viſcera, opening obſtructions, and ſtimulating in a proper manner the excretory ducts, ſo as to make them duly perform their office; but as ſoon as by the ſtanding of the water open, or by any other accident, this ſubtile element is evaporated, all the virtues of the water muſt be gone with it.

The great quantity of this powerful ſpirit contained in the waters makes them more fit for the robuſt and ſtrong conſtitutions, when deprived by illneſs, than for the weak and tender ones; but even the tendereſt people may take them, only obſerving to take but a ſmall doſe, or to dilute them with an equal quantity of common water immediately before the taking them.

Hoffman alſo recommends the *Pyrmont water* mixed with equal quantities of milk, on his own experience, in ſcorbutic and gouty caſes. Hoffm. Opera, tom. v. p. 433. 8vo.

We have already obſerved, under the articles ACIDULÆ and *Spaw*, that *Pyrmont water*, and other mineral waters of a ſimilar nature, owe their acidulous taſte and peculiar virtues to the fixed air which they contain; and to thoſe articles the reader is referred for a brief hiſtory of this important diſcovery. We ſhall here add ſome farther remarks on the effects and medical uſes of this water.

Perſons who drink it at the well are affected with a kind of giddineſs or intoxication, which is probably owing to the great quantity of fixed air with which the water abounds. The common operation of this water is by urine; but it is alſo gently ſudorific; and if taken in large quantity proves laxative. However, in order to this effect, it is uſual to mix ſome ſalts with the firſt glaſſes. It is drank by glaſſfuls in the morning to the quantity of from one to five or ſix pints, according to circumſtances; thoſe who drink it walking about between each glaſs. This water is recommended in caſes where the conſtitution is relaxed: in want of appetite and digeſtion; weakneſs of the ſtomach, and heart-burn; the green ſickneſs; female obſtructions and barrenneſs; the ſcurvy and cutaneous diſeaſes; and in the gout, eſpecially, as Hoffman obſerves, when mixed with milk: in colics; bloody fluxes; diſorders of the breaſt and lungs; in which caſes it is beſt taken lukewarm: in nervous, hyſteric, and hypochondriacal diſorders; in apoplexies and palſies; in the gravel, and urinary obſtructions; in foulneſs of the blood; and in obſtructions of the finer veſſels. It amends the lax texture of the blood; exhilarates the ſpirits without inflaming, as vinous liquors are apt to do; and is reckoned among the beſt reſtoratives in decayed and broken conſtitutions. It is ſaid to poſſeſs the general virtues of the Spa *water*, and at the fountain it is more ſpirituous, as well as a ſtronger chalybeate. Elliot's Medicinal Virtues, &c. of Mineral Waters, 1781. p. 181.

Near the famous well at *Pyrmont*, is a ſtone quarry under ground, from ſome parts of which a ſulphureous ſteam comes out, which commonly riſes to a ſmall height. Animals held in this ſteam are ſoon ſuffocated, but recover if quickly taken out. When a man ſtands in this ſteam, but with his head over it, it proves an excellent ſudorific. Dr. Seip propoſes to perform cures in ſeveral diſeaſes with it. See Phil. Tranſ. N° 448. ſect. 4. and Miſc. Berolin. tom. v. part 2. ſect. 4. See GROTTA *del Serpi*.

PYRMONT *water, Imitation of.* This medicinal water may be imitated very nicely by art in the following manner: take a quart of the pureſt and lighteſt water, add to it thirty drops of a ſtrong ſolution of iron made in ſpirit of ſalt, a drachm of oil tartar per deliquium, and thirty drops of ſpirit of vitriol, or a little more or leſs, as is found neceſſary, not to let the alkali of the oil of tartar prevail too ſtrongly, though it muſt prevail a little. Shake all briſkly together, and on taſting it will be found extremely to reſemble the true *Pyrmont water*.

The baſis on which this is founded is the analyſis and trial of the true *Pyrmont water*, by which it is found to contain a ſubtile aqueous fluid, a volatile iron, and a predominant alkali, all joined together into one briſk pungent ſpirituous water. The artificial *Pyrmont* thus made, if the proportions are carefully minded, will extremely reſemble the natural, and will have the ſame effect as a medicine. Shaw's Lectures, p. 90.

But the beſt method of forming artificial *Pyrmont water* is by impregnating it with fixed air, for which we are indebted to Dr. Prieſtley. The firſt perſon, we believe, who actually compounded an artificial acidulous or ſpirituous water, like that of Seltzer or *Pyrmont*, was M. Venel; though he was ignorant of the real nature of the ingredient to which it owed theſe qualities, and which he erroneouſly ſuppoſed to be common air. For this purpoſe he diſſolved in a pint of water two drachms of foſſile alkali, to which he added an equal quantity of marine acid; in the proceſs he made uſe of a veſſel with a narrow neck, and to prevent the eſcape of the air, he diſpoſed the ingredients in ſuch a manner, that they could not communicate with each other till after the bottle was corked. In this caſe the fixed air diſſodged from the alkaline ſalt, in a phial nearly full and cloſely corked, being confined, ſuffers a degree of compreſſion that greatly promotes its combination with the water. See Memoires preſentes par les Sçavans Etrangers, tom. ii. containing two Memoirs of M. Venel, read before the Royal Academy of Sciences in 1750; and Lavoiſier's Eſſays, &c. by Henry, p. 34, &c. However, Dr. Prieſtley was undoubtedly the firſt who ſo far improved upon the diſcoveries made by himſelf and others, in relation to the principle denominated fixed air, as to contrive an eaſy method of impregnating water with it. The firſt idea of this kind occurred to him in 1767, when, having placed ſhallow veſſels of water within the region of fixed air on the ſurface of the fermenting veſſels of a brewery, and left them all night in that ſituation, he found that the water had acquired a very ſenſible and pleaſant impregnation. He proceeded to accelerate the impregnation by pouring the water from one veſſel into another, while they were both held within the ſphere of the fixed air. The method of effecting this by air diſſodged from chalk, and other calcareous ſubſtances, did not occur to him till the year 1772, when he publiſhed his Directions for this purpoſe, together with a drawing of the neceſſary apparatus, which he had before communicated to the board of admiralty. This apparatus, repreſented in *Tab.* III. *Pneumatics, fig.* 50. conſiſts of a glaſs veſſel *a* with a narrow neck, and ſo formed that it will ſtand upright with its mouth downwards: this veſſel, when filled with water, and covered with a ſlip of paper or thin paſteboard, preſſed cloſe to it, to prevent the admiſſion of common air, is inverted in another veſſel *b* with a little water in it, ſo that the ſlip of paper or paſteboard may be withdrawn, and the end of the pipe *c* introduced into it. This pipe is flexible and air-tight, and beſt made of leather, ſewed with a ſhoemaker's waxed thread. It is kept open at both ends by a piece of a quill, while one of them is introduced into the veſſel of water, and the other into the bladder *d*; the oppoſite end of which is tied round a perforated cork, kept open by a quill, and the cork is made to fit a phial *e*, two thirds of which

ſhould be filled with chalk juſt covered with water. Dr. Prieſtley has ſince found it moſt convenient to uſe a glaſs tube, and to preſerve the advantage which he had of agitating the veſſel *e*, he makes uſe of two bladders, communicating by a perforated cork, to which they are both tied. He alſo obſerves, that the flexible pipe is not neceſſary; but inſtead of this a bent tube of glaſs muſt be ready to be inſerted into the hole made in the cork, when the bladder containing the fixed air is ſeparated from the phial in which it was generated. The extremity of this tube being put under the veſſel of water, and the bladder being compreſſed, the air will be conveyed into it, as in the other caſe. Inſtead of the bladder, a ſmall phial may be interpoſed between the phial containing the chalk, &c. and the veſſel of water: for thus the chalk and water that may be thrown up the tube communicating with this phial will lodge at the bottom of the other, while nothing but the air will get into the pipe communicating with the water. The apparatus being thus prepared, let the phial containing the chalk and water be detached from the bladder, and the pipe alſo from the veſſel of water; pour a little oil of vitriol upon the chalk and water; and having carefully preſſed all the common air out of the bladder, put the cork into the bottle preſently after the effervefcence has begun. Alſo preſs the bladder once more after a little of the newly-generated air has got into it, in order the more effectually to clear it of all the remains of the common air; and then introduce the end of the pipe into the mouth of the veſſel of water as in the drawing, and begin to agitate the chalk and water briſkly. This will preſently produce a conſiderable quantity of fixed air, which will diſtend the bladder; and this being preſſed, the air will force its way through the pipe, and aſcend into the veſſel of water, the water at the ſame time deſcending, and coming into the baſon.

When about one half of the water is forced out, let the operator lay his hand upon the uppermoſt part of the veſſel, and ſhake it as briſkly as he can, not to throw the water out of the baſon; and in a few minutes the water will abſorb the air, and taking its place, will nearly fill the veſſel as at the firſt. Then ſhake the phial containing the chalk and water again, and force more air into the veſſel, till, upon the whole, about an equal bulk of air has been thrown into it. Alſo ſhake the water as before, till no more of the air can be imbibed. As ſoon as this is perceived to be the caſe, the water is ready for uſe; and if it be not uſed immediately, ſhould be put into a bottle as ſoon as poſſible, well corked, and cemented. It will keep, however, very well, if the bottle be only well corked, and kept with the mouth downwards.

It may be proper to obſerve on this proceſs, that the phial *e* ſhould always be placed conſiderably lower than the veſſel *a*; that the water to which the chalk is put ſhould be changed after every operation; that with a veſſel of water holding three pints, and a phial containing the chalk and water of ten ounces, a little more than a tea-ſpoonful of oil of vitriol will produce air enough to impregnate ſuch a quantity of water; that the whole proceſs does not take up more than a quarter of an hour, and the agitation not five minutes; and that in this method the water is eaſily made to imbibe an equal bulk of air; whereas Dr. Browning found that *Pyrmont water* at the ſpring-head did not contain ſo much as one half. This apparatus has received conſiderable improvements, which we ſhall briefly recite; but in juſtice to the merit of the original inventor, his method deſerves to be recorded; and beſides, it requires leſs time, and is much leſs expenſive than thoſe that are now generally uſed.

The apparatus contrived by Dr. Nooth, and improved by Mr. Parker, is repreſented in *Tab.* III. *Pneumatics*, *fig.* 51. It is made of glaſs, and ſtands on a wooden veſſel *d d* reſembling a tea-board: the middle veſſel B has a neck which is inſerted into the mouth of the veſſel A, to which it is ground air-tight. This lower neck of the veſſel B has a glaſs ſtopple S, compoſed of two parts, both having holes ſufficient to let a good quantity of air paſs through them. Between theſe two parts is left a ſmall ſpace, containing a plano-convex lens, which acts like a valve, in letting the air paſs from below upwards, and hindering its return into the veſſel A. The upper veſſel C terminates below in a tube *r t*, which, being crooked, hinders the immediate aſcent of the bubbles of fixed air into that veſſel, before they reach the ſurface of the water in the veſſel B. The veſſel C is alſo ground air-tight to the upper neck of the middle veſſel B, and has a ſtopple *p* fitted to its upper mouth, which has a hole through its middle. The upper veſſel C holds juſt half as much as the middle one B; and the end *t* of the crooked tube goes no lower than the middle of the veſſel B.

For the uſe of this apparatus: fill the middle veſſel B, with ſpring or any other wholeſome water, and join to it the veſſel C. Pour water into the veſſel A (by the opening *m*, or otherwiſe) ſo as to cover the riſing part of its bottom: about three fourths of a pint will be ſufficient. Fill an ounce phial with oil of vitriol, and add it to the water, ſhaking the veſſel ſo as to mix them well together. As heat is generated, it will be beſt to add the oil by a little at a time, otherwiſe the veſſel may be broke. Put to this, through a wide glaſs or paper funnel, about an ounce of powdered raw chalk, or marble. White marble being firſt granulated, or pounded like coarſe ſand, is better for the purpoſe than pounded chalk, becauſe it is harder; and, therefore, the action of the diluted acid upon it is ſlower, and laſts a conſiderable time. On this account, the ſupply of fixed air from it is more regular than with the chalk: and beſides, when no more air is produced, the water may be decanted from the veſſel A, and the white ſediment waſhed off, and the remaining granulated marble may be employed again, by adding to it freſh water and a new quantity of oil of vitriol. The funnel in this proceſs is made uſe of, in order to prevent the powder from touching the inſide of the veſſel's mouth; for if that happens, it will ſtick ſo ſtrongly to the neck of the veſſel B, as not to admit of their being ſeparated without breaking. Place immediately the two veſſels B and C (faſtened to each other) into the mouth of the veſſel A, as in the figure, and all the fixed air which is diſengaged from the chalk or marble by the oil of vitriol, will paſs up through the valve in S into the veſſel B. When this fixed air comes to the top of the veſſel B, it will diſlodge from thence as much water as is equal to its bulk; which water will be forced up through the crooked tube into the upper veſſel C.

Care muſt be taken not to ſhake the veſſel A when the powdered chalk is put in; otherwiſe a great and ſudden effervefcence will enſue, which will perhaps expel part of the contents. In ſuch caſe it may be neceſſary to open a little the ſtopple *p*, in order to give vent, otherwiſe the veſſel A may burſt. It will be proper alſo to throw away the contents, and waſh the veſſel; for the matter will ſtick between the necks of the [illegible] cement them together. The operation [illegible] begun afreſh. But if the chalk be thro[illegible] ſhaking the machine, or if marble be uſed [illegible] nce will not be violent. If the chalk be pu[illegible] loſely wrapt up in paper, this accident [illegible] better guarded againſt. When the effer[illegible] n well, the veſſel C will ſoon be filled with [illegible] e veſſel B half filled with air; which will e[illegible] to be the caſe by the air going up in la[illegible] through the crooked tube *r t*.

When this is obſerved, take off the [illegible] and C together as they are, and ſhake th[illegible] water and air within them may be much [illegible] great part of the fixed air will be abſorbed [illegible] a will appear by the end of the crook[illegible] conſiderably under the ſurface of the water [illegible] The ſhaking them for two or three minute[illegible] ſufficient for this purpoſe. Theſe veſſels muſt n[illegible] while joined to the under one A, otherwiſe [illegible] effervefcence will be occaſioned in the la[illegible] with the ill conſequences above mentioned [illegible] water and air have been ſufficiently agitated [illegible] pper veſſel C, ſo that the remaining water [illegible] into B, and the abſorbed air paſs out. [illegible] ſels together, and replace them into the [illegible] in order that B may be again half fille[illegible] air. Shake the veſſels B and C, and let o[illegible] bed air, as before. By repeating the opera[illegible] our times, the water will be ſufficiently im[illegible] Whenever the effervefcence nearly ceaſ[illegible] A, it may be renewed by giving it a gen[illegible] ſhat the powdered chalk or marble at the [illegible] be mixed with the oil of vitriol and water a[illegible] u a greater quantity of fixed air will be di[illegible] When the effervefcence can be no lon[illegible] ſhaking the veſſel A, either more chalk [illegible] or more oil of vitriol; or more water, [illegible] of theſe produce the deſired effects.

The ingenious Mr. Magellan has ſtill farther improved the contrivance of Dr. Nooth and Mr. Parker. He has two ſets of the veſſels B and C. While he is ſhaking the air and water contained in one of theſe ſets, the other may be receiving fixed air from the veſſel A. By this means twice the quantity of water may be impregnated in the ſame time. He has a wooden ſtand K (*fig.* 52.) to fix the veſſels B, C on, when taken off from A, which is very convenient. He has a ſmall tin trough for meaſuring the quantity of chalk or marble requiſite for one operation, and a wide glaſs funnel for putting it through

through into the veſſel A, to prevent its ſticking to the ſides, as mentioned before.

He has alſo contrived a ſtopple without a hole, to be uſed occaſionally inſtead of the perforated one *b*. It has a kind of baſon at the top to hold an additional weight when neceſſary (ſee *fig.* 53.) The ſtopple muſt be of a conical figure, and very looſe; but ſo exactly and ſmoothly ground as to be air-tight merely by its preſſure, which may be increaſed by additional weights put into its baſon. Its uſe is to compreſs the fixed air on the water, and thereby increaſe the impregnation. For by keeping the air on the water in this compreſſed ſtate, the latter may be made to ſparkle like Champaign. And if the veſſels are ſtrong, there will be no danger of their burſting in the operation.

If the veſſels be ſuffered to ſtand ſix or eight hours, the water will be ſufficiently impregnated even without agitation. But by employing the means above deſcribed, it may be done in as many minutes.

The water thus impregnated may be drawn out at the opening *k*. But if it is not wanted immediately, it will be better to let it remain in the machine, where it has no communication with the external air. Otherwiſe the fixed air flies off by degrees, and the water becomes vapid and flat; as alſo happens to other acidulous waters. But it may be kept a long time in bottles well ſtopped, eſpecially if they are placed with their mouths downwards.

Mr. Blades of Lothbare-hill has ſtill farther improved this apparatus, by changing the ſtopple at *k* for a glaſs cock, which is more convenient. He has likewiſe altered the middle veſſel B into a form more advantageous for the impregnation. See *Tab.* III. *Pneumatics*, *fig.* 54.

For Dr. Hulſe's method of impregnating water with fixed air, ſee *Patent* FEVER.

Dr. Withering of Birmingham has lately contrived a new apparatus for impregnating water with fixed air, which, he ſays, is preferable to that in common uſe, becauſe it can be made at leſs expence, and is more eaſily prepared; becauſe the whole quantity of fixable air produced is converted to uſe, without any waſte of the vitriolic acid; becauſe it impregnates three times the quantity of water at one time, more completely and with leſs trouble; and this impregnated water will always retain its virtue, if the joints and cocks of the machine are made perfectly air-tight; for which purpoſe they ſhould once a year be ſupplied with a ſmall quantity of unſalted lard. This apparatus is exhibited in *Tab.* III. *Pneumatics*, *fig.* 55. and conſiſts of a glaſs veſſel A, about ten inches high in the cylindrical part, and ſix inches and a half in diameter; another glaſs veſſel B, about twelve inches high in the conical part, one inch and a half in the neck, and five inches in diameter at the bottom; a copper pipe C, paſſing through the ſtopper of the veſſel B, and tied faſt in its place with the bladder H, made of ſtrong leather, air-tight, and kept ſtiff by a ſpiral wire paſſing through its whole length; a conical braſs pipe I, with a ſtop-cock K, fixed into the tube D; another conical pipe F, with a ſtop-cock L, into which the end of the tube E is accurately ground ſo as to be air-tight, and cutting off all communication with the atmoſphere when the pipe E is removed; two large hog's bladders H, H, each of which ought to hold two quarts; a ſtop-cock I to prevent the water riſing into the bladders, when the veſſel A is inverted; a bladder K, tied to the crooked tube with the ſtop-cock I, which occaſionally opens or ſhuts the communication with the veſſel B; a glaſs funnel M, accurately ground with the glaſs ſtopper N; an aperture O, fitted with a glaſs ſtopper or a ſilver cock, from which the impregnated water is to be drawn for uſe; and, laſtly, the tube P opening into the veſſel A. When this apparatus is uſed, let the veſſel A be filled with pure water, and any other ingredients that are required, in a proper proportion; into the veſſel B put as much marble or whiting, in ſmall lumps, as will cover its bottom to the height of about two inches, and pour in water to the height repreſented by the dotted line; let the mouth of the veſſel A be well fitted with a cork, and through a hole in the cork paſs the tube P, putting upon the cork melted ſealing-wax of the ſofteſt kind, or modelling-wax, ſo as to make the whole air-tight. The modelling-wax may be procured at the engravers, or it may be prepared by adding to half a pound of melted bees-wax two ounces of tallow, and one ounce of Venice turpentine; to this maſs add a ſufficient quantity of red lead or Spaniſh brown to give it a colour, and let the mixture be ſtirred till it is cold: let the mouth of the veſſel B be ſtopped with a piece of mahogany, turned into a conical figure in a lathe, and of a ſize ſomewhat larger than the mouth of the glaſs will admit; put this piece of wood into melted bees-wax, and heat the wax till the wood begins to grow black: when cool, turn it again till it fits the mouth of the veſſel: the tubes C, I, and M are fitted into holes bored through the wooden ſtopper, previous to its being immerſed in the wax: puſh theſe tubes through the holes, and preſs the ſtopper into the orifice of the veſſel B, and cement the whole with ſealing or modelling wax: ſhut the ſtop-cocks I and L, having previouſly preſſed the air out of the bladder K; open the ſtop-cocks G and E; then ſqueeze the air out of the bladders H, H, and afterwards preſs the conical pipe E into the pipe F: pour about a large ſpoonful of oil of vitriol through the funnel M, and ſtop it with its ſtopper N. The fixable air let looſe by the effervеſcence in the veſſel B, riſing through the tube C, paſſes into the bladders H, H, and diſtends them. In this caſe open the ſtop-cock I, and from the aperture O draw out about a quart of water; and the ſpace before occupied by the water will be filled with fixable air, which ſoon begins to be abſorbed by the remaining water, and is ſtill ſupplied from the bladders H, H, and from the effervеſcing mixture in the veſſel B. When the bladders are conſiderably collapſed, more vitriolic acid muſt be added through the funnel M, ſo that they may be always kept pretty fully diſtended. When an impregnation is ſpeedily required, turn the ſtop-cocks at G and E, and open that at L; then ſeparate the pipe E from the tube F, and agitate the veſſel A; the fixable air will paſs into the bladder K, and may be preſſed into the two other bladders, when the parts of the apparatus are united. During the agitation, the ſtop-cock at I ſhould be cloſed, and opened only occaſionally to ſupply out of the bladders H, H the fixable air abſorbed by the water. If a ſtrong impregnation be required, this proceſs ſhould be carried on in a room, the heat of which does not exceed forty-eight degrees of Fahrenheit's thermometer. Dr. Withering obſerves, that the impregnated water receives no taſte from the bladders: and that if the veſſel A with its impregnated water be ſeparated from the veſſel B, at the conical parting E, F, it may be incloſed in a pyramidal mahogany caſe, out of the lower part of which the ſilver cock at O projects; and thus ſerve for an ornamental as well as a luxurious and ſalubrious addition to the ſide-board, particularly in the ſummer and autumnal ſeaſons.

Mr. Henry has deſcribed a method of impregnating water in large quantities with fixed air, ſo as to give it the properties of mineral water, for the uſe of the ſick on board of ſhips, and in hoſpitals. He has given the following account of his apparatus and proceſs for this purpoſe. Cut off the two extremities of a calf's or pig's bladder *f*, *Tab.* III. *Pneumatics*, *fig.* 56. and having previouſly moiſtened them, into one end inſert the top of the tubular ſtopper *e*, round the neck of which it is to be cloſely fattened with ſtrong thread. Into the upper end introduce the part *g* of the long bent tube *h*, and tie them round in the ſame manner. The pipe *b* muſt be paſſed through a hole formed by a hot iron borer, in a large cork adapted to the orifice *i* in the caſk B B, holding about ten or twelve gallons, to which it muſt be cemented: and the length of the pipe from this point muſt be ſuch as to reach within a few inches of the bottom of the caſk B B, which is to be completely filled with freſh water, or ſuch as has been recovered from lime. See PUTREFACTION *of water*.

To a quantity of mild calcareous earth and water, placed in the air-veſſel C, add a ſmall portion of ſtrong vitriolic acid, and by the time moſt of the common air may be ſuppoſed to be expelled by the fixed air, ariſing from the mild calcareous earth, add a larger quantity of acid, and putting the tubulated ſtopper *e* in its place, the bladder *f* will become inflated. Preſs it gently till its ſides collapſe; and then introducing the pipe *b b* with its cork, into the orifice *i* of the caſk B B, again preſs the air forward, as it diſtends the bladder into the water caſk, where bubbling up through the water, it will riſe to the ſurface, and by its preſſure, force the water to aſcend into the funnel *k*, which is to be cemented into the head of the caſk at *l*. In proportion as the water in the caſk becomes impregnated with fixed air, that in the funnel will return into its place; but if, at any time, the latter ſhould riſe ſo high as to be in danger of overflowing, a quantity of air may be let out of the water caſk, by means of the ſmall plug at *m*. And this is neceſſary to be done, occaſionally, to diſcharge the reſiduum of the fixed air, which is not ſoluble in water.

If the operation be required to be performed more expeditiouſly, it may be quickened by agitating the water caſk. To do this, the tubular ſtopper *e* muſt be withdrawn from the air veſſel, and ſupported, together with the bladder, by an aſſiſtant, while the caſk B B is ſhaken. During this time another tubular ſtopper muſt be put

into

into the air veſſel, and it may be immerſed into a quantity of lime-water to prevent waſte. When the agitation has been continued for ſome minutes, in proportion to the falling of the water in the funnel, replace the ſtopper attached to the bladder *f* in the air veſſel when taken out of the lime-water, and proceed as before, repeating the agitation occaſionally.

During the proceſs, additional quantities of vitriolic acid may be introduced into the air veſſel through the opening at *d*, which is to be, at all other times, carefully ſecured with its ſtopper.

By this proceſs, fixed air may be imparted to wine, beer, and almoſt any liquor whatever. And when beer is become flat or dead, it will be revived by this means; but the delicate agreeable flavour, or acidulous taſte communicated by the fixed air, and which is manifeſt in water, will hardly be perceived in wine, or other liquors, which have much taſte of their own.

The artificial mineral waters thus made, are more pleaſant to the taſte than the natural *Pyrmont* or Seltzer waters; which, beſides their fixed air, contain ſaline particles of a diſagreeable taſte, which are known to contribute little or nothing to their medicinal virtues, and may, in ſome caſes, be hurtful. They are likewiſe conſiderably ſtronger. According to Sir John Pringle, theſe waters may be made more nearly to reſemble genuine *Pyrmont* water, by adding to each pint of them from eight to ten drops of *tinctura martis cum ſpiritu ſalis*. Or this may be done, by adding to the water in the middle veſſel B (*fig.* 51.) in the proportion of about thirty grains of Epſom ſalt, ten grains of common ſalt, a ſcruple of magneſia alba, and a dram of iron filings or iron wire, clean and free from ruſt, to one gallon of ſpring water, and impregnating the whole with fixed air in the manner already deſcribed. Let them remain till the other ingredients, and as much of the iron as is neceſſary, are diſſolved, which will be in two or three days; or the magneſia may be omitted, and then the operation will be finiſhed in leſs than half that time. Theſe waters may be rendered ferruginous or chalybeate very eaſily, by putting in the middle veſſel two or more ſlender phials, filled with cuttings of fine iron-binding wire, or with ſmall iron nails; becauſe the impregnated water will diſſolve the iron ſo faſt, as to become well ſaturated with it in a few hours, according to the experiments of Mr. Lane. But the method of rendering theſe artificial waters chalybeate, uſed by Dr. Hulme, is to add one grain of ſalt of ſteel to each pint (ſixteen ounces) of water already impregnated with fixed air.

The diſcovery of an eaſy method of impregnating water with fixed air is of great importance; as it is now well known that ſuch water is a very powerful antiſeptic, or that it both reſiſts and corrects PUTREFACTION. It is, therefore, given with great ſucceſs in putrid fevers, in the ſea-ſcurvy, in dyſenteries, in mortifications, and in other diſorders ariſing from a putrid cauſe, or attended with putrefaction, a draught of it being taken now and then, or even by way of common drink. But the ingenious Mr. Bewly has invented a ſtill better method of exhibiting fixed air as a medicine. He directs a ſcruple of alkaline ſalt to be diſſolved in a ſufficient quantity (a quarter of a pint, or leſs) of water, which is to be impregnated with as much fixed air as it can imbibe: this is to be drank for one doſe. Mr. Bewly directs it to be prepared in larger quantities at a time, and calls it his mephitic julep. If immediately after it a ſpoonful of lemon juice, mixed with two or three ſpoonfuls of water, and ſweetened with ſugar, be drank, the fixed air will be extricated in the ſtomach; and thus a much greater quantity of it may be given than the ſame quantity of water alone can be made to imbibe. Fixed air acts as a corroborant; and, therefore, may be given with ſucceſs in weakneſs of the ſtomach, and in vomitings ariſing from that cauſe. It has alſo been given with ſucceſs in the STONE, and in nephritic complaints. When the lungs are purulent, fixed air, mixed with the air drawn into the lungs, has repeatedly been found to perform a cure. The bark alſo may be given with advantage in water impregnated with fixed air, as they both coincide in the ſame intention. Fixed air may be applied by means of a ſyringe, funnel, or otherwiſe, to inflamed breaſts, putrid ulcers, mortified parts, ulcerated ſore throats, and has been found in ſuch and ſimilar caſes to have very remarkable efficacy. It may alſo be given internally at the ſame time. In putrid dyſenteries, and in putrid ſtools, fixed air may be given by way of clyſter. Fermenting cataplaſms are of ſervice chiefly as they ſupply fixed air to the part. In caſes of putridity, fixed air has been ſucceſsfully applied to the ſurface of the body, expoſed to ſtreams of it. It is alſo found an excellent cooling as well as ſtrengthening beverage in hot relaxing weather, and has the advantage of being pleaſant to the taſte. See on the ſubject of this article Prieſtley's Exp. and Obſ. on Air, vol. ii. p. 263, &c. 298, &c. Phil. Tranſ. vol. lxv. part i. p. 59, &c. Magellan's Deſcription of a Glaſs Apparatus for making Mineral Waters, &c. p. 1, &c. Prieſtley's Exp. and Obſ. vol. v. Appendix, p. 389, &c. Elliot's Account of the Nature and Medicinal Virtues of the principal Mineral Waters, &c. 1781. Henry's Account of a Method of preſerving Water at Sea, &c. 1781. p. 19, &c.

PYROBOLOGY. See PYROTECHNY.

PYROBOLUS, in *Natural Hiſtory*, a name given by many authors to the ſtone more generally called PYRITES; others have called it *ſiderites*, *pyrobalanus*, *purpurites*, and *aithauma*, and the Greeks *ſphæra*.

PYROCTOGONIUM, in *Natural Hiſtory*, the name given by Dr. Hill to a genus of foſſils uſually comprehended by authors, with many other bodies of a different figure and ſtructure, under the general name PYRITES.

The characters of the *pyroctogonium* are theſe: it is a compound, inflammable, metallic body, of a regular octohedral figure, or compoſed of eight planes.

There is only one known ſpecies of this genus, which is a very ſingular and elegant foſſil, being compoſed of eight triangular planes; theſe being the ſides of two quadrilateral pyramids, with broad baſes, which being joined baſe to baſe, conſtitute the *pyroctogonium*. See *Tab. of Foſſils, Claſs* 5.

It is found very frequently in Cornwall, Devonſhire, and moſt other of our counties where there are mines. It is ſometimes met with looſe in the earth, ſometimes lodged in the bodies of marcaſites, or in the ſolid foſſils, and varies ſometimes from its iron colour to a duſky yellow. It is ſometimes [illegible] mens connected into a [illegible] in ſize, and cohere in [illegible] injuring one another's figu[illegible] caſe of the cryſtals, the [illegible] the outer ſurface only is [illegible] regular figures, the whol[illegible] ſubſtance.

Maſſes of this kind are n[illegible] gularly orbicular figure, a[illegible] figured *pyroctogonia* of [illegible] Foſſ. p. 620.

PYROENUS, formed of [illegible] term ſometimes uſed for [illegible] called becauſe made by fi[illegible] of a fiery nature.

PYROET, PYROUET, or [illegible] *Manege*. See PIROUET.

PYROLA, in *Botany*. See [illegible]

PYROLAMPIS, in *Zoology*. [illegible]

PYROMACHUS, a name [illegible] when reduced to a ſton[illegible] copper, when fuſed wit[illegible] leſs ductile.

PYROMANCY, [illegible] performed by means of [illegible] The ancients imagined the [illegible] ſpecting fire and flame: t[illegible] direction, or which way [illegible] added other matters to [illegible] urine, with its neck bou[illegible] narrowly on which ſide it [illegible] their augury.

Sometimes they threw pi[illegible] mediately, they obſerved [illegible]

PYROMETER, formed of [illegible] in *Phyſics*, the name of a [illegible] the alteration of the dime[illegible] ſolid bodies, ariſing from h[illegible] Muſchenbroek, who was [illegible] machine, has given a table [illegible] ent metals, in the ſame [illegible] pared cylindric rods of [illegible] and lead, he expoſed them [illegible] flame in the middle; then [illegible] ively to one with three, [illegible] virtue to this trial, he took [illegible] expoſing them ſome time [illegible] it began to freeze, and [illegible] thirty-two degrees. The [illegible] are digeſted in the following [illegible] expanſion are marked in parts equal to the [illegible] part of an inch.

Expanſion

Expanſion of	Iron	Steel	Copper	Braſs	Tin	Lead
By one flame	80	85	89	110	153	155
By two flames placed cloſe together	117	123	115	220		274
By two flames 2 inches diſtant	109	94	92	141	219	263
By three flames placed cloſe together	142	168	193	275		
By four flames placed cloſe together	211	270	270	361		
By five flames	230	310	310	327		

It is to be obſerved of tin, that it will eaſily melt, when heated by two flames placed together. Lead commonly melts with three flames, placed together, eſpecially if they burn long.

From theſe experiments it appears, at firſt view, that iron is the leaſt rarefied of any of theſe metals, whether it be heated by one or more flames; and therefore is moſt proper for making machines, or inſtruments, which we would have free from any alterations by heat or cold, as the rods of pendulums for clocks, &c. So likewiſe the meaſures of yards or feet ſhould be made of iron, that their length may be as nearly as poſſible the ſame, ſummer and winter.

The expanſion of lead and tin, by only one flame, is nearly the ſame; that is, almoſt double of the expanſion of iron. It is likewiſe obſervable, that the flames, placed together, cauſe a greater rarefaction than when they have a ſenſible interval between them; iron, in the former caſe, being expanded 117 degrees, and only 109 in the latter; the cauſe of which difference is obvious.

By comparing the expanſions of the ſame metal, produced by one, two, three, or more flames, it appears, that two flames do not cauſe double the expanſion of one; nor do three flames three times that expanſion, but always leſs: theſe expanſions differ ſo much the more from the ratio of the number of flames, as there are more flames applied at the ſame time.

It is alſo obſervable, that metals are not expanded equally, at the inſtant of their melting, but ſome more, ſome leſs. Thus tin began to run, when rarefied 219 degrees; whereas braſs was expanded 377 degrees, and yet was far from melting.

As to the conſtruction of M. Muſchenbroek's *pyrometer*, together with Desaguliers's alterations and improvements, the curious may conſult Deſagul. Experim. Philoſoph. vol. ii. p. 221, &c. See alſo Muſchenbroek's tranſlation of the Experiments of the Academy del Cimento, printed at London in 1731. And for a *pyrometer* of a new conſtruction, by which the dilatations of metals in all their kinds may be examined and compared with Fahrenheit's thermometer, ſee Muſchenb. Introd. ad Philoſoph. Nat. 4to. 1762. vol. ii. p. 612.

But it has been obſerved, that M. Muſchenbroek's *pyrometer* was liable to ſome objections; and theſe have been removed in a good meaſure by Mr. Ellicott, who has given a deſcription of his improved *pyrometer* in the Philoſophical Tranſactions, N° 443. This may alſo be ſeen in Dr. Hutton's Abridgment, vol. viii. p. 464.

This inſtrument is formed with a flat plate of braſs A A (*Tab.* III. *Miſcellany*, *fig.* 33.) which is ſcrewed down to a thick piece of mahogany. Upon this plate are ſcrewed three pieces of braſs, two of which, B, B ſerve to ſupport the bar iron bar C, called the ſtandard bar.

The upper part of the third piece of braſs is a circle D about three inches in diameter, divided into three hundred and ſixty equal parts or degrees: within this circle is a moveable plate of divided likewiſe into three hundred and ſixty parts, and a ſmall ſteel index. The bar of metal E upon which the experiment is to be made, is laid on the ſtandard bar. F is a lever two inches and a half long, faſtened to an axis, which turns in two pieces of braſs ſcrewed to one of the ſupports B. To the end of this lever is faſtened a chain, or ſilk line, which, after being wound round a ſmall cylinder, to which the index in the braſs circle D is faſtened, paſſes over a pulley, with a weight hung to the end of it. Upon the axis, to which the lever is faſtened, is a pulley, a quarter of an inch in diameter, to which a piece of watch-chain is faſtened, the other end of which is hooked to a ſtrong ſpring G, which bears againſt one end of the metal E. H is a lever exactly of the ſame form and dimenſions with the other; but the chain faſtened to the pulley on its axis is hooked to the ſtandard bar. The line faſtened to the end of this lever, after being wound round a cylinder, to which the moveable plate is fixed, paſſes over a ſmall pulley, and has a weight hung to the end of it; or rather the ſame line paſſing under a pulley to which the weight is hung, has its other end faſtened to the lever F; ſo that one weight ſerves for both levers. From this deſcription it is plain, that whenever the bar E is lengthened, it gives liberty to the weight to draw the lever F upwards by its action on the ſpring G; and the index will, at the ſame time, by means of the ſilk line, be carried forward in the circle, and as the bar ſhortens, it will return back again: the ſame motion will be communicated to the ſtandard bar. When the bar is lengthened $\frac{1}{720}$th of an inch, the index will be carried once round the braſs circle, which is divided into three hundred and ſixty degrees; and therefore, if the metal lengthens the 7200th part of an inch, the index will move one degree. In order to make an experiment with this inſtrument, lay a bar of any kind of metal, as E, on the ſtandard bar, then heat this bar to any degree of heat with a lamp, and mark the degree of its expanſion as indicated by the moveable plate; obſerve alſo the degree of expanſion of the metal E, by the heat communicated to it from the ſtandard bar, as marked on the braſs circle by the index: let the inſtrument ſtand, till the whole is thoroughly cold: then removing the bar E, lay any others ſucceſſively in its place, and proceed exactly as before; and thus the degrees of expanſion of different metals by the ſame degree of heat may be eſtimated.

By the help of this inſtrument Mr. Ellicott found, upon a medium, that the expanſions of bars of different metals, as nearly of the ſame dimenſions as poſſible, by the ſame degree of heat, were as follow:

Gold,	Silver,	Braſs,	Copper,	Iron,	Steel,	Lead,
73	103	95	89	60	56	149

The great difference between the expanſions of iron and braſs, has been applied with good ſucceſs to remedy the irregularities in pendulums ariſing from heat. Phil. Tranſ. vol. xlvii. p. 485. See PENDULUM.

Mr. Graham uſed to meaſure the minute alterations, in length, of metal bars, by advancing the point of a micrometer-ſcrew, till it ſenſibly ſtopped againſt the end of the bar to be meaſured. This ſcrew, being ſmall and very lightly hung, was capable of agreement within the three or four thouſandth part of an inch. On this general principle Mr. Smeaton contrived his *pyrometer*, in which the meaſures are determined by the contact of a piece of metal with the point of a micrometer-ſcrew. A B C D (*Tab.* III. *Miſcellany*, *fig.* 34.) repreſents the main bar or baſis of this inſtrument: E F is the bar to be meaſured, lying in two notches; one fixed to the upright ſtandard A B, the other to the principal lever H I: the end E of the bar E F bears againſt the point of G, a ſcrew which is of uſe in examining the micrometer-ſcrew: the other end of the bar F bears againſt a ſmall ſpherically protuberant bit of hard metal fixed at the ſame height as G, in the principal lever H I: K is an arbor fixed in the baſis, which receives at each end the points of the ſcrews H, I, upon which the lever H I turns and ſerves as a fulcrum to it: O is a ſlender ſpring, to keep the lever in a bearing ſtate againſt the bar; and P is a check, to prevent the lever from falling forward when the bar is taken out: N is the feeler, ſomewhat in the ſhape of a T, ſuſpended, and moveable up and down upon the points of the ſcrews I, M, which, as well as I, H, are ſo adjuſted as to leave the motion free, but without ſhake: Q R is the handle of the feeler, moveable upon a looſe joint at R; ſo that, laying hold of it at Q, the feeler is moved up and down without being affected by the irregular preſſure of the hand: the extremity S of the feeler is alſo furniſhed with a bit of protuberant hard metal, to render its contact with the point of the micrometer-ſcrew more perfect: T is the micrometer-ſcrew; V the divided index-plate; and W a knob for the handle: the micrometer-ſcrew paſſes through two ſolid ſcrewed holes at D and Y: the piece Y Z is made a little ſpringy, and endeavours to pull the ſcrew backwards from the hole at D; and, conſequently, keeps the micrometer-ſcrew conſtantly bearing againſt its threads the ſame way, and thereby renders the motion thereof perfectly ſteady and gentle: X is the index, having diviſions upon it, anſwering to the turns of the ſcrews: this piece points out the diviſions of the plate, as the face of the plate points out the diviſions upon the index. When the inſtrument is uſed, lay hold of the knob at Q with one hand, and, moving the feeler up and down, with the other move forward the ſcrew T till its point comes in contact with the feeler; then will the plate and index V and X ſhew the turns and parts. The baſis of this inſtrument (as well as the other parts of it) is braſs; one end of which is continued of the ſame piece at right angles, to the height of three inches and a half; and the other end acts upon the middle of a lever of the ſecond kind, whoſe fulcrum is in the baſis; and, therefore, the motion of the extremity of the lever is double the difference be-

tween the expanſion of the bar and the baſis. Hence, having the length of the lever from its fulcrum to the point of ſuſpenſion of the feeler, the diſtance between the fulcrum and the point of contact with the bar, the inches and parts that correſpond to a certain number of threads of the micrometer, and the number of diviſions in the circumference of the index-plate; the fraction of an inch expreſſed by one diviſion of the plate may be deduced: thoſe meaſures are as follow: from the fulcrum of the lever to the feeler, 5.875 inches; from the fulcrum to the plate of contact, 2.895 inches; length of ſeventy threads of the ſcrew, 2.455 inches; and the diviſions in the circumference of the index-plate, 100. Hence the value of one diviſion will be the $\frac{1}{4\,7\,5\,3\,6}$d part of an inch: but if the ſcrew be altered one fourth of one of theſe diviſions, when the contact between the ſcrew and feeler is well adjuſted, the difference of contact will be very perceivable to the ſlighteſt obſerver; and conſequently, $\frac{1}{1\,1\,8\,4}$th part of an inch is perceivable in this inſtrument. When the inſtrument is made uſe of, it is immerged, together with the bar to be meaſured, in a ciſtern of water, which water, by means of lamps underneath, is made to receive any intended degree of heat, not greater than that of boiling, and thereby communicates the ſame degree of heat to the inſtrument, the bar, and to a mercurial thermometer immerged therein, for the purpoſe of aſcertaining that degree. See *fig.* 35. in which A B is the ciſtern, C the cover, which, when the inſtrument (*fig.* 34.) is raiſed upon blocks, goes on between the bar E F and the baſis B C; D a handle to take off the cover, when hot; E the mercurial thermometer; F the cock to let out the water; and G H a hollow piece of tin, which ſupports ſeven ſpirit lamps, which are raiſed higher or lower by the ſcrews I and K, in order to give the water in the ciſtern a proper degree of heat. With this *pyrometer* Mr. Smeaton performed ſeveral experiments, which are arranged in a table; and their reſult agrees very well, he obſerves, with the proportions of expanſions of ſeveral metals given by Mr. Ellicott. The following table ſhews how much a foot in length of each metal grows longer by an increaſe of heat correſponding to 180° of Fahrenheit's thermometer, or to the difference between freezing and boiling water, expreſſed in ſuch parts of which the unit is equal to the 10000th part of an inch.

1. White-glaſs barometer-tube,	- -	100.
2. Martial regulus of antimony,	- -	130.
3. Bliſtered ſteel,	- - -	138.
4. Hard ſteel,	- - - -	147.
5. Iron,	- - - -	151.
6. Biſmuth,	- - - -	167.
7. Copper hammered,	- - -	204.
8. Copper eight parts, mixed with tin one,		218.
9. Caſt braſs,	- - - -	225.
10. Braſs fifteen parts, with tin one,	-	229.
11. Braſs wire,	- - - -	232.
12. Speculum metal,	- - -	232.
13. Spelter ſolder, viz. braſs two parts, zinc one,		247.
14. Fine pewter,	- - -	274.
15. Grain tin,	- - - -	298.
16. Soft ſolder, viz. lead two, tin one,		301.
17. Zinc eight parts, with tin one, a little hammered,		323.
18. Lead,	- - - -	344.
19. Zinc or ſpelter,	- - -	353.
20. Zinc hammered half an inch per foot,	-	373.

For a farther account of this inſtrument, with its uſe, ſee Phil. Tranſ. vol. xlviii. art. 79. p. 598, &c.

Mr. Ferguſon has conſtructed and deſcribed a *pyrometer* which makes the expanſion of metals by heat [illegible] the 45000th part of an inch. The [illegible] machine is repreſented by [illegible]. Its frame A B C [illegible] circle [illegible]

that if F expands, it will puſh E forward, and turn the index *c*.

The machine ſtands on four ſhort pillars, high enough from a table, to let a ſpirit lamp be put on the table under the bar F; and, when that is done, the heat of the flame of the lamp expands the bar, and turns the index.

There are bars of different metals, as ſilver, braſs, and iron; all of the ſame length as the bar F, for trying experiments on the different expanſion of different metals, by equal degrees of heat applied to them for equal lengths of time; which may be meaſured by a pendulum, that ſwings ſeconds. Thus,

Put on the braſs bar F, and ſet the index to the 360th degree: then put the lighted lamp under the bar, and count the number of ſeconds in which the index goes round the plate, from 360 to 360 again; and then blow out the lamp, and take away the bar.

This done, put on an iron bar F where the braſs one was before, and then ſet the index to the 360th degree again. Light the lamp, and put it under the iron bar, and let it remain juſt as many ſeconds as it did under the braſs one; and then blow [illegible] will ſee how many degrees the index [illegible] cle: and by that means you will know [illegible] the expanſion of iron is to the exp[illegible] which will be found to be as 210 is to [illegible]2. By this method, the relative exp[illegible] metals may be found.

The bars ought to be exac[illegible] and to have them ſo, they ſhould be [illegible] through a hole.

When the lamp is blown [illegible] the index turn backward; which ſh[illegible] it contracts as it cools.

The inſide of this *pyrometer* [illegible] follows.

In *fig.* 37. A *a* is the ſh[illegible] es between rollers; and, on the ſide [illegible] eth in an inch, which take into the [illegible] B (twelve in number) on whoſe axis is [illegible] hundred teeth, which take into the [illegible] inion D, on whoſe axis is the whe[illegible] ed teeth, which take into the ten lea[illegible], on the top of whoſe axis is the inde[illegible]

Now, as the wheels C an[illegible] red teeth each, and the pinions D and [illegible] each, it is plain, that if the wheel C [illegible], the pinion F and the index on its [illegible] hundred times round. But, as the fi[illegible] ly twelve leaves, and the bar A *a* that [illegible] teeth in an inch, which is twelve in[illegible] re; one inch motion of the bar wi[illegible] ion F to turn one hundred times roun[illegible] t of one hundred over and above, [illegible] ve. So that, if A *a* be puſhed one [illegible] ned one hundred and twenty-five time[illegible]

A ſilk thread *b* is tied to the [illegible] D, and wound ſeveral times round [illegible] end of the thread is tied to a piece o[illegible] ring G which is fixed into the ſtod[illegible] e bar *f* expands, and puſhes the bar [illegible] thread winds round the axle, and dr[illegible] and as the bar contracts, the ſpring [illegible] thread, and turns the work the cont[illegible] puſhes back the ſhort bar A *a* again[illegible] This ſpring always keeps the teeth [illegible] ntact with the leaves of the pi[illegible] ſhake in the teeth.

In [illegible] ſo [illegible] or [illegible] ſtands a [illegible] another frame that [illegible] the former by means of grooves, but with a very ſmall [illegible] degree of tightneſs; the friction of which

which may be increased by the preſſure of four ſcrews. The inner ſliding frame, which is likewiſe of deal, keeps the tube of the microſcope in a horizontal poſition, and in great part without the frame, inſomuch that the end which carries the lens is but little within the ſpace between the frame and the board. This microſcope is conſtructed in ſuch a manner as that the object obſerved may be at inch diſtant from the lens; and it has a wire which is ſituated in the focus of the glaſſes, in which the objects appear reverſed. At the top of the apparatus there is a piece of deal, an inch and a half thick, and two inches broad, laid in a horizontal direction from the board to the top of the frame. To this piece the rods of the different ſubſtances, whoſe expanſion by heat is to be meaſured, are ſuſpended; one end of it ſlides into a ſocket, which is cut in the thickneſs of the board, and the other end, which reſts upon the frame, meets there with a ſcrew, which makes the piece move backwards and forwards, to bring the objects to the focus of the microſcope. There is a cork very ſtrongly driven through a hole bored vertically through this piece; and in another vertical hole, made through the cork, the rods are fixed at the top; ſo that they hang only, and their dilatation is not counteracted by any preſſure. In order to heat the rods, a cylindrical bottle of thin glaſs, about twenty-one inches high, and four inches in diameter, is placed in the inſide of the machine, upon a ſtand independent of the reſt of the apparatus. In this bottle the rods are ſuſpended at a little leſs than an inch diſtance from one of the ſides, in order to have them near the microſcope. Into this bottle is poured water of different degrees of heat, which muſt be ſtirred about, by moving upwards and downwards, at one of the ſides of the bottle, a little piece of wood, faſtened horizontally at the end of a ſtick: in this water is hung a thermometer, the ball of which reaches to the middle of the height of the rods. During theſe operations the water riſes to the cork, which thus determines the length of the heated part; the bottle is covered, to prevent the water from cooling too rapidly at the ſurface; and a thin caſe of braſs prevents the vapour from fixing upon the piece of deal to which the rods are fixed. This *pyrometer* is repreſented in *fig.* 38. in which *a a* is the ſtand to which it is ſuſpended; *b* the hook from which it hangs; *c c c* the deal-board, which is the baſis of the whole apparatus; *d d d d* four arms to which is fixed the frame *e e e e*; the other frame which carries the microſcope is *f f f f*; *g g* are two croſs pieces, through which paſſes the tube of the microſcope, and which ſupport it near both ends; *h h* is the microſcope; *i* its micrometer; *k* the cork through which paſſes the glaſs rod *l l*, and by which it is kept ſuſpended; *m* a rod of metal, or of any other ſubſtance leſs dilatable than glaſs; *n* the point of union, obtained by means of two connected rings, in which both rods are faſtened by ſcrews: above theſe is another pair of rings, in one of which the metal rod is free, and which rod it ſupports; *o p* the piece to which the glaſs rod is ſuſpended; *q* a ſquare piece fixed to the frame by four ſcrews, behind which is a box, in which, as well as in a groove cut in the baſis in *p*, the piece *o p* ſlides; *r* a ſcrew, which paſſes through the ſquare piece *q*, whoſe uſe is to move backwards or forwards the piece *p* in order to bring the ſurface of the metal rod to the focus of the microſcope: *s s s s* four ſcrews, with round metal plates behind their heads, which ſerve to preſs the frame of the microſcope againſt the frame *e e e e*; the longitudinal openings, through which the ſcrews paſs, permit the free motion of the firſt frame, when one ſtrikes gently with a hammer to the bottom or the top of one of the ſides. If the microſcope is wanted higher or lower than the grooves permit, the ſcrews may be removed to other holes made on purpoſe in the ſide pieces of the frame *e e e e*: *t t t t* is the cylindrical bottle, in which hang the rods in order to be heated at different degrees by water of various temperatures; *u u* are the ſupporters of the bottle; *x* the thermometer ſuſpended in the water; *y y* a rod, to the lower end of which is fixed a ſmall plate, to ſtir the water by moving it up and down; *z z* a ſyphon, one branch of which is within, and the other without, the bottle, the latter being furniſhed with a cock, which ſerves to draw off the quantity of water that is neceſſary for changing the temperature in the bottle. For a farther account of this inſtrument, together with the principle of its conſtruction and uſe, both in the comparative meaſure of the expanſions of bodies by heat and the meaſure of their abſolute expanſion, and the experiments made with it, we muſt refer to an elaborate eſſay of M. De Luc on *Pyrometry*, &c. in the Phil. Tranſ. vol. lxviii. part i. art. 20. p. 319—546.

PYRONOMIA, a term uſed by the chemical writers to expreſs the art of regulating fire, ſo as to make it ſubſervient to all their proceſſes in a determinate degree.

PYROPHAGI. *See* FIRE-*eaters*.

PYROPHORUS, formed of *πυρ, fire*, and *φερω, I bear*, in *Chemiſtry*, the name uſually given to that ſubſtance called by ſome *black phoſphorus*; a chemical preparation poſſeſſing the ſingular property of kindling ſpontaneouſly when expoſed to the air.

This ſubſtance was accidentally diſcovered by M. Homberg, who prepared it of alum and human faeces. See PHOSPHORUS *fecalis*. See alſo M. Le Fevre's preparation, deſcribed under PHOSPHORUS *of ſulphur*.

It was apprehended for a conſiderable time after the diſcovery, that human faeces were eſſential to the operation, till the youngeſt ſon of the great Lemeri found, that honey, ſugar, flour, and, indeed, any animal or vegetable matter, might be ſubſtituted inſtead of the human faeces; and ſince that time, M. De Suvigny has ſhewn that moſt vitriolic ſalts may be ſubſtituted for the alum; having added to the aluminous *pyrophorus* of Homberg two other claſſes of ſubſtances of this kind, viz. the metallic, or thoſe made with the three vitriols of iron, copper, and zinc; and the neutral, or thoſe compoſed of vitriolated tartar and Glauber's ſalt.

The aluminous *pyrophorus* may be made in the following manner. Take four or five parts of alum, and one part of wheat flour, or any animal or vegetable ſubſtance; calcine theſe together to a brown or blackiſh maſs: powder the maſs, and put it into a phial; ſtop it looſely with paper, and ſet it in a ſand heat, ſo as to make it continue glowing hot for ſome time; after this, remove the whole from the fire, ſet it to cool gradually, and finally ſtop the bottle very cloſe down.

The following proceſs is recommended by Macquer for this preparation. Let three parts of alum and one part of ſugar be mixed together. This mixture muſt be dried in an iron ſhovel over a moderate fire, till it be almoſt reduced to a blackiſh powder of coal; during which operation it muſt be ſtirred with an iron ſpatula. Any large maſſes muſt be bruiſed into powder, and then it muſt be put into a glaſs matraſs, the mouth of which is rather ſtrait than wide, and its length ſeven or eight inches. This matraſs is to be placed in a crucible, or rather earthen veſſel, large enough to contain the belly of the matraſs, with about a ſpace equal to the thickneſs of a finger all round it. The ſpace is to be filled with ſand, ſo that the matraſs ſhall not touch the earthen veſſel: the apparatus is then to be put in a furnace, and the whole to be made red-hot: the fire muſt be gradually applied, that any oily or ſuliginous matter may be expelled. After which, when the matraſs is made red-hot, ſulphurous vapours exhale: this degree of heat is to be continued till a truly ſulphureous flame, which appears at the end of the operation, has continued nearly a quarter of an hour: the fire is then to be extinguiſhed, and the matraſs to cool without taking it out of the crucible; and when it ceaſes to be red-hot, it muſt be ſtopped with a cork. Before the matraſs is perfectly cold, it muſt be taken out of the crucible, and the powder it contains muſt be poured into a very dry glaſs phial, which muſt be well cloſed with a glaſs ſtopper. If we would preſerve this *pyrophorus* a long time, the bottle containing it muſt be opened as ſeldom as is poſſible. Sometimes it kindles while it is poured into the glaſs phial, but it may be then extinguiſhed by cloſing the phial expeditiouſly.

When half a dram of this *pyrophorus* is put on a piece of paper and expoſed to air, it quickly kindles, becomes red like burning coals, emits a ſtrongly ſulphurous vapour, and burns the paper or other combuſtible body which ſupports it.

The ſpontaneous aceenſion of the aluminous *pyrophorus*, on its being expoſed to the air, has been a ſubject of conſiderable diſcuſſion among chemiſts and philoſophers; the lateſt and ableſt of whom have adopted the hypotheſis propoſed by M. De Suvigny, in the Memoires de Mathematique et de Phyſique, tom. iii. To explain this curious appearance, M. De Savigny juſtly obſerves, that the vitriolic acid in the alum, during the calcination in the phial, leaves its earthy baſis, and unites with the phlogiſton in the coal. By its union with this inflammable matter, a part of it is undoubtedly rendered volatile, and exhales partly under the form of volatile vitriolic acid, and partly in that of a blue ſulphureous flame; while another part of it combines likewiſe with the phlogiſton forming a real ſulphur, or an earthy hepar ſulphuris; in which the ſulphur is protected from the fire by the earth with which it is combined, and the particles of which remain every where intermixed with thoſe of the powder. Thus far (ſays Mr. Kirwly, an excellent chemiſt and philoſopher) M. De Savigny is ſupported by the appearances, and by a juſt chemical analyſis of the powder: but he proceeds farther, and ſuppoſes that, at the end of the proceſs, a part of the vitriolic acid is left in a diſengaged, or uncombined

ſtate,

state, and highly concentrated. In this state it is well known that this acid attracts moisture, and at the same time generates a considerable degree of heat. When the *pyrophorus*, therefore, is exposed to the air, he again supposes that this disengaged and concentrated acid suddenly attracts the watery particles floating in the atmosphere, and, by the heat thus generated, sets fire to the sulphur and other inflammable matter contained in the powder. This hypothesis he has endeavoured to establish by the following observations: that the *pyrophorus*, as he apprehends, can be made only with substances fit for producing sulphur, or with sulphur itself:—that no *pyrophorus* will be produced, if the mixture be calcined by too long or too violent a fire; because then the whole vitriolic acid can be combined into perfect sulphur, and consequently is engaged, and not in a proper state to attract the moisture of the air; or else if it does not combine into sulphur, being half disengaged from its base, it is driven off by the violence or long continuance of the fire; and, consequently, after this complete calcination, no acid remains partly disengaged, as it ought to be, that it might unite with the water with sufficient activity:—that when the *pyrophorus* is very slowly moistened, as when it is kept in a bottle not well closed, it does not kindle, because sufficient heat is not produced by this slow and gradual attraction of water: it is also spoiled and rendered incapable of kindling, when exposed to the open air; because its acid becomes then saturated, or nearly saturated with moisture, and cannot, therefore, unite with that of the air with sufficient activity:—that a *pyrophorus*, thus spoiled by exposure to moisture, may be restored to its peculiar properties by making it again red-hot in a matrass; since by this calcination its partly-disengaged acid is again concentrated, and resumes all its force of combining with water:—and, lastly, that the inflammation of the *pyrophorus* is accelerated by placing it upon paper a little wetted, or by breathing upon it; because the acid thus attracts the moisture more hastily, and consequently with more heat.

M. De Suvigny extends the same reasoning to the several other *pyrophori* which he discovered, similar to that of alum; particularly to those which are made by substituting vitriolated tartar, Glauber's salt, and other vitriolic salts with metallic, earthy, or alkaline bases, in the room of alum. Mr. Bewly has lately examined this hypothesis with his usual acuteness and accuracy; and from numerous well-conducted experiments he is led to conclude, that *pyrophori* of all the above mentioned classes may be prepared, differing from them in no other particular, except that they contain no vitriolic acid, and which nevertheless kindle as readily, on being exposed to the air, as those which have been impregnated with that principle. In order to shew, that the presence of vitriolic acid is not necessary to constitute the *pyrophorus* made with vitriolated tartar, he added to a quantity of this tartar more than an equal weight of powdered charcoal, and calcined the mixture a long time, in a red heat, in an open crucible; frequently stirring the powder, in order to expel from it as much of the vitriolic acid as possible; the calcination was also sometimes repeated with fresh charcoal: and yet on heating the salt, thus deprived of a considerable part of its acid, with charcoal, in a crucible or tobacco-pipe, in the manner which we shall here subjoin, he observed no diminution in its quality of producing a *pyrophorus*.

Mr. Bewly, in several of his experiments, made use of the bowl of a tobacco-pipe, in which he combined the materials, which he wished to examine in small quantities, and in an expeditious manner; pressing them down slightly, so as to fill half or three-fourths of the bowl, and filling the remainder of it with fine sand. This is kept in a red heat twenty minutes or half an hour; or it may continue there two hours longer, if the operator please, without any injury to the *pyrophorus*. The pipe being taken out of the fire, the matter is knocked out of it as soon as it becomes cool, and generally, pretty soon afterwards, takes fire spontaneously. Thus he formed his *pyrophorus* with a mixture consisting of two parts of alum, previously calcined in a red heat; and of powdered charcoal and salt of tartar each one part.

In another experiment, having added successively quantities and increasing quantities of fixed alkali to the salt heated as above, till the vitriolic acid contained in the mixture might be considered nearly as an evanescent quantity, a *pyrophorus* was still produced on calcining it with charcoal as before. He also mixed equal parts of salt of tartar, and vegetable or animal coal, or sometimes three parts of the former with two of the latter, and calcined them in the usual manner: and this composition, on being exposed to the air, generally kindled in half a minute or a minute; though, as it contained no sulphur, it did not burn with so much vivacity as the vitriolic *pyrophori*. This, which Mr. Bewly calls the alkaline *pyrophorus*, differs in no circumstance from M. De Suvigny's neutral *pyrophori*, except in not containing that principle to which he ascribes their accension. However, lest it might be suspected that the salt of tartar which he employed might accidentally contain vitriolated tartar, or vitriolic acid, he repeated the experiment with tartar calcined by himself, as well as with nitre fixed or alkalified by deflagration with charcoal, and with iron filings; and in all these cases with the same result. By diversifying in a like manner M. De Suvigny's experiments on the metallic *pyrophori*, Mr. Bewly found that none of the three vitriols, heated with charcoal alone, in his usual method, could produce a *pyrophorus*. And thus he found that the addition of an alkaline salt to the composition, which was a part of M. De Suvigny's process, was essential to its success.

Treating in the usual manner equal parts of calcined green vitriol and charcoal, the powder, which contained no sulphur nor hepar sulphuris, did not acquire any of the properties of a *pyrophorus*. The vitriolic acid seemed to have been entirely dissipated; having no base to detain it, when dislodged from the metallic earth. The charcoal and calx of iron, left in this process, were calcined again, together with some salt of tartar; and a *pyrophorus* was produced, which exhibited indications of its containing a scarce perceptible portion of hepar sulphuris. Thirty grains of crocus martis aperitivus were calcined with fifteen grains of charcoal, and the same quantity of salt of tartar; and the mixture burnt spontaneously, though it contained no hepar sulphuris, or vitriolic acid. Having by these experiments evinced that metallic *pyrophori* may be prepared without vitriolic acid, Mr. Bewly proceeded to form an aluminous *pyrophorus* of the same kind. For this purpose, he procured the earth of alum by a long and violent calcination; and examining a part of it, he found, by the usual tests, that it neither contained any sulphur, hepar sulphuris, nor alum undecompounded. This he considered as perfectly pure, though he afterwards found that it contained a small quantity of vitriolated tartar; and yet it repeatedly furnished a *pyrophorus*, as often as when alum itself is employed. From these and similar experiments he infers, that the several kinds of *pyrophori* are not kindled by moisture, attracted by the vitriolic acid, as M. De Suvigny has maintained; and his conclusion is further confirmed by some experiments of Dr. Priestley, from which it appears, that they are kindled in dry nitrous and dephlogisticated air.

M. Proust, cited by Mr. Bewly, describes a variety of new *pyrophori*, which neither contain vitriolic acid, nor seem likely to owe their accension to the attraction of humidity from the air. These principally consist of a coaly matter simply divided by metallic or other earths; such are the sediment left on the filter in preparing Goulard's extract, various combinations of tartar or its acid, or the acetous acid, with metals, calcareous earth, &c.

Mr. Bewly, having evinced the insufficiency of M. De Suvigny's theory, and discovered that the *pyrophori* are not kindled by moisture, attracted (merely) by the vitriolic acid, directed his attention to the nitrous acid, which Dr. Priestley has shewn to be a constituent part of atmospherical air, as the probable agent in the production of this phenomenon. The strong affinity which this acid has with phlogiston, and the heat, and even flame, which it is known to produce with certain inflammable matters, manifested that it was equal to the effect; and having excluded the vitriolic acid from having any essential concern in this operation, he suggests, either that the *pyrophorus* is kindled by moisture attracted by some of the other ingredients which compose it; or that it has the power of decompounding atmospherical air, by suddenly attracting its nitrous acid, and thereby generating a heat sufficient to kindle the phlogistic matter contained in it. This idea appears plausible, when he further considered that Dr. Priestley produced the purest respirable air with this same acid combined with other principles; and that this air, as well as common air is diminished, and probably in part decompounded, in a variety of phlogistic processes. In this ingenious writer concludes, upon the whole, from the experiments he hath made, that the *pyrophorus* seems to owe its singular property to its being a combination of earth or alkali with phlogiston; the vitriolic acid, when present, only occasionally increasing or diminishing the effect, according to circumstances. In the process of calcination, the earth or alkaline principle is not merely mixed, but actually, though loosely, combined with the phlogistic principle of the coal; so that the *pyrophorus*, considering it in its most simple state, is only a [illegible]dey

dry phlogisticated alkali or earth. On these data, the phenomena may be explained in the two following methods; with respect particularly to the influence of moisture and heat upon the *pyrophorus*. Supposing either the alkaline or earthy principle to have a greater affinity to water than to the phlogiston with which either of them is united, they may, on being exposed to a moist atmosphere, attract the humidity, and thereby set the phlogistic principle at liberty; which may, in its turn, attract, and be ignited by, the supposed aerial acid, its strong affinity to which is well known:—or, if this hypothesis be rejected, the inflammable matter may be kindled, merely in consequence of the heat produced by the combination of the alkali, &c. with moisture. See on the subject of this article, Chemical Dict. article *Pyrophorus*; and Priestley's Obs. on Air, vol. iii. Appendix, p. 386, &c. vol. iv. Appendix, p. 479, &c.

PYROPHYLACIA, a term used by Kircher and some others to express those magazines of fire which are placed in the cavities of mountains and other hollows of the earth, and serve to supply the several volcanoes in the different parts of the world. See VOLCANO.

PYROSCOPIA, formed of πυρ, *fire*, and σκοπεω, *I consider*, among the Greeks, a kind of divination, being the same with PYROMANCY and ignispicium.

PYROSIS, a word used to express an intense heat and redness in the face, such as that of persons who travel in extremely hot weather, and the like.

PYROTECHNY, Πυροτεχνια, formed from πυρ, *fire*, and τεχνη, *art*, the art of fire, or a science which teaches the management and application of fire in several operations.

Pyrotechny is of two kinds, military and chemical.

PYROTECHNY, *military*, is the doctrine of artificial fireworks, and fire-arms, teaching the structure and use both of those used in war for the attacking of fortifications, &c. as gunpowder, cannons, bombs, granadoes, carcasses, mines, fuses, &c. and of those made for amusement-sake, as rockets, stars, serpents, &c.

Some call *pyrotechny* by the name *artillery*; though that word is usually confined to the instruments used in war. Others choose to call it *pyrobolary*, or rather *pyrobalistry*, q. d. the art of missile fires, from the Greek πυρ, *fire*, and βαλλω, *to cast*, or *throw*.

Wolfius has reduced *pyrotechnia* into a kind of MIXT mathematical art: indeed it will not allow of geometrical demonstrations; but he brings it to tolerable rules and reasons; whereas before it had used to be treated by authors at random, and without regard to any reasons at all.

See the elements of *military pyrotechny* under the several instruments and operations, CANNON, BOMB, ROCKET, GUNPOWDER, &c.

PYROTECHNY, *chemical*, is the art of managing and applying fire in distillations, calcinations, and other operations of chemistry.

Some reckon a third kind of *pyrotechnia*, viz. the art of fusing, refining, and preparing metals.

PYROTECHNICAL *sponge*. See SPUNGE.

PYROTICS, Πυροτικα, formed from πυρ, *fire*, in *Medicine*, caustics, or remedies either actually or potentially hot; and which, accordingly, will burn the flesh, and raise an eschar.

PYROUET. See PIROUETTE.

PYRRHALA, in *Ornithology*, the name of a bird well known in England by the name of the BULLFINCH, and called by some authors *rubicilla*.

PYRRHICHA, Πυρριχη, in *Antiquity*, a kind of exercise on horseback; or a feigned combat, for the exercise of the cavalry.

It was thus called from its inventor Pyrrhichus, or Pyrrhus, in Cydonia, who first taught the Cretans to march in measure and cadence to battle, and to observe the pace of the Pyrrhic foot. Others derive the name from Pyrrhus son of Achilles, who instituted this exercise at the obsequies of his father. Aristotle says, that it was Achilles himself who invented it.

The Romans also called it *ludus Trojanus*, the Trojan game; and Aulus Gellius, *decursus*. It is doubtless this exercise that we see represented on medals, by two cavaliers in front, running with lances, and the word *decursio* in the exergum.

PYRRHICHIUS, Πυρριχιος, in the Greek and Latin *Poetry*, a foot consisting of two syllables, both short; as *deus*.

Among the ancients this foot is also called *peribomus*; by others *hegemonus*.

PYRRHOCORNIX, in *Ornithology*, a name given by authors to a bird of the crow-kind, described by some authors as a distinct species; but Mr. Ray, and other very judicious naturalists, esteem it the same with the CORACIAS, or Cornish chough, or only differing in age or by other accidents.

PYRRHONIANS, PYRRHONEANS, or PYRRHONISTS, a sect of ancient philosophers, so called from their founder Pyrrho, a Greek philosopher, born at Elis in Peloponnesus, who was a disciple of Anaxarchus, and accompanied him as far as India. In this journey he followed Alexander the Great; and hence we may know in what time he flourished.

The distinguishing character of this philosopher was, that he professed to doubt of every thing, maintaining, that men only judge of truth and falsehood from appearances, which deceive. On this principle he kept himself in continual suspension of mind, never determining on any thing; to avoid the inconveniencies of error, and false judgments.

He found in all things (says Bayle) reasons to affirm and to deny; and therefore he suspended his assent after he had well examined the arguments *pro* and *con*, and reduced all his conclusions to a *non liquet*, let the matter be farther enquired into. Hence it is (says he) that he sought truth as long as he lived, but he so contrived the matter, as never to grant that he had found it. Though he is not the inventor of that method of philosophising, yet it goes by his name. The art of disputing about every thing, without doing any thing else but suspending one's judgment, is called *Pyrrhonism*, or SCEPTICISM.

Those now distinguished by the name of *Pyrrhonians*, or SCEPTICS, are persons who, from the great number of things that are dark and obscure, and from the aversion they bear to popular credulity, maintain, that there is nothing certain in the world.

The truth is, *Pyrrhonism* has some foundation in nature: we do not judge of things from their real essences, but from their relations to ourselves. Most of our ideas we receive by means of our senses; but our senses are not given us to judge of the essences, but of the relations of things to ourselves; i. e. how they may affect us so as to do us good or hurt.

Thus, e. gr. our eyes do not give us the real magnitudes of objects, but their relative ones only.

The ACADEMICS differed from the *Pyrrhonians*, in that they owned there were some things more like or more near akin to truth than others, which the *Pyrrhonians* peremptorily denied.

Le Clere observes, that the *Pyrrhonians*, in affirming that there is nothing certain, were the most assuming and decisive of all philosophers; since they must first have examined all things, to be able to determine precisely, that all things are uncertain.

It may be added, that the very principle of the *Pyrrhonians* destroys itself; for if there be nothing certain, then must that dogma itself be precarious; and if no one thing be more probable, or liker to truth than another, why shall the principle of the *Pyrrhonians* be believed preferably to the opposite one? hence itself is come at in the same way as our other knowledge.

PYROPŒCILOS, in the *Natural History of the Ancients*, the name by which they call the granite of Arabia, commonly known to this day under the name of the *oriental granite*.

The name is derived from the Greek πυρ, *fire*, or *fire-coloured*, and ποικιλος, *spotted*; and the ancients having used the epithet fiery to yellow, as well as red, some have imagined the granite must be a yellow stone; but it is evident that red is the colour meant by it here.

PYRSEPHORUS, Πυρσεφορος, in the Athenian festival, Hephæstia, the same with LAMPADEPHORUS.

PYRUS, *pear-tree*, in *Botany*, a genus of the *icosandria pentagynia* class. Its characters are, that the flower hath a permanent empalement of one leaf, which is concave, and divided into five parts at the top; it hath five roundish concave petals, which are inserted in the empalement, and about twenty awl-shaped ſtamina, shorter than the petals, inserted in the empalement, and terminated by single ſummits; the germen is situated under the flower, supporting three or four ſtyles, crowned by ſingle ſtigmas, and afterwards becomes a pyramidal fleshy fruit, indented at the top, but produced at the base, having five membranaceous cells, each containing one smooth oblong seed, pointed at the base. Miller.

Linnæus has joined to this genus the *malus* and cydonia of Tournefort. See APPLE, PEAR, and QUINCE.

PYTHAGORAS's *table*. See TABLE.

PYTHAGOREAN, or PYTHAGORIC *system*, among the *ancients*, was the same with the Copernican system among the moderns. See SYSTEM.

It was thus called, as having been maintained and cultivated by Pythagoras, and his followers; not that it was invented by him, for it was much older.

PYTHAGOREANS, a sect of ancient philosophers, who adhered to the doctrines of Pythagoras.

Pythagoras, the founder of this sect, was of Samos, the son of a lapidary, and a pupil of Pherecydes, and flou-

visited (says Bayle) about five hundred years before Christ, in the time of Tarquin, the last king of Rome, and not in Numa's time, as many authors have supposed. See Cicero Tuscul. Quest. lib. iv. cap. 1.

This sect was also called the *Italic sect*, or *Italic school*, because Pythagoras, after travelling into Egypt, Chaldea, and even into the Indies, to inform his understanding, returning home to his own country, and there unable to bear the tyranny of Polycrates, or Syloson, retired into the eastern part of Italy, then called the Greater Greece, and there taught and formed his sect.

He is held to have excelled in every part of science: Laertius says, among the Chaldees and Hebrews he learnt divination, and the interpreting of dreams; and that in Egypt he learnt all the mysteries of the priests, and the whole system of symbolical knowledge, with all their theology. Porphyry adds, that he learnt the mathematical sciences in his travels; geometry from the Egyptians, the doctrine of numbers and proportions from the Phœnicians, and astronomy from the Chaldeans; morality and theology he chiefly learnt from the magi.

He was the first who assumed the modest title *philosopher*, or *lover of wisdom*; those who excelled in the knowledge of nature, and made themselves conspicuous by an exemplary life, till his time having borne the arrogant appellation *sages*.

Iamblichus observes, that in Phœnicia he conversed with the prophets and philosophers, the successors of Mochus the Physiologist; which Mochus, Sellers, and some others, will have to be Moses.

His school in Italy was at Crotona, where he is said to have been attended by no less than six hundred scholars. His house was called the temple of Ceres, and the street where it stood, the Museum.

Out of this school proceeded the greatest philosophers and legislators, Zaleucus, Charondas, Archytas. Porphyry says, as soon as he arrived in Italy, he had an audience of two thousand people, to whom he explained the laws of nature, reason, and justice.

He endeavoured to assuage the passions of the mind with verses and numbers; and made a practice of composing his mind every morning by his harp, frequently singing the poems of Thales. Exercises of the body also made a considerable part of his discipline.

His school became so popular, that whole cities and people committed their republics to the government of his scholars. At length, Porphyry adds, envy stirring up sedition against them, they were expelled; and, in time, their learning, which they ever kept secret, was lost; except some difficult things learnt by rote by the ordeal of hearers; for Pythagoras never committed any thing to writing.

Beside his public school, Pythagoras had a college in his own house, which he called ἀνδρών, *andreum*: in this were two orders or classes of scholars, *exoterici*, *esoterici*, called *auscultantes*; and ἀκουσματικοὶ, *acusmatici*. The former were novices and probationers, who were kept under a long cautelen, and had even a quinquennial silence imposed, to teach them modesty and attention, according to Apuleius; or, according to Clemens Alexandrinus, to teach them to abstract their minds from sensible objects, and inure them to the pure contemplation of the Deity.

The latter were called *genuini*, *perfecti*, *mathematici*, and *Pythagorici*, by way of eminence. These alone were let into the arcana and depths of the real Pythagoric discipline.

Clemens observes, that these orders corresponded very exactly to those among the Hebrews: for in the schools of the prophets there were two classes, viz. the sons of the prophets, who were the scholars; and the doctors or masters, who were also called *perfecti*; and among the Levites, the novices or tyros, who had their quinquennial exercises, by way of preparation. Lastly, even among the proselytes there were two orders; *exoterici*, or proselytes of the gate; and *esoterici* or *perfecti*, proselytes of the covenant. He adds, it is highly probable, that Pythagoras himself had been a proselyte of the gate, if not of the covenant.

Gale endeavours to prove, that Pythagoras borrowed his philosophy from that of the Jews; to this end producing the authorities of many of the fathers, and ancient authors; and even pointing out the tracks and footsteps of Moses in several parts of Pythagoras's doctrine.

Pythagoras taught, that God is one; that he is a most simple, incorruptible, and invisible being; and therefore only to be worshipped with a pure mind, with the simplest rites, and those prescribed by himself. Laertius observes, that he made unity the principle of all things; hence arose duality, &c.

In his conversation with the Egyptians, he learnt abundance of secrets about numbers; to which he attributed so much, that he even attempted to explain all things in nature by numbers. In effect, it was a common opinion of the ancient philosophers, that the species of things have to each other the nature and relation of numbers; and that the universe, and all things therein, were produced according to certain numbers, inherent in the Creator's mind.

Hence Porphyry observes, the *Pythagoreans* studied the doctrine of numbers with great attention; since the incorporeal forms, and first principles of things, i. e. the divine ideas, could not be delivered in words, they had recourse to demonstration by numbers; and thus called the common reason and cause of unity, eternity, and equality, by the name *one*.

Pythagoras further taught, that there is a relation or kinship between the gods and man; and therefore that the gods take care of man. Which, Clemens Alexandrinus says, is apparently borrowed from the doctrine of Providence.

It is said, that Pythagoras, considering God as the mover of the universe, and the soul of the world, affirmed, that our souls are portions of God. Cicero De Nat. Deorum, lib. i. cap. 11.

Pythagoras also asserted a μετεμψυχωσις, or transmigration of souls; and therefore the immortality of the soul. He also taught, that virtue is harmony, health, and every good thing; and that God, and therefore all things, consist of harmony.

With respect to the end of our actions and studies, he taught, that the study of philosophy should tend to make men like God; and that the acquisition of truth was the only way to attain to the likeness of God; but that truth cannot be known, unless it be enquired after with a purified soul, and such as has overcome the passions of the body. And his followers are said to have taught, that men become perfect three ways. 1. By converting with the gods; for, during their commerce, they abstain from every evil action, and become, as far as possible, like the gods. 2. By doing good to others; for it is God's property; it is an imitation of God. 3. By going out of this life. The best presents which heaven gave to men, according to Pythagoras, are to speak truth, and to do good offices; those two things, said he, resemble the worship of God. See Bayle, art. *Pythagoras*.

PYTHAGORIC *theorem*, or *proposition*, is the 47th of the first book of Euclid. See PYTHAGORAS and PYTHOMENUSE.

PYTHAGORIC *intervals*. See TETRACTYS.

PYTHAGORIC *abacus*. See ABACUS and TABLE.

PYTHIA, or PYTHIAN, in *astrology*, the priestess of Apollo, by whom he delivered oracles. See DELPHOS.

She was thus called from the god himself, who was entitled *Apollo Pythius*, from his slaying the serpent Python; or, as others will have it, ἀπὸ τοῦ πύθεσθαι, because Apollo, the sun, is the cause of rottenness; or because the carcase of Python was left there to putrefy; or, according to others, from πυνθάνομαι, *I enquire*, because people went to hear and consult his oracles.

This priestess was to be a pure virgin. She sat on the covercle, or lid, of a brazen vessel, mounted on a tripod; before the ascended which, she used to wash her whole body, and especially her hair, in Castalio, a fountain at the foot of Parnassus, where the poets, men inspired by the same deity, used to wash and drink; and thence, after shaking the laurel-tree that grew by it, and sometimes eating the leaves, which were supposed to conduce to inspiration, and were succeeded by a violent enthusiasm, she delivered her oracles, or rather explained those of the god; i. e. she rehearsed a few ambiguous and obscure verses, which were taken for oracles.

Diodorus Siculus (lib. xvi.) informs us, that these priestesses were at first virgins, but that after one of them was deflowered by Echecrates, a Thessalian, choice was made of women above fifty years of age; that so they might either be secured from the attempts of lust, *or if* they should at any time be forced to the violation of their chastity, having passed the time of child-bearing, they might remain undiscovered, and not bring the oracles or religion into contempt: nevertheless they wore the habit of virgins, thereby to signify their purity and virginal modesty.

All the *Pythiæ* did not seem to have had the same talent at poetry, or to have memory enough to retain their lessons. Plutarch and Strabo make mention of poets, who were kept in pay, as interpreters of Jupiter, &c.

PYTHIA, or PYTHIAN *games*, were solemn games instituted in honour of Apollo, and in memory of his killing the serpent Python with his arrows.

The *Pythia* were celebrated in Macedonia, in a place called *Pythium*. They were next in fame after the Olympic games, but were more ancient than they; for it is pretended they were instituted immediately after the de-

feat of the ſerpent. The *Pythia* were alſo celebrated at Delphi; and they were theſe that were the moſt renowned.

The *Pythian* games, according to Pauſanias, were firſt inſtituted by Jaſon or Diomedes, king of Etolia, and reſtored by Eurylochus of Theſſaly, in the third year of the 48th Olympiad, or the year of the world 3361, and 584 years before the birth of Chriſt; from which time the Greeks reckoned ſometimes by *Pythiades*, as they had been accuſtomed to do by Olympiads. They were at firſt celebrated every eight years, but afterwards every four years, in the third year of each Olympiad; ſo that the *Pythiade*, which was a term of four years, ſerved as an epocha for the inhabitants of Delphi. At firſt they conſiſted of poetical and muſical conteſts, but in proceſs of time they conſiſted of the other exerciſes of the PANCRATIUM, which were performed in the Olympic games. The victors were crowned with branches of laurel; though, at the firſt inſtitution, the crown was of beech-leaves. The Romans are ſaid to have adopted theſe games in the year U. C. 642, and to have given them the name of APOLLINARES *ludi*.

A part of Pindar's poems was compoſed in praiſe of the victors in the *Pythian* games.

The critics are divided on the ſubject of the ſerpent Python. The poets ſay, that Juno made uſe of it to perſecute Latona, and prevent her bringing into the world Apollo and Diana, whom ſhe had conceived of Jupiter; and that it was for this reaſon that Apollo afterwards killed it.

Strabo ſays, it was no other than a famous villain, one Draco, that Apollo freed the world from. Dickinſon, in his Delphi Phœnicizantes, maintains the Python of the Greeks to be the Typhon of the Phœnicians; and the Typhon of the Phœnicians to be the Og of Scripture; and Apollo, who ſlew it, he will have to be Joſhua.

PYULCUM, a word uſed by the ancients to expreſs an inſtrument uſed in their times to draw out the pus from the bottom of deep ſinuſes, probably a ſort of canula.

PYXIS *nautica*, in *Navigation*, the ſeaman's COMPASS.

The word πυξὶς literally ſignifies a *box*.

PYXIS, among *Anatomiſts*, is alſo uſed for the cavity of the hip-bone. See ACETABULUM.

END OF THE THIRD VOLUME.

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